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COMPETITIVENESS REPORT 2015

INNOVATION AND POLAND'S PERFORMANCE IN 2007–2014

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Preface

Competitiveness is a broad concept that refers to sustainable economic growth, but also to the ability to improve the living standards of a society, strengthen a country's position on foreign markets, and increase its attractiveness to foreign direct investment. Competitiveness embraces a wide range of issues and defies easy determination when it comes to both its current level and its development over time. However, measuring competitiveness and constantly analyzing changes in the competitiveness of economies is important for both policy makers and societies. This book is an attempt to respond to this need by examining Poland's competitiveness from 2007 to 2014.

Now in its 30th edition, this book is part of a monographic series of comparative studies on the main development trends in the Polish economy undertaken by the World Economy Research Institute at the Warsaw School of Economics. The aim of the research discussed in this year's edition of the monograph is to assess changes in the competitiveness of the Polish economy in 2007–2014, meaning both during the global economic and financial crisis and in the post-crisis years. The focus of these analyses is the role of innovation and how it contributes to the development of Poland's competitive advantages. The competitive position and innovation capacity of the Polish economy are compared with those of other European Union member states, in particular those that, after undergoing socioeconomic transition in the 1990 s, became a part of the bloc as a result of its successive rounds of enlargement in 2004, 2007, and 2013. Some aspects of competitiveness are also analyzed in comparison with selected emerging markets.

Such a broad approach makes it possible to identify scenarios for the future development of Poland's competitive position and to formulate recommendations for economic policy makers.

This volume consists of three main parts divided into chapters and supplemented by tentative conclusions at the end of the book.

Part One (Chapters 1–5) offers a comparative analysis of Poland's economic development in 2007–2014, using a variety of economic and social indicators, such as GDP growth and per capita income and its convergence, in addition to income inequality and poverty. Subsequently, the competitive position of the Polish economy in external economic relations is analyzed, including the ability to sell products on international markets, as well as the country's attractiveness to foreign direct investment.

Part Two (Chapters 6–10) contains a detailed analysis of the determinants of Poland's competitiveness in 2007–2014 and identifies changes in the role of these determinants in the wake of the global economic and financial crisis and in the post-crisis period. The key factors affecting competitiveness taken into account in this analysis include economic policy, human resources, investment, the financial market, and total factor productivity.

As the global economy becomes increasingly based on knowledge, innovation plays a key role in building the competitive advantages of countries, regions and enterprises. Therefore this year's edition of the monograph focuses on various dimensions of innovation and its importance to the Polish economy. Innovation is essential for productivity growth, and it also shapes the competitive advantages of enterprises on international markets. The third part of the book (Chapters 11–17) focuses on new forms of innovation, such as public sector innovation, social innovation, open innovation, and eco-innovation, including their role in shaping Poland's competitive advantages from 2007 to 2014.

Each chapter ends with conclusions from the analyses conducted by the authors. The overall wrap-up in the last part of the book highlights interdependencies between innovation and competitiveness. In addition, some recommendations are offered on how Poland can become more competitive in the future. Overall, the book shows that policy makers should focus on stable long-term goals because only such an approach can make it possible to build a more competitive economy based on innovation and human resources.

This volume is not limited to analyzing current trends. It also offers some solid theoretical background. The authors hope their research findings will stimulate a debate on various theoretical issues underlying competitiveness and on how Poland can successfully embrace the most advanced form of competitiveness: sustainable competitiveness.

Marzenna Anna Weresa

Part I

Poland's Competitiveness in 2007–2014

Chapter 1

Comparative Economic Performance in 2004–2014: Poland and the European Union

Zbigniew Matkowski, Ryszard Rapacki, Mariusz Próchniak

This chapter aims to assess changes in the competitiveness of the Polish economy from 2004 to 2014 with a special focus on changes in Poland's competitive position during the global economic crisis. The comparative analysis covers key indicators of economic development, such as GDP growth, inflation, unemployment, public finances, and the current-account balance, which taken together constitute the so-called "magic pentagon of competitiveness."

The international context: economic growth trends in the world economy

Before embarking on a comparative analysis of Poland's economic performance in 2004–2014, we will first outline its global context, sketching a picture of the prevailing medium-term patterns of economic growth that occurred in the world economy during this period.

As can be seen from the preliminary data shown in Table 1.1, the global Gross Domestic Product grew 2.6% in 2014, which implies stabilization compared with 2012 and 2013. In the medium-term perspective, this growth dynamic is, on the one hand, above the trend line for 2007–2011, which includes the effects of the deepest global recession since World War II (–2.4% in 2009). On the other hand, it remains well below global economic growth in the pre-crisis years (2004-2007).

As in 2011–2013, and similar to the prevailing trends from 2004 to 2010, the continuing recovery of the global economy was mostly due to fast economic growth in developing economies; their GDP growth rate was 4.3%. The most remarkable growth indices were recorded in Southeastern Asia (5.9%), especially China (7.3%). Unlike in the past, however, the macroeconomic performance of the world economy was not supported by rapid growth in Africa and Latin America.

Table 1.1. World economic growth in 2004–2014 (rates of growth in %)

Year	2004–2007 (annual averages)	2007–2011 (annual averages)	2012	2013	2014[a]
World	3.9	1.9[b]	2.4	2.5	2.6
Developed countries	2.7	0.6	1.1	1.2	1.6
Eurozone	2.4	0.5	–0.8	–0.5	0.8
USA	2.8	0.6	2.3	2.2	2.3
Japan	2.3	0.0	1.5	1.5	0.4
Transition countries	7.8	3.4	3.3	2	0.8
Russia	7.6	2.9	3.4	1.3	0.5
Developing countries, of which: least developed countries	7.2 7.7	6.1 6.3	4.8 5.0	4.8 5.3	4.3 5.3
Africa	5.9	4.1	5.6	3.5	3.5
Southeastern Asia	8.4	7.8	5.6	5.9	5.9
China	11.3	10.5	7.7	7.7	7.3
India	9.1	7.8	4.7	5	5.4
Latin America	5.4	3.8	2.7	2.6	1.3

[a] Preliminary data. [b] 2008–2011.
The economic growth rates of country groups are calculated as a weighted average of individual country GDP growth rates, where weights are based on GDP in 2005 prices and exchange rates.

Source: United Nations (2009), *World Economic Situation and Prospects 2009*, New York; United Nations (2015), *World Economic Situation and Prospects 2015*, New York.

Meanwhile, global economic growth was adversely affected by relatively slow growth in developed economies (compared with both 2012 and 2013 and 2004–2007), including in particular the eurozone (0.6%). This trend was compounded by a mounting fiscal crisis in the eurozone and the disappointing growth performance of some of its member countries.

Size of the economy

We begin our analysis of the performance of the Polish economy in 2014 and of its international competitive position with a brief assessment of Poland's economic potential and its place in the world economy as well as in the enlarged European Union.

The basic measure of the size of economy is the value of gross domestic product (GDP) produced in a country in a given year. In spite of all its shortcomings, this is still the most comprehensive measure of economic activity, widely used in macroeconomic analyses. For the needs of inter-country comparisons, the values of GDP expressed

in domestic currencies are converted into a single international currency (e.g. US$ or EUR), using current exchange rates (CER) or purchasing power parities (PPP) as conversion factors. Purchasing power parity is believed to better represent the value of output produced in a country with the consideration of different price levels in the domestic markets for goods and services. It is also less susceptible to fluctuations in current exchange rates. For these reasons it is more widely used in broad international comparisons. On the other hand, many economists argue that the conversion factors used in calculating GDP at PPP are often imprecise and tend to overestimate the value of GDP for less developed countries against the value of GDP in more developed ones. The same reservation applies to the values of per capita GDP. In our assessments of total and per capita GDP, we apply both alternative conversion systems: CER and PPP, so as to provide readers with a more comprehensive comparison.

Table 1.2, based on the latest IMF data, shows the ranking of the world's largest economies in 2014 according to the value of GDP measured in U.S. dollars at current exchange rates (CER) and at purchasing power parities (PPP).[1] GDP data for 2014 given in the table are preliminary estimates that may be subject to further revisions.

The ranking is arranged according to the value of GDP calculated at CER. The alternative ranks of the countries concerned based on GDP values at PPP are given in parentheses. The full list of the 30 biggest economies arranged in terms of the value of GDP at PPP would also include Thailand, Egypt, Pakistan, Malaysia, Philippines, and South Africa, while excluding the United Arab Emirates, Belgium, Switzerland, Sweden, Austria, and Norway.

The estimated values of GDP at PPP for the developing countries are as a rule much higher than the alternative estimates of GDP at CER, while the relationship between the two estimates for the developed countries is usually the opposite. The difference between the two estimates is mainly due to the difference in price levels: GDP calculated at PPP reflects the value of output produced in a given country expressed in dollars at prices that exist in the United States.

[1] Purchasing power parity (PPP) is a conversion factor that shows how many currency units of a given country would be needed to buy the same basket of goods and services that could be purchased for US$1 in the United States. The value of GDP at PPP is expressed in calculative units called "international dollars" that represent the purchasing power of US$1 in the US market. The estimated PPP value of GDP of a given country corresponds to its value calculated at U.S. prices.

Table 1.2. The world's largest economies in 2014 (GDP in US $ billion)

Rank	Country	GDP at CER		GDP at PPP	
		billions of US $	% of world's total	billions of US $	% of world's total
1(2)	United States	17,416	22.4	17,416	16.3
2(1)	China	10,335	13.3	17,632	16.5
3(4)	Japan	4,770	6.1	4,788	4.5
4(5)	Germany	3,820	4.9	3,621	3.4
5(8)	France	2,902	3.7	2,587	2.4
6(10)	United Kingdom	2,848	3.7	2,435	2.3
7(7)	Brazil	2,244	2.9	3,073	2.9
8(12)	Italy	2,129	2.7	2,066	1.9
9(6)	Russia	2,057	2.7	5,559	3.3
10(3)	India	2,048	2.6	7,277	6.8
11(15)	Canada	1,794	2.3	1,579	1.5
12(19)	Australia	1,483	1.9	1,100	1.0
13(13)	South Korea	1,449	1.9	1,790	1.7
14(16)	Spain	1,400	1.8	1,534	1.4
15(11)	Mexico	1,296	1.7	2,144	2.0
16(27)	Netherlands	880	1.1	798	0.7
17(9)	Indonesia	856	1.1	2,554	2.4
18(17)	Turkey	813	1.0	1,512	1.4
19(14)	Saudi Arabia	778	1.0	1,652	1.5
20(35)	Switzerland	679	0.9	445	0.4
21(20)	Nigeria	594	0.8	1,058	1.0
22(38)	Sweden	559	0.7	434	0.4
23(24)	**Poland**	**552**	**0.7**	**941**	**0.9**
24(25)	Argentina	536	0.7	927	0.9
25(34)	Belgium	528	0.7	467	0.4
26(43)	Norway	512	0.7	340	0.3
27(21)	Taiwan	505	0.7	1,022	1.0
28(39)	Austria	436	0.6	387	0.4
29(31)	United Arab Emirates	416	0.5	605	0.6
30(18)	Iran	403	0.5	1,284	1.1
	World	77,609	100.0	106,999	100.0

Note: All GDP data for 2014 are preliminary IMF estimates. The positions given in the first column refer to GDP calculated at CER and GDP calculated at PPP (the latter in parenthesis).

Source: IMF, World Economic Outlook Database (www.imf.org), Jan. 30, 2015.

According to these data, Poland ranked 23rd or 24th, depending on the conversion rate, among the world's largest economies in 2014. Compared with the previous year, Poland's position did not change in terms of the GDP value measured at CER, but it deteriorated (by two positions) in terms of GDP value calculated at PPP because of more rapid growth in some developing economies (such as Thailand and Egypt). The share of Poland in global GDP did not change compared with the previous year: it was 0.7% at CER and 0.9% at PPP.

Such minor changes of a country's position on this list from one year to another are not so important. These changes may be caused by short-run cyclical fluctuations in output as well as changing inflation and exchange rates, in addition to some revisions in the GDP data and conversion factors. More important are long-term trends, which show whether the position of a given country in the world economy tends to improve or deteriorate over a longer period, or whether it remains constant.

Poland's position in the global economy has changed during the last 10 years. In 2004, Poland ranked 25th among the world's largest economies as regards the size of its GDP measured at CER, and 23rd in terms of GDP measured at PPP. If we compare these figures with the results in 2014, we can see that Poland's position in the global ranking has improved in terms of the CER GDP value (by two positions), but it has remained about the same or deteriorated slightly (by one position) in terms of the PPP GDP value. Poland's share in the global output measured at PPP has not changed, but its share measured at CER has increased significantly. In terms of the GDP value taken at CER, Poland has outdistanced highly developed countries such as Belgium, Norway, and Austria, but in the global PPP GDP ranking it has been outpaced by Egypt. Taking into consideration the unusually rapid growth of many emerging and developing economies, this is not a bad result, testifying to the good growth performance of the Polish economy in a highly competitive international environment.

Of note are some major changes that have occurred in the structure of the world's economy during the last several years as a result of rapid economic growth in developing countries in Asia and Latin America. In terms of the GDP value measured at PPP, China has outdistanced Japan and Germany, and – if the newest IMF estimates are accurate – it has already become the largest economy in the world, leaving the United States behind.[2] India and Brazil have advanced to third and seventh place respectively. More than half of the world's 30 biggest economies, according to the PPP GDP value, are now developing countries or so-called emerging economies. The three largest emerging economies in Asia – China, India, and Indonesia – now produce 23% of

[2] It will be interesting to see whether China's lead over the United States in terms of PPP GDP, suggested by the IMF estimates, will be confirmed by the World Bank's alternative PPP GNI estimates for 2014, which are yet to be released.

total global output measured at PPP, and the three largest economies of Latin America contribute a further 6%, making up a total share of almost 30%. The growing role of the emerging countries in Asia and Latin America in the world economy is reflected not only by their increased share in world output, but also by the increasing role they play in international trade and finance. The global financial and economic crisis has not stopped the rapid growth in the developing countries of the Far East, which have become the most dynamic part of the global economy.

Let us now focus on the share of the European Union (EU28) in the world economy. According to preliminary IMF estimates, the combined GDP of EU member countries in 2014 was $18,399 billion at CER or $18,124 billion at PPP, which represented 23.7% and 16.9% of global output respectively. For benchmarking purposes, the GDP of the United States that same year was $17,416 billion, representing 22.4% of total global output measured at CER or 16.3% if measured at PPP. The share of China was 13.3% or 16.5%, respectively.

Although the EU28 is now the largest integrated economic entity in the world, larger than any single economy, it may soon lose its lead to China or the United States (or both) because these two countries (particularly China) are now growing much faster than the EU.

Table 1.3 provides data on the size of EU economies. It includes preliminary data on the value of total GDP in individual EU member countries in 2014, calculated in euros at current exchange rates (CER) and at the purchasing power standard (PPS).[3]The GDP data for 2014 are preliminary estimates that will be subject to further revisions.[4]

As in the case of GDP estimates at PPP expressed in U.S. dollars, the GDP values at PPS expressed in euros depend on the purchasing power of international currency (in this case, the euro) in a particular country, i.e. on the relative price level (against the average price level in the EU). For all the CEE countries, the GDP values at PPS are much higher than those calculated at CER. For Poland, the difference in 2014 was 75%, for the Czech Republic it was 53%, and for Bulgaria 122%. The difference between the two alternative valuations of the GDP – at CER and at PPP vs. PPS – is usually the

[3] The purchasing power standard (PPS) for EU member states, calculated by Eurostat, the EU's statistics office, is based on the average price level in the EU28. The value of GDP at PPS is measured in calculative units (called PPS), which express the purchasing power of the euro in the given country.

[4] The preliminary (forecasting) estimates of the GDP values for EU countries in 2014 were taken from the *Statistical Annex* to *European Economic Forecast*, published by the European Commission in October 2014 (European Commission, 2014a). A newer economic forecast published by the European Commission in February 2015 (European Commission, 2015) does not include data on GDP values. The same remark applies to the per capita GDP data used in Figure 1 in the next paragraph. As of Feb. 10, 2015, when we completed this text, Eurostat had not published its estimates of the GDP values for EU member states for the previous year. Despite the great progress in information technology, national income accounts, the basic macroeconomic statistics, still provide us with what is evidently historical data.

bigger, the less developed the country concerned is, though this is not a strict rule since the difference is related to the relative price level, which may not be proportional to the development level. It cannot be ruled out that the PPP or PPS values of GDP for the CEE countries given by the World Bank, the IMF, and Eurostat are overestimated. In any case, the conversion rates (parities) used in estimating GDP at PPP or PPS are favorable for most CEE countries. This reservation should be kept in mind when interpreting the comparative positions of CEE economies in the EU in terms of total GDP and in assessing the gap between Central Eastern Europe and Western Europe in terms of per capita GDP. This is why we include both CER and PPP or PPS estimates of GDP in our comparisons.

The European Union now comprises 28 member states of very different sizes and different economic potential. The five biggest countries in terms of population and production volume – Germany, France, the United Kingdom, Italy, and Spain – represent 63% of the EU28's total population and 71% of its combined GDP if calculated at CER or 68% if calculated at PPS. The 15 Western European countries that belonged to the EU before its major enlargement (EU15) represent 79% of the total population and produce 91% of the combined GDP calculated at CER, or 86% of the combined GDP calculated at PPS. The 13 new member states that joined the EU in 2004, 2007 or later – 11 CEE countries plus Cyprus and Malta – represent 21% of the total population, but produce 9% or 14% of the total GDP respectively. This asymmetry between the EU "old core" and the new entrants (or, more broadly, between Western Europe and Central and Eastern Europe) should be borne in mind when evaluating the position of Poland in the European Union.

Poland is the largest country among the new EU member states in terms of area, population and GDP. Poland ranks sixth in the enlarged European Union in terms of area and population (7.1% and 7.6% respectively). In terms of GDP value calculated at PPS, it also ranks sixth (5.1%), but it is eighth (2.9%) if GDP is converted using CER. As we can see, Poland's share in the EU28's economic potential is much lower than suggested by the size of its territory or population, but, in light of historical experience, this should come as no surprise; a similar disproportion is in evidence for all other CEE countries.

Poland has significantly improved its position in the European economy since it joined the EU. Its share in the combined output of all the current EU member countries (EU28), calculated at CER, rose from 1.9% in 2004 to 2.4% in 2007, 2.8% in 2010, and 2.9% in 2014. Likewise, Poland's share in the EU28's total output calculated at PPS rose from 3.6% in 2004 to 4.1% in 2007, 4.7% in 2010, and 5.1% in 2014. Compared with the previous year, Poland's position in this ranking did not change in 2014.

Table 1.3. GDP of EU member countries in 2014 (€ billion)

Rank	Country	GDP at CER		GDP at PPS	
		billions of €	%	billions of €	%
1(1)	Germany	2,900.0	20.8	2,772.0	19.9
2(2)	United Kingdom	2,232.0	16.0	1,940.0	13.9
3(3)	France	2,134.0	15.3	1,916.0	13.8
4(4)	Italy	1,620.0	11.6	1,620.0	11.6
5(5)	Spain	1,059.0	7.6	1,187.0	8.5
6(7)	Netherlands	648.7	4.7	599.3	4.3
7(9)	Sweden	430.7	3.1	337.4	2.4
8(6)	**Poland**	**410.3**	**2.9**	**716.8**	**5.1**
9(8)	Belgium	401.9	2.9	359.4	2.6
10(10)	Austria	329.6	2.4	296.4	2.1
11(15)	Denmark	258.7	1.9	188.1	1.4
12(18)	Finland	203.2	1.5	164.6	1.2
13(17)	Ireland	183.7	1.3	169.4	1.2
14(13)	Greece	180.8	1.3	217.8	1.6
15(14)	Portugal	174.7	1.3	215.7	1.5
16(12)	Czech Republic	154.7	1.1	236.9	1.7
17(11)	Romania	151.6	1.1	293.4	2.1
18(16)	Hungary	101.6	0.7	183.1	1.3
19(19)	Slovakia	75.3	0.5	112.8	0.8
20(24)	Luxembourg	47.5	0.3	38.6	0.3
21(21)	Croatia	43.2	0.3	67.8	0.5
22(20)	Bulgaria	41.4	0.3	92.0	0.7
23(23)	Slovenia	37.0	0.3	46.7	0.3
24(22)	Lithuania	36.2	0.3	59.6	0.4
25(25)	Latvia	24.2	0.2	36.2	0.3
26(26)	Estonia	19.4	0.1	26.3	0.2
27(27)	Cyprus	17.3	0.1	20.8	0.1
28(28)	Malta	7.8	0.1	10.4	0.1
	EU28	13,924.5	100.0	13,924.5	100.0

Note: All GDP data for 2014 are preliminary European Commission estimates. The positions given in the first column refer to GDP calculated at CER and PPS (the latter in parenthesis). The percentage shares in the EU28 total were calculated by the author.

Source: European Commission (2014a).

Economic growth and real convergence

During the last 25 years, the Polish economy has experienced a fast real convergence vis-à-vis both EU countries and all transition economies. The improvement in Poland's relative development level was primarily due to its economic growth – the fastest among the new EU members from Central and Eastern Europe (EU11), and more than twice as fast as the average for the "old core" (EU15). Poland and these two groups of countries had similar economic growth trajectories from 2004 to 2014, after Poland's EU entry. Table 1.4 provides a statistical picture of the trend.

Table 1.4. Growth of Gross Domestic Product (GDP), 1990–2014

Country	Real GDP growth rate					Real GDP index in 2014		
	Average annual % growth	Annual % growth						
	1990–2014	2004	2012	2013	2014[a]	1989 = 100	2000 = 100	2004 = 100
Poland	**3.0**	**5.1**	**1.8**	**1.7**	**3.5**	**211**	**164**	**146**
Czech Rep.	1.4	4.9	–0.8	–0.7	2.5	141	143	125
Slovakia	2.3	5.2	1.6	1.4	2.4	177	173	145
Hungary	1.1	4.8	–1.5	1.5	3.6	133	126	107
Slovenia	1.4	4.4	–2.6	–1	2.7	141	128	111
Estonia	1.6	6.5	4.7	1.6	1.5	148	162	126
Lithuania	0.7	7.4	3.8	3.3	3.1	120	179	133
Latvia	0.5	8.9	4.8	4.2	2.5	112	169	126
Bulgaria	0.5	6.6	0.5	1.1	1.7	114	156	127
Romania	0.9	8.4	0.6	3.4	2.9	124	164	129
Croatia	0.0	4.1	–2.2	–0.9	–0.6	99	122	102
EU15	1.5	2.3[b]	–0.6[b]	–0.1[b]	1.2[b]	146	116	108

[a] The data for 2014 refer to the first three quarters and are calculated as the arithmetic averages of the quarterly GDP growth rates (compared with the corresponding quarter of the previous year).
[b] Weighted average calculated by the authors where PPP GDP estimates (based on IMF data) for a given year are treated as weights. The unweighted averages are 3.1 in 2004, – 1.1 in 2012, – 0.3 in 2013, and 1.3 in 2014.
The annual GDP growth rates are calculated based on Eurostat data. The cumulative GDP growth indices are calculated based on IMF data (for the EU15 – weighted average with PPP GDP estimates for a given year as weights). Growth indices 1989 = 100 are also based on EBRD estimates that go back to 1989.

Source: Eurostat (ec.europa.eu/eurostat); EBRD (www.ebrd.com); IMF, *World Economic Outlook Database*, October 2014; own calculations.

Poland's GDP grew by 46% in the studied period, or around 4% per annum on average. Poland's economic growth was the fastest among the new EU members from Central and Eastern Europe (EU11). At the same time, it exceeded by sixfold the EU15's

GDP growth rate. As a result (see Tables 1.5 and 1.6), Poland managed to considerably narrow its gap in economic development with all the current EU members. At the same time, Poland's income gap narrowed with regard to nine of 11CEE economies in the EU11 group. In this case, changes in the relative development level of the Polish economy resulted not only from its fast growth but also from diverging demographic trends and different appreciation paths for real exchange rates in individual CEE countries.

Table 1.5. Relative development levels in Poland and selected EU countries, 1989–2014 (GDP per capita at PPP, Poland = 100)

Country	1989	2000	2004	2006	2008	2010	2012	2013	2014[a]
Poland	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Germany	279	243	237	230	211	192	186	182	179
France	268	238	224	216	193	174	162	160	155
Italy	274	243	220	212	193	168	153	148	142
Britain	256	248	255	246	207	174	162	163	162
Spain	199	200	204	206	185	158	142	140	137
Ireland	195	271	292	292	240	208	197	194	197
Portugal	159	167	157	160	144	131	115	118	115
Greece	178	174	194	186	169	140	112	109	106
EU15 average	**262**	**238**	**232**	**226**	**202**	**178**	**166**	**163**	**159**
Czech Republic	197	145	161	162	149	131	124	122	121
Hungary	146	112	127	124	115	105	98	99	99
Slovakia	155	102	116	126	129	118	112	112	111
Slovenia	194	164	176	172	162	134	124	122	122
Estonia	142	93	112	128	124	102	108	109	107
Lithuania	145	81	102	112	115	97	105	109	109
Latvia	137	76	98	110	109	85	91	96	95
Bulgaria	122	60	69	74	78	69	68	67	66
Romania	89	55	69	76	87	81	80	82	82
Croatia	133	102	116	116	116	95	92	91	87

[a] Own estimates calculated using GDP growth rates for the first three quarters of 2014 (for the EU15 group – weighted average calculated by the authors) and2013 data for relative development levels.

Source: IMF, *World Economic Outlook Database,* September 2005 (for 1989); Eurostat (ec.europa.eu/eurostat) (for 2000–2014); own calculations.

As seen in Table 1.5, at the time of the EU's enlargement in 2004, the level of economic development (or GDP per capita in PPP) in the EU15 was more than twice as high as in Poland on average (132%). Since it joined the EU in 2004, Poland has narrowed its gap with the "old" EU countries in terms of development level by 63 percentage

points, a rate of roughly 6 p.p. a year. The process of real income convergence was the fastest with respect to Ireland (95 p.p.), the UK (93 p.p.) and Greece (88 p.p.). Under the most optimistic scenario, Poland is likely to close its development gap with Greece, or fully catch up with it, either this year or next at the latest.

As far as the new EU CEE member countries are concerned, Poland was the most successful in real convergence – in terms of the level of economic development – with regard to the region's wealthiest countries. It narrowed its gap with Slovenia by 54 p.p. and with the Czech Republic by 40 p.p. In terms of GDP per capita, Poland outpaced Hungary for the first time since World War II. However, a process of real income divergence was at work as well: Poland's development gap vis-à-vis Lithuania increased, while some other CEE economies, notably Romania, narrowed their income gap with Poland.

Table 1.6. Development gap in new EU member countries vis-à-vis the EU15 average, 1989–2013 (GDP per capita in PPP, EU15 = 100)

Country	1989	2004	2012	2013	2014[a]
Poland	**38**	**43**	**60**	**61**	**63**
Czech Republic	75	69	75	75	76
Slovakia	59	50	68	69	70
Slovenia	74	76	75	75	76
Hungary	56	54	59	61	62
Estonia	54	48	65	67	67
Lithuania	55	44	63	67	68
Latvia	52	42	55	59	59
Bulgaria	47	30	41	41	41
Romania	**34**	**30**	**49**	**50**	**51**
Croatia	51	50	56	56	55

[a] Own estimates calculated using GDP growth rates for the first three quarters of 2014 (for the EU15 group – weighted average calculated by the authors) and2013 data for relative development levels.

Source: IMF, *World Economic Outlook Database,* September 2005 (for 1989); Eurostat (ec.europa.eu/eurostat) (for 2004–2014); own calculations.

As seen in Table 1.6, in 2014 Poland's GDP per capita in PPP terms stood at 63% of the EU15 average. This was equivalent to a gain of 25 percentage points from 1989 to 2014, of which 20 points were gained since Poland's EU entry in May 2004.[5] These

[5] Diverging demographic trends provide another explanation of the catching-up process in Poland with the target development level in the EU. While the Polish population increased only slightly between 1989 and 2013 (to 38.533 million from 38.173 million, or 0.9%), EU15 countries experienced more sizeable demographic growth. Their overall population increased by 8.3%, from 369 million to nearly 400 million. These demographic trends are reflected in larger GDP growth rate differentials in per capita terms. While the rate for Poland was 2.9% annually, the EU15 average for GDP per capita growth was 1.3% per annum.

trends can be attributed to a remarkable acceleration in Poland's real convergence process after EU accession. From 1990 to 2003, the gain was 0.5 p.p. per year on average; in 2004–2014 it quadrupled to 2 p.p. annually.

Poland's growth and real convergence performance looks quite good compared with other EU members from Central and Eastern Europe, particularly in the long term and considering the systemic transformation process so far. From 1990 to2014, Poland was the undisputed leader in catching up with the EU15 in terms of economic development. However, that changed in 2004. In the period following the EU's enlargement, the real convergence process was the fastest in Lithuania and Romania, which narrowed their respective income gaps vis-à-vis the EU15 by 24 and 21 percentage points respectively. Further down the list were Poland, Slovakia, and Estonia, with 20 p.p., 20 p.p. and 19 p.p. respectively. For the remaining EU11 countries the gap either decreased insignificantly or remained unchanged (in the case of Hungary).

Socioeconomic development and standard of living

The basic measure of socioeconomic development and standard of living is national income or product per inhabitant. Figure 1 shows the value of per capita GDP measured at PPS in EU member countries in 2004 and 2014.[6] The figure enables us to compare the value of GDP per capita and to evaluate the growth of real income in individual countries in the period after the EU's major enlargement. The GDP per capita data for 2014 are preliminary estimates. It should be noted that both the total and per capita GDP data for CEE countries calculated at PPS are much higher than the corresponding values calculated at CER. As already pointed out, the GDP data for CEE countries calculated at PPS are imprecise and may be overestimated.

According to our calculations based on preliminary data by the European Commission (2014a), the average per capita GDP in the enlarged EU (EU28), calculated at PPS, was € 27,300 in 2014. In the current euro area (EU19) it was € 29,000, and in the "old" EU countries (EU15) it was € 29,700.

The income levels recorded in individual EU countries vary greatly. Luxembourg leads the EU with a GDP per capita at PPS of € 69,200 in 2014.[7] A high per capita GDP (about € 30,000 or more) is also recorded in the Netherlands, Belgium, Denmark,

6 To simplify the information, the per capita GDP data originally expressed in PPS are labeled here € (standardized euro). The same applies to the total GDP data shown in Table 1.3.

7 The unusually high value of GDP per capita in Luxembourg is largely due to high incomes generated and earned by international banks, financial institutions, and headquarters of big international corporations located in the country. This does not adequately reflect the average living standard of inhabitants compared with other Western European countries.

Sweden, Austria, Germany, Ireland, and the United Kingdom. France, Italy, and Spain have lower per capita GDPs, ranging from €25,000 to €29,000. The less advanced Western European countries, Greece, Portugal, Cyprus, and Malta, exhibit much lower per capita incomes (between €20,000 and €24,000). In CEE countries, per capita GDP ranges from €13,000 in Bulgaria to €22,500 in the Czech Republic and Slovenia.

Against this background, Poland's position in the per capita GDP rankings in the EU is unimpressive. With a per capita GDP at PPS of €18,600 in 2014, Poland is in the lower part of the list in the enlarged EU. Only five other EU member countries, Hungary, Latvia, Croatia, Romania, and Bulgaria, have lower income per inhabitant.

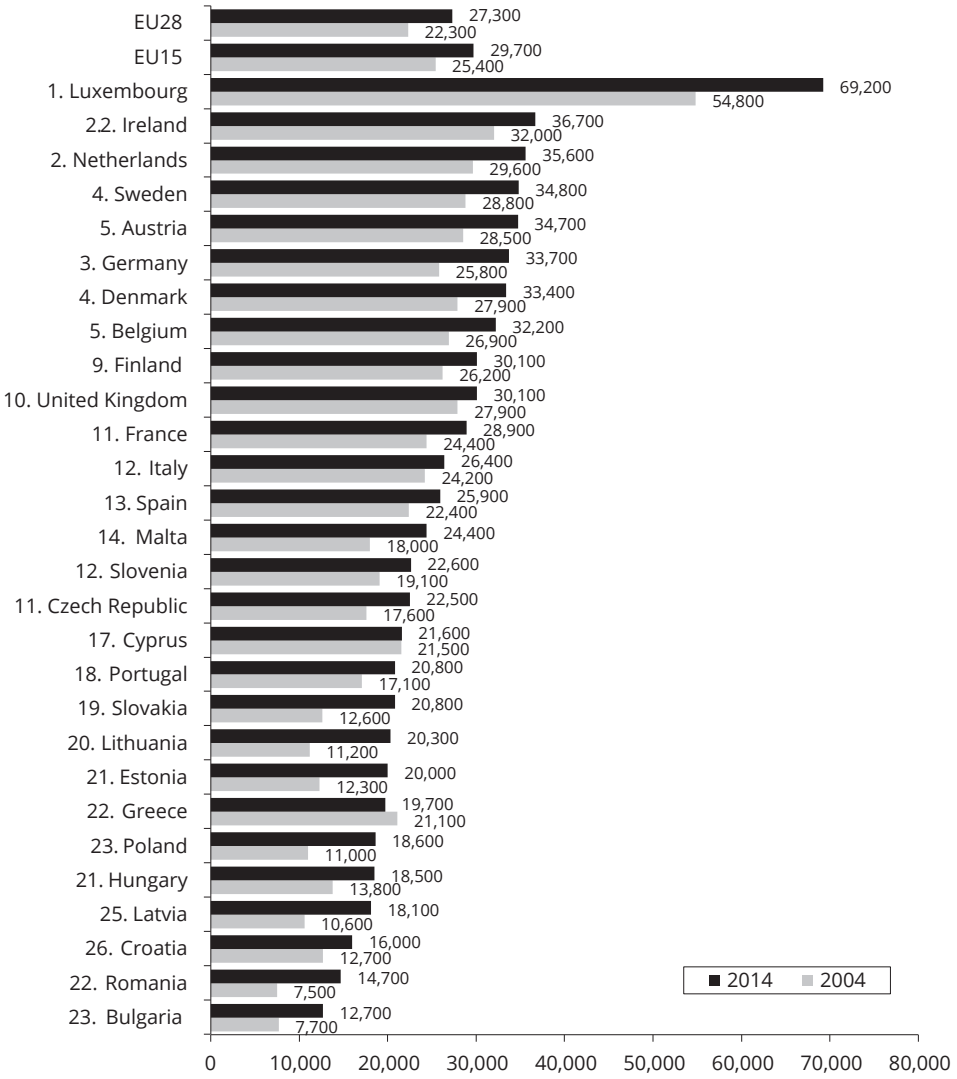
In the last few years, this ranking has undergone substantial changes due to different responses of individual economies to the global financial crunch and the eurozone crisis. As a result, Poland has outdistanced Hungary and Latvia, and narrowed its income gap with Estonia and Lithuania, but the distance to Slovakia, the Czech Republic, and Slovenia remains substantial.

Comparing the GDP per capita data for 2004 and 2014, shown in Figure 1, we can see that since joining the EU, Poland has made significant progress in reducing its income gap with more advanced countries in Western Europe. During the last 10 years, Poland's per capita GDP measured at PPS has increased by almost 70%, while the EU15's per capita GDP at PPS has risen by 17%, implying remarkable progress in real convergence (see the previous section for details).

Of course, GDP per capita is a crude and tentative measure of the standard of living in a country. The living standards of inhabitants are also highly dependent on income distribution and possessed wealth. Unfortunately, international statistics do not offer much data on the financial and real assets of households. Information on income inequality, particularly poverty, is also incomplete and often outdated. The latest estimates of poverty rates made by the World Bank, using the international poverty line of $2 per day, show that the incidence of absolute poverty in all EU countries is small (below 2%). However, in most CEE countries, a considerable part of the population lives below the income and consumption level recognized as a poverty line using national standards. According to a recent OECD report on income distribution and poverty (OECD, 2013), based on 2010 data, the relative poverty rate in Poland (the percentage of the population living at less than half of the national median income) was about 11%, an indicator roughly equal to the OECD average, but almost twice as high as in the Czech Republic and Denmark.[8]

[8] Another OECD study has found some empirical proof for the hypothesis that high income inequality negatively affects economic growth – by undermining educational opportunities for children from poor families, lowering social mobility, and hampering skill development. See Cingano (2014).

Figure 1.1. EU28 member countries by GDP per capita in PPS (€)



Note: The ranking is based on preliminary PPS GDP estimates for 2014. Reference data for 2004 illustrating the change observed in the period after EU enlargement. GDP per capita calculated by dividing total GDP by the total population at the beginning of the year.

Source: The figure is based on European Commission (2014a) data.

A conventional gauge of income inequality is the Gini coefficient, which measures the overall concentration of household income. Poland is among EU countries with relatively high income inequalities. The Gini coefficient of disposable income for Poland, at 30.7 in 2013, was slightly higher than the EU28 average. Among the

new EU member states, more egalitarian patterns of income distribution are reported by the Czech Republic, Slovakia, Slovenia, and Hungary. Among Western European countries, more equality can be seen in Austria, Belgium, Denmark, the Netherlands, Sweden, Finland, and Germany, countries that strongly promote the welfare state idea. In a positive trend, the Gini coefficient in Poland has decreased gradually since 2005.

Another indicator of income inequality is the income gap between the poorest and the richest people in a country. According to Eurostat data, the ratio of income earned by the wealthiest 20% and the poorest 20% of families in Poland in 2013 was almost 5:1, roughly equal to the EU average. But in most EU countries this ratio was lower, and a significantly larger gap between the rich and the poor was only noted in Italy, Spain, Portugal, and Greece, as well as in Romania, Bulgaria, and Latvia. In the quintile distribution of household incomes observed in Poland, the wealthiest 20% of families accrued more than 40% of total household income, and the richest 10% gained almost 30% of total disposable income.[9]

A concise measure of the social development and living standard is the Human Development Index (HDI), compiled by UNDP. It is the geometric mean of three component indices reflecting GNI per capita, life expectancy at birth and education level, which are assumed to represent three basic dimensions of human development: a long and healthy life, thorough knowledge, and a decent standard of living. The index values range from 0 to 1; higher values imply a higher development level.

According to the latest *Human Development Report* (UNDP, 2014), based on 2013 data, Slovenia (ranked 25th) was the best performer among CEE countries, followed by the Czech Republic, Estonia, Lithuania, Poland, Slovakia, Hungary, Latvia, Croatia, Romania, and Bulgaria (58th). Poland, with an HDI of 0.834, is close to the CEE average, but behind most other EU28 countries and ahead of only Portugal, Slovakia, Hungary, Croatia, Latvia, Romania, and Bulgaria. Poland is currently No. 35 in the global league table, together with Lithuania.

Poland's HDI has increased consistently, which testifies to the sustainability of the country's socioeconomic development. Since 2008, Poland has advanced in the HDI classification by three places – with most progress made in the last three years – and Poland's HDI has increased significantly. However, Poland's position in the worldwide HDI rankings is still remote and close to that of developing countries such as Qatar, Brunei, and Bahrain. Nor does Poland rank high in the HDI league in terms of the three components of the index: income, health, and education.

[9] More information on income inequality and poverty in Poland and other EU countries can be found in part 1.3 of this chapter.

The same source gives estimates of the so-called inequality-adjusted HDI (IHDI). This index aims to capture the living standard and development level of the average person in society, which is less than the aggregate HDI when there is inequality in the distribution of income, education, and health. Poland's IHDI is lower than the value of the original HDI, but this does not significantly change the country's position in the global HDI rankings.[10]

Certainly, the very concept of the HDI and the computation method used in compiling it are disputable. The index does not cover all the dimensions of social development. For example, it does not consider such human values as freedom, democracy, justice, and social cohesion. The component indices used to reflect material wealth, health condition, and education also exhibit some deficiencies. The resulting scores of individual countries are sometimes controversial. If the index were used to indicate countries that are best to live in and to identify those that should be avoided, its indications could sometimes be misleading. Nevertheless, the HDI is still the most popular general indicator of living standards, widely used in international comparisons.

The Economist Intelligence Unit (EIU) recently started compiling a composite index of social well-being, called the Quality of Life Index (QLI). The index is calculated on the basis of quantitative and qualitative data that represent various factors affecting the quality of life and various dimensions of social well-being, such as: (1) material wealth, (2) health, (3) political stability and security, (4) family life, (5) community links, (6) climate and geography, (7) job opportunities, (8) political freedom, (9) governance, and (10) gender equality. The newest, 2015 QLI ranking (EIU, 2015) covers 86 countries, including 11 CEE countries that belong to the EU. The top positions in the QLI ranking are occupied by highly developed countries: Switzerland, Germany, Sweden, the United States, Finland, and Denmark. As for the CEE countries included in the classification, the highest ranks were posted by Estonia, Slovenia, and the Czech Republic, while the lowest ones went to Hungary, Romania, and Bulgaria. Poland was ranked 38th, roughly in the middle of both the entire group and the CEE subgroup.

Another well-being index, called "Better Life Index" (BLI), is compiled by the OECD. The index has a similar subject structure; it is based on a large set of quantitative and qualitative data. It employs an advanced computation methodology and allows the user to calculate his own aggregate index for each country, using his own weights attributed to the various dimensions of social well-being, but the data and results are only available for 36 member and candidate states of the OECD, including only a few CEE countries. The composite index takes values ranging from 0 to 10 (higher values

[10] In terms of the IHDI, Poland ranked 29th among 145 countries in the latest global standings, which is roughly equivalent to its 35th position on the overall HDI ranking list covering 187 countries.

mean a better performance). According to the newest BLI ranking (OECD, 2015), Poland, with an unweighted BLI value of about 5.5, is close to the OECD average. Among several dimensions of social well-being captured by the BLI, Poland has high marks in areas such as personal security, education and social bonds, but low marks for material living conditions, health, and life satisfaction.

One important aspect of social wealth is the availability of jobs and employment opportunities. This factor directly influences income and wealth, as well as the extent to which education and knowledge can be transformed into higher living standards. High unemployment is in sharp conflict with people's sense of well-being and wealth. Yet high unemployment has become one of the main economic problems in Europe and elsewhere. The problem has become more acute in the last several years due to the global crisis and turbulence in the eurozone. Unemployment levels in most EU countries remain high even though recession has phased out. This is because a large part of the jobless are affected by long-term structural unemployment and short-term frictional unemployment (both are unrelated to the current level of business activity), and because changes in employment and unemployment lag behind changes in output and are usually of less impact.

In 2014, the average unemployment rate in the EU28, as recorded in labor force surveys, was 10.2%, according to preliminary estimates (European Commission, 2015). In Western Europe, the highest unemployment was seen in Greece (26.6%), Spain (24.3%), Portugal (14.2%), and Cyprus (15.9%). Among CEE countries, Croatia (17.0%), Slovakia (13.4%), and Bulgaria (11.7%) were the most affected.[11] Poland, with an unemployment rate of 9.1% reported in labor market surveys, was slightly below the EU average, but the registered unemployment was much higher: 12.3% yearly on average (GUS, 2015a). A special problem is high unemployment among young people. On average in the EU, unemployment among young people is two or three times higher than among adults. In Poland, the unemployment rate among those under 25 was more than 24% in 2014 (Eurostat, 2015).

Comparative assessment of macroeconomic performance

Our general assessment of the current condition of the Polish economy will be based on an analysis of five macroeconomic indicators commonly used in comparative

[11] All the figures are the average unemployment rates recorded in the harmonized labor force surveys (LFS). Registered unemployment was usually higher.

assessments of macroeconomic performance: (a) the rate of economic growth, (b) unemployment rate, (c) inflation rate, (d) general government balance, and (e) current-account balance. The key tool used in this analysis is called the pentagon of macroeconomic performance.[12] It illustrates the extent to which individual countries meet five macroeconomic goals: (a) economic growth, (b) full employment, (c) internal equilibrium (no inflation), (d) public finance equilibrium, and (e) external payments equilibrium. The extent to which these goals have been achieved in a given year is expressed by the five variables marked on the pentagon axes.

Table 1.7. Key macroeconomic indicators in Poland and selected other EU countries in 2014

Country	GDP growth	Inflation	Unemployment	General government balance	Current-account balance
	%	%	%	% of GDP	% of GDP
Czech Republic	2.3	0.4	6.1	–1.3	–1.0
France	0.4	0.6	10.4	–4.3	–1.8
Germany	1.5	0.8	5.0	0.4	7.7
Hungary	3.3	0.0	7.7	–2.6	4.1
Italy	–0.5	0.2	12.8	–3.0	1.8
Poland	**3.3**	**0.1**	**9.1**	**–3.6**	**–0.9**
Slovakia	2.4	–0.1	13.4	–3.0	1.1
Spain	1.4	–0.2	24.3	–5.6	–0.1
Sweden	1.8	0.2	7.8	–2.2	5.9

Note: All the data are preliminary estimates. Data on unemployment are the harmonized unemployment rates based on labor market survey data (yearly average).

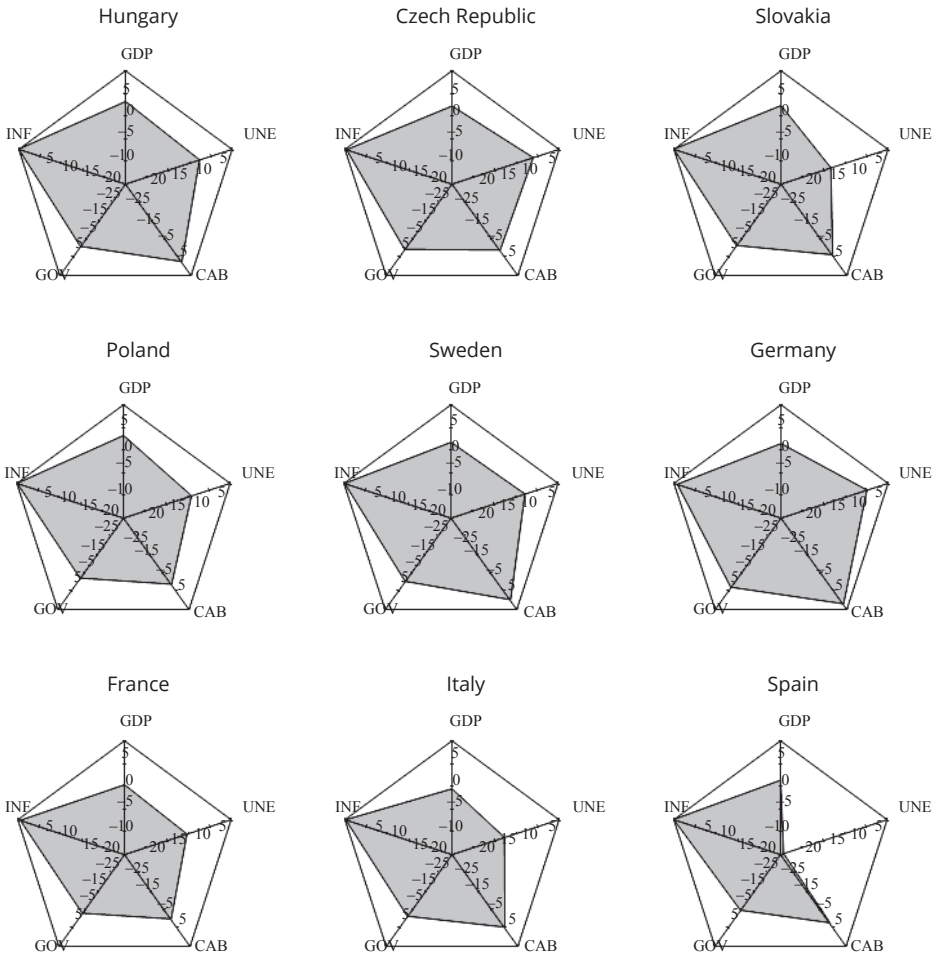
Source: European Commission (2015). The data on GDP growth and CPI inflation for Poland are in line with the latest estimates by Poland's Central Statistical Office (GUS, 2015a, 2015b).

The tips of the pentagon, representing maximum or minimum values of the indicators, are considered to be desirable (positive) targets, although in some cases this can be disputable. For example, a high current-account surplus or a budget surplus, as well as zero inflation or zero unemployment, may not be an optimal result. Another problem is interrelations (notably conflicts) between various macroeconomic goals. For example, low unemployment (according to the Phillips curve) is often accompanied by high inflation, and vice versa. A separate question is the relative significance

[12] This method was also used in the comparative analysis of Poland's macroeconomic performance in earlier reports by this publisher. This is also where the merits and limitations of this kind of analysis are discussed in greater detail, along with a list of references (cf. Weresa, ed., 2013, pp. 27–33).

of each criterion (e.g. whether low inflation is as important as low unemployment). All these reservations should be taken into account when interpreting such charts.

Figure 1.2. Macroeconomic performance in Poland and selected other EU countries in 2014



GDP – GDP growth rate (%)
UNE – unemployment (%)
INF – CPI inflation (%)
GOV – general government balance (% of GDP)
CAB – current-account balance (% of GDP)

Source: Own elaboration based on the data shown in Table 1.7.

When comparing the pentagons drawn for a given year among individual countries or when comparing them over time for any single country, we should consider

both their surface and shape. A larger surface of the pentagon is assumed to mean better economic performance, while a more harmonious shape indicates more balanced growth. Of course, such an assessment is confined to the five aforementioned parameters of current macroeconomic performance. It tells nothing about the size of a given economy, its economic potential, or its development prospects. It does not even tell much about its possible performance in the next year, though an economy in good condition increases the chances of good future performance. Nevertheless, any analysis based on this method should be conducted with caution.

Let us now compare the overall performance of the Polish economy in 2014 with the situation seen in three other CEE countries: Hungary, the Czech Republic, and Slovakia, and in five Western European economies: Germany, France, Italy, Spain, and Sweden. The choice of the countries included in this comparison is not accidental. Among the CEE countries, Hungary, the Czech Republic, and Slovakia are the most similar to Poland in terms of development level, structure of the economy, advancement of the process of market reforms, and the progress of integration with the European Union. In Western Europe, Germany, France, and Italy are Poland's main trade partners and major sources of FDI inflows. Italy and Spain are similar to Poland in the size and structure of the economy, and face a number of similar macroeconomic problems, including a sizeable budget deficit, large public debt, and high unemployment. Sweden has been included in this comparison because of the similar value of its total GDP at CER and its good economic performance in the last few years, despite (or thanks to) its refusal to participate in the Economic and Monetary Union (EMU).

Table 1.7 includes data on the five macroeconomic indicators reflecting the performance of the analyzed economies in 2014. These are the most recent estimates, released by European Commission on Feb. 5, 2015 as part of its winter economic forecast (European Commission, 2015). Most of the data are preliminary estimates that may be subject to further corrections and revisions. In the case of Poland, these data are in line with preliminary data published by the Central Statistical Office (GUS) and the National Bank of Poland (NBP). Whatever minor differences exist do not significantly affect our general assessment. Figure 2 presents the data in the form of pentagons, more convenient for a comparative analysis.

We begin our analysis with an inter-country comparison of the five macroeconomic indicators in light of the overall economic situation in the EU28. Next, we will compare the general performance of the economies in 2014 from the point of view of the competitive position of the Polish economy, taking into account changes from the previous year.

The year 2014 was the fifth year of moderate growth in the world economy after the global economic crisis of 2008–2009. After a slowdown in 2012–2013 triggered

by the financial crisis in the euro area, economic growth in the eurozone and in the EU as a whole remained unimpressive. According to preliminary estimates, total real GDP growth in the euro area was a mere 0.8% in 2014, and the combined EU28 GDP grew by 1.3% (compared with 3.3% growth in global GDP). The weak output growth in Europe was mainly due to economic stagnation in France and Italy, and relatively slow output growth in Germany and Spain, which could not be outweighed by more distinct growth in the United Kingdom, Ireland, Sweden, and most CEE countries. In the analyzed group, CEE countries posted the best growth performance: Poland (3.3%), Hungary (3.3%), Slovakia (2.4%), and the Czech Republic (2.3%). Among the five Western European countries considered here, Sweden and Germany noted modest growth (1.8% and 1.5% respectively), Spain overcame a prolonged recession and reported some growth (1.4%) for the first time, but France saw virtually no rise in output, and Italy again noted a drop.

Despite some acceleration in output growth in Europe, last year brought a further decline in inflation in most countries. In 2014, average consumer price inflation in the EU28 decreased to 0.6%. In most EU countries inflation was cut to less than 1%, and some economies faced the danger of deflation. In the analyzed group, the highest inflation in 2014 was paradoxically noted in Germany and France (0.8% and 0.6% respectively), followed by the Czech Republic (0.4%), while inflation in the remaining countries was almost zero. During the last few years inflation in Europe has subsided as a result of both slackening demand and restrained fiscal and monetary policies. But now governments and central banks must be alert because deflation may soon become an additional drag on economic growth.

Contrary to the Phillips curve, unemployment in Europe did not rise with the fall in inflation. As mentioned in the previous section, unemployment continues to run at relatively high levels in most EU countries because output is not yet rising vigorously and unemployment is mainly of the long-term structural and short-term frictional type, which is unlikely to respond significantly to a small acceleration of output growth. As a matter of fact, the average unemployment rate in the EU has shown an upward trend since the beginning of the global crisis.

In 2014, the average unemployment rate in the EU28 decreased slightly due to some acceleration in output growth, but it has remained quite high, at over 10%. A small decrease in unemployment was also seen within the analyzed group. The unemployment rate continued to be relatively low in Germany (5%), the Czech Republic (6%), Hungary, and Sweden (both 8%). In Poland and France, the jobless rates (9% and 10% respectively) were roughly comparable to the EU28 average. In Italy and Slovakia, unemployment was much higher (at about 13%), and in Spain it continued at an unusually high level (almost 25%). It should be recalled that the figures quoted here

refer to unemployment data recorded in labor market surveys; these are usually lower than the registered unemployment rates.

The last few years have seen some improvement in the state of public finance in the European Union, as reflected by a reduction in the average size of the general government deficit in the EU28 from 6.5% of GDP in 2010 to 3.0% of GDP in 2014. This is the result of deliberate policies pursued by the governments of most EU countries and strongly supported by the European Commission, aimed at fiscal consolidation (even at the expense of slower output growth). Nevertheless, the road toward meeting the budget deficit limit imposed by the Maastricht Treaty (3% of GDP) is still quite long for several EU member countries, including some EMU members. In the analyzed group, Germany was the only country with a full equilibrium between government expenditure and revenue in 2014, and the Czech Republic was close to the same result. All the remaining countries reported budget deficits ranging from 2% to 2.5% of GDP in Sweden and Hungary, to 3% in Italy and Slovakia, 3.5% in Poland, 4.5% in France, and 5.5% in Spain. In Poland, the budget deficit calculated according to EU standards stood at 3.6% of GDP, a figure significantly lower than in the preceding year. However, this improvement was partly a temporary consequence of a change in the pension system last year.

Continued budget deficits lead to a rise in public debt, both in absolute terms and relative to the GDP value. By the end of 2014, the total gross public debt in the EU28 had risen to €12,300 billion, or almost 90% of the total GDP produced that year, according to preliminary data (European Commission, 2014a). In the analyzed group, the public debt-to-GDP ratio at the end of 2014 ranged from 41% in Sweden to 44% in the Czech Republic, 49% in Poland, 54% in Slovakia, 75% in Germany and Hungary, 95% in France, almost 100% in Spain, and over 130% in Italy (European Commission, 2015). In most countries, public debt is growing in absolute terms due to continuous budget deficits and rising interest payments.[13]

The current-account balances in the individual countries are not directly comparable because they depend on a variety of factors that determine the volume of exports and imports, terms of trade, current international payments, private income transfers, and short-term capital flows. The current-account deficits or surpluses reported by individual countries are to a large extent structural in nature. At the same time, cyclical changes in the current-account balance do not follow a regular pattern and are difficult to forecast. In 2014, acceleration in economic growth had a limited impact on the relative size of the current-account balances of the countries in the analyzed group. A slight worsening in the current-account balance was only recorded in Slo-

[13] The decrease in Poland's public debt from 56% of GDP in 2013 to 49% of GDP in 2014 was mainly due to a new arrangement in public finance statistics following a change in the public pension system.

vakia and Spain. Despite the better output growth, Poland and the Czech Republic reduced their current-account deficits, while Germany and Hungary increased their surpluses. According to preliminary balance-of-payments data, Poland and the Czech Republic both reduced their current-account deficits to 1% of GDP, a level lower than that in France. Spain roughly equalized its current-account balance. The remaining countries in the group recorded surpluses, ranging from 1% of GDP in Slovakia to 2% in Italy, 4% in Hungary, 6% in Sweden, and almost 8% in Germany.

In analyzing the changes in the five indicators of macroeconomic performance compared with the previous year, we can conclude that 2014 brought some acceleration in economic growth in Europe after an acute euro-area crisis, but the results are not very conspicuous. Nevertheless, almost all the countries in the analyzed group, except France and Italy, noted a remarkable rise in economic activity and some improvement in their GDP growth rates. Faster output growth was accompanied by decreased unemployment, but the unemployment rates remained relatively high in most countries in the group. Despite the bigger output growth, inflation fell to almost zero in all the countries in the group, and some countries faced a serious danger of deflation. Most countries in the sample also further reduced their budget deficits (in relation to GDP), though the relative size of the French and Spanish budget deficits remained well above the desired limit (3% of GDP). So far more rapid output growth has produced no tangible worsening in the current-account balances of the countries; some have even noted an improvement.

Let us now turn to a general assessment of Poland's current economic performance in terms of the five macroeconomic indicators, compared with other economies in the analyzed group.

Both the surface and the shape of the pentagon reflecting the overall condition of the Polish economy in 2014 are similar to those shown by Hungary and the Czech Republic. This means that among these indicators, the overall performance of these economies was more or less comparable. All three countries noted a considerable rise in output last year: Poland and Hungary recorded a reasonably high growth rate, and the Czech Republic got out of a small recession. Inflation was practically cut to zero in all three countries. Unemployment was also reduced, but it remains relatively high in Poland and Hungary, while becoming lower in the Czech Republic. Poland's budget deficit was higher than Hungary's and much higher than the Czech Republic's. Poland and the Czech Republic continued to report some deficits on their external current accounts, while Hungary succeeded in raising its surplus. Compared with Slovakia, the Polish economy had better growth performance and much lower unemployment, but Slovakia had a better result (surplus) in its current-account balance and a slightly lower budget deficit.

The shape of the pentagon for Poland is also similar to the shapes for Germany and Sweden, but its surface is smaller. This indicates that using these five criteria, the results achieved by the Polish economy in 2014 were generally poorer than in the previous year. GDP growth in Poland was much faster than in Germany and Sweden, and the inflation rate was lower than in Germany, but in all other respects Germany and Sweden had better scores. Unemployment in Sweden and Germany is considerably lower. Both countries have a sizeable current-account surplus and both have achieved much better results in bringing their budgets into equilibrium.

The shape of the pentagon for Poland is also similar to that drawn for France, but its surface is larger. This suggests that the overall current performance of the Polish economy in 2014 was better under these five macroeconomic terms. The main handicap of the French economy, compared with Poland, has been a complete stagnation in output since 2012, coupled with high unemployment. As regards the three remaining indicators of economic performance, the results noted by both economies were comparable in 2014.

Poland continued to perform much better economically than Spain, which finally overcame an uninterrupted recession of nearly five years. However, Spain is still plagued by huge unemployment, a large budget deficit, and a substantial public debt. Much the same can be said about the general macroeconomic performance in Poland and Italy, although Italy was still mired in a prolonged recession, and it also struggled with high unemployment and a giant public debt.

Compared with the preceding year, the overall performance of the Polish economy improved considerably in 2014, but the improvement was not radical. GDP growth was twice as fast as in the previous year, inflation fell to zero, the budget deficit and public debt – expressed as a percentage of GDP – were reduced, and the current-account deficit decreased. However, the situation in the labor market did not improve markedly, and unemployment remains high. It is not clear whether the relatively good macroeconomic results last year will be repeated and reinforced this year.

Overall, Poland did relatively well in 2014 in terms of the five basic macroeconomic performance indicators, especially in the context of Europe's economic woes. The assessment of the general condition of the Polish economy offered by the OECD in its recent *Economic Survey of Poland 2014* (OECD, 2014c) is highly positive. According to the OECD, Poland's overall economic performance has been impressive over the past decade, and the country's relatively rapid economic growth has made it possible to considerably shorten the distance to the EU average in terms of the standard of living. Nevertheless, Poland's recent achievements should not obscure the existence of several unresolved economic and social problems as well as some serious threats to future development.

The Polish economy in 2014 and the outlook for the years ahead

Poland was the only EU member country that managed to avoid recession during the global economic and financial crisis of 2008–2009. Even though this was mainly the result of an improved foreign trade balance (a deeper fall in imports than in exports), the very fact that the Polish economy was able to avoid a decrease in real GDP during the crisis was an unquestionable success, testifying to its noteworthy resilience to external shocks as well as good general condition. After two years of relatively fast GDP growth (3.7% in 2010 and 4.8% in 2011), the next two years were marked by a considerable deceleration, to 1.8% in 2012 and 1.7% in 2013. The Polish economic slowdown was a direct outcome of the stagnation or even drop in output in Western Europe. It also stemmed from the global economic crisis and the debt crisis in the euro area. In 2014, Poland's real GDP grew by 3.3%, according to preliminary GUS data (GUS, 2015b), confirmed by the European Commission (2015). The question is whether this accelerated growth noted last year will prove to be a permanent trend in terms of the outlook for the Polish economy.

Table 1.8. Contribution of final demand components to changes in real GDP in Poland, 2013–2014 (%)

Output and demand	2013				2014			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
GDP[a]	0.5	0.7	2.3	3.0	3.4	3.5	3.3	3.1
Domestic demand	–0.8	–1.7	1.0	1.8	3.4	5.4	4.9	4.6
Consumption	0.0	0.5	1.4	1.7	2.0	2.5	2.7	2.3
private	0.0	0.2	0.8	1.3	2.0	1.8	2.0	1.6
public[b]	0.0	0.3	0.6	0.4	0.0	0.7	0.7	0.7
Gross capital formation	–0.8	–2.2	–0.4	0.1	1.4	2.9	2.2	2.3
fixed investment	–0.3	–0.3	0.2	0.7	1.4	1.5	1.8	2.4
change in stocks[c]	–0.5	–1.9	–0.6	–0.6	0.0	1.4	0.4	–0.1
Net exports	1.3	2.4	1.3	1.2	0.0	–1.9	–1.6	–1.5

[a] The percentage change in real GDP against the corresponding period of the preceding year without seasonal adjustment.
[b] The difference between the contribution of total consumption and private consumption.
[c] The difference between the contribution of gross capital formation and gross fixed investment.

Source: GUS (2015a), supplemented by own calculations.

Some judgments might be possible after examining the changes in the main components of final demand, which determined the dynamics of GDP in the last two years.

This analysis is a follow-up to similar studies conducted in previous years and included in previous editions of this report. The analysis makes it possible to show the main demand components responsible for GDP growth – to identify the demand components that either stimulated or sustained output growth and those that hampered it. It also enables us to establish whether the observed output growth was adequately matched by an increase in internal and external demand, which is essential for a further rise in output. The results of the analysis may also be helpful in assessing the growth prospects of the Polish economy in 2015 and beyond.

The impact of individual demand components on real GDP growth in the consecutive quarters of the 2013–2014 period is illustrated by data in Table 1.8. The table shows the direct contribution of the individual demand components to real GDP growth (without multiplier effects). This contribution is calculated by multiplying the growth rate of a given demand component by its share in the absorption of GDP.[14] The first row of the table shows the growth rate of real GDP measured against the same quarter of the preceding year (without seasonal adjustment). It is equal to the combined impact of the demand components (domestic and external) shown in the given column. Public consumption is calculated as the residual of total consumption over private consumption. The change in stocks is calculated as the difference between gross capital formation and fixed investments. Net exports are the difference between exports and imports. All the variables are measured at constant prices.

In our previous analysis, presented in the last year's report (Weresa, ed., 2014), we noted that output growth in 2012–2013 was slow and fragile because of weak domestic and external demand. The small GDP growth in those two years was mainly the result of a continuing improvement in the foreign trade balance, propelled by exports growing faster than imports (despite unfavorable developments in Poland's major export markets in Western Europe). Domestic demand was relatively weak, and its total volume tended to decline due to a continuous fall in accumulation and a prolonged stagnation in both private and public consumption. The unfavorable demand and supply balance prompted concerns about the possibility of sustaining further output growth, especially amid uncertainty over future economic developments in the external environment.

This situation changed radically in 2014. Due to imports rising faster than exports, net exports tended to decrease, assuming ultimately negative impact values and thus hampering output growth. But a heavy rise in domestic demand, unseen since 2011, strongly boosted the rise in total output. Looking at the data in Table 1.8, we can

[14] More precisely, it is the product of the growth of a given demand component (at constant prices) and of its share in GDP in the corresponding period of the preceding year, according to the well-known method of decomposition of the GDP growth rate.

see that the acceleration in GDP growth that began in the second half of 2013 and continued throughout 2014 was chiefly based on the revived domestic demand. In 2014, the volume of private and public consumption increased by about 3%, and the volume of investment outlays (both private and public) rose by about 10%. The sudden jump in investment outlays and a solid increase in consumer and government spending provided a strong growth impulse. Despite the somewhat negative effect of the foreign trade balance, this resulted in a substantial growth of real GDP, by 3.3% on a yearly basis.

Among the various demand components, a solid increase in private consumer spending and a substantial rise in investment outlays contributed most to GDP growth last year. Another important growth stimulus came from rising exports, though their impact on domestic output growth was neutralized by an even higher rise in imports. To attain further output growth, it is essential that the positive demand trends that appeared last year are sustained and reinforced. But it is difficult to predict whether investment, especially private investment, will grow further (its rise in 2014 may have been a temporary effect, implying a return to previous, "normal" levels). An increase in consumer spending depends on a rise in employment and real wages, which in turn depend on output growth. With the priority given to fiscal consolidation, government expenditure is subject to tax constraints. Export growth hinges on a further increase in economic activity in Poland's export markets in both Western and Eastern Europe, and on future exchange rate developments. The recovery in Western Europe may be not strong enough to allow a substantial rise in Polish exports. It is also necessary to consider the adverse effect of the political and military turmoil in Ukraine, including the Russian involvement, and of the restrictions imposed on Polish exports. All these factors are difficult to predict, even in the short term. They are influenced by government policy and depend on political and economic developments in the international environment.

Meanwhile, GDP growth in the last few quarters has clearly suggested a budding revival in the Polish economy. Real GDP grew 3%–3.5% in year-on-year terms in each quarter last year, adding up to a handsome annual growth rate of 3.3%, one of the best results in the EU28 in 2014. However, the ongoing revival has not been fully confirmed by some other indicators of economic activity, and the current condition of the economy is still burdened with many setbacks, including high unemployment. This means that the revival is not yet strong and extensive enough to encompass the entire economy.

On the supply side, seasonally adjusted industrial production ran at a rate of about 5% per year in the first half of 2014, but in the second half its growth decelerated to 2%–3%. A similar jump, followed by a slowdown, took place in construction, where the production volume increased at a 10% annual rate in the spring, but leveled off

to 2%–3% a year. The inflow of new orders to industry rose strongly in the first half of 2014, but then stabilized. With the considerable rise in consumer spending, the total volume of retail sales increased by 2.7% in 2014, twice as much as in 2013. But the stock of commodities continued at the level of the previous year, and inventories did not show a clear-cut upward trend typical of a recovery or revival. Despite some revival on the housing market and a considerable rise in residential construction, the number of new housing units completed last year was slightly less than in the preceding year.

Aside from the considerable increase in consumer spending, probably the most important achievement of the Polish economy in 2014 was that investment rebounded. This applied to both the construction sector and investment in machinery and equipment. The total volume of investment outlays increased by almost 10% over the previous year. However, this increase began from a very low level, following a prolonged fall in investment, and a considerable part of it was likely due to necessary replacement investments. Another positive trend is a significant growth in exports, whose volume increased by about 5% in 2014, despite a relatively low level of economic activity in Western Europe and Russian embargos. But the volume of imports increased even more considerably, by almost 10%, neutralizing the stimulating effect of exports on output growth.

The labor market has not improved radically as yet. A distinct rise in employment would require more vigorous and continuous output growth. Total employment increased by 1% in 2014 compared with the previous year, and average employment in the enterprise sector rose by 0.6%. The level of unemployment recorded in labor market surveys decreased to about 8% at the end of 2014, and registered unemployment fell to 11.5%. However, the overall labor market situation did not improve perceptibly.

When assessing living standards, an important factor is a rise in wages and other income sources. According to official GUS data (GUS, 2015a, 2015b), both the average nominal gross wage and the average nominal gross pension increased by about 3.6% in 2014. With practically no rise in the consumer price index and a small growth of savings, this was the main driving force behind consumer expenditure. It would be interesting to know how the average income level reported in household budget surveys changed from the preceding year, but the survey data are published with an almost half-year delay, so it is impossible to assess the situation now.

Business sentiment indicators for industry, construction, and trade, based on survey data, reveal a rising trend, though some segments remain in negative territory. Consumer confidence, as reported in household opinion surveys, improved significantly last year, yet it is still relatively low, and the same is true of businesses' assessment of their own financial situation and of the general situation in the economy. Nevertheless, both business sentiment surveys conducted by GUS and similar surveys

by the Research Institute for Economic Development at the Warsaw School of Economics point to a marked improvement in the general business climate.

The growth prospects for the Polish economy in the years ahead will strongly depend on future economic developments in Europe and the global economy. The latest forecasts for the world economy predict some acceleration in output growth in the next two years as a result of an expected revival in the United States and Western Europe. According to a recent World Bank forecast (World Bank, 2015), the global economy as a whole will grow 3.0% in 2015 and 3.3% in 2016. The latest IMF forecast (IMF, 2015) assumed faster growth in global output – 3.2% in 2015 and 3.4% in 2016 if converted into U.S. dollars, and 3.8% and 4.0% based on constant local prices. The OECD forecast (OECD, 2014a) is also relatively optimistic: 3.7% in 2015 and 3.9% in 2016. For the euro area, the World Bank and the OECD predict a gradual recovery and a return to small growth: 0.8% in 2015 and 1.1% in 2016, while the IMF expects 1.3% growth in the euro area in 2015. The European Commission, in its newest winter forecast (European Commission, 2015), slightly downgraded its former growth projections for Europe, envisaging 1.3% GDP growth for the euro area in 2015 and 1.9% in 2016, and predicting 1.7% and 2.1% respectively for the EU28 as a whole.

Growth forecasts for Poland for this year and next vary, depending on the source and publication date. The European Commission, in its economic forecast for Europe released on Feb. 5, 2015 (European Commission, 2015), significantly upgraded its projections for Polish GDP growth in the next two years: to 3.2% in 2015 and 3.4% in 2016. An array of similar GDP growth forecasts for Poland for the next two years have been released by the IMF (2015): 3.3% in 2015 and 3.5% in 2016; the OECD (2014a): 3.0% and 3.5%, and the World Bank (2015b): 3.2% and 3.0%. On the other hand, the EBRD unexpectedly lowered its previous GDP growth forecast for Poland to 3.0% in 2015 in its forecast update for the transition region released in January 2015 (EBRD, 2015).

Among growth forecasts produced domestically, the latest forecast by the Gdańsk Institute for Market Economics (IBnGR, 2015) suggests that Poland's real GDP will grow 3.5% in 2015 and 3.8% in 2016. When drafting the budget for 2015, the government (Rada Ministrów, 2014) assumed that Poland's GDP would grow by 3.8% in 2015. The National Bank of Poland, meanwhile, in its latest *Inflation Report* (NBP, 2014), lowered its GDP growth forecast to 3.0% in 2015 and 3.3% in 2016.

The IMF's medium-term growth forecast until 2019, published in October 2014 and revised in January 2015 (IMF, 2014, 2015), assumed that global output growth would accelerate to about 4% a year and that the euro area and the EU28 as a whole would return to their "usual" growth rates of around 1.5% and 2.0% respectively. For Poland, the IMF predicted moderate GDP growth in the next five years, at a rate of 3%–3.5% a year, with a tendency toward a slight acceleration at the end of the decade.

Several analyses of growth factors for Poland published in the last few years suggest that the development potential of the Polish economy is still considerable and, if properly utilized and supported by an active growth-oriented economic policy, it could ensure a sustainable growth rate of about 4% a year (provided there is sufficient demand on both the domestic and foreign markets).[15] However, some recent studies (cf. e.g. Matkowski, Próchniak, Rapacki, 2013, 2014) warn that future growth in the Polish economy may be significantly reduced to around 2% a year or even less, due to unfavorable demographic trends.

Even if economic growth in Poland continues to run at a rate of 3%–3.5% a year in the next few years, as suggested by these medium-term forecasts, it is quite unlikely that the country will soon return to the kind of rapid growth it experienced before the outbreak of the global crisis, when Poland's economy grew at a healthy rate of 4%–5% a year or even faster. Moreover, long-term growth forecasts taking into account supply constraints related to demography, are extremely unfavorable to Poland and some other CEE countries.

Long-term growth forecasts (until 2060) released by the European Commission and the OECD (European Commission, 2014b; OECD, 2014b) suggest Poland and other CEE countries will experience a gradual deceleration of economic growth after 2015. The European Commission predicts that Poland's potential GDP growth will decrease from 3.4% in 2015 to 2.6% in 2020, 1.9% in 2030, 1.3% in 2040, 0.6% in 2050, and 0.5% in 2060. Due to the output gap, the actual GDP growth could be even lower. According to the OECD, Poland's GDP growth will decelerate from 4.3% in 1995–2011 to 2.6% in 2011–2030, and 1.0% in 2030–2060. The slowdown predicted in both forecasts will be mainly due to unfavorable demographic changes, including population aging, a drop in fertility, and a massive outflow of workers, especially young, well-educated working-age people.

If these forecasts come true, Poland may face not only slower growth in incomes and social well-being, but also a possible reversal of its catching-up process around 2045, coupled with a renewed widening in the country's income gap with Western Europe. In order to avoid such a scenario, the government should adopt a set of proper socioeconomic policies to neutralize the risks and keep GDP growth at a satisfactory rate. The same is true of other CEE countries facing similar risks to economic growth.[16]

[15] Such a long-term growth rate was assumed in many projections for the Polish economy for the next 10–20 years – see e.g. Boni (ed.), 2009; Kleer *et al.* (eds.), 2011; Matkowski, 2010; Rapacki, 2002; Kołodko, 2013.

[16] For more on this subject, see section 1.2 of this chapter, which discusses the implications of this long-term growth forecast for the income convergence process between CEE and Western Europe.

Meanwhile, the growth of the Polish economy will still be critically dependent on further economic developments in Europe and worldwide. A big challenge for Poland in the next few years is public finance consolidation. A serious threat is posed by the aging of the population and the growing burden imposed on the economy by the costs of retirement payments. In any case, a continuous rise in exports and investment is the basic condition for sustained economic growth in the coming years.

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Chapter 2

The Impact of the Global Crisis on the Income Convergence of Poland and Other Central and Eastern European Countries Toward the Average Income in the EU15

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This chapter aims to assess income convergence among the 11 European Union member states from Central and Eastern Europe (CEE) in relation to the old EU members (i.e. EU15; Malta and Cyprus are not included in this analysis), with a special focus on convergence trends during the global economic crisis. This analysis is supplemented by a simulative forecast of the catching-up process between these CEE countries and other EU economies that shows how much time they need to close the income gap.

Convergence between EU11 and EU15

This subchapter intends to assess income convergence among the 11 Central and Eastern European (CEE) countries that joined the EU in 2004, 2007, and 2013: Poland, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, Slovakia, and Slovenia (EU11).[1] Convergence in these countries is analyzed in relation to the old EU members (EU15). A detailed analysis of convergence inside the group of the new EU member countries (except Croatia) was included in some previous editions of the report (see e.g. Matkowski and Próchniak, 2013).

This analysis covers the 1993–2014 period. As the key topic of this edition is the impact of the global crisis on the income level convergence of the countries studied, calculations were also made for three seven-year subperiods, 1993–2000, 2000–2007, and 2007–2014. Including these three subperiods allows us to assess the pace of the

[1] This paper is a follow-up study to analyses on the subject published in earlier editions of the report (see e.g.: Matkowski and Próchniak, 2014). The 2013 edition includes an analysis of regional convergence in regions across the EU (Matkowski and Próchniak, 2013). The methodology of the analysis is described in detail in the 2008 edition of the report (Próchniak, 2008).

catching-up process before and after the global crisis. In 1993–2007, income-level convergence before the global crisis is analyzed, while the 2007–2014 period provides data to show how real economic convergence trends changed after the start of the global crisis. To assess time intervals of equal length, the 1993–2007 period was further divided into two parts in order to verify income-level convergence in the first few years of systemic transformation and in the years approaching the EU's first enlargement for Central and Eastern European countries. Such a time frame allows us to analyze the time stability of the catching-up process in Europe during the last two decades. This approach constitutes the value added of this edition. Moreover, the convergence analysis is important for assessing Poland's competitiveness, which is defined here as the capacity to increase the real incomes of society faster than in other countries.

Our analysis is based on the two most popular concepts of income convergence: absolute β-convergence and σ-convergence. Absolute β-convergence exists when less developed economies (with lower GDP per capita) grow faster than more developed economies (with higher GDP per capita). σ-convergence occurs when income differentiation between economies decreases over time. Income differentiation can be measured by standard deviation, variance, or a coefficient of variation of GDP per capita levels.

To verify the absolute β-convergence hypothesis, we estimate the following regression equation:

$$\frac{1}{T}\ln\frac{y_T}{y_0} = \alpha_0 + \alpha_1 \ln y_0 + \varepsilon_t. \tag{1}$$

The explained variable is the average annual growth rate of real GDP per capita between period T and 0; the explanatory variable is the log of the GDP per capita level in the initial period, while ε_t is the random factor. If parameter α_1 is negative and statistically significant, β-convergence exists. In such a case we can calculate the value of coefficient, which measures the speed of convergence, from (see e.g. Barro and Sala-i-Martin, 2003, p. 467):

$$\beta = -\frac{1}{T}\ln(1 + \alpha_1 T). \tag{2}$$

In order to verify the σ-convergence hypothesis, we estimate the trend line of dispersion in income levels between countries:

$$\mathrm{sd}(\ln y_t) = \alpha_0 + \alpha_1 t + \varepsilon_t. \tag{3}$$

The explained variable is the standard deviation of log GDP per capita levels between the economies, the explanatory variable is the time variable ($t = 1,\ldots,22$ for the 1993–2014 period), while ε_t, as previously, is a random factor. If parameter α_1 is negative and statistically significant, σ-convergence exists.

The calculations are based on the time series of real GDP per capita at purchasing power parity (PPP in $), extracted from the International Monetary Fund database (IMF, 2015). When converting nominal GDP per capita at PPP (in current prices) into real GDP per capita at PPP (in constant prices), we used the GDP deflator for the United States.

Beginning with the previous edition of this report, the group of Central and Eastern European countries was expanded to include Croatia, the 11th and newest EU member country. Although Croatia joined the EU in 2013, its inclusion does not violate the assumption that the analyzed group is homogenous. Economic reforms in Croatia began at about the same time as in Romania and Bulgaria, and Croatia does not lag behind other new EU member states in advancing the reform process. Therefore, we may adopt a research hypothesis that the EU11 countries should exhibit income convergence both with regard to one another and toward the EU15. Some data will also show the catching-up process inside the EU11 group.

The existence of income convergence in the examined countries is due to a number of factors, including their similar development level and economic structures, a similar course of system reforms, mutual economic cooperation, liberalization of international trade, and reduced restrictions in the flows of factors of production (including labor and capital) among countries. The convergence process was strengthened by EU structural and regional policies aimed at reducing development differences. Financial aid was mainly targeted at less developed regions and countries to accelerate their economic growth. All these factors stimulated the process of convergence both in the pre-accession period and after the new member countries joined the EU, but the strength of these factors and their impact on the pace of convergence varies for different countries and years.

In contrast, the impact of the global crisis on the catching-up process is not obvious and requires an in-depth examination. The crisis significantly changed many countries' macroeconomic performance, producing large fluctuations of economic growth paths (and inflation rates that affected purchasing power parities). At first glance, one may expect that recession increased income gaps between the CEE countries and the EU15, meaning that the real convergence slowed down. However, we cannot ignore the fact that the crisis might in fact strengthen the catching-up process in Europe. If the fall in incomes in the EU15 countries exceeded that in the CEE countries, the latter group would come closer to the former in terms of income level differences. However, such a statistical convergence is surely not a desired target for individual countries.

β-convergence

The results of testing β-convergence between the EU11 countries and the EU15 are presented in Table 2.1 and Figure 2.1. The convergence is analyzed among the 26 EU countries as well as between the EU11 and EU15 areas. The aggregated data for the two regions, EU11 and EU15, are weighted averages with variable weights reflecting the population of a given country included in a specific group in a given year.

Table 2.1. Regression results for β-convergence

Period	α_0	α_1	*t*-stat. (α_0)	*t*-stat. (α_1)	*p*-value (α_0)	*p*-value (α_1)	R^2	β-convergence	β
26 countries of the enlarged EU									
1993–2014	0.2092	–0.0189	7.40	–6.59	0.000	0.000	0.6443	yes	0.0191
1993–2000	0.0786	–0.0045	1.29	–0.73	0.209	0.473	0.0217	no	–
2000–2007	0.4173	–0.0378	7.28	–6.65	0.000	0.000	0.6480	yes	0.0385
2007–2014	0.1974	–0.0193	3.16	–3.19	0.004	0.004	0.2974	yes	0.0195
2 regions (EU11 and EU15)									
1993–2014	0.2450	–0.0227	.	.	.	.	1.0000	yes	0.0230
1993–2000	0.1380	–0.0110	.	.	.	.	1.0000	yes	0.0110
2000–2007	0.4222	–0.0390	.	.	.	.	1.0000	yes	0.0398
2007–2014	0.3278	–0.0315	.	.	.	.	1.0000	yes	0.0320

Source: Own calculations.

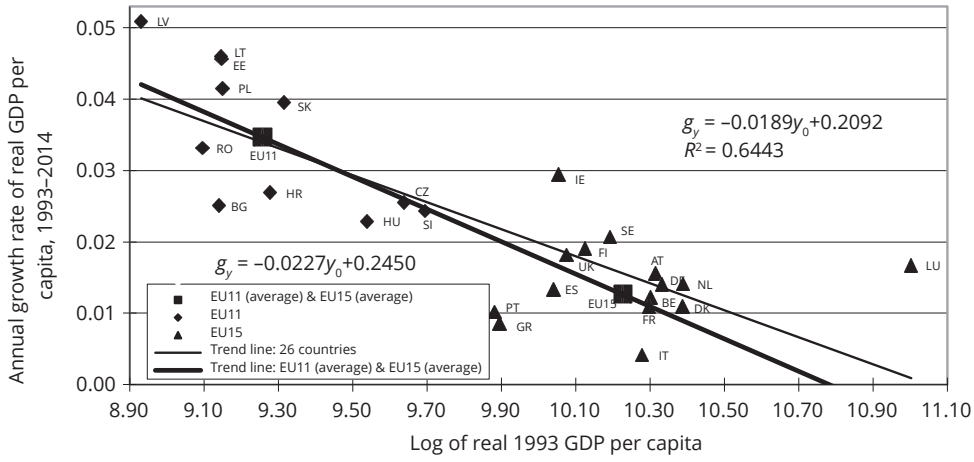
Table 2.1 shows the results of estimating regression equation (1) along with the estimated convergence coefficients calculated according to formula (2). The first column in Table 2.1 indicates the period. The next columns give the estimated values of parameters α_0 and α_1, *t*-statistics, *p*-values (significance levels), and R^2 (the *R*-squared coefficient for the two-region model equals 1 by definition). The ninth column provides information about the existence of β-convergence. The answer is "yes" if the GDP growth rate is negatively and significantly correlated statistically with the initial income level. It is so if the estimated α_1 coefficient is negative and the corresponding *p*-value is less than 0.1 (assuming a 10% significance level). The last column gives the estimated value of coefficient β.

The results confirm the existence of a clear-cut income-level convergence of the EU11 countries toward the EU15 throughout the 1993–2014 period. The catching-up process took place both among the 26 countries of the examined sample and between the two regions, EU11 and EU15. For the 26 countries of the enlarged EU, the slope

of the regression line is negative, with *t*-statistics at –6.59, *p*-value at 0.000, and the *R*-squared coefficient at 64%. This shows the existence of strong convergence trends inside the enlarged European Union. Countries with lower 1993 income levels recorded more rapid economic growth on average in 1993–2014 than those countries that were initially more developed. Since the Central and Eastern European economies were less developed in 1993, these results demonstrate an evident catching-up process by the EU11 countries with Western Europe.

The existence of β-convergence in 1993–2014 among the 26 EU countries is illustrated in Figure 2.1. In the figure, the EU11 countries are marked by rhombuses, while the EU15 countries are marked by triangles. As we can see, the points representing the EU11 countries appear in the upper left part of the chart, while the points representing the EU15 economies are located in the lower right part. This means that the EU11 countries recorded more rapid economic growth from 1993 to 2014, while their initial income level was lower.

Figure 2.1. GDP per capita growth rate over the 1993–2014 period and the initial GDP per capita level



Source: Own calculations.

Figure 2.1 shows that the dispersion of the points representing individual countries is not far from the negatively sloped trend line. This results in a relatively high value of the *R*-squared coefficient, at 64%. Differences in the initial income level account for almost two-thirds of the differences in the economic growth rates for the 1993–2014 period.

The points marked in Figure 2.1 make it possible to compare the outcomes of individual countries and to assess changes in their competitive positions during the

studied period. The most rapid economic growth rates were reported by the Baltic states and Poland. GDP per capita in Latvia, Lithuania, Estonia, and Poland grew at a rate exceeding 4% annually throughout the studied period, although these countries' initial income levels were relatively low. Slovakia also recorded the rate of economic growth at about 4%, but its initial income level was slightly higher. The results shown by these countries helped strengthen convergence inside the group.

The position of Poland is favorable compared with other CEE countries. Poland ranked fourth in terms of the rate of economic growth among the 26 EU countries. Rapid economic growth in Poland was one of the factors leading to an improvement in the country's competitive position. Given the relatively low income level in Poland in 1993, these results strengthened convergence in the group as a whole.

The average results of the catching-up process of the EU11 group toward Western Europe are weakened by Bulgaria and Croatia. These two countries had a relatively low GDP per capita level in 1993, and they also recorded relatively slow economic growth throughout the 1993–2014 period (about 2.5% annually). As a result, the points representing these two countries are located far below the trend line and negatively affect its gradient. The three richest CEE countries, Slovenia, the Czech Republic, and Hungary, also recorded an annual economic growth rate of around 2.5% from 1993 to 2014. The outcomes of these three countries are very similar in terms of the pace of output growth and the initial GDP per capita level, as reflected by the closely located points representing the position of individual countries.

Figure 2.1 also shows some differences in the economic growth paths of Western European countries. Luxembourg exhibited relatively fast economic growth compared with its initial income level. As a result, the point representing this country appears significantly above the trend line. This situation is atypical because the high level of income per inhabitant in Luxembourg and its rapid growth stem mainly from the fact that Luxembourg is a tax haven and hosts a number of enterprises from the financial and high-tech sectors. The high income distance between Luxembourg and the remaining Western European countries does not reflect differences in the standard of living. By contrast, three Mediterranean countries, Portugal, Greece, and Italy, recorded a slow rate of economic growth.

In Figure 2.1, the analysis of individual countries demonstrates that convergence exists not only among the 26 EU countries but also inside the EU11 area. Moreover, our additional calculations indicate that convergence inside the EU11 group is even stronger than, for instance, in the group consisting of only Western European economies. In the EU11 group, the highest initial income level was reported by Slovenia, the Czech Republic, and Hungary, but their economic growth rate from 1993 to 2014

was low compared with other CEE countries. These results were one of the factors stimulating convergence in the CEE area.

Aggregated data for the two regions, the EU11 and EU15, further confirm the existence of convergence in the 1993–2014 period. In Figure 2.1, the points representing these two regions are marked by squares. The EU11 group as a whole recorded more rapid economic growth than the EU15 area, but the group's initial income level was much lower.

The β-coefficients, which measure the speed of convergence and are calculated according to formula (2), stand at 1.91% for the 26 countries and at 2.30% for the two regions. The β-coefficients allow us to estimate the time needed to reduce the development gap between the studied countries. If the average growth patterns observed in 1993–2014 continue, the countries of the enlarged EU will need about 30–35 years to reduce the gap to their common hypothetical steady state by half. (The value is calculated as follows: $-\ln(0.5)/0.0191 = 36.3$ years and $-\ln(0.5)/0.0230 = 30.1$ years.)[2]

These results point to a slow catching-up process by the EU11 countries toward Western Europe. Based on these estimates, it is not expected that the income levels in Poland and other Central and Eastern European countries will become equal to those in Western Europe in the medium term. Moreover, some future growth scenarios presented in the second part of this chapter suggest some divergence trends that may appear in the coming years.

A closer look at the stability of the convergence process over time reveals that the speed of the catching-up process during the periods was highly differentiated. The high instability of the pace of convergence in the analyzed countries was driven by several factors, including the global crisis. More precisely, in 1993–2000, in the sample of the 26 EU countries, there was no statistically significant decrease of the income gap between the CEE economies and Western Europe (on average for the whole group). For the 1993–2000 period, the slope of the trend line is negative but statistically insignificant (p-value at 0.473 and the R^2 coefficient at 2%). Such statistical outcomes of model estimation indicate a lack of convergence despite a negative slope of the trend line. These findings, partly in contrast to our previous analyses covering a similar time horizon, result largely from the fact that this study – unlike those carried out a few years ago – also includes Bulgaria, Croatia, and Romania, i.e. the countries that in the 1990s had a different institutional environment and recorded different macroeconomic outcomes compared with the eight CEE countries that joined the EU in 2004. Consequently, the convergence inside the enlarged group has not been confirmed as statistically significant.

[2] The half-life (t^*) is the solution of the equation: $e^{-\beta t^*} = 0.5$, where β is the rate of decrease (Romer 2000, p. 41). By taking logs of the above formula, we get: $t^* = -\ln 0.5/\beta$.

The speed of convergence accelerated strongly from 2000 to 2007. The slope of the regression line is negative and statistically significant (p-value at 0.000 and the R^2 coefficient at 65%) for this period and the 26 EU countries. The parameter β, measuring the pace of convergence, stands at 3.85%. A clear-cut convergence was undoubtedly driven by the EU's enlargement. Our previous studies on the subject demonstrate that EU enlargement significantly contributed to accelerated economic growth in the CEE countries.[3] Moreover, many countries experienced what can be called an "integration anchor" effect much earlier than they formally joined the EU. As a result, from 2000 to 2007, the CEE countries recorded relatively fast economic growth compared with the EU15 group.

The clear-cut convergence trend that occurred at the beginning of the first decade of the 21st century slowed down after 2007. This was undoubtedly due to the global crisis. This study demonstrates that during the 2007–2014 period, the group of the 26 EU countries converged but at a much slower pace than in 2000–2007. For the 2007–2014 period, the slope of the trend line is negative and statistically significant (with the p-value at 0.004 and the R^2 coefficient at 30%), but the β parameter measuring the pace of convergence is only 1.95%. This means that the speed of convergence was almost twice as slow as from 2000 to 2007. The weakening pace of the catching-up process was largely due to the global crisis, which led to a recession in all EU countries except Poland. On the one hand, this negatively affected the speed of convergence; but on the other hand, since Western European countries were hit by recession as well, no divergence trends leading to higher income inequalities appeared (at least not for the whole group on average throughout a specific subperiod).[4]

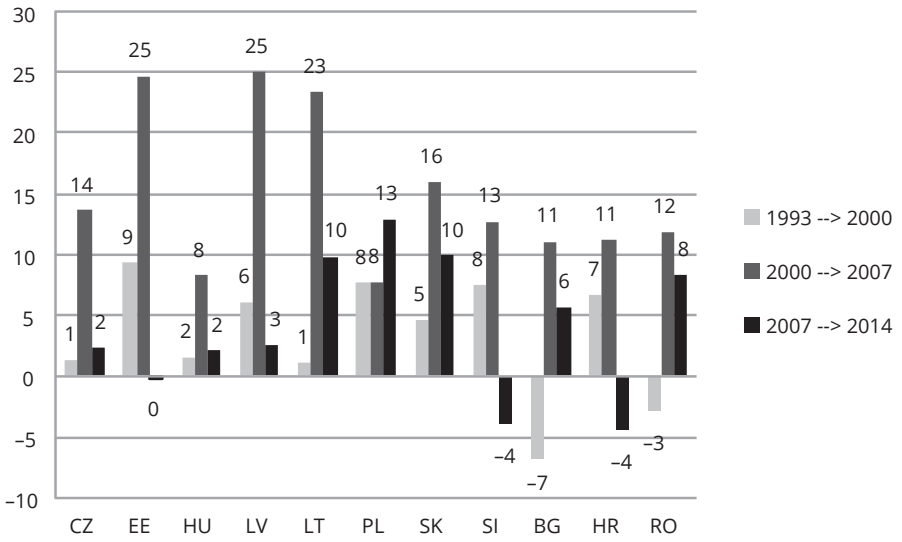
Similar findings in terms of the time stability of the convergence process can be drawn on the basis of calculations carried out for the two regions, EU11 and EU15. The fastest pace of convergence took place in 2000–2007 with the β parameter standing at 3.98%. In 1993–2000 and 2007–2014, the speed of convergence was slower, with the β parameters at 1.10% and 3.20% respectively. But unlike estimates including the

[3] For example, Rapacki and Próchniak (2009, 2010) show that EU enlargement had a positive impact on the economic growth of Central and Eastern European countries. A more recent study (Rapacki and Próchniak, 2014), which expands and supplements earlier analyses, confirms the positive impact of EU membership on economic growth and the real convergence of the CEE countries, suggesting that the main channels of this influence were: (i) an increased scope of economic freedom, (ii) improved quality of governance, (iii) the progress of market reforms, (iv) the inflow of EU funds, (v) the development of international trade, and (vi) the inflow of foreign investment.

[4] Próchniak and Witkowski (2013) apply more advanced econometric models – based on the Bayesian Model Averaging method – to analyze the time stability of conditional β-convergence in the EU. In that study, the structural breaks are assumed to exist in 1998 and 2004 for the EU27 countries. In another study carried out by these two authors for the EU28 group, the time stability of the convergence process in continuous terms is analyzed, allowing changes in the pace of the catching-up process from one year to the next (Próchniak and Witkowski, 2014).

sample of the 26 countries, the calculations for the two regions are based on only two observations, and they cannot be verified in statistical terms. However, our earlier findings about the negative impact of the global crisis on the speed of convergence in the EU are confirmed.

Figure 2.2. The reduction in individual EU11 countries' income gap toward the EU15 in the three consecutive seven-year subperiods[a]



[a] The changes are expressed in percentage points; in each year the EU15 GDP per capita at PPP is taken as a base equal to 100.
Source: Own calculations based on IMF data.

The results of β-convergence presented here are the average results for the whole region. As shown in Figure 2.1, individual EU11 countries displayed different rates of GDP growth and different degrees of convergence toward Western Europe. It is worth taking a look at the nature of the catching-up process in individual EU11 countries toward the EU15 in the respective subperiods.

Figure 2.2 shows by how many percentage points the income gap of a given EU11 country to the EU15 area decreased in the 1993–2000, 2000–2007, and 2007–2014 periods. The data in Figure 2.2 confirm the conclusions drawn from the analysis of β-convergence. Namely, for all the CEE countries except Poland, the income gap toward Western Europe closed at the fastest rate in 2000–2007. In the three Baltic states, the income gap in this period decreased by more than 20 percentage points. The Czech Republic and Slovakia also significantly reduced their income gaps – by about 15 percentage points from 2000 to 2007. In 2007–2014, after the start of the global crisis,

the outcomes of all the countries except Poland deteriorated in terms of closing the development gap. In this period, Slovakia and Lithuania reduced their income gap by 10 p.p., and Romania and Bulgaria reduced theirs by 8 and 6 p.p. Latvia, the Czech Republic and Hungary reduced their income gaps by 2–3 p.p. In Estonia, the relative GDP per capita level compared with the EU15 average did not change from 2007 and 2014, while in the other two countries, Slovenia and Croatia, it decreased: in 2014, average GDP per capita in these two countries was 4 p.p. lower than in 2007 (assuming the EU15 income level is 100).

Poland was the only country that significantly improved its relative development level. In the 1993–2000 and 2000–2007 periods, Poland reduced its income gap with Western Europe by 8 p.p. This process accelerated from 2007 to 2014, with Poland narrowing its development gap by 13 p.p. during that period. EU funds probably played a major role in accelerating the pace of convergence in Poland after EU enlargement, leading to increased competitiveness in the Polish economy. Poland was a key recipient of funds from the EU's 2007–2013 budget. The amount of money granted by the EU in the form of various types of aid and structural funds positively influenced the Polish economy on both the demand and supply sides. As a result, Poland recorded relatively good economic growth figures in the last few years, becoming the only EU country to avoid recession during the global crisis. The EU's 2014–2020 budget sets aside more structural funds for new member states and should prove to be a major driver of convergence in Poland toward Western Europe in the coming years.

To sum up, despite the existence of a clear-cut convergence trend between the old and new EU member states, the pace of the catching-up process suggests that no major changes can be expected in either the short or medium term in competitiveness measured by real GDP per capita between Poland and other EU11 countries, on the one hand, and the old EU members on the other. Moreover, the economic performance of the EU11 countries may deteriorate unless the implications of the crisis are overcome quickly and the fiscal stance improves soon. The period of time it takes to return to the pre-crisis economic growth path will be a key determinant of the future competitive position of EU11 countries compared with the EU15 area.

σ-convergence

σ-convergence of the Central and Eastern European countries toward Western Europe is measured by changes in the standard deviation of the GDP per capita levels among the 26 EU countries as well as between the EU11 and EU15 areas. The results

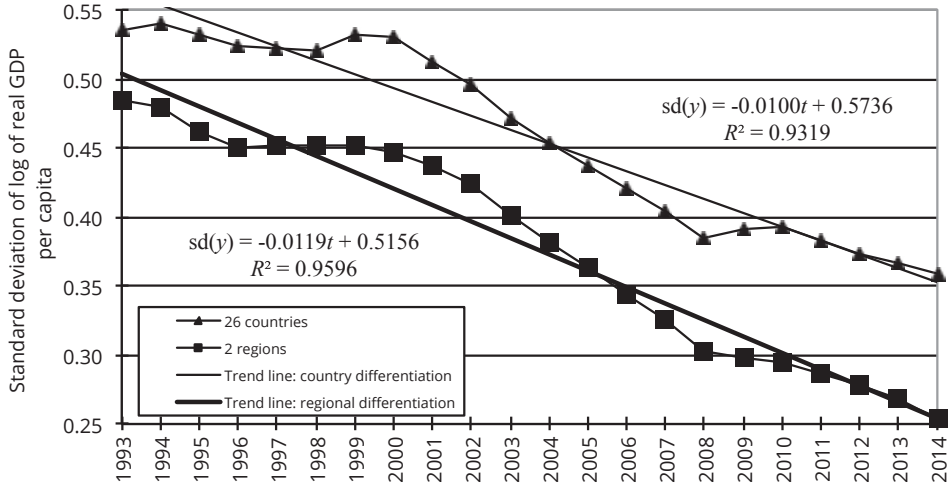
of the trend line estimation for standard deviations are shown in Table 2.2. Figure 2.3 offers a graphical illustration of the outcomes.

Table 2.2. Regression results for σ-convergence

Period	α_0	α_1	*t*-stat. (α_0)	*t*-stat. (α_1)	*p*-value (α_0)	*p*-value (α_1)	R^2	σ-convergence
26 countries of the enlarged EU								
1993–2014	0.5736	–0.0100	71.96	–16.55	0.000	0.000	0.9319	yes
1993–2000	0.5352	–0.0013	105.80	–1.27	0.000	0.251	0.2116	no
2000–2007	0.5483	–0.0184	293.92	–49.75	0.000	0.000	0.9976	yes
2007–2014	0.4065	–0.0055	85.35	–5.87	0.000	0.001	0.8517	yes
2 regions (EU11 and EU15)								
1993–2014	0.5156	–0.0119	71.90	–21.78	0.000	0.000	0.9596	yes
1993–2000	0.4828	–0.0051	78.53	–4.19	0.000	0.006	0.7456	yes
2000–2007	0.4721	–0.0182	157.76	–30.65	0.000	0.000	0.9937	yes
2007–2014	0.3278	–0.0088	80.86	–10.96	0.000	0.000	0.9524	yes

Source: Own calculations.

Figure 2.3. Standard deviation of GDP per capita, 1993–2014



Source: Own calculations.

The data in Table 2.2 show that there existed σ-convergence both among the 26 EU countries and between the EU11 and EU15 areas during the time period as a whole. The slopes of both estimated trend lines are negative and statistically significant at

high significance levels (confirmed by *p*-values standing at 0.000). The high values of the *R*-squared coefficients (exceeding 90%) reflect a very good fit of empirical points to the trend line.

Figure 2.3 shows the standard deviation of log GDP per capita levels. As we can see, income differences between the EU11 countries and the old EU members displayed a downward trend. Income differences decreased the most obviously and consistently in the second part of the analyzed period, which means after 2000. In 2009–2010, due to the economic crisis and decelerated economic growth in many rapidly developing countries, income differences among the 26 countries of the analyzed group increased, although the average data for the two regions do not support this evidence.

Looking at the results of σ-convergence given in Figure 2.3 and Table 2.2 for the individual subperiods, it is possible to see a high degree of similarity to the outcomes for β-convergence. From 1993 to 2000 in the sample of the 26 individual countries, there was no statistically significant decrease in income differentiation (although the trend line is negative). The fastest decrease in development differences took place in the middle of the analyzed period, i.e. from 2000 to 2007. After the global crisis, in 2007–2014, income differences also diminished, but not as rapidly as in previous years.

Figure 2.3 shows that convergence is not an automatic process and that development differences will not necessarily continue to narrow in the future; divergence trends may appear. The latest global crisis is a good example; it has led to increased income level differences in selected years. Such unexpected shocks or any other potential disruptions in the future may hamper convergence trends in Europe. Consequently, it is essential to pursue the right economic policies (fiscal and monetary policies, combined with institutional environment reforms) in order to keep the process of income level equalization inside the enlarged European Union on track. If such high-quality policies are in place and if the external environment is favorable, a further decline may be expected in income differences in the next few years, along with an accelerated convergence of the EU11 countries toward the EU15.

Closing the income gap: a forecast

In the preceding section, income convergence between the CEE countries and Western Europe in the 1993–2014 period was analyzed with the help of some econometric methods. This section presents a simulative forecast of the catching-up process between the CEE countries (EU11) and Western Europe (EU15). Our forecast (or, more precisely, simulation) of the further pace of income convergence between these two groups of countries will be made according to three hypothetical scenarios. All of them update

our former forecasts presented in previous editions of this report (see e.g. Weresa, ed., 2013, 2014). The tables presenting these forecasts are arranged in the same format as previously in order to facilitate comparisons, but the data in the tables are completely new, showing the results of new calculations based on the latest input data.

The first scenario, which is a simple extrapolation of past growth trends, assumes that individual CEE countries and the EU15 group as a whole will in the future maintain the average yearly growth rates of per capita GDP noted in the 1993–2014 period.[5] For most CEE countries, and particularly for Poland, this is a very optimistic scenario from the point of view of the period needed to close the income gap between the two groups of countries.

The second scenario is more analytical in nature. It is based on the newest medium-term GDP forecast released by the IMF (IMF, 2015) and on a long-term demographic forecast published by Eurostat (Eurostat, 2015). This scenario assumes that during the next five years, CEE countries and the EU15 group as a whole will develop in line with the GDP growth forecast given by the IMF, and from 2020 on they will continue to grow at the constant GDP growth rate foreseen by the IMF for 2019. The assumed growth rates of total GDP have been transformed into per capita terms using the Eurostat's demographic projections until 2080.[6] Compared with the first scenario, this second scenario seems to be more realistic, though the assumptions about future GDP growth in the CEE countries are also quite optimistic.[7]

The common feature of both these scenarios is the assumption that the CEE countries will maintain some lead over the EU15 group as regards the growth of per capita GDP and the catching-up process will consequently continue. We will focus on calculating the probable length of the period needed to close the income gap (against the average per capita GDP level in the EU15). The basic difference between the two variants is that the ratios of the GDP per capita growth rates between the CEE countries and the EU15 group in the first scenario are assumed to remain constant, at their average levels noted in the 1993–2014 period, while in the second scenario, these ratios may change, according to the current and future GDP growth trends as well as population trends.

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5 The GDP per capita growth rates quoted here refer to the growth of real GDP measured at constant prices in national currencies (euro in the case of the EU15). The rates differ slightly from the growth rates calculated from PPS GDP data, which were used in the calculations made in the previous section of this paragraph.

6 Due to the lack of comparable demographic data, we have assumed no further change in population numbers after 2080.

7 The assumed GDP growth rate for Poland after 2020 (3.6% per year) lies within the range viewed as feasible in several growth forecasts for Poland for the next 10–20 years (cf. the literature quoted in the discussion about the growth prospects of the Polish economy, given in part 1.1 of this chapter), though it may not be sustained in the longer term due to the demographic barrier.

In both of the above scenarios, the reference point in our forecast is the relative level of GDP per capita in 2014. The initial income gaps existing in 2014 (relative levels of per capita GDP) have been calculated using European Commission data on total GDP and population (European Commission, 2014a). GDP per capita was calculated by dividing the value of total GDP by total population at the beginning of the year. The period necessary to close the income gap depends on the initial income gap and the assumed future growth rate of per capita GDP, i.e. on the assumed growth of total GDP and the expected change in population numbers.

Our calculations have been made in two versions as regards the estimation of the initial income gap and the expected length of the catching-up period. In the first version, the income gap is measured by the relative level of per capita GDP calculated at the purchasing power standard (PPS). In the second version, the income gap is measured by the relative level of per capita GDP calculated at current exchange rates (CER). Although such calculations are usually done with respect to per capita income calculated at PPS, in this analysis we will consider both alternative ways of measuring the income gap (at PPS and CER) because it is still uncertain whether the figures on GDP per capita at PPS for CEE countries are adequate and not overestimated. The algorithm used to calculate the length of the catching-up period was presented and discussed in an earlier edition of this report (Weresa, ed., 2012, p. 57).

Table 2.3. Closing the income gap – scenario 1

Country	GDP per capita growth rate (%)	GDP per capita in 2014 (EU15 = 100)		Number of years necessary to reach the average level of GDP per capita in the EU15	
	1993–2014	PPS	CER	PPS	CER
Bulgaria	2.9	43	18	51	103
Croatia	3.2	54	32	31	58
Czech Rep.	2.5	76	48	22	58
Estonia	5.1	67	47	11	20
Hungary	2.3	62	33	44	103
Latvia	5.4	61	38	12	24
Lithuania	4.9	68	39	11	26
Poland	**4.2**	**63**	**34**	**16**	**37**
Romania	3.3	49	24	35	69
Slovakia	4.1	70	44	13	29
Slovenia	2.7	76	57	19	38
EU15	1.2	100	100	–	–

Source: Own calculations based on data from Eurostat (2015) and the European Commission (2014a), supplemented where necessary by some auxiliary data from the IMF (2015) and the World Bank (2015), Jan. 15, 2015.

Table 2.4. Closing the income gap – scenario 2

Country	GDP growth rate (%)		GDP per capita in 2014 (EU15 = 100)		Number of years necessary to reach the average level of GDP per capita in the EU15	
	2014–2019	2020–	PPS	CER	PPS	CER
Bulgaria	2.7	3.0	43	18	40	93
Croatia	1.6	2.0	54	32	91	224
Czech Rep.	2.3	2.1	76	48	50	141
Estonia	3.3	3.6	67	47	16	30
Hungary	1.9	1.8	62	33	136	.
Latvia	3.7	3.9	61	38	14	29
Lithuania	3.6	3.7	68	39	10	26
Poland	**3.4**	**3.6**	**63**	**34**	**20**	**46**
Romania	3.1	3.5	49	24	32	64
Slovakia	3.0	3.0	70	44	21	44
Slovenia	1.7	1.9	76	57	63	159
EU15	1.6	1.6	100	100	–	–

Source: Own calculations based on data from Eurostat (2015), the European Commission (2014a), and the IMF (2015), Jan. 15, 2015.

It should be remembered that the EU15 group, used here as a reference frame to represent the average income level in Western Europe, is composed of 15 countries that belonged to the EU before its major enlargement in 2004 and 2007 (it does not correspond exactly to the group of the 15 Western European countries that belong to the euro area, usually denoted as the EA15). The average per capita GDP in the EU15 group was calculated by dividing the total GDP value for this group by the total population. The growth rates of per capita GDP for the EU15 group used in the first scenario refer specifically to this group, but under the second and third scenarios, because of the lack of respective data for the so-defined group, we used the GDP growth rates given by the indicated data sources for the euro area (EA18 or EA19), which do not differ much from those for the EU15 group and are an acceptable substitute.

The assumptions made in the first two scenarios and the results of our calculations are presented in Table 2.3 and Table 2.4. The first column in both tables shows the assumed growth rates of per capita GDP or total GDP; the next two columns give the initial levels of GDP per capita at PPS and CER relative to the average level in the EU15; and the last two columns indicate the number of years necessary to reach the average level of per capita GDP in the EU15 if the initial per capita GDP level is measured at PPS or at CER.

In 2014, GDP per capita in all the CEE countries belonging to the EU was much lower than the EU15 average. The lowest levels of per capita GDP were recorded in Bulgaria (43% of the EU15 average at PPS and 18% at CER) and Romania (49% and 24% respectively), while the highest levels were seen in Slovenia (76% at PPS and 57% at CER) and in the Czech Republic (76% and 48%). In Poland, GDP per capita in 2014 accounted for 63% of the EU15 average when calculated at PPS and 34% when calculated at CER. For all the CEE countries, the per capita GDP values calculated at PPS are much higher than those converted at CER. Consequently, the period necessary to close the income gap calculated at PPS is considerably shorter than the period required for closing the gap calculated at CER.

Scenario 1 is a simple extrapolation of the past trends of GDP per capita, assuming that the CEE countries (EU11) and the EU15 group will maintain the average yearly growth rates of per capita GDP found in the 1993–2014 period. Under this assumption, individual CEE countries would need 11 to 51 years to reach the average level of GDP per capita seen in the EU15 group if the initial income gap is calculated at PPS, and 20 to 103 years if it is calculated at CER. The three Baltic states, Estonia, Latvia, and Lithuania, along with Slovakia and Slovenia, would have the best catching-up prospects if they continue to develop according to their past trends. Estonia would need only 11 years at PPS or 20 years at CER to reach the average income level of the EU15. Lithuania would need 11 or 26 years for the same, and Latvia would take 12 or 24 years. Poland would need 16 years if the initial income gap is calculated at PPS or 37 years if it is calculated at CER. For Slovakia, the respective catching-up periods are 13 or 29 years, for Slovenia they are 19 or 38 years, for the Czech Republic 22 or 58 years, and for Croatia 31 or 49 years. Romania, Bulgaria, and Hungary are in the worst positions. Hungary, keeping up its earlier growth trend, would need 44 years to achieve the average income level at PPS seen in the EU15, or 103 years if it is measured at CER. Romania and Bulgaria would need 35 or 69 years and 51 or 103 years respectively for the same.

The time required to close the income gap against the EU15 under scenario 2 differs from that obtained in scenario 1 because the future GDP growth rates assumed here differ from past trends. For most CEE countries, the catching-up period turns out to be longer than in the first scenario. The convergence period becomes slightly shorter for Romania (32 years at PPS and 64 years at CER) and possibly for Bulgaria (40 years at PPS and 93 years at CER). For the remaining countries in the group, the catching-up period does not change much or it becomes longer. For Lithuania, the expected catching-up period remains almost the same: 10 years at PPP or 26 years at CER. For Estonia and Latvia, it rises to 14–16 years at PPS or 29–30 years at CER. For Slovakia, the catching-up period rises to 21 or 44 years respectively, for Slovenia

to 63 or even 159 years, and for the Czech Republic to 50 or 141 years. For Croatia and Hungary, the catching-up period becomes extremely long: in the case of Croatia it is 91 years at PPS or 224 years at CER; in the case of Hungary, only the first figure (at PPP) can be assessed reasonably – it is 136 years, while the alternative estimate (at CER) jumps into a very distant future and may be meaningless. Poland is placed in the upper half of the CEE group in this respect, with a chance to close the income gap toward Western Europe within 20 years if the initial income gap is calculated at PPS, or 46 years if calculated at CER.

These estimates should be treated as minimal because they have been made at constant prices and exchange rates noted at the starting point, on the assumption that the current price differentials between the CEE and EU15 will not change. In fact, due to the gradual equalization of price levels within the EU28, the purchasing power of the future income earned in any of the CEE countries may turn to be lower than expected on the basis of constant price calculations, with a resulting increase in the period needed to close the income gap.

In addition to the purely extrapolative forecast presented under scenario 1, based on the growth trends observed in the whole transition period of 1993–2014, or instead of this forecast, we could also develop a similar extrapolative forecast for income convergence based on the growth pattern observed in the 2004–2014 period, after the EU's major enlargement to include CEE. The retrospective analysis of the catching-up process, presented in the preceding section, brings some empirical evidence of the acceleration of income convergence between the CEE countries and Western Europe after their EU accession, though the identification of the specific effect of integration on the speed of convergence would require further research. But the growth patterns seen in the last 10 years, influenced by the global financial and economic crisis as well as the debt crisis in the euro area, were rather atypical and are unlikely to be repeated (let us believe so) in the years to come. Therefore, the average growth rates noted by various EU countries in that period and the resulting growth differentials cannot be directly applied to any reasoning about possible future developments. For instance, Poland, thanks to its continuous output growth, has noted a substantial increase in its real GDP volume during the entire period. Reinforced by population declines, this was reflected in a relatively high GDP per capita growth rate of 3.8% per year, whereas the respective average growth rate for the EU15 group in the same period was only 0.3%, leading to a growth differential of almost 13:1 between Poland and the EU15. There is no doubt that such a big difference in the growth rates between the member countries of the same integrated economic area cannot be sustained. Therefore the growth patterns seen during that period cannot be used to forecast the future course of the convergence process.

We have also analyzed some other scenarios of the convergence process, including some alternative extrapolation variants with longer and shorter backward observation periods as well as some other variants of analytical forecasts, with different assumptions as to the future growth rates in the CEE countries and in the EU15 group (cf. Matkowski, 2010; Matkowski and Próchniak, 2014; Matkowski, Próchniak, Rapacki, 2013, 2014). In all the analyzed variants, the period necessary for Poland to close the income gap toward the EU15, measured at PPS and adjusted for the 2014 starting point, ranged between 15 and 25 years. We can therefore conclude that, under all realistic assumptions, the minimum period necessary for Poland to catch up with the EU15 in terms of the average PPS income level is now 15–20 years.

Thus, expectations voiced until recently by some optimistic authors (cf. Rybiński, 2009), that Poland could reach the income level seen in Western Europe within 10 years, were quite unrealistic. This is simply impossible, both economically and physically; the formal proof was given in our earlier publications (see e.g. Matkowski, Próchniak, 2014). Therefore, we have to accept that Poland may be capable of closing the income gap to Western Europe, but this would require a lot of time and effort. On the other hand, we cannot exclude the possibility of a considerable slowdown in future growth in Poland and other CEE countries, which could lower the rate of the convergence process and eventually reverse it into divergence. Such a possibility is implied by the third scenario, presented below.

Scenario 3 is based on a long-term growth forecast for EU countries until 2060 drawn up under the auspices of the European Commission (European Commission, 2014b). This forecast, already mentioned in the previous section of this chapter, is based on a thorough analysis of the unfavorable demographic trends and their impact on employment and labor productivity, as well as on expected changes in total factor productivity (TFP). Under the forecast, beginning around 2020, economic growth in Poland and most other CEE countries will slow down, mainly as a result of an aging population and an outflow of young working-age people seeking jobs and better living conditions abroad. This would lead to a gradual decrease in the growth rate differential between the CEE countries and Western Europe and even a reversal of the growth ratio between the two groups. One consequence of changing growth patterns would be a decreased rate of income convergence between the two groups of countries and a renewed widening of the income gap. This forecast is highly pessimistic not only because it practically excludes the chance of bridging the income gap toward Western Europe within the lifetime of a single generation for most CEE countries, but also because it foresees very slow growth in real income and wealth (about 1.5%–2% a year in terms of per capita GDP) over the next 50 years for both the EU15 and most CEE countries.

The implications of this scenario for the catching-up process between the CEE countries and Western Europe are shown in Table 2.5. Unlike the first two scenarios, which indicated the length of the period needed to close the income gap, this scenario – because of the stopping or reversal of the convergence process within the forecast horizon – gives only the relative income levels foreseen at the beginning of the consecutive decades and the minimum size of the income gap at the turning point from convergence to divergence (for the countries affected by such a switch). For the sake of simplicity, the relative income levels illustrating the size of the income gap are given only in terms of GDP per capita calculated at PPS. The alternative estimates of the relative income levels against the EU15 in terms of GDP per capita calculated at CER would be much lower. The starting point in this scenario is the year 2014.[8] The initial income gap was calculated against the EU15 average, but the future GDP per capita growth rates for the reference group were assumed to be equal to the EA18 average, as given in the European Commission forecast.

Table 2.5. Closing the income gap – scenario 3

Country	GDP per capita growth rate, 2015–2060 (%)	Income gap (GDP per capita at PPS, EU15 = 100)						The minimum income gap
		2014	2020	2030	2040	2050	2060	
Bulgaria	2.1	43	49	56	60	61	61	.
Croatia	1.7	54	55	57	60	64	66	.
Czech Rep.	1.5	76	78	81	83	84	84	.
Estonia	1.9	67	75	84	88	88	87	.
Hungary	1.6	62	65	72	74	75	73	75(2051)
Latvia	2.4	61	73	89	95	96	97	.
Lithuania	2.3	68	83	96	99	103	105	.
Poland	**1.9**	**63**	**71**	**83**	**88**	**87**	**83**	**88(2044)**
Romania	1.9	49	54	59	62	64	64	64(2054)
Slovakia	1.9	70	77	93	97	94	92	97(2038)
Slovenia	1.3	76	76	79	80	80	80	.
EU15	1.3	100	100	100	100	100	100	.

Source: Own calculations based on data from Eurostat (2015) and the European Commission (2014b), Jan. 25, 2015.

[8] In our previous presentation of this scenario, included in the last two issues of this report, we took 2010 as the starting point. But earlier presentations of this scenario were based on another set of input data (taken from an earlier long-term economic and demographic forecast published by the European Commission in 2012), so the results are not directly comparable.

Table 2.5 shows that starting in about 2030, due mainly to unfavorable demographic trends (taking into account presumed migration), for most CEE countries the growth advantage over Western Europe will diminish or disappear completely. In the second half of the forecast period, four countries in the group, including Poland, will switch from convergence to divergence, while most other countries will stay at about the same relative income level against the EU15 that they have already reached, without any chance of closing the remaining income gap (at least not until 2060). Only two CEE countries may close their income gap within the next 50 years: Lithuania can do that around 2040, and Latvia may be on the right track to do so shortly after 2060. The least developed countries in the group, Croatia, Bulgaria, and Romania, will cease reducing their income gap toward Western Europe around 2040 or somewhat later, stopping at 60%–65% of the average income level seen in the EU15. Hungary will probably remain at about 75% of the Western average, Slovenia will reach no more than 80%, and the Czech Republic will muster no more than 85%. Poland is expected to reach 88% of the average income level in the EU15 around 2045, and after that date its income gap to Western Europe will begin to increase. A renewed divergence may also appear in Slovakia, Hungary, and Romania. Of course, this scenario does not give any indication as to the further development of the convergence vs. divergence process after 2060, which is beyond the time scope of the forecast.[9]

One can hope that this depressing scenario, precluding any chance of bridging the development and income gap between CEE and Western Europe within the lifetime of one generation, will not come true. Nevertheless, the possibility of such undesirable developments, under *laissez-faire* conditions, cannot be ignored. Notably, the reliability of the alarming forecast announced by the European Commission is supported by similar results obtained in another long-term growth projection prepared by the OECD (OECD, 2014). In order to prevent this scenario, well-coordinated, multidirectional efforts must be made as soon as possible by the governments of the countries concerned, accompanied by action as part of common European policy, aimed at overcoming the emerging threats to future economic growth. In the case of Poland, a complex development program is needed, dedicated to the maintenance and acceleration of economic growth. Such a program should focus on correcting unfavorable demographic trends, creating better institutional conditions for enterprise development, further expanding and modernizing the infrastructure, improving the use of

[9] Our former calculations for this scenario, based on an earlier European Commission long-term forecast for the same time horizon (European Commission, 2012), were even more depressing, suggesting a reversal of the convergence process around 2040 or 2045 in all CEE countries except Bulgaria (Croatia was not yet included in the European Commission forecast at the time). Cf. Matkowski, Próchniak, 2014; Matkowski, Próchniak, Rapacki, 2013, 2014.

existing labor and material resources, and promoting education, knowledge and innovativeness – all these crucial factors of growth in a highly competitive international environment.[10]

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[10] For more on the implications of this forecast for Poland's future development see: Rapacki, 2012, Rapacki and Próchniak, 2013, Matkowski, 2013, Matkowski, Próchniak, Rapacki, 2013, 2014.

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Chapter 3

Income Inequality, Poverty and Other Selected Aspects of Social Exclusion in Poland

Patrycja Graca-Gelert

This chapter outlines the main income inequality and poverty trends in Poland compared with other European Union countries from 2007 to 2013. This edition of the report presents a general characteristic of social exclusion and examines other aspects of this problem besides income inequality and poverty.

Income inequality and poverty in Poland from 2007 to 2013

There are many ways of measuring income inequality, based on applying different inequality measures, definitions of income, equivalence scales,[1] data sources, and different reference units, such as persons or households.[2] The differences in these various measurements are responsible for most of the divergence in the results of income inequality estimations. In this chapter, we analyze income inequality using mainly the Gini coefficient, which is one of the most often used income inequality measures. The Gini coefficient shows income inequality across the income distribution spectrum and ranges from 0 for perfect equality to 1 for extreme inequality.

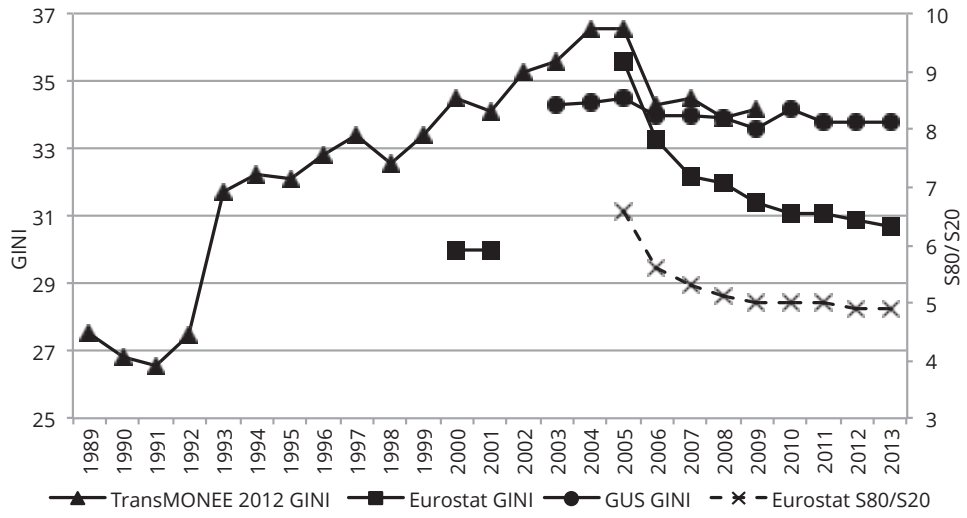
Figure 3.1 shows income inequality in Poland. The differences between the data from different sources are clearly visible and result from the aforementioned problems. Nevertheless, income inequality measured by the Gini coefficient revealed a slightly decreasing yet extinguishing trend in recent years. Another inequality measure, the

[1] Since households differ in the number of persons and demographic composition, it is necessary to transform household income into comparable welfare measures. Equivalence scales make such a transformation possible. In order to obtain income per equivalent unit, household income has to be divided by the weighted number of persons in the household. In this chapter we refer mainly to the modified OECD equivalence scale, which assigns a value of 1 to the household head, 0.5 to each person aged 14 and above, and 0.3 to each child. Poland's Central Statistical Office (GUS) applies the original OECD equivalence scale in the case of relative and subsistence poverty (with weights of 1, 0.7 and 0.5 respectively).

[2] The choice of the reference unit is important because it results in different income distributions and interpretations of income inequality.

S80/S20 income quintile share ratio, which is shown in Figure 3.1, yields similar results. The S80/S20 income quintile share ratio is used by Eurostat as an alternative income inequality measure and is calculated as the ratio of total income received by the 20% of the population with the highest income to that received by the 20% of the population with the lowest income. Although this chapter concerns income inequality in Poland from 2007 to 2013, Figure 3.1 presents income disparities from the beginning of the systemic transition for the sake of comparison. Numerous studies show a substantive decrease in income inequality after 2004.

Figure 3.1. Income inequality[a] in Poland, 1989–2013



Note: [a] TransMONEE – disposable per capita income; Eurostat – equivalized disposable income (per person); GUS – available household per capita income.

Source: Eurostat; TransMONEE 2012 Database, UNICEF Regional Office for CEE/CIS, Geneva; GUS, 2014a, Table 5, p. 287.

Other kinds of quintile share ratios shown in Table 3.1 – calculated as the ratio of the mean income of one quintile group to the mean income of another quintile group – yield somewhat different conclusions. Income inequality measured by the ratio of the mean income of the fifth and first quintiles shows that income disparities have increased since 2010. The III/I quintile ratio indicates that income inequality deepened between the middle- and low-income groups. It is necessary to note that the data in Table 3.1 were not adjusted with an equivalence scale, which may influence the conclusions drawn from the analyzed data.[3]

[3] A similar problem arises in the case of Table 3.

Table 3.1. Households' mean monthly income[a] in Poland by quintile group, 2007–2013

Measure	2007	2008	2009	2010	2011	2012	2013
Total	894.53	1006.57	1071.67	1147.18	1183.66	1232.85	1254.89
I quintile	308.39	343.15	359.95	398.95	389.25	400.45	392.40
II quintile	552.41	631.11	671.72	710.69	739.81	764.16	775.94
III quintile	749.40	853.36	911.55	964.34	1004.32	1046.51	1071.14
IV quintile	1004.19	1140.19	1224.31	1293.95	1342.90	1402.79	1430.24
V quintile	1862.22	2068.89	2196.16	2373.77	2446.12	2556.19	2611.20
V quintile / I quintile	6.04	6.03	6.10	5.95	6.28	6.38	6.65
III quintile / I quintile	2.43	2.49	2.53	2.42	2.58	2.61	2.73
V quintile / III quintile	2.48	2.42	2.41	2.46	2.44	2.44	2.44

Note: [a] Disposable per capita income. Rows 2–6 in Polish zlotys.

Source: Calculated from GUS, (2008-2014a), *Budżety Gospodarstw Domowych*.

Income inequality trends from 2007 to 2013 were different in individual socioeconomic groups (Table 3.2). GUS data indicate that throughout the analyzed period, farmers were the group with the largest income disparities, which diverged substantially from income inequality in other groups. In addition, this socioeconomic group has experienced a steep rise in income disparities since 2010. Since 2007, the lowest income inequality has continuously been recorded among old-age pensioners. Rural income disparities were somewhat higher than urban income inequality throughout the analyzed period and the difference between rural and urban income disparities has widened continually since 2010.

Table 3.2. Income inequality[a] in individual socioeconomic groups in Poland, 2007–2013

Households	2007	2008	2009	2010	2011	2012	2013
Employees	35.2	34.0	34.3	34.7	34.6	34.3	34.1
Farmers	54.8	57.2	53.6	53.3	53.9	55.9	59.9
Self-employed	41.3	38.7	37.8	37.5	37.3	38.2	37.4
Old-age pensioners	23.6	24.2	24.1	24.9	24.4	24.2	23.9
Disability pensioners	28.9	29.4	28.7	29.1	29.2	27.9	28.0
Urban	32.5	31.5	31.2	32.3	31.7	31.7	31.2
Rural	34.1	34.3	33.8	33.9	33.7	34.3	35.2

Note: [a] Available per capita income. Income inequality is measured by the Gini index.

Source: GUS, 2014a, Table 5, p. 287.

High income inequality among farmers was accompanied by low mean income in this group (Table 3.3). Moreover, the ratio of farmers' mean income and mean total

income showed the largest variability among all socioeconomic groups. The self-employed showed the highest ratio of income to mean total income from 2007 to 2013. However, this ratio decreased gradually throughout the analyzed period. The lowest relative income position was observed in the case of disability pensioners.

Table 3.3. Relation[a] of socioeconomic groups' mean income to mean total income in Poland, 2007–2013 – main trends

Households	2007	2008	2009	2010	2011	2012	2013
Employees	0.99	1.01	1.01	1.01	1.02	1.01	1.01
Farmers	0.92	0.85	0.80	0.86	0.81	0.86	0.90
Self-employed	1.35	1.28	1.25	1.23	1.22	1.21	1.22
Old-age and disability pensioners	0.99	0.97	0.98	0.97	0.99	1.00	1.01
Old-age pensioners	1.05	1.03	1.04	1.02	1.04	1.05	1.07
Disability pensioners	0.81	0.76	0.77	0.77	0.78	0.77	0.77

Note: [a] Relation of individual socioeconomic groups' mean monthly disposable per capita income to mean monthly disposable per capita income in Poland.

Source: Calculated from GUS, (2008-2014a), *Budżety Gospodarstw Domowych*.

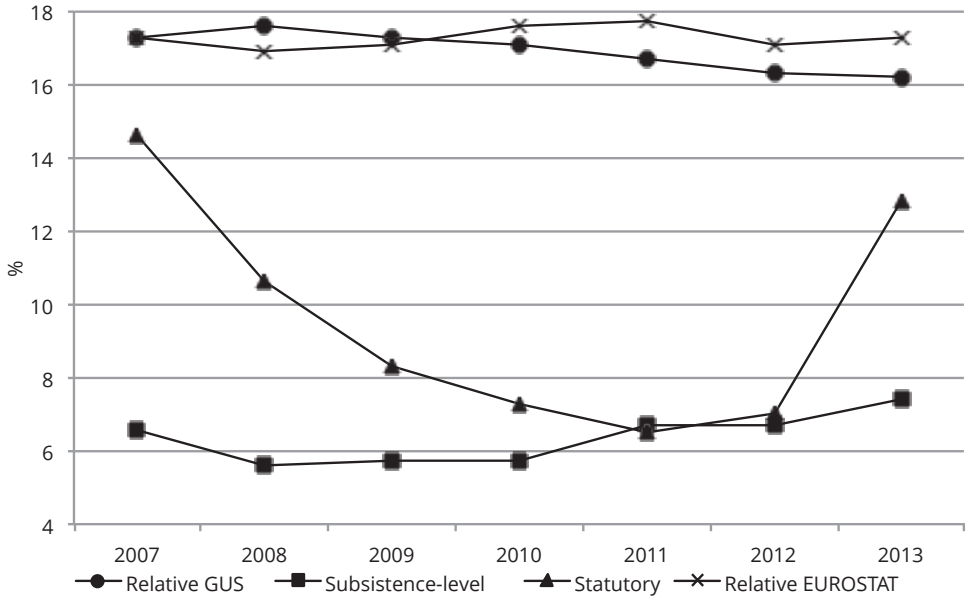
As in the case of income inequality, there are many ways of measuring poverty or being at risk of poverty. Poverty measures are most often classified into absolute and relative.[4] Poland has adopted no single official poverty measure (GUS, 2014a, p. 1). The poverty and at-risk-of-poverty rates in Poland are primarily assessed on the basis of three poverty lines, i.e. a certain level of satisfaction of needs below which households are considered to be poor or at risk of poverty. Poland's Central Statistical Office uses different definitions of poverty lines than Eurostat. First, the economic poverty line is based on expenditures (with the exception of the statutory poverty line) and not disposable income (Eurostat). Second, GUS uses three key poverty measures: the subsistence poverty rate, the statutory poverty rate, and the relative poverty rate. The two first indicators are absolute poverty measures. The subsistence poverty rate is based on the extreme poverty line calculated by the Institute of Labor and Social Studies. Expenditures below the extreme poverty line lead to biological deprivation. The statutory poverty line is the amount of income that entitles a household to social benefits. The relative poverty line is equivalent to 50% of the mean monthly household

[4] In more general terms, poverty measures can also be divided into objective and subjective. In the objective approach, the satisfaction of persons' and households' needs is assessed on the basis of assumptions made independently of the analyzed agents. The subjective approach means that the satisfaction of needs is assessed by the analyzed persons and households themselves. Both objective and subjective poverty can be measured in either absolute or relative terms. Apart from objective poverty, GUS also estimates subjective poverty. Subjective poverty analysis was omitted in this chapter.

expenditures (GUS, 2014a, p. 10). The relative poverty line used by Poland's Central Statistical Office is different from the main Eurostat relative poverty line, which is 60% of the median equivalized disposable income.

For comparison, Figure 3.2 includes all these poverty measures for Poland from 2007 to 2013. The measures yield different conclusions about at-risk-of-poverty trends in recent years. Notably, three of the four indicators – the exception being the relative poverty rate estimated by GUS – showed an increase. However, the large increase in the case of statutory poverty resulted mainly from a change in social intervention thresholds in November 2012 (GUS, 2014a, p. 3). The subsistence levels for all types of households were also increased in 2013.

Figure 3.2. Poverty and the at-risk-of-poverty in Poland at different poverty thresholds, 2007–2013



Source: Eurostat; GUS, (2008-2014a), *Budżety Gospodarstw Domowych*; GUS, (2014b).

Experiencing greater risk of poverty depends on the type and characteristics of the household. Table 3.4 presents data on the at-risk-of-poverty rates at different poverty lines in individual socioeconomic groups. It is clear that households supporting themselves from non-earned sources were the most at risk, while households formed by self-employed individuals were at the least risk of poverty in 2013. Old-age pensioners enjoyed a relatively good situation in this area as well.

In addition, GUS calculations indicate that the groups most at risk of poverty are households with unemployed persons (as reference persons[5]), especially those with a low education level or disabled, and households with many children (GUS, 2013b, p. 16).

Table 3.4. The at-risk-of-poverty rate in individual socioeconomic groups in Poland, 2010–2013

Households	Subsistence level				Statutory				Relative			
	2010	2011	2012	2013	2010	2011	2012	2013	2010	2011	2012	2013
Total	5.8	6.8	6.8	7.4	7.4	6.6	7.2	12.8	17.4	16.9	16.3	16.2
Employees	5.3	5.8	6.2	6.4	7.1	5.9	6.9	12.0	16.6	15.6	15.3	14.9
Farmers	9.0	13.2	11.1	13.4	12.3	13.6	12.2	22.8	26.5	29.3	26.4	26.7
Self-employed	2.3	3.5	2.6	3.9	3.5	3.6	2.6	7.5	9.8	10.0	7.9	9.2
Old-age pensioners	3.8	4.6	4.3	4.8	4.0	3.6	3.6	6.8	13.2	12.5	11.9	11.4
Disability pensioners	9.7	13.0	12.1	13.2	10.1	10.6	10.7	18.2	25.7	26.4	25.8	26.3
Persons supporting themselves from non-earned sources	22.4	22.0	22.6	21.5	26.9	23.3	24.9	34.6	42.0	41.4	41.5	39.0

Source: GUS, 201b, p. 12; GUS, 2013b, p. 18.

Income inequality and poverty in Poland compared with other EU countries from 2007 to 2013

Income inequality in the European Union (EU27 as well as EU28) measured by the Gini coefficient stood at 30.5% in 2013 and increased by 0.1 percentage point compared with the previous year. The Gini coefficient in individual EU countries had values that varied by more than 10 percentage points. In 2013, the highest income inequality was reported in Bulgaria, Latvia, and Lithuania, whereas the highest income disparities were noted in Slovakia, Slovenia, and the Czech Republic. According to Eurostat, income inequality in Poland decreased by 0.2 percentage points, further approaching the EU average. It is interesting to see how social transfers have been effective in decreasing income inequality among EU countries. Eurostat publishes data on income disparities after and before social transfers – including as well as excluding pensions from social transfers (Table 3.5). Generally, though with several exceptions, countries with the lowest income inequality have been the most effective in decreasing

[5] According to GUS, a reference person is a person aged 16 and over who gains the highest permanent in the longer time income of all the household members (GUS, 2014a, p. 36).

income disparities. However, there is a weaker relationship between the initial level of income inequality – i.e. before social transfers including pensions – and income disparities after social transfers. In 2013, countries with the highest income inequality before social transfers were Greece, Germany, and Portugal, while the lowest income inequality before social transfers was recorded in Slovakia, Malta, Slovenia, and the Czech Republic. After excluding pensions from social transfers, the greatest income disparities in 2013 were noted in Ireland (pensions in that country lead to a substantial decrease in income inequality), Lithuania, and the United Kingdom, while Slovakia, the Czech Republic, and Slovenia were the countries with the lowest levels of income inequality. In Poland, the effectiveness with which income disparities were decreased through social transfers was low compared with what happened in other EU countries, regardless of whether we include or exclude pensions from social transfers.

Income inequality rarely changes greatly from one year to the next. Greater (permanent) changes usually occur over a period of several years. Therefore major changes in the rankings of countries by income inequality are not frequent. The greatest increase in this league table compared with the previous year was observed in Bulgaria, Lithuania, Luxemburg, and Hungary, while the greatest decrease was experienced by Spain, the United Kingdom, and Slovakia. The analysis of longer time series yields a better view of changes in income disparities. Among the countries with the biggest changes (more than 2 percentage points) in income disparities from 2007 to 2013 were France (increase), Luxemburg (increase), Cyprus (increase), Hungary (increase), Denmark (increase), Portugal (decrease), the Netherlands (decrease), and the United Kingdom (decrease). By contrast, Bulgaria, Greece, and Italy experienced the smallest changes in income inequality. In many cases the changes in income disparities were not monotonic (Table 3.5). In Poland, income inequality decreased during the analyzed period, according to Eurostat. In total, the decrease was 1.5 percentage points. However, this trend began in 2005 and was one of the most spectacular downward trends in the EU (down by 4.9 percentage points).

In 2013, almost 83.5 million people in the EU28, or 16.7% of the total population, were at risk of poverty. This marked a decrease of almost 1.5 million and 0.2 percentage points from the previous year. The at-risk-of-poverty rate in individual countries had values that varied by almost 15 percentage points. The poverty rates have diverged since 2007. Among the countries with the lowest at-risk-of-poverty rates were the Czech Republic, the Netherlands, and Finland, while the highest at-risk-of-poverty rates were recorded in Greece, Romania, and Bulgaria. Since Eurostat uses the relative approach to measuring poverty, the high (low) poverty rates are usually (at least to some extent) a reflection of high (low) levels of income inequality.

Table 3.5. Income[a] inequality in 2007, 2010, and 2013[b]; Poland compared with other EU countries[c d]

Country/region	2007	2010	2013	2013		
	Gini coefficient (%) after social transfers			Gini coefficient (%) before social transfers (pensions excluded from social transfers)	Gini coefficient (%) before social transfers (pensions included in social transfers)	S80/S20
Slovakia	24.5	25.9	24.2	28.3	41.3	3.6
Slovenia	23.2	23.8	24.4	30.6	44.1	3.6
Czech Republic	25.3	24.9	24.6	28.8	44.1	3.4
Sweden	23.4	24.1	24.9	32.9	53.4	3.7
Netherlands	27.6	25.5	25.1	31.4	44.9	3.6
Finland	26.2	25.4	25.4	33.6	46.5	3.6
Belgium	26.3	26.6	25.9	34.0	47.1	3.8
Austria	26.2	28.3	27.0	33.3	47.0	4.1
Denmark	25.2	26.9	27.5	38.9	53.0	4.3
Malta	26.3	28.6	27.9	32.6	43.8	4.1
Hungary	25.6	24.1	28.0	34.8	51.9	4.2
Germany	30.4	29.3	29.7	36.2	56.4	4.6
Ireland	31.3	30.7	29.9	46	53.5	4.7
France	26.6	29.8	30.1	35.8	50.3	4.5
United Kingdom	32.6	32.9	30.2	39.8	54.5	4.6
Luxembourg	27.4	27.9	30.4	38.1	49.5	4.6
EU28	.	30.5	30.5	36.1	51.2	5.0
EU27	30.6	30.5	30.5	36.0	51.3	.
Poland	**32.2**	**31.1**	**30.7**	**33.9**	**47.7**	**4.9**
Croatia	29.0	31.6	30.9	37.3	49.3	5.3
Cyprus	29.8	30.1	32.4	35.5	45.1	4.9
Italy	32.2	31.2	32.5	34.8	48.9	5.7
Estonia	33.4	31.3	32.9	36.3	48.0	5.5
Spain	31.9	34.4	33.7	38.8	49.3	6.3
Romania	37.8	33.3	34.0	37.0	50.8	6.6
Portugal	36.8	33.7	34.2	38.4	55.9	6.0
Greece	34.3	32.9	34.4	37.0	61.6	6.6
Lithuania	33.8	37.0	34.6	40.2	53.2	6.1
Latvia	35.4	35.9	35.2	38.3	50.8	6.3
Bulgaria	35.3	33.2	35.4	38.1	49.1	6.6

Note: [a] Equivalized disposable income. [b] The 2013 data for Ireland refer to 2012. [c] The countries are sorted by the ascending value of the Gini coefficient after social transfers in 2013. [d] Missing data are marked with a dot.

Source: Eurostat.

In 2013, the at-risk-of-poverty rate in Poland was near the EU average, and Poland recorded an increase by 0.2 percentage points compared with the previous year. However, Poland was one of the countries with the most stable at-risk-of-poverty rates from 2007 to 2013. Among the countries with the greatest changes in poverty (more than 2 percentage points) during the analyzed period were Sweden (increase), Slovenia (increase), Greece (increase), the United Kingdom (decrease), and Romania (decrease).

There is a general negative relationship between the at-risk-of-poverty rate and the absolute level of the poverty threshold (PPS, €; Table 3.6). Low absolute poverty thresholds show the real extent of poverty and living standards of people at risk of poverty against the EU as a whole. Three countries, the Czech Republic, Slovakia, and Hungary, are a visible exception, with a low at-risk-of-poverty rate as well as a low absolute poverty threshold.

Table 3.6. At-risk-of-poverty rates[a] in 2007, 2010, and 2013[b]; Poland compared with other EU countries[c d]

Country/region	2007	2010	2013	2013		
	At-risk-of-poverty rate after social transfers			At-risk-of-poverty rate before social transfers (pensions excluded from social transfers)	At-risk-of-poverty rate before social transfers (pensions included in social transfers)	Poverty threshold PPS, €
Czech Republic	9.6	9.0	8.6	16.6	36.9	13,418
Netherlands	10.2	10.3	10.4	20.8	37.2	24,393
Finland	13.0	13.1	11.8	26.4	41.7	24,086
Denmark	11.7	13.3	12.3	28.1	41.8	24,111
Slovakia	10.6	12.0	12.8	20.1	38.0	12,055
France	13.1	13.3	13.7	24.2	44.7	24,424
Hungary	12.3	12.3	14.3	26.3	49.6	9,465
Austria	12.0	14.7	14.4	25.9	44.1	26,365
Slovenia	11.5	12.7	14.5	25.3	42.3	18,000
Sweden	10.5	12.9	14.8	27.1	42.3	25,864
Belgium	15.2	14.6	15.1	26.3	42.0	24,917
Cyprus	15.5	15.6	15.3	24.3	36.5	22,881
Ireland	17.2	15.2	15.7	39.3	50.4	20,398
Malta	15.1	15.5	15.7	23.3	38.4	19,575
Luxembourg	13.5	14.5	15.9	29.4	45.3	34,355
United Kingdom	18.6	17.1	15.9	30.1	45.2	20,751
Germany	15.2	15.6	16.1	24.4	43.7	24,407
EU27	16.5	16.5	16.6	25.8	44.3	.

Country/region	2007	2010	2013	2013		
	At-risk-of-poverty rate after social transfers			At-risk-of-poverty rate before social transfers (pensions excluded from social transfers)	At-risk-of-poverty rate before social transfers (pensions included in social transfers)	Poverty threshold PPS, €
EU28	**.**	**16.5**	**16.7**	**25.8**	**44.3**	**.**
Poland	17.3	17.6	17.3	23.0	43.0	11,471
Estonia	19.4	15.8	18.6	25.4	39.6	10,773
Portugal	18.1	17.9	18.7	25.5	46.9	11,980
Italy	19.8	18.2	19.1	24.6	45.2	19,331
Latvia	21.2	20.9	19.4	26.0	43.0	8,339
Croatia	18.0	20.6	19.5	29.7	44.6	9,146
Spain	19.7	21.4	20.4	30.0	45.5	17,940
Lithuania	19.1	20.5	20.6	30.3	46.6	9,264
Bulgaria	22.0	20.7	21.0	26.7	41.8	7,629
Romania	24.8	21.1	22.4	27.8	48.2	4,698
Greece	20.3	20.1	23.1	28.0	53.4	11,450

Note: [a] Relative at-risk-of-poverty rates for poverty thresholds at 60% of median equivalized income. [b] The 2013 data for Ireland refer to 2012. [c] The countries are sorted by the ascending value of the at-risk-of-poverty rate after social transfers in 2013. [d] Missing data are marked with a dot.

Source: Eurostat.

An important indicator of poverty is its depth, i.e. the relative at-risk-of-poverty gap, which shows the difference between the median equivalized disposable income of people below the at-risk-of-poverty threshold and the at-risk-of-poverty threshold – in this case 60% of the median of the equivalized disposable income – expressed as a percentage of this threshold. In 2013, the relative at-risk-of-poverty gap was 23.5% at the EU28 level, which means that one-half of the people at risk of poverty had an income below 76.6% of the poverty threshold, i.e. below 45.9% (76.5%×60%) of the median of equivalized disposable income. In 2013, the countries with the lowest at-risk-of-poverty rate, Finland, the Netherlands, and the Czech Republic, experienced the lowest relative at-risk-of-poverty gap. The situation was analogous in the case of those countries that experienced a high at-risk-of-poverty rate – Greece, Romania, Spain, and Bulgaria – where the depth of poverty was also substantial. The relative at-risk-of-poverty gap in Poland in 2013 was somewhat below the EU average and increased by 1.2 percentage points over the last two years.

The depth of poverty can also be shown using data on income distribution around the individual poverty thresholds. In this case the reference poverty threshold is 60% of the median of the equivalized disposable income (Table 3.7).

Table 3.7. Relative at-risk-of-poverty gap in 2007, 2010 and 2013[a]; Poland compared with other EU countries[b c]

Country/region	2007	2010	2013	2013[c]		
	Relative at-risk-of-poverty gap			40%/60%	50%/60%	70%/60%
Finland	14.1	13.8	15.0	18.6	45.8	172.9
Netherlands	17.0	16.2	16.5	24.0	50.0	179.8
Czech Republic	18.1	21.1	16.6	26.7	50.0	183.7
France	17.9	19.5	16.6	21.9	49.6	158.4
Luxembourg	18.8	18.6	17.5	22.0	52.8	161.6
Cyprus	19.7	18.0	17.7	20.3	52.9	158.2
Ireland	17.6	15.5	19.1	29.9	56.1	150.3
Malta	18.1	17.3	19.1	20.4	56.7	161.1
Belgium	17.8	18.0	19.2	25.8	55.0	160.9
United Kingdom	22.4	21.4	19.6	27.7	56.6	156.6
Sweden	20.3	19.7	19.8	30.4	55.4	149.3
Germany	23.2	20.7	20.4	26.1	58.4	144.7
Slovenia	19.4	20.2	20.4	25.5	58.6	147.6
Austria	17.0	21.8	21.3	34.0	59.7	149.3
Estonia	20.2	23.2	21.5	36.0	58.1	143.5
Hungary	19.8	16.5	21.7	28.0	61.5	151.0
Poland	**24.0**	**22.2**	**22.6**	**33.5**	**62.4**	**143.9**
Denmark	17.0	21.6	23.7	39.0	57.7	168.3
EU28	.	23.5	23.8	34.1	61.1	147.3
EU27	23.2	23.4	23.8	34.3	61.4	148.2
Slovakia	19.2	25.7	24.1	38.3	60.9	150.0
Lithuania	25.7	32.6	24.8	32.5	63.6	135.4
Portugal	24.3	22.7	27.3	42.8	67.4	136.4
Latvia	24.8	28.9	27.5	41.8	66.5	144.8
Italy	22.4	24.5	28.0	43.5	64.9	143.5
Croatia	23.0	27.6	28.1	42.1	69.2	133.8
Bulgaria	33.5	29.6	30.9	45.7	71.9	131.4
Spain	25.9	32.3	30.9	45.6	68.1	140.2
Romania	34.8	30.6	32.6	48.7	72.8	135.7
Greece	26.0	23.4	32.7	48.1	71.9	135.9

Note: [a] The 2013 data for Ireland refer to 2012. [b] The countries are sorted by the ascending value of the at-risk-of-poverty gap in 2013. [c] The three columns below show the relations of the at-risk-of-poverty rates at the 40%, 50%, and 70% poverty thresholds and the at-risk-of-poverty rate at 60% of median equivalized income (in %). [c] Missing data are marked with a dot.

Source: Eurostat; own calculation based on Eurostat data.

In the case of Poland, the "40%/60%" indicator at 33.5% means that 33.5% of the people at risk of poverty at the 60% poverty threshold were also at risk of poverty at the 40% poverty threshold. In other words, 66.5% of the population had an equivalent disposable income between 40% and 60% of the median of the equivalized disposable income. The lower the "40%/60%" indicator, the larger is the concentration of income around the 60% poverty threshold (the reverse holds true for the "70%/60%" indicator). In the case of countries with a high "40%/60%" indicator, the depth of poverty has to be assessed as substantial.

Social exclusion: selected aspects

Social exclusion (SE) is a complex issue that has been thoroughly and widely described in the literature from a theoretical perspective. However, the translation of the concept into empirical terms has been difficult and rather unsatisfactory to date. The estimation of SE, especially using aggregated indices, and the theoretical concept differ significantly. In addition, the way in which researchers in different countries understand SE varies. Here are a few of the many definitions of SE:

1) "Structural, institutional or agentive processes of repulsion or obstruction." (Fischer, 2011, p. 17).
2) "A way of analyzing how and why individuals and groups fail to have access to or benefit from the possibilities offered by societies and economies." (Fischer, 2011, p. 5).
3) "The process through which individuals or groups are wholly or partially excluded from the society in which they live." (Hickey, Du Toit, 2007, p. 2).
4) "A dynamic process of progressive multidimensional rupturing of the 'social bond' at the individual and collective levels. … Social exclusion precludes full participation in the normatively prescribed activities of a given society and denies access to information, resources, sociability, recognition, and identity, eroding self-respect and reducing capabilities to achieve personal goals." (Silver, 2007, p. 1).
5) "Complete social exclusion is the final culmination of a series of specific exclusions from basic rights." (De Haan, 2000, p. 26).
6) "Social exclusion is (1) multidimensional or socioeconomic, and encompasses collective as well as individual resources, (2) dynamic or processual, along a trajectory between full integration and multiple exclusions, (3) relational, in that exclusion entails social distance or isolation, rejection, humiliation, lack of social support networks, and denial of participation, (4) active, in that there is a clear agency doing the excluding, and (5) relative to context." (Omtzigt, 2009, p. 4).

Most of the sources report that the term "social exclusion" was introduced in 1974 by French politician Rene Lenoir, deputy minister for social action in the government of Jacques Chirac, although some researchers note that the concept of SE was originally formulated in the works of Plato and Aristotle as well as Adam Smith (e.g. Sen, 2000; Omtzigt, 2009). The title of Lenoir's work (*Les exclus: Un français sur dix*, 1974) indicates that SE affected 10 percent of French society at the time and Lenoir himself defined those excluded as "mentally and physically handicapped, suicidal people, aged invalids, abused children, substance abusers, delinquents, single parents, multi-problem households, marginal, asocial persons, and other social 'misfits'" (Sen, 2000, p. 1).

The debate on SE gained momentum in the 1980 s when the problem of a new kind of poverty emerged, an "underclass" unable to partake of the benefits of economic growth (Silver, 2007). The notion of SE was introduced to development studies in 1993 when the International Institute of Labor Studies – the International Labor Organization's research arm – and the United Nations Development Program began to study the issue (Fischer, 2011). In subsequent years the concept of SE became more competitive with regard to the British term "poverty" (De Hann, 2000), leading to more intense research and debates on SE.

As mentioned, the concept of SE is understood differently by different researchers. According to Silver (2007), the term SE is ambiguous and its different interpretations result from the fact that the notion of SE is embedded in conflicting social science paradigms and political ideologies. Generally, in many countries the term is interpreted, understood, and used in various ways.[6] The biggest difference in how SE is interpreted on the basis of a variety of historical and philosophical factors is still visible between France and Britain. De Haan (2000) and many other researchers argue that the French use of the term is tied to the idea of social solidarity and is thus defined as a rupture of social bonds, while in the British tradition SE tends to reflect the free choice of individuals to shape their relations with other individuals.

Despite the many different definitions of SE, it is possible to identify several common points worked out by researchers in this area.

First, SE should be seen as a process and not a state or outcome reflecting this process. In addition, SE may occur in every social group, regardless of the level of income.

Second, SE is a multidimensional problem because a person or group can be socially excluded in many dimensions[7] – often at the same time (De Haan, 2000).

6 Fischer (2011) provides numerous definitions of SE presented in studies from different countries.

7 Chiefly social, economic, and political dimensions.

These dimensions enter into complex interrelations; they often overlap and can either enhance SE or cancel out in terms of overall impact (Silver, 2007).

Third, two important notions are related to SE – relativity and relationality. Relativity means that SE should be understood differently depending on the country and society. On the other hand, relationality refers to either the intentional act of exclusion or the process of exclusion in one aspect that leads to exclusion in another dimension (Fischer, 2011).

Fourth, SE may be active or passive. However, there is no absolute agreement among researchers about whether or not SE can be passive (see e.g. Sen, 2000 vs. Silver, 2007). Active exclusion implies the intentionality of the exclusion of individuals or social groups through, for example, particular actions and excluders, while passive SE "comes about through social processes in which there is no deliberate attempt to exclude" (Sen, 2000, p. 15) individuals or groups.

Fifth, SE should be analyzed together with the process of social integration or social inclusion, as exclusion often intensifies or arises from different kinds of social inclusion (Fischer, 2011; Sen, 2000). In addition, individuals or social groups may often experience processes of exclusion and inclusion at the same time. This has to be considered when analyzing SE (Silver, 2007).

Sixth, almost every theoretical study on SE contains a comparative analysis of problems related to SE and poverty. Numerous researchers point to differences rather than similarities between SE and poverty, mostly because empirical studies on SE are carried out from the angle of poverty analysis, which is not the best approach to analyzing SE. The notion of SE is often used as a synonym of poverty or being at risk of poverty. However, such a simplification is misleading, for example because it does not include situations when SE occurs in higher income groups, i.e. beyond poverty. In brief, poverty and SE overlap only partially. However, in most of the literature, SE is defined through the notion of poverty or presented by poverty indicators or measures related to poverty at the operational level of analysis. Some studies treat SE as one of the aspects of poverty, while others present poverty as a part of SE (Fischer, 2011). The opposite of SE is a cohesive, inclusive society, whereas a more equal society is the opposite of poverty. Another important difference between SE and poverty is that SE analysis concentrates on horizontal social relations, i.e. it emphasizes the difference of being "in" or "out," while poverty is concerned with vertical social relations, i.e. the difference between being "up" and "down" (Silver, 2007, p. 4).

Seventh, there exists a severe problem of translating SE into empirical terms, that is by measuring or assessing it. As has been mentioned, SE is a multidimensional process. Even though SE should rather be understood as a process of falling into and remaining in deprivation, any attempt at capturing SE empirically leads to presenting

it in a static way – as a state and not a process. Moreover, attempts at assessing SE to date have been imperfect in capturing the concept because it is impossible to present this problem using one synthetic measure. In addition, unlike in the case of poverty or the situation of being at risk of poverty, there are no SE thresholds or SE lines below which people are (totally) excluded. Similarly, it is difficult to imagine a situation when a particular person or group exists entirely outside of society (Silver, 2007). On the other hand, attempts at creating a composite index to measure SE are not free from flaws. First, an integration of indices from three different dimensions – economic, social, and political – is questionable, especially when these indices would change in opposite directions. Second, the weights attached to these indices would be arbitrarily chosen and might not reflect reality, since the weights vary among countries at different stages of development. Third, it would be difficult for policymakers fighting against SE to formulate and implement appropriate policies based on such composite indicators (Bhalla, Lapeyre, 1997).

The measurement and monitoring of SE in the European Union is not free from deficiencies. The SE indicators used by the EU differ from the theoretical concepts of SE. Moreover, the EU uses a composite indicator of SE, which, as mentioned above, has many drawbacks.

The European Union adopted the notion of SE in the 1990s and ever since then, one of the EU's objectives has been monitoring and fighting SE. The Maastricht Treaty as well as the Amsterdam Treaty contain regulations that obligate the EU to combat SE (Maastricht Treaty, 1992, Art. 1, Agreement on Social Policy Concluded Between the Member States of the European Community with the Exception of the United Kingdom of Great Britain and Northern Ireland, p. 127; Amsterdam Treaty, 1997, Amendment to Art. 117 and Art. 118, p. 35–36). A concise clause concerning efforts to combat SE was included in the Nice Treaty (Nice Treaty, 2001, Amendment to Art. 138, p. 17) and the Lisbon Treaty (Lisbon Treaty, 2007, General Provisions, Art. 2 [p. 11] and Art. 5a [p. 49]).

In 2000, the EU adopted a development plan known as the Lisbon Strategy that called for efforts to ensure greater social cohesion (European Commission, 2010). More detailed proposals on ways of monitoring and combating SE were presented at the European Council summit in Leaken in 2001, when 18 indicators were adopted for monitoring poverty and SE as a result of the Lisbon Strategy established at the European Council's 2000 summit. The indicators were divided into two groups: primary indicators (10) covering the most important aspects of SE in EU countries, and secondary indicators (8). The primary Leaken indicators include: 1) at-risk-of-poverty rate by age and gender (1a), by most frequent activity and gender (1b), by household type (1c), by tenure status (1d), at-risk-of-poverty threshold (1e), 2) inequality of income distribution measured with the S80/S20 quintile share ratio, 3) at-persistent-risk-of-

poverty rate by gender (60% median), 4) relative at-risk-of-poverty gap, 5) regional cohesion (dispersion of regional employment rates), 6) long-term unemployment rate, 7) persons living in jobless households, 8) early school leavers not in education or training, 9) life expectancy at birth, 10) self-defined health status by income level. The following indicators are secondary Leaken indicators: 11) dispersion around the at-risk-of-poverty threshold, 12) at-risk-of-poverty rate anchored at a moment in time, 13) at-risk-of-poverty rate before social transfers by gender, 14) inequality of income distribution measured by the Gini coefficient, 15) at-persistent-risk-of-poverty rate by gender (threshold at 50% of the median equivalized disposable income), 16) long-term unemployment share, 17) very long-term unemployment rate, 18) persons with low educational attainment (European Commission/Eurostat, 2003).

In 2003, the EU-SILC (European Union Statistics on Income Living Conditions) project was launched, with the objective of collecting comparable data on income, poverty, SE, and living conditions in EU countries. The EU-SILC surveys started in 2004 within the EU15 (with the exception of Germany, the Netherlands and the United Kingdom) and for Estonia, Norway, and Iceland (Eurostat).

At the EU summit in 2010, the new economic strategy called Europe 2020 was launched, replacing the Lisbon Strategy[8] and aiming to stimulate growth and employment and to enhance the competitiveness of the EU against other economies. One of the priorities of this strategy is to ensure development favorable to social inclusion through the promotion of employment and efforts to combat poverty. The aim is to reduce the number of people at risk of poverty or social exclusion by 20 million by 2020. In addition, one of the seven flagship initiatives of the Europe 2020 strategy is the European platform against poverty and social exclusion, which is designed to help combat poverty and SE. At the end of each year starting from 2011, Annual Conventions take place that provide support for EU countries in fighting poverty and SE. However, individual EU countries are free to choose their own measures and means to combat poverty and SE.

Table 3.8 presents the main indicators for monitoring SE in the EU under the Europe 2020 agreements and the SE targets for individual countries. The countries are sorted by the ascending value of the composite indicator of being at risk of poverty or social exclusion, which incorporates three basic SE dimensions taken into consideration by the EU: the at-risk-of-poverty rate, severe material deprivation, and very low work intensity,[9] with people counted only once even if they are present in more than

[8] The evaluation of the Lisbon Strategy in terms of social exclusion was unsatisfactory (European Commission, 2010).

[9] The definition of the at-risk-of-poverty rate is the same as used above in the analysis of being at risk of poverty in the EU. The definitions of the two other indicators are as follows. The severe material deprivation

one sub-indicator. As can be seen, the groups of countries with the lowest and highest value of the at-risk-of-poverty or social exclusion rate are not very different from the groups of countries with the lowest and highest extent of poverty as presented in the previous part of this chapter. Hungary deserves special attention among all EU countries because it is ranked seventh in terms of the at-risk-of poverty rate, while being ranked 25th overall with the composite indicator due to its severe deprivation rate. Poland is close to the EU average.

Table 3.8. Europe 2020 targets at EU and EU-country[a] level and their realization[b] in 2013[c d]

EU/ EU country	Reduction in the number of people at risk of poverty or social exclusion (in thousands)	At-risk-of-poverty rate	Severe material deprivation (%)	Households with very low work intensity (%)	Aggregated index, i.e. people at risk of poverty or social exclusion (%)	The number of people at risk of poverty or social exclusion (in thousands)
Czech Republic	Maintaining constant the number of people at risk of poverty or social exclusion at the 2008 level (15.3% of the whole population), striving to reduce the number of such individuals by 30,000	8.6	6.6	6.9	14.6	1,508
Netherlands	100	10.4	2.5	9.4	15.9	2,650
Finland	150	11.8	2.5	9.0	16.0	854
Sweden	Reduction in the share of women and men not belonging to the workforce (with the exception of full-time students), long-term unemployed or on long-term sick leave to a level significantly below 14% by 2020	14.8	1.4	7.1	16.4	1,602
France	Reduction in the at-risk-of-poverty rate anchored at a fixed moment in time by one-third from 2007 to 2012 or by 1,600 thousands of persons	13.7	5.1	7.9	18.1	11,229
Austria	235	14.4	4.2	7.8	18.8	1,572

rate defined by Eurostat shows the percentage of people who are unable to pay for at least four of the following items: 1) to pay the rent, mortgage or utility bills, 2) to keep the home adequately warm, 3) to face unexpected expenses, 4) to eat meat or protein regularly, 5) to go on holiday, 6) to buy a television set, 7) to buy a washing machine, 8) to own a car, 9) to have a telephone. Households with very low work intensity are "people of all ages (from 0–59 years) living in households where the members of working age worked less than 20% of their total potential during the previous 12 months" (Eurostat).

EU/ EU country	Reduction in the number of people at risk of poverty or social exclusion (in thousands)	At-risk-of-poverty rate	Severe material deprivation (%)	Households with very low work intensity (%)	Aggregated index, i.e. people at risk of poverty or social exclusion (%)	The number of people at risk of poverty or social exclusion (in thousands)
Denmark	22 (households with low work intensity)	12.3	3.8	12.9	18.9	1,059
Luxembourg	w/o goal	15.9	1.8	6.6	19.0	96
Slovakia	170	12.8	10.2	7.6	19.8	1,070
Germany	330 (long-term unemployment)	16.1	5.4	9.9	20.3	16,212
Slovenia	40	14.5	6.7	8.0	20.4	410
Belgium	380	15.1	5.1	14.0	20.8	2,286
Estonia	Reduction in the at-risk-of-poverty rate (after social transfers) to 15% (from 17.5% in 2010)	18.6	7.6	8.4	23.5	313
Malta	6.560	15.7	9.5	9.0	24.0	99
EU	20,000	16.7	9.6	10.7	24.5	122,649
United Kingdom	Targets enshrined in the 2010 Child Poverty Act	15.9	8.3	13.2	24.8	15,586
Poland	**1,500**	**17.3**	**11.9**	**7.2**	**25.8**	**9,748**
Spain	1,400–1,500	20.4	6.2	15.7	27.3	12,630
Portugal	200	18.7	10.9	12.2	27.4	2,877
Cyprus	27	15.3	16.1	7.9	27.8	240
Italy	2,200	19.1	12.4	11.0	28.4	17,326
Croatia	.	19.5	14.7	14.8	29.9	1,271
Ireland	186 by 2016	15.7	9.8	23.4	30	1,378
Lithuania	170	20.6	16.0	11.0	30.8	917
Hungary	450	14.3	26.8	12.6	33.5	3,285
Latvia	121	19.4	24.0	10.0	35.1	702
Greece	450	23.1	20.3	18.2	35.7	3,904
Romania	580	22.4	28.5	6.4	40.4	8,601
Bulgaria	260	21.0	43.0	13.0	48.0	3,493

Note: [a] The targets of individual EU countries were set in 2011.[b] The countries are sorted by the ascending value of the aggregate at-risk-of-poverty or social exclusion index in 2013.[c] The 2013 data for Ireland refer to 2012. [d] Missing data are marked with a dot.

Source: European Commission and Eurostat.

To conclude, Poland improved its relative as well as absolute position in income inequality, being at risk of poverty and other aspects of social exclusion presented

in this chapter compared with other EU countries. However, this trend is petering out and the indicators are stabilizing. Poland is close to the EU average in all the analyzed dimensions.

Overall, this analysis shows that social exclusion is a complex issue that defies easy evaluation and that the SE indicators used in the EU capture only a part of the issue. In principle, social exclusion can only be assessed satisfactorily in its economic dimension and shown in static rather than dynamic terms.

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Chapter 4

The Impact of the Global Crisis on the Competitiveness of Poland's Foreign Trade and Balance of Payments in 2007–2014

Mariusz-Jan Radło

This chapter traces changes in Poland's foreign trade and export competitiveness, and it also examines how the country's balance of payments evolved from 2007 to 2014. The analysis focuses on the short- and medium-term impact of the global economic crisis on Poland's international trade and balance of payments.

Although the study covers the 2007–2014 period, in some cases it does not cover all of 2014 due to the lack of available statistics. Four major sources of statistical data are used in the study: the National Bank of Poland (NBP), the Central Statistical Office, the OECD, and Eurostat.

Apart from the introduction, conclusions and references, this chapter contains five logically interrelated sections. The first section offers general information on the evolution of Poland's exports, imports, and balance of payments. The second section presents a detailed analysis of the commodity structure of Poland's exports and imports and of how it has changed during the analyzed period. This section also examines revealed comparative advantage (RCA) indices. The third section analyzes changes in the structure of service exports and imports, and it also provides an analysis of revealed comparative advantage indices. The fourth section discusses the geographical structure of Poland's exports. The fifth part looks at changes in the balance of payments during the analyzed period. All five sections are then summarized.

The value of exports and imports

The data in Table 4.1 show that the value of Poland's goods and services exports (in current prices and in euro terms) increased by 58.5%, from €121.2 billion in 2007 to €192.1 billion in 2014. The value of goods and services imports increased by only 40%, from €132 billion to €184.9 billion.

In the first six years of the studied period, Poland recorded a deficit in the trade of goods and services; in the last two years of the period – in 2013 and 2014 – it recorded a surplus. This was in part due to a significant reduction in the country's trade-of-goods deficit as a result of which this trade was practically balanced in 2013 and 2014. Previously, from 2007 to 2012, Poland had deficits in the trade of goods that ranged from €7 billion to €22 billion. Another reason was that Poland's surplus in the trade of services at the end of the analyzed period was significantly higher than at the beginning of the period. The surplus was €6.2 billion in 2012, followed by €8 billion in 2013, and €7.2 billion in 2014, up from around €5 billion in 2007–2009. As a result of these developments, Poland recorded a €7.2 billion surplus in the trade of goods and services in 2014. The trade of goods was balanced while the trade of services showed a surplus.

Table 4.1. Poland's international trade in goods and services in 2007–2014 (€ billion)

	2007	2008	2009	2010	2011	2012	2013	2014
Trade in goods								
Exports of goods	98.1	112.7	95.3	117.9	132.3	140.8	148.9	157.7
% of total exports	80.9	81.2	80.9	81.5	81.8	81.5	81.5	82.1
Imports of goods	114.2	135.5	102.6	128.3	144.7	148.0	148.2	157.7
% of total imports	86.6	86.6	85.5	84.6	85.7	85.1	85.2	85.3
Balance of trade in goods	–16.1	–22.8	–7.3	–10.4	–12.4	–7.2	0.7	–0.03
Trade in services								
Exports of services	23.1	26.0	22.5	26.7	29.3	32.0	33.8	34.4
% of total exports	19.1	18.8	19.1	18.5	18.2	18.5	18.5	17.9
Imports of services	17.7	20.9	17.4	23.4	24.2	25.8	25.8	27.2
% of total imports	13.4	13.4	14.5	15.4	14.3	14.9	14.8	14.7
Balance of trade in services	5.4	5.1	5.1	3.3	5.1	6.2	8.0	7.2
Trade in goods and services								
Exports of goods and services	121.2	138.7	117.8	144.6	161.6	172.8	182.7	192.1
Imports of goods and services	131.9	156.4	120.0	151.7	168.9	173.8	174.0	184.9
Balance of trade in goods and services	–10.7	–17.7	–2.2	–7.1	–7.3	–1.0	8.7	7.2

Notes: The values of goods and services exports and imports are based on data from balance-of-payments statistics. The 2014 data are based on preliminary monthly figures.

Source: Author's elaboration based on NBP data.

The data in Table 4.1 shows that goods accounted for a steadily increasing proportion of Poland's total exports during the analyzed period. In 2007, goods accounted

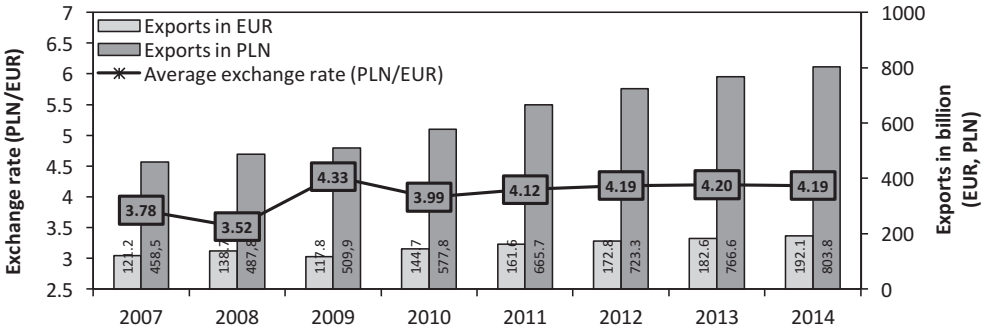
for 80.9% of Poland's total exports; by 2014 the figure had increased to 82.1%. The nominal value of goods exports increased by 60.8% during this period, from €98.1 billion in 2007 to €157.7 billion in 2014. Parallel to these changes, the proportion of services exports in the country's total exports fell from 19.1% to 17.9% in the studied period despite an increased nominal value of these exports, from €23.1 billion in 2007 to €34.4 billion in 2014. The value of goods imports increased by 38.1% during the analyzed period, and their proportion in total imports decreased from 86.6% to 85.3%. The value of services imports increased by 40.1% in 2007–2014, and their proportion in total imports increased from 13.4% to 14.7%.

The decline of global trade in the wake of the crisis also had a significant impact on the Polish economy after 2007. In 2009, the value of Poland's exports fell by almost €21 billion, from €138.7 billion in 2008 to €117.8 billion in 2009. The decrease applied to both goods and services; goods exports decreased by about €17.4 billion, and services exports fell by about €3.6 billion. A much greater decline was recorded on the import side in 2008–2009. It resulted mainly from reduced imports of goods. In total, Poland's imports fell by €36.5 billion in 2009 compared with 2008 (from €156.5 billion to €120 billion), with goods imports shrinking by €32.9 billion and services imports decreasing by €3.5 billion.

Changes in exchange rates were an important factor that softened the impact of the 2009 global trade collapse on the Polish economy. As can be seen from the data in Figure 4.1, Poland's goods and services exports fell from €138.7 billion in 2008 to €117.8 billion in 2009. At the same time, the value of exports expressed in Polish zlotys increased from ZL487.8 billion to ZL509.9 billion. These differences resulted from a significant rise in the exchange rate of the euro against the zloty, from an average of 3.52 in 2008 to an average of 4.33 in 2009. In 2010, the euro bought 3.99 zlotys on average; in 2011 this rose to 4.12. In 2012–2014 the euro-zloty rate remained stable at around 4.20.

As shown in Table 4.2, the exports-to-GDP ratio increased by 7 percentage points in Poland in 2007–2013, from 40.8% to 47.8%. Throughout the EU28, the increase was 4.9 percentage points during the same period, from 40% to 44.9%. The greatest increases were recorded by the Central and Eastern European countries that joined the EU in 2004 and 2007. The rapid growth of exports in these countries was due to their integration with the EU and the inclusion of these economies into European production and trade chains. Export-oriented Germany recorded the greatest increase in the exports-to-GDP ratio among the largest European economies in 2013, at 50.7%. In other large EU economies, the increase ranged around 30%.

Figure 4.1. Exchange rate fluctuations and their impact on the value of Poland's exports, 2007–2014



Source: Author's elaboration based on NBP data.

Table 4.2. The value of goods and services exports in relation to GDP in the EU, 2007–2013

Economy	2007	2008	2009	2010	2011	2012	2013	Change, p.p., 2007–2013
Austria	58.9	59.3	50.1	54.4	57.3	57.2	57.4	–1.5
Belgium	82.5	84.4	73.7	79.8	85.0	86.1	85.9	3.4
Bulgaria	59.5	58.2	47.5	57.4	66.5	66.7	70.2	10.7
Croatia	42.3	42.1	36.6	39.7	42.3	43.7	43.3	1.0
Cyprus	48.2	45.8	40.8	42.0	43.5	43.5	45.0	–3.2
Czech Republic	68.2	64.4	59.0	66.6	72.9	78.0	78.6	10.4
Denmark	52.2	54.7	47.6	50.4	53.7	54.8	54.9	2.7
Estonia	67.1	71.0	63.8	77.5	87.3	90.2	87.7	20.6
Finland	45.8	46.8	37.3	40.4	41.0	40.6	40.1	–5.7
France	26.9	26.9	23.4	25.5	26.9	27.4	27.2	0.3
Greece	23.8	24.1	19.3	22.2	25.1	27.3	29.1	5.3
Spain	26.9	26.5	23.9	27.4	30.8	32.7	34.1	7.2
Ireland	80.4	83.3	90.2	99.8	102.7	107.8	:	..
Lithuania	53.8	59.6	54.2	67.7	77.2	83.9	86.9	33.1
Luxembourg	175.9	181.8	162.0	170.8	178.3	177.3	175.7	–0.2
Latvia	42.5	43.1	43.9	53.6	58.8	61.6	59.7	17.2
Malta	92.2	91.8	81.8	90.6	97.1	102.1	93.7	1.5
Netherlands	74.2	76.3	68.6	78.7	83.9	88.0	88.3	14.1
Germany	47.2	48.2	42.5	47.6	50.6	51.8	50.7	3.5
Poland	**40.8**	**39.9**	**39.4**	**42.2**	**45.1**	**46.7**	**47.8**	**7.0**
Portugal	32.2	32.4	28.0	31.3	35.7	38.7	40.7	8.5

Economy	2007	2008	2009	2010	2011	2012	2013	Change, p.p., 2007–2013
Romania	29.3	30.4	30.6	35.4	40.0	40.6	42.2	12.9
Slovakia	86.9	83.5	70.6	80.4	89.5	96.6	97.6	10.7
Slovenia	69.5	67.9	59.4	66.8	73.0	76.1	78.1	8.6
Sweden	51.9	53.5	48.0	49.5	49.9	48.5	45.8	–6.1
Hungary	81.3	81.7	77.6	85.1	91.6	94.7	96.2	14.9
Italy	28.9	28.5	23.7	26.6	28.8	30.2	30.4	1.5
UK	26.6	29.4	28.4	30.1	32.1	31.8	31.4	4.8
EU28	**40.0**	**41.2**	**36.9**	**40.9**	**43.8**	**44.9**	**44.9**	**4.9**

Source: Author's elaboration based on Eurostat data (nama_exi_c).

Trade in goods

The data on the balance of trade in goods in Table 4.3, broken down into intermediate, capital, and consumer goods, show that Poland recorded the greatest deficit in the trade of intermediate goods. In 2007–2014 this deficit ranged from €15.7 billion to €23.5 billion. Poland's deficit in the trade of capital goods in 2007–2014 decreased from €10 billion to €2.8 billion, while the surplus in the trade of consumer goods persisted throughout the studied period and increased from €11.3 billion in 2007 to €21.3 billion in 2014.

As shown in Table 4.3, intermediate goods accounted for 50.4% of the total value of Poland's goods exports in 2014, 4 percentage points less than in 2007, and the nominal value of intermediate goods exports increased by €27.6 billion from 2007 to 2014. Intermediate goods accounted for 61.4% of the total value of Poland's goods imports in 2014, echoing the 61.6% share posted at the beginning of the analyzed period. Intermediate goods imports grew in step with total goods imports in the studied period, rising from €72.5 billion to €100.2 billion.

Capital goods accounted for 14.5% of total goods exports in 2014, 3 percentage points more than in 2007, with a nominal increase of €12.2 billion. The proportion of these goods in total goods imports during the period fell from 18.5% to 16.4%, while in nominal terms they increased from €21.7 billion to €26.7 billion. Consumer goods were responsible for 35.1% of the total value of goods exports in 2014, 0.9 percentage points more than in 2007, increasing by €22.9 billion in nominal terms. The proportion of consumer goods in total goods imports increased from 20% to 22.3%, growing by €12.9 billion in nominal terms.

These data mean that Poland's foreign trade is dominated by international linkages within global value chains, and that Poland is both a supplier and a recipient

of intermediate goods. Poland's upstream linkages within global value chains were stronger than downstream linkages within these chains. This was due to the fact that intermediate goods imports met demand created by domestic production processes. It is only in the middle of these global production value chains that the upstream linkages of the Polish economy are stronger than its downstream linkages. In 2007–2014 Poland strengthened its position at the end of the production chains as an exporter and supplier of goods, including consumer goods and capital goods, to final recipients.

Table 4.3. Changes in the value of Poland's exports and imports of intermediate, capital and consumer goods, € billion, 2007–2014

Years	Intermediate			Capital			Consumer		
	Imports	Exports	Balance	Imports	Exports	Balance	Imports	Exports	Balance
2007	72.5	55.3	–17.2	21.7	11.7	–10.0	23.5	34.8	11.3
2008	84.1	60.6	–23.5	24.8	14.7	–10.0	29.1	40.2	11.1
2009	61.4	45.7	–15.7	18.5	12.7	–5.8	24.7	39.1	14.4
2010	80.1	59.9	–20.2	22.2	15.0	–7.1	29.1	45.3	16.2
2011	93.3	70.3	–23.0	23.9	17.4	–6.6	30.3	47.7	17.5
2012	95.0	74.7	–20.3	24.6	19.4	–5.2	30.9	50.0	19.2
2013	93.9	78.0	–15.9	25.8	22.3	–3.5	32.8	53.8	21.0
2014	100.2	82.9	–17.3	26.7	23.9	–2.8	36.4	57.7	21.3
Change 2008–2009	–22.7	–14.9		–6.3	–2.0	4.3	–4.5	–1.1	
2009 (2008=100)	73.0	75.4	2.4	74.6	86.3		84.7	97.2	12.5
Change 2007–2014	27.7	27.6	–0.1	5.0	12.2	7.2	12.9	22.9	10.0
2014 (2007=100)	138.3	149.8		123.1	203.9		154.8	166.0	

Source: Author's elaboration based on Eurostat data (ext_st_28msbec).

During the crisis, changes in global economic trends had a varying impact on trade in intermediate, capital and consumer goods. In terms of exports, intermediate goods turned out to be far more sensitive to the global downturn than capital and consumer goods. Consumer goods were the least sensitive. In 2009, the value of intermediate goods exports represented 75.4% of their 2008 level, while the corresponding figures for capital goods and consumer goods were 86.3% and 97.2% respectively.

The greater vulnerability of intermediate goods to the crisis after 2007 is not surprising. Companies were more likely to reduce their inventories and procurement of raw materials and components during the crisis and afterward in order to reduce costs and production. At times of crisis, firms often decide to concentrate their business in the parent company in order to restore their position and protect their existence (Drauz, 2013). In periods of economic recovery, trade in intermediate goods

tends to grow faster than trade in final goods (Sturgeon and Memedovic, 2011). Demand for intermediate goods increases because such goods enable companies to revive production after a period of recession and the related aversion to fixed capital investment and potentially greater propensity to outsource. Outsourcing tends to increase as a result of a crisis because companies seek to reduce costs and increase their operational flexibility in order to decrease their vulnerability to future crises. However, throughout the 2007–2014 period, greater relative increases in exports were recorded for final goods, including capital and consumer goods, than in the case of intermediate goods.

Table 4.4. Changes in the value of Poland's exports and imports of intermediate goods, capital and consumer goods, % of imports/exports, 2007–2014

Year	Intermediate		Capital		Consumer	
	Imports	Exports	Imports	Exports	Imports	Exports
2007	61.6	54.3	18.5	11.5	20.0	34.1
2008	60.9	52.4	17.9	12.7	21.1	34.8
2009	58.7	46.9	17.7	13.0	23.6	40.1
2010	61.0	49.9	16.9	12.5	22.1	37.6
2011	63.2	51.9	16.2	12.8	20.5	35.3
2012	63.2	51.8	16.3	13.5	20.5	34.7
2013	61.6	50.6	16.9	14.5	21.5	34.9
2014	61.4	50.4	16.4	14.5	22.3	35.1
Change 2008–2009	–2.2	–5.5	–0.2	0.3	2.5	5.3
Change 2007–2013	–0.2	–4.0	–2.1	3.0	2.3	0.9

Note: The above estimates of the proportions of individual types of goods in total trade omit goods not included in any of the above categories. The value of such goods usually did not exceed 1%–2%.

Source: Author's elaboration based on Eurostat data (ext_st_28msbec).

Changes in revealed comparative advantage (RCA) indices in the trade of intermediate, capital and consumer goods indicate that Poland had high revealed comparative advantages in the trade of consumer goods in 2007–2014. Poland's revealed comparative advantage in the trade of capital goods also improved steadily. By contrast, the country's RCA indices in the trade of intermediate goods deteriorated (see Table 4.5).

The commodity structure of Poland's trade in goods changed significantly in the analyzed period. The data in Table 4.6 show that in exports Poland recorded higher relative and nominal growth than in imports in 2007–2013 in all commodity groups except for "goods not elsewhere specified" (n.e.s.). The greatest relative increases in the value of imports in the studied period were recorded in the case of animal and vegetable

oils, fats and waxes (by 76.8%); food and live animals (about 76%); and mineral fuels, lubricants and related materials (46%). The smallest increases in imports were recorded for machinery and transport equipment (19.5%), and manufactured goods (3.7%). Imports decreased in the case of "commodities and transactions, n.e.s." On the export side, the greatest relative growth was recorded for beverages and tobacco (137.4%), and for animal and vegetable oils and fats and waxes (133.9%). The lowest rise in exports was recorded in the case of manufactured goods (29.4%), machinery and transport equipment (36.4%), and "miscellaneous manufactured articles" (49.5%). Exports decreased in the case of "commodities and transactions, n.e.s."

Table 4.5. Revealed comparative advantages (RCA) in Poland's trade of intermediate, capital and consumer goods, 2007–2014

Goods	2007	2008	2009	2010	2011	2012	2013	2014
Intermediate	–0.13	–0.15	–0.23	–0.20	–0.20	–0.20	–0.20	–0.20
Capital	–0.47	–0.34	–0.30	–0.30	–0.24	–0.19	–0.15	–0.12
Consumer	0.54	0.50	0.53	0.53	0.54	0.53	0.48	0.45

Source: Author's elaboration based on NBP data.

The following commodities were the most vulnerable to global crisis and the collapse of global trade in 2009:

- In imports: commodities and transactions, n.e.s.; mineral fuels, lubricants and related materials; crude materials, inedible, except fuels; animal and vegetable oils, fats and waxes; and manufactured goods;
- In exports: mineral fuels, lubricants and related materials; crude materials, inedible, except fuels; manufactures goods; and commodities and transactions, n.e.s.

The following commodities were relatively resistant to the global crisis and the 2009 collapse of global trade:

- In imports: beverages and tobacco; food and live animals; miscellaneous manufactured articles; and chemicals and related products, n.e.s.;
- In exports: beverages and tobacco; food and live animals; machinery and transport equipment; and miscellaneous manufactured articles.

The differences in the resilience of different commodities to the global crisis and the collapse of world trade were in line with a general trend whereby demand for durable consumer goods and intermediate goods falls rapidly in times of crisis, while demand for goods related to current consumption is relatively stable.

No less important were changes in the commodity structure of Poland's trade in goods, combined with changes in the country's revealed comparative advantages indices in 2007–2013. Table 4.7 shows that the following commodity groups accounted

for the highest percentage of total imports in 2013: machinery and transport equipment (33.65%); manufactured goods (17.2%); chemicals and related products (14.25%); mineral fuels, lubricants and related materials (11.63%); and miscellaneous manufactured articles (9.01%). Together these goods accounted for 85.74% of the total value of goods imports. Their proportion in total imports decreased by 1.43 percentage points in 2013 compared with 2007. The highest proportions of total exports in 2013 were noted in the case of: machinery and transport equipment (37.91%), manufactured goods (20.08%), miscellaneous manufactured articles (12.81%), food and live animals (10.96%), and chemicals and related products (9.17%). Together these commodity groups accounted for 90.93% of total goods exports and their share in exports decreased by 0.81 percentage points in 2013 compared with 2007.

Table 4.6. Changes in the value of Poland's goods exports and imports, 2007–2013 and 2008–2009

Commodity group	Imports		Exports	
	2013 (2007=100)	2009 (2008=100)	2013 (2007=100)	2009 (2008=100)
Food and live animals	176.0	86.4	194.0	89.6
Beverages and tobacco	139.9	87.2	237.4	124.8
Crude materials, inedible, except fuels	139.4	62.6	159.0	66.0
Mineral fuels, lubricants and related materials	146.6	59.0	183.4	57.7
Animal and vegetable oils, fats and waxes	176.8	65.0	233.9	78.8
Chemicals and related products, n.e.s.	139.7	76.6	186.2	79.2
Manufactured goods	103.7	65.9	129.4	71.0
Machinery and transport equipment	119.5	71.3	136.4	83.1
Miscellaneous manufactured articles	134.1	83.4	149.5	82.6
Commodities and transactions, n.e.s.	83.6	38.7	32.9	78.4

Source: Author's elaboration based on OECD data.

Poland's revealed comparative advantage indices were positive throughout the analyzed period in five categories of goods: beverages and tobacco (0.37 in 2007 and 0.74 in 2013), food and live animals (0.46 in 2007 and 0.40 in 2013), miscellaneous manufactured articles (0.40 in 2007 and 0.35 in 2013), manufactured goods (0.09 in 2007 and 0.15 in 2013), and machinery and transport equipment (0.15 in 2007 and 0.12 in 2013). The lowest RCA indices were recorded in the following commodity groups: commodities and transactions, n.e.s. (–1.12 in 2007 and –2.22 in 2013), mineral fuels, lubricants and related materials (–0.97 in 2007 and –0.91 in 2013), chemicals and related products (–0.57 in 2007 and –0.44 in 2013), animal and vegetable oils, fats and

waxes (–0.5 in 2007 and –0.38 in 2013), and "crude materials, inedible, except fuels" (–0.27 in 2007 and –0.3 in 2013).

Table 4.7. The structure of Poland's trade in goods and the country's revealed comparative advantages, 2007–2013

Commodity group	2007	2008	2009	2010	2011	2012	2013
Imports							
Food and live animals	5.23	5.55	6.87	6.52	6.50	6.94	7.35
Beverages and tobacco	0.57	0.51	0.63	0.63	0.59	0.63	0.64
Crude materials, inedible, except fuels	2.95	3.00	2.69	2.99	3.43	3.42	3.28
Mineral fuels, lubricants and related materials	9.94	11.34	9.57	10.89	12.79	13.65	11.63
Animal and vegetable oils, fats and waxes	0.33	0.40	0.37	0.36	0.49	0.50	0.47
Chemicals and related products, n.e.s.	12.78	12.75	13.97	14.20	14.15	13.84	14.25
Manufactured goods	20.77	18.35	17.30	17.62	18.10	17.17	17.20
Machinery and transport equipment	35.26	34.93	35.65	34.49	31.72	31.97	33.65
Miscellaneous manufactured articles	8.42	8.83	10.54	10.10	9.73	8.90	9.01
Commodities and transactions, n.e.s.	3.75	4.34	2.41	2.21	2.48	2.98	2.51
Exports							
Food and live animals	8.30	8.27	9.31	9.16	9.24	10.32	10.96
Beverages and tobacco	0.83	0.91	1.43	1.32	1.26	1.35	1.34
Crude materials, inedible, except fuels	2.25	2.16	1.79	2.26	2.30	2.30	2.43
Mineral fuels, lubricants and related materials	3.76	4.25	3.08	4.15	4.90	5.00	4.70
Animal and vegetable oils, fats and waxes	0.20	0.21	0.21	0.21	0.20	0.23	0.32
Chemicals and related products, n.e.s.	7.24	7.75	7.72	8.55	8.94	9.10	9.17
Manufactured goods	22.79	21.37	19.08	20.07	21.24	21.03	20.08
Machinery and transport equipment	40.83	41.16	43.01	41.63	39.21	37.78	37.91
Miscellaneous manufactured articles	12.58	12.24	12.72	12.58	12.53	12.43	12.81
Commodities and transactions, n.e.s.	1.22	1.69	1.66	0.07	0.17	0.45	0.27
RCA							
Food and live animals	0.46	0.40	0.30	0.34	0.35	0.40	0.40
Beverages and tobacco	0.37	0.58	0.81	0.75	0.76	0.76	0.74
Crude materials, inedible, except fuels	–0.27	–0.33	–0.40	–0.28	–0.40	–0.39	–0.30
Mineral fuels, lubricants and related materials	–0.97	–0.98	–1.13	–0.96	–0.96	–1.00	–0.91
Animal and vegetable oils, fats and waxes	–0.50	–0.64	–0.58	–0.56	–0.88	–0.78	–0.38
Chemicals and related products, n.e.s.	–0.57	–0.50	–0.59	–0.51	–0.46	–0.42	–0.44
Manufactured goods	0.09	0.15	0.10	0.13	0.16	0.20	0.15
Machinery and transport equipment	0.15	0.16	0.19	0.19	0.21	0.17	0.12
Miscellaneous manufactured articles	0.40	0.33	0.19	0.22	0.25	0.33	0.35
Commodities and transactions, n.e.s.	–1.12	–0.95	–0.37	–3.49	–2.71	–1.88	–2.22

Source: Author's elaboration based on OECD data.

Table 4.8. The proportion of high-tech goods in the total exports of EU countries, 2007–2013

Economy	2007	2008	2009	2010	2011	2012	2013
Greece	4.4	5.0	5.5	4.6	4.1	3.2	2.6
Portugal	6.8	6.3	3.7	3.0	3.1	3.4	3.4
Bulgaria	3.5	3.6	4.6	4.1	3.7	3.8	4.0
Spain	4.2	4.2	4.8	4.8	4.8	5.0	5.5
Slovenia	4.6	5.2	5.5	5.3	5.3	5.2	5.5
Romania	3.5	5.4	8.2	9.8	8.8	6.3	5.6
Lithuania	7.3	6.5	5.8	6.0	5.6	5.8	5.8
Finland	17.5	17.3	13.9	10.0	8	7.3	6.2
Italy	6.0	5.9	6.8	6.5	6.4	6.4	6.6
Poland	3.0	4.3	5.7	6.0	5.1	6.0	6.7
Croatia	6.5	6.7	7.6	7.0	5.8	7.2	6.9
Latvia	4.6	4.6	5.3	4.8	6.7	6.4	8.0
Belgium	6.6	6.8	8.8	8.4	7.7	8.6	8.7
Denmark	11.7	10.7	12.3	9.3	9.3	9.4	9.3
Slovakia	5.0	5.2	5.9	6.6	6.6	8.2	9.5
Sweden	13.3	13.2	14.6	14.5	13.8	12.8	13.0
Germany	13.0	12.4	14.0	14.0	13.5	14.2	14.2
Austria	11.1	10.8	11.7	11.8	11.2	12.8	14.2
Estonia	7.8	7.5	6.9	10.4	14.8	14.1	14.8
Czech Republic	14.1	14.1	15.2	16.1	16.4	16.1	15.0
EU28	16.1	15.4	17.1	16.1	15.4	15.7	15.3
UK	16.8	15.4	19.0	17.6	16.4	17.4	15.4
Hungary	21.3	20.2	22.2	21.8	20.9	17.3	16.1
Netherlands	18.3	16.2	18.4	18.6	17.2	18.8	17.7
Cyprus	14.6	19.1	20.1	19.3	14.8	11.7	18.1
Ireland	25.7	24.3	22.1	18.9	20.3	20.7	19.8
France	16.7	17.6	19.7	20.4	18.7	20.0	20.3
Luxembourg	32.9	35.6	41.9	29.4	25.8	27.1	22.2
Malta	42.8	38.3	35.2	32.9	30.1	29.6	28.6

Source: Author's elaboration based on Eurostat data (htec_si_exp4).

Table 4.8 shows the proportion of high-tech goods in Poland's total exports in the analyzed period. This is yet another indicator that describes the structure and competitiveness of Poland's exports during the period. The data show that the share of high-tech goods in Poland's exports increased from 3% in 2007 to 6.6% in 2013. Interestingly, the proportion of high-tech goods in Poland's exports in 2013 was higher

than in many old EU countries such as Greece, Portugal, Spain, Italy, and Finland.[1] It was also higher than in some of the countries that joined the EU in 2004 and later, including Bulgaria, Slovenia, Romania, and Lithuania. However, the Polish figure was still lower than the EU28 average proportion of high-tech goods in total exports, which ranged from 15.3% to 17.1% in 2007–2013.

Trade in services

Services accounted for 17.9% of Poland's exports and for 14.7% of its imports in 2014. Throughout the 2007–2014 period, Poland recorded a surplus in the trade of services. In 2007–2012, this surplus contributed to a reduction in the country's foreign trade deficit. In 2013 and 2014, services were responsible for nearly all of the surplus in the foreign trade of goods and services. Detailed data on trade in services is presented in Table 4.9.

The table shows that in 2007–2014, the proportion of "other services" (including business services and IT) in total services exports increased the most: from 28.5% in 2007 to 37.8% in 2014. Exports of "other services" in the full year 2013 totaled €12.6 billion in value terms, while the figure for the first three quarters of 2014 was €9.7 billion. Unlike in other categories of services, Poland recorded a deficit in the trade of "other services" throughout the analyzed period, though this deficit was relatively small. The second-highest value of exports in 2013 was transportation services, at €9.4 billion in 2013 and €7.4 billion in the first three quarters of 2014. In the analyzed period as a whole, Poland experienced a large surplus in the trade of transportation services. In 2013, this surplus was just over €4 billion, while in the first three quarters of 2014 it was €3.34 billion. Travel services were responsible for 25.2% of Poland's total services exports in 2013. The value of travel services in 2013 was €8.5 billion, while the figure for the first three quarters of 2014 was €6.1 billion. Throughout the analyzed period, Poland recorded a surplus in the trade of travel services; in 2013 the surplus was €1.98 billion. Services related to goods processing accounted for 7.4% of the total value of Poland's services exports in 2013, or €2.5 billion. In the analyzed period as a whole, imports of these services were outnumbered by exports in terms of value. Maintenance and repair services had the smallest role in Poland's services exports. Their proportion in total exports decreased in 2007–2012 and then stabilized

[1] The proportion of high-tech goods in Finland's exports decreased from 17.5% in 2007 to 6.2% in 2013. This was in part due to problems experienced by the Nokia company, which used to dominate Finnish exports. After 2007 Nokia adopted a misguided development strategy that significantly reduced its market position and resulted in its eventual acquisition by Microsoft.

at just over 2% in 2013 and 2014. At the same time, imports of these services increased significantly in 2013 and 2014.

Table 4.9. The structure of Poland's trade in services and revealed comparative advantages, € billion, 2007–2014*

Year	Transportation		Travel		Goods for processing		Maintenance and repair services		Other services	
	€ Billion	%	€ Billion	%	€ Billion	%	€ Billion	%	€ Billion	%
Exports										
2007	6.8	29.5	7.7	33.4	1.1	4.6	0.9	4.1	6.6	28.5
2008	7.5	28.9	8.0	30.8	0.9	3.6	0.8	3.2	8.7	33.6
2009	6.3	28.2	6.4	28.7	1.1	4.7	0.5	2.3	8.1	36.1
2010	6.7	25.1	7.2	27.0	1.3	5.0	0.5	2.0	10.9	40.9
2011	8.0	27.1	7.6	26.1	1.6	5.4	0.6	2.2	11.5	39.2
2012	8.8	27.3	8.5	26.6	1.9	5.8	0.5	1.4	12.4	38.7
2013	9.4	27.9	8.5	25.2	2.5	7.4	0.8	2.3	12.6	37.2
2014	7.4	28.9	6.1	23.6	2.0	7.6	0.5	2.1	9.7	37.8
Imports										
2007	4.2	23.5	5.7	31.9	0.1	0.5	0.0	0.2	7.8	44.0
2008	4.9	23.5	6.7	31.9	0.1	0.4	0.0	0.2	9.2	44.0
2009	3.8	22.0	5.3	30.2	0.1	0.3	0.0	0.3	8.2	47.2
2010	4.7	20.2	6.5	27.8	0.1	0.4	0.2	0.7	11.9	50.9
2011	5.0	20.7	6.1	25.1	0.1	0.6	0.2	0.7	12.8	52.9
2012	5.6	21.6	6.8	26.5	0.1	0.4	0.2	0.7	13.1	50.8
2013	5.4	20.9	6.5	25.3	0.2	0.7	0.6	2.3	13.1	50.7
2014	4.1	19.9	5.9	29.1	0.2	0.8	0.6	2.7	9.7	47.5
	Balance	RCA	Balance	RCA	Balance	RCA	Balance	RCA	Balance	RCA
2007	2.64	0.25	2.05	0.07	0.98	2.34	0.91	3.20	–1.20	–0.41
2008	2.59	0.22	1.33	–0.02	0.86	2.31	0.79	2.69	–0.47	–0.25
2009	2.50	0.27	1.18	–0.03	1.01	2.73	0.48	2.14	–0.12	–0.25
2010	1.98	0.23	0.72	–0.02	1.24	2.49	0.37	1.07	–0.98	–0.21
2011	2.95	0.28	1.59	0.05	1.45	2.27	0.47	1.17	–1.28	–0.29
2012	3.19	0.25	1.69	0.02	1.76	2.67	0.28	0.71	–0.70	–0.26
2013	4.04	0.31	1.98	0.01	2.32	2.33	0.19	0.01	–0.50	–0.29
2014	3.37	0.37	0.13	–0.21	1.80	2.30	–0.02	–0.27	0.04	–0.23

Notes: The 2014 data covers only the first three quarters.

Source: Author's elaboration based on NBP data.

Meanwhile, the highest revealed comparative advantages (RCA) in the trade of services were noted for goods for processing (2.34 in 2007 and 2.3 in 2014) and transportation (0.25 in 2007 and 0.37 in 2014). In the case of maintenance and repair services, positive but decreasing RCA indices were recorded throughout the studied period except in 2014, when the index was negative. For travel services, the RCA indices ranged from –0.21 to 0.07. In the case of other services, the RCA index was continually negative; it was –0.41 in 2007 and stood at –0.23 in 2014.

Export and import markets

The main geographical destinations in Poland's foreign trade have remained unchanged for years. Detailed data is available in Table 4.10.

Only four of Poland's 25 largest export markets do not belong to the European Economic Area. These are Russia, the United States, China, and Canada. The remaining 21 countries are members of either the European Union or the European Free Trade Association (EFTA). Poland's top 10 export markets in the first half of 2014 were Germany (25.6%), the United Kingdom (6.3%), Czech Republic (6.0%), France (5.7%), Russia (4.5%), Italy (4.7%), the Netherlands (4.0%), Sweden (2.9%), Slovakia (2.4%), and Hungary (2.6%). Together these markets accounted for 64.7% of Poland's total exports.

EU and EFTA countries also dominated among Poland's 25 largest import markets. However, non-EU and non-EFTA countries were far more numerous in this case than in the case of export markets. They included Russia, China, the United States, South Korea, Japan, Turkey, and India. Poland's 10 largest import markets in the first half of 2014 were Germany (21.4%), Russia (11.7%), China (9.8%), Italy (5.2%), the Netherlands (3.7%), France (3.9%), the Czech Republic (3.4%), the United Kingdom (2.6%), Belgium (2.5%), and the United States (2.5%). Together these markets accounted for 66.6% of Poland's imports.

Table 4.10. The geographical structure of Poland's foreign trade, % of exports/imports, 2012–2014[a]

Imports				Exports			
Economy	2012	2013	2014	Economy	2012	2013	2014
Germany	20.9	22.9	21.4	Germany	24.9	24.9	25.6
Russia	14.6	12.6	11.7	UK	6.8	6.5	6.3
China	9.0	8.0	9.8	Czech Republic	6.2	6.1	6.0
Italy	5.0	5.0	5.2	France	5.8	5.6	5.7
Netherlands	3.8	4.5	3.7	Russia	5.5	5.4	4.5
France	3.9	3.9	3.9	Italy	4.9	4.3	4.7
Czech Republic	3.6	3.8	3.4	Netherlands	4.4	3.9	4.0
UK	2.4	2.6	2.6	Sweden	2.6	2.7	2.9
Belgium	2.2	2.6	2.5	Slovakia	2.5	2.6	2.4
USA	2.6	2.4	2.5	Hungary	2.4	2.5	2.6
Slovakia	2.1	2.3	1.8	Spain	2.0	2.2	2.5
Sweden	1.9	2.1	1.8	USA	2.0	2.2	2.1
Spain	1.9	2.1	2.0	Belgium	2.1	2.2	2.3
Austria	1.7	2.0	1.8	Norway	1.7	2.1	2.1
South Korea	2.3	1.9	2.0	Austria	1.9	1.8	1.7
Norway	1.5	1.8	1.3	Denmark	1.7	1.6	1.6
Hungary	1.6	1.7	1.6	Turkey	1.7	1.5	1.4
Denmark	1.1	1.2	1.3	Romania	1.5	1.5	1.5
Japan	1.5	1.1	1.4	Lithuania	1.5	1.5	1.3
Turkey	1.1	1.1	1.3	China	1.0	1.1	1.0
Finland	0.9	0.8	1.0	Switzerland	0.9	0.9	0.8
Romania	0.6	0.7	0.8	Latvia	0.7	0.8	0.9
Switzerland	0.8	0.7	0.8	Finland	0.7	0.8	0.9
Lithuania	0.5	0.7	0.6	Estonia	0.6	0.5	0.6
India	0.6	0.7	0.8	Canada	0.5	0.5	0.7

Note: [a] Data for the first half of 2014.

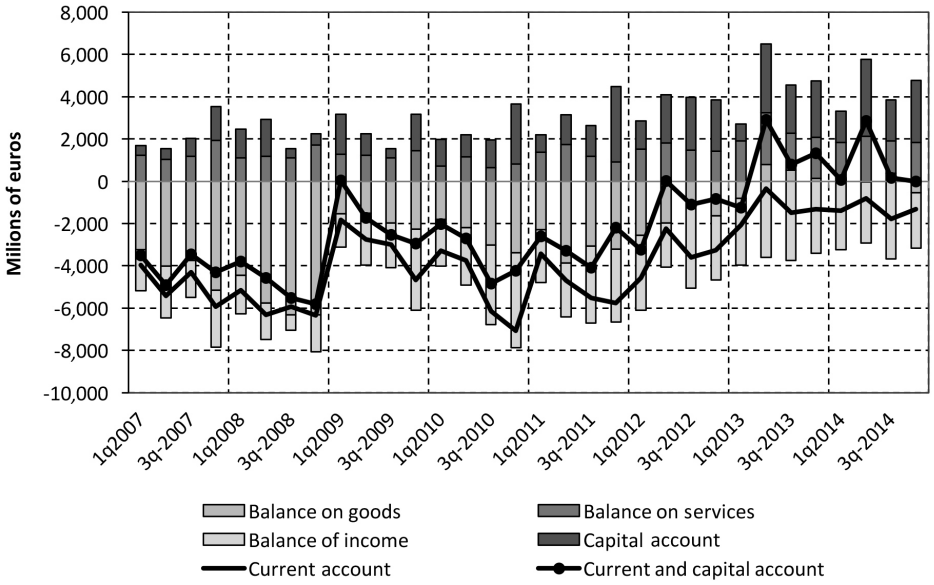
Source: Author's elaboration based on OECD data.

Balance of payments

The main components of the balance of payments are the current account (including the balance on goods and services and the balance of primary and secondary income), the capital account, the financial account, and net errors and omissions. As pointed out by Misala (2011), in the first two decades of economic transformation Poland's balance

of payments was typical of a catching-up transition economy. The country's current-account deficit was balanced mainly by the inflow of foreign capital and central bank transactions aimed at smoothing the balance of payments. In 2007–2014 important new factors appeared that led to changes in Poland's balance of payments. These included the implications of the global economic crisis after 2007, a growing inflow of EU funds, structural changes in the economy, and exports of goods growing faster than imports.

Figure 4.2. Current and capital account on a quarterly basis, 2007–2014



Source: Author's elaboration based on NBP data.

As shown in Figure 4.2, Poland's current account deteriorated in the period preceding the collapse of world trade in 2009 and at the beginning of the global economic crisis in 2007. This was mainly due to a deeper deficit in the trade of goods. Global trade declined in early 2009, accompanied by a fall in Poland's exports in euro terms. Paradoxically, this led to an improvement in the country's trade balance – mainly because imports declined faster than exports. This applied in particular to intermediate goods in the trade of which Poland previously had the greatest deficit. Later foreign trade revived, pushing the current-account deficit back to its pre-crisis level. At the beginning of 2012, these trends reversed, and in subsequent years Poland noted a steady improvement in its balance of payments. This was mainly due to the continually improving trade balance, followed by rapidly growing exports. The trade of services also showed a growing surplus.

A negative balance of income was one factor that adversely affected Poland's current-account balance throughout the studied period. This was mainly due to high income earned by foreign direct investors and portfolio investors. Funds transferred by migrants to the country had a positive influence on the balance of income transfers, but were unable to fully offset the balance of income.

Another component of the balance of payments, the capital account, reflects net changes in the ownership of national assets. An essential part of the capital account is money flowing in and out of the economy. These flows are due to the borrowing and sale of assets. In recent years Poland's balance of payments has been determined mainly by an inflow of EU funds supporting various investment projects. As a result, Poland recorded a surplus in its capital account in the analyzed period, a surplus that grew mainly due to increasing transfers of aid allocated for investment projects. As a result, the total current and capital account balance was positive in 2013 and 2014.

Table 4.11. Financial account, € billion, 2007–2014

	2007	**2008**	2009	**2010**	2011	**2012**	2013	**2014***
Financial account	–18.24	–28.40	–14.09	–23.07	–19.93	–9.36	–5.40	–4.99
Liabilities	40.41	23.90	27.35	44.88	30.02	18.46	4.75	16.57
foreign direct investments	18.25	9.72	10.11	13.36	13.27	5.63	0.07	10.24
portfolio investments	–0.02	–3.66	11.30	21.89	11.73	15.64	1.73	5.51
other investments	22.18	17.84	5.94	9.63	5.01	–2.81	2.95	0.82
Assets	11.34	–2.82	1.55	9.49	5.28	2.50	–0.84	12.74
foreign direct investments	5.41	2.96	4.37	6.59	3.17	0.45	–2.77	4.24
portfolio investments	4.60	–1.70	1.04	0.62	–0.61	0.34	1.65	5.15
other investments	1.32	–4.08	–3.86	2.28	2.72	1.72	0.28	3.34
Financial derivatives	1.46	0.74	1.30	0.82	0.12	–2.13	–0.57	–0.21
Official reserve assets	9.38	–2.43	10.41	11.50	4.70	8.73	0.75	–0.95

Notes: * Data for the first three quarters of 2014.

Source: Author's elaboration based on NBP data.

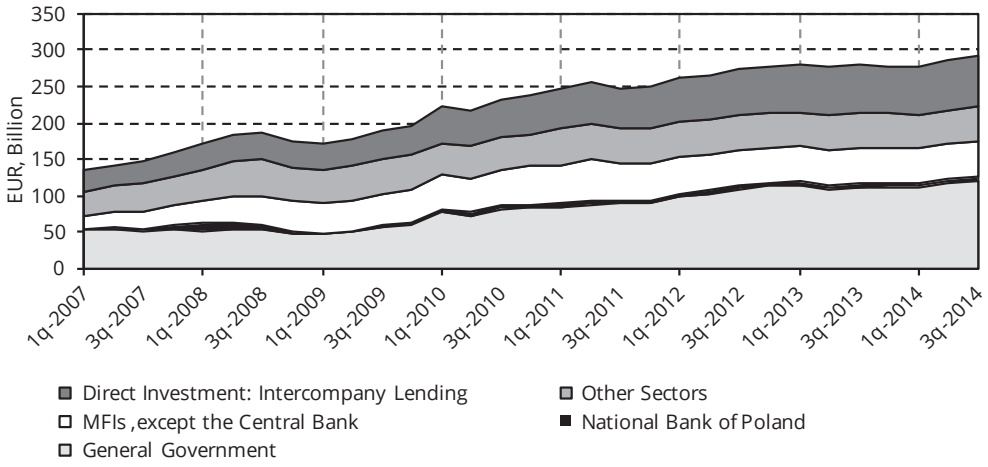
The data in Figure 4.3 show that individual components of the financial account changed significantly in 2007–2014. The inflow of foreign direct investment (FDI) was relatively high throughout the analyzed period, with the exception of 2013, when the net FDI inflow was close to zero. In 2012, the FDI inflow was also low. In the remaining years, the FDI inflow was relatively high, even in 2009, which was a critical year for the developing global crisis. Net portfolio investment inflows were negative in 2007 and 2008. Beginning in 2009, Poland experienced a significant increase in the inflow

of portfolio investment, with most of these funds invested in government bonds. These inflows fell significantly in 2013 and 2014.

The inflow of "other investments" was associated with an increase in the foreign liabilities of companies and increased foreign liabilities of the National Bank of Poland (NBP, 2014). These inflows were very high in 2007 and 2008, and then declined significantly, turning negative in 2013; in 2014 they were slightly positive.

Poland's outward FDI flows were relatively high from 2007 to 2014, ranging from €2.96 billion to €7.59 billion, except in 2012 and 2013 when they were €0.45 billion and -€2.95 billion respectively. Polish portfolio investment abroad was subject to substantial fluctuations in the analyzed period. It was the highest in 2007 and 2014, at €4.6 billion and €5.15 billion respectively. Otherwise, Polish portfolio investment abroad was much lower and twice fell into negative territory.

Figure 4.3. Poland's gross external debt position by sector, 2007–2014



Notes: * Data for the first three quarters of 2014.

Source: Author's elaboration based on NBP data.

Other investments also varied. The balance of trade in financial derivatives between residents and non-residents was positive but low in 2007–2011. A small negative balance was recorded in this trade after 2011. Reserve assets were also subject to fluctuations.

An important change that largely resulted from the crisis was a significant increase in the gross debt of the Polish economy, which grew from €134.3 billion at the beginning of 2007 to €292.5 billion at the end of the third quarter of 2014. The most negative feature of this trend was a huge increase in the foreign debt of the government sector, from €53.5 billion to €119.3 billion (see Figure 4.3).

Summary and conclusions

The structure and size of Poland's foreign trade changed significantly in 2007–2014, and there were also significant changes in the balance of payments. Among the key positive developments was strong growth of exports, in particular those of goods, leading to a surplus in the balance of trade in recent years. Another positive trend is a steady increase in the value of Poland's outward FDI, accompanied by an inflow of foreign direct investment that has substantially contributed to an increase in Poland's exports in recent years.

Negative trends include in particular an increase in government debt that may upset the country's balance of payments and make it difficult to pursue an effective macroeconomic policy in the long term.

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Chapter 5

Changes in Poland's Attractiveness to Foreign Investors in the Context of the Global Crisis

Tomasz M. Napiórkowski

This chapter seeks to approach the recent economic crisis from the perspective of foreign direct investment (FDI). The study is guided by the following research question: What is the impact of the crisis on Poland's attractiveness as a destination for foreign direct investment?

Because the time series for FDI data and their determinants are too short to conduct a study of Poland alone, it was decided to build a panel study that includes the Czech Republic, Hungary, and Slovakia (Central European countries, or CECs). These economies were chosen based on their location, size, and membership in the OECD: the Czech Republic since Dec. 21, 1995; Hungary since May 7, 1996; Poland since Nov. 22, 1996, and Slovakia since Dec. 14, 2000.

Based on these factors, the proposed research question can be reformulated as follows: What is the impact of the recent economic crisis on the attractiveness of Central European countries as destinations for foreign direct investment? To answer this question, the procedure laid out in this text will test the hypothesis that the economic crisis of 2008 has had a positive effect on the attractiveness of Central European countries as destinations for foreign direct investment.

For the time frame of this research, the beginning year is 1996, when three of the analyzed economies were members of the OECD. OECD membership has been picked as the starting point because membership sends a strong message of political and economic stability to foreign investors and provides them with a promise of equal treatment (National Treatment Rule).[1] The end of the researched time frame is 2013, the latest year for which the data are available.

The data on FDI came from UNCTAD (2014a). Collecting the data on all economies from one source makes it possible to bypass the issue of various sources using different methodologies to gather and record FDI data (for more see UNCTAD, 2014b). Data

[1] As in the case of becoming a member of the European Union, as described by researchers such as: Bevan, Estrin, 2000; Buch, Kokta and Piazolo, 2001; Carstensen, Toubal, 2003; Xun, Awokuse, 2005; and Blonigen, Piger, 2011.

on the remaining variables were collected from the World Bank's World Development Indicators database (World Bank, 2014).

This research is laid out as follows: the first two sections look at the dynamics of FDI flows and FDI stock from 1996 to 2013; second, the study conducts an econometric analysis to test the stated research hypothesis and thus answer the proposed research question.

Foreign direct investment flows in Central European countries from 1996 to 2013

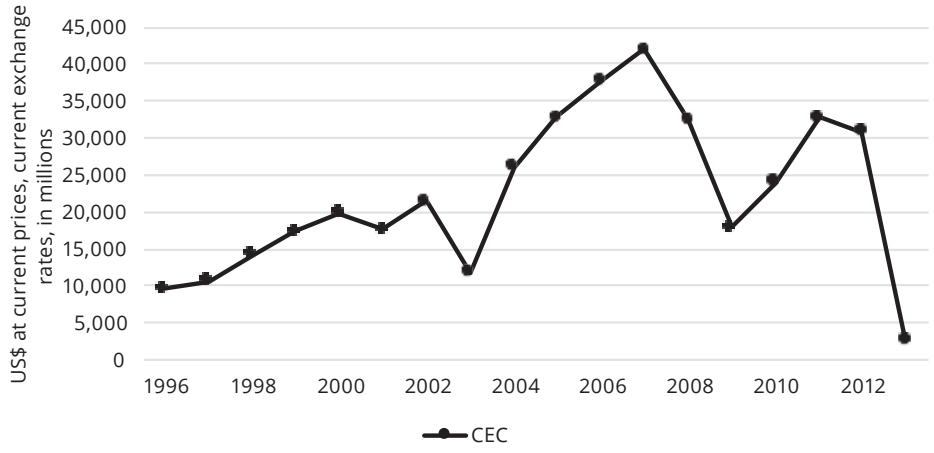
The aim of this section is to present the comparative position of the examined economies as FDI flow recipients (FDI inflows) and as sources of FDI flows (FDI outflows) in unadjusted (i.e., reported) values and relative to the EU and global totals. This shows the changing interest of foreign investors in CECs (i.e., the investment attractiveness of these countries) relative to investor interest in other host economies.

As a group (Figure 5.1), CECs experienced a parabola-like schedule of inward FDI flows, with the highest FDI flows recorded in 2007 ($41,972.66 million) and the lowest in 2013 ($2,634.73 million). This suggests that FDI flows directed to CEC as a group were lower in 2013 than in 1996 ($9,595.76 million). However, if we were to take 2012 as the end year, the story would be different: FDI inflows to CECs that year equaled $30,851.95 million.[2]

Looking at the inflow of FDI to CECs as a percentage of total inflows into the EU (Figure 5.2), that value changed from 7.71% in 1996 to 14.28% in 2012 and 1.07% in 2013, with minimum and maximum values of 1.07% and 14.28% in 2013 and 2012 respectively. If FDI flows to CECs are compared with the total values for the world (Figure 5.2), they reach their maximum value of 3.54% when the previous series reaches its second maximum (2004) and its minimum value of 0.18% that same year (2013), with 2.32% in 2012. Both series exhibit similar changes over the years until 2004, after which the former is more volatile than the latter.

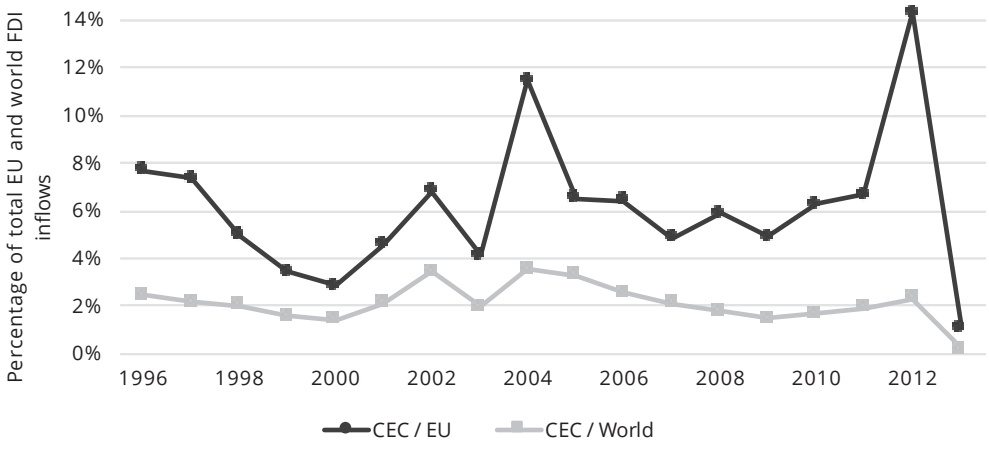
[2] The significant decrease in the value of FDI inflows can be attributed to capital in transit, which will be discussed further in this text.

Figure 5.1. FDI inflows to the CEC group from 1996 to 2013 ($ at current prices, current exchange rates, in millions)



Source: Author's own graph based on UNCTAD data, accessed Sept. 12, 2014.

Figure 5.2. FDI inflows to the CEC group from 1996 to 2013 (as a percentage of total EU and world FDI inflows)



Source: Author's own graph based on UNCTAD data, accessed Sept. 12, 2014.

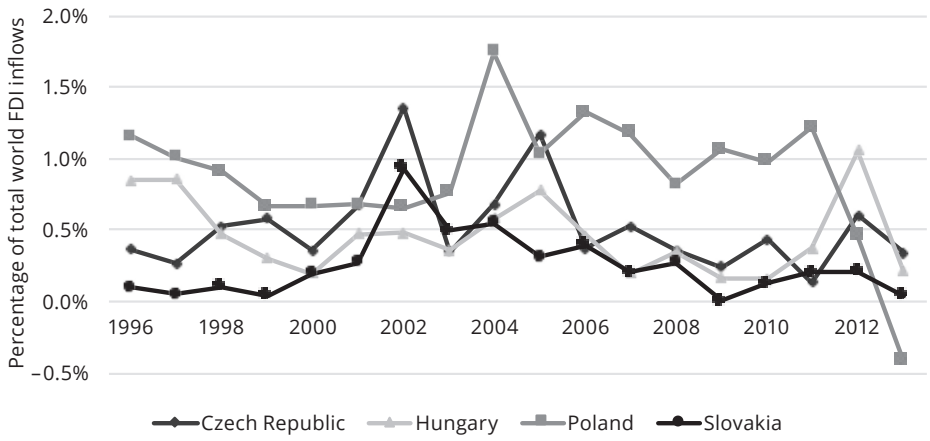
Prior to presenting the inward FDI flow values in relative terms, it is worth mentioning a few facts about the values for individual economies before adjustment:

- The group can be divided into two subgroups: one where FDI inflows in 1996 were lower than in 2013 (the Czech Republic: $1,428.44 million and $4,990.44 million,

and Slovakia: $369.7 million and $590.97 million); and another where the opposite is true (Hungary: $3,299.58 million and $3,091.06 million, and Poland: $4,498 million and -$6,037.74 million).

- The highest value for the group ($23,560.76 million) and the lowest (-$6,037.74 million) were both recorded for Poland (in 2007 and 2013 respectively).
- With the exception of the Czech Republic ($1,301.37 million in 1997), all minimum values were recorded after the start of the crisis (Hungary: $1,994.61 million in 2009, Poland: $6,037.74 million in 2013, and Slovakia: – $6.08 million in 2009).
- Contrary to the point above, all of the maximum values (with the exception of that for Hungary: $13,983.35 million in 2012) were recorded prior to the global crisis (the Czech Republic: $11,653.25 million in 2005, Poland: $23,560.76 million in 2007, and Slovakia: $5,864.88 million in 2002).

Figure 5.3. FDI inflows to the studied economies from 1996 to 2013 (as a percentage of total world FDI inflows)



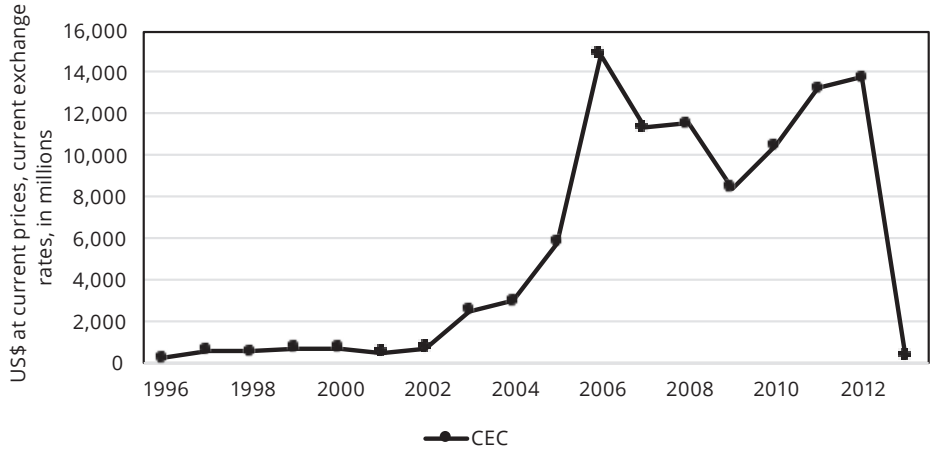
Source: Author's own graph based on UNCTAD data, accessed Sept. 12, 2014.

When looking at Figure 5.3, the first conclusion that can be drawn is that until around 2006, all of the examined economies were of similar attractiveness to foreign investors; it is only later that Poland diverged from the group. Interestingly, both the minimum (–0.416% in 2013) and maximum (1.745% in 2004) values for the entire group were recorded in Poland. Hungary is another outlier as it is the only CEC whose maximum value (1.051%) was recorded after the crisis (2012). The maxima for other economies (the Czech Republic and Slovakia) were in 2002. The minimum values, on the other hand, were all seen after the year in which the global economic downturn began: Slovakia in 2009 (0.000%), Hungary in 2010 (0.155%), the Czech Republic

in 2011 (0.136%), and Poland in 2013 (–0.416%). Lastly, all of the studied economies appeared to be less important destinations of FDI in 2013 (the Czech Republic: 0.344%, Hungary: 0.213%, Poland: –0.416%, and Slovakia: 0.041%) than in 1996 (0.366%, 0.845%, 1.151% and 0.095% respectively).

Shifting the attention to FDI outflows in millions of dollars, the analyzed time frame for the CEC group can be divided into three distinctive sections (Figure 5.4): first, from 1996 ($258.78 million) to 2001 ($537.18 million) when the series was relatively flat; second, from 2002 ($728.86 million) to 2006 ($14,860.48 million) when the series experienced significant growth; third, the V-shaped part of the plot with the first maximum of $11,318.99 million in 2007and the second of $13,779.89 million in 2012 with a minimum of $8,435.70 million in 2009.

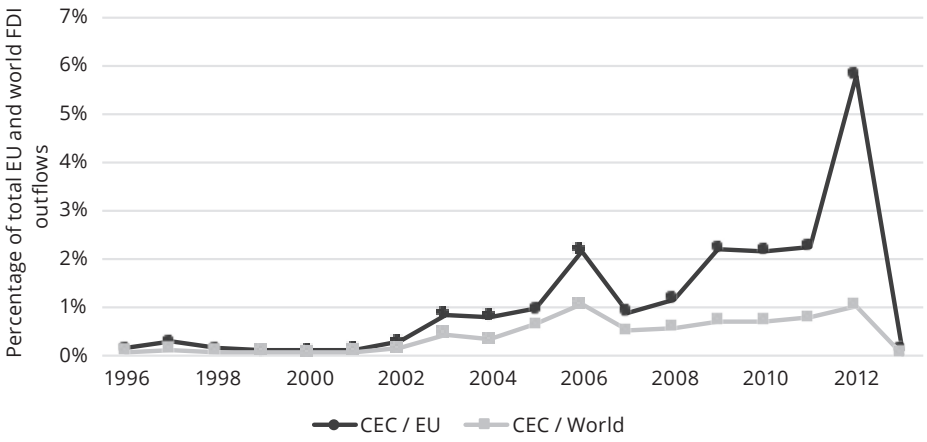
Figure 5.4. FDI outflows from the CEC group from 1996 to 2013 ($ at current prices, current exchange rates, in millions)



Source: Author's own graph based on UNCTAD data, accessed Sept. 12, 2014.

When the FDI outflows for the CEC group are compared with those in the EU and the world (Figure 5.5), a similar growth pattern is visible. FDI outflows from CECs represented 0.142% of all EU outflows in 1996, and were relatively unchanged until 2000, when they sank to their all-time low of 0.089%. Then FDI outflows from CECs increased relative to the value for the EU, reaching their first maximum of 2.159% in 2006. The maximum for the series (5.793%) was seen in 2012. As can be expected, CECs are significantly less relevant sources of FDI flows when compared with global values (Figure 5.5), i.e., the values range from 0.020% (2013) to 1.043% (2006). The series showed similar trends until 2007, after which the latter stayed relatively flat, while the former experienced significant growth.

Figure 5.5. FDI outflows from the CEC group from 1996 to 2013 (as a percentage of total EU and world FDI outflows)



Source: Author's own graph based on UNCTAD data, accessed Sept. 12, 2014.

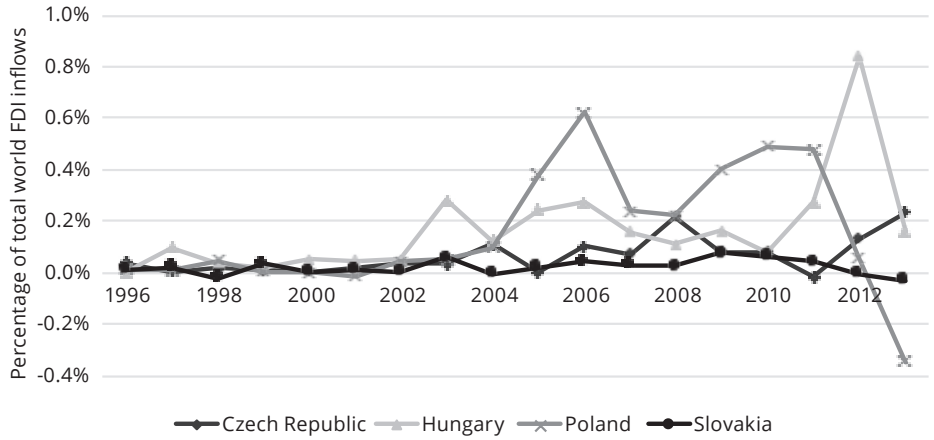
As with FDI inflows, prior to comparing each of the CECs on a relative basis, it is advantageous to look at the unadjusted values.

- The Czech Republic and Hungary both had higher FDI outflows in 2013 ($3,294.12 million and $2,269.39 million) than in 1996 ($152.88 million and -$3.64 million), and the same could be said of Poland if the value for 2013 (-$4,851.90 million) were excluded and 2012 ($726.56 million) were taken as the end point (1996: $53.00 million). Slovakia, on the other hand, experienced lower outflows in 2013 (-$422.41 million) and in 2012 (-$73.45 million) than in 1996 ($56.53 million).
- The highest value of FDI outflows for all four economies ($11,336.6 million) was recorded in 2012 in Hungary, while the lowest value (-$4,851.90 million) was recorded in 2013 in Poland.
- In terms of the location of the maximum and minimum values, all of them were recorded after the start of the crisis, with the exception of the minimum for Hungary (-$3.64 million, 1996) and the maximum for Poland ($8,883.20 million, 2006).
- The minimum values are negative for all the CECs: – $327.40 million for the Czech Republic, – $3.64 million for Hungary, – $4,851.90 million for Poland, and -$422.41 million for Slovakia.

When looking at FDI outflows from each of the CECs as a percentage of the world's total outflows (Figure 5.6), the first observation is that until 2003 all the series moved in tandem. It was only that year that Hungary's outflows temporarily diverged from the rest of the pack by increasing to 0.283%. Poland began to stand out as a source of

FDI flows from 2005 (0.380%) to 2007 (0.238%), with a maximum value of 0.623% in 2006. While Poland's outflows dipped in 2008 (0.492%) and then showed signs of recovery, the values of the other economies remained stagnant. The exception was Hungary, which became the leading source of FDI outflows in 2012 (0.842%). Only in the last year of the analysis, in which the absolute minimum for the group was recorded in Poland (–0.344%), did the Czech Republic's outflows increase to their maximum of 0.233%.

Figure 5.6. FDI outflows from the studied economies from 1996 to 2013 (as a percentage of total world FDI inflows)



Source: Author's own graph based on UNCTAD data, accessed Sept. 12, 2014.

As mentioned earlier, the volatile shifts in the final years of the analysis can be attributed to shifting investor interest in capital in transit (NBP, 2014, p. 1), defined as inflows of foreign funds to Poland. This resulted in increased capital investment by enterprises, but these funds did not stay in Poland and were later invested abroad (NBP, 2010, p. 15).

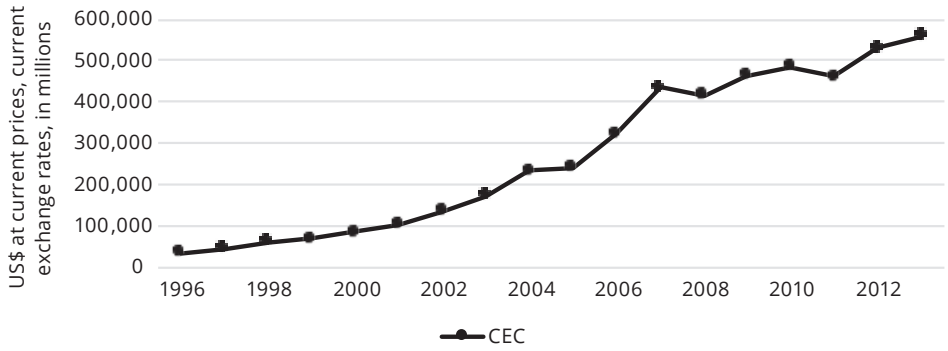
The first conclusion from this analysis is that CECs play an increasing role as destinations and sources of FDI flows. To be more specific, the importance of the researched CECs as destinations of FDI flows in the EU increased by 6.574 percentage points from 1996 to 2012. Excluding the value reported for 2013 (0.115 percentage points), the relative importance of the researched CECs as sources of FDI flows in the EU increased by 5.651 percentage points in the analyzed time frame. As for global relevance, the story is a bit grimmer because CECs lost 2.275 percentage points between 1996 and 2013 (0.137 percentage points for 2012) as destinations of FDI flows and 0.045 percentage points (for 2013; a gain of 0.958 percentage points for

2012) as sources of those flows. In terms of the crisis, the studied economies (with a few exceptions) generally saw their highest and lowest FDI inflows and outflows after the crisis. Therefore, it is hard to identify a one-sided impact of the crisis on these flows.

Foreign direct investment stock in Central European countries from 1996 to 2013

The researched economies as a whole enjoyed an almost constantly increasing value of inward FDI stock (Figure 5.7) during the analyzed period. The only exceptions are the values recorded for 2008 ($415,899.66 million, down from $433,998.33 million in 2007) and 2011 ($461,090.86 million, down from $485,246.16 million in 2010). However, these declines were short-lived and disappeared in subsequent years. Overall, the value of inward FDI stock in CECs increased from $33,362.85 million in 1996 to $557,859.15 million in 2013.

Figure 5.7. Inward FDI stock to the CEC group from 1996 to 2013 ($ at current prices, current exchange rates, in millions)



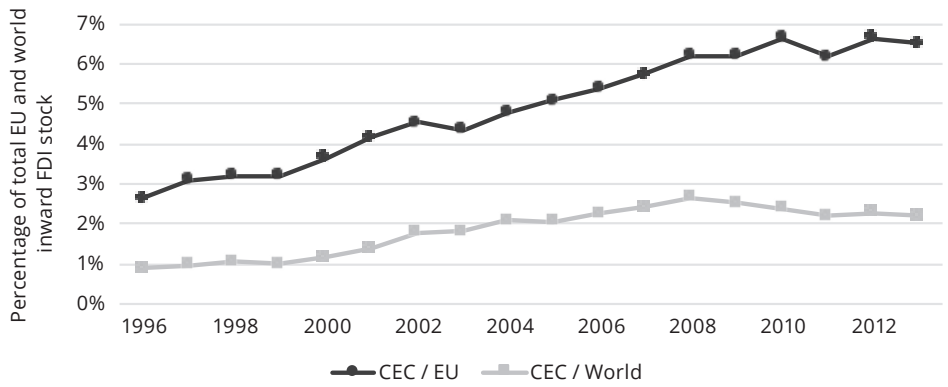
Source: Author's own graph based on UNCTAD data, accessed Sept. 12, 2014.

The situation is similar when the inward FDI stock in the CEC group is presented as a percentage of the EU and world totals (Figure 5.8). For both series, the lowest value (2.619% and 0.886% respectively) was recorded at the start of the analyzed period, while the biggest values (6.635% and 2.653% respectively) were recorded at the beginning and during the recent crisis (2008 and 2010 respectively). This suggests that the analyzed group's relative attractiveness to foreign investors peaked when the global recession was at its worst. In reference to the EU, CECs increased their attrac-

tiveness by 3.881 percentage points and in reference to the world their attractiveness rose by 1.305 percentage points.

When analyzing the inward FDI stock in each CEC, the situation is more straightforward as all the countries posted their minimum values in 1996 (the Czech Republic: $8,572.41 million, Hungary: $13,281.88 million, Poland $11,463.00 million, and Slovakia: $2,045.56 million), while seeing their maximum values in 2013 (Hungary: $111,014.66 million, Poland: $252,036.85 million, and Slovakia $58,831.89 million) and in 2012 ($136,442.40 million) for the Czech Republic. In terms of the crisis, the Czech Republic's inward FDI stock declined slightly in 2011 and 2013, Hungary's decreased in 2010 and 2011, Poland's in 2011, and Slovakia's in 2010. Lastly, it is important to note the declining position of Hungary, which was first in terms of inward FDI allocation in 1996 and third in 2013.

Figure 5.8. Inward FDI stock to the CEC group from 1996 to 2013 (as a percentage of total EU and world inward FDI stock)

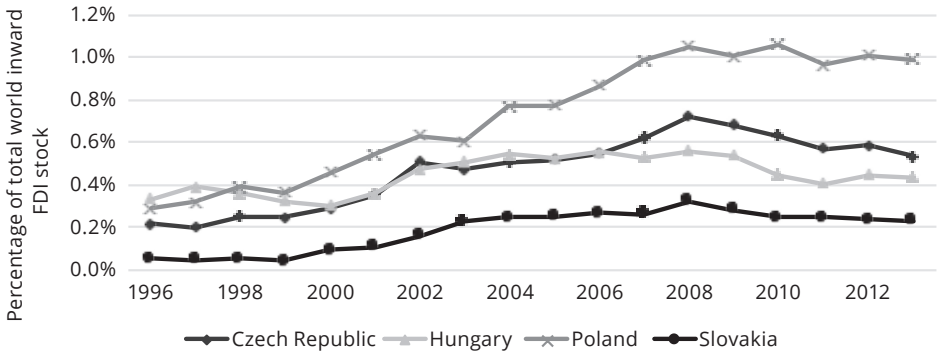


Source: Author's own graph based on UNCTAD data, accessed Sept. 12, 2014.

Expressed relative to the total inward FDI stock in the world (Figure 5.9), the inward FDI stock in each of the analyzed economies exhibits an upward trend. All of the minimum values (0.215% in 1996 for the Czech Republic, 0.304% in 2000 for Hungary, 0.287% in 1996 for Poland, and 0.045% in 1997 for Slovakia, the lowest value in this set) were registered well before the recent economic downturn. Inversely, the series (i.e. the relative attractiveness of the studied economies as FDI destinations) peak in the year the crisis began (0.722% for the Czech Republic, 0.561% for Hungary, and 0.322% for Slovakia) and in its second year (1.059% for Poland, the highest value in the set). When looking at the difference between the percentage of inward FDI stock from 1996 to 2013, Poland realized the biggest gain (0.703 percentage points),

followed by the Czech Republic (0.319 percentage points), Slovakia (0.180 percentage points), and Hungary (0.103 percentage points).

Figure 5.9. Inward FDI stock to the studied economies from 1996 to 2013 (as a percentage of total world inward FDI stock)



Source: Author's own graph based on UNCTAD data, accessed Sept. 12, 2014.

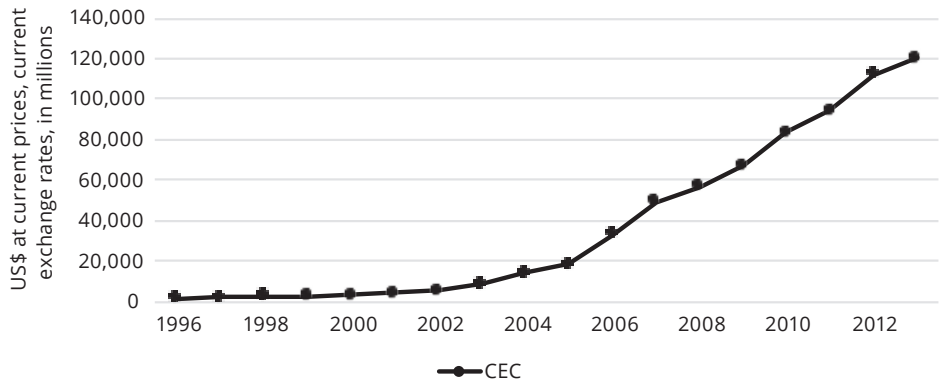
Similar conclusions can be drawn when looking at the outward FDI stock from the region and each of its economies. The value of the outward FDI stock for the CEC group (Figure 5.10) continually increased throughout the studied period ($1,681.43 million in 1996 and $120,262.34 million in 2013). The first uptake in the rate of change took place after 2000. It was followed by an even greater spurt in the growth of CEC outward FDI stock in 2005. Like many positive changes following 2004, this can be attributed to the analyzed countries joining the EU.

As in the case of inward FDI, when the outward FDI stock from CECs is set against the EU and global values (Figure 5.11), the group looks better with time. The position of CECs as an investor relative to the EU increased by 1.032 percentage points, from 0.101% in 1996 to 1.133% in 2013, and relative to the world it increased by 0.418 percentage points (from 0.039% to 0.457%). Notably, both the minimum (0.101% and 0.039% respectively) and maximum values (1.139% and 0.468% respectively) were recorded in the same years for both series: 1996 and 2012 respectively.

Further similarities are revealed by the nominal values of the outward FDI stock in each of the four economies individually. First, all the minimum values ($497.92 million in 1996 for the Czech Republic, $265.49 million in 1996 for Hungary, $677.94 million in 1997 for Poland, and $182.85 million in 1996 for Slovakia) were noted long before the crisis of 2008. Second, with the exception of Slovakia ($4,412.60 million in 2012), all the maxima were recorded in the last year of the analysis ($21,384.08 million for the Czech Republic, $39,612.55 million for Hungary, and $54,973.77 million

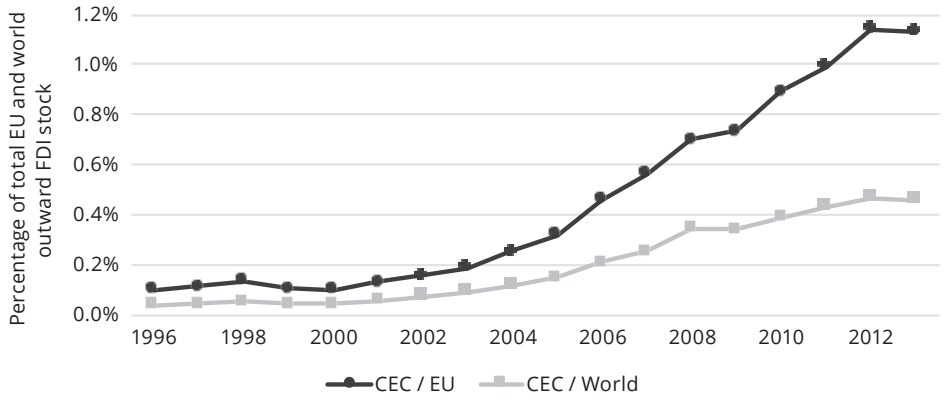
for Poland), i.e. after the crisis. The outward FDI stock of the Czech Republic declined only once in the 2008–2013 period – in 2011. There were no declines for Hungary, and one each for Poland and Slovakia – both in 2013. Unlike in the case of the inward FDI stock, Poland was the leader in both 1996 and 2013, while the Czech Republic, which was second in 1996, was outperformed by Hungary in 2013.

Figure 5.10. Outward FDI from the CEC group from 1996 to 2013 ($ at current prices, current exchange rates, in millions)



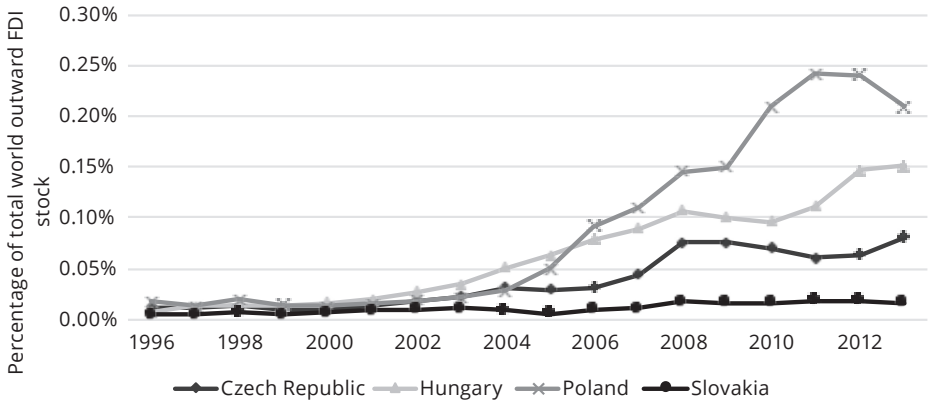
Source: Author's own graph based on UNCTAD data, accessed Sept. 12, 2014.

Figure 5.11. Outward FDI stock from the CEC group from 1996 to 2013 (as a percentage of total EU and world outward FDI stock)



Source: Author's own graph based on UNCTAD data, accessed Sept. 12, 2014.

Figure 5.12. Outward FDI stock from the studied economies from 1996 to 2013 (as a percentage of total world outward FDI stock)



Source: Author's own graph based on UNCTAD data, accessed Sept. 12, 2014.

Around 2002, the four economies began to diverge in terms of their outward FDI stock expressed as a percentage of the world's total (Figure 5.12), with Poland – despite having a late start compared with Hungary – being the significant positive outlier of the group, with the greatest change from 1996 (0.014%) to 2013 (0.209%) of 0.192 percentage points and the highest value of 0.241% in 2011. Hungary recorded a 0.144 p.p. increase (from 0.006% to 0.151%), the Czech Republic posted a 0.070 p.p. increase (from 0.012% to 0.081%), and Slovakia saw a 0.012 p.p. rise (from 0.004% to 0.016%). Interestingly, 2014 brought declines in Poland and Slovakia, accompanied by increases in Hungary and the Czech Republic. As for the locations of the minimum and maximum values, i.e. when each of the CECs was the least and most important as a source of FDI stock, those were, as before, prior to and after the crisis respectively.

The analysis of the inward and outward FDI stock for the CECs as a group and for each of its members shows that their relative importance as a destination and as an investor increased over the examined period both within the EU and globally. There are no significant negative effects of the recent economic crisis; any declines in the value of FDI stock were short-term. Therefore, unlike in the case of FDI flows, it can be concluded that the crisis has had a positive impact on the FDI stock located in and coming out from the studied economies, which supports the stated research hypothesis. This is further confirmed by the fact that all of the stock series reached their maxima in 2012 and 2013.

The influence of the recent global economic crisis on the FDI stock in Central European countries from 1996 to 2013

The previous section, in addition to providing an overview of the dynamics of FDI flows and FDI stock associated with the studied economies, attempted to answer the proposed research question with an ocular test, i.e. by looking at the data and the trends they exhibited. The goal of this section is to test the hypothesis with an econometric approach.

The topic of the impact a crisis can have on FDI is not new in the literature. A comprehensive study has been conducted by Bogach and Noy (2012), in which the authors not only look at the impact of a crisis on FDI in general, but also control for the types of the events, which are listed as follows: banking crisis, systematic banking crisis, currency crisis, inflation crisis, hyperinflation crisis, stock market crisis, domestic debt crisis, and external debt crisis (Bogach, Noy, 2012, p. 11).[3] The researchers demonstrated the negative impact of all of the listed crises on both FDI flows and FDI stock; however, the coefficients of the currency, stock market and domestic debt events for FDI flows and FDI stock equations were found statistically insignificant (Bogach, Noy, 2012, pp. 14–15). The authors conclude with a general statement that financial crises have a negative impact on FDI in both developing and emerging economies (Bogach, Noy, 2012, p. 17). The decrease in FDI activity during the global crisis can be partially attributed to a fall in the availability of external finance (Desbordes, Wei, 2014, p. 19). So far, the literature suggests that the coefficient of the crisis variable should be negative, which means rejecting the stated hypothesis.

The four studied economies, especially Poland, are positive outliers in the context of the impact of the recent crisis on FDI. This is supported by Leven (2012), who concludes that even though the crisis damaged FDI flow activity in most economies, "in Poland this reduction was short-lived and after some structural adjustment, FDI stabilized and even increased in some areas" (Leven, 2012, p. 64). Interestingly, in addition to highlighting Poland's continuous growth[4] and its relatively low labor costs during the crisis, Leven says that the conservative strategies of Polish banks, combined with the shielding of Poland's financial system by foreign parent banks with increasing inflows of liquidity, the relatively poor development of Poland's mortgage market (including poorly developed foreclosure and bankruptcy procedures), and

[3] For the definitions of the presented types of crisis events see: Bogach and Noy (2012, p. 23)

[4] Also noted (in the crisis context) in a wide panel study conducted by Bose and Jha (2012) and covering the CECs analyzed here.

Poland's continued attractiveness for offshore and outsourcing activities, all positively contributed to Poland's resilience to the crisis in terms of inward FDI activity (Leven, 2012, pp. 62–63).

The model is built using inward FDI stock (*IFIDS*, $ at current prices, current exchange rates, in millions, UNCTAD) as the dependent variable regressed on: a) the size of the economy represented by the gross domestic product (*GDP*, $ constant 2005, World Bank, H_0: $\beta_{GDP} > 0$), b) the openness of the economy to international trade as shown by the sum of its exports (*X*, $ constant 2005, World Bank) and imports (*M*, $ constant 2005, World Bank) as a percentage of its gross domestic product (H_0: $\beta_{(X+M)/GDP} > 0$, Carbaugh, 2009, p. 9), c) unit labor cost (*ULC*, OECD index 2010 = 100, H_0: $\beta_{ULC} < 0$), d) the development of the country's financial system proxied by money and quasi money expressed as a percentage of its GDP (*M2*, World Bank, H_0: $\beta_{M2} > 0$, Buch, Kokta and Piazolo, 2001, p. 9) and e) a dummy variable to represent the years 2008 onward,[5] i.e. the crisis period (*CRISIS* = 1 for 2008–2013 and *CRISIS* = 0 for 1996–2007, H_0: $\beta_{CRISIS} > 0$, Desbordes, Wei, 2014, p. 4).

The first three explanatory variables are the "staple" economic variables that can be found in a significant number of research studies on the determinants of FDI (e.g., Ranjan, Agarwal, 2011, pp. 256–257). The financial market is included due to its importance during the recent economic crisis and due to its presence in the literature (e.g., Buch, Kokta and Piazolo, 2001, pp. 9–10). When discussing the determinants of FDI, it should be clear that – unless a strict econometric procedure is used to determine which explanatory variables should be included in the regression, e.g., a stepwise method – their selection is a subjective decision of the researcher. This is especially true of factors extending beyond the "staple" group. This issue is driven by the abundance and generally poor cross-quotation of FDI determinants (for more on this topic see: Blonigen, Piger, 2011).

Unfortunately, some transformations of the data were required. The following statements are made based on the availability of data at the time of their extraction: Sept. 12, 2014:

- Because *GDP* was given in dollars, it has been transformed to millions of dollars. Also, in order to estimate the value of *GDP* for Slovakia and Hungary for 2013, an assumption was made that the difference between 2011 and 2012 is the same as that between 2012 and 2013.
- Data on *X* for Hungary and Slovakia for 2011–2013 were supplemented with estimates based on linear trend equations with R-squared values of 0.96 and 0.94

[5] Significantly, the author assumes that the effects of the crisis are still pronounced, i.e. their impact on FDI is still (2013) present.

respectively. The same was done for *M* for the mentioned countries (the corresponding R-square values are 0.96 and 0.92).

- Data on *ULC* for Poland for 2013 were estimated with the constant difference method mentioned above. For Slovakia, *ULC* for 1996–1999 were supplemented based on a linear trend with an R-squared of 0.93.
- The data on *M2* for all the economies for 2013 were also estimated with the constant difference method. For Slovakia, the data also had to be supplemented for 2009–2013. This was done with a linear trend equation with an R-squared of 0.49. Put in a structural form, the model is presented in Equation 1.

Equation 1. Structural representation of the model

$$IFDIS_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 \left(\frac{X+M}{GDP} \right)_{it} + \beta_3 ULC_{it} + \beta_4 M2_{it} + \beta_5 CRISIS_{it} + \gamma_i + \varepsilon_{it}$$

Where:
$IFDIS_{it}$ – Inward FDI stock in country *i* at time *t*
β_0 – Constant
β_n – Coefficient of the n^{th} explanatory variable
GDP_{it} – GDP in country *i* at time *t*
$[(X+M)/GDP)_{it}$ – Trade openness of country *i* at time *t*
$M2_{it}$ – Money and quasi money as a percentage of GDP in country *i* at time *t*
γ_i – Fixed cross-section effect for country *i*
ε_{it} – Error term
n = 1, 2... 5
i = 1, 2, 3, 4
t = 1996, 1997... 2012, 2013

Source: Author's own equation.

Because the variables are book examples of non-stationarity, they should be tested for the presence of cointegration between the independent variables and the dependent variable, i.e. whether there are long-term equilibria between them. If the presence of cointegration is confirmed, then the variables can be used in their original form (Banerjee, Carrion-i-Silvestre, 2006, p. 1). In order to test for cointegration, Pedroni (Pedroni, 1999) cointegration tests with the null hypothesis of no cointegration were used. The results of the test (Table 5.1) for between-dimensions generally suggest the rejection of the null hypothesis (only Group rho-Statistic with p-value = 0.9788 suggest otherwise). The results of the test for within-dimensions are divided with Panel v-Statistic and Panel rho-Statistic not allowing for the rejection of the null hypothesis,

while Panel PP-Statistic and Panel ADF-Statistic suggest the opposite. When incorporating the fact that the residuals of the model have no unit root, i.e. they are stationary (Table 5.2), the null hypothesis of lack of cointegration is not rejected.

Table 5.1. Results of the cointegration test

Alternative hypothesis: common AR coefs. (within-dimension)				
	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	–0.111	0.544	–0.283	0.611
Panel rho-Statistic	1.428	0.923	1.123	0.869
Panel PP-Statistic	–6.1	0.000	–4.253	0.000
Panel ADF-Statistic	–2.342	0.01	–2.021	0.022
Alternative hypothesis: individual AR coefs. (between-dimension)				
	Statistic	Prob.		
Group rho-Statistic	2.03	0.979		
Group PP-Statistic	–8.427	0.000		
Group ADF-Statistic	–2.195	0.014		

Source: Author's table based on the results obtained with EViews software on data from the World Bank and UNCTAD, accessed Sept. 12, 2014.

Table 5.2. Results of residual tests for the presence of a unit root

Method	Statistic	Prob.**	sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	–3.626	0.000	4	64
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	–3.111	0.001	4	64
ADF – Fisher Chi-square	24.811	0.002	4	64
PP – Fisher Chi-square	56.292	0.000	4	68

Source: Author's table based on the results obtained with EViews software on data from the World Bank and UNCTAD, accessed Sept. 12, 2014.

In order to validate the use of fixed cross-section effects (see: Wooldridge, 2010), the Redundant Fixed Effects test was administered. The results (Table 5.3) show that the null hypothesis stating that the used effects are redundant can be rejected. Because of the use of a dummy variable that is time dependent as an explanatory variable, period effects were not included in order to avoid severe multicolinearity, i.e. a near singular matrix.

Table 5.3. Results of the Redundant Fixed Effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	42.795	(3,63)	0.000
Cross-section Chi-square	80.003	3	0.000

Source: Author's table based on the results obtained with EViews software on data from the World Bank and UNCTAD, accessed Sept. 12, 2014.

The model's coefficients were estimated with the Ordinary Least Squares method (Leitão, 2010) with the White diagonal coefficient covariance method, which is robust to observation-specific heteroskedasticity. The results of the estimation are presented in Table 5.4.

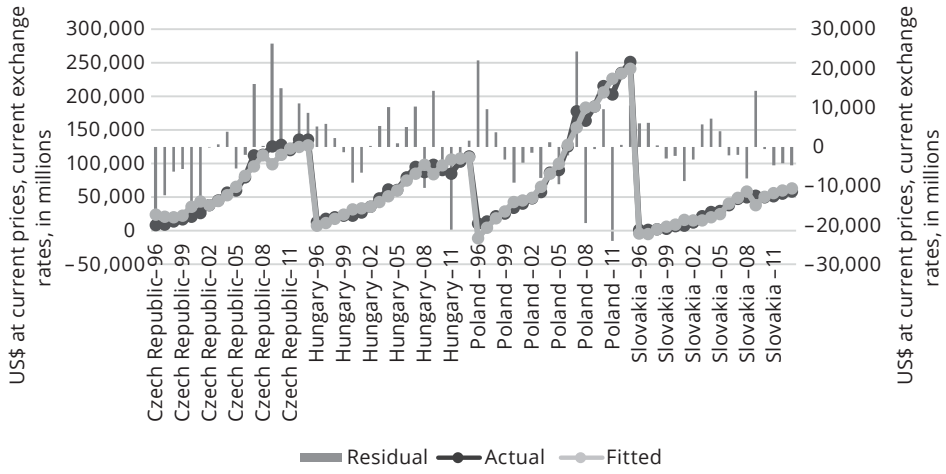
Table 5.4. Results of the model estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	–159,972.0	16,382.08	–9.765	0.000
GDP	1.134	0.070	16.198	0.000
(X+M)/GDP	54,406.60	13,469.29	4.039	0.000
ULC	–471.863	249.971	–1.888	0.064
M2	605.119	200.287	3.021	0.004
CRISIS	9,306.986	4,770.728	1.951	0.055

Source: Author's table based on the results obtained with EViews software on data from the World Bank and UNCTAD, accessed Sept. 12, 2014.

All of the independent variables' coefficients have the expected signs and all but two (*ULC* – p-value = 0.064 and *CRISIS* – p-value = 0.055) are significant at a very restrictive 1% level of significance (the highlighted coefficients are significant at a 10% level of significance). The Prob. (F-statistic) equals 0.000, the R-squared equals 0.972 (meaning that the model explains 97.2% of the dynamics of the dependent variable), and the residuals have a normal distribution (Jarque-Bera statistic = 1.079 with p-value = 0.583; hence, not allowing the rejection of the null hypothesis of normal distribution) – all validating a good model. The closeness of the fitted data to the actual data is also seen in Figure 5.13.

Figure 15.13. Actual and fitted data (left-hand side axis), and residuals (right-hand side axis) (both axes in $ at current prices, current exchange rates, in millions)



Source: Author's graph based on the results obtained with EViews software on data from the World Bank and UNCTAD, accessed Sept. 12, 2014.

The estimated coefficients can be interpreted, *ceteris paribus*, as follows:

- An increase in gross domestic product by $1 million (constant 2005) has been estimated to have resulted in an increase in the inward FDI stock in the researched economies by $1.13 million.
- An increase in the openness expressed as the sum of exports plus imports as a percentage of gross domestic product by one unit has been estimated to have resulted in an increase in the inward FDI stock in the researched economies by $54,406.6 million.
- An increase in the unit labor cost by one index point has been estimated to have resulted in a decrease in the inward FDI stock in the researched economies by $471.86 million.
- An increase in money and quasi money expressed as a percentage of gross domestic product by one unit has been estimated to have resulted in an increase in the inward FDI stock in the researched economies by $605.12 million.
- A change in the value of the dummy variable representing the crisis from 0 to 1 has been estimated to have resulted in an increase in the inward FDI stock in the researched economies by $9,306.99 million.

Despite the fact that the lack of multicolinearity is not a prerequisite for the Ordinary Least Squares method and is routinely neglected in studies similar in topic to this

one (according to Wooldridge, 2009, quite justifiably), it is proper to disclose that the Pearson linear correlation coefficient is above 0.5 for pairs *GDP – [(X+M)/GDP]*, *[(X+M)/GDP] – ULC* and *ULC – CRISIS*. This, however, is not enough to merit the issue of multicolinearity, which, if significant, would result in high p-values of estimated coefficients and a simultaneous high R-squared statistic. Also, keeping in mind that the values of the used variables are secondary data and that the variables themselves are literature-based, the normal aids for multicolinearity (e.g., dropping variables or extending the scope of the data collected) cannot be used in such a study. The reason for addressing this issue when interpreting the values of the coefficients is that because there exists a wide evoked set of possible determinants of FDI (not to mention their permutations), and if the problem of multicolinearity is present, it can impact the values of estimated coefficients. As a result, the above interpretation should be treated as general in nature.

Based on the values of the estimated coefficients, it is possible to suggest a certain path (hierarchy) that should guide policy makers in the researched economies. First, the four economies should continue to increase their trade openness and a (responsible) evolution of their financial systems. Next, unit labor costs should not be allowed to increase without justification, e.g. requalification of the labor force for high-skill based industries.[6]

Conclusions

The objective of this chapter was to answer the research question about the impact of the recent economic crisis on the attractiveness of Central European countries as destinations for foreign direct investment. This was done by testing the research hypothesis that the economic crisis has had a positive effect on the attractiveness of Central European countries as destinations for foreign direct investment.

In the first part of the analysis, inward and outward FDI flows and the FDI stock were analyzed for the Czech Republic, Hungary, Poland, and Slovakia. In terms of flows, CECs have become more attractive and more significant investors compared with the EU as a whole. Globally, however, their attractiveness has declined even though their significance as investors increased (except in 2013). The situation is more one-sided when it comes to FDI stock, as both the inward and outward values increased, with only minor and short-term declines, and all the maxima were realized in 2012 or

[6] Two coefficients are not analyzed here, *GDP* and *CRISIS*. This is because an increase in GDP is an obvious policy goal and politicians cannot impact the binary variable.

2013. Based on the analysis of raw data, it is possible to conclude that, even though the study of FDI flows did not allow for either outright rejection or acceptance of the research hypothesis, the results of the study of FDI stock strongly suggest that the hypothesis should be accepted.

The second part of this chapter focused on an econometric approach to the topic. In it, the model's coefficients were estimated with the Ordinary Least Squares method with fixed cross-section effects and the White diagonal method of coefficient covariance. The results of the estimation fall in line with previous studies on the topic and suggest the acceptance of the stated research hypothesis as the coefficient of the dummy variable used to represent the crisis is positive and statistically significant at a 10% level of significance.

Based on the fact that the stated research hypothesis has been confirmed and on the results of the case study for Poland conducted by Leven (2012), it can be said that the crisis period was a period of gains for Poland in terms of its relative FDI attractiveness and foreign funds allocated in it.

As mentioned earlier, this study suffers from the subjectivism of the researcher in terms of deciding which economic concepts should be included as determinants of the dependent variable and in which permutation they should be included (e.g., gross domestic product vs. GDP per capita). Another limitation – one that can be remedied in the future – is the need to supplement the gathered data. Even though these supplementations do not impact the results of the model, they are still "foreign" to the original data.

Referring to the second limitation of the data, it would be an interesting exercise to repeat the estimation of the presented model once the data is available from the original source. While this would not reveal much about the validity of the model and its results, it would show the level of appropriateness of the methods of supplementation used. As with the decision on which determinants should be used, the researchers chose Ordinary Least Squares as the method of estimating coefficients. Thus it would be interesting to compare these results with those of a dynamic model estimated with the General Method of Moments, which could then be tested using various instruments – a study that goes beyond the scope of this chapter.

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Part II

Factors Determining Poland's Competitiveness: Changes During and After the Global Crisis

Chapter 6

Key Economic Policy Developments in 2007–2014 and Challenges Ahead

Ryszard Rapacki, Adam Czerniak

This chapter aims to assess key developments in Polish economic policy from 2007 to 2014 and identifies challenges ahead. In our assessment, we single out two major components of economic policy: macroeconomic policy and structural policy.

Macroeconomic policy, also known as stabilization policy or demand-management policy, primarily impacts the demand side of the economy, and its outcomes tend to materialize in the short term. Structural policy deals with the supply side of the economy and tends to materialize in the longer term.

Key macroeconomic policy developments

During and directly after the global financial crisis, the most important changes in Polish macroeconomic policy took place in four key areas: general government (gg) deficit, structural unemployment reduction, housing policy, and monetary policy. Activities carried out by the government in these areas often overlapped, magnifying the effects of different policies (for example, subsidies for home buyers stimulated the growth of private investment outlays), but also diminishing the positive results of reforms (for example, active labor market policies were hampered by cutbacks in public spending). Still, policies pursued in each area were relatively independent and consequently require separate discussion.

Fiscal policy

Of particular relevance to this evaluation of macroeconomic policy pursued in 2007–2014 are government efforts to reduce the public deficit in both nominal and structural (i.e. adjusted for cyclical fluctuations) terms. An external macroeconomic shock in the form of a downturn in global trade in late 2008 and 2009 coincided with the introduction of three expansive fiscal policies:

- a reduction in the disability pension contribution to 6% in January 2008 (from 13% until the end of June 2007);
- cuts in the effective personal income tax (PIT) rate in January 2009 through introducing two tax rates (18% and 32%) instead of three (19%, 30% and 40%); and
- a major increase in public investment, especially at the local government level, through co-financing projects developed under EU programs. As a result, the gg deficit increased to 7.5% of GDP in 2009, from 1.9% in 2007, according to ESA95 accounting standards (Eurostat 2014), requiring an amendment to the 2009 budget bill. These counter-cyclical fiscal policies should be viewed as beneficial for the economy as they helped Poland avoid the recession experienced by all other EU countries during the global financial crisis. Public investment contributed 0.9 p.p. to real GDP growth in 2009. Without this, Poland would have fallen into a technical recession as early as the first quarter of 2009. The tax cuts also supported consumption, which increased by 2.1% in y-o-y terms, contributing 1.2 p.p. to GDP growth despite a decline in employment and slower wage growth.[1]

After Poland exceeded the 3% deficit threshold imposed by the EU Stability and Growth Pact (SGP), the European Commission in May 2009 launched the so-called Excessive Deficit Procedure (EDP) and demanded that the Polish government reduce persistent public finance imbalances (Council of the European Union, 2009). The government imposed an austerity policy on both the revenue and expenditure side of the Polish budget. The most important measures aimed at boosting public revenues were:

- an increase in the VAT rates beginning in January 2010 (the main rate rose from 22% to 23%);
- an increase in disability pension contributions by 2 p.p. to 8% as of February 2012;
- several increases in excise taxes on tobacco products and alcoholic beverages;
- freezing income tax brackets at their 2008 levels and thus increasing the effective tax rate;
- passing several tax evasion laws, including one to prevent fraud in VAT payments by companies trading in goods such as steel rods, fuel, and precious metals, and one imposing taxes on companies registered in tax havens such as Cyprus, Malta, and Luxembourg and thus evading corporate income taxes.

Most of the savings made by the government in the post-crisis period focused on the expenditure side of fiscal policy. The most important measures concerned the pension system. These included a reduction in the size of the fully funded pillar and an increase in the retirement age. The first modifications focused on the mechanism for transferring pension contributions. In 2011, the government temporarily reduced

[1] Own calculations based on Central Statistical Office (GUS) data.

the amount of pension premiums transferred from the Social Insurance Institution (ZUS) to Private Pension Funds (OFE) from 7.3% to 2.3% (with a subsequent increase to 2.8% in 2013). The key change in the system, however, was introduced in early February 2014, when 51.5% of OFE assets were transferred to ZUS. Those were Treasury bonds, securities guaranteed by the state (mainly "road bonds" issued by BGK) and cash. The transferred T-bonds were redeemed and public debt fell by 9 p.p. to 49.5% of GDP at the end of the first quarter of 2014 (Eurostat, 2014). The remaining funds were transferred to the Demographic Reserve Fund managed by ZUS and designed to finance shortages in the social security system. The OFE assets of each individual will have to be gradually transferred to ZUS starting at 10 years before retirement (MPiPS, 2013). The government also banned any further investment of contributions left in private pension funds in securities issued or guaranteed by the state.

The key change in the fully funded pillar was in the amount of funds that will be transferred from ZUS to OFE in subsequent years. Prior to 2011 the entire pension contribution of 7.3% was transferred to OFE. Under the new rules, it will now stay in ZUS and be recorded on a special sub-account indexed against nominal GDP growth. Those who wished to continue saving in the fully funded pillar were given an alternative option. They could declare that they wanted the state to transfer 2.98% of their contributions to private pension funds. Such a decision was made by 2.5 million Poles, or 15.1% of all those who were eligible. This is probably not enough to keep private pension fund net inflows (paid-in contributions minus the transfer of assets to pensioners) positive. Based on data from the Ministry of Labor and Social Policy (MPiPS, 2013), it can be estimated that the monthly inflow of funds to OFEs will be around ZL250 million, much less than the ZL550 million that private funds will have to transfer to ZUS every month.

Changes in the fully funded pillar of the pension system produced significant short-term fiscal savings for both the social security system and the central government. Government expenditures will now drop by several billion dollars a year because of lower debt servicing costs, and social insurance fund expenses will be as much as ZL10 billion to ZL12 billion lower each year in the next few years, compared with a no-change scenario (MPiPS, 2013). The negative effect of this policy, apart from trimming the fully funded pillar, is that it decreases the inflow of new funds to the capital market, especially the Warsaw Stock Exchange (WSE) and the Polish debt market. This will hamper the development of the equity market in the coming years, which could cause the WSE to lose its leading position in the region to the Vienna Stock Exchange in terms of the largest number of initial public offerings.

Another important change in the pension system was a decision in 2012 to increase the retirement age to 67 for both men and women. Previously, men retired at 65 and

women at 62. The retirement age will increase gradually. Beginning January 2013, the retirement age will be increasing at a rate of three months per month. The target level will be reached in 2020 for men and in 2040 for women. The short-term impact of this change on the social security system deficit was marginal and did not exceed ZL1 billion in the analyzed period.

In order to reduce the nominal and structural deficit, the government decided to go ahead with institutional changes. Since 2010 the parliament has passed a number of new expenditure rules aimed at limiting the growth of public spending at both the central and local government levels. The first rule, referred to as a "disciplining expenditure rule," came into force in early 2011. It set an upper limit for the growth of flexible central government expenditures, i.e. those that are not predefined by existing law. The limit was variable and set at 1 p.p. above inflation each year. However, the new rule applied to only 12% of gg expenditure (Ministry of Finance, 2013). In addition, it was temporary and was to be abolished once the EDP against Poland was abrogated. Hence its impact was negligible on the long-term improvement in the country's fiscal health.

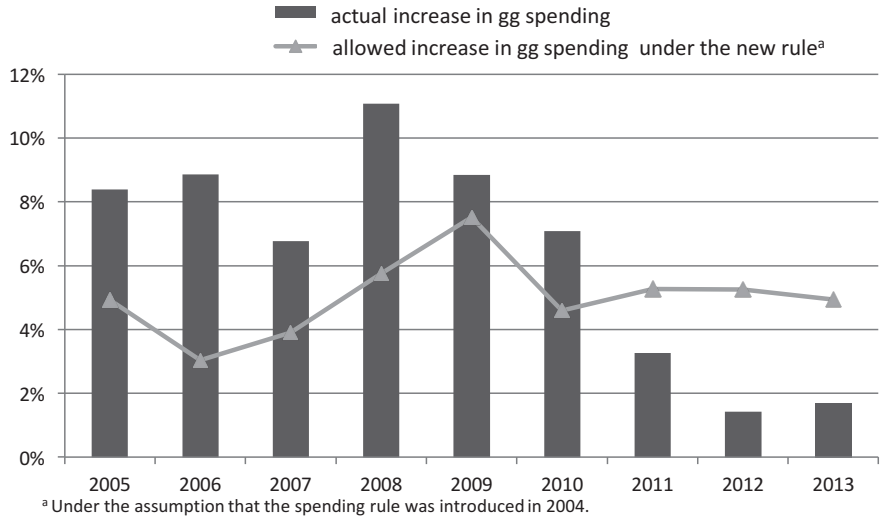
An expenditure rule introduced in 2009 for local governments had a much stronger impact on the gg deficit. This rule was based on two pillars. First, starting with the 2011 budget, the day-to-day expenditure of local government units (JST) had to be lower than projected revenues plus the budget surplus from previous years and on-sight funds. Second, a limit was set on expenditures allocated in a given year for debt service and expenditures on the repayment of loans and the redemption of securities issued by local government units (excluding debt incurred to finance projects co-financed with EU funds). This limit had to be lower than the average difference between current and capital revenues and current expenditures multiplied by the quotient of total planned expenditures and average total expenditures from the last three years. The limit was binding for the first time for drafting 2014 budget targets. Its effects, however, were visible in previous years when governments gradually restricted investment outlays in order to finish infrastructure projects before the rule fully entered into force. This is confirmed by data on the local government deficit, which fell from 1.2% of GDP in 2010 to 0.2% in 2013 (Eurostat 2014). Moreover, local governments were expected to close 2014 with a financial surplus, in line with the budget targets.

Equally important from the perspective of long-term fiscal sustainability was the introduction in 2014 of the so-called stabilizing expenditure rule, which replaced the ineffective disciplinary rule. This new rule was based on a complex mathematical formula for the upper ceiling on planned public spending. The limit depends on historical and projected real GDP growth, the CPI inflation forecast, and on the public deficit and debt levels. The rule takes into account discretionary policy changes to the

income side of the budget. It covers nearly 90% of gg expenditures and was first applied to the 2015 draft budget.

The introduction of the stabilizing fiscal rule changed the process of drafting the budget. Previously, the budgets of the central and local governments and other public institutions were drafted independently. Under the new rule, the Ministry of Finance must be informed by all institutions covered by the new regulations about expenditures planned for the subsequent year. Taking this into account, the ministry adjusts central budget spending so as to keep public spending below the limit. This increases central administration control over fiscal policies pursued by the public sector as a whole. According to our calculations, if the rule had come into force in 2004, the permissible gg expenditure growth would have been about half the actual growth in 2006–2008. As a result, the Polish government would have mustered a budget surplus at the end of the expansionary phase. Moreover, the rule is counter-cyclical as it allows the use of funds saved at a time of prosperity to increase public spending in a period of economic slowdown. In the 2011–2012 period, this rule would have enabled gg spending to increase twice as much as it actually did.

Figure 6.1. The impact of the stabilizing expenditure rule



Source: Own calculations based on Eurostat data (2014).

To reduce the budget deficit, the Ministry of Finance introduced another important institutional change: central liquidity management in the public sector. Some public institutions, including the national healthcare fund and special purpose funds, were

forced to keep their surplus funds on a Ministry of Finance account in the publicly owned BGK bank. In this way, other institutions could use surplus liquidity in the sector to finance their short-term deficits instead of issuing bonds or borrowing money from private banks. Thanks to this management system, gg debt service costs were reduced by several hundred million zlotys a year and the borrowing needs were lowered by a total of ZL33 billion (2% of GDP) in 2010–2014. Another important measure aimed at reducing the budget deficit was a decision to freeze compensation expenditures in the public sector at their 2009 nominal level. This move yielded ZL2.2 billion in savings in 2014 alone (Ministry of Finance, 2014).

As a result of all these measures, the government managed to permanently reduce the gg deficit from 7.6% of GDP in 2010 to 4.0% in 2013 (by ESA 2010 standards). Moreover, according to European Commission (2014) forecasts, the deficit is expected to fall to 2.4% of GDP in 2015, and the European Union is expected to abrogate the excessive deficit procedure in the spring of 2016. The introduction of long-term austerity measures (including the pension system reform, the establishment of the stabilizing expenditure rule, and the centralization of liquidity management) brought down the structural deficit to 2.9% of GDP in 2014, from 6.0% in 2011 (European Commission, 2014).

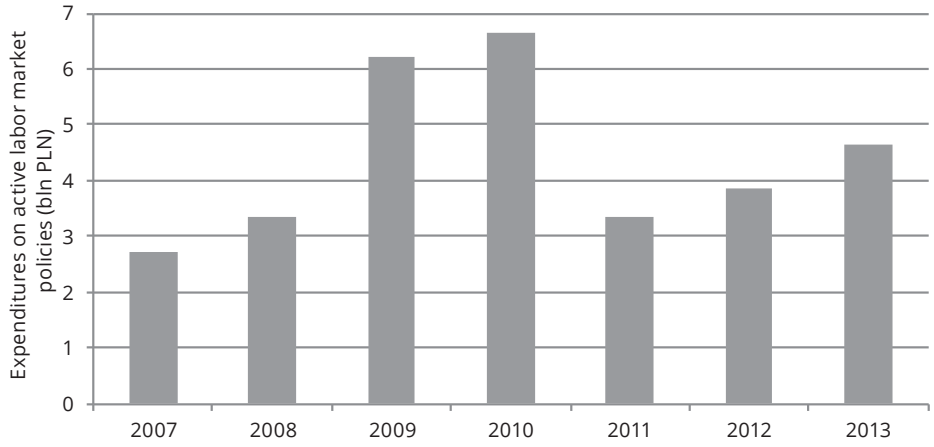
Labor market policy

Because of the need to cut public spending in the post-crisis period, the room for active labor market policies was limited. Due to cuts in the Labor Fund in 2011, the Ministry of Labor and Social Policy (MPiPS) decided to halve spending on measures to counteract unemployment to ZL3.3 billion, from ZL6.6 billion a year earlier. This decision came as the government coped with a statutory limit on spending on unemployment benefits, which kept growing steadily amid unfavorable macroeconomic conditions. In 2011, expenditures on active forms of counteracting unemployment began to increase again, but they did not exceed ZL5 billion by 2014 (Figure 6.2).

Due to the austerity policies, the Ministry of Labor and Social Policy took action to increase the efficiency of expenditure allocation by labor offices. For the first time in the history of the Polish public sector, a conditional subsidy was introduced. As of May 2014, the amount of money transferred to labor offices for salaries depends on how successful they are in reducing the unemployment rate. Seventy percent of the subsidy is disbursed as before, but the remaining 30% goes only to the best labor offices. Furthermore, under the new regulations, unemployed citizens registered in labor offices are now classified into three categories: those who only need help in finding a suitable job because they have sufficient skills and education; those who need an internship or additional training to successfully apply for available job openings; and those who

are excluded from the labor market and thus endangered by social exclusion, including those working in the shadow economy and those not interested in taking any job. All unemployed persons, regardless of the category in which they are classified, will have contact with only one labor officer. Those classified as excluded from the labor market will be granted help by private intermediaries, with the government picking up the tab. These changes should increase the efficiency of resource spending on passive labor market policies, which should help reduce the unemployment rate.

Figure 6.2. Funds for active labor market policies in 2007–2013



Source: Own calculations based on budgetary data for 2007–2013.

Housing policy

The government pursued an active housing policy in the analyzed period. From 2007 to 2012, a subsidy program financed by BGK and called "Family on its Own" was at work to help first-time buyers purchase a home. More than half of the 192,000 households that used funds under the program acquired an apartment on the resale market (BGK, 2013), mostly before the global financial crisis. In 2010–2012, the program helped prevent a sudden drop in demand for new housing in the wake of increased unemployment and tighter lending policies by banks. Transaction prices on the new-home market in major cities fell by only 14% between the first quarter of 2010 and the fourth quarter of 2012 (Łaszek *et al.*, 2014). This was accompanied by a reversal of proportions among those benefitting from the "Family on its Own" program. The proportion of households that used program funds to buy new homes grew from 9.6% in 2007 to 39.8% in 2013.

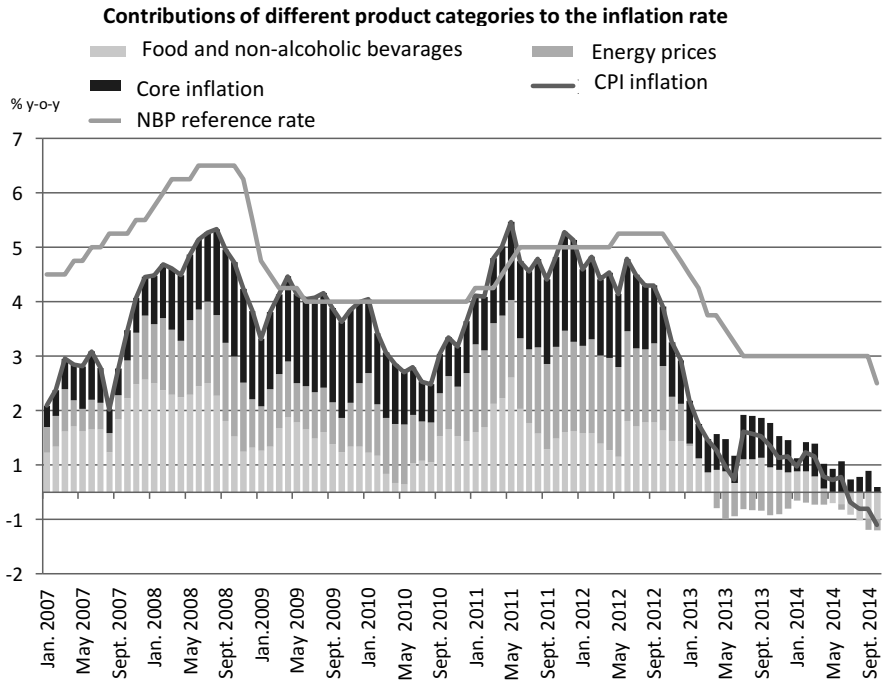
After the “Family on its Own” program ended, the government began working on another housing subsidy program for young families that could help revive the country’s stagnant real estate market. A new stimulus program, "Housing for the Young," came into force at the beginning of 2014, allowing first-time buyers to finance their down payments and pay their loan installments. This program covered all types of new residential premises, from apartment buildings offered by developers to condominiums built by housing cooperatives to single-family houses. The program led to a gradual reduction in surplus housing unsold by developers and to a steady increase in transaction prices (by 2% in the first three quarters of 2014 on average).

In 2014, the government also launched a third program to stimulate the supply of housing, called “Apartments for Rent.” BGK bank assets were used to finance a special-purpose investment fund tasked with purchasing properties to be rented out to citizens at below-market prices. The aim of this program is to increase the supply of affordable housing in big cities in order to increase the mobility of the population and reduce structural unemployment across the country. However, the program appears to have little chance of success because of problems with the purchase of properties. BGK wants to buy only entire blocks of finished flats in order to rent them out at below-market rates and then resell these at a price that would make the profitability of the investment equal to the average market rate of return. But pressing ahead with all three objectives at the same time seems to be impossible, and the program will not increase the supply of rental housing; flats offered for rent by BGK will crowd out private apartment owners, who will no longer be competitive in terms of price.

Monetary policy

Monetary policy was pursued under extremely unfavorable conditions in the studied period. A large number of external shocks, such as a decline in global trade, strong fluctuations in the exchange rate of the Polish zloty, a spike and subsequent drop in oil and agricultural prices, a Russian embargo on Polish food, and changes in government-regulated prices (such as waste disposal and kindergarten fees), resulted in strong fluctuations in inflation independent of the Monetary Policy Council’s decisions. Also disruptive for Polish monetary policy were decisions made by the world’s largest central banks, including the U.S. Fed, the euro area’s EBC, the Bank of Japan, and the Bank of England. Their extremely loose monetary policy significantly increased the profitability of carry trade in Poland, creating pressure on the Monetary Policy Council to cut interest rates.

Figure 6.3. Monetary policy and sources of inflation, 2007–2014



Source: Own calculations based on NBP and GUS.

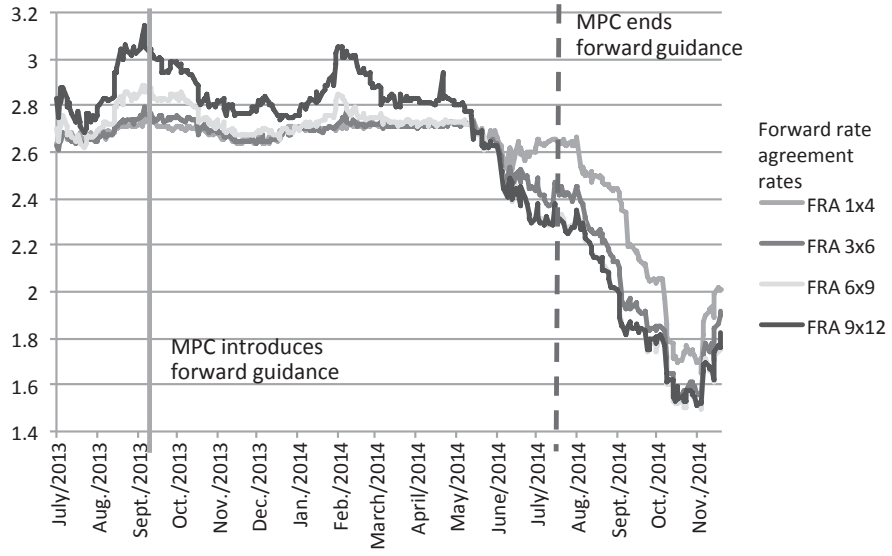
The Council consequently introduced non-standard policy measures that included:

- an increase in the reserve requirement ratio in October 2010;
- a temporary introduction of forward guidance from September 2013 to June 2014;
- an asymmetric reduction in interest rates in October 2014 when the Lombard rate was cut by 100 basis points, the reference rate was reduced by 50 bps, and the deposit rate was left unchanged. The Council also changed the market communication method, especially regarding its future monetary policy path. Last but not least, in the most recent easing cycle, key interest rates were cut to their lowest level ever (with 2.00% for the reference rate).

The most important non-standard tool was the introduction of forward guidance, which means including information in RPP statements that there would be no changes in monetary policy in a given period of time. When introducing forward guidance in September 2013, the Council declared that interest rates would not change until at least the end of the year (RPP, 2013). The RPP then gradually extended that period until the end of the third quarter of 2014. This move was designed to lower interest rates on assets with longer maturities. This objective was achieved, as indicated by

a clear narrowing in the difference between the FRA 1x4 and 9x12 rates immediately after forward guidance was introduced. However, the RPP made some mistakes when it then sought to exit from its forward guidance policy. By mid-2014 the economic outlook had deteriorated so dramatically that a rate cut was required, yet the Council decided against reducing interest rates because of the declarations it had made when the forward guidance policy was still in force. Even though the RPP abandoned forward guidance in July, it refrained from cutting interest rates until October. The Council was probably behind the curve in easing monetary policy and eventually went ahead with a 50 bp cut in an attempt to compensate for this delay.

Figure 6.4. The effectiveness of forward guidance policy



Source: Own calculations based on data from the Datastream service.

Despite using non-standard measures, the Council failed to fulfill its mandate and could not keep the inflation rate within the NBP target of 2.5% +/–1 pp. CPI inflation stayed within the target range for only 15 of 57 months of the RPP's term (2010-2014).

Directions and effects of structural policy

This section focuses on assessing the main thrusts and key outcomes of structural policy in Poland. The main aim of this policy is to influence the supply side of the economy, and its outcomes fully materialize only in the long term. In general terms,

the effects of structural policy boil down to changes in the level and composition of the supply of goods and services in an economy and to changes in the structure of incentives determining the decisions of economic agents. By the same token, structural policy aims to create favorable conditions for sustainable economic growth and, more generally, for rapid socioeconomic development.

The key structural reforms carried out in Poland from 2007 to 2014 as part of the systemic transformation process included privatization, market liberalization, and increasing the scope of economic freedom in the broad sense. In this last case, steps undertaken by policy makers were aimed above all at reducing corruption and dismantling or mitigating the adverse impact of bureaucratic hurdles hampering the expansion of private entrepreneurship. Other important goals and priorities of structural policy included promoting the development of markets and competition, and designing and implementing public finance sector reforms. This was combined with a more comprehensive reform of the government sector itself, with a view to ensuring increased effectiveness and efficiency of government agencies and strengthening incentives fostering economic development (through measures such as an increased flow of positive externalities for the private sector). Another important goal was broadening the scope of financial intermediation coupled with the development of financial markets.

Generally, the structural policy pursued in Poland from 2007 to 2014 deserves a positive assessment. However, it was not without flaws. In fact, policy makers would have probably achieved better results had they decided to embark on more far-reaching and comprehensive structural reforms in the analyzed period.

Below we tentatively assess Polish structural policy. We begin with a brief overview of indicators of progress in structural reform that are published annually by the European Bank for Reconstruction and Development (EBRD). The indicators are classified into four categories (further sub-divided into nine areas) and refer to: (i) the enterprise sector, (ii) development of markets and competition, (iii) financial institutions, and (iv) infrastructure. Table 6.1 shows details.

As seen in Table 6.1, Poland made progress in structural reforms in the studied period in three of nine areas: privatization of state-owned enterprises (large-scale privatization), competition policy, and infrastructure development. Notably, in three other areas, Poland achieved its maximum scores in previous years, which implies there is no room for further improvement. As a result of its progress, the average score showing the overall advancement of structural reforms in Poland rose from 3.78 in 2007 to 3.87 in 2013. This trend can be also interpreted differently: while in 2007 Poland covered 83% of the road from "plan to market" (from the perspective adopted in this study, i.e. the development of market institutions), by 2013 the figure had grown to around 86%.

Table 6.1. Progress in structural reforms in Poland, 2007–2013

Year	Enterprise sector			Development of markets and competition			Financial institutions		Infrastructure	Average score
	Large-scale privatization	Small-scale privatization	Enterprise restructuring and corporate governance	Price liberalization	Trade and exchange rate liberalization	Competition policy	Banking sector	Capital markets, insurance sector and other financial services		
2007	3.3	4.3	3.7	4.3	4.3	3.3	3.7	3.7	3.3	3.78
2014	3.7	4.3	3.7	4.3	4.3	3.7	3.7	3.7	3.7	3.87
Change	+0.33	0	0	0	0	+0.33	0	0	+0,33	+0.09

Note: *S*cale from 1 to 4.3; the higher the score, the bigger is the progress of structural reforms.

Source: EBRD, *Transition Report 2013,* London 2013; EBRD, *Transition Report 2007,* London 2007; EBRD, *Transition Report Database*: http://www.ebrd.com/pages/research/analysis/forecasts.shtml; own calculations.

The scores in Table 6.1, illustrating the progress of structural reforms in the area of financial institutions, have been extended and complemented by selected indicators of the development of financial markets in Poland from 2006 to 2012, shown in Table 6.2.

Table 6.2. Selected indicators of financial market development in Poland, 2006–2012 (% GDP)

	Interest spreada		Domestic credit to private sector		Stock market capitalization		Monetization ratio (M2/GDP)	
	2006	2012	2006	2012	2008	2012	2006	2012
Level	3.3	4.0[b]	33.4	53.7	21.0	36.3	45.5	57.8
Change	-	–0.7	-	+20.3	-	+15.3	-	+12.3

[a] Lending rate minus deposit rate (percentage points).
[b] For 2012, the interest spread was calculated as the difference between the annual average interest rate on credit and deposits in domestic currency on the basis of National Bank of Poland data.

Source: World Bank, *2008 World Development Indicators,* Washington, D.C., 2008; World Bank, *World Development Indicators Database 2014*: http://databank.worldbank.org/; IMF, *International Financial Statistics,* May 2008, Washington, D.C.; National Bank of Poland (NBP): http://www.nbp.pl.

The data in Table 6.2 imply that the studied period marked a remarkable development of financial markets in Poland. The GDP share of domestic credit to the private sector rose, the Warsaw Stock Exchange increased its capitalization, and the monetization ratio in the Polish economy showed an upward trend. Compared with previous years, the interest spread diminished significantly and remained stable in the range of 3 to 4 percentage points; in 2002, it stood at 5.8 p.p. In transition countries in Southeastern Europe, the spread ranged from 3.4 to 9.1 p.p., whereas in the Com-

monwealth of Independent States it ranged from 3.6 to 17.5 p.p. (Rapacki, Matkowski, Próchniak, 2013). The interest spread is commonly viewed by economists as one of the most important gauges of systematic risk inherent in the financial system, or as a yardstick measuring the efficiency of the banking sector and the security of financial transactions. Consequently, Poland's interest spread data can be interpreted as pointing to a downward trend in the perception of systematic risk in the Polish economy, both compared with the past and against the background of other transition countries.

The picture of structural policy and its impact on the development of financial markets in Poland is not free of trouble spots. Of particular significance are changes that took place between 2011 and 2014 in Poland's new pension system, which was launched in 1999 and was viewed by many economists as an institutional innovation. The changes were based on a gradual limiting of the role of privately managed pension funds (OFE) to the point of dismantling the original three-pillar pension system. The objective of the multi-pillar system was to diversify and thus reduce the level of risk faced by its participants. At the same time, the new pension system was designed as a vehicle aimed at increasing the propensity to save (which is traditionally low in Poland), enhancing the expansion of the domestic capital market, and consequently accelerating long-term economic growth. The negative perception of these changes by international financial markets led the EBRD to downgrade Poland's score in its 2014 *Transition Report* due to insufficient progress the country has made in structural reforms in the "capital markets, insurance sector and other financial services" area.

The next important area reflecting the goals and outcomes of structural policy in Poland in 2007–2014 is the scope of economic freedom and the incidence of perceived corruption. Table 6.3 has the relevant data.

Table 6.3. Indicators of economic freedom and corruption in Poland, 2007–2014

	Index of Economic Freedom *Heritage Foundation*		Corruption Perception Index *Transparency International*	
	2007	2014	2007	2013
Level	57.4(83)	67.0(50)	46(58)	60(38)
Change	-	+ 9.6 (+33)	-	+14 (+20)

Notes: Index of economic freedom – scale from 0 to 100; the higher the index, the broader is the scope of economic freedom. The index is an average of scores in 10 areas: (1) business freedom, (2) trade freedom, (3) fiscal freedom, (4) government size, (5) monetary freedom, (6) investment freedom, (7) financial freedom, (8) protection of property rights, (9) freedom from corruption, and (10) labor freedom.
Global rank in brackets; the 2009 ranking list contained 179 countries.
Transparency International corruption index – scale from 1 to 10; the higher the index the lower is the corruption level. The index is calculated based on similar indices of other institutions and the authors' own research. The figures in brackets represent the global ranks of countries; the 2008 ranking covered 180 countries.

Source: The Heritage Foundation, *2014 Index of Economic Freedom,* Washington, D.C, 2014: http://www.heritage.org/index/; Transparency International, *Corruption Perceptions Index*: http://www.transparency.org/cpi2013/results; authors' computations.

The data clearly show that the structural policy pursued in Poland in the analyzed period contributed to a considerable broadening of the scope of economic freedom. At the same time, it brought down the level of perceived corruption. As a result, Poland significantly improved its relative international position in the Heritage Foundation and Transparency International rankings, moving up by 33 and 20 places respectively.

To make this assessment of economic freedom and corruption more comprehensive, Table 6.4 furnishes data on changes in the business environment in Poland from 2007 to 2013.

Table 6.4. The business environment in Poland, 2007–2013

	Entry regulations		Contract enforcement		Employing workers		Insolvency procedures	
	Number of startup procedures	Time required to start a business (days)	Number of procedures required to register property	Time required to register property (days)	Number of procedures	Time required (days)	Employment rigidity index (scale from 0= flexible to 100= rigid)	Time to resolve insolvency (years)
Level	4(10)	30(31)	6(6)	35(197)	33(38)	685/830	25(37)	3.0 (3.0)
Change	–6	–1	0	–162	–6	–145	–12	0

Source: World Bank, *World Development Indicators Database 2014*: http://databank.worldbank.org/.

The data shows that the business environment considerably improved in Poland in the studied period. The improvement applied to six of the eight areas singled out in the table. The most spectacular progress took place in terms of shortening the time required to register property (by 82%) as well as in terms of a reduction in the number of startup procedures (by 60%). At the same time, the flexibility of the labor market (understood as the ease of hiring and firing workers) increased, the effectiveness of contract enforcement improved, and market entry barriers were slightly lowered. On the other hand, the number of procedures required to register property did not change, and the effectiveness of insolvency procedures (and, more generally, the quality of business judiciary) remained low. Although Poland has not been ranked among countries with the most attractive conditions for doing business in Central and Eastern Europe, the progress it has made in this area over the past several years has contributed to strengthening the country's competitive position in the region.

According to the most recent World Bank report (World Bank, 2014), the year produced further favorable changes in the business environment in Poland. These included a reduced cost of plugging into the power grid and improved access to energy.

Moreover, improvements were made in the process of registering property (real estate) and notarial fees were reduced. Finally, due to the launch of a new system of export and import clearance (with a new terminal in Gdańsk), the time of clearance has been reduced by two days. As a result, the World Bank's newest *Doing Business* publication ranks Poland 32nd worldwide, up 40 places since 2009.[2]

However, the conditions of doing business in Poland vary greatly. For example, Poland ranks 137th worldwide (among 189 countries) in terms of the ease of obtaining building permits, and does only slightly better in terms of paying taxes (87th) and procedures related to registering a new business (85th). On the other hand, Polish businesses enjoy relatively favorable conditions in terms of access to credit (17th).

Overall, the priorities and outcomes of structural policy pursued in Poland in 2007–2014 deserve a positive evaluation. Yet the policy was not free of weaknesses. Above all, it failed to adequately address many strategic development challenges. For example, policy makers failed to design and implement comprehensive, in-depth reforms for the public finance sector and the labor market, and they also provided insufficient support to the R&D sector. In the next section, we briefly discuss the most important challenges facing economic policy makers.

Major challenges facing economic policy

Major challenges facing economic policy in Poland can be classified into two interconnected categories. The first category deals with conceptual, political and institutional development barriers that make up a broad framework of economic activity in Poland and determine the structure and strength of incentives influencing the behavior and decisions of economic agents. The second category covers challenges that stem from the mode of operation of the Polish economy, its growth factors and macroeconomic performance.

In the first category, the most fundamental weaknesses of Polish economic policy include the failure of successive governments and policy makers to define the target point on Poland's road from "plan to market" – the model of capitalism that should be built in the country. The goal of systemic transformation in Poland was defined vaguely as the creation of a liberal market economy (or capitalism), without a clear vision of what shape it should take.

[2] It should be noted that from 2009 to 2014 the World Bank changed its method for calculating the indicator, which may somewhat distort Poland's progress and make the task of drawing unequivocal conclusions more challenging.

Meanwhile, the European Union is home to at least four models of capitalism with diverse institutional architectures and market infrastructures. A study by Hanson (Hanson 2006) finds that the European Union's body of law, *acquis communautaire*, gives member countries a surprisingly wide margin of freedom in designing and implementing their own national institutions and solutions that best fit their specific needs.

Due to the lack of a clear vision about the model of capitalism that would best fit the country's development determinants and aspirations, Poland's emerging market economy is largely a hybrid. Various parts of the country's institutional architecture come from different institutional systems and are not complementary. As a consequence, instead of promoting positive synergies and increased efficiency, this institutional incoherence has generated various frictions and promoted inertia in the system.

Second, despite its relatively fast economic growth, Poland lacked a comprehensive and well-targeted long-term development strategy. As a result, for most of the systemic transformation period, the Polish economy drifted along instead of following a predetermined development trajectory.

Third, the government has apparently failed in its attempts to precisely define Poland's present and future role in the EU – other than just being a recipient of EU funds. While the need for efficient absorption of EU funds (and institutions) goes without saying, an optimal allocation and choice of alternative uses for these funds should originate from a national development strategy and well-defined, clear-cut development priorities. Such a strategy is unavailable. While Poland has done relatively well in terms of gaining access to structural and cohesion funds, it has performed much worse in defining its development priorities in the allocation and use of these funds. At the same time, it has underperformed in its endeavors to fully recognize the costs and benefits of various EU initiatives and programs in terms of Poland's national interest.

Fourth, Poland risks becoming a peripheral EU member country (a "Europe of two speeds"). Under this scenario, Poland would increasingly specialize in the production of simple manufacturing goods with a low level of processing and relatively low value added, being at best a subcontractor for more technologically advanced products.

Fifth, apart from fundamental weaknesses, the list of major challenges includes a failure by government to create favorable conditions for sustainable, long-term economic growth, in particular failure to generate positive externalities for the private business sector. More specifically, key government failures in this area include underfunding of R&D activities, insufficient (or unavailable) support for the development of human capital, neglecting the significance of the small stock of social capital, which is one of the most acute development barriers in the Polish economy, and ineffective efforts to foster the development of information and communication technologies (ICT).

The government weakness described above largely stems from a strong redistributive bias in Poland's public expenditure policy (a distorted pattern of government functions) at the expense of development spending. Other causes include a failure to meet the "golden rule" of public finance, continually growing scale of rent-seeking, and the persistence of an unproductive model of entrepreneurship, as described by William Baumol (Baumol 1990).

Moreover, Poland continues to exhibit many symptoms of the Myrdalian "soft state" where the incidence of corruption tends to be excessive, the judiciary branch of power is increasingly inefficient (in particular business courts), and law enforcement continues to be weak. At the same time, there have been mounting symptoms of a declining quality of public and merit goods such as healthcare and education.

Finally, in sharp contrast to some other transition countries in the region (Slovakia and the Baltic states), Poland has not managed to substantially downsize its government sector and reduce the scope of its functions during the past seven years (and more generally throughout the transition period). If the proportion of public expenditure to GDP is adopted as the basic gauge of the size of government, this index has remained stable in Poland since the early 1990 s, at above 40%. In the global perspective, the index for Poland has been about twice as high as those in peer countries with a similar level of economic development (23%–24%). At the same time, the figure has remained close to the average level in the European Union and the OECD. This pattern implies that Poland displays indicators comparable to those in the most developed EU countries. In other words, the size of government in Poland is excessive for the country's economic development level. What's more, in the last two to three years the size of government in Poland has begun to grow again. Employment in public administration has increased by over 10% to more than 600,000.

When it comes to major macroeconomic development challenges facing Polish economic policy, the first challenge that is likely to adversely affect Poland's development prospects in the next 20 to 40 years is its unfavorable demographic trends. These include a shrinking population (a trend that is expected to be more pronounced than in most other EU countries), unfavorable changes in the age composition of Polish society, emigration and brain drain, and a permanent decline in the dependency ratio – the number of those working per one retired person.

Second, the Polish government failed in its efforts to embark on a comprehensive reform of the labor market. As a result, the participation rate in Poland's workforce is among the lowest in the European Union, while the proportion of the labor force employed in part-time jobs and self-employed is among the highest in the EU.

Third, for most of the transition period, the Polish economy has displayed the lowest propensity to save and one of the lowest investment-to-GDP ratios in Central

and Eastern Europe. Under the endogenous growth model, the investment rate and domestic savings (which provide funding for investment) are the necessary conditions for fast and sustainable economic growth in the long term.

A fourth key barrier to sustained economic growth and continuous improvement in Poland's international competitive position is a persistently low innovative capability of the Polish economy. Of special note among its numerous symptoms is a low proportion of high-tech products in manufacturing exports (7%) and a huge license trade deficit (the ratio of export receipts to import spending is 1:10).

A fifth major challenge for Polish economic policy is a low (and shrinking, according to some empirical studies) stock of social capital. Using the terminology devised by Francis Fukuyama, Poland should be described as a *low-trust society* (Fukuyama 1997). Moreover, while the distrust of Poles to the very institution of the state is strongly determined historically, a new trend has emerged that involves a similar distrust on the part of the state toward citizens and private business. As a result, the government and public administration in Poland tend to devise a variety of bureaucratic hurdles that limit economic freedom.

A sixth serious development challenge stems from rapidly growing tensions in Poland's energy mix, which are mostly due to delayed investment projects aimed at developing and modernizing the country's power-generation base. The effect of this factor is compounded by the prospect of a substantial rise in the costs of generating and supplying electricity in Poland, in the wake of an intergovernmental agreement (known as the climate package) adopted by the EU in the autumn of 2014. The package calls for considerable reductions in toxic emissions and the resulting need to switch to more environment-friendly energy generation technologies.

Overall, the cumulative effect of these development barriers, combined with a missing or insufficient response of economic policy, may eventually lead to a steady deceleration of growth dynamics and a subsequent deterioration in the international competitiveness of the Polish economy. Some symptoms of this new unfavorable trend have already appeared in Poland. In the past few years the Polish economy has decelerated in terms of potential GDP growth, from more than 5% to around 4% per annum, i.e. by about 1.5 percentage points. What's more, based on long-term forecasts by the European Commission, the OECD and our own projections (Matkowski, Próchniak, Rapacki 2013), after 2020 Poland's economic growth is likely to decelerate further – to a level below 2% annually. This may lead to a persistently high, double-digit unemployment rate.

Even worse, there are reasons to believe that such a scenario is likely to produce one more serious threat: it may boost and perpetuate an imitative model of development under which Poland would become an importer of ready-made institutions ("*one*

size fits all"), even though some of these would be incompatible with the country's priorities and development potential.

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Chapter 7

Development of Human Resources in Poland in 2007–2014

Mateusz Mokrogulski

This chapter seeks to evaluate trends in the development of human resources in Poland as one of the factors behind economic competitiveness from the start of the financial and economic crisis to 2014. The analysis covers the main factors determining the state of human resources in the economy, including demographic trends, developments in employment and unemployment, wages, and changes in labor productivity. The evaluation places particular emphasis on current labor market trends.

Demography

Poland's population has decreased during the last three years. At the end of 2014 it stood at 38.484 million, down by about 12,000 from a year earlier, according to preliminary data from the Central Statistical Office (GUS). The balance of net international migration for permanent residence remains negative, and the process of temporary emigration is gaining importance. At the end of 2013, 2.196 million Poles were temporarily staying abroad, compared with 2.13 million a year earlier and 2.27 million in 2007, a record year in terms of temporary emigration. In 2013, Britain was still home to the largest number of Polish immigrants (642,000). It was followed by Germany (560,000) and Ireland (115,000). In 2014, emigration from Poland increased particularly to Germany, which was the last EU country (together with Austria, in May 2011) to open its labor market to citizens from new member states. The Netherlands also gained significance in this respect, with the number of Poles temporarily residing in that country increasing to 103,000. The number of Polish citizens living outside Poland is an obvious demographic problem that will be more difficult to solve with each passing year. Many immigrants are quickly able to find work abroad (though often below their qualifications), develop professionally, and achieve their desired economic status. Many are opening their own businesses and becoming highly regarded professionals. Unable to pursue their professional dreams at home, they decide to stay

abroad. For Poland this means a loss not only in demographic terms, but also because its citizens are working abroad instead. Also important is the fact that these people have received their education in Poland, often at public universities. Thus, many of those who once studied at the expense of Polish taxpayers are now contributing to the GDPs of other countries. In the long term, this trend is bound to have a negative impact on the Polish economy.

British Prime Minister David Cameron has made several negative statements about Poles living in Britain. According to Cameron, immigrants from new EU member states whose children remained in their home countries should not be eligible for child benefits in Britain. Cameron also said that the decision to open the UK's borders to Poles and workers from other countries was a mistake. Such a statement coming from a British official might seem shocking because the United Kingdom, Ireland, and Sweden were the only countries that did not introduce any restrictions on employment for citizens from new EU member states. Moreover, a report by the Centre for Research and Analysis of Migration at University College London suggests that immigrants from other EU countries are not a burden for the UK budget. Research shows that the same cannot be said of non-European immigrants, many of whom have already permanently settled in the UK. Most of them work in occupations that do not require high qualifications. If it imposed restrictions on employees from other EU member states, the United Kingdom would breach the principle of the free movement of workers, which is one of the fundamental freedoms ushered in by the Treaty Establishing the European Communities.

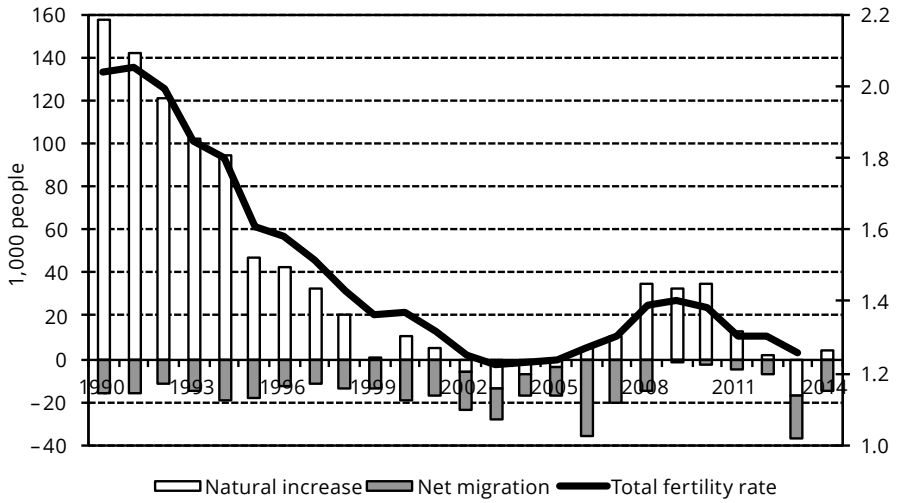
Meanwhile, the fertility rate in Poland decreased to 1.26 at the end of 2013, from 1.30 in the previous two years and a record 1.40 in 2009. This may raise concern especially as the fertility rate in Poland has remained below 2.1 – a level that ensures the so-called simple replacement of generations – since the beginning of the transition period. Poland has been among EU member states with low fertility rates for years. In 2012, only Portugal had a lower rate. The EU average is 1.58, while France and Ireland have the highest rates, both at 2.01 in 2012.

The steadily declining fertility rate has led to a deterioration in Poland's demographic structure. In 2014, citizens aged 60–65 years and older accounted for 19.0% of the total population, up from 18.4% in 2013 and 14.8% in 2000. The proportion of those aged 17 and less is steadily decreasing. In 2014, it stood at 18.1%, down from 18.2% a year earlier and 24.4% in 2000. In the following years the aging of the population is expected to continue in Poland as well as other EU countries, posing a problem for these economies.

Due to the deteriorating fertility rate, in 2007 the government introduced special child allowances for taxpayers. Over the years the amount of the allowances has been

subject to some modifications. In 2014, single parents raising one child were entitled to a tax deduction of ZL1,112.04 (i.e. 2 x ZL556.02) provided their annual income did not exceed ZL56,000. In the case of married couples, the maximum annual income entitling taxpayers to the tax credit was twice as high, at ZL112,000. For those bringing up two children, the rules for using the tax credit did not change: regardless of income, the credit is ZL1,112.04 per year per child. Recently the government increased allowances for large families. In the case of families with three children, the tax credit for the third child is now ZL2,000.04 per year, and for families with at least four children it is ZL2,700 per year for the fourth and each subsequent child. Another important change is the possibility of deducting the full credit, even if the income tax paid by an individual is less than the credit. Previously a family could not get a refund higher than the amount of tax due, which put families with modest means at a disadvantage. Starting with the 2014 tax year, a family can get a refund higher than the tax paid, but the refund cannot be higher than the total amount of tax-deductible social security and health insurance paid by the taxpayer. These personal income tax solutions can therefore be seen as a sign of family policy in Poland.

Figure 7.1. Natural increase, net migration (left axis) and total fertility rate (number of newly born children per woman – right axis) in Poland, 1990–2014



Source: Central Statistical Office (GUS).

Another important subject is the issue of parental leave, which was recently extended. Mothers who gave birth to a child in 2013 and subsequent years are entitled to a paid leave of up to one year. The annual leave consists of 20 weeks of basic mater-

nity leave, 6 weeks of extra maternity leave, and 26 weeks of parental leave. Parental leave may also be taken by the child's father, and in addition both parents have the option of taking parental leave at the same time. The child's father is also entitled to a paternity leave of two weeks. This can be taken up to the time the child is one year old. In addition, the possibility of taking parental leave[1] has been extended. Currently, a parent can take it until the child reaches the age of five.

However, all these partial measures have done little to boost fertility in Poland. Only a comprehensive family policy – not a set of uncoordinated initiatives – could do the trick, especially as the government has devised a few mechanisms that increase rather than reduce the financial burden on families. One example is a rise in the VAT rate on baby products to 23% at the beginning of 2012, from a preferential rate of 8% previously. As demand for goods such as children's shoes and baby clothes is inelastic, only a slight decline in demand can be expected despite the steeper price tags. The new, higher VAT rate will increase government revenue, but shift the cost onto parents.

Poland needs a comprehensive family policy under which those deciding to have children would not be discriminated against in comparison with the rest of society. Such a policy should encompass the labor market, the education sector, and arrangements for home buyers. Although family policy entails specific costs for the government in the short term, in the long term it could prove to be an investment in human capital capable of inhibiting or even reversing the country's increasingly unfavorable demographic trends.

Labor market

Economic activity in Poland dropped suddenly in the fourth quarter of 2008 as the financial and economic crisis spread across Europe. The negative trends also affected the labor market, resulting in reduced employment and rising unemployment, accompanied by a significantly slower growth of wages, which nevertheless continued to rise in real terms. The Polish labor market responded to the crisis relatively quickly, although employment and unemployment trends were delayed by several months in relation to real GDP growth.

The labor market deterioration that started in Poland in the fourth quarter of 2008 lasted until the first half of 2010. The registered unemployment rate increased from 9.5% at the end of 2008 to 12.1% at the end of 2009 and then rose to 12.4% a year later. Demand for labor changed unevenly in different sectors of the economy during that

[1] Distinct from the "parental leave" mentioned earlier.

period. Real wages increased at a much slower pace than when the economy grew rapidly. Notably, wages in the public sector grew faster than in the corporate sector from 2008 to 2013, not necessarily because the former was more productive than the latter. While in the initial phase of the crisis faster wage growth in the public sector could have had a stabilizing effect on consumer demand, the persistence of this relationship in subsequent years suggests that the Polish labor market had become less flexible. In early 2010 employment and unemployment began to stabilize. At the end of 2013 the unemployment rate stood at 13.4% and was unchanged from the end of 2012. Corporate-sector employment increased at a moderate rate of 0.7% a year on average from the end of 2010 to the end of 2013. Wages grew at a slow rate in the economy as a whole in real terms: 1.4% in 2011, 0.1% in 2012, and 2.5% in 2013. The marked rise in 2013 was in part due to an unexpected drop in inflation and nominal wages not yet adjusting due to their rigidity. Wages in the corporate sector fell by 0.2% in real terms in 2012.

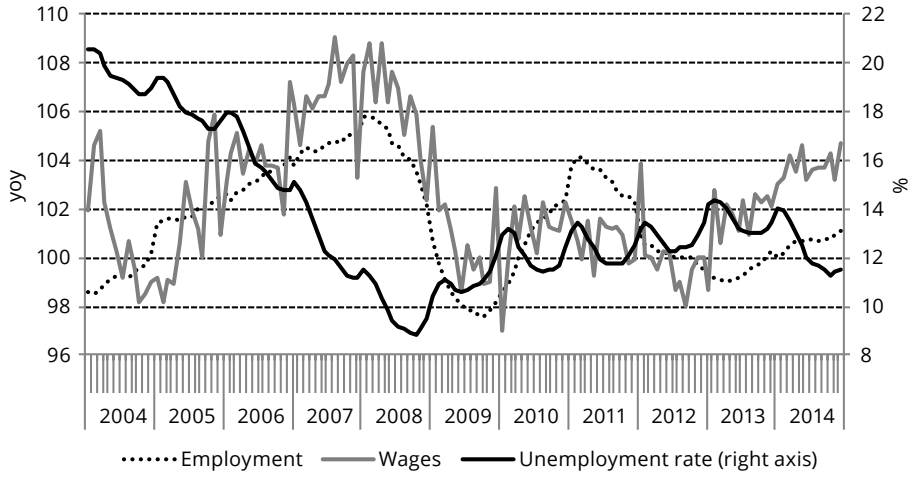
In 2014, the trend of the previous four years changed. Above all, the unemployment rate decreased significantly, to 11.5% at the end of 2014. This meant that the number of those unemployed decreased by more than 330,000 over the course of the year. Due to seasonal factors the lowest unemployment rate was noted in October, at 11.3%. Moreover, corporate-sector employment increased markedly in 2014, 1.1% in year-on-year terms at the end of the year and 0.6% in average annual terms. Wages in the corporate sector increased 3.7% year-on-year on average in both nominal and real terms. In the second half of the year real wages grew in part due to deflation that began in July. At the end of the year the prices of goods and services in Poland were 1.0% lower than a year earlier. Interestingly, this was the first instance of a year-on-year decrease in the price level since the beginning of market reforms in the country in the early 1990 s. In addition, data for the first three quarters of last year show that, in a reversal of the previous trend, wages in the corporate sector increased more markedly than in the public sector.

Corporate-sector employment underwent varying changes in various sectors of the economy in 2014. The greatest average annual increases were noted in the following sectors (according to the Polish Classification of Activities – PKD 2007):

- information and communication (3.1%)
- water supply, sewerage, waste management remediation activities (2.4%)
- administrative and support service activities (2.4%)

Not everywhere were the trends positive; some industries are still experiencing a slowdown or decline. For example, in the construction industry demand for labor decreased by 7.7%, and in "mining and quarrying" and "electricity, gas, steam and air conditioning supply" it dropped by 6.5% and 5.5% respectively. Employment in construction increased until mid-2012, even in times of economic downturn.

Figure 7.2. The growth of real wages and employment in the corporate sector (corresponding month of the previous year = 100) and the registered unemployment rate in Poland



Source: Central Statistical Office (GUS).

Data on gross wage growth in the corporate sector by industry do not match the data on employment. The greatest average nominal wage growth was recorded in the following PKD-2007 sections:

- administrative and support service activities (5.3%)
- manufacturing (4.3%)
- construction (4.3%)

Wage growth was positive in all of the analyzed sections, with the smallest increases noted in the following sections:

- mining and quarrying (1.8%)
- water supply, sewerage, waste management, remediation activities (3.0%)
- information and communication (3.0%).

The Polish labor market became increasingly inflexible in 2010–2013, with a rising long-term unemployment rate and growing unemployment in the youngest age group, those 15–24. By the end of 2013, the long-term unemployment rate had risen to 4.4%, from 3.0% at the end of 2010 and 2.4% at the end of 2008. Unemployment in the 15–24 age group increased to 27.3%, from 23.6% at the end of 2010 and 17.1% at the end of 2008, highlighting a growing problem among first-time job seekers. The increasing number of long-term unemployed may eventually lead to their social exclusion.

In 2014, the figures improved slightly. The unemployment rate in the youngest age group decreased to 23.9%, yet it remained above the EU28 average of 22.2%. In

the fourth quarter of 2014 the average time of job seeking increased to over a year and was about two months longer than in 2010. The increased rigidity of the labor market was one of the causes of emigration after the first phase of the financial and economic crisis.

An economic climate survey conducted by the National Bank of Poland[2] among businesses showed that employment forecasts significantly improved in the first quarter of 2015. For more than a year, more companies have been planning to increase rather than decrease employment, reversing the trend of the previous five years and lifting the employment rate significantly above its long-term average. In terms of ownership, the greatest demand for work is declared by private enterprises, particularly those foreign-controlled. In terms of branches, the greatest growth is expected in industry, followed by construction and services. Moreover, 23.7% of enterprises, less than the average numbers since 2005, declared a readiness to increase wages. The highest percentage of companies planning to increase wages (in terms of Polish Classification of Activities – PKD 2007 sections) is in industry and services (mainly in transport and trade). In construction, this percentage is much lower, at around 6%. In what is already a well-established trend, wage increases are more often planned by large enterprises than those from the SME sector.

Similar conclusions about demand for labor can be drawn from the Manpower Employment Outlook Survey.[3] According to a representative sample of 750 employers, 9% are planning an increase in total employment, 8% are planning to reduce the number of jobs, and 79% are not expecting any personnel changes. The net employment outlook is 1%, or 5% after seasonal adjustments. Although expectations worsened slightly compared with the first quarter of 2014, the net employment forecast remained positive.[4]

The Manpower research showed positive labor market expectations in Poland through most of the economic slowdown with the exception of a short period from the fourth quarter of 2014 to the second quarter of 2013. In seven of 10[5] surveyed sectors more employers are planning to increase employment rather than cut jobs in the first quarter of 2015.

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2 The NBP's economic climate survey is conducted quarterly. This chapter presents the results of a survey conducted in the final quarter of 2014 and examining businesses' forecasts for the first quarter of 2015.

3 The survey is conducted quarterly in 42 countries and covers 65,000 HR departments. This chapter presents the results of a survey examining employers' expectations for the first quarter of 2015.

4 All the data below is seasonally adjusted data.

5 The following sectors were surveyed: construction; energy/gas industry/water supply; finance/insurance/real estate/services; retail and wholesale trade; public sector institutions; mines/mining; manufacturing; restaurants/hotels; agriculture/forestry/fisheries; transport/logistics/communication.

Manufacturing companies are clearly optimistic; their net employment outlook is +12%, 2 p.p. more than in the previous quarter and unchanged from a year earlier. In wholesale and retail trade, the net employment outlook is +9% (qoq: down 4 p.p.; yoy: stable), and the forecast for construction is +8%, marking stabilization in both quarterly and annual terms. By contrast, the following sectors had negative expectations for employment: "electricity, gas and water supply" (–4%, a decrease of 3 p.p. in qoq terms and an increase of 5 points yoy), "agriculture, hunting, forestry and fishing" (–3%, meaning stabilization in qoq terms and a decrease of 15 p.p. in yoy terms), as well as "mining, quarrying" (–2%, an increase of 5 p.p. in qoq terms and a 1 p.p. rise in yoy terms).

These results do not fully correspond with the current trends in employment. In particular, there are significant discrepancies in the construction industry. Meanwhile, companies in other EU countries, such as Ireland, Bulgaria, and Romania, expect an increase in demand for labor, while businesses in Finland, Italy, and the Netherlands are the most averse to job creation.

In a positive trend, the employment rate in Poland is steadily rising. From 2004 to 2013, the overall rate (for the 15–64 age group) increased from 51.7% to 60.0%. In 2004, Poland had the lowest employment rate in the EU. By the end of 2013 it had surpassed eight member countries, with the EU28 average at 64.1%. During the crisis, this growth trend was suppressed, but did not reverse. The Czech Republic stood out among EU countries in Central and Eastern Europe at the end of 2013, with an employment rate of 67.7%.

The employment rate in the 55–64 age group increased from 26.2% in 2004 to 40.6% in 2013, enabling Poland to move from the last to seventh position in the EU (with the EU28 average at 50.2%). The growth of this indicator accelerated during the crisis. The current trends are the result of the following developments:

- part of the population stripped of their right to state pensions (transition);
- lack of extended privileges in the form of early retirement for women born after 1953 and men born after 1948;
- activation of older people on the labor market with the 50+ program.[6]

In the coming years there will be a further improvement in the activation of people over 55, artificially induced by a steady increase in the retirement age. The changes will be particularly evident in the case of employment rates for women.

[6] The full name of the program is “Solidarity Across Generations: Measures Aimed at Increasing the Economic Activity of People Aged Over 50.”

Table 7.1. The employment rate in 2013 and the average unemployment rate in 2014: Poland compared with selected other countries

Country	Employment rate (%), 15–64 age group				Unemployment rate (%)		
	Total	Women	Men	aged 55–64	Total	under 25	Long term[a]
Poland	60.0	53.4	66.6	40.6	9.0	23.9	4.4
Czech Republic	67.7	59.6	75.7	51.6	6.1	15.9	3.0
Slovakia	59.9	53.4	66.4	44.0	13.2	30.4	10.0
Hungary	58.4	52.8	64.3	38.5	7.7	20.4	4.9
Lithuania	63.7	62.8	64.7	53.4	10.7	19.3	5.1
Latvia	65.0	63.4	66.8	54.8	10.8	19.6	5.8
Estonia	68.5	65.7	71.4	71.4	7.4	15.0	3.8
Germany	73.5	69.0	78.0	63.6	5.0	7.7	2.3
France	64.1	60.4	67.8	45.6	10.2	24.3	4.2
Spain	54.8	50.3	59.2	43.2	24.5	53.2	13.0
Ireland	60.5	55.9	65.1	51.3	11.3	24.0	7.9
Netherlands	74.3	69.9	78.7	60.1	7.4	12.7	2.4
Britain	70.5	65.8	75.4	59.8	7.6[a]	20.7[a]	2.7
Denmark	72.5	70.0	75.0	61.7	6.6	12.6	1.8
Romania	59.7	52.6	66.8	41.5	6.8	24.0	3.3
Bulgaria	59.5	56.8	62.1	47.4	11.6	23.6	7.4
Croatia	52.5	48.5	56.5	37.8	17.0	45.0	11.0
EU28	64.1	58.8	69.4	50.2	10.2	22.2	5.1
USA	67.4	62.3	72.6	60.9	6.2	13.4	1.9

[a] Data for 2013.

Source: Eurostat.

Education, labor costs and productivity

Poles are relatively well educated compared with other Europeans in terms of the percentage of people with at least a secondary education among those aged 25–64. In Poland, this indicator stood at over 90.0% in 2014, compared with the EU average of 75.8%, after a steady rise in recent years, including the crisis period. However, Poland is below the EU average in terms of the percentage of the population with a higher education (26.1% against 29.1%), despite an upward trend in recent years. A relatively small number of people in Poland participate in various courses and training programs: 4.1% in 2014, against 10.6% in the EU28 on average. Statistics confirm that the level of education has a positive impact on wages. However, lifelong learning is

just as important. Focusing on self-development and professional growth helps avoid unemployment during an economic downturn and reduces the risk of joblessness among those approaching retirement age.

Table 7.2. Education indicators (data for 2014), unit labor costs (Q3 2014), and minimum wage (2015): Poland compared with selected other EU countries

Country	Population with upper secondary or tertiary education[a]	Population with tertiary education[a]	Participation rate in education and training[a]	Unit labor costs (%, yoy)	Minimum wage	
	% of population (aged 25–64)				EUR	PPS
Poland	90.5	26.8	4.1	1.5	410	738
Czech Republic	93.1	21.2	9.4	2.2	332	502
Slovakia	91.2	20.4	2.9	0.9	380	536
Hungary	82.9	22.9	3.3	–0.4	333	593
Lithuania	93.4	36.1	5.2	–0.3	300	464
Latvia	89.6	30.4	5.9	5.5	360	507
Estonia	91.0	38.8	12.3	0.9	390	488
Germany	86.8	27.4	7.9	0.3	1,473	1,441
France	76.9	33.2	5.7[b]	0.2	1,458	1,337
Spain	56.3	34.4	10.1	0.3	757	798
Luxembourg	81.7	44.8	13.8	1.6	1,923	1,561
Britain	79.0	40.4	15.9	n.a.	1,379	1,114
Sweden	83.6	38.3	28.6	0.1	-	-
Romania	73.8	15.8	1.7	3.7	218	384
Bulgaria	81.2	26.8	1.7	n.a.	184	380
Croatia	82.7	21.3	2.5	n.a.	396	584
EU28	75.8	29.1	10.6	0.6	-	-

[a] Preliminary data. [b] Data for 2012.

Source: Eurostat.

The relatively good education of the Polish population contrasts with low nominal labor costs per hour of work. Nominal labor costs in Poland are similar to those in Hungary and higher than in Lithuania, Latvia, Romania, and Bulgaria, but they are still one-third of the EU average and one-fourth of those in Germany. Therefore the cost advantage of Poland and other Central and Eastern European countries seems evident. The question is whether this advantage will be sufficient for foreign companies to create new jobs in the long term. In addition, it may turn out that the persistence of relatively low wages compared with the EU average will continue to encourage

educated people to seek employment abroad (as was described at length in the section on demographic trends). Specific incentives are needed to encourage young people to stay in the country and create significant added value through their work here. Financial stability is also an important factor for those deciding to start a family and have children.

Another issue is the minimum wage in each EU member state. This can be set in two ways:

- at the national level: the minimum wage then applies to all those employed under a contract of employment and can be set on either a monthly or hourly basis (Germany, Ireland, France, Malta, United Kingdom),
- in collective agreement: in this case there is no single country rate.

National minimum wages exist in 22 EU member states. Denmark, Cyprus, Latvia, Austria, Finland, and Sweden do not have a minimum wage set at the national level. All Nordic countries belonging to the EU[7] set the minimum wage through collective agreements. This may mean that the method of setting the minimum wage depends on the model of capitalism in a given country. This hypothesis needs to be validated by more research. In 2015, Germany joined the group of countries with a national minimum wage. There is a large discrepancy between EU member states in terms of the minimum wage level. In particular, as in the case of nominal labor costs, Central and Eastern European countries have significantly lower minimum wages. Interestingly, the countries of Southern Europe (Spain, Portugal, and Greece) that have been particularly affected by the recent financial and economic crisis have lower minimum wage levels than the rest of the "old" EU.

As of 2015 the minimum monthly wage in Poland is ZL1,750 gross (up from ZL1,680 in 2014). This applies to all those employed under a contract of employment with the exception of the first year of employment. Then the wage cannot be lower than 80% of the currently applicable minimum wage. In 2015, this is ZL1,400, equivalent to 44.2% of the average monthly gross wage in the economy projected in the 2015 Budget Act.

Critics argue that the minimum wage contributes to unemployment. If there were no minimum wage, they say, there would be more jobs for less well-qualified workers. Since employers cannot pay less than the minimum wage, these people often end up unemployed or agree to work under civil contracts. Despite this criticism, even liberal economies such as the United Kingdom and the United States have minimum wage regulations. In Poland, less than 5% of all those employed were paid the minimum

[7] In Norway, which is not part of the EU, but is a member of the European Economic Area (EEA), the minimum wage is also set by collective agreements.

wage in 2005, according to Eurostat data. It is therefore difficult to accept that the minimum wage has a negative effect on major labor market trends.

Table 7.3. Nominal labor cost in € per hour in selected EU member states

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013
Poland	5.2	5.7	6.4	7.6	6.6	7.2	7.3	7.4	7.6
Czech Republic	6.3	7.0	7.7	9.2	9.1	9.8	10.5	10.5	10.3
Slovakia	5.9	6.4	6.9	7.3	7.6	7.7	8.0	8.3	8.5
Hungary	6.3	6.4	7.3	7.8	7.1	7.0	7.3	7.5	7.4
Lithuania	3.5	4.1	5.0	5.9	5.6	5.4	5.5	5.8	6.2
Latvia	3.0	3.7	4.8	5.9	5.8	5.5	5.7	6.0	6.3
Estonia	4.9	5.7	6.8	7.8	7.7	7.6	7.9	8.4	9.0
Slovenia	11.7	12.2	12.8	13.9	14.4	14.6	14.9	14.9	14.6
Germany	26.8	27.1	27.3	27.9	28.6	28.8	29.6	30.5	31.3
France	n.a.	n.a.	n.a.	31.2	31.6	32.5	33.6	34.3	34.3
Ireland	25.2	26.4	27.6	28.9	29.3	28.9	28.7	29.0	29.0
Britain	21.3	22.4	23.3	20.9	18.8	20.0	20.1	21.6	20.9
Luxembourg	28.3	29.2	30.0	31.0	32.2	32.9	33.9	34.7	35.7
Romania	2.4	3.0	3.8	4.2	4.0	4.1	4.2	4.1	4.6
Bulgaria	1.6	1.7	2.0	2.6	2.9	3.1	3.3	3.6	3.7
Croatia	n.a.	n.a.	n.a.	9.2	8.7	8.6	8.7	8.7	8.8

Source: Eurostat.

When entering the European Union, Poland had one of the lowest labor productivity rates (expressed as GDP per person employed in PPS terms) among member states, outperforming only the Baltic states.[8] In 2007 labor productivity in Poland[9] began to rise slowly but steadily. Paradoxically, the financial and economic crisis improved Poland's position against other EU economies. However, Poland is still among countries with low labor productivity. In 2013, only Latvia, Estonia, Bulgaria, Romania, Hungary, and the Czech Republic trailed it in terms of labor productivity (Table 7.4). Croatia, which became an EU member in July 2013, had higher labor productivity than most of the countries that joined the bloc in 2004 or 2007. Now that EU economies are undergoing a moderate recovery, a slow increase in labor productivity can be expected in Poland, along with a continued process of catching up with Western Europe. It is important that an excessive increase in real wages is avoided during this period of

8 And also in Bulgaria and Romania, which joined the European Union in 2007.

9 At this writing 2014 data were not yet available.

moderate economic recovery because this could result in continued reluctance to create new jobs among employers. They would focus on reducing labor costs instead.

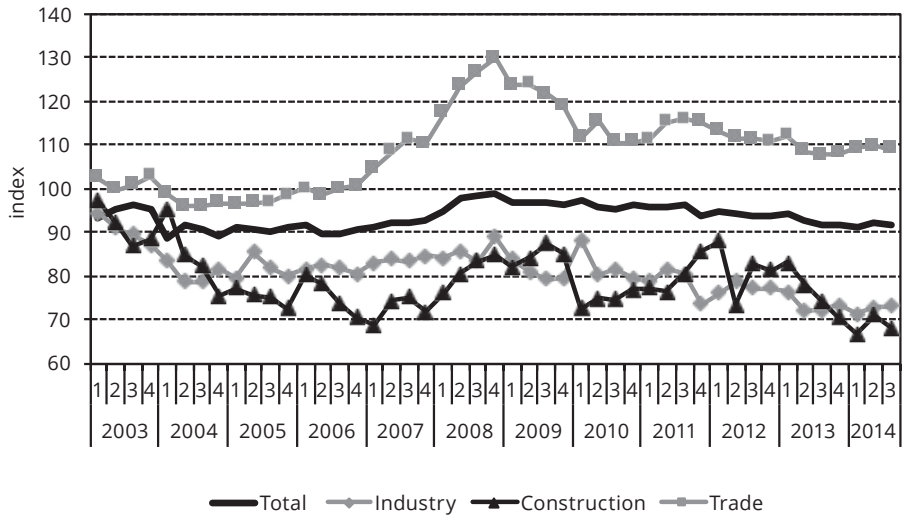
Table 7.4. Labor productivity expressed in GDP (PPS) per person employed: Poland compared with selected other EU countries (EU28 = 100 for each year)

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Poland	62.0	61.8	61.2	62.2	62.4	65.5	70.1	72.0	73.7	74.4
Czech Republic	73.1	73.1	74.0	76.3	74.1	75.9	74.3	74.6	73.9	72.0
Slovakia	65.8	68.8	71.7	76.4	79.8	80.0	82.4	81.6	82.1	82.7
Hungary	67.1	67.7	67.8	66.6	70.6	72.4	71.7	72.6	71.2	70.7
Lithuania	53.9	55.0	56.8	59.6	62.0	58.0	68.2	72.3	74.1	74.7
Latvia	45.9	47.9	48.9	54.0	55.1	57.3	60.8	63.8	66.3	67.0
Estonia	57.8	60.9	62.4	66.7	65.7	66.1	69.7	69.7	70.2	70.0
Slovenia	81.6	83.3	83.4	83.2	83.7	80.1	79.5	81.1	80.9	81.2
Germany	107.7	108.7	108.8	108.4	107.9	104.3	106.8	108.2	107.1	107.1
France	115.5	116.5	115.4	115.6	115.3	117.3	116.7	116.7	116.3	116.1
Ireland	136.8	135.6	135.6	136.5	127.1	133.0	137.9	141.2	141.9	135.6
Britain	115.6	115.1	114.5	111.9	109.0	107.0	102.5	100.3	99.3	99.5
Luxembourg	170.7	170.3	179.6	180.0	168.4	159.5	164.2	165.5	162.8	164.1
Romania	34.7	36.2	39.8	43.4	49.1	49.4	49.7	50.5	51.1	51.7
Bulgaria	34.8	35.8	36.4	37.5	39.7	39.7	40.9	43.0	44.5	43.4
Croatia	73.6	74.7	73.7	77.3	78.3	76.3	75.2	77.2	80.4	80.2

Source: Eurostat.

Unit labor costs rose only temporarily in Poland after it joined the European Union. Since 2008, nominal unit labor costs have shown a slight downward trend. Their current level is around 8% lower than in 2002 on average, with a clear divergence across sectors. In trade, unit labor costs started to grow strongly in 2007 and achieved their maximum value in the fourth quarter of 2008 (equal to 140% of the 2002 average). In 2009 there was a significant adjustment in the value of this indicator, and since 2010 it has stayed relatively stable at 111% of the 2002 average. In industry and construction, unit labor costs in 2014 remained well below the 2002 average, at 69% and 72% respectively. Theoretically, the recovery on the labor market could have an inflationary effect. However, the price processes in Poland are strongly influenced by trends on global markets, where oil prices dropped sharply in the second half of 2014. One risk factor is how the Polish zloty will fare against core market currencies, especially the euro, the U.S. dollar, and the Swiss franc. One way or another, the stabilization of unit labor costs is a positive sign for the Polish economy.

Figure 7.3. Growth of seasonally adjusted unit labor costs in Poland (2002 = 100)



Source: Own calculations based on Central Statistical Office (GUS) data.

Conclusions

Recent years have marked a clear deterioration in demographic trends in Poland. In addition, economic emigration within the EU continues to grow and the situation on the domestic labor market remains uncertain despite a significant improvement in 2014. At the same time, Poland began to introduce some small-scale family policy tools that have yet to result in increased fertility rates. Poland still has a noticeable competitive advantage over Western European economies in terms of labor costs, and it also stands out in terms of productivity. A major challenge for economic policy makers is to create incentives for young and educated people to remain in the country and continue their family and professional life here. Family policy should also cover the labor market and include arrangements for home buyers.

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Chapter 8

Investment in Poland

Piotr Maszczyk

Investment and infrastructure are important determinants of the competitiveness of economies. This subsection analyzes the role of investment and infrastructure in shaping the competitiveness of the Polish economy, taking into account the changes that occurred during the recent global crisis.

Investment

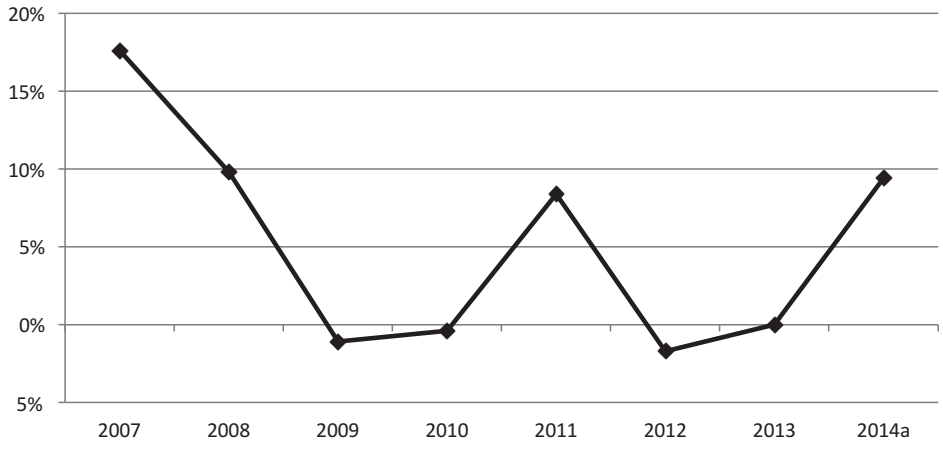
An in-depth look at investment outlays in Poland during the global crisis from 2007 to 2014 reveals that both the level and growth of investment outlays changed due to the situation in the global economy. Until the end of 2008, the value of investment outlays grew consistently, with double-digit growth in 2007. This made it possible to return to a level of investment from before the deep drop of 2001–2003. In 2009, the value of investment outlays in the Polish economy began to decrease, except in 2011 when investment increased by 8.4%, in tandem with GDP growth. In the last five years the growth and value of investment outlays have shown negative trends due to the adverse effects of the global economic crisis. Poland's economic growth in 2011 was more than 1 percentage point faster than in 2014, 4.5% vs. 3.3%, even though investment outlays grew at a slower rate (8% vs. 9.6%). As long as the negative effects of the global crisis affected the world economy, they reduced the positive trends in Poland. The year 2013 marked a positive change in this area. With fewer negative consequences of the global crisis, Poland's investment growth rate was positive in the subsequent two years. Nevertheless, as in the case of GDP growth, the adverse influence of the global turbulence on Poland was relatively moderate, at least compared with the rest of the EU. The value of investment outlays decreased no more than 1.7% in year-on-year terms, with a 17.6% increase in 2007.

On the one hand, growing investment increased the competitiveness of the Polish economy. On the other, Polish enterprises performed better on the European market and increased their investment outlays and thus their capacity to meet growing

demand. The global crisis empirically confirmed the demand model, at least with regard to the situation in Poland. Because of a specific feedback mechanism described in the Keynesian model, investment outlays influence the economy far more dramatically than private consumption or government spending and are responsible for the part of aggregate demand most strongly dependent on the business climate. Thus investment stimulated both the demand and supply sides of the Polish economy.

A year before the start of the global crisis, the country's GDP growth rate was above 6%, with double-digit dynamics in investment. In 2008, the Polish economy expanded by 5.1% and the value of investment outlays grew by around 10%, still above the medium-term growth trend started in 2004. The following year marked a negative change in both GDP growth (1.6%) and investment (a decrease by 1%). In 2010, the Polish economy grew 3.9%. This was not enough to increase the value of investment outlays, but the rate at which this part of aggregate demand decreased was lower than in the previous year (0.4%). In 2011, Poland's economic growth picked up again (to 4.5%) and investment increased by around 8% because of the feedback mechanism described above. The following year marked another deceleration in GDP growth (to 1.9%) and investment outlays dropped by 1.7%, as expected. When the growth rate decreased in 2013 (by 0.3 percentage points), expectations that investment outlays would drop seemed to be justified. The anticipated effect did not materialize, and investment outlays grew by 0.9%.

Figure 8.1. Investment growth in Poland, 2007–2014



[a] preliminary data

Source: Author's calculations based on Central Statistical Office data.

Taking into account preliminary data for 2014, it seems that this change of pattern was not sustainable but expendable and driven by short-term factors. The accelerating growth of GDP stimulated an even greater growth of investment. The future path of investment growth in Poland is discussed later in this chapter. Still, it is widely expected that investment outlays will increase as a result of faster GDP growth (most probably 3.5%). This could mean that the feedback mechanism observed in the 2008–2012 period would be at work again.

According to optimistic expectations voiced last year, 2014 marked a significant increase in the rate at which investment outlays grew compared with the previous year. Actual results exceeded even the most optimistic expectations, which suggested that investment would grow 8%. Investment outlays totaled ZL75.3 billion at the end of the third quarter of 2014, 13% more than in the same period of 2013. Preliminary data released by the government's Central Statistical Office (GUS) in February showed that investment outlays in all of 2014 approached ZL252.9 billion and were 9.4% higher than the previous year (in 2013, investment in Poland increased by 0.9%). Considering that GUS preliminary data are usually underrepresented, it can be expected that the rate at which investment outlays grew in 2014 was above 10%. The 2014 investment ratio (the relation of investment outlays to the GDP in current prices) was 19.6%, compared with 18.8% in 2013 and 19.1% in 2012.

The significant acceleration in investment outlays and gross fixed capital formation in the Polish economy in 2014 was accompanied by faster GDP growth than in the previous year (3.3% in 2014, compared with 1.6% in 2013, according to GUS preliminary data). This means that the link between this part of aggregate demand and the overall economic situation was the same as the relationship described by the Keynesian model. However, while the data describing the Polish economy in 2008–2012 testified to such a feedback mechanism, in 2013 the relationship between GDP growth and the value and growth of investment outlays was shaped in a totally different way.

The prime factor driving investment in 2014 was that the negative influence of the global crisis was no longer felt in the Polish economy. In fact, the overall impact of the financial crisis on Poland was relatively moderate, at least compared with the rest of the EU. From 2008 to 2014, the Polish economy expanded by almost 25%, while the average cumulative growth in the EU as a whole during that period was close to zero. Still, the crisis led to a general decline in confidence among both households and enterprises, triggering a decreased propensity to consume and invest. The rate at which investment grew fell in 2008, followed by a significant drop in investment outlays in 2009 and 2010. In addition, in the first two years of the crisis, the availability of credit offered to both households and enterprises decreased significantly because of a new, restrictive policy introduced by commercial banks. However, as time passed,

banks became accustomed to the poorer climate and started to lend money to enterprises planning investment projects, which led to a positive growth rate for investment in 2011, but this rate did not fully reflect the positive endogenous factors influencing the Polish economy. In 2012, the value of investment outlays dropped again (and the growth in 2013 was moderate), indirectly showing that the fallout from the global crisis still negatively influenced Poland's corporate sector. Notably, the non-financial sector recorded substantial financial results, which enabled it to finance investment projects with its own funds.

Another factor behind the acceleration in investment was direct financing from the European Union budget, combined with structural and cohesion funds (despite the fact that the EU's 2007–2013 budget was formally closed), which fueled capital formation in both the public and private sectors. Data by the Ministry of Regional Development show that the total expenditure of businesses, institutions and individuals benefiting from EU funds in Poland in 2014 came to ZL319.4 billion and increased by ZL64.2 billion (in the part directly financed by the EU, the increase was ZL45.4 billion), compared with ZL64.2 billion in 2013 (ZL45.4 billion directly financed by the EU). In 2014, businesses, institutions and individuals benefiting from EU funds again spent more than 30% of all structural and cohesion funds allocated to Poland under the EU's 2007–2013 budget.

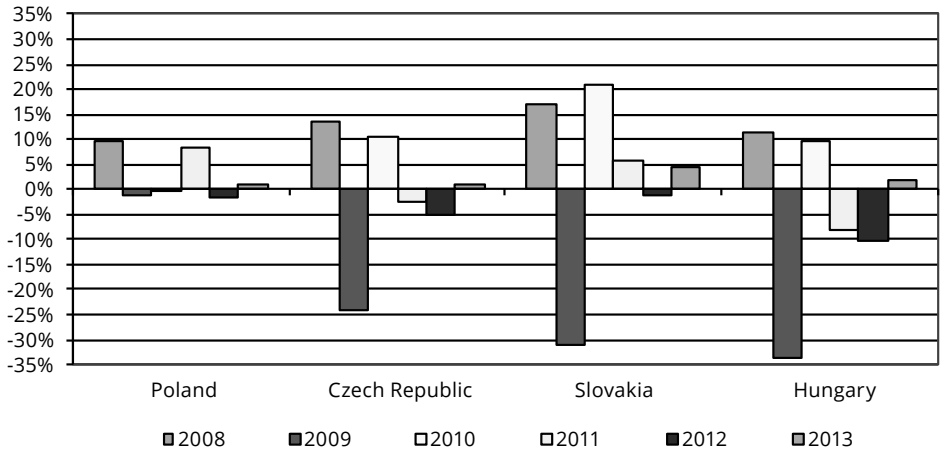
A third factor driving investment in 2014 was a significant increase in foreign direct investment (FDI). Preliminary data by the Polish Information and Foreign Investment Agency (PAIiIZ) show that FDI in Poland increased by almost 100%, approaching €18 billion, after a decline in 2012 and 2013. From 2004 to 2011 foreign direct investment in Poland ranged from $10 billion $24 billion annually. In 2012 it was only $4.8 billion, a decrease that was accompanied by an increased outflow of foreign capital amounting to $4 billion. In 2013, the FDI inflow was negative for the first time since the National Bank of Poland (NBP) began publishing its own statistics. Of course, both the negative value of FDI in 2013 and its rapid increase in 2014 were to an extent due to expendable reasons. In 2013, due to a single decision to close down a special-purpose entity established previously in Poland, more than €3.5 billion was transferred to the British tax haven of Jersey, according to the NBP. And the fast growth last year was because of a new investment project by Volkswagen A.G. in Biełężyce near Poznań. According to the PAIiZ, this marked the biggest investment project in European industry in the last decade. Taking this into account, the total value of FDI in 2015 should come to €10 billion, meaning stable growth compared with 2012 and 2013 but a decrease compared with the 2004–2011 period.

The PAIiZ data show that the structure of FDI is changing continually. The role of services is growing, while capital investment is decreasing. PAIiZ is recording a growing

number of brownfield projects and fewer greenfield projects. While Poland is unlikely to lose its selling points completely, the structure and amount of FDI will fluctuate each year to a much greater extent than previously. Nevertheless, automobile, aviation and aerospace, chemicals, and agriculture and food remain the most popular industries for FDI.

Although the level and growth of capital formation in all Central and Eastern European countries that have joined the EU is mainly determined by external factors (the global crisis), there are significant differences between them (Figure 8.2).[1] The Czech Republic and Slovakia mirror each other in the value and growth of investment outlays. This increasingly visible convergence trend differs from the pattern in Poland and Hungary.

Figure 8.2. A comparison of investment growth in Poland, the Czech Republic, Hungary, and Slovakia, 2008–2013



Source: Author's calculations based on Eurostat data.

During the studied period, investment in the Czech Republic increased only in 2008 and 2010. Despite this, the Czech economy was unable to return to its 2008 investment level. After a nearly 24% drop in 2009 and another cumulative drop of 7.5% in 2011 and 2012, the Czech economy could not muster a stable growth rate in this part of aggregate demand.

[1] The data on investment outlays in the Czech Republic, Hungary, and Slovakia in 2008–2013 come from the Eurostat website: http://epp.eurostat.cec.eu.int.

Until 2013, data on investment outlays and their growth showed that, in the analyzed group of countries, the Slovak pattern was the closest to Poland's, although the 0.1% drop in investment in Slovakia in 2013 could mean a future change in this pattern and a convergence toward the Czech Republic. Along with Poland and Hungary, Slovakia managed to maintain positive investment growth in 2011. Yet Slovakia's 2011 growth rate was lower than Poland's and in 2010 the value of investment outlays in Slovakia increased, whereas investment in Poland decreased. Likewise, in 2013 the value of investment outlays in Slovakia decreased, while in Poland and Hungary the opposite was the case. While the Slovak investment growth path was similar to Poland's until 2009, 2010 marked a major change and the endogenous factors influencing the dynamics of investment outlays not only offset the negative influence of external problems, but resulted in higher investment outlays than a year earlier. The amplitude of variations in the value of investment in Slovakia was the highest in the group. Regardless of whether the rate rose or fell, the Slovak figure was always the highest.

Hungary, like Poland, also recorded a positive growth rate for investment in 2013 (2.7%). Except for one year (2010), when Hungary managed to keep a positive growth rate for investment outlays while investment in Poland decreased, the trend in terms of changes in this part of aggregate demand in both countries remained the same. In the case of Hungary, yet another important factor influencing the value of investment outlays changed in 2013. Until 2012, notably in times of relatively good economic trends, the Hungarian growth rate for investment was the lowest among Central European countries, and when the situation got worse the decrease in this part of aggregate demand in Hungary was usually the most severe. But in 2013, Hungary's investment growth rate was higher than Poland's. This could mean that the negative impact of a serious slump in the Hungarian public finance sector on investment outlays became much smaller in that country. A contributory factor was that the Hungarian government was finding it less difficult to ensure financial discipline.

The future path of investment growth: tentative estimates

Considering the acceleration in GDP growth and investment outlays in 2014, combined with some optimistic data published in February 2015, investment in Poland is likely to increase strongly in 2015.

The trend on the supply side, in particular the productivity of capital in the Polish economy since the mid-1990 s, was analyzed in depth in the 2014 edition of this report. That analysis showed that rapid investment growth was correlated with rapid GDP growth. When the growth of fixed capital investment in Poland started to decelerate at

the end of 1997, GDP growth slowed as well. When fixed capital outlays began to grow again at the end of 2003, the same trend was noted for GDP. A peculiar situation emerged during the 2009–2010 and 2012–2013 periods when, despite the decreased investment outlays and reduced employment, GDP growth remained positive, chiefly due to total factor productivity (TFP). During that period, capital and labor were utilized so effectively that GDP continued to grow despite a decrease in these two factors of production.

Taking into account this mechanism, 2014 echoed this trend. Faster GDP growth was accompanied by a much higher rate at which domestic demand changed (4.6%), and, based on the specific feedback mechanism described in the previous part of this subchapter, it positively influenced, and was at the same time stimulated by, investment outlays.

Data released by the Central Statistical Office in January 2015 showed a further acceleration in GDP growth, driven above all by domestic demand and investment outlays. Considering the positive forecasts, including a European Commission projection for 3.5% GDP growth in Poland in 2015, it is likely that investment in Poland will increase by around 10%. Of course, the higher the GDP growth rate, the higher the figure can be expected for investment outlays.

While analyzing the probability of the positive scenario, one more factor should be taken into consideration. In the presence of serious deflationary pressure, the central bank will probably keep its expansionary attitude and continue to lower interest rates through the first quarter of 2015. Cheap credit, together with positive shocks on the supply side (deflation in Poland is largely "imported" and stems from falling commodity prices) will probably additionally stimulate investment growth.

With all these favorable data and forecasts for the Polish economy, it is highly unlikely that investment in Poland will decline in 2015. The worst-case scenario is moderate growth of 5%, while the optimistic scenario is double-digit growth of around 15%–20%.

Two key factors should be considered in analyzing the probability of a negative scenario. First, the negative scenario is more likely because of the decreasing inflow of financial transfers from the EU budget. Funds available under the bloc's previous budget have run out and the possibilities of using cash from the new budget are limited due to natural administrative lag. Investment projects were carried out not only in the public sector; EU co-financing positively influenced both public and private investment. This positive climate will probably turn negative in 2015 and the first half of 2016. Most of the funds allocated to the corporate sector have already been spent and their beneficiaries have been reimbursed for their expenditures or are waiting for such reimbursement. This means that prospective investment has already been made,

and it is unlikely that investment supported by EU financing will be kept at the same level. New investment projects in the next 12 to 15 months will likely be financed from companies' own funds or bank credit, and the cost of money from this source is much higher than that of EU funds.

Second, in the longer term, the structure of investment in Poland could limit GDP growth to 2%–3.5%, leaving Poland in the "middle income trap." Because of the feedback mechanism described above, investment is strongly dependent on the business climate, so with such moderate GDP growth, investment outlays would increase relatively slowly, thus having a negative impact on the economy. Even though this risk is most likely in the medium and long term – not during the next year— it poses a serious threat to Poland's real convergence path. So far the Polish economy, with its emerging "model of capitalism" and institutions supporting market development, has managed to grow without any significant investment in innovative projects. But the efficiency of the predominant strategy whereby Polish enterprises (and the economy as a whole) import technology (mostly machinery) and know-how from more developed economies and countries – as a result of which the Polish economy is growing faster than more developed countries – is quickly declining. Moreover, the "model of capitalism" based on imitation (instead of innovation) and low costs, which has functioned relatively well in Poland so far, could end quickly with production reallocated to countries with cheaper labor.

What the Polish economy really needs is a strategy in which the corporate sector will manage to transform imported technology in an original and productive way in order to be able to create innovative goods and services. And such a process would be impossible without new (or at least reformed) institutions that will ensure an appropriate level of factors of production, and thus enable sufficient investment in innovation. Institutions such as universities, investment funds, venture capital, and business angels have to be financed – at least in part and in the first few years – from public sources, including EU funds.

As in the previous edition of this report, all these estimates have been made with the assumption that Poland's economic and political environment will develop according to a baseline scenario in which no unexpected positive or negative trends will emerge either in Europe or worldwide during 2015. Poland's central bank will be able to pursue an expansionary monetary policy – one encouraging a moderate increase in credit offered by commercial banks to the corporate sector – only if deflation in Poland persists. But this could be prevented by a further increase in commodity prices stimulated by continued tension in political relations between the EU and the United States, on the one hand, and Russia, on the other, in the wake of the Ukrainian crisis.

The same would happen if the negative consequences of the financial crisis in Greece, especially the so-called "Grexit," spread in Europe.

If, however, the political and economic situation in Ukraine and Russia improves and there is a relatively swift positive change in the business climate throughout the European Union, mainly in the eurozone, economic growth will pick up in Germany and other countries that are Poland's most important foreign trade partners. The growth estimates for Germany and the United States released in the fourth quarter of 2014 seemed to promise such a positive influence of exogenous factors on Polish growth. As a result, Poland's own investment outlays and GDP could be higher than expected. However, such a scenario is far less probable than a negative one fostered by the drop in EU funding and the lack of a mechanism to create innovative products.

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Chapter 9

Changes in Total Factor Productivity in the Context of the Global Crisis

Mariusz Próchniak

The aim of this chapter is to determine the relative competitive position of Poland and other EU countries from Central and Eastern Europe and the evolution of this position over the time of the global crisis. The competitive position is measured here using the total factor productivity concept.

The analysis of total factor productivity (TFP) is conducted using the growth accounting framework. Growth accounting is an empirical exercise aimed at calculating how much economic growth is caused by changes in measurable factor inputs and in the level of technology. The level of technology, which cannot be directly observed, is measured as a residual. This means that we define technical progress as that part of economic growth which cannot be explained by changes in measurable factor inputs. This residual technical progress is interpreted as the increase in the total productivity of the inputs, denoted as TFP.

The basic model of growth accounting includes two measurable factor inputs: labor and physical capital. To calculate the TFP growth rate, the following equation is used:

$$\text{TFP growth} = \frac{\dot{A}}{A} = \frac{\dot{Y}}{Y} - \left[s_K \frac{\dot{K}}{K} + \left(1 - s_K\right) \frac{\dot{L}}{L} \right],$$

where Y – output (GDP), A – level of technology, K – physical capital, L – labor, s_K – physical capital share in income.[1]

In previous editions of the report, we extended the basic model of growth accounting. In the 2013 edition, we estimated total factor productivity in various sectors of the economy for Poland and selected other countries in Central-Eastern and Western Europe (10 sectors were examined according to the NACE-2 classification) (Próchniak, 2013). In the 2012 and 2014 editions, in addition to the basic model of growth accounting, we also estimated the human capital-extended version, which was related to the

[1] This paper is a follow-up study to the author's previous analyses on the subject (see for instance: Próchniak, 2012, 2013, 2014). The methodology of the analysis is described in detail in the 2008 edition of the report (Próchniak, 2008).

main topics of these editions of the report (Próchniak, 2012, 2014). Since the purpose of this study is to assess changes in total factor productivity in the context of the global crisis, in order to verify the research hypotheses it is sufficient to use the basic model, with physical capital and labor, estimated at the level of the entire economy.

A new element in this edition of the study is sensitivity analysis, meaning that TFP changes in alternative variants of the model (with different assumptions) are estimated. The sensitivity analysis makes it possible to show a broader picture of the dynamics of total factor productivity. Such an analysis is also important because the growth accounting framework is based on a number of assumptions that need to be adopted, affecting the results obtained.

The analysis covers 11 CEE countries, referred to as the EU11 (Poland, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, Slovakia, and Slovenia).[2] All the calculations were also carried out for the EU15, or the 15 "old" EU members in Western Europe. Data for the EU15 constitute a reference point. We do not show the detailed estimates for individual EU15 countries but only aggregated figures for the entire group. The calculations for the EU15 are weighted averages to make the results comparable.

The analysis covers the 2005–2014 period. To assess the impact of the global crisis, we also present summary statistics of selected variables for the following subperiods: 2005–2007, 2008–2010, 2011–2013, and 2014. The years from 2005 to 2007 show the situation before the global crisis, the 2008–2010 period can be seen as the time of the crisis, while the years 2011–2013 describe the situation immediately after the crisis. The year 2014 was also singled out in order to highlight the latest trends of the examined variables. The division of the analyzed period into various subperiods also makes it possible to show the changes in total factor productivity during various stages of EU membership.

In this round of research, we updated all the time series of the analyzed variables. All the steps of the analysis were recalculated. Moreover, some time series have new coverage. Thus, all the results are fully documented in the study and the analysis does not use information from previous editions of the report.

The following time series were collected for the purposes of our analysis: (a) the growth rate of GDP, (b) the growth rate of labor, and (c) the growth rate of physical capital. The data are derived from the following sources: the World Bank (World

[2] Rapacki and Próchniak (2006) establish the growth accounting framework for the whole group of post-socialist countries. Another study by Rapacki and Próchniak (2012) analyzes the TFP growth rates in the 10 Central and Eastern European countries (CEE-10) compared with the 29 emerging economies from other regions of the world, with a comparable 1993 per capita income level to that observed in the CEE-10 countries: five post-socialist transition countries, four countries from the Middle East, four East Asian economies, 11 countries from Latin America, and five African countries.

Bank, 2015), the International Monetary Fund (IMF, 2015), and the International Labor Organization (ILO, 2015).

The economic growth rate is the real annual GDP growth rate, taken from the IMF database.

The growth rate for labor is the change in total employment according to the International Labor Organization data (ILO, 2015). These statistics have the same coverage for all the countries and are derived from Labor Force Surveys (LFS). The figures refer to employed persons (including self-employment), regardless of whether in a given period they worked or were employed but did not work. We are aware this measure is imperfect; however, it is difficult to find for all the EU countries complete time series that would work better in showing the dynamics of labor and would be a reliable source of information.[3] At the time of the analysis, employment statistics were only available for the first three quarters of 2014 (in the case of two CEE countries, Croatia and Romania, for only two quarters). Therefore, when calculating the 2014 employment dynamics, we compare these figures with those for the first three quarters of 2013 (in the case of Croatia and Romania, for the first two quarters of 2013) in order to compare with the corresponding period of the previous year.

The amount of physical capital is calculated using the perpetual inventory method. Since this method requires a number of assumptions, it is worth performing sensitivity analysis to assess the robustness of the results to the assumptions made. In the basic model, we assume a 5% depreciation rate and an initial capital/output ratio of 3. In the perpetual inventory method, the initial year should be earlier than the first year for which TFP is calculated; in our analysis the perpetual inventory method starts in 2000; this is the year for which we assume a capital/output ratio of 3. The capital/output ratio for the basic model is in line with estimates by King and Levine (1994), who note that the ratio for the 24 OECD countries was around 2.5. However, it is expected that the level of capital productivity in CEE economies (especially during the first decade of transition) was lower than in OECD countries. Therefore, in the alternative variant of the model, we perform calculations assuming an initial capital/output ratio of 5 (which indicates a lower level of capital productivity because, given the value of 5, a larger stock of capital is necessary to achieve a given volume of output). In an alternative variant of the model, we assume that the depreciation rate is 10%. In both models, investments are measured by gross fixed capital formation.

[3] A problem with choosing an appropriate measure is much more evident in the case of human capital. Any variable representing human capital can be questioned, even more so than in the case of labor. This is one of the reasons why many empirical studies on growth accounting ignore human capital, taking into account only labor and physical capital.

Table 9.1. Labor, physical capital, and TFP contribution to economic growth in the basic

		2005			2006			2007			2008			2009		
		growth (%)	contr. (% points)	contr. (%)	growth (%)	contr. (% points)	contr. (%)	growth (%)	contr. (% points)	contr. (%)	growth (%)	contr. (% points)	contr. (%)	growth (%)	contr. (% points)	contr. (%)
Bulgaria	L	0.4	0.2	3	4.3	2.1	33	4.6	2.3	36	3.3	1.7	27	–3.2	–1.6	29
	K	3.3	1.7	26	5.2	2.6	40	6.0	3.0	46	6.7	3.3	54	8.4	4.2	–76
	TFP	4.5	4.5	71	1.8	1.8	27	1.2	1.2	18	1.2	1.2	19	–8.1	–8.1	147
	GDP	6.4	6.4	100	6.5	6.5	100	6.4	6.4	100	6.2	6.2	100	–5.5	–5.5	100
Croatia	L	–0.6	–0.3	–7	0.9	0.4	9	1.8	0.9	18	1.3	0.7	31	–1.8	–0.9	13
	K	4.2	2.1	49	4.2	2.1	42	4.7	2.4	47	4.9	2.5	119	5.3	2.7	–38
	TFP	2.5	2.5	58	2.4	2.4	49	1.8	1.8	36	–1.0	–1.0	–50	–8.7	–8.7	125
	GDP	4.3	4.3	100	4.9	4.9	100	5.1	5.1	100	2.1	2.1	100	–6.9	–6.9	100
Czech Rep.	L	1.7	0.9	13	1.3	0.7	10	1.9	1.0	17	1.6	0.8	26	–1.4	–0.7	15
	K	4.1	2.0	30	4.3	2.1	30	4.4	2.2	38	5.2	2.6	85	5.0	2.5	–55
	TFP	3.8	3.8	57	4.2	4.2	60	2.6	2.6	45	–0.3	–0.3	–11	–6.3	–6.3	140
	GDP	6.8	6.8	100	7.0	7.0	100	5.7	5.7	100	3.1	3.1	100	–4.5	–4.5	100
Estonia	L	1.9	1.0	10	5.9	2.9	28	0.9	0.5	6	–0.2	–0.1	2	–9.5	–4.7	32
	K	6.3	3.1	33	7.2	3.6	35	9.0	4.5	57	9.2	4.6	–86	6.3	3.1	–21
	TFP	5.4	5.4	57	3.9	3.9	37	2.9	2.9	37	–9.8	–9.8	184	–13.2	–13.2	89
	GDP	9.5	9.5	100	10.4	10.4	100	7.9	7.9	100	–5.3	–5.3	100	–14.7	–14.7	100
Hungary	L	0.2	0.1	2	0.7	0.4	9	–0.1	0.0	–44	–1.2	–0.6	–67	–2.5	–1.3	19
	K	3.4	1.7	43	3.4	1.7	44	3.2	1.6	1455	3.3	1.6	184	3.1	1.6	–23
	TFP	2.2	2.2	55	1.8	1.8	47	–1.4	–1.4	–1311	–0.2	–0.2	–17	–7.1	–7.1	104
	GDP	4.0	4.0	100	3.9	3.9	100	0.1	0.1	100	0.9	0.9	100	–6.8	–6.8	100
Latvia	L	1.2	0.6	6	6.0	3.0	27	2.6	1.3	13	–0.2	–0.1	4	–13.9	–6.9	39
	K	5.9	2.9	29	7.7	3.8	35	8.7	4.4	44	8.6	4.3	–154	5.8	2.9	–16
	TFP	6.6	6.6	65	4.1	4.1	38	4.4	4.4	44	–6.9	–6.9	250	–13.7	–13.7	77
	GDP	10.1	10.1	100	11.0	11.0	100	10.0	10.0	100	–2.8	–2.8	100	–17.7	–17.7	100
Lithuania	L	0.4	0.2	3	–0.4	–0.2	–2	1.6	0.8	8	–1.7	–0.8	–29	–7.7	–3.8	26
	K	4.1	2.1	26	4.7	2.4	30	6.1	3.0	31	7.9	3.9	135	6.3	3.2	–21
	TFP	5.5	5.5	71	5.6	5.6	72	6.0	6.0	61	–0.2	–0.2	–6	–14.2	–14.2	95
	GDP	7.8	7.8	100	7.8	7.8	100	9.8	9.8	100	2.9	2.9	100	–14.8	–14.8	100
Poland	L	3.2	1.6	44	3.4	1.7	27	4.4	2.2	33	3.7	1.8	36	0.4	0.2	13
	K	1.3	0.6	17	1.7	0.9	14	2.5	1.2	18	3.7	1.9	36	4.1	2.1	126
	TFP	1.4	1.4	39	3.7	3.7	59	3.3	3.3	49	1.4	1.4	28	–0.6	–0.6	–39
	GDP	3.6	3.6	100	6.2	6.2	100	6.8	6.8	100	5.1	5.1	100	1.6	1.6	100
Romania	L	–1.8	–0.9	–22	1.9	1.0	12	0.7	0.3	5	0.2	0.1	1	–1.3	–0.7	10
	K	3.4	1.7	41	4.4	2.2	28	5.8	2.9	46	8.2	4.1	56	9.2	4.6	–70
	TFP	3.4	3.4	81	4.7	4.7	60	3.1	3.1	49	3.1	3.1	43	–10.5	–10.5	160
	GDP	4.2	4.2	100	7.9	7.9	100	6.3	6.3	100	7.3	7.3	100	–6.6	–6.6	100
Slovakia	L	3.1	1.5	23	3.9	2.0	24	2.4	1.2	11	3.2	1.6	28	–2.8	–1.4	28
	K	3.6	1.8	27	4.6	2.3	28	5.0	2.5	24	5.4	2.7	47	5.0	2.5	–51
	TFP	3.3	3.3	50	4.1	4.1	49	6.8	6.8	64	1.4	1.4	25	–6.1	–6.1	123
	GDP	6.7	6.7	100	8.3	8.3	100	10.5	10.5	100	5.8	5.8	100	–4.9	–4.9	100
Slovenia	L	0.4	0.2	4	1.3	0.6	11	2.5	1.2	18	1.1	0.6	17	–1.5	–0.8	10
	K	3.8	1.9	48	3.8	1.9	34	4.4	2.2	31	5.0	2.5	76	5.2	2.6	–34
	TFP	1.9	1.9	48	3.1	3.1	55	3.5	3.5	51	0.2	0.2	7	–9.6	–9.6	124
	GDP	4.0	4.0	100	5.7	5.7	100	6.9	6.9	100	3.3	3.3	100	–7.8	–7.8	100
EU15	L	2.0	1.0	49	1.8	0.9	28	1.8	0.9	29	0.9	0.5	485	–1.8	–0.9	20
	K	2.0	1.0	48	2.0	1.0	31	2.2	1.1	36	2.4	1.2	1230	2.1	1.1	–24
	TFP	0.1	0.1	3	1.3	1.3	41	1.1	1.1	35	–1.6	–1.6	–1615	–4.7	–4.7	104
	GDP	2.0	2.0	100	3.2	3.2	100	3.1	3.1	100	0.1	0.1	100	–4.5	–4.5	100

Source: Author's calculations.

model, 2005–2014

2010			2011			2012			2013			2014		
growth (%)	contr. (% points)	contr. (%)	growth (%)	contr. (% points)	contr. (%)	growth (%)	contr. (% points)	contr. (%)	growth (%)	contr. (% points)	contr. (%)	growth (%)	contr. (% points)	contr. (%)
–6.2	–3.1	–785	–2.9	–1.4	–78	–1.1	–0.5	–90	0.0	0.0	2	1.4	0.7	52
5.2	2.6	660	2.9	1.5	79	2.3	1.2	199	2.3	1.2	134	2.1	1.1	76
0.9	0.9	225	1.8	1.8	99	–0.1	–0.1	–9	–0.3	–0.3	–36	–0.4	–0.4	–28
0.4	0.4	100	1.8	1.8	100	0.6	0.6	100	0.9	0.9	100	1.4	1.4	100
–4.0	–2.0	88	–3.2	–1.6	672	–3.1	–1.6	71	5.4	2.7	–296	2.1	1.0	–126
3.4	1.7	–75	1.9	0.9	–403	1.6	0.8	–36	1.3	0.6	–70	1.1	0.6	–69
–2.0	–2.0	87	0.4	0.4	–169	–1.4	–1.4	65	–4.3	–4.3	466	–2.4	–2.4	295
–2.3	–2.3	100	–0.2	–0.2	100	–2.2	–2.2	100	–0.9	–0.9	100	–0.8	–0.8	100
–1.0	–0.5	–20	–0.3	–0.1	–7	0.4	0.2	–17	1.0	0.5	–52	0.6	0.3	12
3.5	1.8	72	3.4	1.7	92	3.2	1.6	–155	2.7	1.3	–144	2.2	1.1	43
1.2	1.2	48	0.3	0.3	15	–2.8	–2.8	273	–2.8	–2.8	296	1.1	1.1	44
2.5	2.5	100	1.8	1.8	100	–1.0	–1.0	100	–0.9	–0.9	100	2.5	2.5	100
–4.4	–2.2	–88	6.2	3.1	37	1.9	1.0	21	1.0	0.5	32	0.0	0.0	–1
1.7	0.9	35	1.4	0.7	9	3.4	1.7	37	4.0	2.0	123	3.9	1.9	158
3.8	3.8	153	4.5	4.5	54	2.0	2.0	42	–0.9	–0.9	–55	–0.7	–0.7	–57
2.5	2.5	100	8.3	8.3	100	4.7	4.7	100	1.6	1.6	100	1.2	1.2	100
0.0	0.0	–1	0.8	0.4	26	1.7	0.9	–52	1.6	0.8	71	5.5	2.7	98
2.2	1.1	105	1.4	0.7	44	1.2	0.6	–35	0.8	0.4	38	1.1	0.5	19
0.0	0.0	–4	0.5	0.5	30	–3.1	–3.1	187	–0.1	–0.1	–9	–0.5	–0.5	–17
1.1	1.1	100	1.6	1.6	100	–1.7	–1.7	100	1.1	1.1	100	2.8	2.8	100
–6.4	–3.2	243	1.3	0.6	12	1.6	0.8	16	2.1	1.0	25	–0.7	–0.4	–13
1.4	0.7	–53	0.1	0.0	1	1.8	0.9	18	3.0	1.5	37	2.5	1.3	47
1.2	1.2	–90	4.6	4.6	87	3.5	3.5	67	1.6	1.6	38	1.8	1.8	66
–1.3	–1.3	100	5.3	5.3	100	5.2	5.2	100	4.1	4.1	100	2.7	2.7	100
–5.3	–2.6	–166	0.5	0.2	4	1.8	0.9	24	1.3	0.7	21	2.1	1.0	35
1.4	0.7	43	1.3	0.6	11	1.7	0.9	24	1.5	0.7	23	1.9	1.0	32
3.6	3.6	222	5.2	5.2	85	1.9	1.9	52	1.8	1.8	57	1.0	1.0	32
1.6	1.6	100	6.0	6.0	100	3.7	3.7	100	3.3	3.3	100	3.0	3.0	100
–2.5	–1.2	–32	0.6	0.3	6	0.2	0.1	5	–0.1	–0.1	–5	1.9	0.9	29
3.6	1.8	46	3.3	1.6	36	3.7	1.9	94	3.3	1.6	106	3.1	1.5	48
3.3	3.3	86	2.6	2.6	58	0.0	0.0	2	0.0	0.0	–1	0.8	0.8	24
3.9	3.9	100	4.5	4.5	100	2.0	2.0	100	1.6	1.6	100	3.2	3.2	100
0.0	0.0	2	–1.1	–0.6	–24	1.4	0.7	123	–0.2	–0.1	–2	–6.9	–3.5	–144
4.4	2.2	–191	3.8	1.9	81	4.1	2.0	368	4.2	2.1	59	2.5	1.2	52
–3.3	–3.3	289	1.0	1.0	42	–2.2	–2.2	–391	1.5	1.5	43	4.6	4.6	192
–1.1	–1.1	100	2.3	2.3	100	0.6	0.6	100	3.5	3.5	100	2.4	2.4	100
–2.1	–1.0	–23	–0.1	0.0	–2	0.6	0.3	16	0.0	0.0	0	1.0	0.5	22
2.8	1.4	31	3.1	1.6	52	3.9	1.9	107	2.7	1.4	145	2.3	1.2	50
4.1	4.1	92	1.5	1.5	49	–0.4	–0.4	–24	–0.4	–0.4	–46	0.7	0.7	29
4.4	4.4	100	3.0	3.0	100	1.8	1.8	100	0.9	0.9	100	2.4	2.4	100
–1.5	–0.7	–61	–3.1	–1.5	–252	–1.3	–0.7	25	–1.9	–1.0	97	1.4	0.7	50
2.6	1.3	105	1.4	0.7	112	1.0	0.5	–19	0.4	0.2	–21	0.5	0.2	17
0.7	0.7	56	1.5	1.5	240	–2.5	–2.5	94	–0.2	–0.2	24	0.5	0.5	33
1.2	1.2	100	0.6	0.6	100	–2.6	–2.6	100	–1.0	–1.0	100	1.4	1.4	100
–0.4	–0.2	–10	0.4	0.2	12	–0.3	–0.2	48	–0.3	–0.1	–140	–4.7	–2.3	–178
1.2	0.6	29	1.1	0.6	35	1.2	0.6	–169	1.0	0.5	457	0.8	0.4	31
1.7	1.7	81	0.9	0.9	53	–0.8	–0.8	221	–0.2	–0.2	–217	3.2	3.2	247
2.1	2.1	100	1.6	1.6	100	–0.4	–0.4	100	0.1	0.1	100	1.3	1.3	100

The last assumption concerns the factor shares in GDP. We assume that all the factor shares in income are the same.[4] In most empirical studies, a physical capital share of 0.3 is assumed. However, for some countries (especially Poland), the physical capital share of 0.3 significantly overestimates the TFP growth rate. Thus, in line with suggestions by some economists (see e.g. Welfe, 2001), this share in the basic model has been increased to 0.5 in order to better fit the real values. This means that, in the basic model, labor and physical capital shares are both equal to one-half. In contrast, in the alternative variant, we assume that the physical capital share in income equals one-third while the labor share is two-thirds.

Table 9.1 shows the detailed breakdown of economic growth in the basic model. The values in the respective cells of the table show: (a) the growth rate of labor (L), physical capital (K), TFP, and GDP, (b) the contribution of labor, physical capital, and TFP to economic growth in percentage points, (c) the contribution of labor, physical capital, and TFP to economic growth in percentage terms.

Tables 9.2 and 9.3 sum up the data given in Table 9.1. Table 9.2 shows the average values of the TFP growth rates in the basic model for the individual EU11 countries and the EU15 group as a whole throughout the 2005–2014 period as well as in four different subperiods: (a) before the global crisis (2005-2007), (b) during the crisis or economic slowdown (2008-2010), (c) in the post-crisis 2011–2013 period, which, for some countries, marked a time of recovery while for others was a period of continued poor macroeconomic performance, (d) in 2014. Table 9.3 shows the percentage values of TFP contribution to economic growth in the basic model throughout the 2005–2014 period and in the four distinguished subperiods. Moreover, both tables provide the minimum and maximum values of a given variable for the entire period.

Tables 9.4 and 9.5 refer to the alternative variant of the model with the following assumptions: a 10-percent depreciation rate, an initial capital/output ratio of 5, and a physical capital share in income of one-third. The structure of these tables (including the division into subperiods) is the same as in Tables 9.2 and 9.3. For the sake of conciseness, we do not report in the study the detailed results of the growth accounting for the alternative model (as in Table 9.1).

The global financial crisis and economic recession could disrupt the mechanisms driving the economy and lead to new trends and relationships between some macroeconomic variables. For example, in years with negative GDP growth, the changes in TFP influence economic growth in a different way than in years with positive GDP

[4] Arbitrary values of factor shares are widely assumed in empirical studies (King and Levine, 1994, Wang and Yao, 2003, Caselli and Tenreyro, 2005). Wang and Yao (2003) show that different assumptions about factor shares do not yield different outcomes. Caselli and Tenreyro (2005) obtain similar conclusions from models based on arbitrary and real factor shares.

growth.[5] Consequently, model estimations may involve some atypical outcomes that should be interpreted with caution.

Table 9.2. TFP growth rates in the basic model (%)

Country	The whole 2005–2014 period			2005–2007	2008–2010	2011–2013	2014
	Mean	Min	Max	Mean	Mean	Mean	
Bulgaria	0.2	–8.1	4.5	2.5	–2.0	0.5	–0.4
Croatia	–1.3	–8.7	2.5	2.2	–3.9	–1.8	–2.4
Czech Republic	0.1	–6.3	4.2	3.5	–1.8	–1.8	1.1
Estonia	–0.2	–13.2	5.4	4.1	–6.4	1.8	–0.7
Hungary	–0.8	–7.1	2.2	0.8	–2.4	–0.9	–0.5
Latvia	0.7	–13.7	6.6	5.0	–6.5	3.2	1.8
Lithuania	1.6	–14.2	6.0	5.7	–3.6	3.0	1.0
Poland	**1.6**	**–0.6**	**3.7**	**2.8**	**1.4**	**0.9**	**0.8**
Romania	0.5	–10.5	4.7	3.7	–3.6	0.1	4.6
Slovakia	1.5	–6.1	6.8	4.7	–0.2	0.2	0.7
Slovenia	–0.1	–9.6	3.5	2.8	–2.9	–0.4	0.5
EU15	0.1	–4.7	3.2	0.8	–1.5	0.0	3.2

Source: Author's calculations.

Table 9.3. TFP contribution to economic growth in the basic model (%)

Country	The whole 2005–2014 period			2005–2007	2008–2010	2011–2013	2014
	Mean	Min	Max	Mean	Mean	Mean	
Bulgaria	53	–36	225	39	130	18	–28
Croatia	96	–169	466	48	54	121	295
Czech Republic	97	–11	296	54	59	194	44
Estonia	54	–57	184	44	142	14	–57
Hungary	–94	–1,311	187	–403	28	69	–17
Latvia	64	–90	250	49	79	64	66
Lithuania	74	–6	222	68	104	65	32
Poland	**30**	**–39**	**86**	**49**	**25**	**19**	**24**
Romania	57	–391	289	63	164	–102	192
Slovakia	41	–46	123	54	80	–7	29
Slovenia	73	7	240	51	62	119	33
EU15	–105	–1,615	247	26	–477	19	247

Source: Author's calculations.

[5] For example, an increase in TFP has a positive impact on economic growth during an expansionary period but a negative impact during a recession.

Table 9.4. TFP growth rates in the alternative variant of the model (%)

Country	The whole 2005–2014 period			2005–2007	2008–2010	2011–2013	2014
	Mean	Min	Max	Mean	Mean	Mean	
Bulgaria	2.6	–4.6	7.2	4.9	1.1	2.4	0.8
Croatia	0.9	–5.9	5.5	4.9	–1.3	–0.1	–1.4
Czech Republic	2.2	–3.7	6.7	6.0	0.5	–0.1	2.4
Estonia	2.2	–9.0	8.4	7.0	–3.1	3.0	0.8
Hungary	1.1	–4.5	4.9	3.4	–0.1	0.4	–0.1
Latvia	3.2	–8.8	9.7	7.9	–2.9	4.5	3.3
Lithuania	4.0	–10.2	8.7	8.6	–0.3	4.3	2.0
Poland	**3.4**	**1.6**	**5.8**	**4.5**	**3.5**	**2.6**	**2.0**
Romania	3.1	–7.2	7.2	6.5	–0.7	2.0	7.2
Slovakia	3.5	–3.2	9.1	7.0	2.2	1.9	1.9
Slovenia	2.0	–7.0	5.7	5.3	–0.5	1.4	1.5
EU15	2.0	–2.4	5.3	2.8	0.5	1.5	5.3

Source: Author's calculations.

Table 9.5. TFP contribution to economic growth in the alternative variant of the model (%)

Country	The whole 2005–2014 period			2005–2007	2008–2010	2011–2013	2014
	Mean	Min	Max	Mean	Mean	Mean	
Bulgaria	218	53	1,075	76	405	225	57
Croatia	–13	–1118	408	105	39	–247	176
Czech Republic	103	64	147	92	94	125	97
Estonia	90	36	254	76	146	57	69
Hungary	195	–3	893	376	166	110	–3
Latvia	50	–303	134	77	–40	90	124
Lithuania	123	67	387	102	189	98	67
Poland	**92**	**61**	**150**	**82**	**104**	**99**	**61**
Romania	107	–96	302	113	98	44	302
Slovakia	90	61	143	82	90	101	82
Slovenia	128	–142	588	99	133	159	103
EU15	245	–226	1,163	103	215	362	405

Source: Author's calculations.

The data in Tables 9.1–9.3 yield a number of findings. Over the entire period, the highest TFP growth rate (in the basic model) was recorded in Lithuania, Poland, and

Slovakia. In 2005–2014, total factor productivity grew at an average rate of 1.6% per annum in Lithuania and Poland, and 1.5% in Slovakia. In the remaining EU11 countries, the growth of productivity was much slower, not exceeding 0.7%, and sometimes it was even negative. Latvia and Romania recorded TFP growth rates of 0.7% and 0.5% per annum respectively in 2005–2014; in Bulgaria, the Czech Republic, Slovenia and Estonia, total factor productivity did not change significantly throughout the studied period (the TFP growth rates stood at 0.2%, 0.1%, – 0.1%, and –0.2%); while Hungary and Croatia noted a fall in TFP by 0.8% and 1.3% on average respectively.

Comparing the results achieved by the CEE countries with the average outcomes for the EU15 group, it turns out that the CEE countries displayed more rapid TFP growth on average. In the EU15, total factor productivity actually did not change over the 2005–2014 period (the growth rate was 0.1%). This last figure means that almost the entire economic growth of the EU15 area can be attributed to and explained by both physical capital and employment dynamics. Five of the 11 CEE countries recorded a positive TFP growth rate in 2005–2014 at a level of 0.5% or more. Consequently, over the entire 2005–2014 period, the competitive position of many EU11 countries – as measured by changes in total factor productivity – improved, compared with the Western European economies. This especially applies to Poland, which displayed the most rapid TFP growth in the analyzed period.[6]

Of course, we must point out that the part of TFP which is due to increased labor productivity should be partly considered as a human capital contribution to economic growth. Because of the difficulties in calculating the stock of human capital for the studied group of countries, TFP in our approach also includes the impact of human capital on economic growth.

The best performance of Poland in terms of changes in the total factor productivity compared with the other EU11 economies can undoubtedly be treated as the country's success. In studies carried out several years ago, the Baltic states had the best achievements in terms of TFP growth rates. Prior to the global crisis, they showed very rapid economic growth, which was hard to explain by changes in labor and physical capital, and consequently it was attributed to TFP. The position of Poland in these analyses was moderate – not as good as that of the Baltic states, but neither was it trailing the group. The extension of the time horizon significantly changed the outcomes for individual countries in favor of Poland, while worsening the position of the Baltic states. This is visible when the results for the individual subperiods are discussed.

The highest variance of TFP growth rates in the analyzed period was noted in the Baltic states. The strong differences in how productivity grew in these countries

[6] For the TFP growth rates for Poland in previous years, see e.g.: Rapacki (2002).

resulted to a large extent from high fluctuations in GDP growth rates. The Baltic states recorded rapid economic growth in the first few years of their EU membership, at times exceeding 10% per annum. These countries were also hardest hit by the implications of the global crisis because, in 2009, they noted a double-digit fall in GDP. As a result, TFP changes in the Baltics were the most differentiated among EU11 countries. The difference between the highest and the lowest TFP growth rates was slightly above 20 percentage points in Latvia and Lithuania (ranging from –13.7% to 6.6% in Latvia and from –14.2% to 6.0% in Lithuania) and almost 19 p.p. in Estonia. In the remaining CEE countries except the Baltic states and Poland, the spread of the TFP growth rates ranged from 15 p.p. in Romania to 9 p.p. in Hungary. Poland, which exhibited regular growth in output throughout the 2005–2014 period and was the only EU country to avoid recession, recorded exceptionally small variations in TFP, at 4.3 percentage points. Even the countries of Western Europe as a whole recorded greater fluctuations in productivity growth in 2005–2014 than Poland. This last result is another reason to positively assess Poland's achievements in terms of total factor productivity. Apart from the fact that Poland recorded the fastest growth of productivity in the last 10 years, it was the most stable of the whole group of Central and Eastern European countries. In Poland, the slowest growth of TFP in the examined period was recorded in 2009 (–0.6%), while the fastest growth appeared in 2006 (3.7%).

Based on the data in Table 9.2, it is worth analyzing the dynamics of total factor productivity in the individual subperiods. Before the global crisis, in 2005–2007, all the CEE countries recorded a positive growth rate of TFP. It was the highest in the Baltic states (5.7% in Lithuania, 5.0% in Latvia, and 4.1% in Estonia), which – as already mentioned – was due to very rapid GDP growth in these countries before the crisis. The growth rate of TFP in Poland at that time was moderate at 2.8% on average (the same as in Slovenia). Apart from the Baltic states, Slovakia (4.7%), Romania (3.7%), and the Czech Republic (3.5%) also recorded better results than Poland. The other three CEE countries, Bulgaria, Croatia, and Hungary, showed slower dynamics in terms of total factor productivity in 2005–2007, at 2.5%, 2.2%, and 0.8% respectively. Throughout the 2005–2007 period, the TFP growth rates in all the CEE countries were no worse than in the EU15 as a whole: in the latter group TFP grew at a rate of 0.8%, which means at the same pace as in Hungary.

The crisis brought significant changes in the dynamics of total factor productivity. In 2008–2010, all the CEE countries except Poland recorded negative TFP growth. The Baltics, which recorded the highest pre-crisis TFP growth rates, performed the worst in terms of productivity growth during the crisis, with negative growth rates at –6.5% in Latvia, – 6.4% in Estonia, and –3.6% in Lithuania. Poor results in 2008–2010 were also recorded in Croatia (–3.9%), Romania (–3.6%), Slovenia (–2.9%), and Hungary

(–2.4%). Poland was the only country with positive TFP growth, at 1.4% in 2008–2010. In this period, the EU15 group as a whole recorded a decline in TFP by 1.5% on average.

In 2011–2013, the majority of the CEE countries began to improve their positions compared with previous years in terms of TFP dynamics. The Baltic states again recorded positive TFP growth rates. They stood at 3.2% in Latvia, 3.0% in Lithuania, and 1.8% in Estonia. Poland maintained positive TFP growth at 0.9% per annum, slightly worse than in previous years. Bulgaria, Slovakia, and Romania also noted positive TFP growth rates, but very close to zero (not exceeding 0.5%). Slovenia and Hungary displayed negative TFP growth rates in this period, ranging from 0% to –1% a year, while in Croatia and the Czech Republic, the TFP decline was greater, at almost 2%. In the EU15 group, total factor productivity did not change from 2011 to 2013.

In 2014, the CEE countries posted varied outcomes in terms of TFP dynamics. Some of them improved their performance in relation to 2011–2013, while others worsened their positions. The TFP growth rate in Poland in 2014 was 0.8%, similar to the average for the 2011–2013 period. Six other CEE countries also recorded positive TFP growth: Romania (4.6%), Latvia (1.8%), the Czech Republic (1.1%), Lithuania (1.0%), Slovakia (0.7%), and Slovenia (0.5%). In four CEE countries, TFP growth in 2014 was negative: in Bulgaria (–0.4%), Hungary (–0.5%), Estonia (–0.7%), and Croatia (–2.4%). In the EU15 group as a whole, the TFP growth rate in 2014 was positive, at 3.2%, which was the best result achieved by this group in the past 10 years.

As regards TFP contributions to economic growth, the figures for the studied period are strongly distorted by the fact that positive TFP growth during a recession means a negative contribution to economic growth. On the other hand, in the case of a strong economic slowdown with GDP growth close to 0%, a change of a few percent in total factor productivity translates into a several thousand percent TFP contribution to economic growth. Nevertheless, it is possible to determine some trends and regularities on the basis of the aggregated results for the whole period.

As indicated by the data presented in Table 9.3, TFP contributions to economic growth in most countries (except Croatia, the Czech Republic, Hungary, and Poland) ranged between 40% and 80% in 2005–2014. This confirms the important role of TFP in the economic growth of the studied countries after their EU entry. In Poland, the TFP contribution to economic growth was 30% on average in 2005–2014. The negative figures for Hungary and the EU15 should be treated as a spurious result reflecting the residual method of calculating TFP, and is in no way indicative of technological regression in some EU countries or regions.

It is worth comparing the results for the basic model with the estimates for the alternative model, which takes into account different assumptions. Comparing the data in Tables 9.4 and 9.5 with corresponding figures from Tables 9.2 and 9.3, we can

draw two main conclusions. First, the new assumptions imply higher TFP growth rates than in the basic model. Second, the TFP growth trends in the subsequent subperiods and the ranking of individual countries do not radically change after the introduction of the new assumptions.

In the alternative model, shown in Table 9.4, Poland achieved relatively high TFP growth rates throughout the 2005–2014 period: 3.4% a year on average. This ranks Poland third in the CEE group. Moreover, as in the basic model, Poland exhibited the smallest annual fluctuations in TFP growth rates in the studied period: from 1.6% to 5.8%. Analyzing the trends for the individual subperiods, we can see some gradual slowdown in the TFP growth in Poland: from 4.5% in 2005–2007 and 3.5% in 2008–2010 to 2.6% in 2011–2013 and 2.0% in 2014.

Given these results (for both the basic and alternative models), we have to emphasize that treating the averaged data for the entire period as an optimistic forecast for the future may be misleading. Although it has been a few years since the start of the crisis, in 2013–2014 some countries in the analyzed group still recorded negative TFP growth, in part due to a return of the recession or continued slowdown.

As we can see, in 2014 the EU11 countries, with a few exceptions, did not return to their TFP growth rates from the pre-crisis period. Moreover, these countries' economic growth paths had not yet stabilized, as reflected by the continuing large fluctuations in TFP growth rates. The direction of further changes is uncertain and will depend on a number of factors determining economic growth in the EU11 countries in the years ahead. An optimistic aspect is that the outcomes achieved by the CEE countries were relatively good compared with the EU15.

Summing up, our results show that changes in productivity played an important role in the economic growth of Poland and other EU11 countries in the analyzed period. The TFP growth rates of most EU11 countries were higher than in Western Europe as a whole. This means that the new EU member states, including Poland, improved their relative competitive position measured by changes in total factor productivity in the last 10 years. This is a positive outcome of the Central and Eastern European countries' first 10 years in the European Union. In contrast, the global crisis negatively affected the TFP dynamics. This negative impact was recorded by both the CEE and Western European countries. The pace of returning to economic growth paths from the pre-crisis period will determine further changes in total factor productivity.

Finally, it is worth adding that studies on the decomposition of economic growth and the estimation of TFP for Poland have also been carried out by other Polish authors.[7] For example, Florczak and Welfe (2000) and Welfe (2001) calculate TFP

[7] For the sake of conciseness, we do not describe the results of these studies in detail.

in Poland in 1982–2000 on the basis of the standard growth accounting framework with two factors of production: labor and physical capital (machinery and equipment or total fixed assets). In their study, the elasticity of output with respect to fixed assets, i.e. the physical capital share in income, is calibrated at a level of 0.5 or estimated on the basis of the production function. In another study by Welfe (2003), the author estimates the TFP for Poland in 1986–2000 using a variety of physical capital shares in income (from 0.25 to 0.7). Florczak (2011), on the basis of the Wharton method, calculates the values of TFP adjusted for short-term demand-side shocks for Poland in 1970–2008, followed by analyzing the determinants of total factor productivity. The TFP for Poland was also estimated by: Zienkowski (2001), Piątkowski (2004), and Ptaszyńska (2006). Roszkowska (2005), and Tokarski, Roszkowska, and Gajewski (2005) conducted growth accounting for Poland's provinces. Zielińska-Głębocka (2004) estimated the TFP for 100 sectors of the Polish economy, Ciołek and Umiński (2007) calculated TFP growth rates in Polish- and foreign-owned companies in Poland, while Doebeli and Kolasa (2005) used the index number decomposition method in growth accounting for Poland, the Czech Republic, and Hungary.

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Chapter 10

The Financial System and Private Equity Sector Development

Oskar Kowalewski

Introduction

Poland's prospects of rapid economic growth deteriorated significantly at the end of 2014. This was due to two key factors: unimpressive growth throughout the European Union and the conflict in Ukraine.

The EU economy as a whole grew 1.3% in 2014, and the figure for the euro area was 0.8%. Slow growth in the eurozone was accompanied by a decline in the prices of goods and services in the fourth quarter of 2014, prompting the European Central Bank (ECB) to launch its Quantitative Easing (QE) program in Europe at the beginning of 2015 to stimulate economic growth in the eurozone and throughout the EU. The European Commission expects economic growth to pick up in 2015 to 1.5% for the EU as a whole and 1.1% for the euro area. The recovery, in particular in Germany, should have a positive impact on Polish economic growth.

Meanwhile, the Polish economy was adversely affected by the conflict in Ukraine combined with economic sanctions imposed by Russia. This is expected to have a negative effect on Poland's economic growth in 2015 as well.

Despite these setbacks, the Polish economy grew more than 3% in 2014, a significant acceleration over the previous year. Poland's 2014 GDP growth was about four times as fast as the EU average. In 2015, Polish GDP growth is expected to be at a similar or slightly lower level, with the European Commission projecting a figure of 2.8%. The slowdown, combined with the ongoing armed conflict in Ukraine, can have a significant impact on Poland's financial system in the near future.

Moreover, the country's economic growth prospects and its banking sector are likely to be strongly influenced by the Swiss National Bank's decision to free the exchange rate of the Swiss franc in the first quarter of 2015. The decision has had a strong impact on Poland and other countries in the region because prior to the financial crisis of 2008, many mortgage loans granted to households were denominated in the Swiss currency. Consequently, an unexpected surge in the price of the

franc against all other major currencies in the first quarter of 2015 resulted in higher loan installments for many Polish households and stirred a broad political debate on whether mortgage loans should be denominated in foreign currencies. Some new financial regulations have been proposed that may strongly influence the profitability of the banking sector in coming years. Nevertheless, despite these disruptions, the Polish financial system remained stable and continued to develop in 2014, as described in greater detail in the next section.

It is expected that Poland's economic growth will accelerate as a result of reforms, in particular those designed to spur innovation. An important element of this process should be the growing importance of private equity firms in Poland. The experience of developed countries shows that such firms have a significant impact on the development of innovative companies. Due to their nature, innovative companies often face problems with access to capital at different stages of their development. This problem, referred to as an equity gap, is one of the major issues that developing companies face in Poland today. Private equity firms play an important role because they support promising companies with capital after carefully reviewing their potential for growth. Many innovative companies would be unable to develop without investment from private equity firms, which also provide knowledge, experience, and support in the form of human resources. Therefore, the development of private equity firms will have a significant impact on the development of innovative companies, contributing to long-term economic growth. The next section will outline the current state and prospects of Poland's private equity sector.

The financial system in Poland

The Polish financial system continued to develop rapidly in 2014 despite an economic slowdown at the end of the year. Slower economic growth prompted the Monetary Policy Council (RPP) to cut interest rates. At the end of 2014, the reference rate of the National Bank of Poland (NBP) stood at 2.50%, its lowest level since 1989.

One visible process in the development of the Polish financial system in 2014 was its consolidation. The changes covered all financial system entities, in particular those active in the banking, insurance, and pension sectors. An important driver of this process was the declining profitability of market players as a result of increased competition and changes in the Polish economy. In the case of pension fund companies (PTEs), the consolidation process was mainly a consequence of a regulatory reform that affected their activities and the size of assets they manage. Following these

regulatory changes, the number of open pension funds (OFEs) is expected to drop significantly in the coming years.

The consolidation process in banking, insurance, and pension fund companies was accompanied by a significant increase in the number of investment funds in Poland. The rise reflects the sector's dynamic growth in recent years, stemming from a substantial reduction in central bank interest rates, followed by a decrease in bank deposit rates. Lower deposit rates prompted a shift in households' savings pattern from banks to investment funds. The value of investment fund shares held by households grew by 25% in 2014, more than in the case of other intermediaries in the Polish financial system.

The financial sector assets-to-GDP ratio increased to 130% at the end of 2014, mainly due to growing banking and investment fund assets. However, compared with the EU average, the Polish financial system remained underdeveloped in this area. Moreover, the value of private pension fund assets decreased significantly in 2014. New regulations obligated private pension funds to transfer some of their assets to the state-owned social security system (ZUS). Following this operation, private pension fund assets fell from a peak of ZL300 billion at the end of 2013 to ZL150 billion at the end of 2014. Table 10.1 shows how the Polish financial system has changed structurally in recent years.

The banking sector has long been the dominant component of the Polish financial system. In 2014, banking sector assets grew in absolute terms, and their relative role also increased to nearly 50% of total financial system assets, chiefly because private pension fund assets declined by almost 50%. Due to the economic downturn, banking sector assets are growing at a slower rate than in previous years. However, the overall economic slowdown, coupled with falling interest rates and the outflow of bank deposits, has not had a negative impact on the financial performance of banks. Their 2014 profits continued to run high, mainly due to increased banking activity and rising net commission income. Even though the average return on assets and return on equity in the banking sector are gradually decreasing, they remain higher than in many other European economies (NBP, 2014).

The capital market's role in the Polish financial system increased again in 2014. At the end of the year, the market capitalization of both domestic and foreign companies totaled ZL905 billion. The rise was mainly due to higher prices of shares in most listed companies, with continued high volatility during the year. While the political crisis in Ukraine stopped the upward trend on the Polish capital market at the beginning of 2014, the second half of the year was conducive to growth as a result of improving economic conditions at home and positive trends on global capital markets.

Nevertheless, the Warsaw Stock Exchange's WIG broad market index increased by only 0.26% in 2014.

Twenty-eight new companies, including six foreign ones, decided to go public through initial public offerings (IPOs) on the Warsaw Stock Exchange's regulated market in 2014, while the NewConnect unregulated market had 22 IPOs, a substantial decline from the previous year. The drop was largely due to the weakening credibility of companies that have decided to go public on this market. Meanwhile, the Catalyst corporate bond market has gained prominence in recent years, although it remains underdeveloped compared with its counterparts in Western Europe. In 2014, the total market value of corporate bonds traded on Catalyst rose by 1% over the previous year.

The growth of the capital market was hampered by the deteriorating financial performance of brokerages, which reported a further decrease in their balance-sheet assets in 2014. This was due to falling prices on the capital market combined with weak demand for new financial instruments stemming from the small number of new IPOs and the increased inflow of savings to investment funds. Even though IPOs and bonds attracted more investor interest, brokerages were less profitable than several years ago. This was in part due to stiffer competition on the market for financial services, which is dominated by bank-owned entities. This situation is likely to lead to further consolidation among brokerages.

The improved situation on the capital market and low interest rates contributed to the growth of investment fund assets in 2014. This was fueled by an increased inflow of money to investment funds as well as their positive investment results. With declining interest rates, household bank deposits were converted into investment fund shares for the second straight year, and investment fund assets reached their highest value ever. Funds investing in domestic debt securities, chiefly non-Treasury securities, were the most popular with households. Amid rising stock prices, households were also increasingly interested in equity funds.

Meanwhile, insurance industry revenue and income declined by 10% and 30% respectively in 2014. A particularly strong decline in revenue was recorded in the property and casualty insurance segment. The life insurance segment exhibited sustainable growth, but it was not strong enough to stop premiums in the insurance sector as a whole from dropping. At the end of 2014, the total value of insurance premiums in Poland came to ZL60 billion, accounting for around 1.4% of all premiums in the EU. Life insurance accounted for the largest percentage of premiums collected, echoing the pattern in countries with more developed insurance sectors.

Due to low market interest rates, life insurers as well as pension funds are now exposed to serious risks. Low interest rates have a negative impact on the profitability of insurance and pension fund companies and make it difficult for them to achieve

guaranteed rates of return for their clients. These entities must achieve the guaranteed rates of return from investment or they must cover the shortfall from their own incomes. The balance sheets of insurance companies are also negatively influenced by greater competition, which forces insurers to reduce their premiums.

The insurance market continues to be dominated by the state-controlled PZU Group, which held more than 30% of the market in 2014. PZU strengthened its position last year through the acquisition of the Polish subsidiary of Britain's Link4, in addition to three foreign insurance companies. In 2013, Poland's largest commercial bank, PKO BP, became a major player in the insurance sector through the acquisition of the Nordea Group.

PKO BP and PZU also compete on the pension fund market, where both hold prominent positions. In 2014, the role of pension funds in the economy decreased significantly in the wake of a social security system reform implemented the previous year. At the end of 2014, the net assets of Poland's pension funds stood at ZL160 billion, about half that of a year earlier.

The decrease had a significant impact on pension fund companies (PTEs) managing pension funds (OFEs). The total equity of Poland's pension fund companies was ZL4 billion in 2014. It increased over the previous year as a result of gains posted by some companies. However, some PTEs may be forced to merge because pension fund assets have decreased significantly. The number of pension funds decreased from 14 in 2013 to 12 at the end of 2014.

The social security and pension fund system reforms have had a significant impact on the development of the Polish capital market. First, they have decreased the value of pension fund assets, leading to less investment on the market. Second, the reforms have affected OFE investment policies, in practice transforming pension funds into equity funds. Prior to the reforms, OFE investment policies resembled those of balanced growth funds, with money invested equally in stock and bonds. Today, regulations require OFEs to invest at least 75% of their assets in equity. In fact, stocks account for more than 82% of pension fund portfolios. Several OFEs are considering whether to diversify their portfolios by investing more assets on foreign markets.

While geographic diversification can reduce the risk for pension funds, the outflow of capital may have a negative impact on the domestic capital market. The full impact of the social security market reforms will be not be visible for a few years. For now, the reforms have resulted in a lower role for pension funds and had a significant impact on the structure of the Polish financial system, as shown in Table 10.1.

Table 10.1. Assets of financial intermediaries at the end of 2010 and 2014, ZL million and %

Financial intermediaries	2010	%	2014	%
Credit institutions	1,173	39.70	1,425	40.92
Stock market capitalization	796	26.97	905	25.98
Bond market capitalization	487	16.49	622	17.85
Insurance companies	145	4.92	167	4.80
Mutual funds	122	4.12	195	5.60
OFE pension funds	221	7.49	160	4.59
Brokerages	9	0.31	9	0.25
Total	2,954	100.00	3,482	100.00

Source: Own computation based on NBP and Warsaw Stock Exchange data.

Private equity firms

There is no clear definition of private equity capital in Poland. The terms "private equity" and "venture capital" are often used interchangeably. The concept of private equity capital is the broader term and will therefore be used in this section in reference to the activity of both private equity and venture capital funds, the latter being a broad subcategory of private equity firms.

Private equity investments are generally made by private equity firms in the equity or debt of companies that are not publicly traded on a stock exchange. The aim is to achieve profits in the form of capital appreciation in the medium or long term. Private equity firms can be classified into three main groups depending on their investment strategy: private equity firms that invest in mature companies; venture capital firms that focus on investment in early-stage companies; and business angels investing in early-stage companies as well as providing them with seed funding. These firms differ mainly depending on what stage in the life of a company they focus on. Another important difference is the scale of investment. In practice, the differences between private equity and venture capital investors are often difficult to determine. Private equity firms often invest in both mature and early-stage companies. Therefore the term "private equity investment" is widely used because it applies to investment in all stages of a company's development. This section follows this approach.

In an economy, private equity firms act as financial intermediaries that allocate capital entrusted by investors in non-listed companies with above-average growth potential. Such investment is expected to generate above-average returns for inves-

tors. The European Private Equity and Venture Capital Association (2000) identifies five basic groups of investors: private investors; large companies; banks; pension funds and insurance companies; and public institutions (local and central). National government agencies play the greatest role among these investors in Poland today. This is due to the financial crisis of 2008 and a significant decline in the amount of funds raised by private equity firms since 2008. Table 10.2 shows the structure and types of institutional investors who invested in private equity firms in 2007 and 2013 respectively.

Table 10.2. The amount of funds raised by private equity firms by type of investor in 2007 and 2013 (€ thousand)

Type of investor	2007	2013
Banks	12,000	0
Capital markets	8,750	0
Corporate investors	0	6,500
Endowments and foundations	100,000	300
Family offices	0	2,680
Funds of funds	36,000	61,560
Government agencies	40,220	108,810
Insurance companies	0	6,570
Other asset mangers	2,560	2,860
Pension funds	0	23,700
Private individuals	8,410	15,000
Sovereign wealth funds	0	1,270
Unclassified	615,849	32,000
Total	**823,780**	**261,250**

Source: EVCA (2014).

Funds of funds are another important type of institutional investor, although they invested only half of what government agencies did in 2013. Banks, which used to be important institutional investors, have made no new investments in private equity firms in the past two years, while the role of individual investors in Poland has increased significantly. In 2013, individual investors were responsible for 5.7% of new investments, although that is a minor role compared with that of individual investors in developed countries. This may be due to the small number of wealthy individuals ready to take risks. So far not a single university has invested in private equity firms, an indication that many Polish academic institutions are not interested in going commercial with their research results.

Private equity capital is primarily allocated in innovative small and medium-sized enterprises (Private Equity Council, 2008). For these companies, such investment is often the only way to finance their development. The high risk related to their operations makes it difficult for them to obtain bank loans or other outside funding. Moreover, private equity investment is often related to active governance, often accompanied by the transfer of expertise and human capital to these companies. From the beginning of their involvement, private equity investors have an exit strategy to enable them to cash in their profits. The most common investment horizon for private equity firms is five years, a period that may be extended depending on the company's development and the market situation. Companies benefiting from private equity capital are usually prepared to go ahead with an IPO, which is often the simplest way to exit from an investment. By going public, the company advances to the next phase of its development, while private capital firms contribute to the development of the capital market.

The positive impact of private equity firms on the economy has been demonstrated by Taylor, Brooks, and Hodge (2002). The researchers found that private equity firms invested $273.3 billion in 16,000 companies in the United States in 1970–2000. These companies generated 13.1% of the U.S. GDP and employed 5.9% of its total work force during this period. The study also showed that, thanks to private capital investments, new jobs were created that required higher qualifications and yielded above-average wages. Taylor, Brooks, and Hodge showed that companies infused with private equity capital had higher sales and exports, spent more on research and development, and paid higher taxes than companies using other sources of funding.

Similar findings were presented by Wasmer and Weil (2000), who studied 20 OECD countries in 2000. Their study showed that the role of private equity firms in the economy increased by 0.075% of GDP, accompanied by a 0.25% – or 2.5% in the long term – fall in unemployment. This explains why private equity firms are seen today as an important element of stimulating long-term economic growth. In addition, the literature shows that private equity firms help develop an economy based on knowledge and innovation (Sobańska and Sieradzan, 2004).

Development of private equity firms in Poland

Private equity firms provide funding to companies and often support them with knowledge and human capital. This investment often enables private equity funds to achieve high returns. However, private equity firms are a relatively new form of financial intermediary. Their dynamic development began in the 1950 s in the United States, which supported their growth from the start. A particularly important factor

was a reduction in capital gains tax for individuals. Moreover, pension funds were allowed to invest up to 10% of their assets in the securities of non-listed companies. The opening of the new alternative, technology-heavy NASDAQ stock market contributed significantly to the development of the private equity sector. This offered an excellent and relatively safe way of disinvestment for private equity funds (Panfil, 2005). As a result, the U.S. private equity market grew at a yearly rate of 3.56% in the 1990s (Sobańska and Sieradzan, 2004). The burst of the Internet bubble in 2001 caused private equity funds to reduce their activity by about 61%. The market recovered in 2003, but its growth was stopped again by the global financial crisis in 2007.

The beginnings of the Polish private equity market had strong ties with the U.S. market. The first private capital fund was the Polish-American Enterprise Fund, which began operating in 1990. It was created by the U.S. government to promote Poland's economic and political transition through development of the private sector. That same year the Danish Investment Fund for Central and Eastern Europe was established. It was also based on government capital. In subsequent years, private equity firms based on private funds were launched, mainly by foreign and domestic banks. The first private equity firms were established by BRE Bank, Bank Pekao and BGŻ. Likewise, international private equity firms such as Advent Private Equity Fund Central Europe and European Renaissance Capital began investing in Poland (Panfil, 2005). In 1997, National Investment Funds (NFIs) started to operate. Several of these, due to their special tax status, were transformed at the end of their original mission into high-risk investment funds such as Midas and Black Lion Fund. As a result of changes in regulations, these funds lost their tax privileges in 2012, yet most of them continued to operate as high-risk investment funds.

Polish Enterprise Investors, created through the conversion of the Polish-American Enterprise Fund, is the most active private equity firm in Poland. This firm holds seven private equity funds with a combined equity of over € 2 billion. Polish Enterprise Investors invests anywhere from tens to hundreds of millions of zlotys in companies from Central and Eastern Europe (CEE). In recent years there also has been a significant increase in the number of specialized private equity funds interested in investing in specific sectors of the economy such as biotechnology and telecommunications. The opening of the NewConnect alternative market on the Warsaw Stock Exchange in 2007 contributed to the dynamic development of these funds. NewConnect is not only an important source of capital for private equity companies; it also enables easy disinvestment through an IPO.

The structure and characteristics of Poland's private equity market

Thirty-four private equity funds operated in Poland in 2013. Seventeen of these were private equity funds, 13 venture capital funds, and four were of the mixed type (EVCA, 2013). In total, these funds managed ZL18.5 billion worth of equity, with the largest amount invested in buyouts of Polish companies. By contrast, the value of venture capital funds was ZL2 billion in 2013.

The Polish private equity market is dominated by foreign capital, whose share ranges from 95% to 99%, according to various estimates. Most of these funds are managed by global private equity firms such as Bridgepoint, The Carlyle Group and 3i, which are primarily interested in projects with a minimum value of €100 million (Secus, 2008). However, the value of assets managed by private equity firms relative to GDP remains relatively low, as shown in Table 10.3. In Poland, this ratio was a mere 0.10% in 2013. It was higher than in other CEE countries, but still significantly lower than in Western Europe.

Table 10.3. Private capital funds investing in selected European countries in 2013

Country	No. of funds	Value of assets (in € billion)	% of GDP
Austria	50	2,984	0.17%
Belgium	61	9,367	0.27%
Bulgaria	2	45	0.03%
Czech Republic	6	392	0.09%
Denmark	46	8,981	0.74%
Finland	52	5,601	0.41%
France	270	82,329	0.31%
Spain	135	13,167	0.19%
Ireland	30	2,304	0.10%
Germany	260	35,524	0.18%
Poland	34	4,605	0.10%
Romania	3	190	0.05%
Ukraine	6	873	0.01%
United Kingdom	378	265,568	0.50%
Hungary	21	812	0.06%

Source: EVCA (2014).

Private equity fund investments fell to ZL1.4 billion in 2013 and were significantly lower than in previous years, chiefly due to the global financial crisis of 2008. Prior to the crisis, the value of investment by private equity funds increased steadily, as shown in Table 10.4. The only exception was 2001, when private equity firm investment decreased after the Internet bubble burst in the United States.

In subsequent years, as the economic situation improved, the Polish private equity market started to grow moderately. Private equity fund investment peaked in 2006, when it grew more than 168% over the previous year, followed by 125% in 2007. According to the EVCA (2013), private equity fund investment exceeded ZL2.4 billion in 2007 and was twice as high as a year earlier. However, the global financial crisis disrupted this upward trend in 2008. Ever since then, the value of private equity firm investment has declined in Poland.

Table 10.4. Number of companies with private equity firm investment and the value of this investment, ZL million

	1995	2000	2005	2010	2013
Number of companies	70	48	42	53	94
Investment value	256	634	453	1,993	1,406

Source: EVCA (2014).

Despite the negative trend in the value of investment, the number of companies in which private equity firms are investing has grown steadily since 1995. In 2013, the number of companies that private equity firms invested in rose to 94, from 72 in 2012. The average value of investment was around ZL10 million.

Private equity firms invest mainly in small and medium-sized firms in Poland. Only a small group of private equity firms invests less than ZL1 million. This is due to the high costs of the due diligence process, which can raise the costs of investment and lower the expected return. For this reason, the future growth of the sector largely depends on the development of business angels investing mainly in small enterprises.

Most private equity firms in Poland are universal, which means they invest in different sectors of the economy rather than one specific sector. Table 10.5 presents the structure of private equity firm investment in Poland in 2007 and 2013. The data show only slight changes in the structure of investment during the last five years. In 2013, most private equity firms invested in companies from the manufacturing sector and those in the distribution of consumer goods and business and industrial services. These industries have accounted for more than a third of all private equity investments in Poland for a long time.

Table 10.5. Private equity firm investment by sector in 2007 and 2013 (€ thousand)

Sector focus	2007				2013			
	Amount	%	No. of companies	%	Amount	%	No. of companies	%
Life sector	13,608	3.1	4	7.7	14,042	4.0	7	7.4
Communications	67,504	15.5	15	28.8	11,395	3.2	19	20.2
Consumer goods and retail	28,502	6.5	6	11.5	91,138	25.9	11	11.7
Consumer services	65,053	14.9	3	5.8	17,246	4.9	12	12.8
Business and industrial products	104,029	23.9	8	15.4	16,091	4.6	3	3.2
Business and industrial services	1,256	0.3	1	1.9	58,820	16.7	8	8.5
Transportation	33,778	7.8	2	3.8	54,022	15.4	3	3.2
Construction	1,863	0.4	1	1.9	26,400	7.5	1	1.1
Energy and environment	0	0.0	0	0.0	29,728	8.5	4	4.3
Financial services	92,379	21.2	7	13.5	10,229	2.9	5	5.3
Computers and consumer electronics	23,632	5.4	3	5.8	22 410	6.4	21	22.3
Chemicals and materials	199	0.0	1	1.9	0	0.0	0	0.0
Real estate	3,420	0.8	1	1.9	0	0.0	0	0.0
Total investment	435,224	100.0	52	100.0	351,520	100.0	94	100.0

Source: EVCA (2014).

In 2013, private equity firms invested in 71 new companies, channeling almost 75% of their total investment. This investment structure should be evaluated positively because it promotes the development of new projects. On the other hand, most private equity firms either invested in mature companies or purchased existing businesses. Venture capital accounted for only 4.1% of all investments made by private equity firms in 2013, far less than in 2007. Table 10.6 shows how the structure of private equity firm investment changed in 2007–2013. The small scale of venture capital investment in 2013 reflects the risk related to this type of investment, but it also suggests problems with obtaining outside capital in an early phase of business development in Poland. This state of affairs should be evaluated negatively because the early phase of business development is crucial for many new enterprises.

Table 10.6. Private equity firm investment by stage of business development in 2007 and 2013 (€ thousand)

Stage of business development	2007				2013			
	Amount	%	No. of companies	%	Amount	%	No. of companies	%
Seed	2,824	0.7	4	6.9	1,559	0.4	23	25.8
Start-up	3,069	0.7	9	15.5	4,946	1.3	20	22.5
Later stage venture	33,218	7.7	14	24.1	9,127	2.4	16	18.0
Total venture capital	39,111	9.0	27	46.6	15,632	4.1	59	66.3
Growth	100,686	23.2	8	13.8	150,412	39.6	14	15.7
Rescue/ Turnaround	1,256	0.3	1	1.7	0	0.0	0	0.0
Replacement capital	11,100	2.6	3	5.2	8,214	2.2	2	2.2
Buyout	282,035	65.0	19	32.8	205,775	54.1	14	15.7
Total investment	434,188	100.0	58	100.0	380,033	100.0	89	100.0

Source: EVCA (2014).

In most developed economies, private equity firm investment is shifting from early to later stages of business development. According to EVCA (2014), the share of new companies in venture capital firm investment in Europe declined from 10.4% in 2007 to 7.5% in 2013. During the same period, the proportion of buyout transactions increased significantly, to 84% of the total value of private equity firm investment in 2013.

This trend stems mainly from increased risk aversion in the market following the global financial crisis. Investments in early-stage companies are relatively risky. This type of investment requires costly legal and financial analysis (due diligence) and adequate experience in the industry. As these transactions are often small-scale, the necessary expenses are disproportionately high for most private equity firms. Many such firms refrain from this type of investment. They prefer projects with less risk and uncertainty, and consequently tend to invest in mature companies with a higher transaction value. In recent years private equity firm investment in turnaround and buyout companies has increased significantly.

The role of venture capital investment is declining and may adversely affect long-term economic growth. In the past, venture capital firm investment was an important driver of innovation in the economy.

In 2013, private equity funds exited from 36 companies in Poland, most of these mature businesses. The number of sold companies and the value of transactions were

significantly higher than in 2007. In 2013, the total value of divestments exceeded ZL1 billion, but that does not include income generated by private equity firms during the investment period. The total income earned by private equity firms may have been significantly higher, but no information is available on their average rates of return.

Table 10.7. Exit routes of private equity firms in Poland in 2007 and 2013 (€ million)

Exit route	2007				2013			
	Amount at cost	%	No. of companies	%	Amount at cost	%	No. of companies	%
Sale to another private equity firm	72,256	52.3	4	13.8	0	0.0	0	0.0
Divestment by trade sale	25,504	18.5	9	31.0	230,01	80.8	11	28.9
Sale to financial institution	2,552	1.8	5	17.2	24,87	8.7	12	31.6
Sale to management	3,423	2.5	2	6.9	3,91	1.4	4	10.5
Divestment by public offering	4,864	3.5	5	17.2	18,31	6.4	7	18.4
Repayment of principal loans	20,350	14.7	1	3.4	0,61	0.2	3	7.9
Divestment by write-off	0	0.0	0	0.0	7	2.5	1	2.6
Divestment by other means	9,218	6.7	3	10.3	0	0.0	0	0.0
Total divestment	138,167	100.0	26	100.0	284,77	100	36	100.0

Source: EVCA (2014).

Based on the above data, the most common exit route for private equity firms was divestment by trade sale. In 2013, this divestment strategy accounted for 80% of the total value of transactions and for 29% of the total number of divested companies. The table shows that this exit route was used for the divestment of companies with a high market value. The second most popular exit route in terms of transaction value was sale to another financial institution, including other private equity firms.

An exit through an IPO is still rare in both Poland and other European countries. In Poland, this type of transaction accounted for only 6.4% of the total market value of divestments. In Europe as a whole, the figure was even lower, at 5.9% in 2013, attesting to continued risk aversion on the capital market in the wake of the financial crisis.

Conclusions

The Polish economy slowed down in 2014, mainly due to continued problems in the eurozone. The slowdown, however, had no negative impact on Poland's financial sector, which continued to develop. The development of the financial sector is expected to positively influence the country's economic growth in the future. However, for this to happen, a further evolution is needed in the structure of the Polish financial system, which is still dominated by banking. The banking sector's role in the economy increased further in 2014, in part due to a decreased role for pension funds in the wake of a recent reform. The reduced role of pension funds is likely to adversely affect the development of the Polish capital market in the long term. Another negative trend is that investment by private equity firms is decreasing, largely due to the financial crisis that began in 2008.

Private equity firms provide financing to developing enterprises and also support them by providing knowledge and human resources. A study of companies benefiting from this form of financing indicates that resources provided by private equity firms are mainly used by small and rapidly developing enterprises, many of which operate in high-tech industries. These companies need not only access to financing in order to develop, but also knowledge and human resources. Private equity firms can provide these. Research shows that companies benefiting from private equity investment have a positive impact on economic growth and help reduce unemployment. Therefore, investment by private equity firms is considered to be an important determinant of long-term economic growth.

In Poland, private equity capital is seldom employed to finance the development of companies, and investment by private equity companies has significantly declined in recent years. In 2013, the value of private equity firm investment dropped by almost 30% to ZL1.3 billion. Nevertheless, the Polish private equity market remains the largest in the CEE region. In 2013, Polish private equity funds raised about 70% of all private equity capital in the CEE region and their investment accounted for 60% of total investment.

The existing literature points to several factors that may hamper the further development of the Polish private equity market (Panfil, 2005; Grzywacz 2005). The first factor is that the Polish capital market is still relatively poorly developed. This limits valuation possibilities and the exit route for private equity firms through IPOs. Another factor is regulatory restrictions on investment in private equity firms, in particular by pension funds and insurance companies. One weakness of the Polish private equity industry is inadequate access to new capital. The existing investment restrictions

significantly limit the development of private equity firms in Poland. As a result, the Polish private equity market is dominated by foreign entities, which had an 85% market share in 2014. Moreover, most of the new funding comes from the public sector and is often related to financial aid available under European Structural Funds.

A third factor is the lack of tax incentives and double taxation of private equity firms in Poland. Additionally, recent legal reforms have significantly reduced the tax benefits for private equity firms doing business in the form of limited joint-stock partnerships, which was a popular form in the past. Prior to the reform, the revenues, profits and costs of limited joint-stock partnerships were treated as those of the partners and not the firm itself in terms of income tax. This changed in 2014 when private equity firms were made subject to tax liability along general rules and thus faced additional costs.

U.S. experience shows that these problems and restrictions may significantly hinder the development of the private equity market in the long term. Therefore further development of private equity firms in Poland may only be possible with help from the government – through the creation of appropriate legal forms for private equity firms, combined with liberalized rules for large institutional investors and significant tax incentives. In the absence of governmental reforms, the Polish private equity market may be subject to further marginalization, which will adversely affect access to capital for companies. This study shows that mostly small, fast- growing companies operating in high-tech industries benefit from private equity firm financing. The development of such companies has a significant impact on long-term economic growth and unemployment. Consequently, the development of the private equity market should be a priority for the government in coming years. Failure to take action may exacerbate the negative trends, as indicated by the recent withdrawal of some foreign private equity firms from Poland.

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Part III

Innovation in Poland

Chapter 11

Poland's National Innovation System and How It Evolved in 2007–2014

Marzenna Anna Weresa

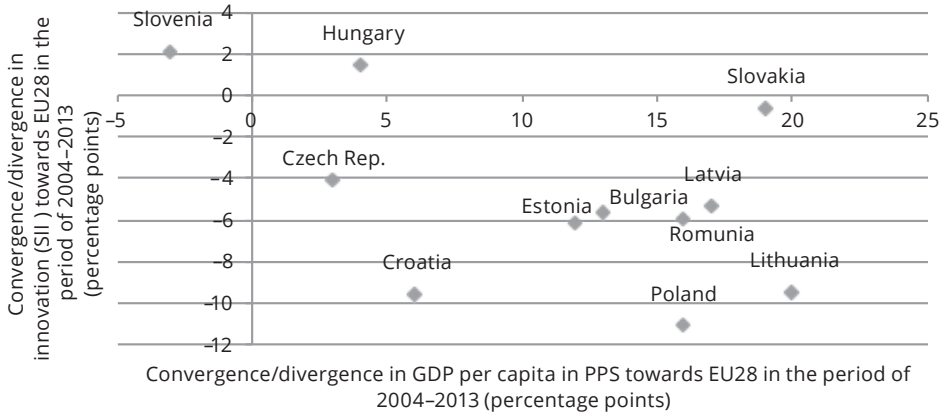
In the first decade of the 21st century, the European Union adopted the so-called Lisbon Strategy to promote innovation and competitiveness. This was later replaced by the *Europe 2020* strategy for the 2010–2020 period, with an innovation union as a key element (EC, 2010). However, a common innovation strategy for all EU countries does not mean that there are no differences in how these countries' national innovation systems function. These differences have been reflected in the different innovation performances of individual member states (EC, 2014).

The monitoring of innovation indicators in EU countries creates the motivation for national governments to improve their innovation positions. In particular, this applies to countries described as moderate or modest innovators. Poland is a moderate innovator. In 2013, it ranked 25th among EU member states in terms of innovation performance (EC 2014, p. 11).

The main objective of this chapter is to determine the innovation capacity of the Polish economy from 2007 to 2014, and to examine the changes that occurred in this area, in particular during the global economic crisis of 2007–2010. The innovation performance of the Polish economy will be compared with other EU member states and selected non-EU countries. In addition, the indicators that measure Poland's innovative position will be benchmarked against the average values for the EU as a whole. To offer a broader picture, selected innovation indicators are compared with their median value for developed countries that are members of the Organization for Economic Cooperation and Development (OECD).

Poland's national innovation system is of the catching-up type (Weresa, 2012). The transformation of the whole economic and social system from central planning to a market economy in the 1990 s also covered the research and development (R&D) sector and the education system. As a result of this transition process, Poland's real GDP per capita converged toward the EU average, but this was not accompanied by a similar convergence in terms of innovation performance as measured by the Summary Innovation Index (SII) (Figure 11.1).

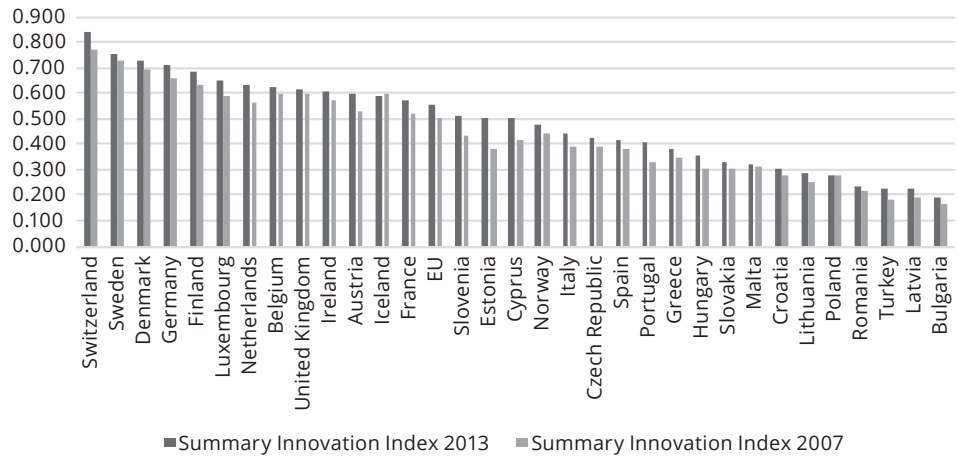
Figure 11.1. Changes in innovation performance (measured by the Summary Innovation Index) and GDP per capita (in PPS) in relation to the EU28 average, 2004–2013 (percentage points)



Source: Author's elaboration based on Eurostat data (accessed Aug. 28, 2014) and on the Innovation Union Scoreboard (2008 and 2014 editions), European Commission.

The global crisis further intensified these trends. Since 2007 Poland's income convergence with the EU average has accelerated, while the innovation performance of the Polish economy measured by the SII has lagged behind the EU average, and the gap has grown (Figure 11.2).

Figure 11.2. Summary Innovation Index: Poland and other European countries compared in 2007 and 2013



Source: Author's elaboration based on EC, 2014.

The main features of Poland's national innovation systems are illustrated in Figure 11.3 using 22 indicators compared with their median values in OECD countries.

Table 11.1. Patent applications to the European Patent Office at the national level (per million labor force): Poland and other European countries compared, 2004–2012

	2004	2007	2008	2009	2010	2011	2012
EU28	240.43	244.97	235.60	233.42	232.37	228.69	225.19
Bulgaria	5.30	3.49	5.24	4.53	4.98	5.56	5.54
Czech Republic	21.44	35.97	39.68	33.05	36.36	36.97	35.82
Denmark	382.57	442.61	434.23	399.22	429.04	425.04	422.91
Germany	576.19	583.08	551.35	557.00	554.68	538.48	534.63
Estonia	12.89	41.04	49.34	63.78	54.67	58.33	61.45
Ireland	140.41	147.55	144.26	151.02	142.61	141.39	139.38
Greece	13.55	21.11	18.65	18.70	13.01	10.56	7.91
Spain	59.95	62.36	62.43	66.05	64.34	65.77	67.27
France	305.83	309.94	309.95	304.34	296.19	293.22	287.01
Croatia	17.70	16.64	16.18	12.47	16.67	16.77	16.84
Italy	188.17	198.31	187.87	175.43	177.55	170.60	161.15
Latvia	8.57	13.21	18.77	15.87	13.76	15.39	13.10
Lithuania	6.88	6.46	11.13	5.44	10.47	12.10	12.41
Hungary	36.95	44.97	42.82	43.8	45.15	45.01	45.21
Austria	367.71	405.52	379.09	392.74	406.68	405.65	411.82
Poland	**7.31**	**11.98**	**13.63**	**16.45**	**20.78**	**23.65**	**26.87**
Portugal	10.61	21.70	20.04	16.30	16.60	15.12	13.45
Romania	2.34	3.26	3.27	3.14	3.45	3.54	3.59
Slovenia	111.03	115.09	133.34	117.36	99.79	96.99	84.38
Slovakia	7.78	14.54	13.35	10.74	16.83	17.85	19.14
Finland	539.26	470.27	463.86	488.01	512.30	524.02	541.36
Sweden	482.36	578.07	561.16	523.85	556.61	546.25	540.99
United Kingdom	188.01	180.70	169.77	170.47	166.40	161.68	158.23

Source: Eurostat, http://ec.europa.eu/eurostat/data/database, accessed Feb. 28, 2015.

There is a huge gap separating Poland from most other OECD countries with regard to innovation performance (Weresa, 2014). Only three of 22 analyzed indicators are higher for Poland than the OECD median. Two of these indicators measure the development of communication. These are the number of mobile broadband users per inhabitant and internet network density per inhabitant. A third indicator that can be regarded as a strength of Poland's innovation system involves cooperation in patent-

ing (joint patents with inventors from abroad as a percentage of the total number of international patents).

With regard to patenting by domestic inventors in the European Patent Office (EPO) or the Patent Cooperation Treaty (PCT) application procedure, Poland still occupies one of the lowest positions in Europe, even though these indicators increased in 2007–2013. Although the number of patents filed by Polish inventors to the EPO per million employees tripled to 26.87 in 2007–2012, it was still one-tenth of the EU average and lower than the corresponding indicator in the Czech Republic and Hungary, not to mention European leaders in this field such as Finland, Sweden, and Germany. However, Poland did surpass some southern EU countries, such as Greece and Portugal (Table 11.1).

Similar disparities can be seen when comparing Poland's position in terms of the number of patents per unit of GDP with the positions of other EU countries. On the one hand, Poland performed better than other European countries. The number of patents in relation to GDP (measured in billions of dollars, in constant 2011 prices) in Poland was higher than in the Czech Republic, Hungary, Spain, Portugal, and Greece, and similar to that in Italy. Moreover, this indicator increased in Poland by 50 percent from 2007 to 2013. However, comparing the Polish indicator with those in other emerging markets (for example, the BRIC countries), it can be observed that in 2004–2012 Poland lagged behind Russia and China, while staying ahead of Brazil and India (Table 11.2).

During the global crisis, some countries reported a decrease in patenting indicators. The number of patents per employee decreased in Germany, France, the UK, Italy, Spain, Greece, and Slovenia. The number of patent applications in relation to GDP fell in Germany, the UK, Finland, and Italy. In Poland, both indicators showed an upward trend, which could mean that the crisis did not have a significant impact on patenting activity in Poland.

Poland compares well with the OECD as a whole in terms of the percentage of 15-year-olds with the highest score in the OECD Program for International Student Assessment (PISA), which is an indicator of the quality of the education system (Figure 11.3).

The remaining 18 innovation indicators illustrated in Figure 11.3 were significantly below the OECD median in Poland. One of the weaknesses of the Polish innovation system in 2007–2014 was insufficient innovative activity in the business sector. Private sector spending on R&D relative to GDP in Poland was less than one-twentieth of the OECD median. Total R&D expenditure in Poland was also low. In 2013, it constituted 0.87% of GDP, down from 0.89% the previous year (GUS, 2014, p. 1). The ratio of R&D expenditure to GDP increased slightly in 2007–2013 (from 0.57% in 2007 to 0.87%

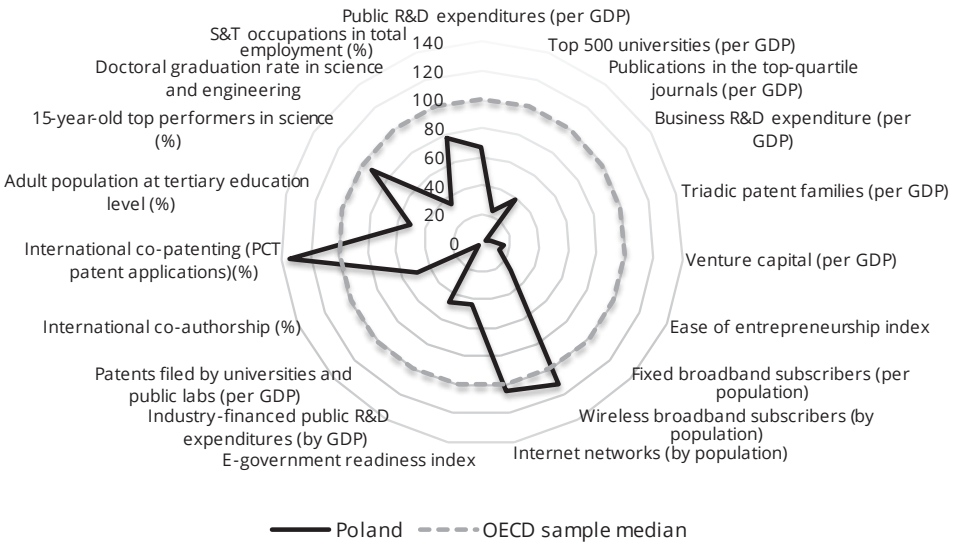
in 2013), in what can be seen as a plus for Poland's innovation system. This ratio grew slowly but steadily until 2012 despite the global economic crisis, and then fell slightly in 2013 (Figure 11.4).

Table 11.2. Resident applications per $ 100 billion GDP (in 2011 PPS): Poland and other European countries compared, 2007–2013

	2007	2008	2009	2010	2011	2012	2013
Austria	1,066	1,058	1,093	1,185	1,078	1,138	1,139
Brazil	172	167	168	154	167	169	170
Bulgaria	204	224	232	225	244	224	263
China	1,639	1,901	2,049	2,373	3,081	3,685	4,506
Czech Republic	293	289	340	370	334	358	407
Estonia	170	215	399	393	297	190	204
Finland	1,803	1,672	1,662	1,665	1,548	1,748	1,719
France	977	1,006	1,009	1,045	1,025	1,031	1,033
Germany	2,245	2,308	2,340	2,294	2,184	2,190	2,181
Greece	186	204	235	251	265	253	284
Hungary	340	339	401	342	340	362	n/a
India	140	137	143	158	148	153	163
Italy	634	607	631	633	621	607	610
Poland	**346**	**350**	**398**	**425**	**493**	**561**	**531**
Portugal	115	166	250	210	238	264	285
South Korea	9,437	9,064	9,015	8,763	8,851	9,286	9,739
Romania	249	277	314	414	419	305	286
Russia	908	870	872	938	833	874	861
Spain	297	321	327	337	327	330	314
Sweden	1,380	1,502	1,483	1,501	1,423	1,446	1,484
Thailand	120	112	130	143	109	111	168
United Kingdom	982	956	972	960	913	911	871

Source: Based on World Intellectual Property Organization data, http://ipstats.wipo.int/ipstatv2/ipstableval, accessed Feb. 28, 2015.

Figure 11.3. Main features of Poland's innovation system in 2013[a]

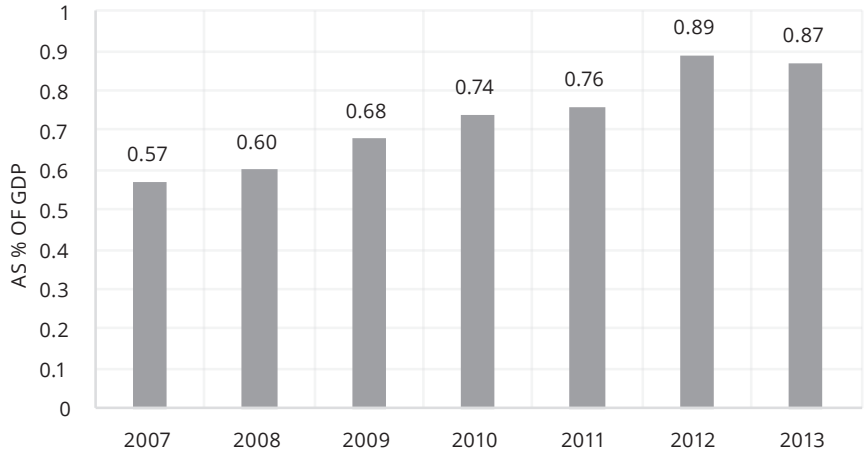


Note: Normalized index of performance relative to the median values in the OECD area (Index median = 100). More on methodology: OECD (2014).

[a] or latest available year.

Source: Based on: OECD (2013a), doi: 10.1787/data-00669-en, accessed April 20, 2014.

Figure 11.4. R&D expenditure as a percentage of GDP in Poland, 2007–2013



Source: Author's elaboration based on GUS, 2013, p. 10, and GUS, 2014, p. 1.

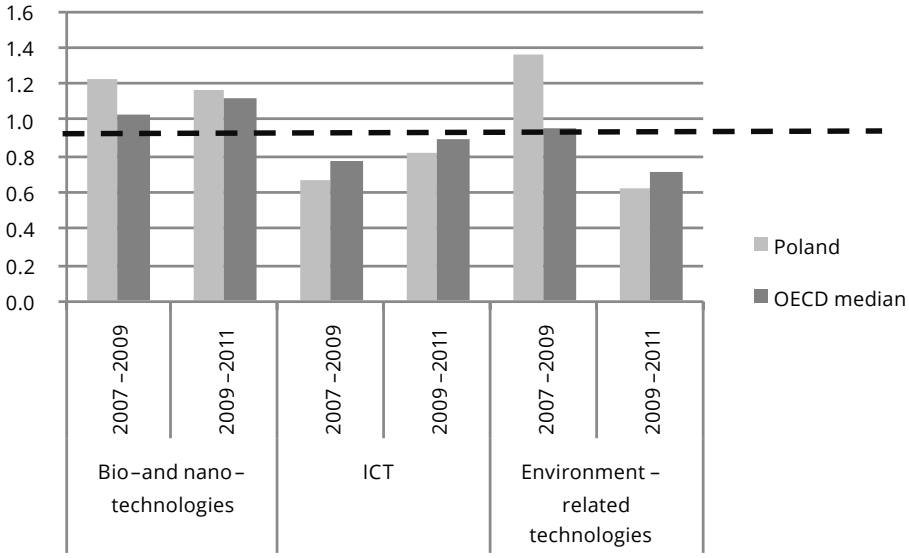
One of the greatest weaknesses of the Polish innovation system is the low level of venture capital development, although this indicator grew slightly in 2007–2013. According to OECD data, venture capital funds were equivalent to 0.0001% of Poland's GDP in 2007, increasing to 0.002% in 2012 (OECD, 2013, p. 201). This was a very low level compared with the OECD median (Figure 11.3).

The indictors that describe the development of human capital in Poland were also below the OECD median. These indicators include the number of Ph.D. graduates in science and engineering as a percentage of the total number of Ph.D. graduates, the percentage of employees in science and technology, and the percentage of 15-year-olds with the highest PISA score (above 633.33 points) (Figure 11.3). The PISA score for Polish school students was only slightly lower than the OECD median. This means that in the early stages of education, human capital characteristics in Poland are similar to the overall OECD pattern, but differences begin to appear at higher levels of education. Particularly strong are disparities in the percentage of Ph.D. graduates in science and engineering and in life sciences. In Poland, these indicators are roughly one-third of the OECD median.

Poland's innovation performance in 2007–2014 was good with regard to the development of electronic communication. Two indices that describe this dimension of the national innovation system – the number of mobile broadband users per inhabitant and internet network density per capita – were higher than the OECD median level. Another strong point of Poland's innovation system was high internationalization of patenting activity. The number of joint patent applications with inventors from abroad (filed in the PCT procedure) as a percentage of the total number of PCT patent applications was far above the OECD median (Figure 11.3).

When it comes to the technological specialization of the Polish economy, there was little change for key technologies during the global crisis. In 2007–2009 Poland enjoyed revealed technological advantages (RTA) in environmental technologies and in biotechnology and nanotechnology, but had no such advantage in information and communication technology (ICT). During the crisis, Poland managed to maintain its advantages in bio- and nanotechnologies and initiated the process of catching up in ICT. In 2009–2011 the RTA index decreased slightly compared with 2007–2009 for bio- and nanotechnology, while increasing for ICT. However, Poland lost its revealed technological advantage in environmental technologies in 2009–2011. The RTA index fell below 1, from 1.35 to 0.62 (Figure 11.5).

Figure 11.5. Changes in the Revealed Technological Advantage (RTA) in key technologies: Poland compared with the OECD average in 2007–2009 and 2009–2011



Note: The dashed line in the figure indicates an RTA level of 1; RTA values below this level mean a lack of technological advantage, while RTA values above this level mean the occurrence of such an advantage.

Source: Author's elaboration based on data published in: OECD (2013) and OECD (2014).

This analysis of the different aspects of Poland's innovation performance shows that in most areas, Poland's innovation system is less well developed than those in other OECD countries on average. The key challenges that Poland faces with regard to the performance of its national innovation system (OECD 2014, p. 400) include the need to:

- increase the role of innovation in stimulating economic growth,
- improve innovation policy making,
- conduct further reforms in R&D in the public sector,
- strengthen research capacity and infrastructure in public R&D,
- increase the innovation activity of enterprises, especially small and medium-sized businesses.

One of the problems of Poland's innovation performance that requires immediate intervention is the need to restructure the public R&D sector. Table 11.3 examines the main characteristics of Poland's public R&D sector, comparing them with the OECD median, with a focus on changes that occurred in this area during the global economic crisis.

As shown in Table 11.3, public support for research conducted at universities and non-university research centers in Poland was distributed evenly in 2007–2012.

Nevertheless, public financing for university research increased gradually. In 2012, public expenditure on research conducted by universities accounted for 55% of total government expenditure on R&D and higher education, and this figure increased by 6 percentage points compared with 2007. Despite the increase, the figure remained far below the OECD median (65.6% in 2012).

The structure of public support for R&D in Poland broken down by the type of research changed slowly but steadily in favor of applied research. The share of basic research in total public expenditure on R&D decreased from 43.6% in 2007 to 34.8% in 2012, while in the OECD on average this percentage was stable, at 43%. Public support for R&D in Poland goes mainly to the non-defense sector. In 2007–2012, almost 70% of public R&D funds went to research centers as a lump-sum subsidy, and the remaining 30% was funded on a competitive (project) basis. Thus, a model dominates in Poland whereby funds go to research institutions rather than specific projects, though there has been some shift toward funding on a competitive basis as project financing has increased by 2 percentage points since 2007.

The approach to public funding in priority areas changed from 2007 to 2012. In 2007, research in priority areas (so-called "thematic research") absorbed almost 66.8% of total public expenditure on R&D and education, while in 2010 this figure dropped to 41.8%. It subsequently increased to 69.3% in 2012.

Public support for R&D and innovation in Poland is available mostly in the form of non-repayable grants. Indirect tools, such as tax credits related to R&D activity, play a marginal role in the system of public support for research and innovation in the business sector (Table 11.3).

The main trends in the development of Poland's national innovation system in 2007–2014 show that a major problem is incomplete transformation of the public R&D sector. While some restructuring is already under way, changes are taking place too slowly. Apart from restructuring the institutional base of the national innovation system, it is necessary to develop human resources in R&D. This requires a significant increase in R&D expenditure and improvements in the quality of education.

The global economic crisis did not negatively affect Poland's innovation performance. The negative implications of the crisis were to an extent mitigated by an inflow of EU funds and their use for financing research and innovation. It can be expected that this investment will help improve Poland's innovative position in the long term.

Table 11.3. Public R&D expenditure broken down by financing sector, type of research and type of support in 2007–2012

	Financing R&D by type of organization (universities *vs.* research institutes) % of public sector research expenditure	R&D expenditure as % of public sector expenditure			R&D expenditure supporting institutions conducting R&D as % of total funding	Direct public support (e.g. grants) for business R&D as % of total public support for business R&D
		Basic research	Non-defense -oriented R&D	"Thematic research"		
2012						
Poland	**55.2**	**34.8**	**92.8**	**69.3**	**68.6**	100
OECD median	65.6	43.6	99.0	58.8	n/a	81.0
2010						
Poland	**50.9**	**37.2**	**96.8**	**41.8**	**68.6**	**100.0**
OECD median	66.7	42.7	98.6	45.4	62.4	
2007						
Poland	**48.9**	**43.6**	**97.9**	**66.8**	**66.8**	100.0

Source: Author's elaboration based on: OECD (2012), pp. 451–462, OECD (2013a), and OECD (2014).

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Chapter 12

The Innovation Objectives of Polish Industrial Firms on Their Main Target Markets

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Introduction and theoretical context

This chapter analyzes the importance of the innovation objectives of Polish industrial firms as compared with the objectives of firms in other countries in Europe. In this context, we analyze the relationships between the structure of innovation objectives and the involvement of Polish firms on their main target markets. We intend to assess whether the type of target market and the level of a firm's export involvement affects the structure and hierarchy of innovation objectives in terms of importance.

It is assumed that an innovation is the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations (OECD, Oslo Manual, 2005, p. 46). The analysis covers the objectives of all types of innovations (as distinguished by the OECD): product innovations, process innovations, marketing innovations, and organizational innovations. According to the classification widely accepted in the literature, technological innovations include product and process innovation, while non-technological innovations include organizational and marketing innovations. Due to the high degree of aggregation of empirical data on the target markets for new products, the domestic market and foreign (export) markets are distinguished in the analysis.

Various motives for innovation introduced by firms are discussed in the literature. Among the most important motives is the creation of a competitive advantage (see e.g. Kay, 1993; Utterback, 1994; Besanko *et al.,* 2007), based on a firm's cost advantage and/or on differentiation (see Porter 1985). This is possible due to innovations introduced in each of the value-creation corporate functions as well as in relations with business partners. Research reports point to a positive influence of innovation on the international competitiveness of firms (see e.g. literature review in Halpern, 2007). Research also indicates that, in a broader context, there are positive bidirectional

relationships between the innovativeness and internationalization of firms (e.g. Amendola *et al.,* 1993; Kafouros *et al.,* 2008; Filippetti *et al.,* 2011).

The innovation concept comprises both the outcome and the process through which this outcome is attained. In management practice, innovation motives should therefore be regarded as objectives (the desired outcomes) of the innovation process, and they should be presented as a sequence of phases within this process. Defining innovation as a process makes it possible to analyze the constituting activities and the sequence (leading to the subsequent goals) required for an innovation outcome. Definitions of innovation as an outcome highlight the significant characteristics of the outcome (such as the degree of novelty, enhanced utility, access to new customers, and reduction of product cost), thus making it possible to identify the features of an innovation and to classify innovations into categories for further analysis (Damanpour, 1991; Oslo Manual, 2005; Holms, Moir, 2007; Quintane *et al.,* 2011; Lewandowska, Gołębiowski, 2012).

While setting innovation objectives, various criteria describing an innovation should be considered, such as the subject of the innovation (the criterion applied by the OECD to distinguish innovation types), the scope of the expected change (radical/revolutionary vs. incremental/evolutionary innovation), and the duration of the innovation effects (short- vs. long-term). It is also necessary to define the hierarchy of objectives and specify vertical relations between them (e.g. strategic vs. operational objectives). Moreover, it is necessary to consider the complementarity or substitutability of innovation objectives and resulting innovative activities. The literature draws attention to the significance of links between technological and non-technological innovation, emphasizing the strategic dimension of innovation stimulated by market factors, and not just by technological factors (Bessant, Tidd, 2007; Terziovski, 2010).

In our view, the objective of an innovation is its desired outcome – the direct, declared or actually observed effect of an innovative activity that makes it possible to assess its effectiveness. These direct outcomes of innovation activities are the vehicles to achieving the strategic business and social objectives of an organization, such as gaining and maintaining competitiveness, enhancing the range of products and services offered and increasing their attractiveness, creating new demand, entering new markets, increasing the firm's market share, and raising the firm's profile and improving its relationships with stakeholders. Both the firm's strategic objectives and environmental factors (demand and pressure from competitors, technology advances, regulatory and social pressures) are the drivers of innovation that affect the setting of innovation objectives.

Studies show that firms tend to view innovation objectives in terms of a positive effect on improving their operational performance and competitive advantage.

Enterprises also relate these objectives to an improvement in their image and reputation. Furthermore, innovation objectives are perceived as a way to enhance employee satisfaction, and improve firms' resources and capabilities (including technological, market and organizational knowledge), technical abilities and financial performance (Simpson *et al.*, 2006; Laforet, 2011). However, innovation may also produce unexpected effects, either positive or negative, such as increased costs, project failure, or problems in relations with stakeholders.

Objectives of technological and non-technological innovations undertaken by firms in Poland and other EU member states as well as selected other European countries

Eurostat data for 2008–2010 shows that Poland ranked low among EU27 member states as far as the innovativeness of firms is concerned. Only 28% of Polish firms were innovative in line with an OECD classification (i.e. introduced at least one product or process innovation during the three-year period), compared with 79% in Germany, 68% in Luxemburg, and 61% in Belgium.

The *Community Innovation Survey* (CIS) asked respondents about the direct outcomes of innovation (e.g. product quality improvement, reduction of unit labor cost, reduction of time to respond to consumer and supplier needs) and about product related strategic objectives resulting from innovation (entering a new market, maintaining/increasing the market share). Tables 12.1 and 12.2 list the objectives (effects) of four types of innovation undertaken by innovative firms in EU member states and selected other European countries.

Eurostat's *Community Innovation Survey* for 2008–2010 shows that the key objective of technological (product and process) innovation is an improvement in the quality of goods and services (mentioned by 56% of firms in the studied countries on average). The second most frequently mentioned innovation objective is an increase in the product range (51% of firms), and the third most important objective is an increase or maintenance of market share (mentioned by 46% of firms). For Poland, the figures were 50%, 49%, and 43% respectively.

Polish firms mentioned technological innovation objectives less often than their counterparts in other European countries on average (see Table 12.1). The biggest negative differences for Polish firms were found in the case of the following innovation objectives: an improvement in the quality of goods and services (–6 p.p.); a reduction of unit labor cost (–7 p.p.), and a reduction of material and energy consumption

(–4 p.p.). These differences apply to product and process innovation objectives related to building/increasing a competitive advantage based on differentiation or a cost-based advantage necessary to improve competitiveness. The analysis also revealed that in the case of seven technological innovation objectives (among a total of 10 listed in the CIS questionnaire), the percentage of Polish firms that identified these objectives as important was lower than the percentage of firms in most other Central and Eastern European (CEE) countries. At the same time, Poland had the lowest percentage of firms in the CEE region identifying the following objectives: more flexible production and a reduced unit labor cost. Slovenian, Romanian, Hungarian, and Latvian firms were more focused than Polish firms on technological innovation objectives as a whole. This may suggest that in overall terms, innovation in these countries is more intense than in Poland (see Table 12.1 for details).

Table 12.2 provides data on the non-technological innovation objectives of firms in EU member states and selected other European countries. The most frequently listed organizational innovation objectives are: an increase in product quality (mentioned by 59% of firms in all the analyzed countries on average) and a reduction of firms' response time to the needs of customers and suppliers (54% of firms). In Poland, 47% of firms achieved these objectives. As in the case of technological innovation, the percentage of Polish firms introducing organizational innovation was lower than in Europe on average. The biggest negative differences for Polish firms were seen in the case of the following organizational innovation objectives: improvements in the quality of goods and services (–12 p.p.); a reduction of unit labor cost (–11 p.p.), and an increased ability to develop new product or processes (–9 p.p.). A comparison between Polish firms and their counterparts in other CEE countries shows that in the case of all organizational innovation objectives listed in the CIS questionnaire, the figures for Polish firms were lower than those for firms in most other countries in the region. At the same time, Poland had the region's lowest percentage of firms that increased their ability to develop new products or processes. In Hungary, Slovenia, Romania, Latvia, and Slovakia, the figures for all organizational innovation objectives were higher than in Poland, which may suggest that innovation in these countries is more intensive than in Poland (see Table 12.2 for details). Notably, the figures for Hungary, Slovenia, Romania, Latvia, and Slovakia were the highest among all the studied countries.

The marketing innovation objectives listed in the CIS research do not directly refer to innovative changes in marketing activities. They are in fact market objectives to be accomplished as result of product, process, and organizational innovations as well as innovative marketing activities. Data on the objectives of marketing innovations (Table 12.2) show that the most frequent objective is to increase a firm's market share (listed by 66% of firms in the studied countries), followed by access to new

customers/market segments (mentioned by 46% of firms), and entering new geographic markets (listed by 30% of firms). The figures for Polish firms, at 49%, 33%, and 20% respectively, are again significantly lower than on average in Europe: by 17 p.p., 13 p.p., and 10 p.p. respectively. The Polish figures are also lower (in some cases significantly lower) than in most EU member states from the CEE region. The biggest negative differences for Polish firms in terms of marketing innovation objectives were in relation to their counterparts in Hungary (where the figures were 92%, 84%, and 42% respectively) and Slovenia (92%, 80%, and 45% respectively). The reasons for these significant differences between countries are difficult to establish due to the high level of data aggregation and different industry and ownership structures as well as other factors determining the market behavior of firms. However, these differences may suggest that, compared with their counterparts in other countries (including those from the CEE region), Polish firms are less eager to take advantage of opportunities to combine non-technological (i.e. organizational and marketing) and technological innovation with a view to developing synergies from such interactions. It also appears that Polish firms are less eager to make use of possibilities to substitute various types of innovation.

Hierarchy of innovation objectives of Polish industrial firms on their main target markets: research results

The analysis in this subchapter is based on a sample of 7,783 medium-sized and large enterprises using the GUS PNT-02 questionnaire (the Polish version of the CIS questionnaire for 2008–2010, NACE section B-E). The survey showed that a total of 3,588 enterprises had introduced at least one type of innovation in the studied period. We divided the sample of innovative firms into three categories based on the level of export intensity: *enterprises oriented toward the local market* (they sold their goods exclusively on the domestic market in 2008–2010), n = 796; *enterprises oriented toward both the local and international markets* (selling goods on both), n = 1,525; and *enterprises oriented toward international markets* (which sold their goods exclusively on international markets), n = 1,267. See Table 12.3 for details.

A Chi-square test with column proportions (Bonferroni method) was applied to reveal statistically important differences among firm categories, marked as a, b and c in the respective tables.

The results in Table 12.3 show that process innovation was introduced most intensively (by 60.5% of firms in the sample), followed by product innovation (57.3% of surveyed firms), organizational innovation (50.4%), and marketing innovation (42.1%).

Enterprises oriented toward both the local and international markets introduced product innovation more often than those oriented mainly toward international markets and those that operated exclusively on the local market (69.0%, 55.2%, and 38.1% respectively).

Similar results were yielded for process innovation (65.0%, 58.0%, and 55.5% respectively) as well as marketing innovation (49.0%, 38.9%, and 33.7%).

As for organizational innovations, those were introduced more often by enterprises oriented toward international markets (55.7% of enterprises), and less intensively by those oriented toward both the local and international markets (49.0%). Enterprises focusing solely on the local market were innovating the least intensively (42.8%).

In order to minimize the number of variables, exploratory factor analysis (with the Varimax rotation) was used in further analysis. Bartlett's test of sphericity was applied to test the null hypothesis that the variables were uncorrelated in the population. A Kaiser-Meyer-Olkin (KMO) test was used to measure the sampling adequacy. The reliability of the factor analysis results was proven with Cronbach's α statistic.

A General Linear Model Univariate Analysis with Bonferroni's post hoc test was used in order to verify statistically significant differences in the importance of innovation objectives for each cluster of firms and to establish their hierarchy.

A factor analysis of innovation objectives using the Varimax rotation (KMO=0.887; $x^2(153) = 5{,}444.09$; $p < 0.001$) allowed us to determine four underlying factors that explained 59.556% of the accumulative explained Variance (Table 12.4).

The first factor, called *process and CSR innovation objectives*, consisted of the following items: improvement of workplace safety and hygiene, reduction of material and energy consumption, reduction of environmental impacts or improvement of health and safety, reduced unit labor costs, improved flexibility of production or service provision, and increased capacity of production or service provision (accumulative explained Variance = 21.386%, Crombach's $\alpha = 0.895$).

The second factor, *organizational innovation objectives*, comprised the following items: improved quality of goods and services, improved flexibility of production/service provision, reduced time of response to customer needs, reduced costs per production unit, and improved communication and interaction among different business activities (accumulative explained Variance =15.782%, Crombach's α =0.791).

The third factor, *product objectives* (connected with product, but also with process innovation), consisted of the following items: an increased range of products, entry into new markets, and improved quality of goods and services (accumulative explained Variance =11.601%, Crombach's α =0.636).

The fourth factor, *marketing innovation objectives*, included the following items: introduction of products to a new segment of customers, entry into new markets,

and increasing or maintaining the market share (accumulative explained variance =11.601%, Crombach's α =0.636). See Tables 12.4 and 12.5 for details.

After the rotation, a hierarchy of factors was established in terms of importance for enterprises with different market orientations. Statistically important differences in terms of innovation objectives for each firm category (subsample) were marked with the letters a, b and c.

Firms that focused on both the domestic and foreign markets ranked (the achievement of) organizational innovation objectives as the most important (with a mean of 3.16 on a scale of 1 to 4), followed by marketing innovation objectives (3.15), product innovation objectives (2.33), and process- and CSR-related innovation objectives (1.83). A similar hierarchy of innovation objectives in terms of importance appeared in firms that chiefly focused on foreign markets. However, in this case, the importance of individual categories of innovation objectives was assessed as significantly lower (3.06, 2.90, 2.09, and 1.63 respectively). In the subsample of firms that exclusively focused on the domestic market, the hierarchy of innovation objectives was similar to that in the abovementioned subsamples, with even lower assessments of each category of innovation objectives (2.92, 2.69, 1.68, and 1.52 respectively). See Table 12.6 for details.

As industries become increasingly advanced technologically, the innovative potential of firms is growing. They also increasingly use technological innovations in their competitive strategies. We consequently decided to analyze the importance of innovation objectives depending on the technological advancement of firms. In the case of organizational innovation objectives, there were no statistically significant differences in how these objectives are viewed by firms in subsamples with different levels of technological advancement (means ranged from 3.03 to 3.15 on a scale of 1 to 4) (see Table 12.7). Statistically insignificant differences were observed in the perception of marketing innovation objectives in terms of importance (means ranging from 2.91 to 3.09 and tending to increase with the growing technology level of firms). Greater differences were observed in the perception of product innovation objectives in terms of importance. The lowest figure was noted for low-tech firms (a mean of 2.06), while the figures for medium-tech and high-tech firms were 2.25 and 2.36 respectively. Process- and CSR-related innovation objectives were assessed as the least important (means ranging from 1.60 to 1.78, with statistically insignificant differences between the ratings) regardless of the firms' technology level. This means that overall the differences in the firms' technology advancement were not linked to the importance of various types of innovation objectives, except for product innovation.

The type of main target market appeared to be a factor that differentiates the importance of particular innovation objectives in firms in various technology-level subsamples (see Table 12.8). The importance of organisational innovation objectives

was ranked higher in firms that focus on domestic market in medium-tech (mean=3.36) and high-tech industries (mean =3.23). In firms targeting mainly foreign markets and in firms simultaneously operating on both domestic and foreign markets, the importance of organisational innovations was indicated as relatively higher in medium-tech (means = 3.23; 3.33 respectively) and in low-tech industries (means= 3.30 and 3.21, respectively), than in high tech-industries. This may suggest the greater importance of organizational innovations viewed as a competitive weapon in foreign markets in traditional industries in which technological innovations are less significant business success factors.

Marketing innovation objectives were listed as the most important by high-tech firms that focused on foreign markets (3.33) and by those that focused mainly on the domestic market (3.22). On the other hand, firms that operated on both the domestic and foreign markets tended to perceive marketing innovation objectives in low-tech industries (3.28) and medium-tech industries (3.23) as more important than in high-tech industries (3.10).

Product innovation objectives were seen as the most important in high-tech industries by firms oriented toward the domestic market (2.83), followed by those that chiefly focused on foreign markets (2.56) as well as those that operated on both domestic and foreign markets (2.53). These objectives were also highly ranked in medium-tech firms that focused on foreign markets (2.56) and by those that targeted both the domestic and foreign markets (2.57).

Process- and CSR-related innovation objectives were ranked as the most important by high-tech firms focusing on the domestic market (2.13) as well as by high-tech firms (2.16) and medium-tech firms (2.04) that focused on foreign markets. Among firms that targeted both types of markets, these objectives were viewed as more important in low-tech industries (2.03) and medium-tech industries (2.10) than in high-tech industries (1.87).

The above data may suggest that among firms focusing on the domestic market as well as those focusing on foreign markets, there is a positive relationship between firms' (industries') technological advancement and the growing importance of marketing innovation, product innovation and (less so) process- and CSR-related innovation.

Another finding is that a firm's ownership/capital structure (i.e. being a member of a business group) does not influence the perception of innovation objectives in terms of importance. There are no statistically significant differences in the importance of innovation objectives between independent firms and those that are part of either domestic or foreign-owned capital groups (see Table 12.9). An analysis of the importance of innovation objectives among firms grouped by ownership revealed no significant differences in the perception of innovation objectives. For reasons of space this data is not presented here in detail.

Summary and concluding remarks

Our international comparisons show that Polish firms lag behind their counterparts in other European countries, including their peers in the CEE region, in terms of innovation objectives.

A statistical analysis of anonymized 2008–2010 CIS data for Polish enterprises enabled us to identify three categories of enterprises with a different level of export involvement. We found statistically important differences in the perception of innovation objectives classified with the use of factor analysis employing the Varimax rotation.

Firms that simultaneously target the domestic and foreign markets tend to rank the importance of all types of innovation objectives higher than firms focusing on either the domestic or foreign markets. This may result from different market conditions leading to a diversification of the innovation mix and efforts to integrate various innovation activities in order to adapt to different business environments.

Differences in the technological advancement of firms (and industries) do not significantly influence the importance of particular types of innovation objectives, except for product innovation. The importance of product innovation objectives increases with the technological advancement of firms. Moreover, the importance of marketing, product, and process- and CSR-related innovations tended to increase with the technological advancement of industry among firms focusing on the domestic market and those that chiefly targeted foreign markets.

The higher importance of organizational and marketing innovations compared with technological innovation, irrespective of the main target market, shows that non-technological innovations are perceived as significant drivers of firms' competitiveness. Due to the lower capital intensity of non-technological innovations, this attitude can be viewed as a symptom of rationality in the behavior of firms in the context of their resource limitations, which discourage them from costly technological innovations. Notably, this approach is especially widespread in "traditional" low- and medium-tech industries, which dominate in the Polish economy and in which R&D and product innovation are a less effective source of competitive advantage than in high-tech industries. Research studies (e.g. Santamaria *et al.* 2009; Wintjes *et al.* 2014) point to the usefulness of enhancing and diversifying a firm's innovation mix, especially when accompanied by more widespread introduction of non-technological innovations and combined with technological innovations with a view to exploiting synergy and substitution effects in innovation processes. In this context, changes in innovation policy are advisable, oriented toward supporting more diversified innovation activities by firms.

Table 12.1. Percentage of firms in EU member states* and selected other European countries that introduced at least one type of product or process innovation in 2008–2010

Country	Product innovation objectives				Process innovation objectives					
	Increase range of goods and services	Improve quality of goods and services	Enter new markets	Replace old products or processes	Improve flexibility of production or service provision	Increase capacity of production or service provision	Reduce unit labor costs	Improve occupational safety	Reduce environmental impacts or improve health and safety	Reduce consumption of materials and energy
Austria	50	58	49	41	33	29	19	21	20	21
Belgium	50	47	41	39	28	27	20	15	16	15
Bulgaria	41	46	40	30	29 (+4) **	27	26 (+4)	29 (+4)	21	21
Croatia	48	59 (+9)	41	38	40 (+15)	31	30 (+8)	25	26 (+4)	24 (+3)
Cyprus	69	84	64	76	75	72	47	50	37	36
Czech Republic	49	45	33	32	28 (+3)	24	25 (+3)	16	15	19
Estonia	40	46	36	38	28 (+3)	33 (+1)	25 (+3)	17	13	19
France	59	48	61	36	24	27	24	21	21	18
Spain	35	43	36	28	34	36	25	21	19	18
Ireland	48	53	55	30	34	30	40	30	23	35
Lithuania	43	55 (+5)	41	44 (+5)	38 (+13)	38 (+6)	32 (+10)	31 (+6)	26 (+4)	27
Luxembourg	75	70	53	33	38	34	25	25	24	17
Latvia	50 (+1)	58 (+8)	54 (+11)	44 (+5)	30 (+5)	32	32 (+10)	28 (+3)	27 (+5)	31 (+10)
Malta	41	45	34	20	28	22	24	24	18	20
Norway	60	73	70	48	36	37	49	49	38	34
Poland	**49**	**50**	**43**	**39**	**25**	**32**	**22**	**25**	**22**	**21**
Portugal	40	51	42	30	32	34	35	34	26	27
Romania	58 (+9)	67 (+17)	47 (+4)	41 (+2)	38 (+13)	41 (+9)	28 (+6)	38 (+13)	30 (+8)	30 (+9)
Serbia	35	40	23	27	26	27	21	22	20	17

Slovakia	55 (+6)	60 (+10)	42	41 (+2)	46 (+21)	31	24 (+2)	32 (+7)	24 (+2)	29 (+8)
Slovenia	73 (+24)	66 (+16)	55 (+12)	46 (+7)	38 (+13)	35 (+3)	44 (+22)	34 (+9)	33 (+11)	37 (+16)
Sweden	40	39	34	29	21	21	21	17	18	18
Turkey	63	74	64	39	42	59	52	46	38	49
Hungary	61 (+12)	68 (+18)	66 (+23)	48 (+9)	46 (+21)	36 (+4)	25 (+3)	33 (+8)	35 (+13)	35 (+14)
Italy	43	51	33	26	25	24	15	27	17	14
Average	**51**	**56**	**46**	**38**	**34**	**34**	**29**	**28**	**24**	**25**

* Except Denmark, Finland, Greece, the Netherlands, Germany and Britain.
** The figures in brackets show the difference (in percentage points) between a specific country and Poland.

Source: Own elaboration based on Eurostat data for CIS 2008–2010 for all European enterprises (NACE B, C, D, E, G46, H, J58, J61, J62, J63, K i M71); http://epp.eurostat.ec.europa.eu/portal/page/portal/science_technology_innovation/data/database.

Table 12.2. Percentage of firms in EU member states* and selected other European countries that introduced at least one type of organizational or marketing innovation in 2008–2010

Country	Organizational innovation objectives					Marketing innovation objectives		
	Reduce time to respond to customer needs	Improve flexibility of production or service provision	Improve quality of goods and services	Reduce costs per production unit	Improve communication and interaction among business activities	Introduce products for new segment of customers	Enter new markets	Increase or maintain market share
Austria	59	35	63	39	53	59	24	65
Belgium	60	29	61	32	40	46	24	71
Bulgaria	42	34 (+7) **	63 (+16)	46 (+15)	40 (+4)	39 (+6)	28 (+8)	62 (+13)
Croatia	47	31 (+4)	58 (+11)	39 (+8)	39 (+3)	49 (+6)	27 (+7)	56 (+7)
Cyprus	82	72	85	53	64	77	36	94
Czech Republic	31	29 (+2)	47	30	26	31	11	44
Estonia	61 (+14)	37 (+10)	47	46 (+15)	40 (+4)	30	41 (+21)	74 (+25)
France	49	28	56	34	35	31	27	67

Country	Organizational innovation objective[s]					Marketing innovation objective[s]		
	Reduce time to respond to customer needs	Improve flexibility of production or service provision	Improve quality of goods and services	Reduce costs per production unit	Improve communication and interaction among business activities	Introduce products for new segment of customers	Enter new markets	Increase or maintain market share
Spain	56	31	55	36	37	41	31	50
Ireland	61	40	63	54	42	59	40	75
Lithuania	47	35 (+8)	57 (+10)	44 (+13)	24	32	25 (+5)	56 (+7)
Luxembourg	59	36	69	38	50	41	36	78
Latvia	61 (+14)	39 (+12)	64 (+17)	58 (+27)	49 (+13	42 (+9)	34 (+14)	51 (+2)
Malta	64	37	65	39	38	44	20	65
Norway	47	41	68	49	45	53	31	86
Poland	**47**	**27**	**47**	**31**	**36**	**33**	**20**	**49**
Portugal	63	43	60	51	45	44	34	58
Romania	56 (+9)	38 (+11)	66 (+19)	43 (+12)	49 (+13)	37 (+4)	26 (+6)	53 (+4)
Serbia	37	20	39	17	30	25	15	31
Slovakia	51 (+4)	29 (+2)	58 (+11)	46 (+15)	29	48 (+15)	16	73 (+24)
Slovenia	72 (+25)	47 (+20)	75 (+28)	64 (+33)	56 (+20)	80 (+47)	45 (+25)	92 (+43)
Sweden	23	29	41	29	31	38	27	69
Turkey	43	36	51	25	27	64	69	78
Hungary	83 (+36)	48 (+21)	78 (+31)	70 (+39)	63 (+27)	84 (+51)	42 (+22)	92 (+43)
Italy	53	39	50	29	30	25	23	59
Average	**54**	**36**	**59**	**42**	**41**	**46**	**30**	**66**

* Except Denmark, Finland, Greece, the Netherlands, Germany and Britain.
** The figures in brackets show the difference (in percentage points) between a specific country and Poland.

Source: Own elaboration based on Eurostat data for CIS 2008–2010 for all European enterprises (NACE B, C, D, E, G46, H, J58, J61, J62, J63, K i M71); http://epp.eurostat.ec.europa.eu/portal/page/portal/science_technology_innovation/data/database.

Table 12.3. Sample characteristics

Sample characteristics		Enterprise category						Whole sample of large and medium-sized enterprises (N=3,588)	
		Enterprises oriented toward local (domestic) market (n=796)		Enterprises oriented toward local and international markets (n=1,525)		Enterprises oriented toward international markets (n=1,267)			
		N	%	N	%	N	%	N	%
Introduction of product innovation		303	38.1c	1,052	69.0a	700	55.2b	2,055	57.3
Introduction of process innovation		442	55.5b	992	65.0a	735	58.0b	2,169	60.5
Introduction organizational innovation		341	42.8c	616	48.6b	850	55.7a	1,807	50.4
Introduction of marketing innovation		268	33.7b	748	49a	493	38.9b	1,509	42.1
Firm size	Medium	636	79.9a	929	60.9b	960	75.8a	2,525	70.4
	Large	160	20.1b	596	39.1a	307	24.2b	1,063	29.6
Technology level	Not classified industries	315	39.6a	17	1.1b	35	2.8b	367	10.2
	Low technology	229	28.8b	454	29.8b	487	38.4a	1,170	32.6
	Medium technology	233	29.3c	984	64.5a	698	55.1b	1,915	53.4
	High technology	19	2.4a	70	4.6a	47	3.7a	136	3.8
Capital group	Polish group	145	18.2a	290	19a	131	10.3b	566	15.8
	Foreign group	65	8.2b	394	25.8a	298	23.5a	757	21.1
	Independent firm	586	73.6a	841	55.1c	838	66.1b	2,265	63.1

Each letter (a, b, c) denotes a subset of categories whose column proportions (Bonferroni method) differ significantly from each other at the .05 level.

Source: Own calculation in SPSS 21 based on anonymized data for large and medium-sized enterprises from the PNT-02 questionnaire for 2008–2010.

Table 12.4. Total Variance Explained

Factor	Extraction sums of squared loadings			Rotation sums of squared loadings		
	Eigenvalue	Explained Variance (%)	Accumulative explained Variance (%)	Eigen value	Explained Variance (%)	Accumulative explained Variance (%)
Process and CSR innovation objectives	6.353	35.293	35.293	3.849	21.386	21.386
Organizational innovation objectives	1.766	9.811	45.104	2.841	15.782	37.168
Product objectives	1.457	8.093	53.197	2.088	11.601	48.769
Marketing innovation objectives	1.145	6.359	59.556	1.942	10.786	59.556

Source: Own calculation in SPSS 21 based on anonymized data for large and medium-sized enterprises from the PNT-02 questionnaire for 2008–2010.

Table 12.5. Rotated Component Matrix[a]

Innovation objectives	Factor			
	Process and CSR innovation objectives	Organizational innovation objectives	Product objectives	Marketing innovation objectives
Improve occupational safety	0.808			
Reduce consumption of materials and energy	0.771			
Reduce environmental impacts or improve health and safety	0.757			
Reduce unit labor costs	0.750			
Improve flexibility of production or service provision	0.626			
Increase capacity of production or service provision	0.624			
Improve quality of goods and services (as organizational innovation outcome)		0.731		
Improve flexibility of production or service provision (as organizational innovation outcome)		0.722		
Reduce time to respond to customer needs (as organizational innovation outcome)		0.714		
Reduce costs per production unit (as organizational innovation outcome)		0.688		

Innovation objectives	Factor			
	Process and CSR innovation objectives	Organizational innovation objectives	Product objectives	Marketing innovation objectives
Improve communication and interaction among business activities (as organizational innovation outcome)		0.656		
Increase range of goods and services			0.792	
Enter new markets			0.713	
Improve quality of goods and services			0.554	
Introduce products for new segment of customers (as marketing innovation outcome)				0.785
Enter new markets (as marketing innovation outcome)				0.780
Increase or maintain market share (as marketing innovation outcome)				0.711

Extraction Method: Principal Component Analysis. [a] Rotation converged in 5 iterations.

Source: Own calculation in SPSS 21 based on anonymized data for large and medium-sized enterprises from the PNT-02 questionnaire for 2008–2010.

Table 12.6. Hierarchy of firms' innovation objectives in terms of their importance by sales market

Type of innovation/main sales market		Average	Standard deviation	n
Organizational innovation objectives	Orientation on local market	2.92c	0.73	341
	Orientation on international market	3.06b	0.71	616
	Orientation on both local and international markets	3.16a	0.68	850
Marketing innovation objectives	Orientation on local market	2.69c	0.84	268
	Orientation on international market	2.90b	0.81	493
	Orientation on both local and international markets	3.15a	0.72	748
Product objectives	Orientation on local market	1.68c	0.98	605
	Orientation on international market	2.09b	0.90	988
	Orientation on both local and international markets	2.33a	0.77	1,307
Process and CSR innovation objectives	Orientation on local market	1.52b	0.92	605
	Orientation on international market	1.63b	0.91	988
	Orientation on both local and international markets	1.83a	0.87	1,307

Each letter (a, b, c) denotes a subset of categories whose column proportions (Bonferroni method) differ significantly from each other at the .05 level.

Source: Own calculation in SPSS 21 based on anonymized data for large and medium-sized enterprises from the PNT-02 questionnaire for 2008–2010.

Table 12.7. Hierarchy of firms' innovation objectives in terms of their importance by technology level

Type of innovation/technology level of enterprises		Average	Standard deviation	N
Organizational innovation objectives	Low technology	3.05a	0.74	511
	Medium technology	3.13a	0.67	1,021
	High technology	3.03a	0.77	83
Marketing innovation objectives	Low technology	2.93a	0.83	562
	Medium technology	3.06a	0.75	769
	High technology	3.09a	0.66	72
Product objectives	Low technology	2.06b	0.95	869
	Medium technology	2.25a	0.80	1,622
	High technology	2.36a	0.75	124
Process and CSR innovation objectives	Low technology	1.60a	0.95	869
	Medium technology	1.78a	0.87	1,622
	High technology	1.61a	0.94	124

Comment and source as in Table 12.6.

Table 12.8. Hierarchy of firms' innovation objectives in terms of their importance by both sales market and technology level

Type of innovation /main sales market/technology level			Average	Standard deviation	n
Organizational innovation objectives	Orientation on local market	Low technology	3.02c	0.15	74
		Medium technology	3.36a	0.11	100
		High technology	3.23b	0.26	8
	Orientation on international market	Low technology	3.30a	0.07	207
		Medium technology	3.23b	0.06	348
		High technology	3.09c	0.16	36
	Orientation on both local and international markets	Low technology	3.21b	0.06	230
		Medium technology	3.33a	0.04	573
		High technology	3.06c	0.12	39
Marketing innovation objectives	Orientation on local market	Low technology	2.87c	0.17	103
		Medium technology	3.01b	0.13	73
		High technology	3.22a	0.30	9
	Orientation on international market	Low technology	2.96b	0.09	217
		Medium technology	3.01b	0.07	239
		High technology	3.33a	0.18	22
	Orientation on both local and international markets	Low technology	3.28a	0.06	242
		Medium technology	3.23a	0.04	457
		High technology	3.10b	0.14	41

Product objectives	Orientation on local market	Low technology	2.44b	0.15	158
		Medium technology	2.26c	0.12	187
		High technology	2.83a	0.26	18
	Orientation on international market	Low technology	2.37b	0.07	346
		Medium technology	2.56a	0.06	575
		High technology	2.56a	0.16	41
	Orientation on both local and international markets	Low technology	2.53a	0.06	365
		Medium technology	2.57a	0.04	860
		High technology	2.53a	0.12	65
Process and CSR innovation objectives	Orientation on local market	Low technology	1.90b	0.18	158
		Medium technology	1.85b	0.14	187
		High technology	2.13a	0.31	18
	Orientation on international market	Low technology	1.92b	0.09	346
		Medium technology	2.04a	0.07	575
		High technology	2.16a	0.19	41
	Orientation on both local and international markets	Low technology	2.03a	0.07	365
		Medium technology	2.10a	0.04	860
		High technology	1.87b	0.15	65

* Each letter (a, b, c) denotes a subset of categories whose column proportions (Bonferroni method) differ significantly from each other at the .05 level.
Note: The numbers of enterprises in individual groups listed in Tables 12.6, 12.7 and 12.8 are different from those in Table 12.3 because we only take into account enterprises that answered all questions about innovation objectives.

Source: Own calculation in SPSS 21 based on anonymized data for large and medium-sized enterprises from the PNT-02 questionnaire for 2008–2010.

Table 12.9. Hierarchy of firms' innovation objectives depending on ownership

Hierarchy of innovation objectives		Average	Standard deviation	n
Organizational innovation objectives	Polish capital group	3.04a	0.68	327
	International capital group	3.13a	0.65	498
	Independent enterprise	3.06a	0.73	982
Marketing innovation objectives	Polish capital group	3.06a	0.71	280
	International capital group	3.06a	0.71	275
	Independent enterprise	2.95a	0.83	954
Product objectives	Polish capital group	2.17a	0.89	486
	International capital group	2.15a	0.83	631
	Independent enterprise	2.08a	0.92	1,783
Process and CSR innovation objectives	Polish capital group	1.73a	0.84	486
	International capital group	1.76a	0.92	631
	Independent enterprise	1.67a	0.92	1,783

* Each letter (a, b, c) denotes a subset of categories whose column proportions (Bonferroni method) differ significantly from each other at the.05 level.

Source: Own calculation in SPSS 21 based on anonymized data for large and medium-sized enterprises from the PNT-02 questionnaire for 2008–2010.

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Chapter 13

Public Sector Innovation in Poland

Marta Mackiewicz

The key economic role of the public sector makes innovation in this sector increasingly important. Government organizations are frequently forced to improve their operational performance, especially during economic slowdowns when public resources become scarce. At the same time, technological and regulatory changes in the public sector improve processes concerning the delivery of public services and the launch of new services. These efforts should be considered examples of innovative activity incorporating what the private sector calls product innovation[1] and process innovation. However, as the size of the operational footprint exerted by governments is much bigger than that of private companies, the array of public sector innovation is wider and includes changes in goal-oriented public policies. The public sector innovation category also includes conceptual innovation (development of new views and changing assumptions), policy innovation (change of mindset, intentions, and behaviors), and systemic innovation (development of new ways of interacting with other organizations). This section discusses some examples of innovation activity within the Polish government administration. It also reports on findings from a literature review and face-to-face interviews conducted with representatives from central government bodies.

Definitions of public sector innovation

Research on public sector innovation dates back to the 1970s (Roessner, 1977). Although the concept of public sector innovation is not new, subject reference works are quite scarce (OECD, 2012). This is primarily due to the incompleteness of information on in-house processes within the public sector and barriers to measuring public

[1] A product innovation is the introduction of a new product or service, or a significant qualitative change in the characteristics or purpose of an existing product or service. In simple terms, the term "service innovation" is sometimes used for services; however, according to the OECD Oslo Manual for the measurement of innovation (which is the most popular set of guidelines for the collection and interpretation of data on innovation), any service innovation is a product innovation.

sector innovation.[2] Serious measurement attempts were not taken until recently, and they have encountered a number of problems (European Commission, 2013; OECD, 2010). All earlier studies on the public sector primarily revolve around public organization management and the characteristics of public organizations versus private companies (Perry, Rainey, 1988). The 1980s and 1990s brought the *new public management* approach with a strong focus on performance and achievement of goals. In the early 1990s, this approach was conceptualized by Hood (1991) and others. The next step was the introduction of *networked governance*, which articulates the role of networks and the limited capacities of individual actors, especially in far-reaching policies that require the cooperation of many organizations.[3]

Public sector and its economic role

No analysis of public sector innovation is viable without defining public sector constituents. In Poland, a primary document to define the public sector is the Act on Public Finances, which identifies the following three sub-sectors: a) the central government, which includes but is not limited to public government bodies, state control and law enforcement agencies, government administration bodies, and other units; b) local government, which includes territorial government units along with their bodies, unions, and organizational units; and c) social insurance. The local government sub-sector, though undoubtedly innovative, is not covered here. This study is limited to the central government, encompassing ministries and central administration offices, largely because of the availability of literature and international research on the subject, which enables comparisons with other countries.

Public sector innovation vs. private sector innovation

The OECD defines public sector innovation as the implementation of new or significantly improved processes/operations or products by a public sector organization

[2] No extensive studies have been conducted on public sector innovation because research attention has focused on the private sector and researchers tend to assume that innovation in the public sector does not differ significantly from what happens in the private sector.

[3] In addition to "networked governance," this new model is often referred to as New Public Governance. The literature also furnishes many other terms for networked governance, such as collaborative governance (Ansell, Gash, 2008; *Public Administration Review*, Special Issue 2006 60(1)), digital-era governance (Dunleavy *et al.*, 2006), new governance (Bevir, 2006), and the "whole-of-government" approach (Christensen, Laegreid, 2007).

(OECD, 2012d). As this definition has been developed based on the most readily used definition of innovation provided in the Oslo Manual, it comes close to the definition of private sector innovation. However, despite apparent similarities, public sector innovation can be proved to extend beyond the mere improvement of services delivered to citizens or the streamlining of processes that ensure more efficient performance of the administration. Public sector innovation can be understood to mean setting new goals for public policies or new delivery methods for public policy goals. Such goals may require that assumptions underpinning existing goals be challenged and that interactions be established with other organizations, accompanied by the use of outside knowledge bases (Windrum, 2008).

Mulgan defines public sector innovation as "the creation and implementation of new processes, products, services and methods of delivery which result in significant improvements in outcomes efficiency, effectiveness or quality" (Mulgan, Albury, 2003).

Public sector innovation may be seen as a process of developing and implementing new ideas to create new value for the public through the introduction of new or improved processes, or delivery of new or improved services. Basically, any innovation activity within an organization is considered to be internal innovation and any public-focused innovation activity is classified as external innovation.[4]

Innovation can take various forms, ranging from smart public procurement, which drives innovation in enterprises or other market players by mobilizing new forms of innovation financing, to delivering e-services through digital platforms (Rivera León, Roman, Simmonds, 2012).

Moreover, unlike private sector innovation, public sector innovation is primarily focused on creating new value for citizens. The definition by Bason (2010) directly associates public sector innovation with the process of creating value for the public. According to Bason, innovation is built through the following four simultaneous shifts:

- a shift from random innovation to a conscious and systematic approach to public sector renewal;
- a shift from managing human resources to building innovation capacity at all levels of government;
- a shift from running projects to orchestrating processes of co-creation, creating new solutions with people, not for them;
- a shift from administrating public organizations to courageously leading innovation across and beyond the public sector (Bason, 2010).

[4] Internal innovation streamlines the execution of public tasks or reduces cost of such tasks, thereby improving the operational performance of an organization.

We can therefore conclude that there is innovation that is unique to the public sector. Such public sector-specific innovation is targeted at creating public goods and improving the situation for society or certain social groups. Therefore, unlike in Schumpeter's definition of innovation, it is not *first mover profit* that drives public sector innovation. As far as the private sector is concerned, an innovation goal is clearly defined (pursuit of profit), although an *a priori* assessment of whether an intended innovation actually contributes to profit is sometimes infeasible. By contrast, for the public sector, goals are not always clearly defined, and the multiplicity of stakeholders additionally upsets the goal-setting process. Such a goal-setting barrier is far less valid for companies as they are customer-oriented.

Sometimes, however, a non-standard approach is needed to meet a goal, and such an approach can also be considered innovative.

Conceptual innovation with Mexico and Brazil as case examples

To reduce the risk of epidemic diseases, a critical portion of the population needs to be immunized, which requires the population to be persuaded to vaccinate. However, it is not in every country that all people vaccinate although they are offered free vaccination programs. With a certain fraction of the population left unvaccinated, the risk for outbreaks continues to be high. To meet the goal of risk reduction, Mexico, Brazil and other developing countries have introduced conditional cash transfers to motivate parents to vaccinate their children. What is considered to be innovation is the change of mindset, whereby not only free vaccination, but also additional rewards to those who would use free immunization services, is provided and considered beneficial from the social well-being perspective (although people should normally be required to pay for immunization services as benefits conferred by vaccines are personal).

Source: Fiszbein A., Schady N., (2009), *Conditional Cash Transfers*, The World Bank.

Although public sector innovation is not profit-driven, some elements of Schumpeter's innovation concept are intrinsic to the public sector, especially where the private sector is unlikely to act because of high costs or risks. In the case of private sector incapacity, it is public procurement that can potentially lead to new technological solutions or other invention types, such as medical inventions, thereby benefiting society and creating a market for new products. Furthermore, public procurement is also a way to attain public policy goals, best exemplified by green public procurement with its specific green criteria that seek to deliver environmental objectives (such as reduced environmental impact or enhanced environmental protection).

Public sector innovation differs from private sector innovation in that the former usually entails a larger scale and broader impact. Public sector innovation is implemented rapidly, unlike in the private sector where changes tend to be more gradual and, obviously, more scalable. Moreover, public sector innovation often entails challenges of pilot-testing the effectiveness of developed solutions, especially when innovation involves legislative changes. This specific feature of public-sector innovation

leads to a number of adverse consequences, mainly including substantial spending (from the public purse, thus subject to social control). The considerable cost the change entails is not always acceptable to the public. Thus, conflicts of interest occur and concerns arise over how the public or authorities overseeing public finances (such as the Supreme Audit Office) will respond to spending.

A large portion of public sector innovation is implemented using EU funding. However, such financial assistance carries a negative aspect in that it restricts funding to similar projects (e.g. projects aimed at streamlining or reshaping processes for improvement).[5] Meanwhile, changes in the private sector can be made at any time, so needs are addressed much faster.

Unlike the profit-oriented private sector, the public sector is expected to be more likely to share information and disseminate good practices. Comparisons with other similar organizations and the information flow across organizations are considered drivers of the sharing process. Many solutions are absorbed across organizations in a process that is encouraged by both formal and non-formal relationships as well as training programs. What follows is a certain "readiness and ability to create, absorb, and implement solutions that are capable of streamlining efforts" (Zerka, 2011).

The table below summarizes the features of public sector innovation that are not seen in private sector innovation.

Table 13.1. Features of public sector innovation

Innovation-restricting	Innovation-supporting
Scale of changes and innovation impact	Extensive consultation on proposed changes
Multiplicity of stakeholders	Likelihood to share good practices
Risk-averse culture created by accountability control	
Legal regulations and procedures that impose constraints on innovative solutions	
Unclear goals	

Source: Own work.

[5] Funding for projects that have already received EU financial assistance entails the risk of EU contribution recovery. Projects are subject to a sustainability criterion, which requires project results to be sustained for five years. Where the results of projects implemented with EU financial assistance are unsatisfactory, project upgrading is hardly possible. In such cases, projects are usually abandoned.

Public sector innovation: classification effort

These differences between public and private sector innovation constitute a starting point for a definition and classification effort with regard to public sector innovation.

Given the above definitions, public sector innovation may be understood to mean value-creating changes that help implement governmental tasks in a more effective and efficient way.

As mentioned earlier, innovation is classifiable into internal and external types. Innovation can also be bottom-up, where it stems from the needs or ideas of government employees, or top-down, where it evolves from legal regulations or European policies. The table below shows examples of bottom-up and top-down innovation.

Table 13.2. Sources of innovation

	Internal	External
Bottom-up	Creative workers Organizational culture that supports idea sharing	Cooperation with other organizations; study visits; sharing good practice
Top-down	Leadership vision Organizational strategy	Budget cuts, new legal regulations

Source: Own work.

This basic classification into bottom-up and top-down innovations by no means exhausts all the possible classifications of public sector innovation. However, it can also be used for the private sector.

There are two distinct trends in the literature. The first involves a claim that factors influencing the innovation activity of private companies and methods for innovation implementation are also applicable to public organizations. The second trend articulates differences between private and public entities as far as their innovative behavior is concerned (Arundel, Hollanders, 2011).

Our research allows us to suggest the following classification of innovations for the public sector in Poland (Table 13.3)

Innovation is also classifiable according to the user perspective, in particular the perspective of citizens or clients of administration offices and governmental organizations. From the citizen perspective, we can identify several primary innovation types (Table 13.4).

In the public sector, service innovations prevail, while product innovations play a minor role. Marketing innovation in the private sector is equivalent to communication innovation in the public sector (Bugge, Mortensen, Bloch, 2011).

Table 13.3. Purpose-based typology of innovation

Purpose	Type	Example
Governance	Process management Management by objectives Competence-based management	Identification of key processes Governance control Improvement in staff performance; external coaches; workplace description; job grading
Process	Use of information and communication technologies	Electronic document flow Standardization (shared service centers, joint purchasing centers, ISO standards) E-services available to citizens
Regulations	Involvement of direct addressees of new regulations in regulation development processes Improvement in legislative process quality	Investigating the needs of addressees of regulations Creation of analytical units to assess regulatory impact
System	Building new systems Participatory methods Public consultation	New social insurance system Changes in educational system Consultation bodies (Councils) with the participation of nongovernmental organizations

Source: Own work.

Table 13.4. Innovation types: citizen perspective

Innovation type	Description	Example
Service	New services and new service delivery methods	One-stop-shop system for business registration
Product	New products	Medical equipment
Communication	New ways of communication with the public	Use of social media in the public administration

Source: Own work based on Hartley J. (2005) and Bugge M., Mortensen P., Bloch C. (2011).

Frequently, innovation that aims the improve performance efficiency is not readily noticeable for citizens (some outcomes are visible, but the entire process of producing outcomes is hidden). Therefore, from the government organization perspective, yet another classification is viable:

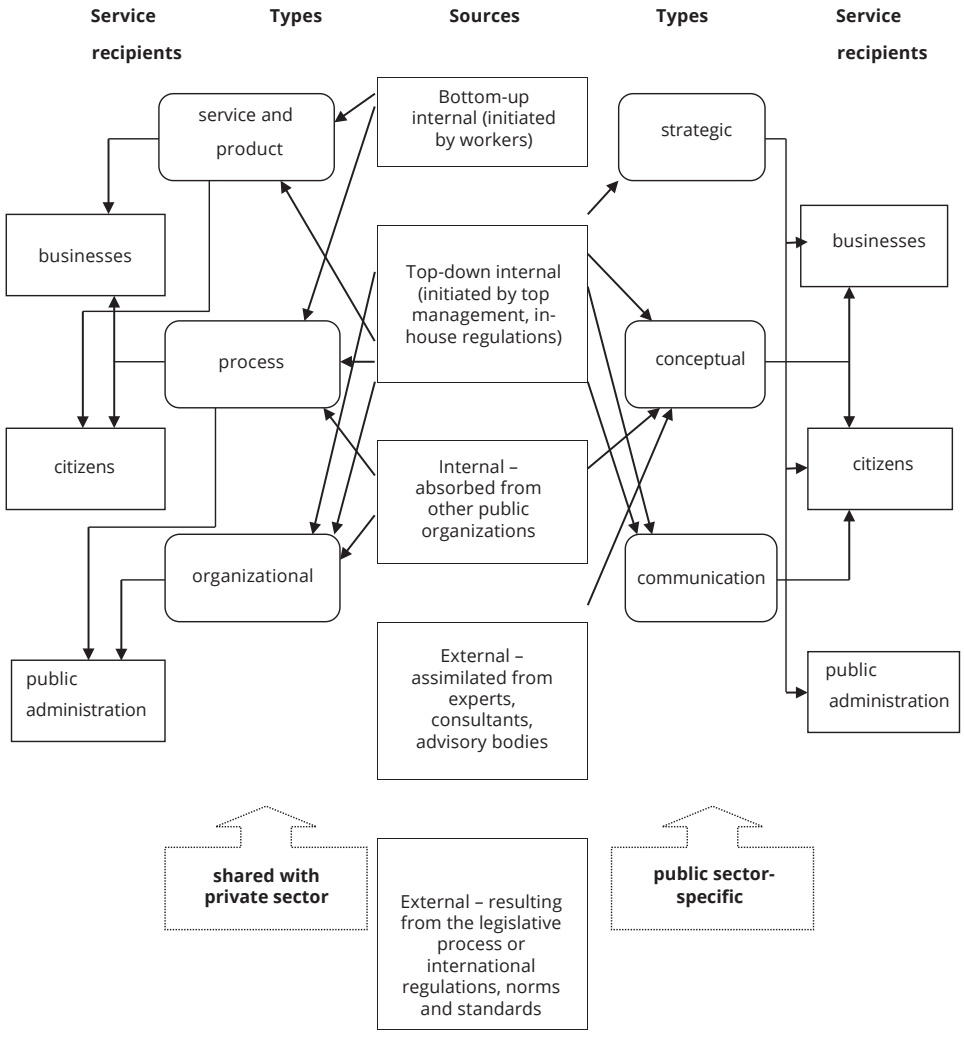
Table 13.5. Innovation types: government perspective

Innovation type	Description	Example
Process	New ways of organizing processes	Process mapping; split into front office and back office
Strategic	New goals	Adoption of customer service standards
Governance	New ways of involving external actors	Public consultation; bottom-up initiatives; investigation of public service recipients' needs

Innovation type	Description	Example
Conceptual	Development of new views and challenging existing assumptions	Concepts for instruments to impact the fertility rate and demographic processes
Organizational	New structures	Department changes that correspond with task modification; new organizational regulations that reflect processes within the organization

Source: Own work.

Figure 13.1. Classification of public sector innovation



Source: Own work.

Role of public sector innovation

Public sector innovation can play multiple roles, from satisfying public needs to meeting broader socioeconomic objectives that are not necessarily noticeable in the short term (e.g. the need to ensure conditions for sustainable growth). The purpose of public sector innovation is also to provide public services and public goods of increasingly higher quality in an increasingly efficient way. Efficiency is particularly important at a time of financial stress associated with an economic slowdown, when, on the one hand, available resources are insufficient to meet the needs and expectations of the public, and, on the other hand, new needs emerge because of reduced need-satisfaction capabilities of the private sector.

Process optimization

To address the need for enhanced efficiency, cost-reduction measures are used that draw on economies of scale. This has proven to work for all network organizations. Examples include the Shared Service Center, which is responsible for the execution of specific tasks in one location (such as the Ministry of Justice and the Social Insurance Institution). Through ICT systems and process-based organizations, competency centers can be created to provide certain types of services in any profitable location.

An electronic document flow or the creation of analytical units tasked with assessing the regulatory impact marks yet another similar innovation designed to improve efficiency. In Poland, the first step in creating such units is to make a diagnosis (how many people within the administration work in analysis, what their competences are, and where they are positioned in the decision-making process). Pilot projects are then carried out that focus on managing analyst groups in ministries and informed career development for analysts through training programs and collaboration across units within ministries. The interviewed respondents consider the creation of analytical units to be one of the most significant innovation activities in the public sector, as they largely improve the quality of the legislative process. Changes in the legislative process will be complemented by systematized public consultation and increased involvement of nongovernmental organizations (as set forth in the *Better Regulation Programme 2015* document).

At present, attention is also given to sharing political power with nongovernmental organizations, for example by appointing them to play a significant role in various advisory bodies that are actively involved in legislative processes.

Processes are also optimized through new management methods. However, our respondents emphasized that process management is difficult to put in place in most public organizations. The project management model is commonly used. Process management practices have been satisfactorily applied in Poland's Social Insurance Institution (ZUS), which adopted the management-by-objectives approach and then optimized its processes.

Process optimization, with the Social Insurance Institution as a case example

Changes in management practices were made gradually. A starting point was to identify and describe all the processes as they were and as they should be. The next step was to analyze available resources, both infrastructure resources, including ICT, and human resources, while taking into account employee competences. The diagnosis served as the basis for developing a long-term growth strategy. At the same time, a balanced scorecard6 was built and used to identify key processes and indicators for measuring progress towards goals. Front- and back-office activities were reorganized at the Social Insurance Institution and seven business lines were created. Each business line is now monitored for efficiency, quality, productivity and cost with the indicator matrix. As the processes were described and cost centers were identified, it was possible to examine workforce productivity, performance effectiveness, and efficiency (e.g. how long a client needed to wait for a decision to be issued). Department benchmarking formed the basis for standardization. Several years ago, unit costs and other performance indicators substantially differed from one department to another, so gradual rebalancing of indicator values was needed to enable standardization.

Shared Service Centers were established to provide specialist services to all departments. Now services can be transferred to locations that entail the lowest delivery costs and ensure streamlined delivery due to high specialization (there is no need for each department to provide the full range of services).

With the processes described and an ICT system in place, integrated management of tasks is now possible, with tasks directed to locations with the lowest workload. In addition, these two efforts made it possible to create one of Poland's first e-offices, which now provides uninterrupted access to a vast array of services via the Internet (e.g. transaction services, office appointments, and document transmission).

The optimization of the organizational structure and the implementation of organizational regulations into the process approach all took place at the same time, allowing workforce competencies and experiences to be combined, and ensuring cost saving.

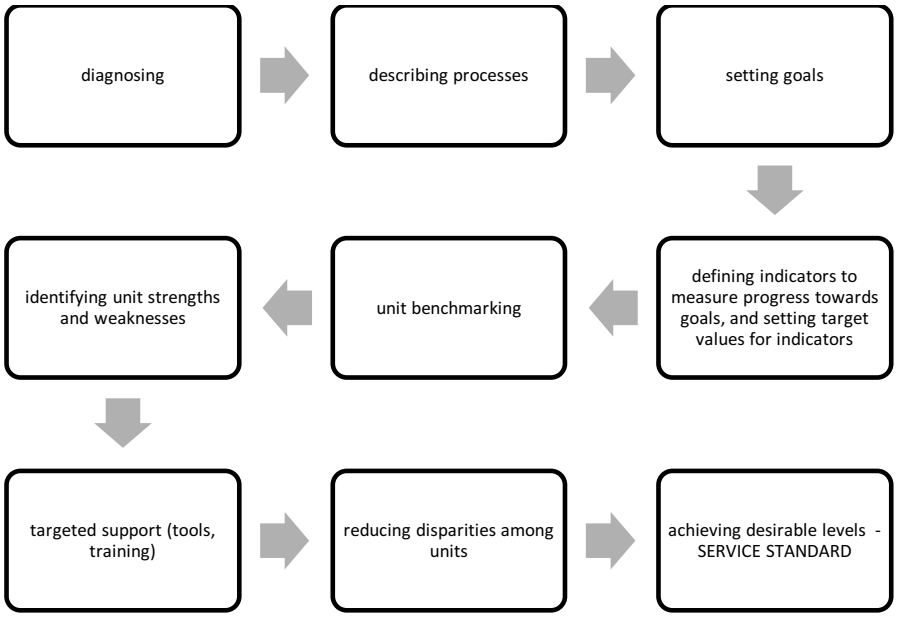
Recurring client satisfaction surveys are crucial to the change process. The surveys are used to set goals for each business line. The Social Insurance Institution remains customer-oriented (in line with its mission statement), with continuing efforts to raise employee awareness of the purposes of governance control models, service quality indicators and high organizational performance.

Source: Own work based on an interview and strategic and diagnostic documents available at www.zus.pl.

Standardization is not only sought for outsourced services, but is also the result of consolidation of in-house processes, in particular the purchasing process. Government organizations are building Customer Service Offices and standardizing a certain array of services. This effort stems from a change in the mindset (the client is no longer perceived as an administration-dependent suppliant but as a purchaser of a service) combined with the emergence of a client-centric view that provides for a more partnership-based relationship between clients and the administration.

6 It is a strategy management tool that can be used to link a long-term development strategy with a management system, using result measurement mechanisms.

Figure 13.2. Creation of service standards, with the Social Insurance Institution as a case example



Source: Own work.

Yet another trend is standardization of the workplace description and job-grading process. This effort is shared across the entire administration, although some organizations are making less progress and others are just fine-tuning standards already in place.

The widespread use of the customer satisfaction management model in administration offices, including offices that provide services to specific groups of recipients, marks a change in public administration over the past few years. The customer satisfaction management concept has been borrowed from the private sector, and it has been implemented with EU financial assistance.

New public services

At present, information technology is a primary enabler of new public services. However, not all new services are sufficiently refined, according to respondents. For example, the use of the Electronic Platform of Public Administration Services (ePUAP), which is designed to ease citizens' contacts with the administration, requires a prior visit to a specific office in person in order to authenticate a person's "trusted profile."

As a result, many people do not use any public e-services because they have not authenticated their "trusted profiles" in a procedure that clears them to use a range of services from the ePUAP platform.

Access to services available from the ePUAP

To become a user, one has to create a user account with the ePUAP (www.epuap.gov.pl) and then apply for a confirmation of their "trusted profile." The next step is to go to an office (the list of offices is available from the ePUAP system) to authenticate their profile (and this is the only time when an in-person visit is required). During the visit, the account user's personal data is confirmed by an official who compares the user's particulars with the data stored in the system. Once the data has been verified with the user's identity card, the ePUAP account is awarded "trusted profile" status.

Source: www.epuap.gov.pl, accessed Nov. 15, 2014.

Similar systems are successfully operated in other countries. Good practices could be borrowed from Estonia, which has allowed its citizens to use electronic identity, with government-issued EICs and digital signatures.

In periods involving heavy use of ePUAP (e.g. close to a deadline for filing annual tax returns or other documents), logging difficulties encourage the use of traditional forms of contact with the administration. According to the Ministry of Administration and Digitization, ePUAP has around 200,000 users.

The following are some new services enabled through computerization:

- Electronic Platform for Collection, Analysis and Sharing of Digital Medical Records – a system designed to enable healthcare providers to access full medical documentation (this functionality has been designed but has yet to be deployed);
- Business Activity Central Register and Information Record – a system designed to streamline the business registration process;
- E-service system of the Ministry of Justice – designed to provide electronic access to the National Court Register, the National Criminal Register, and the *Monitor Sądowy i Gospodarczy* Official Gazette Publishing Office;
- Digitization of Court Land and Mortgage Registers – a system designed to provide digital access to more than 100 land and mortgage registers in district courts nationwide;
- E-customs program – a tool to provide services to entrepreneurs in the collection of customs duty and in trade in goods;
- Public Statistical Information System – a tool designed to provide citizens, businesses, and social and government organizations with direct electronic access to statistical records; the system also enables all liable entities to fulfill their statistical duties by electronic means;
- Electronic submission of personal income tax returns.

All these new services and service delivery methods are essential not only for saving time and for the comfort of external recipients (citizens and businesses), but also to generate financial savings in the public sector. As a result, public funds can be allocated to other tasks. Even more important, the new services trigger thinking about the government's business architecture. They also entail an essential aspect whereby goals and goal attainment methods have to be agreed on, and all interlinked elements need to be implemented. This aspect is also important in the context of ICT systems, as it determines inter-operability and data exchange among systems.

Once deployed, ICT systems not only significantly improve efficiency levels, but also enable the delivery of new services. For example, ICT systems deployed for judiciary purposes have enabled the launch of the Court Decision Portal, the Information Portal, and the e-Minutes system. The Court Decision Portal provides citizens with access to judicial decisions. Those accessing a court website can get access to decisions issued by that particular court, which is especially helpful for professionals and legal representatives. The Information Portal provides information on the proceedings involved. It is intended for professional legal representatives as it informs them about the stage of a specific case and about where they can find administrative documents in pending proceedings. The e-Minutes tool is designed to ensure transparency of proceedings through tape recording. This is particularly important in civil proceedings.

Another interesting example of a new service mentioned by the respondents is a tool for public fundraising via the www.zbiorki.gov.pl website.

Also worthy of note is major progress in electronic services. The percentage of online public services in Poland increased from 20% in 2006 to 78.5% in 2010, reaching one of the highest levels in the European Union (European Commission, 2013a). While Poland did not score high in the European Public Sector Innovation Scoreboard in terms of ICT-enabled efficiency, e-government services are the most important area of innovation for the Polish administration (European Commission, 2013a). The European Trend Chart on Innovation shows that Polish respondents identified the existence of innovation in only one of eight areas, specifically in ICT/service digitization/e-government[7] (Rivera León, Simmonds, Roman, 2012).

[7] Respondents were asked to answer a multiple-choice question that listed eight areas of innovation: process innovation, service delivery, public procurement, organizational changes, ICT/service digitization/e-government, public-private partnership, human resource management, and monitoring and evaluation.

Changes in public policies

Among the significant changes that have taken place in recent years is the implementation of the principles of good governance, including the principle of participatory governance.

The Polish Ministry of the Economy has initiated many changes to fuel the innovation and knowledge creation process and to disseminate the resulting solutions and effects. Given that the public procurement system should make a positive impact on innovation in businesses, the ministry says it seeks to create the "intelligent customer" capability in public administration (Ministry of Economy, 2008).

In this context, "green public procurement" is also worthy of note, whereby the public authorities seek to meet environmental objectives by procuring services and goods with a reduced environmental impact. Green public procurement is also designed to spur efforts to promote green innovation and an effective use of available resources. Meanwhile, the Public Procurement Authority has drawn up "The National Sustainable Procurement Action Plan 2013–2016," a document that constitutes the basis for incorporating environmental and social aspects into tender processes.

An increasingly pronounced trend in the financial policies of many countries is the use of spending reviews. This is in response to public disappointment with the results of reforms related to the implementation of performance-based budgeting. Performance-based budgets were expected to positively contribute to increased efficiency of public spending and to the accountability of the administration for completing tasks. However, the experience of many countries shows that a performance-based budget can face numerous constraints. Despite immense organizational efforts and training provided to thousands of officials, the informational value of the adopted indicators has turned out to be lower than expected, primarily because of the considerable aggregation of performance-based budgets.

Spending reviews are designed to eliminate tasks that are no longer significant from the government policy perspective or those that no longer produce satisfactory results.

The purpose of such reviews is to avoid inertia in budgetary allocation decisions that commonly occurs in government budgeting. Spending reviews help release funds that may then be assigned to new programs. Such an innovation effort can be considered to be conceptual innovation.

Poland vs. other countries

Governments have to compete with one another to attract investors, residents, and tourists. Such competition is yet another factor (in addition to financial resources) that drives continuous streamlining efforts. Although the Innobarometer[8] survey (one of the most extensive surveys in the EU that supports international comparisons) shows that Poland does not stand out from other countries (67.7% of Polish organizations have introduced new services since 2008, versus an EU average of 66.3%), innovation levels within the Polish public sector are relatively low.

Our research, in particular interviews with public administration officials, shows that innovation is not a strong point of the Polish public sector. According to the respondents, poor innovation performance is attributable to many causes, including "built-in conservatism," a large number of stakeholders, and the requirement to have new solutions evaluated by expert groups. Another feature typical of the Polish administration is its relative disinclination toward pilot initiatives. In the Innobarometer survey, only 10% of respondents said that executive staff supported checking new ideas through trial and error, while other countries (Sweden, Belgium, and Hungary) recorded a much wider use of the trial-and-error approach (European Commission, 2011). The Polish administration was also less likely to discuss or test new solutions: only 18% of the Polish organizations said they did so (European Commission, 2011). Poland is among three countries (along with Belgium and Bulgaria) in which internal barriers to innovation are viewed as very significant. Poland is also one of two countries (alongside Belgium) in which external barriers are perceived as very significant (European Commission, 2013a). Moreover, our respondents often mentioned the need to act in line with regulations in force, which is often a barrier to implementing new solutions.

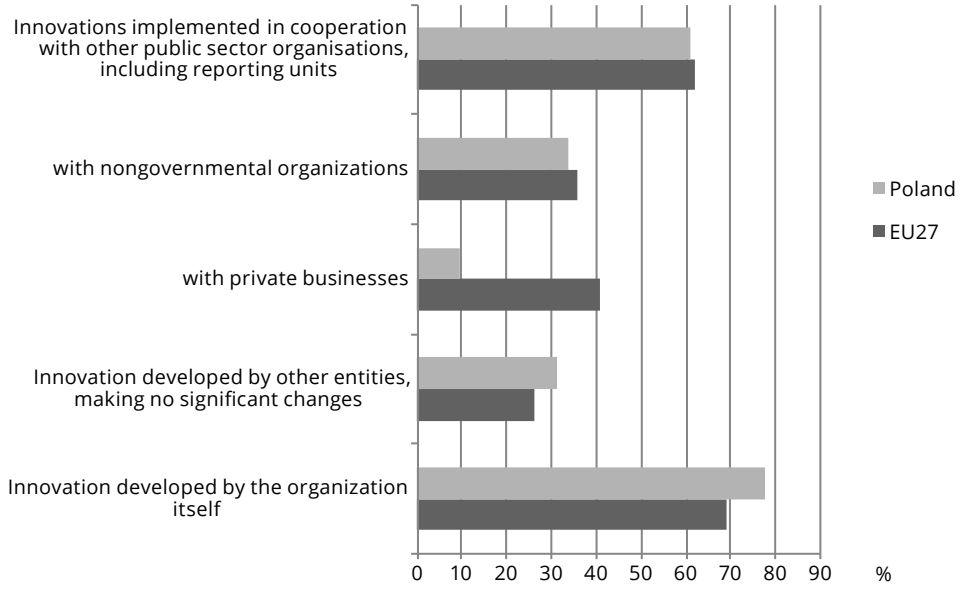
Poland (and eight other countries) scored below the European average on at least 10 of 20 indicators analyzed in the *Public Sector Innovation Scoreboard* pilot exercise (European Commission, 2013a). Only one indicator, measuring the education of public administration employees, showed Poland standing out positively from other countries.

Poland's relatively poor performance may be due to it being less likely to implement new or considerably improved services in cooperation with various partners.

[8] The 2010 Innobarometer Report is based on interviews with chief strategy officers and senior managers within public administration bodies in EU countries along with Norway and Switzerland. For Poland, the total sample size was 409.

In terms of implementation, the Polish administration declares that it is a self-handler, while in other countries the collaborative model is more widely followed, whereby new solutions are developed together with various partners.

Figure 13.3. Cooperation in developing innovation (%)



Source: European Commission (2011), *Innobarometer 2010: Analytical Report on Innovation in Public Administration (Flash Eurobarometer 305)*, DG Enterprise, Brussels.

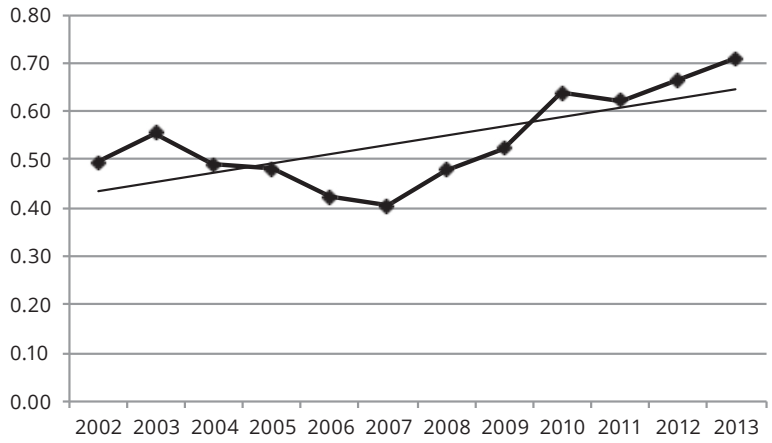
The Polish public administration scored above the EU27 average on just two counts in terms of sources of innovation; these were conferences and citizens. Ideas from staff, management, enterprises as suppliers, enterprises as service recipients, and professional advisory organizations;[9] as well as best practice in other government organizations, were mentioned less often than on average in the EU27.

However, there is an ongoing process of catching up with more developed countries. This is clear from a World Bank survey that identifies an upward trend in government effectiveness.[10]

9 Half of the respondents believe they are an insignificant source of new ideas.

10 The Worldwide Governance Indicators project assesses six dimensions of governance for 215 economies. Among the dimensions is government effectiveness. The indicators are based on questionnaire surveys among enterprise, citizen and expert respondents as well as on datasets provided by survey institutes, nongovernmental organizations, and international organizations (http://info.worldbank.org/governance/wgi/index.aspx#home).

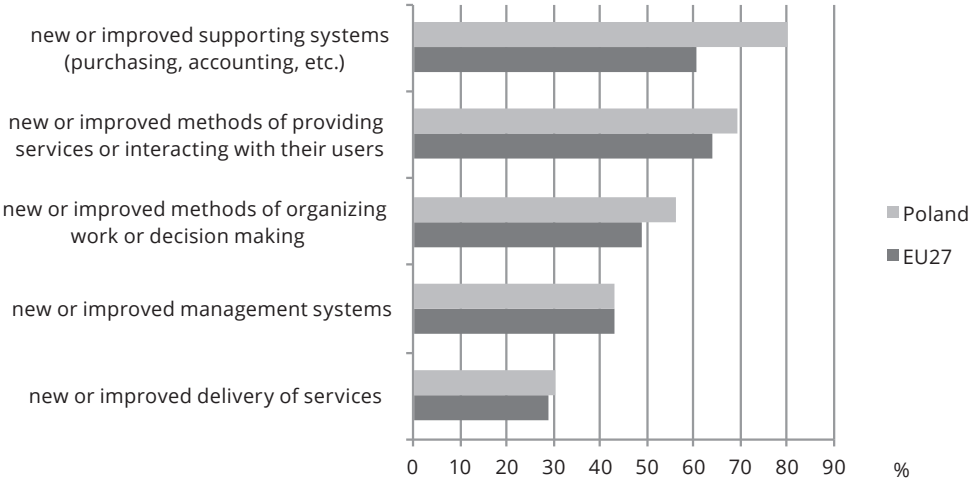
Figure 13.4. Changes in government effectiveness in Poland, 2002–2013



Source: World Bank, http://info.worldbank.org/governance/wgi/index.aspx#home, accessed Nov. 20, 2014.

The catching-up process can also be gleaned from the Innobarometer survey, in which the number of Polish government organizations that declared they had introduced innovation since 2008 was above the EU27 average (Figure 13.5).

Figure 13.5. Distribution of responses to the question of whether a respondent's organization has introduced any new or improved processes or organizational methods since January 2008



Source: European Commission (2011), *Innobarometer 2010: Analytical Report on Innovation in Public Administration (Flash Eurobarometer 305)*, DG Enterprise, Brussels.

Among central government organizations are units that are closer to the European model than the largely negative picture of the Polish administration. Among organizations that have made the most progress in recent years in terms of new services and innovative solutions is the Social Insurance Institution, which was once identified with poor management, unfriendly customer service, and poor-quality services.

Several other Polish organizations were included in a good practice review by the OECD Observatory of Public Sector Innovation. Poland submitted six good practices, including four by the central government (the Ministry of the Environment and the Ministry of Finance). These involved service, organization, and process innovations[11] and included the Green Technology Accelerator (an innovative project by the Ministry of Environment involving a contest for best green technologies); the *ekoportal* website with publicly available environmental databases; and the Eco-Management and Audit Scheme (in which organizations voluntarily commit themselves to assess their environmental impact).

To sum up, both the results of comparative studies in EU member states and interviews with managers from Polish central government organizations point to a low level of innovation activity in the public sector. However, there is a positive trend in evidence. Given that innovation in the public sector is likely to proliferate faster than in the private sector, good practices can reasonably be expected to become standard in the near future.

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Chapter 14

The Development of Social Innovation in Poland and Other EU Countries

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In recent years there has been a growing interest in social innovation, which represents a new approach to solving the problems of modern societies. These problems are associated with what are known as "grand challenges" such as population aging, mass urbanization, growing social inequalities, poverty, environmental problems, migration, and lifestyle diseases. Despite the importance of social innovation for contemporary socioeconomic development, this subject is still poorly recognized in the literature. This study aims to present the concept of social innovation and discuss practical examples of its implementation in Poland and the European Union. In particular, we discuss the key elements and common characteristics of social innovations and their relationship with the Open Innovation (OI) paradigm. An important part of the study is a search for an answer to the question of what kinds of actors are involved in the process of social innovation.

A specific feature of social innovation is that it extends beyond the usual technological and economic aspects and includes a strong social dimension. It is not possible to precisely measure the impact of this type of innovation with statistical indicators, as one of its key objectives is to improve the so-called "quality of life," a concept that defies precise definition and measurement. Consequently, mainly qualitative methods are used in the study. In particular, we discuss innovation policy instruments aimed at developing social innovation in the European Union and in Poland in particular. At the EU level, one of the most important tools in this context is the European Social Innovation Competition, and at the national level it is the "Social Innovation" program run by the National Center for Research and Development (NCBR). The results of both programs are used in this paper to present practical examples of specific social innovations and to identify the most common socioeconomic areas in which these are implemented. The analysis is the basis for formulating recommendations for future innovation policy measures aimed at promoting social innovation.

What is social innovation?

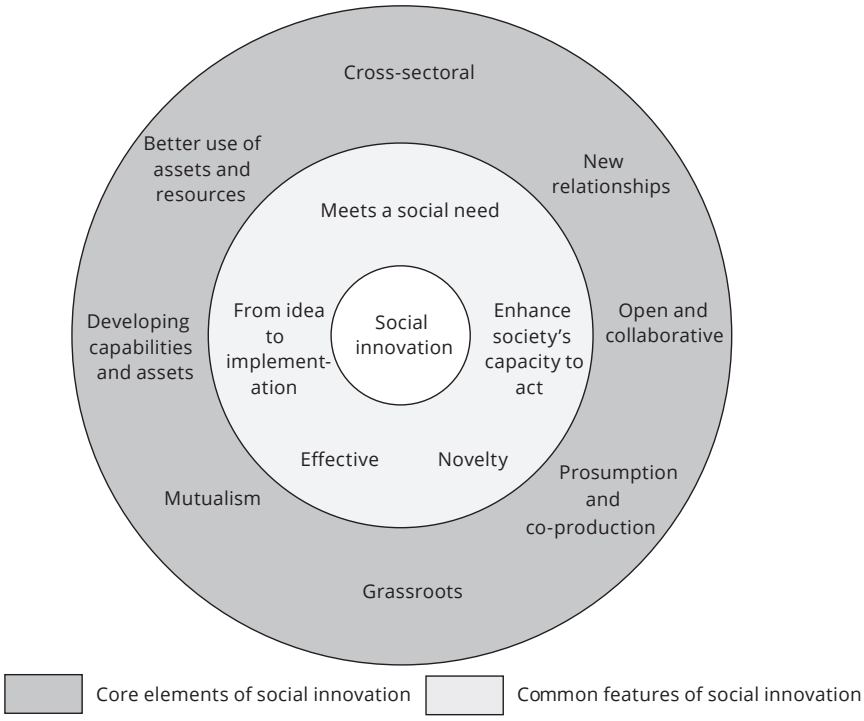
The latest findings in economics refer to innovation as a way of solving contemporary problems of development, such as environmental degradation and the exclusion of some groups from certain areas of socioeconomic development (Weresa, 2014, p. 18). In this context, the concept of social innovation is of particular importance. It has become a popular area of scientific research, though a universal definition of this term has yet to be developed. According to Phills *et al.* (2008, p. 39), social innovation is "a novel solution to a social problem that is more effective, efficient, sustainable or just than existing solutions, and for which the value created accrues primarily to society as a whole rather than private individuals. A social innovation can be a product, production process or technology, but it can also be a principle, an idea, a piece of legislation, a social movement, an intervention or some combination of them." On the other hand, Caulier-Grice *et al.* (2012, p. 18) provide the following definition: "Social innovations are new solutions (products, services, models, markets, processes, etc.) that simultaneously meet a social need (more effectively than existing solutions) and lead to new or improved capabilities and relationships and better use of assets and resources. In other words, social innovations are both good for society and enhance society's capacity to act." These authors identified the core elements and common features of social innovation, as presented in Figure 14.1.

The core elements and common features of social innovation presented in Figure 14.1 are not a complete list, but they can be supplemented with further examples. In addition, some of these functions may overlap and be closely related, such as openness and cooperation, building new relationships, connecting consumers and producers, and mutualism.

In general, it is possible to distinguish two approaches to social innovation, depending on whether the focus is on:

1. the technological aspects of innovative solutions, leaving in the background their possible social applications;
2. the social context of new projects, with a less rigorous assessment of their technological advancement.

Figure 14.1. Core elements and common features of social innovation



Source: Caulier-Grice *et al.* (2012, p. 18).

An important research question is how social innovation can be distinguished from commercial or economic innovation. The viability of such a distinction is pointed out by the OECD Forum on Social Innovations (FSI), operating under the Local Economic and Employment Development (LEED) program. According to the report (OECD, 2011, p. 21), social innovation is not about introducing new types of production, but about satisfying new needs not met by the market or creating new, more satisfactory ways of giving people a place and a role in production. Although social innovations are strictly linked with the local dimension of the innovation system, they are designed to solve problems related to the "grand challenges." Social innovation leads to an increase in the prosperity of society through its impact on employment, consumption, or participation in the socioeconomic system, and by providing solutions to individual and collective problems. Other characteristics distinguishing social innovation from other types of innovation, including commercial technological innovation, include:

- a lasting nature of the changes in raising the quality of life experienced by all users of the innovation (Phills Jr., 2008),

- a bipolar effect based on the appearance of not only a direct result of social innovation, e.g. a new product, concept of action, idea or social strategy, but also an indirect result in the form of new social relationships,
- a broad scope, covering all areas of activity of enterprises and society: the sphere of production, exchange and consumption (Olejniczuk-Merta, 2014, pp. 24–25),
- lower importance of time and anteriority in the implementation of new solutions, since the main criterion for social innovation is not novelty, but wide dissemination and impact on society (Neumeier, 2012, p. 50),
- crossing organizational boundaries within entities, sectors and disciplines (Jędrych, 2013, p. 86).

It is worth underlining the interdisciplinary nature of the concept of social innovation, which has its roots in economics, management, and sociology (Ümarik 2014, p. 99). The multidimensional nature of social innovation is expressed in its different categories, including (Caulier-Grice *et al.*, 2012, pp. 6–8):

1. social change and the transformation of society as a whole, including the role of the social economy and social enterprises in economic growth and social inclusion, as well as the role of business in driving the next wave of innovation and productivity in social fields such as education and healthcare,
2. business strategy and organizational management, in which social innovation is a key element of changes in human, institutional and social capital, leading to organizational efficiency,
3. social entrepreneurship, in which an important role is played by social enterprises developing innovative ways to tackle new social challenges (Hoogendoorn, 2010, p. 77),
4. practical development and implementation of new products, services and programs that meet social needs. F. Moulaert *et al.* (2005) classify this category as the product dimension of social innovation and highlight the growing importance of social enterprises and nongovernmental organizations (NGOs) in providing these items due to the need for austerity measures and a reduction of modern welfare expenses at a time of financial crisis,
5. the process dimension of social innovation, including the governance, empowerment and capacity building of social institutions. Special emphasis should be placed on the formation of social capital, interactions, and competences among social actors involved in the implementation of programs and strategies related to social innovation (Gerometta *et al.*, 2005).

The abovementioned solutions should result in an improved quality of life and social integration. In this context, it is important to distinguish between (Pol, Ville, 2008, pp. 5–6):

- the "micro" quality of life: the quality of life in relation to an individual,
- the "macro" quality of life: the quality of life in regards to a group of individuals.

Social innovation aims mainly to improve the macro quality of life, meant as an increase in the number of valuable options that people can choose from. The determinants of the macro quality of life, which may be positively influenced by social innovation, include education opportunities, financial well-being, healthcare, the environment, job security, political stability, and gender equality.

Many researchers present a similar approach to social innovation. According to F. Westley (2012), social innovation leads to profound changes in basic routines, resource and authority flows, or in beliefs in any social system. The capacity of a society to generate a steady flow of social innovations, especially those that engage vulnerable populations and marginalized groups, is an important contributor to overall social resilience, involving adjustment to external shocks and new needs. K. Gillwald (2000, pp. 41–42) highlights three characteristics of social innovations, determining their impact on current and future social development:

- novelty in relation to former practices,
- diffusion and assimilation in many areas,
- stability beyond temporary fashions.

According to Gillwald, the identification of the key result of social innovation, namely improved societal achievements, is usually subjective. In particular, the result of social innovation is not perceived as better by representatives of those groups that are adversely affected or those that incur the costs related to its implementation. A. Nicholls and A. Murdock (2012) point out that social innovation should contribute to the achievement of certain social values, such as public good, justice, and equity. For J. Gerometta *et al.* (2005, p. 2007), social innovation is both an analytical concept that makes it possible to study the problems of social exclusion and a normative concept that involves the creation of new strategies for social integration.

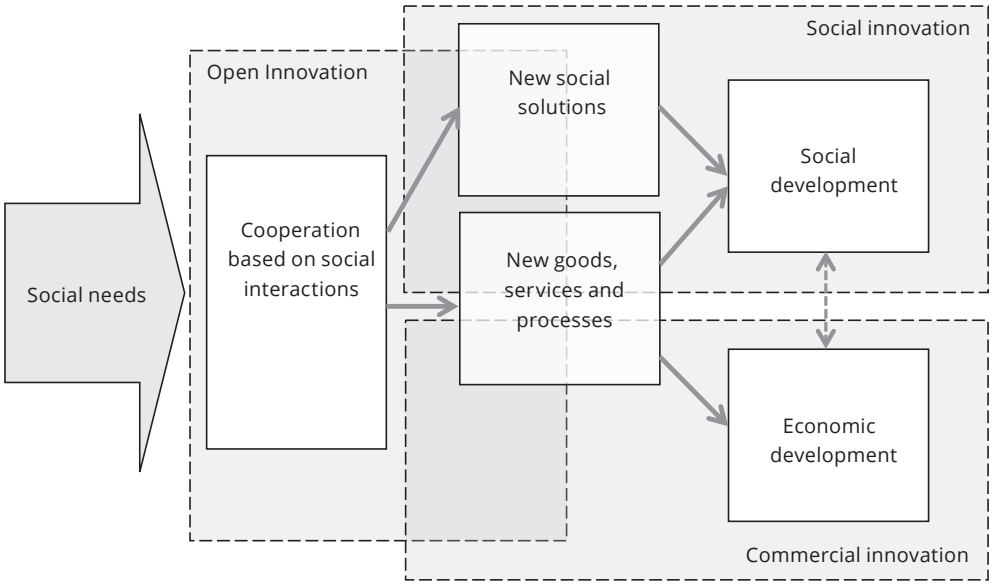
Social innovation and the open innovation (OI) paradigm

The growing importance of the social dimension of the innovation process is reflected in the evolution of innovation process models. This evolution has proceeded from a linear, one-way innovation development model that originated from R&D activities to a complex, multidirectional (systemic/integrated) model in which the key source of innovation is network connections and interactions between people and organizations, on the one hand, and their environment on the other. This modern approach to innovation highlights interactive learning (Lundvall, 1992, p. 9) and

adaptation of new offerings to existing market demand and the real needs of society, which contributes to sustainable development (Liddle, El-Kafafi, 2010). Given the significant role of the social component in the integrated model, social innovation largely fits into this generation of innovation process models.

A modern approach to innovation based on interactions and taking into account social needs is reflected in a strategy referred to as Open Innovation. Under this concept, enterprises should strive to use external sources of innovation by finding and combining ideas that are complementary to their ongoing R&D and by working with external units. It is also important to cooperate with consumers in order to enable the development of products and services that are responsive to the needs of society. This approach is represented by the concept of user-driven innovation (UDI), which postulates the creation of new products or services in collaboration with their potential users. According to Neumeier (2012), the common characteristic of both social innovation and Open Innovation is the involvement of many actors in its creation, because social needs are best perceived by those citizens who are directly affected by specific problems. Therefore, active public participation is essential in searching for innovative solutions to today's "grand challenges." The relationship between the concepts of social innovation and Open Innovation is illustrated in Figure 14.2.

Figure 14.2. Relationship between the concepts of social innovation and the Open Innovation strategy



Source: Own work.

As the above figure shows, cooperation based on the Open Innovation strategy is a response to existing social needs and leads to the development of:

1. new goods, services and processes that meet existing market demand and can be classified into either commercial or social innovation (although the demarcation line between these two categories may be ambiguous and difficult to identify precisely),
2. new social attitudes, institutions, norms, and behaviors expressed in new social practices. This approach is close to the definition of social innovation presented on the basis of the modernization theory by sociologist W. Zapf (1989, p. 177). He defined social innovation as new societal practices, especially new forms of organizing and regulating lifestyles that determine the direction of social change and help solve problems better than traditional practices.

The complementarity between the concept of social innovation and the Open Innovation strategy is reflected in the Open Social Innovation (OSI) paradigm proposed by H. Chesbrough and A. Di Minin (2014, p. 170). Open Social Innovation is defined by these economists as "the application of either inbound or outbound Open Innovation strategies, along with innovations in the associated business model of the organization, to social challenges." This definition includes two dimensions of open innovation processes expressed in:

1. Outbound Open Innovation, involving the transfer of technology from a particular entity to cooperating organizations with business models tailored to the commercial use of this technology (Lichtenthaler, 2009),
2. Inbound Open Innovation, concerning the acquisition of external knowledge and its use in one's own innovation activities (Chesbrough, Crowther, 2006).

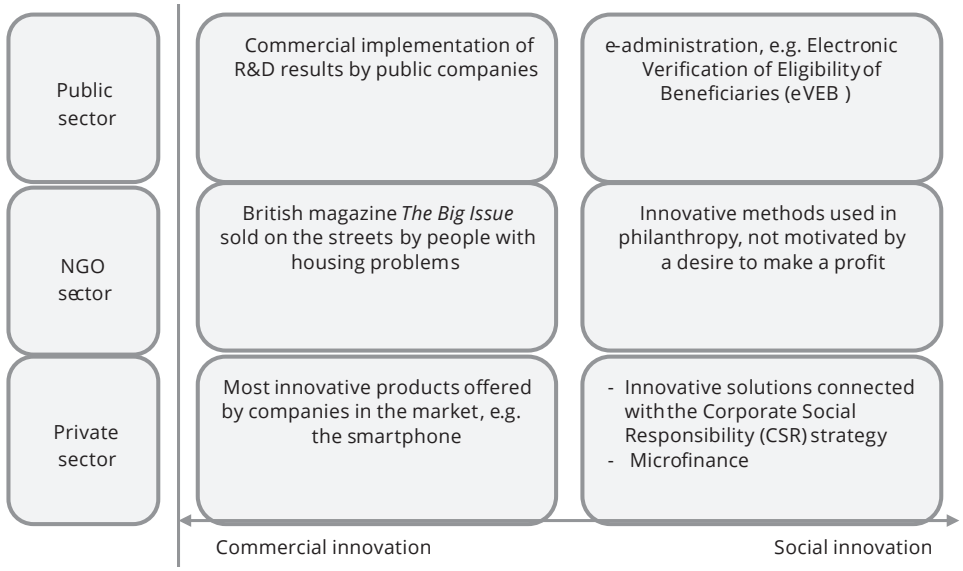
The simultaneous combination of these two dimensions of open innovation activity occurs in a coupled process that includes a two-way flow of knowledge (Enkel, Gassmann, Chesbrough, 2009). Even though Open Innovation and social innovation are not the same concepts, both ultimately strive toward a user-focused collaborative process. D. Chalmers (2013) expects that full implementation of the Open Innovation model will help build more porous organizational structures with greater absorption capacity and engage various stakeholders in social innovation processes.

Social innovation in different sectors of the economy

An important question related to social innovation is what kinds of actors are involved in the process. The fact that social innovations go beyond the market mechanism and have a clear social context might suggest that they occur in the public sector, with

possible extension to NGOs. Meanwhile, the literature emphasizes that social innovation involves a process of exchanging ideas and values between different actors, including representatives from the public, private and NGO, or third, sectors (Phills *et al.*, 2008).

Figure 14.3. Examples of commercial and social innovations in the public, private and NGO sectors



Source: Own work.

The key criterion for qualifying a new solution as social innovation is that it should be inspired by a desire to meet social needs overlooked by both the private sector and traditional forms of public services. Therefore, according to M. Harris and D. Albury (2009, p. 16), innovation implemented by the public sector or NGOs will not qualify as social innovation unless it is directly involved in addressing major societal challenges. On the other hand, private companies that view social challenges (in areas such as education and healthcare) in terms of business opportunities are becoming an increasingly important player in social innovation. This implies an increased number of companies offering cost-effective solutions for a variety of social problems such as malnutrition, the spread of disease, and lack of access to basic resources including food and water. Other innovative approaches to social problems in the private sector include the concept of corporate social responsibility (CSR) and the development of social enterprises. The above analysis shows that social innovation can take place either inside or outside the public services sector. Although in many cases the division between commercial and social innovation may be blurred, Figure 14.3 shows various

examples of these innovations offered by representatives from the public, private and NGO sectors.

As can be seen in Figure 14.3, social innovation can be found in all three sectors: public, private and NGO. However, due to the diverse logics of their functioning (Nicholls, Murdock 2012), social innovation takes different forms in each sector:

1. in the public sector, social innovation refers to innovation introduced in all kinds of services that are traditionally the domain of the state (e.g. social services) with the aim of increasing the effectiveness and efficiency of operations and to ensure a more even spread of services (Moulaert, 2009, p. 12). The government, through access to a huge budget and resources, has the capacity to implement large-scale systemic changes. However, the structure of the public sector reveals a tendency to reduce risk and is in many cases a barrier to innovation and creativity;
2. for nongovernmental organizations, social innovations include both internal processes of organizational change (e.g. new forms of legal operation and cooperation) and the offering of new products and services (Nicholls, Murdock, 2012). The NGO sector is inherently social in nature because it offers services not provided by either the private or public sectors. However, innovation activity in this sector is limited because of the reduced scale of most NGOs and their substantial fragmentation;
3. in the case of private companies, two concepts are used in the context of the need to create social innovation: the concept of Creating Shared Value (CSV) and the concept of the triple bottom line.
    - Technological innovations fail when they are not accompanied by changes in social relations within an organization. According to the CSV concept, presented by M.E. Porter and M.R. Kramer (2011) and complementing Corporate Social Responsibility (CSR) theory, activities undertaken by companies should not only increase their competitiveness, but also contribute to an improvement in living conditions in the communities in which they operate.
    - Under the triple bottom line concept (Elkington, 1997), a corporate development strategy must represent a balance between the economic, environmental and social dimensions of the process.

Social innovation in the European Union

Social innovation has become an important field of interest for the European Commission, which, in its "Guide to Social Innovation" (European Commission, 2013, p. 6), defines it as "the development and implementation of new ideas (products, services and models) to meet social needs and create new social relationships or

collaborations." The strategic direction of activities aimed at promoting innovation in the European Union, including the promotion of social innovation, is defined in the "Europe 2020 – A Strategy For Smart, Sustainable and Inclusive Growth" document. One of the three key priorities of this strategy is inclusive growth through fostering a high-employment economy delivering economic, social and territorial cohesion. This priority is supported by the "European Platform Against Poverty" flagship initiative. In this project, the European Commission committed itself to "design and implement programs to promote social innovation for the most vulnerable, in particular by providing innovative education, training, and employment opportunities for deprived communities" (European Commission, 2010, p. 18).

One of the innovation policy instruments for implementing the Europe 2020 strategy in terms of employment and social inclusion is the Employment and Social Innovation (EaSI) program, which has been in operation since 2014. This program is composed of three complementary Axes:

1. The PROGRESS Axis (modernization of employment and social policies), which comprises the promotion of social innovation and social progress through cooperation between civil society organizations and public and private entities,
2. The EURES Axis (job mobility), concerning a system for the exchange and dissemination of information and the development of different forms of cooperation to promote the geographical mobility of workers,
3. The Social Entrepreneurship and Microfinance Axis, which supports access to microfinance for social entrepreneurship.

Other sources of supporting social innovation projects are presented in Table 14.1. This table lists all the dimensions of supporting social innovation in the European Union, from a document defining the strategic direction of activities to different funding programs and competitions, to initiatives and projects aimed at linking various actors, monitoring results and incubating and strengthening social innovation.

The enormous scale of social innovation in Europe was reflected by the first European Social Innovation Competition run by DG ENTR in 2012–2013, which attracted more than 600 applications. Three projects were shortlisted to compete for €20,000 in prize money:

- Community Catalysts (of the United Kingdom): a project based on extending the reach and impact of social care and health services offered by micro-enterprises through a network of professional business and mentor services, supporting community entrepreneurs via an online platform,
- Economy App (Germany): social innovation improving access to the job market for the economically deprived through the development of a network to make their skills widely visible,

- MITWIN.NET (Spain): social innovation aimed at reducing unemployment among young people by developing an intergenerational professional network designed to facilitate contact between older and younger people in order to share jobs and experience.

Table 14.1. Support for social innovation in the European Union

Dimension	Key solutions in the context of social innovation policy in the European Union
Strategic direction	– Europe 2020 – A Strategy for Smart, Sustainable and Inclusive Growth – "European Platform Against Poverty" flagship initiative
Programs financing social innovation	– The Employment and Social Innovation (EaSI) program – The "Horizon 2020" Framework Programme for Research and Innovation, particularly under the SME Instrument, which supports social innovation aimed at solving the problems of specific target groups – National and regional programs in different member states, co-financed from EU funds – Funding from public, nongovernmental and private sources (European Union, 2012)
Competitions for social innovation	– European Social Innovation Competition, run annually by the European Commission's Directorate-General for Enterprise and Industry (DG ENTR) – RegioStars Awards (for example in the Inclusive Growth – Social Innovation category: creative responses to societal challenges), launched by the European Commission's Directorate-General for Regional and Urban Policy – The Naples 2.0 – International Social Innovation Competition, organized by DG ENTR – The Social Innovation Tournament, organized by the European Investment Bank Institute.
Networking for social innovation	The Social Innovation eXchange (SiX), which acts as a platform for the exchange of knowledge and experience among the public sector, social enterprises and NGOs.
Monitoring the results of social innovation	Collection and dissemination of evidence on the benefits of social innovation and methodologies for their outcome measurement – reports: European Union (2012a), GECES Sub-group on Impact Measurement (2014)
Incubation and strengthening of social innovation	– "Transnational Network for Social Innovation Incubation" (TRANSITION) Project – "Building a European Network of Incubators for Social Innovation" (BENISI) Project – Actions to encourage organizations implementing social innovation to strive for systemic change in Europe, according to the concept of systemic innovation, understood as a set of interconnected innovations, where each is dependent on the other (Devies *et al.*, 2012).

Source: Own compilation, using material from the DG ENTR website, http://ec.europa.eu/enterprise/policies/innovation/policy/social-innovation/index_en.htm, accessed Nov. 20, 2014.

In the second European Social Innovation Competition, run in 2013–2014, the number of submitted projects doubled to 1,254, with the largest number of applicants (351) from Italy, as shown in Table 14.2. Poland was in sixth place with 58 projects submitted, but that did not translate into quality; not a single Polish project qualified for the competition semifinals, which included the 30 top-rated social innovations.

In the second European Social Innovation Competition, which took place in 2014, the prize money increased to €30,000 and was granted to the following projects:

- "From waste to wow! QUID" (Italy): social innovation related to the recycling of slightly damaged textiles ("that cannot be used for top Italian brands") into limited collections, thereby providing jobs to disadvantaged women,
- Urban Farm Lease (Belgium): social innovation facilitating and supporting urban farming in Brussels, with the aim of directly creating 6,000 jobs and indirectly adding 1,500 jobs,
- Voidstarter (Ireland): social innovation engaging unemployed people for refurbishing vacant social housing in Dublin and turning it into sites for learning and entrepreneurship.

Table 14.2. The number of social innovation projects from 10 countries with the largest percentage of applicants in the European Social Innovation Competition in 2014

No.	Country	Number of projects	Number of projects among top 30	Number of projects among top 10
1	Italy	351	9	2
2	Portugal	170	1	0
3	Romania	98	2	0
4	United Kingdom	96	5	3
5	Spain	67	0	0
6	**Poland**	**58**	**0**	**0**
7	Belgium	49	3	2
8	Slovenia	45	0	0
9	Germany	39	4	1
10	Bulgaria	38	0	0
	Other	243	6	2
	Total	**1,254**	**30**	**10**

Source: Own compilation, using material from the DG ENTR website, http://ec.europa.eu/enterprise/policies/innovation/policy/social-innovation/competition/contestants_en.htm, accessed Nov. 20, 2014.

Most of the projects that were rated the highest in the second European Social Innovation Competition were related to social innovation contributing to an increase of employment and social inclusion. Among other applications, the most popular categories were social housing and waste management.

Social innovation in Poland

There are various examples of public programs that promote initiatives related to social innovation. Studies also point to a growing number (though still small in absolute

terms) of specific cases where such initiatives have been implemented in Poland. One limiting factor in the quantitative study of social innovation is that such innovations represent a category that is not yet recognized in statistical surveys. Consequently, it is impossible to analyze this phenomenon with the use of specific indicators and statistics.

According to the "Dynamic Poland 2020" Strategy for Innovation and Efficiency of the Economy (Ministry of Economy, 2013, p. 36), Polish enterprises rarely use new forms of innovation such as open innovation, user-driven innovation, and social innovation. In this context, different limiting factors can be identified, primarily insufficiently developed social capital, defined by R.D. Putnam *et al.* (1993, p. 167) as "features of a social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions." Among the weaknesses of social capital in Poland, the Strategy of Social Capital Development 2020 (Ministry of Labor and Social Policy, 2013, p. 26) points out factors that play an important role in the creation of social innovation. These include:

- a low level of trust in society,
- domination of individualistic behavior over pro-social attitudes,
- a low level of cooperation among actors representing different sectors and industries,
- poor exploitation of the potential offered by public institutions,
- the lack of a coherent system for developing social competences at all stages of life,
- an unfavorable institutional environment for the development of creative industries,
- disparities in access to education, including civic, digital, and cultural education.

Measuring social capital is a complex process. One of the indicators of social capital may be the overall level of social trust (Łopaciuk-Gonczaryk, 2012, p. 9). In this context, the European Social Survey shows that Poland has one of the lowest levels of trust in Europe. This study, conducted in 2013, found that only 13.5% of Polish respondents agreed with the opinion that "most people can be trusted," compared with 13.4% in 2011 and 2009, 11.5% in 2007, and 10.5% in 2005 and 2003 (Czapiński, Panek, 2014, pp. 28–29). Another important indicator used by those measuring social capital is membership of organizations. This indicator is most commonly used in studies on local communities and regions (e.g. Bullen, Onyx, 2000). In this context, business clusters are an important factor contributing to the development of social capital in Poland. Research conducted by A.M. Kowalski (2013, pp. 238, 295) shows that if a cluster is initiated in a given location, it stimulates trust (60% of surveyed companies),[1] cooperation (61%), and the intensity of communication between partners (70%), thus

[1] The results of the European Social Survey showed that the level of trust in clusters was almost 4.5 times higher than the overall level of social trust in Poland, which stands at 13.5%, but, due to different survey methods, the comparative analysis and interpretation of the results should be approached with extreme care.

contributing to the development of social capital and an innovative environment in the broad sense. The positive impact of clusters on social innovation is demonstrated by the fact that some projects in the "Social Innovation" competition run by the National Center for Research and Development since 2013 have been submitted by cluster initiatives such as the "Podkarpacie Country" Quality of Life Cluster and the Eastern Advisory and Service Cluster Association.

The main objective of the Social Innovation Program is to stimulate social development and to improve the quality of life of society, with a particular emphasis on those groups and areas where there is a real need for innovative solutions and new social initiatives. More detailed objectives include:

1. an increased number of innovative technical solutions and innovative products, services and procedures implemented to help solve complex social problems,
2. increased cross-sectoral cooperation at the local, regional and national levels (National Center for Research and Development, 2012).

The Social Innovation Program takes into account the interdisciplinary nature of social innovation and the need to stimulate new social relations and cooperation. This is evidenced by the fact that the competition is open to consortia bringing together NGOs, academic units and enterprises. In the first competition in 2013, 14 projects were positively assessed and supported, while in the second competition in 2014, the number of positively evaluated projects increased to 39 (with 29 recommended for support). The results of the two competitions conducted so far as part of the program (in 2013 and 2014) are used in this study to review the types and nature of social innovations implemented in Poland (Table 14.3).

The characteristics of social innovation and their practical examples point to the great importance of this concept for socioeconomic development. This makes it necessary to present recommendations for innovation policy in this area. Social innovation has huge potential to bring many benefits to citizens and society, and the promotion of this area by the state can become a lever to improve the innovativeness of the economy. This is due to the social dimension of innovation processes, involving different types of entities, institutions, people, and relationships between them. Different measures introduced as part of innovation policy are ineffective without the commitment and dedication of different groups of society. Therefore strengthening the innovativeness of the Polish economy requires the development of a culture of innovation and the public's belief in the value of innovation. Social innovations are excellent examples showing that innovative activity not only contributes to an increase in the competitiveness of the economy, but also, in a direct way, improves the quality of life of different social groups.

Table 14.3. The thematic areas and examples of social innovations supported by the Social Innovation Program

Area	Examples of projects
Social innovation in healthcare	– Geriatric Telediagnostic Platform – Automatized measurement of treatment progress in children with autism – Lean Management in healthcare – A system for reducing the number of hospital infections – A clinically verified system of domestic rehabilitation for people with selected neurological diseases
Social innovation in education	– "Closer" Educational Intervention initiative aimed at creating and implementing a program of educational classes in secondary schools designed to reduce the exclusion of individuals from peer groups – Development of an augmented reality computer system for use in educational software dedicated to science – Equal opportunity – increasing the competences of children with disabilities – Digital Academy – an educational platform offering online courses available to the general public
Social innovation for social inclusion	– New dialogue perspectives: a debate model and tools for social inclusion in decision-making processes – Making use of social economy mechanisms to prevent the professional exclusion of artists with disabilities, based on an IT integration platform – Open HR as an opportunity for the development of the professional potential of people with disabilities – an innovative service model to support the process of hiring and pursuing a career using an extended concept of supported employment – Electronic system supporting independent living for people with intellectual disabilities
Social innovation in the care of the elderly and disabled	– MEMO – a multimedia tool to assist memory and activate the elderly – GRADYS – simulation exercise software with elements of virtual reality, supporting the cognitive functions of elderly people with dementia – Religious E-Tourism – a system for the elderly and physically disabled, supporting religious tourism
Social innovation to facilitate the use of justice administration institutions	– Pilot implementation of the "Community Court" model in Poland as an institutional bridge between the judiciary, local government and civil society organizations to facilitate the implementation of restorative justice in practice – Judgment Analysis System – a project aimed at increasing the availability of tacit knowledge in courts by making it available through a single, open, disabled-friendly and noncommercial system with built-in analytics
Social innovation combining healthcare and education	– "FitPolka" – a complex mobile program using modern E- & M-Health tools for education and prevention of cardiovascular and metabolic diseases among women – Innovative improvement of breast cancer screening: a training-educational program for people with visual disabilities – An online system supporting the identification and treatment of speech disorders in children at preschool age

Source: Own compilation based on ranking lists compiled during the first and second competitions held as part of the Social Innovation Program, NCBR websites, http://www.ncbir.pl/programy-krajowe/innowacje-spoleczne/, last access: Nov. 24, 2014.

In order to promote social innovation, it is necessary to press ahead with efforts to develop the national innovation system in Poland. This system should be based on cooperation and synergy between different sectors, resources, institutions, policies and practices. An important role in this process could be played by social innovation

hubs understood as places where there is cooperation between different actors and where new solutions are incubated in response to the "grand challenges." Support for social innovation should also constitute an important element of innovation policy at the regional level. This is connected with the paradigm of proximity and its cognitive, organizational, geographical, social and institutional dimensions, which play a key role in shaping the relationship between different actors of the innovation system (Boschma, 2005). Support for social innovation should primarily be based on social proximity, which takes into account the context of direct relationships between entities, based largely on trust and reciprocity. In particular, public programs can stimulate the development of local innovation-friendly environments by promoting clusters as structures that enhance social interactions and generate synergies, as well as increase the level of relational capital (Kowalski, 2013a). Cities should also become important players in supporting social innovation. According to J. Gerometta *et al.* (2005, p. 2008), the city level is a key arena of social movements and other civil society experiments.

Summary and conclusions

Social innovations cover a wide range of innovative solutions to social problems. These can be both technological solutions taking the form of new products and process technologies, for example, and non-technological solutions expressed in new social practices such as attitudes, policies, institutions, norms, behaviors and social movements. The key characteristic that distinguishes social innovation from commercial innovation is that social innovation influences the "macro" quality of life, meaning that its benefits are experienced by a larger group of individuals in society. Social innovations are important to economic and social development, particularly at a time of global crisis, because they determine social resistance, understood as the ability of a society to adapt to external shocks and emerging needs.

The analysis shows that social innovation largely fits into the modern model of the innovation process, in which the key sources of innovation are linkages and interactions between people and organizations on the one hand, and their environment on the other. In particular, there is a strong similarity between the concept of social innovation and the Open Innovation strategy. While these concepts are not the same, they are both driven by a user-focused collaborative process. This means that the search for innovative solutions to "grand challenges" is more effective when it involves citizens directly experiencing the social problems in question. The complementarity between the concept of social innovation and the Open Innovation strategy is reflected in the Open Social Innovation (OSI) paradigm, which calls for the use of both inside-out and

outside-in open innovation, along with innovations in business models, in addressing societal challenges. This should contribute to building more permeable organizational structures with greater absorption capacity and engaging various groups of society.

The study demonstrates that, despite popular belief, social innovations extend beyond the public sector and may also be present in the private and third (NGO) sectors, taking on different forms depending on the logic underlying these sectors. In particular, social innovation does not include traditional services offered by the state unless these solve important societal challenges in an innovative and direct way. On the other hand, private companies are becoming an increasingly important player in the field of social innovation. They tend to see "grand challenges" in areas such as healthcare and education in terms of business opportunities and offer cheap, but innovative solutions to various problems affecting society. Another source of social innovation in enterprises is public programs offering funding or other forms of incentives to undertake such activities.

Support for social innovation is an important element of the EU's innovation policy. This study analyzes different dimensions of EU action in this area, starting from the "Europe 2020" strategy, which defines the strategic direction of efforts in this area, through different funding programs (especially the Employment and Social Innovation (EaSI) program) and direct actions by EU institutions, to initiatives designed to link various actors (the SiX platform), monitor the results, and incubate and strengthen social innovation (TRANSITION, BENISI). The strong interest in social innovation in Europe has been especially confirmed by the European Social Innovation Competition run by DG ENTR. In the first call in 2012–2013, more than 600 projects were submitted, while in the second call, in 2013–2014, this number doubled to 1,254. Poland was ranked sixth in terms of the number of submitted projects, but this did not translate into quality, because none of the projects was listed among the 30 highest-rated applications.

Polish innovation policy also includes programs designed to promote social innovation. While there is a growing interest in social innovation, the number of cases in which such innovation has actually been implemented is still relatively small in Poland. It is not possible to conduct a quantitative analysis of this phenomenon by using statistical data, because it is not yet recognized in a direct way in official statistics and there are no specific indicators in this area.

The study identifies various barriers to the creation of social innovation in Poland, primarily the scarcity of social capital, including a low level of social trust and cooperation. In this context, business clusters are an important factor contributing to the development of social capital, in particular trust and collaboration. The positive impact of clusters on social innovation is confirmed by the fact that cluster initiatives

are among the applicants for the NCBR's Social Innovation Program. This program takes into account the aspect of creating new social relations and cooperation, as it is addressed to consortia bringing together NGOs, research institutions and enterprises. Most of the projects positively evaluated in the first two rounds of the program were related to areas such as healthcare, education, social inclusion, and care for the elderly and disabled. At the same time, some projects were interdisciplinary and combined various areas, mostly health and education. In other EU member states, as shown by an analysis of the highest-rated applications in the European Social Innovation Competition, social innovation projects were more focused on employment and social inclusion, followed by social housing and waste management.

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Chapter 15

Open Innovation in Small and Medium-Sized Polish Enterprises

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Open innovation management focuses on exploring and exploiting a variety of innovation opportunities. Many new opportunities have been created by the development of IT and communication technologies, enabling firms to reach for external resources in order to support their competitive advantages and performance. The concept is well described theoretically, but research on the use of open innovation in practice, especially by SMEs, is still scarce and fragmented. Our objective is to examine the relationship between open innovation (OI) embraced by small and medium-sized Polish enterprises (SMEs) and the performance of these firms.

Introduction

Recent developments in IT and advances in communication technologies have impacted all markets (Zittrain, 2008). Access to the Internet has resulted in globalizing the world into one great platform with all possible suppliers and customers on board. In this era of the internet, information has turned out to be a major competitive instrument serving firms and their customers alike. These phenomena offer opportunities, but also involve new risks. The new situation calls for restructuring the companies' focus, strategies, policies, and the mindsets of their managers. An appropriate business model is indispensable (Nenoen, Storbacka, 2010, Huang, *et al.*, 2012). The new business model is expected to support the constant flow of ideas and knowledge resulting in enhanced innovativeness and improved performance.

The paper is designed as follows. We start by reviewing key studies on the role of the customer/user in the innovation process. We then describe the concept of open innovation and outline previous empirical research, demonstrating the relationship between the adoption of open innovation practices and the performance of SMEs. Analysis in the literature shows this relationship is complex and country-specific.

We subsequently test it in the context of Polish SMEs. The final part presents our research design and empirical findings.

Customer as an innovator

One of the main topics in business and managerial studies on current market shifts concerns the new role of the customer. On the one hand, *informed* customers (consumers) become a demanding target, not easy to capture and keep. On the other hand, such *informed* and *connected* customers can be turned into a valuable innovation source.

The most seminal works on the new role of customers started to be published in the 2000s when the relationship between customers and manufacturers changed dramatically. The leading researcher on the topic, Eric von Hippel, observed that "user-centered innovation is a very powerful and general phenomenon. It is rapidly growing due to continuing advances in computing and communication technologies. It is becoming both an important rival to and an important feedstock for manufacturer-centered innovation in many fields" (2005, p. 63).

Von Hippel described the phenomenon of user innovation in the 1970s (1976) and has been analyzing it since then. One of his main achievements was a book entitled *Democratizing Innovation*, which, according to reviewers, challenged innovation theorists and businesses by presenting the important role of users rather than suppliers in the advance of technology. Von Hippel described his book as an explanation on "how the emerging process of user-centric, democratized innovation works … how innovation by users provides a very necessary compliment to … manufacturer innovation" (von Hippel, 2005, p. 2). He referred to a study by Franke and Reisinger (2003), who had noticed that users' needs for products were very heterogeneous. This suggestion, combined with an observation that many users were ready to pay extra to get exactly what they wanted (Franke, von Hippel, 2003), brought von Hippel to the conclusion that users innovated because they could not find the right value proposition on the market and also because they enjoyed the act of creating. Moreover, users were the only ones who benefited from innovation directly, as opposed to all others, who had to sell products based on innovation in order to be rewarded. He concentrated his research on *lead users*, i.e. those users who set new market trends by undertaking efforts to benefit from innovation for their own purposes. Von Hippel predicted that the ability to innovate by users would improve thanks to an increased availability of inexpensive software and hardware and easy-to-use tools and components for innovation. While studying the product development process, von Hippel noticed that users and manufactures developed different types of innovations. He concluded that

these differences were caused by information asymmetry, asserting that "users and manufacturers know different things" (2005, p. 8 and pp. 66–72). According to von Hippel, engaging users in product development may drastically decrease new-product failure rates experienced by manufacturers due to a better understanding of market and customer needs (2005, pp.107–109).

Other important academics who addressed the new role of the customer were S.L. Vargo and R.F. Lusch, the authors of the Service Dominant Logic (SDL) paradigm (2004). Even though the SDL is not directly concerned with innovation, many publications on customer innovation, such as Ordanini and Parasuraman (2011) and Edvardsson and Tronvoll (2013), made references to the SDL. According to its authors, the SDL is a departure from the traditional goods-dominant logic – followed in marketing for over 100 years – in which goods (both tangible products and services) were the focus of trade.

Vargo and Lush claimed that knowledge was "an operant resource" and the foundation of a competitive advantage and economic growth as well as "the key source of wealth" (2004, p. 9). According to Vargo and Lush, "operant resources are often invisible and intangible; often they are core competences or organizational processes" (p. 3). If marketing is expected to increase firm's competitiveness, its primary function should be acquiring valuable knowledge from multiple sources and combining it with the company's internal knowledge resources. This indicates an openness to resource (knowledge) seeking and configuration. What is also noteworthy is the suggestion that the customer is always a value creator, while the role of the supplier is to make value propositions. The final conclusion is that the SDL is customer oriented, and this means "collaborating with and learning from customers and being adaptive to their individual and dynamic needs" (2004, p. 6).

The other prominent researcher focusing on customer value co-creation and its consequences for competition is C.K. Prahalad. Together with V. Ramaswamy, he looked at the world market shifts from the competition perspective (Prahalad, Ramaswamy, 2004). One of their central topics was the changing role of the customer (consumer) as a crucial element of the future business environment. As customers choose to use and experience the suppliers' proposals in very different and creative ways, their creativity, based on unique, tacit knowledge and abilities, could serve as a valuable source of firsthand innovation. In their next works, Prahalad and his co-authors concentrated on the methods of engaging customers in the companies' innovation processes and on suggesting ways of transforming businesses to challenge the global digital environment (Prahalad, Krishnan, 2008). They pointed out that constant innovations, not just periodical breakthroughs, would be forced by the dynamism of the environment. Continuous innovation calls for creating a certain capacity, which in turn depends on the necessary organizational capabilities.

The publications by Prahalad and his co-authors inspired many other academics to discuss co-creation processes. The leading representatives of the Nordic School of Marketing, Gummesson and Grönroos, took part in that debate (Grönroos 2009).

The open innovation concept

Not only customers (consumers) can serve as innovators. New ideas can also be found in various external sources. The first author to use the term "open innovation," in reference to an approach opposite to the vertically integrated R&D model, was Henry Chesbrough (2003).

In a foreword to the first edition of Chesbrough's book (2003), John Seely Brown, former director of the Xerox Palo Alto research center, wrote, "Today most of the world's really smart people aren't members of any single team, but are distributed all over the place in multiple institutions. Similarly, we are now looking for innovations in the interstices between different disciplines – for example, between bio- and nanotechnologies. Any new model of innovation must find ways to leverage the disparate knowledge assets of people who see the world differently and who use tools and methods foreign to those we're familiar with".

Chesbrough claimed that suppliers/brands tended to lose their uniqueness and products turned into commodities. He suggested that the constant innovativeness of companies was the only way to generate profitable growth in such a difficult environment and that companies failing to innovate would perish. The question is how to supply a company with numerous innovations in the long run. There are two models of ensuring constant innovativeness: spending big money on developing internal R&D, or looking outside for innovations.

Chesbrough defined open innovation as "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation" (Chesbrough, Vanhaverbeke, West, 2006, p. 1). The two directions of knowledge flows were termed *outside in* (or *inbound*) and *inside out* (or *outbound*). The concept breaks free from the inwardly focused product development culture and allows the use of either internal or external technology sources, starting R&D processes at any stage of product development, and going commercial with projects in many ways (for example, selling products through marketing channels, outlicensing, or establishing a new venture).

The key topics of publications within the *outside in* category were innovation sources (customers, suppliers, intermediaries, universities and scientific institutions, competitors, other companies), innovation networks, crowdsourcing, customer com-

munity integration, the use of innovation intermediaries such as InnoCentive, and the impact of open innovation on company performance (Laursen, Salter, 2006; Lettl *et al.*, 2006; Piller, Walcher, 2006; Enkel, Gassmann, 2008, 2010).

Publications focusing on *inside out* innovation study streams of income that increase revenue from licensing (IP and/or technology), joint ventures, spin-offs, and so on. As a rule, these instruments were implemented by large, multinational firms that had modified their business models in order to take advantage of licensing policies (Enkel, Gassmann, 2008; Chesbrough, 2007).

Originally, the concept of open innovation was exclusively based on theory. Consequently, it needed to be verified empirically. A study by Chesbrough and Brunswicker on OI in large companies (2013) was an attempt to fill the gap in quantitative research on open innovation. According to Gassman, Enkel and Chesbrough (2010), SMEs were underresearched in the open innovation literature. Such companies needed to command more interest from academics to help manage open innovation efficiently. The topic is still worth investigating, as the literature gives only a fragmented picture of the trend and no conclusive answer as to whether small and medium-sized companies can benefit from open innovation.

Open innovation in SMEs

While reviewing studies on open innovation practices in small and medium-sized companies, we focused on quantitative empirical research publications, which explored the relationships between the involvement of firms in OI and their performance.

A study by Zeng, Xie, and Tam (2010) examined the relationship between cooperation networks and the innovation performance of SMEs in China. The authors surveyed Chinese manufacturing SMEs focusing on inter-organizational cooperation aimed at complementing scarce resources, skills, and competencies. Like other authors (Bullinger *et al.*, 2004), they assumed that firms always benefit from cooperation with external network participants (universities, research institutes, suppliers, customers, and others). Zeng *et al.* (2011) surveyed 137 firms to determine the link between the innovation performance of SMEs (meaning firms with up to 500 employees) and their cooperation with other companies (including competitors), intermediary institutions, research organizations, and government agencies. The research results confirmed the existence of a significant positive relationship between the innovation performance of Chinese SMEs and their cooperation with network partners, except for government agencies. The authors found that direct cooperation with government agencies was far less important for boosting innovation than

government policies supporting the cooperation of SMEs with their partners. Unlike findings based on data from some Western countries, the Chinese results pointed to a relatively weak impact of cooperation with universities and research institutions on innovation performance. These differences support suggestions that OI practices are context dependent.

Van de Vrande *et al.* (2009) surveyed a relatively large sample of Dutch SMEs: 605 manufacturing and service companies involved in continuous innovation. The authors studied open innovation practices and motives to adopt OI by SMEs over a period of seven years. An additional objective was to identify major challenges facing companies undertaking to implement OI. To operationalize OI, the authors distinguished eight innovation practices related to both inbound and outbound innovation (technology *exploration* vs. *exploitation*) among small businesses (with 10–99 employees) and medium-sized firms (with 100–499 employees).

The computer-assisted telephone interviewing (CATI) method was used to collect the data. The questions asked were open ended, and the replies were coded by two researchers.

The results of content analysis led the authors to conclude as follows:

- The most frequently applied practices were customer involvement, external networking, and employee involvement.
- Half of the companies practiced R&D outsourcing.
- Activities such as outward and inward IP licensing, venturing, and capital investment in other companies were rarely practiced.
- Most of the SMEs were engaged in informal, unstructured practices, which usually did not require substantial investments.
- On average, OI was increasingly popular among SMEs.
- There were no major differences between manufacturing and service companies in the intensity of OI practices and implementation trends.
- Medium-sized firms were more advanced in adopting OI than small companies.
- The most important motives for adopting OI practices were market-related, which impacted customers' demand and in consequence financial performance.
- The key barriers to the implementation of OI were related to corporate organization and culture (the problem of inter-organization relationships), but there were also many other barriers mentioned by the surveyed companies.

Unlike with large firms, few publications focused on open innovation in SMEs active in high-tech industries. Parida, Westerberg, and Frishammar (2012) surveyed 252 high-tech Swedish SMEs in the IT industry in an attempt to detect the impact of four inbound open innovation practices. The self-administered questionnaire was sent out to the CEOs of the surveyed SMEs. Parida *et al.* (2012) distinguished the fol-

lowing inbound open innovation practices: technology scouting, vertical technology collaboration, horizontal technology collaboration, and technology sourcing.

"*Technology scouting* represents an internal search or scanning function related to systematically assessing and observing technology trends in order to detect opportunities and encounter threats in a timely manner" (p. 290). It can be very beneficial for SMEs, but at the same time harmful, due to an inclination to invest in too many ideas.

"*Horizontal technology collaboration* refers to opening the product development process for extending collaboration with actors or partners outside the value chain of SME" (p. 297).

"*Vertical technology collaboration* refers to the process of integrating inputs from present and potential customers, and end users" (p. 297). A good example of vertical technology cooperation is collaboration with lead users.

"*Technology sourcing* … is the process of accessing, using, and buying technologies from other firms and institutions for driving the product development process" (p. 297). It includes inward IP licensing.

Data analysis showed a positive correlation among all four inbound innovation activities and the innovation performance of firms.

It is widely believed that the competitive advantage of SMEs depends to a large extent on their innovativeness. In practice, however, only some SMEs are successful. Therefore, the question of whether SMEs should engage in open innovation and if so, under what circumstances, is very relevant. Van Hemert, Njikamp, and Masurel (2013) examined the successfulness of small and medium-sized firms in their innovation activities. They surveyed 243 Dutch SMEs, tracing their "sources of innovation, innovation capabilities, innovation performance and commercialization sources" (p. 425). The authors investigated two OI processes, exploration and exploitation. In their opinion, firms concentrating exclusively on the exploration process risk failure because they may experience problems covering their experimentation costs. On the other hand, exploitation (commercialization) without an innovation system renewal does not ensure long-term benefits (March, 1991). Hemert, Njikamp, Masurel (2013) studied companies' innovation and commercialization sources in relation to their capabilities and innovation performance (measured as a sales profit increase due to the introduction of new or modified products and/or the application of new/improved production/service processes). The authors assumed that greater use of sources of innovation "leads to higher innovation capabilities of SMEs" (Hemert, Njikamp, Masurel 2013, p. 435). As part of the exploration phase, universities and international partner networks were expected to increase the firms' innovation capabilities. This was believed to result in better innovation performance. The other expectation was that greater use of commercialization sources led to better innovation performance

(Hemert, Njikamp, Masurel 2013, p. 436). In this case, an improvement in innovation performance was seen as the consequence of relations with other firms, in particular competitors. Data analysis made it possible to confirm major hypotheses suggesting that universities and international networks were important sources of innovation, increasing SMEs' capabilities to develop new products and processes, and thus enhancing their performance. Innovation performance was additionally supported by contacts with competitors as commercialization sources, which suggested that the ability to exploit knowledge increased the chances of innovation success.

Though many researchers expect that OI has a positive impact on the performance of SMEs, Rosenbusch *et al.* (2011), referring to other authors (Van de Ven, 1986; Acs, Audresch,1988; Nooteboom,1994; Vossen, 1998; Nohria, Gulati, 1996), note that, in contrast to large firms, which have organizational capabilities and resources to face innovation challenges, SMEs usually lack both experience and the necessary resources. Moreover, small firms are in most cases unable to absorb the consequences of a market failure. Therefore their risk aversion seems to be much bigger than that of their larger counterparts. These observations lead Rosenbusch *et al.* to conclude that open innovation may have a vastly different impact on the performance of SMEs than in the case of large companies.

Table 15.1. Limitations to SMEs' engagement in OI, motivation to collaborate, and possible threats

Limitations due to *liability of smallness*	Motivations	Threats
Lack of resources for R&D	Access to external knowledge	Market failure consequences difficult to absorb
Insufficient human resources	Access to missing resources of capabilities	High direct costs of collaboration with large firms
Insufficient internal capabilities, skills and competencies	Risk sharing	High opportunity costs and collaboration with large firms
Lack of clear innovation procedures	Development cost reduction	Unfair sharing of innovation benefits between partners
Little knowledge among managers about benefits of OI	Advancement in product development	Abandoning internal innovation
Psychological barriers and risk aversion (organizational culture)	Increased flexibility	Abandoning developing firm's expertise
Organizational inertia, rigidity hinders business model innovations	Enhancing performance	Investing in too many ideas

Source: Authors' elaboration based on: Chesbrough, Crowther (2006); Chesbrough, Vandhaverbeke, West (2006); Henkel (2006); Van de Vrande, de Jong, Vanhaverbeke, de Rochemont (2009); Rosenbusch, Brinckmann, Bausch (2011); Parida, Westerberg, Frishammar (2012); Hemert, Njikamp, Masurel (2013).

Table 15.1 lists limitations experienced by SMEs in applying the OI model, along with their major motives to use this model and the most important challenges they may face as a result of implementing open innovation.

An empirical study by Rosenbusch *et al.* (2011), based on the findings of 42 other authors and published in articles between 1994 and 2009, made it clear that results of various researchers on innovation in SMEs were controversial. The authors suggested that these contradictory outcomes were a consequence not only of methodological limitations, but also of context-dependent links between innovation and performance. Rosenbusch *et al.* applied meta-analysis techniques to aggregate prior empirical research in order to determine the innovation-performance relationship and to identify possible impact moderators. The companies were based in North America, Europe, Asia, and Australia. The performance measures referred to whole companies (not single brands or products), and they were return-based, growth-based, stock-market-performance-based, and self-reported. Because of the lack of a universal innovation construct, the various innovation measures, such as innovation orientation indicators, internal innovation input indicators, external innovation input indicators, and output indicators, were applied (Kleinknecht, Van Montfort, Brouver, 2002).

The bivariate and multiple regression results led the authors to conclude that the innovation-performance relationship in SMEs was generally positive, but not all innovations were equally beneficial. They discovered that fostering innovation orientation was more beneficial, from the performance perspective, than focusing on innovation process outcomes, such as products or patents. Moreover, not all innovation sources seemed to be equally safe. The authors indicated that relatively small firms were unable to generate benefits from innovations in external collaboration with bigger partners due to high direct and opportunity costs. They pointed to the benefits of relying on internal innovation, which resulted in developing firms' expertise and keeping all performance advantages. The final findings concerned the innovation-performance relationship context factors. The most important of these turned to be the firms' age, type of innovation, and cultural environment. The evidence suggesting that the innovation-performance relationship is culture dependent calls for replicating research on SMEs innovation practices in various countries.

Rationale and objectives of the study

As shown in Table 15.1, the overview of major limitations, motivations and threats faced by SMEs in their OI-related practices highlights the complex nature of the problem. Despite apparent practical implications, an overview of existing literature sources

indicates that academic knowledge in this area is fragmented and inconclusive. A case in point is a meta-analysis by Rosenbusch *et al.* (2011), who managed to find only 42 empirical studies on the topic that had been published over the 20 years prior to their research. Only 12 of these studies analyzed a sample of more than 400 companies. Even fewer publications dealt with the adoption of OI by Polish small and medium-sized companies. The problem was briefly mentioned in a report by the Polish Agency for Enterprise Development (PARP, 2013). More in-depth analyses of inter-firm cooperation on innovations in Poland focused on manufacturers of electrical equipment and exporters (Gołębiowski, 2009; Gołębiowski, Lewandowska, 2010; Lewandowska, Gołębiowski, 2012a; Lewandowska, Gołębiowski, 2012b; Danik, Gołębiowski, 2012). The lack of a clear picture as to the adoption of OI by Polish SMEs and its influence on their performance calls for a more comprehensive investigation involving a large, representative sample of enterprises.

The Oslo Manual, a set of integral guidelines for the collection of innovation data (OECD, 2005), distinguishes several innovation categories, such as product, process, organizational, and marketing innovation. We chose to limit our research exclusively to product innovation. In terms of product innovation we are interested in both outbound and inbound innovation practices. According to previous studies, both forms of open innovation, i.e. inbound and outbound innovation, can help enhance business value, so in effect their combination could lead to an optimal business value level (Chesbrough, Crowther, 2006). Van Hemert *et al.* (2012) confirmed that a more intense use of sources of innovation leads to greater innovation capabilities for SMEs and better performance. In this context we are interested in answering the following main research questions:

- How many open innovation activities focused on product modification/development are practiced by Polish SMEs?
- Does the adoption of OI practices influence SME performance?

Many previous studies supported a hypothesis suggesting that OI adoption has a positive influence on company performance, but the possible threats resulting from SMEs' cooperation with external partners reported by some authors, and the possible unique features of national culture and organizational culture in small and medium-sized Polish firms, inspired us to investigate this relationship for Poland.

Concepts and definitions

For the purpose of this study, in keeping with the literature, we assume that open innovation activities can take two forms: inbound and outbound. Recognizing the role of interactions within a supply chain, we grouped inbound kinds of OI into those

that took place within a firm's supply chain (Intra-Supply Chain Open Innovation, or ISOI) and those involving actors from outside the supply chain (Off-Supply Chain Open Innovation, or OSOI).

Identification of particular innovation sources was based on the survey by Chesbrough and Brunswicker (2013). Of the whole set of innovation sources used by these authors, we left out only two, which, according to our experience, were not applied by Polish SMEs (they involved using knowledge intermediaries). We added a new source (imitating competitors), as we expected it to be of particular importance to SMEs. In line with van de Vrande *et al.* (2009), we supplemented our innovation sources list by including firm employees (those from R&D departments and other staff).

Inbound innovation. The intensity of inbound innovation was measured by the number of product development innovation sources. Arithmetically, this involved the summation of 15 binary question items.

Outbound innovation. Outbound innovation metrics provided information about the number of ways in which firms shared (i.e. sold or gave away freely) their unique knowledge with external parties. There were six binary question items for six different forms of outbound innovation.

Performance. We looked at the percentage share of new and modified products in a firm's total sales revenue in a year preceding the research as an indicator of how successful the firm's OI practices were.

Sampling method

This report uses data gathered in a survey conducted among managers in July and August 2014. The interviews were administered through the CATI approach. The final net sample included 473 cases with a response rate of 35%. Sample elements were drawn at random from a comprehensive database covering almost all industrial and consumer goods companies in Poland and kept by the research agency that was commissioned to conduct the interviews. A subsequent comparison of the net sample and the total population in terms of the distribution of known characteristics did not reveal any statistically significant differences. This suggests that the obtained return rate did not compromise general findings.

The sample was 47.4% composed of manufacturing and 52.6% of service companies. In all, 67.2% of businesses had between 10 and 50 employees and 32.8% were medium-sized firms with employment ranging from 51 to 250. All manufacturers were involved in food and non-alcoholic beverage production, while service companies operated in the hospitality industry (31%), food service (56%), or as travel and tourism agents (13%).

Statistical analysis

The empirical findings discussed in this paper cover the following themes and methods:

1. A review of the current state of open innovation activities by Polish small and medium-sized manufacturing and service companies with frequency distributions, chi-square tests of independence and t-tests.
2. A discussion of the effectiveness of open innovation sources in Polish companies based on a binominal correlation and multiple regression analysis.

The subsequent sections will elaborate on these topics.

State of open innovation in Polish small and medium-sized companies

Participating managers were asked which OI sources, internal or external to the supply chain of their companies, were used by their firms in developing new products or modifying existing ones. The scope of modifications was defined broadly to include not only interventions in the essential features of goods and services but also changes that only applied to product appearance or packaging. The time frame for the question was the preceding three years.

The comparison of innovation sources between manufacturers and service providers is given in the next two tables.

The tabulated data indicate that all the companies made use of ISOI and most of them also brought in novel ideas and technologies from outside their supply chain (412 firms).

Even though Chi-square tests of independence point to the existence of statistically significant differences, there seem to be similarities as well. The most frequently used sources of innovation, both internal and external, are the same for both sectors. Internal OI sources that were reported most often among manufacturers were suppliers (83%), other employees (meaning non-R&D staff, 79.9%), and consumers (78.6%). On the other hand, service firms commonly used insights from other employees (90%), consumers (83.5%), and suppliers (81.1%).

Table 15.2. Intra-supply chain sources of innovation by economic sector

Intra-supply chain sources of product innovation		Economic sector		Total
		Manufacturing	Services	
Business customers (e.g., distributors)	Count	134	141	275
	%	59.8	56.6	58.1
Consumers	Count	176	208	384
	%	78.6	83.5	81.2
Anonymous internet users	Count	21	73	94
	%	9.4	29.3	19.9
R&D employees	Count	120	88	208
	%	53.6	35.3	44.0
Suppliers	Count	186	202	388
	%	83.0	81.1	82.0
Other employees	Count	179	224	403
	%	79.9	90.0	85.2
Total	Count	224	249	473
	%	100	100	100%

Source: Authors' elaboration.

Table 15.3. Outside supply chain sources of innovation by economic sector

Outside supply chain sources of product innovation		Economic sector		Total
		Manufacturing	Services	
License purchases	Count	16	59	75
	%	8.2	27.2	18.2
Patent purchases	Count	10	19	29
	%	5.1	8.8	7.0
Technology purchases	Count	110	122	232
	%	56.4	56.2	56.3
Company acquisitions and takeovers	Count	15	21	36
	%	7.7	9.7	8.7
Copying competitors' solutions	Count	119	138	257
	%	61.0	63.6	62.4
Contracts with universities	Count	17	11	28
	%	8.7	5.1	6.8
Contracts with research institutes	Count	15	12	27
	%	7.7	5.5	6.6
Contributions from consultants	Count	34	45	79
	%	17.4	20.7	19.2
Total	Count	195	217	412
	%	87.1	87.1	87.1

Source: Authors' elaboration.

Regarding outside-supply chain sources, the two most popular drivers of innovations were copying competitor solutions (61% and 63.6% for manufacturing and services respectively) and technology purchases (56.4% and 65.2% respectively). The most visible difference between the two sectors was the prevalence of license purchases, especially by service companies due to the popularity of franchising in this sector.

Overall, even though both sectors were highly innovative (at least according to our definition of product innovation), it seems that the service sector was more so. This could likely be attributed to structural differences between the two sectors, with services facing more competitive pressure due to lower entry barriers and greater ease of modifying intangible products. In addition, more intensive and direct interactions with end customers in the service sector seem to result in a greater predominance of innovative ideas from consumers and employees, possibly owing to their more intense contacts with consumers compared with manufacturing.

The table below shows how the studied companies sold or gave away their innovative solutions.

Table 15.4. Outbound innovation practices by economic sector

Outbound innovation practices		Economic sector		Total
		Manufacturing	Services	
Sale of know-how	Count	24	39	63
	%	66.7	70.9	69.2
Free-of-charge know-how offering	Count	15	26	41
	%	41.7	47.3	45.1
Sale of licenses and patents	Count	1	2	3
	%	2.8	3.6	3.3
Free-of-charge offering of licenses and patents	Count	6	0	6
	%	16.7	0.0	6.6
Establishing spin-off companies	Count	4	10	14
	%	11.1	18.2	15.4
Establishing joint-venture companies	Count	2	3	5
	%	5.6	5.5	5.5
Total	Count	36	55	91

Source: Authors' elaboration.

The first and most obvious observation is that Polish companies are only marginally involved in diffusing their innovations. In the sample, only 19% of the surveyed firms reported any outbound innovation practices. Of these, by far the most typical for both manufacturers and service providers was the sale of know-how. A group of

companies was also involved in the complimentary offering of their solutions. There are two plausible explanations for this lack of activity: First, innovations developed internally by the companies are new only locally, with a limited value to external parties in potential gains to efficiency or effectiveness. Second, a number of the investigated firms may have been unwilling to disclose their novel technologies, tools and procedures for fear of compromising their competitive advantage. Thus, the relative inactivity in this regard could be attributed to a lack of valuable and original innovations; it could also be a cultural and attitudinal matter, or it could be both.

A common measure of the effectiveness of innovative activities is the percentage of sales from new and/or modified products in yearly revenues. The following three tables compare manufacturing and services in terms of the proportion of revenues from new products, modified products, and new and modified products combined.

Table 15.5. Revenues from the sale of new products by economic sector

Revenues from the sale of new products			Economic sector		Total
			Manufacturing	Services	
Percentage of 2013 revenues from the sale of new products introduced to the product range in preceding three years (i.e. from 2011 to 2013)	0%	Count	36	50	86
		%	16.1	20.1	18.2
	1–20%	Count	146	94	240
		%	65.2	37.8	50.7
	21–40%	Count	29	62	91
		%	12.9	24.9	19.2
	41–60%	Count	9	35	44
		%	4.0	14.0	9.3
	61–80%	Count	1	6	7
		%	0.4	2.4	1.5
	81–100%	Count	3	2	5
		%	1.4	0.8	1.1
Total		Count	224	249	473
		%	100.0	100.0	100.0

Source: Authors' elaboration.

The arithmetic means for the percentage of new and modified products for all companies were 15.4% and 16.3% respectively. Considered separately, manufacturers derived 11.4% of revenue from the sale of new products and 12.10% of revenue from selling modified products. To compare, service providers reported 18.9% for new products and 19.7% for modified products. When new and modified products are combined into a single variable, the means amount to 23.8% for food and beverage producers and 38.7% for service providers.

Table 15.6. Revenues from the sale of modified products by economic sector

Revenues from the sale of modified products			Economic sector		Total
			Manufacturing	Services	
Percentage of 2013 revenues from the sale of products modified in preceding three years (i.e. from 2011 to 2013)	0%	Count	39	48	87
		%	17.4	19.3	18.4
	1–20%	Count	145	98	243
		%	64.7	39.4	51.4
	21–40%	Count	21	54	75
		%	9.4	21.7	15.9
	41–60%	Count	15	39	54
		%	6.7	15.6	11.4
	61–80%	Count	3	8	11
		%	1.4	3.2	2.3
	81–100%	Count	1	2	3
		%	0.4	0.8	0.6
Total		Count	224	249	473
		%	100.0	100.0	100.0

Source: Authors' elaboration.

The differences between the two sectors are not only easily visible but also statistically substantiated by significant outcomes of t-tests of independence (not included in this report due to space constraints). It seems then that service firms were consistently more innovative in terms of not only innovation sources but also the proportion of revenues from modified products. The explanations are likely to be similar to those offered earlier: the main drivers of innovativeness in the service sector are arguably the stronger competitive pressures due to lower entry barriers and the relative ease of altering and developing new products compared with manufacturing.

Interestingly, the sample contained a group of firms (13.8%) that did not report any sales from newly introduced and modified products despite making attempts at innovating (as shown in Table 15.2, all firms reported using at least one source of innovation). Ruling out measurement errors, these businesses were apparently unsuccessful in implementing their innovations, which were either never launched in the market or were not accepted by consumers.

Table 15.7. Revenues from the sale of both new and modified products by economic sector

Revenues from the sale of new and modified products			Economic sector		Total
			Manufacturing	Services	
Percentage of 2013 revenues from the sale of products modified or newly introduced in preceding three years (i.e. from 2011 to 2013)	0%	Count	23	39	62
		%	10.9	16.5	13.8
	10%	Count	23	14	37
		%	10.9	5.9	8.3
	20%	Count	115	65	180
		%	54.5	27.5	40.2
	30%	Count	3	2	5
		%	1.4	0.8	1.1
	40%	Count	26	31	57
		%	12.3	13.1	12.7
	50%	Count	1	0	1
		%	0.5	0.0	0.2
	60%	Count	16	38	54
		%	7.6	16.0	12.1
	70%	Count	0	1	1
		%	0.0	0.4	0.2
	80%	Count	3	26	29
		%	1.4	11.0	6.5
	90%	Count	0	2	2
		%	0.0	0.8	0.4
	100%	Count	1	19	20
		%	0.5	8.0	4.5
Total		Count	211	237	448
		%	100.0	100.0	100.0

Source: Authors' elaboration.

Operational performance of open innovation sources

The issue of operational performance (or effectiveness) of OI is investigated here in two ways. First, Pearson correlation coefficients are computed between binary variables reflecting the use of respective innovation sources and the percentages of revenues from modified and new products. These statistics were used to establish which individual sources had the strongest contributions without accounting for other drivers of innovation. The second approach involved constructing multiple linear regression models with a stepwise selection of solutions with the best predictive powers. The models represented the combinations of innovation sources that explained most of the variance in terms of the percentage of revenues from new and modified products.

The following tables set out Person's correlation coefficients, identifying the most effective sources of innovation.

Table 15.8. Pearson's R correlation coefficients for correlations between the use of innovation sources and the percentage of revenues from new and modified products in 2013

Sources of innovation	Total sample Percentage of revenues from:			Manufacturers Percentage of revenues from:			Service providers Percentage of revenues from:		
	new products	modified products	new and modified products	new products	modified products	new and modified products	new products	modified products	new and modified products
Intra-Supply Chain Sources of Innovation									
Suppliers	**0.115**	**0.146**	0.156	**–0.051**	0.134	**0.065**	0.215	**0.177**	**0.233**
Business customers (e.g.. distributors)	0.090	**0.092**	0.108	0.067	0.062	0.081	0.121	**0.127**	**0.148**
Consumers	0.052	0.098	0.091	–0.030	0.025	0.001	0.080	**0.134**	**0.128**
Anonymous internet users	**0.114**	**0.133**	0.148	0.127	**0.122**	0.157	0.038	**0.069**	0.064
R&D employees	0.016	0.031	0.028	**0.152**	**0.137**	**0.182**	0.032	0.048	0.048
Other employees	**0.156**	**0.145**	**0.179**	0.163	**0.102**	**0.163**	**0.124**	**0.144**	0.159
Outside-Supply Chain Sources of Innovation									
License purchases	**0.203**	**0.264**	0.279	**0.109**	**0.148**	**0.164**	0.165	**0.246**	**0.245**
Patent purchases	**0.049**	**0.120**	**0.102**	**0.173**	**0.313**	**0.316**	–0.021	0.019	–0.001
Technology purchases	0.164	**0.080**	0.144	0.113	0.057	**0.103**	0.205	**0.097**	0.179
Company acquisitions and takeovers	0.198	**0.087**	0.167	**0.033**	–0.005	0.015	**0.275**	**0.128**	**0.237**
Copying competitors' solutions	**0.015**	0.113	0.079	**0.041**	0.207	**0.167**	–0.011	0.055	0.027
Contracts with universities	0.050	–0.008	0.024	0.008	–0.026	–0.014	0.120	0.034	0.090
Contracts with research institutes	0.059	0.056	0.069	–0.022	–0.002	–0.014	**0.126**	0.113	**0.142**
Contributions from consultants	**0.138**	**0.196**	**0.200**	**0.128**	**0.279**	**0.267**	**0.134**	**0.146**	**0.166**

Correlations significant at a 5% significance level were entered in bold typeface

Source: Authors' elaboration.

The correlations that are reliably different from zero are designated in bold. The same or very similar values of correlation coefficients are shown as statistically significant when the total sample is considered (i.e. the first three columns) and can become insignificant when subgroups of manufacturers and service provides are examined (e.g. R=0.114 for anonymous internet users is a significant correlation in the "total sample column," while R=0.127 computed for manufacturers is insignificant). This pattern is due not to error, but to the greater power of statistical tests for larger samples, and the total sample is roughly twice the size of the two subgroup samples.

Regarding the relative effectiveness of various sources of innovation, the data suggest that outside supply chain sources seem to be more strongly correlated with revenues from new and updated offerings. This observation is true for both manufacturing and services as well as for the sample as a whole.

Looking at intra supply chain sources, manufacturers seemed to benefit the most by deriving their innovations from R&D employees (R=0.182 for aggregated revenues from new and modified products), other employees (R=0.163), and anonymous internet users (R=0.157). Service firms enjoyed the greatest impacts from suppliers (R=0.233), other employees (R=0.159), business customers (R=0.148), and consumers (R=0.128).

Among outside supply chain sources, those with the strongest links to the percentage of revenues attributed to innovation were patent purchases (R=0.316), consultants (R=0.267), copying competitors' solutions (R=0.167), and license purchases (R=0.164). The service sector had a different combination of significant predictors, covering license purchases (R=0.245), acquisitions and takeovers (R=0.237), technology purchases (R=0.179), consultants (R=0.166), and contracts with research institutes (R=0.142).

The pattern of significant correlations suggests that the sources with the strongest associations and thus possibly the greatest contributions to revenues were often those that were not common among the studied firms (compare with Tables 15.2 and 15.3). These include R&D employees, internet users, patent purchases, and consultants. By the same token, consumers and suppliers, who were among the three most often-reported innovation contributors (see Table 15.2), were effective only among service firms and did not have a significant impact on innovation success among manufacturers.

Finally, even the strongest predictors of revenues offered little explanation of the dependent variance. After squaring the values of R it is possible to obtain estimates of the explained variance. For example, an innovation source with R of 0.2 explains only about 4% of revenue variability. A more holistic approach is offered by regression analysis, which includes several of the best predictors in each model. The tables with three regression models come next.

Table 15.9. A multiple linear regression model predicting the percentage share of new and modified products in companies' total 2013 revenues on the basis of companies' use of innovation sources (stepwise, OLS estimation for manufacturing and service companies)

Model components (manufacturing and service companies)	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	11.847	3.747		3.162	0.002		
license purchases	15.191	3.290	0.211	4.618	0.000	0.925	1.081
other employees	10.516	3.370	0.139	3.121	0.002	0.968	1.033
contributions from consultants	10.100	3.195	0.142	3.161	0.002	0.960	1.042
company acquisitions and takeovers	12.402	4.394	0.126	2.822	0.005	0.967	1.034
suppliers	7.039	3.138	0.100	2.243	0.025	0.965	1.036
Effect size metrics: R=.386; R squared=0.149							

Source: Authors' elaboration.

Table 15.10. A multiple linear regression model predicting the percentage share of new and modified products in companies' total 2013 revenues on the basis of companies' use of innovation sources (stepwise, OLS estimation for manufacturing companies)

Model components (only manufacturing companies)	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	14.227	2.652		5.365	0.000		
patent purchases	24.661	5.738	0.273	4.298	0.000	0.978	1.023
contributions from consultants	10.468	3.096	0.215	3.381	0.001	0.977	1.023
R&D employees	4.797	2.190	0.138	2.190	0.030	0.987	1.013
other employees	5.531	2.727	0.128	2.028	0.044	0.990	1.010
Effect size metrics: R=.435; R squared=0.189							

Source: Authors' elaboration.

The regression models were developed via a stepwise procedure, which is an exploratory technique that yields solutions with the greatest predictive power. The statistical routine includes predictors one by one, looking at the value and significance of the partial correlation. The process ends when no predictor variable can be entered into the model that would have a significant contribution to the explained variance in the dependent variable. The amount of the explained variance is given by the coefficient of determination (R-squared) placed in a separate row at the bottom

of each table. The R-squared values show that the selection of innovation sources was responsible for anywhere from 14.9% (for the whole sample) to 17.2% (services) to 18.9% (manufacturing) of the diversity in revenues from innovative products. The rest of that amount seemed to be due to factors not controlled by the models. The standardized beta values provide information about the relative importance of the variables as predictors. As such, the greatest contribution in all three models came from OI sources external to the supply chain. This finding corresponds with what was said earlier, based on simple binominal correlations. The innovation sources that were excluded from the equations were left out because they explained an insufficient amount of the unique variance compared with the variables admitted as predictors.

Table 15.11. A multiple linear regression model predicting the percentage share of new and modified products in companies' total 2013 revenues on the basis of companies' use of innovation sources (stepwise, OLS estimation for service companies)

Model components (only service companies)	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	21.170	4.355		4.862	0.000		
license purchases	19.071	4.801	0.264	3.972	0.000	0.814	1.228
company acquisitions and takeovers	20.741	6.905	0.188	3.004	0.003	0.911	1.098
suppliers	14.926	4.829	0.187	3.091	0.002	0.978	1.022
patent purchases	–22.419	8.079	–0.195	–2.775	0.006	0.729	1.372
contracts with research institutes	19.346	9.405	0.136	2.057	0.041	0.825	1.212
Effect size metrics: R=.415; R squared=0.172							

Source: Authors' elaboration.

All three equations satisfy the assumptions of a lack of multicollinearity among independent variables, homoscedasticity and normality of residuals, which suggests that the models are stable and likely to replicate in different samples drawn from the same population of companies.

Conclusions

The above study on the state of OI in Polish companies, its effectiveness, and its impact on operational and financial performance, makes it possible to formulate the following general conclusions:

- All investigated companies, regardless of their sector affiliation, used at least one OI source.
- The most common OI sources were non-R&D employees (85% of the whole sample), suppliers (82%), and consumers (81%).
- The least popular OI sources were patent purchases (6% of the sample), contracts with universities (6%), and contracts with research institutes (6%).
- Service companies were more innovative on average in that they used more IO sources.
- Outbound OI practices were rare in both sectors; only 19% of studied companies reported sharing their knowledge.
- The relatively most frequent outbound OI practice was the sale of know-how.
- The mean percentage of revenues from the sale of modified and new products in the whole sample was 15.4% and 16.3% respectively.
- Service companies had a significantly greater percentage of new and modified products in total sales revenues than manufacturers (18.9% vs. 11.4% for new products and 19.7% vs. 12.1% for modified products).
- For manufacturers, the strongest correlations between the use of innovation sources and the percentage of revenues from new and modified products were found for patent purchases (R=0.316), contributions from consultants (R=0.267), R&D employees (Pearson's R=0.182), copying competitors' solutions (R=0.167), license purchases (R=0.164), non- R&D employees (R=0.163), and anonymous internet users (R=0.157).
- Service firms had the strongest correlations for license purchases (R=0.245), acquisitions and takeovers (R=0.237), suppliers (R=0.233), technology purchases (R=0.179), consultants (R=0.166), non-R&D employees (R=0.159), business customers (R=0.148), contracts with research institutes (R=0.142), and consumers (R=0.128).
- Regardless of the type of company (whether dealing with services or manufacturing), the OI sources that were the most strongly associated with the percentage of sales from new and modified products came from outside the company's supply chain (e.g. the purchase of licenses and patents, and contributions from consultants). This seems to indicate that inspirations and solutions obtained from parties other than regular business partners and customers are often more innovative and easier to implement.
- Multiple regression models showed that the structure of adopted OI sources accounted for 17.2% of the variance in the percentage of revenues from new and modified products in the service sector and for 18.9% in manufacturing.

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Chapter 16

Eco-Innovation Drivers: The Results of a Community Innovation Survey

Małgorzata Stefania Lewandowska

Introduction

Global warming, shrinking natural resources, pollution control, and the latest financial crisis are all factors that add to the ongoing debate on what creates a "healthy economy." Proponents of the so-called Green New Deal (UNEP, 2009) or Green Growth (OECD, 2011) are pushing for stricter environmental regulations, expecting that this will facilitate the promotion of a low-carbon economy and a green economy (UNEP, 2011), and thus contribute to economic growth.

At the heart of this debate is the concept of eco-innovation, defined as "the introduction of any new or significantly improved product (good or service), process, organizational change or marketing solution that reduces the use of natural resources (including materials, energy, water, and land) and decreases the release of harmful substances across the life-cycle" (EIO, 2010). This shows that the concept of eco-innovation has spread from environmental protection to all industries.

With this in mind, the aim of this chapter is to examine the eco-innovation performance of European Union members. It also provides insight into the role of eco-innovation drivers in EU countries. This includes existing and expected government regulations and taxes on pollution as well as government grants, subsidies and other financial incentives for environmental innovation; current and expected market demand from customers for environmental innovations and voluntary codes, and agreements for environmental good practice in specific sectors.

The last section of this chapter offers a statistical analysis of eco-innovation drivers based on a set of anonymized firm-level micro-data derived from the Community Innovation Survey 2006–2008 among enterprises in the Czech Republic, Germany, and Romania.

Theoretical background

Eco-innovation, also known as green or sustainable innovation, can be defined as the development of new products, processes, services, and technologies that contribute to the development and well-being of human needs and institutions, while respecting the world's natural resources and regenerative capacity (Gerlach, 2003; Yoon and Tello, 2009). This definition reflects the Corporate Social Responsibility (CSR) approach and is consistent with the definitions of sustainable development that emphasize the integration of ecological, social, and economic dimensions along with a sense of responsibility to existing and future generations.

Sustainable/eco-innovation differs in several major ways from "traditional" innovation (Yarahmadi and Higgins, 2012).

First, environmental innovation is not an open-ended concept. It explicitly accentuates the need to reduce environmental footprints, whether these are intended or not (OECD, 2009).

Second, environmental/eco-innovation is not limited to innovation in product, process, marketing, or organizational methods, but leads to changes in social norms, cultural values, and institutional structures. Some researchers argue that environmental/eco-innovation requires more intense R&D cooperation with external partners (suppliers, Knowledge-Intensive Business Services [KIBS], and universities) than other types of innovation (de Marchi, 2012). The importance of eco-innovation as one of the drivers of firms' business model reconfiguration is also underlined in the literature (Szymura-Tyc and Bałon, 2011).

Innovation theory stresses the importance of technology push and market/demand pull factors as the determinants of firms' innovation activities. Most scholars agree that technology push factors are especially important during the initial phase of developing a new product, whereas demand factors become more important during the diffusion phase (Pavitt, 1984).

In the case of eco-innovation, economic returns on R&D in environmental technology are lower than the social return, and hence firms are not strongly determined to invest in this kind of innovation. Importantly, eco-innovation can produce positive spillovers in both the introduction and diffusion phases, which requires even more investment from the firm. This "double externality" problem reduces the will to invest in eco-innovation and is considered to be another key determinant of the introduction of eco-regulations (Kemp, 2000).

With eco-innovation, regulatory regimes driven by technical standards, either in a command-and-control system or in a system based on voluntary agreements

between the government and industry, are not cost-efficient. That is why the power of such regimes disappears when the standards are met. However, their efficiency can be strongly improved by the introduction of permanent reductions or by repeated negotiations of voluntary agreements (Rennings, 2000).

The determinants of eco-innovation are summarized in Table 16.1.

Table 16.1. Determinants of environmental/eco-innovation

Type of determinants	Characteristics
Technology Push/Supply-side determinants	Technological capabilities (material efficiency, product quality, product range, energy efficiency); R&D activities; human capital endowment; appropriation problem and market characteristics.
Market Pull/Demand side determinants	Expected increase in market share or penetration of new market segments; Social awareness of the need for clean production; environmental consciousness and preference for environmentally-friendly products.
Regulatory Push/ Institutional and political determinants	Implementation and institutionalization of environmental policy instruments: economic and regulatory instruments. Regulatory design: stringency, flexibility, time frame, anticipation of future environmental regulations. Institutional structure: e.g. political opportunities of environmentally-oriented groups, organization of information flow, existence of innovation networks, expected regulations.

Source: Own compilation based on Rennings (2000), Horbach (2008), Horbach *et al.* (2013).

Traditionally, environmental protection was treated as an additional cost imposed on a firm that may eat away its competitiveness, as it forces the firm to allocate some of its resources to pollution reduction, which is inefficient from the business perspective. This view was questioned by many scholars, including Michael Porter (Porter, 1991) and his co-author Claas van der Linde (Porter and van der Linde, 1995b) (for a debate on Porter's hypothesis see the literature review: Ambec, 2011). Porter and van der Linde argue that more severe, but correctly designed regulations can "trigger innovation … that may partially or more than fully offset the costs of complying with them" (Porter and van der Linde, 1995a, p. 98).

Meanwhile, Zadek (2006) argues that responsible business practices can become a driver of regional or national competitiveness and that a competitive advantage can result from sustainability-oriented interactions between the business community, labor organizations, civil society, and public sector institutions.

Eco-innovation performance of EU member countries

The transition to a resource-efficient, low-carbon economy is a central pillar of the EU's Europe 2020 Strategy for its economy for the next decade (EC, 2010). One

of the seven most important proposals of the Europe 2020 Strategy is an "Innovation Union." The Eco-Innovation Action Plan (EcoAP), which was introduced in December 2011 and replaced the Environmental Technology Action Plan (ETAP), is designed to improve the market's acceptance of eco-innovation. The plan's goals are to benefit the environment, create growth and jobs, and ensure a more efficient use of increasingly scarce resources. It focuses on specific bottlenecks, challenges, and opportunities for achieving environmental objectives through technological and non-technological innovation. In order to enhance the diffusion of eco-innovation, EcoAP aims to remove the biggest barriers to eco-innovation by optimizing the use of existing resources and mobilizing financing.

To confirm Poland's respect for the principles of environmental policy, the Polish government adopted its first (1991), second (2000) and third (2008) Environmental Policies (MŚ, 2008) and it also approved all of the EU's international programs designed to protect the environment.

To monitor the eco-performance of EU member states, the European Union has introduced a tool known as the Eco-Innovation Scoreboard (Eco-IS). The aim is to assess the eco-innovation performance of member states and complement other measures of innovativeness.

The Eco-Innovation Scoreboard indicators are divided into five components: eco-innovation inputs (including early-stage investment in clean technology); eco-innovation activities (for example, the percentage of firms taking resource efficiency measures); eco-innovation outputs (such as patents); resource efficiency performance; and socioeconomic outputs (such as turnover, employment, and exports). Indicators developed to reflect eco-innovation turnover and employment provide information about waste, recovery, and recycling, and, for the first time, repair, maintenance and rental services.[1]

The Eco-IS complements other measures of the innovativeness of EU countries and aims to promote a holistic view on economic, environmental, and social performance. However, the scores can be influenced by many structural factors, such as the relative importance of different industrial sectors or economic trends in each country (Eco-IS, 2013). Table 16.2 presents the results of Eco-IS for 2010–2013.

The results of the Eco-IS covering the 2010–2013 period showed striking differences between the EU15 and new member states in the overall eco-innovation performance. The top-ranking EU countries in terms of eco-innovation were Finland, Sweden, Germany, Denmark, and the United Kingdom. All of them scored higher

[1] The 2013 version of the Eco-IS consists of 16 indicators from nine different sources of data. These were the same indicators as those used in the 2012 version. Thirteen indicators were updated, with most of the updates based on data for 2010 and 2012 (for more information see: http://www.eco-innovation.eu).

than the EU28 average. In general, northern and western EU countries significantly surpassed countries from eastern and southern Europe.

Table 16.2. Ranking of EU member states based on the results of the Eco-Innovation Scoreboard for 2010–2013

Country	2010	2011	2012	2013
Finland	156	149	150	138
Sweden	128	142	134	138
Germany	139	123	120	132
Denmark	155	138	136	129
United Kingdom	103	105	101	122
Spain	101	128	118	110
Luxembourg	94	130	108	109
France	96	99	96	108
Austria	131	125	112	106
Belgium	114	115	118	101
Ireland	101	118	113	95
Italy	98	90	92	95
Netherlands	110	109	111	91
Portugal	72	81	84	79
Slovenia	75	109	115	74
Estonia	56	74	78	72
Czech Republic	73	91	90	71
Malta	66	82	72	67
Greece	55	59	67	66
Lithuania	45	52	53	66
Romania	52	67	78	63
Hungary	70	83	73	61
Croatia	0	0	0	57
Latvia	60	77	71	52
Slovakia	48	52	54	47
Cyprus	64	71	74	43
Poland	**54**	**50**	**54**	**42**
Bulgaria	58	67	80	38

Note: In order to standardize the indicators, the "distance-to-reference" method is used, with the EU average defined as the reference value set at 100.
Country-specific figures referring to individual indicators are weighted with the share of the population in order to calculate the EU average, which corrects for the bias of smaller member states; http://database.eco-innovation.eu/indicators/view/269/1

Source: Own compilation based on the Eco-Innovation Scoreboard 2013.

Poland is among the countries that have scored low on the European Eco-Innovation Scoreboard since 2010. In the 2013 scoreboard, Poland was last among EU countries for the second time, with a score significantly below the EU average (42 out of 100) and less than one-third the level of Finland, the EU eco-innovation leader.

Poland performed poorly in all scoreboard indicators, particularly in R&D and innovation investment, early-stage investment in green technology, and the economic outcomes of eco-innovation.

Although the overall picture is unimpressive, long-term trends indicate that Poland has a chance to upgrade its production processes, particularly in resource-intensive sectors. Thus eco-innovation, which leads to cost savings and higher resource productivity, should be one of the fundamental components of Polish innovation policy. The aim of the sustainable development strategy introduced in Poland should be to limit the existing imbalances between economic and social growth and also between socio-economic development and the natural environment (Kasztelan, 2010).

The development and implementation of eco-innovative technologies in Poland is now supported by key national and regional strategies. The "Dynamic Poland" Strategy for Innovation and Economic Efficiency (SIEE) is one of nine strategies that constitute the National Development Strategy until 2020. The latter is in line with the EU's Europe 2020 development strategy.

The "Dynamic Poland" strategy is being implemented through the Enterprise Development Program 2020, which delivers a broad catalogue of instruments designed to support the development of innovation and entrepreneurship in Poland. A number of "smart specialization" areas have also been identified at the national level. These include eco-innovation topics such as waste reduction, reuse and recycling, sustainable transport, energy-efficient construction, water efficiency technologies, and material substitution (KIS, 2014).[2]

Eco-innovation drivers in EU member states: an overview

The data on eco-innovation drivers presented in this section comes from Eurostat's CIS 2006–2008[3] database.

[2] Up-to-date information on Poland's "smart specialization" strategy is available at the Ministry of the Economy website (www.mg.waw.pl). In the future, information will also be posted on a special website focusing on these issues (under construction).

[3] The Community Innovation Survey (CIS) is a survey on the innovation activity of enterprises in EU member states, EU candidate countries, Iceland and Norway. The CIS is based on a survey questionnaire and methodology recommended in the third Oslo Manual, ed. 2005, in order to obtain uniform, comparable, and reliable statistical results. The CIS is designed to obtain information on innovation activities

Table 16.3 shows that, among five different potential eco-innovation drivers, respondents most often listed existing environmental regulations and taxes on pollution (29 percent of all EU enterprises that introduced eco-innovation in 2006–2008 on average), followed by voluntary codes and sector agreements (26 percent on average), expected environmental regulations and taxes (22 percent on average), and customer demand (19 percent on average).

Enterprises from more than half of the surveyed countries most frequently mentioned existing environmental regulations and taxes on pollution among the five different eco-innovation drivers. The highest percentages were recorded for Hungary, the Czech Republic, and Lithuania. This driver was also frequently mentioned by Polish manufacturing enterprises, unlike in the case of Finnish and Swedish enterprises, where existing environmental regulations and taxes on pollution were mentioned less often – ranking fourth on the list of eco-innovation drivers.

Voluntary codes and sector agreements were identified as the most important driver in six countries and as the second most important driver in seven of the 22 surveyed countries. The highest percentage of those mentioning this driver was recorded in Luxemburg (57 percent) and Portugal (44 percent).

Expected environmental regulations and taxes were ranked as the second or third most important driver in most countries. The highest percentage was recorded in Hungary (42 percent of respondents). In Poland, the figure was 20 percent and was slightly lower than the average in all surveyed countries as a whole.

Customer demand was ranked as the fourth most important eco-innovation driver in 13 of 22 researched countries. This particular driver was identified most frequently in Sweden and Finland.

Government grants, subsidies and other financial incentives for the introduction of eco-innovation seem to be the least important eco-innovation. They were mentioned least frequently among the five drivers in all surveyed countries.

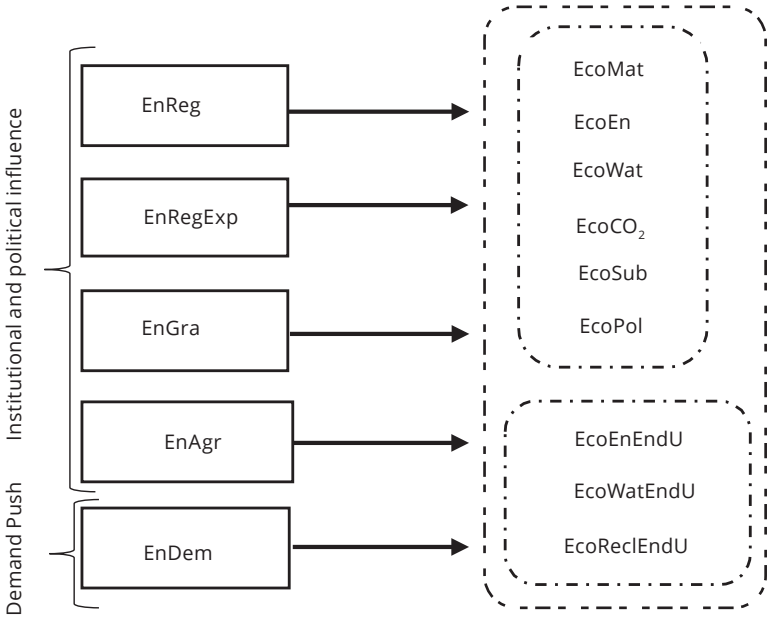
Empirical research on eco-innovation drivers in Bulgaria, the Czech Republic, and Germany

This section offers an empirical analysis of statistically important relationships between potential eco-innovation drivers (institutional, political, and market deter-

within enterprises as well as on expenditure on process and product innovations, public financial support for innovation activities, sources of information and cooperation in innovation, and innovation objectives. The CIS also contains data on the introduction of organizational and marketing innovations and their objectives (CIS 2008).

minants) and the introduction of eco-innovation, divided into two groups: innovation with environmental benefits for the innovating enterprise and eco-innovation beneficial for end users. A conceptual model of the research is presented in Figure 16.1.

Figure 16.1. Conceptual model of eco-innovation drivers



Where:
ENReg – Existing environmental regulations or taxes on pollution; *ENRegExp* – Expected environmental regulations or taxes; *ENGra* – Availability of government grants, subsidies or other financial incentives for environmental innovation; *ENDem* – Current or expected market demand from customers for environmental innovations; *ENVolAgr* – Voluntary codes or agreements for environmental good practice in a specific sector; *EcoMat* – Reduced material use per unit of output; *EcoEn* – Reduced energy use per unit of output; *EcoCO*$_2$ – Reduced CO_2 production by enterprise; *EcoSub* – Reduced materials with less polluting substitutes; *EcoPol* – Reduced soil, water, noise or air pollution; *EcoWat* – Recycled waste, water, materials; *EcoEnEndU* – Reduced energy use by the end user; *EcoAPolEndU* – Reduced air, water, soil or noise pollution; *EcoRecEndU* – Improved recycling of product after use.

Source: Own elaboration.

The detailed operationalization of the studied indicators is presented in Table 16.4.

The analysis is based on anonymized firm-level micro-data from the Community Innovation Survey (CIS) for 2006–2008 covering 15,860 firms from Bulgaria, 6,805 from the Czech Republic, and 6,027 from Germany. The preliminary sample consists of small businesses (under 50 employees), medium-sized companies (50 to 249 employees), and large enterprises (more than 249 employees) from NACE sections A to N. The CIS 2006–2008 also included an optional one-page set of 15 questions on environmental innovation that concerned the types of eco-innovation potentially introduced by

the surveyed firms and eco-innovation drivers. However, the issue of the influence of regulations and pollution taxes was not split into two questions. Nor was it clear whether the eco-innovation introduced had been developed in-house or in cooperation with outside partners, or whether it had been purchased.

For the purpose of this research, firms from sectors with a potentially higher environmental impact were extracted from each country sample. Those were: enterprises from section B (mining and quarrying); section C (manufacturing); section D (electricity, gas, steam and air conditioning); and section H (transportation and storage). The structure of the samples is presented with the use of Chi-square with column proportions to statistically verify significant differences between samples from the three surveyed countries ($p<0.05$) (see Table 16.5 for details).

Poland's Central Statistical Office (GUS) does not release for research purposes the CIS micro data it has collected and made available to Eurostat. For this reason, the results for Bulgaria will be used as a proxy for those for Poland, as the rankings are similar for these two countries in both the Eco-Innovation Scoreboard and the Innovation Scoreboard, although this year Poland – after being downgraded from a *moderate* to *modest innovator* last year – returned to the group of *moderate innovators* and achieved an innovation performance level of just above 50% of the EU average, according to the IUS 2013 (Innovation Union Scoreboard, 2014).

The exploratory nature of this part of the chapter influenced the data analysis methods. To answer the research questions, an exploratory factor analysis (Oblimin rotation), a linear regression, and Z Fisher analysis were used.

A factor analysis of innovation objectives using Oblimin rotation (KMO=0.872; $x^2(36) = 289245{,}67$; $p<0.001$) made it possible to determine two underlying factors that explain 65.46% of the variance. The first factor, called "environmental benefits from the production of goods or services within the enterprise," explains 35.88% of the variance (Crombach's $\alpha = .856$), and the second factor, "environmental benefits from the after-sales use of goods or service by the end user," explains 29.58% of the variance (Crombach's $\alpha = .781$). Details are given in Tables 16.6 and 16.7.

The results of the linear regression for the causal effect of several drivers and different types of eco-innovation for Bulgarian, Czech, and German enterprises are presented in Table 16.8. In order to construct a ranking of all five drivers, Z Fisher analysis was used.

The results for the rotated component embracing all types of eco-innovation beneficial for the enterprise (*EcoEnt*) show that existing environmental regulations are the most important and statistically strongest eco-innovation driver for Bulgarian enterprises. In the Czech Republic, existing regulations have the same impact on the introduction of eco-innovation as voluntary codes and sector agreements, whereas

in Germany customer demand, voluntary codes and expected environmental regulations are seen as equally important and statistically strongest eco-innovation drivers.

When analyzing each type of eco-innovation separately, it is possible to observe that in Bulgaria, existing environmental regulations have the strongest and significantly greater impact than other drivers, so the pattern is similar to that obtained using the rotated component.

In the case of Czech enterprises, when analyzing each type of eco-innovation separately, we can observe that existing environmental regulations have a far greater importance in encouraging the use of environmentally friendly materials and of methods to reduce soil, water, noise, and air pollution. Existing environmental regulations also play a major role in stimulating eco-innovation designed to enhance waste, water and material recycling. As for other eco-innovations, expected regulations are another important eco-innovation driver, alongside existing regulations, voluntary codes and agreements. Customer demand appears to be as important as other drivers only in the case of eco-innovations designed to reduce the use of materials.

In the case of German enterprises, the list of key eco-innovation drivers with a comparable impact is longer. Customer demand is as important to each type of eco-innovation as voluntary codes and agreements. In the case of eco-innovations designed to reduce the use of materials, limit total CO_2 emissions, or recycle waste, expected regulations seem to be of equal importance, whereas in the case of eco-innovations based on using environmentally friendly materials as well as those designed to reduce noise, soil, water, and air pollution, existing environmental regulations have a comparable, strong impact.

In the case of eco-innovations designed to generate benefits from the after-sales use of goods by the end user, the pattern of eco-innovation drivers varies among the three countries. In Bulgaria, existing environmental regulations and customer demand are the main eco-innovation drivers. In the Czech Republic, existing and expected environmental regulations are the most important drivers, whereas in Germany the key drivers are customer demand, voluntary codes and agreements, and expected environmental regulations.

Based on the results of the analysis, especially in the case of Bulgaria, we can argue that the spectrum of eco-innovation drivers in the case of eco-innovation designed to benefit the end user is much broader than in the case of eco-innovation beneficial only for the enterprise. One of the reasons may be that most companies are engaged in value chains, which promotes eco-innovation sharing and corporate learning through mutual knowledge flows. This is beneficial to companies because knowledge transmitted along a value chain is less apparent and consequently more difficult to imitate (Carter and Rogers, 2008).

Based on these results, we can argue that eco-innovation cannot be exclusively viewed as a systematic response to regulation. Similarly, customer demand and public pressure alone, though essential for eco-innovation (Horbach, 2008), will not provide sufficient motivation for enterprises (Rennings, 2000). Only a broader policy, based on several sources of incentives, can convince enterprises to introduce eco-innovation and follow the path of sustainable economic growth.

It also seems that the authorities are not taking full advantage of the potential of eco-innovation grants and subsidies because the efficacy of these incentives is highly limited compared with other eco-innovation drivers. This may be because grants designed to directly correct market failures resulting from underinvestment in innovation, have many drawbacks, such as an information asymmetry between the innovator and the government agency, bureaucracy and costly procedures, corruption, and political pressure (Czarnitzki, Hanel & Rosa, 2011).

On the other hand, studies point to an increased impact of policies combining regulations and taxes with subsidies, particularly for the adoption of innovations designed to reduce CO_2 emissions (Veugelers, 2012). This complementarity between policy instruments may be a way to better leverage the impact of subsidies.

Although the research was based on a representative sample of enterprises from the three surveyed countries, the analysis had its limitations. It covered only a single-period panel of CIS data, which limits the possibility of assessing long-term trends related to the studied causal effects. Limitations were also caused by the structure of the CIS questionnaire itself. It lacked information on the firms' age, the share of foreign ownership, and strategic motives for the introduction of eco-innovation. To an extent, statistically significant differences among the surveyed samples could have biased the results of the study, especially due to differences (among the studied countries) in the firms' size, intensity of introducing various types of innovation, and target sales markets. Nor was the complementarity of eco-innovation drivers investigated.

However, the presented analysis is based on a representative sample of enterprises, which means its results, to a large extent, accurately reflect the actual casual relationships between eco-innovation and their drivers.

Conclusions

Eco-innovation should be viewed as a key driving force for the Polish economy. In this context, a well-designed and properly implemented eco-innovation policy should become a priority for the Polish authorities (Grodzka and Zygierewicz, 2008). The results of this study show that environmental regulations are seen as an important

eco-innovation driver that can help enhance the sustainable growth of firms (Prahalad and Hammond, 2002; Hall and Vredenburg, 2003) and consequently positively influences the economy as a whole. It should be stressed, however, that if environmental standards are to foster eco-innovation, they have to stick to three important principles: they must create an enabling environment for innovation, leaving the approach to innovation to industry and not standard-setting organizations; they should promote continuous improvement rather than locking in any particular technology, and the regulatory process should leave as little room for uncertainty as possible at each stage of the process (Porter and van der Linde 1995a, 1995b).

The results of the analytical part of this study – especially those for German enterprises, where the spectrum of eco-innovation drivers is much broader than in less well-developed economies such as Bulgaria and the Czech Republic – show that government efforts should be based not only on changing existing environmental policies but also on laying the groundwork for a legal and institutional environment that would promote changes in education. The government should also strive to ensure a model of civic and corporate behavior in which the idea of shared responsibility would play a central role. EU countries, including Poland, have already taken action to implement a green economy model in which development is disconnected from material and energy use. It is crucial that the government not only adopts policies that impose restrictions and regulations, but combines these with subsidies and promotion of companies that seek and implement eco-innovation (Kassenberg, 2011; Miedziński, 2013).

Polish companies tend to take a short-sighted view of profit making. They should understand that in the long term investment in eco-innovation – based on R&D and collaboration with the science and public sectors – will give them a competitive advantage far greater than those related to the traditional economy (Wizja 2050).

Table 16.3. Key eco-innovation drivers in EU member states in 2006–2008, based on responses (%) from innovative enterprises (including enterprises that either abandoned or suspended their innovation activities in the analyzed period)

Country	Existing environmental regulations or taxes on pollution	Expected environmental regulations or taxes on pollution	Government grants, subsidies or other financial incentives	Market demand from customers	Voluntary codes or agreements within sector
Belgium	26(2) *	20(3)	11(5)	13(4)	31(1)
Bulgaria	9(1)	6(2)	2(5)	4(4)	5(3)
Czech Republic	45(1)	32(2)	8(5)	16(4)	26(3)
Germany	22(1)	20.6(3)	6(5)	20(4)	21(2)
Estonia	31(2)	25(3)	7(5)	20(4)	33(1)
Ireland	34(1)	25(4)	13(5)	30(3)	31(2)
France	26(1)	16(4)	7(5)	18(3)	24(2)
Croatia	43(1)	35(3)	11(5)	23(4)	36(2)
Italy	25(1)	19(2)	13(5)	14(4)	15(3)
Cyprus	11(2)	8(3)	5(5)	6(4)	20(1)
Latvia	19(2)	13(4)	6(5)	15(3)	38(1)
Lithuania	45(1)	34(2)	14(5)	27(3)	19(4)
Luxembourg	24(2)	22.7(4)	7(5)	23(3)	57(1)
Hungary	50(1)	42(2)	4(5)	37(4)	39(3)
Malta	31(1)	30.9(2)	9(5)	12(4)	14(3)
Netherlands	14(3)	12(4)	8(5)	18(1)	17(2)
Poland	**29(1)**	**20(2)**	**6(5)**	**15(4)**	**16(3)**
Portugal	38(2)	21(4)	8(5)	23(3)	44(1)
Romania	42(1)	23(2)	11(5)	18(4)	20(3)
Slovakia	44(1)	30(2)	7(5)	14(4)	24(3)
Finland	18(4)	20(3)	8(5)	33(1)	30(2)
Sweden	10(4)	13(3)	3(5)	15(1)	14.7(2)
Average	29(1)	22(3)	8(5)	19(4)	26(2)

* Note: The numbers in parentheses indicate the rank of an eco-innovation driver in each country (comparison in rows).

Source: Own compilation based on Eurostat's CIS 2006–2008 data., http://epp.eurostat.ec.europa.eu/portal/page/portal/science_technology_innovation/data/database

Table 16.4. Description and construction of variables

Variable	Description and construction of variables
	Variable – "Eco-innovation drivers"
EnReg	"1" if a firm introduced an environmental innovation in 2006–2008 in response to existing environmental regulations or taxes on pollution; "0" otherwise
EnRegExp	"1" if a firm introduced an environmental innovation in 2006–2008 in response to expected environmental regulations or taxes; "0" otherwise
EnGra	"1" if a firm introduced an environmental innovation in 2006–2008 in response to the availability of government grants, subsidies or other financial incentives; "0" otherwise
EnDem *EnAgr*	"1" if a firm introduced an environmental innovation in 2006–2008 in response to current or expected market demand from customers; "0" otherwise "1" if a firm introduced an environmental innovation in 2006–2008 in response to voluntary codes or agreements for environmental good practice within its sector; "0" otherwise
	Variable – "introduction of eco-innovation"
Group 1 – Eco-innovations within enterprise *EcoEnt*	
EcoMat	"1" if a firm introduced an environmental innovation in 2006–2008 resulting in reduced material use per unit of output; "0" otherwise
EcoEn	"1" if a firm introduced an environmental innovation in 2006–2008 resulting in reduced energy use per unit of output; "0" otherwise
EcoCO_2	"1" if a firm introduced an environmental innovation in 2006–2008 resulting in reduced CO_2 production by enterprise; "0" otherwise
EcoSub	"1" if a firm introduced an environmental innovation in 2006–2008 resulting in the use of materials with less polluting substitutes; "0" otherwise
EcoPol	"1" if a firm introduced an environmental innovation in 2006–2008 resulting in reduced soil, water, noise or air pollution; "0" otherwise
EcoWat	"1" if a firm introduced an environmental innovation in 2006–2008 resulting in recycled waste, water or materials; "0" otherwise
Group 2 – Eco-innovations of end user *EcoEndU*	
EcoEnEndU	"1" if a firm introduced an environmental innovation in 2006–2008 resulting in reduced energy use by the end user; "0" otherwise
EcoPolEndU	"1" if a firm introduced an environmental innovation resulting in reduced air, water, soil or noise pollution by the end user; "0" otherwise
EcoRecEndU	"1" if a firm introduced an environmental innovation resulting in improved recycling of product after use; "0" otherwise

Source: Own elaboration based on CIS 2006–2008 questionnaire.

Table 16.5. Description of the sample of enterprises from Bulgaria (N=3667), the Czech Republic (n=3470), and Germany (n=3193) from selected NACE sections that introduced at least one eco-innovation in 2006–2008

Sample characteristics		Bulgaria (n=3667)		Czech Republic (n =3470)		Germany (n =3193)	
		N	%	N	%	N	%
Product innovation		1,712	46.7a	1,216	35b	1,389	43.5c
Process innovation		1,850	50.4a	1,351	38.9b	1,287	40.3b
Organizational innovation		1,743	47.5a	1,450	41.8b	1,590	49.8a
Marketing innovation		1,196	32.6a	1,283	37b	1,592	49.9c
Enterprises belonging to a capital group		518	14.1a	1,398	40.3b	1,244	39b
Target market	Local/regional	2,562	69.9a	2,141	61.7b	1,754	54.9c
	National	2,727	74.4a	2,624	75.6a	2,497	78.2b
	European Union (EU), EFTA, or EU candidate countries	1,275	34.8a	2,265	65.3b	1,941	60.8c
	All other countries	682	18.6a	995	28.7b	1,395	43.7c
NACE	NACE B	44	1.2a	111	3.2b	73	2.3c
	NACE C	3,324	90.6a	2,792	80.5b	2,654	83.1c
	NACE D	41	1.1a	176	5.1b	123	3.9c
	NACE H	258	7a	391	11.3b	343	10.7b
Size	Small	2,198	59.9a	1,195	34.4b	1,334	41.8c
	Medium	1,161	31.7a	1,370	39.5b	1,208	37.8b
	Large	308	8.4a	905	26.1b	651	20.4c

Note: Each letter (a, b, c) denotes a subset of categories whose column proportions (Bonferroni method) differ significantly from those of other subsets at the 0.05 level.

Source: Own calculations in SPSS 21 based on anonymized micro data from CIS 2008 for Bulgaria, Czech Republic and Germany.

Table 16.6. Total variance explained

Factor	Extraction sums of squared loadings			Rotation sums of squared loadings		
	Eigenvalue	Explained variance (%)	Accumulative explained variance (%)	Eigenvalue	Explained variance (%)	Accumulative explained variance (%)
1	5.019	55.77	55.77	3.23	35.88	35.88
2	0.872	9.69	65.46	2.66	29.58	65.46

Source: Own calculations in SPSS 21 based on anonymized micro data from CIS 2008 for Bulgaria, Czech Republic and Germany.

Table 16.7. Rotated component matrix[a]

Components	Environmental benefits from the production of goods or services within the enterprise	Environmental benefits from the after-sales use of goods or service by the end user
Improved recycling of product after use	0.828	
Reduced air, water, soil or noise pollution	0.786	
Recycled waste, water, or materials	0.728	
Reduced soil, water, noise, or air pollution	0.666	
Replacement materials with less polluting substitutes	0.580	
Reduced energy use	0.566	
Reduced energy use per unit of output		0.854
Reduced material use per unit of output		0.839
Reduced CO_2 "footprint" by enterprise		0.629
Cronbach's Alfa	0.856	0.781

Extraction Method: Principal Component Analysis[a]. Rotation converged in 5 iterations.

Source: Own calculations in SPSS 21 based on anonymized micro data from CIS 2008 for Bulgaria, Czech Republic and Germany.

Table 16.8. Eco-innovation drivers and their hierarchy in Bulgarian, Czech, and German enterprises

Eco-innovations and their drivers		Bulgaria		Czech Republic		Germany	
		Beta	p	Beta	p	Beta	p
Environmental benefits from the production of goods or services within the enterprise and the hierarchy of drivers of this type of eco-innovation in each analyzed country (results for the combined group: *EcoMat*, *EcoEn*, *EcoCO$_2$*, *EcoSun*, *EcoPol*, *EcoWat*)							
EcoEnt	Existing environmental regulations or taxes	**0.386a**	0.000	**0.298a**	0.000	0.142b	0.000
	Expected environmental regulations or taxes	0.178b	0.000	0.199a.b	0.000	**0.199a**	0.000
	Government grants, subsidies	0.096c	0.000	0.073b	0.000	0.025	0.115
	Market demand for eco-innovations	0.066c	0.000	0.119b	0.000	**0.212a**	0.000
	Voluntary codes or agreements within sector	0.176b	**0.000**	0.222a	**0.000**	0.199a	**0.000**
Reduced material use per unit and hierarchy of drivers of this type of eco-innovation in each analyzed country							
EcoMat	Existing environmental regulations or taxes	**0.200a**	0.000	**0.137a**	0.000	0.079b	0.000
	Expected environmental regulations or taxes	0.133b	**0.000**	0.137a	**0.000**	0.122a	**0.000**
	Government grants, subsidies	0.088c	0.000	0.056b	0.001	– 0.012	0.478
	Market demand for eco-innovations	0.045c	**0.013**	0.125a	**0.000**	0.194a	**0.000**
	Voluntary codes or agreements within sector	0.139b	**0.000**	0.137a	**0.000**	0.139a	**0.000**
Reduced energy use per unit and hierarchy of drivers of this type of eco-innovation in each analyzed country							
EcoEn	Existing environmental regulations or taxes	**0.280a**	0.000	**0.185a**	0.000	0.129a.b	0.000
	Expected environmental regulations or taxes	0.109b	0.000	0.133a.b	0.000	0.099b	0.000
	Government grants, subsidies	0.061c	0.000	0.040c	0.015	0.033b	0.051
	Market demand for eco-innovations	0.050c	0.004	0.090b	0.000	**0.152a**	0.000
	Voluntary codes or agreements within sector	0.141b	**0.000**	0.156a	**0.000**	0.156a	**0.000**
Reduced total CO_2 production by the enterprise and hierarchy of drivers of this type of eco-innovation in each analyzed country							

Eco-innovations and their drivers		Bulgaria		Czech Republic		Germany	
		Beta	p	Beta	p	Beta	p
EcoCO₂	Existing environmental regulations or taxes	**0.245a**	0.000	**0.165a**	0.000	0.089b	0.000
	Expected environmental regulations or taxes	0.178b	**0.000**	0.170a	**0.000**	0.154a	**0.000**
	Government grants. subsidies	0.109c	0.000	0.061b	0.000	0.124b	0.000
	Market demand for eco-innovations	0.042c	0.011	0.048b	0.005	**0.167a**	0.000
	Voluntary codes or agreements within sector	0.166b	**0.000**	0.170a	**0.000**	0.152a	**0.000**
Replacement materials with less polluting or hazardous substitutes and hierarchy of drivers of this type of eco-innovation in each analyzed country							
EcoSub	Existing environmental regulations or taxes	**0.304a**	0.000	**0.197a**	0.000	**0.129a**	0.000
	Expected environmental regulations or taxes	0.184b	0.000	0.167a.b	0.000	**0.180a**	0.000
	Government grants, subsidies	0.071c	0.000	0.062c	0.000	–0.055b	0.001
	Market demand for eco-innovations	0.084c	0.000	0.168a.b	0.000	**0.175a**	0.000
	Voluntary codes or agreements within sector	0.103c	0.000	0.121b	0.000	**0.112a**	0.000
Reduced soil, water, noise or air pollution and hierarchy of drivers of this type of eco-innovation in each analyzed country							
EcoPol	Existing environmental regulations or taxes	**0.386a**	0.000	**0.300a**	0.000	**0.139a**	0.000
	Expected environmental regulations or taxes	0.141b	0.000	0.161b	0.000	**0.190a**	0.000
	Government grants, subsidies	0.052c	0.001	0.076c	0.000	0.034b	0.037
	Market demand for eco-innovations	0.101b	0.000	0.022c	0.160	0.134a	0.000
	Voluntary codes or agreements within sector	0.081b.c	0.000	0.183b	0.000	0.181a	0.000
Recycled waste, water or materials and hierarchy of drivers of this type of eco-innovation in each analyzed country							
EcoWat	Existing environmental regulations or taxes	**0.381a**	0.000	**0.310a**	0.000	0.089b	0.000
	Expected environmental regulations or taxes	0.093c	0.000	0.113c	0.000	**0.176a**	0.000
	Government grants, subsidies	0.072c	0.000	0.030d	0.052	–0.015b	0.367
	Market demand for eco-innovations	–0.024	0.134	0.072c	0.000	**0.157a**	0.000
	Voluntary codes or agreements within sector	0.201b	0.000	0.202b	0.000	**0.175a**	0.000
Environmental benefits from the after-sales use of goods or services by the end user and the hierarchy of drivers of this type of eco-innovation in each analyzed country (results for the combined group: *EcoEnEndU, EcoPolEndU, EcoRecEndU*)							

EcoEndU	Existing environmental regulations or taxes	**0.233a**	0.000	**0.178a,b**	0.000	0.099b	0.000
	Expected environmental regulations or taxes	0.15b	**0.000**	0.226a	**0.000**	0.186a	**0.000**
	Government grants, subsidies	0.058c	0.000	0.104b	0.000	0.035b	0.026
	Market demand for eco-innovations	0.229a	0.000	0.146b	0.000	**0.240a**	0.000
	Voluntary codes or agreements within sector	0.121b	0.000	0.149b	0.000	**0.203a**	0.000
Reduced energy use by the end user and hierarchy of drivers of this type of eco-innovation in each analyzed country							
EcoEnEndU	Existing environmental regulations or taxes	**0.191a**	0.000	0.112b	0.000	0.093b	0.000
	Expected environmental regulations or taxes	0.105b	**0.000**	0.172a	0.000	0.134b	0.000
	Government grants, subsidies	0.053c	0.001	0.051c	0.002	0.041c	0.013
	Market demand for eco-innovations	0.225a	**0.000**	0.141a	**0.000**	0.221a	**0.000**
	Voluntary codes or agreements within sector	0.101b	0.000	0.112b	0.000	0.158b	0.000
Reduced air, water, soil or noise pollution by the end user and hierarchy of drivers of this type of eco-innovation in each analyzed country							
EcoPolEndU	Existing environmental regulations or taxes	**0.194a**	0.000	**0.179a**	0.000	0.098b	0.000
	Expected environmental regulations or taxes	0.165b	**0.000**	0.215a	**0.000**	0.183a	**0.000**
	Government grants, subsidies	0.050c	0.002	0.115b	0.000	0.058b	0.000
	Market demand for eco-innovations	0.242a	0.000	0.096b	0.000	**0.183a**	0.000
	Voluntary codes or agreements within sector	0.048c	**0.006**	0.132b	**0.000**	0.195a	**0.000**
Improved recycling of product after use by the end user and hierarchy of drivers of this type of eco-innovation in each analyzed country							
EcoRecEndU	Existing environmental regulations or taxes	**0.216a**	0.000	**0.149a**	0.000	0.060b	0.003
	Expected environmental regulations or taxes	0.113b	**0.000**	0.172a	**0.000**	0.157a	**0.000**
	Government grants, subsidies	0.046c	0.006	0.09b	0.000	–0.012b	0.459
	Market demand for eco-innovations	0.107b	**0.000**	0.124a	**0.000**	0.208a	**0.000**
	Voluntary codes or agreements within sector	0.168a	**0.000**	0.126a	**0.000**	0.166a	**0.000**

Note: Each letter (a, b, c) denotes a subset of categories whose column proportions (Z Fisher method) differ significantly from each other at the 0.05 level.

Source: Own calculations in SPSS 21 based on anonymized micro data from CIS 2008 for Bulgaria, the Czech Republic and Germany.

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Chapter 17

Polish Innovation Policy Through 2020

Beata Lubos

Innovation policy was largely absent in Poland until 2000. Policy makers had focused on research and technological development, rarely using the term "innovation." From 2000 to 2006, a strategy was pursued for "increasing the innovativeness of the Polish economy," the country's first innovation law was drafted (on selected forms of supporting innovation), and a 2004–2006 "financial perspective" was implemented.

From 2004 to 2013, Polish innovation policy faced real challenges. They resulted from: 1) an unprecedented innovation budget, 2) the need to reconcile the expectations of entrepreneurs in terms of capital investment with the government's development ambitions, 3) the growing need for inter-ministerial coordination among implementing agencies and between central and regional administration bodies, 4) attention to detail, combined with a speedy project evaluation process 5) the need to design an effective assessment system for innovative projects. These challenges and ways of addressing them inspired a new approach to innovation policy for the period to 2020.

Innovation policy implementation experience in 2007–2013

In 2006, the government adopted a crucial document: a "Strategy for Increasing the Innovativeness of the Economy for 2007–2013." The strategy defined a national innovation policy framework, assessed the innovativeness of the economy, and set priorities in five areas: (1) human resources for the modern economy, (2) research for the economy, (3) intellectual property, (4) capital for innovation, and (5) infrastructure for innovation. Activities regarding *human resources for the modern economy* focused on shaping public awareness, especially among entrepreneurs, to make sure that innovation was seen as Poland's most important development opportunity and a basis for building a competitive advantage on international markets. Activities concerning *research for the economy* focused on increasing the use of R&D developments in enterprises and the possibility of helping research centers adapt to meet the needs of the modern economy. These efforts were supplemented by the *intellectual property*

for innovation priority, which focused on improving the efficiency of the market for innovation, in particular by increasing the flow of innovative solutions through more widespread and better use of industrial property rights, copyrights and related rights. The *capital for innovation* priority sought to ease access to funding for innovative projects and to encourage the emergence of enterprises based on modern technology. The *infrastructure for innovation* priority focused on improving the conditions for innovative companies, chiefly through developing business environment institutions (BEI), strengthening collaboration between enterprises and the research sector, and promoting the use of information and communication technology (Ministry of Economy, 2006). Work to implement the strategy was based on Operational Programmes run under the National Strategic Reference Framework 2007–2013 (NSRF). The Innovative Economy Operational Programme (OPIE) and the Human Capital Operational Programme were crucial for implementing the policy.

In 2007–2013, OPIE was of great importance for increasing the innovativeness of the Polish economy as part of the NSRF. The program aimed to strengthen the role of enterprises in building a knowledge-based economy. It provided comprehensive support of innovative entrepreneurs through R&D projects, investment, job creation, and advisory and training services. To accelerate the creation and implementation of new technological and organizational solutions by entrepreneurs, the program provided support to the supra-regional business environment. To increase the effectiveness of BEIs, support for the science sector was provided, aimed at increasing the innovativeness of the economy through research, meeting the needs of entrepreneurs, and ensuring the supply of cutting-edge technology for the economy. Support for the science sector included large investment projects and joint infrastructure serving R&D needs. Institutional support was provided to BEIs that played a crucial role in the economy by backing the growth of innovative companies and the development of entrepreneurship. The program supported network ties among BEIs, and it also aided strong innovation centers and institutions providing capital to implement innovative projects. An important element of the program's goal of building a knowledge-based economy was the development of information society tools in both the public and private sectors.

OPIE instruments were grouped into eight Priority Axes. Research and development work aimed at building a knowledge-based economy and implemented by science-industry consortia was financed from *Priority Axis 1: Research and development of new technologies*. This included support for applied research and development projects and for the transfer of R&D results to business through subsidizing the costs of obtaining intellectual property right protection (IPR). *Priority Axis 2: R&D infrastructure* supported investment in research equipment required by centers of excellence. *Priority Axis 3: Capital for innovation* was designed to support projects from

the inception of an innovative idea onward, through advice on creating a company and financial support for newly established businesses. *Priority Axis 4: Investments in innovative projects* provided funding to implement R&D results yielded by projects supported under Priority Axis 1 as well as by projects focused on implementing new technology and advisory services, or by those deemed necessary to carry out R&D activities. OPIE supported investment for developing industrial designs, for purchasing innovative technological and organizational solutions, and for service sector projects creating a substantial number of new jobs. Support under *Priority Axis 5: Diffusion of innovation* was earmarked for developing cooperative relations, in particular supra-regional clusters. Joint investment projects and advisory services that contributed to the transfer and diffusion of knowledge and innovation were supported under this Priority Axis. This section was also tasked with strengthening BEI networks in order to support the innovative activities of enterprises (including technology transfer, the use of industrial property rights, cooperative ties, and the use of industrial designs). *Priority Axis 6: Polish economy on the international market* supported efforts to improve the Polish economy's ties with global markets. *Priority Axis 7: Information society: The establishment of e-administration* channeled funds for the development of e-government. *Priority Axis 8: Information society: Increasing the innovativeness of the economy* encouraged the creation of e-services, electronic communication among companies, and efforts to oppose digital exclusion (Ministry of Regional Development, 2007a).

A mid-term evaluation of OPIE Priority Axes 3–6 showed that the program contributed to an improvement in the innovativeness of Polish enterprises. As far as its objectives are concerned, the program encountered the biggest challenges in strengthening cooperation ties and clustering and in increasing the use of intellectual property protection in business. The most evident positive results of the program included an increased level of new investment by enterprises, a larger number of innovative enterprises, and increased enterprise investment in research and development. The program also contributed to an increased number of new jobs. Thanks to public intervention anticipated in Priority Axis 3, new financial engineering instruments were implemented. The most important barriers to project implementation included complicated and time-consuming financial reporting, difficulties in the transfer of funds, and doubts raised concerning how projects were assessed in terms of innovativeness. Those evaluating the program recommended the following remedial measures:

- upgrading the evaluation of innovative projects and the ways of interpreting project indicators,
- creating a clear division between national and regional programs and ensuring the coordination of measures aimed at similar groups of beneficiaries,

- drawing up a periodically updated development strategy for key sectors of the economy with the greatest innovation potential and giving these sectors preferential treatment for funding and other support (PAG Uniconsult, 2011).

A detailed study of OPIE Priority Axes 1 and 2 concerning support for R&D projects at scientific institutions, including those undertaken in collaboration with enterprises, revealed that:

- in activities benefiting research centers, the best results were yielded by projects that not only focused on achieving a scientific goal, but also involved practical application of R&D results,
- the co-financing of industrial property protection did not lead to increased revenue for scientific institutions,
- enlisting private entities as project leaders increased the chances of implementing a project in practice,
- support instruments available under OPIE Priority Axis 2 contributed to an increased potential and greater innovativeness of Polish research centers, but the scientific benefit was greater than the economic one,
- scientific centers used infrastructure acquired under the program to conduct their own research, teach students, and carry out projects jointly with businesses, but once these ended they experienced problems maintaining the new infrastructure in the long term,
- the relationship between business and science was disturbed by time-consuming and complex scientific procedures,
- research and development projects in small and medium-sized enterprises would not have been undertaken if not for the support they obtained under the program,
- companies were reluctant to participate in projects that lacked clear IPR management rules, while beneficiaries were unclear about going commercial with R&D results. This ambivalence was attributed to nontransparent rules at the stage of call announcement and subsequent changes that required contracts to be modified.
- current research projects can be subsidized from a vast array of programs other than those offered by the EU. However, the implementing authorities and intermediaries lack complete information on how projects by research institutions and enterprises can be supported from various sources (Information Processing Center, Millward Brown, 2014).

The program's impact on the innovativeness of enterprises was evaluated in a study conducted in 2014. The study covered selected Priority Axes, specifically those focusing on supporting innovation in companies. The main conclusions from the survey involved Priority Axis 4, under which support was channeled mainly to companies with an established market position, substantial revenues, and at least 50 employees – meaning com-

panies that had the greatest potential to carry out innovative projects, the evaluators said. The program lacked thematic concentration in terms of support for industries. Investment in fixed assets dominated in the structure of project budgets, while investment in R&D rarely exceeded 10% of the total budget of a project. Support was provided mainly for importing technology, and not for developing it in-house. The innovativeness of solutions developed under OPIE projects was rated by respondents as moderate. The vast majority of beneficiaries (77% to 85%) declared that support obtained through the program contributed to increasing their firm's investment in innovation. It also enabled companies to become involved in more advanced innovation activities and more frequently undertake innovative projects. An overwhelming 77.7% of beneficiaries said the program had a positive impact on their R&D activities. Moreover, the support granted had a positive impact on the competitiveness of beneficiaries. Eighty-one percent of beneficiaries reported an increase in customers from the year in which the entrepreneur filed an application for funding to the year of the study; 79.8% mentioned an improvement in the company's competitive position; 78.8% listed an increase in labor productivity; 71.4% reported an increase in sales; 70% noted an increase in employment; and 56.4% reported an increase in profit. According to the evaluators, the most effective OPIE instruments were measures under Priority Axis 4, in particular Measure 4.1, which, in conjunction with Measure 1.4, led directly to an increase in innovation by stimulating R&D activities in enterprises. On the other hand, measures under Priority Axis 8 exhibited little effectiveness. Although support was granted to a large number of projects, many of them had a very low level of innovativeness and sustainability. According to the evaluators, one weakness of OPIE was that spending was not concentrated in the sense of an excessive fragmentation of implemented measures. A greater concentration of funds, with fewer instruments and areas, would have made it possible to achieve better results, the evaluators said (PSDB WYG, 2014).

The program can also be criticized for its faulty selection of projects, as a result of which most funds were channeled to finance the absorption of already existing technologies. Technically, these measures were correct because the structure of the program permitted this type of investment, but the expectations of policy makers were more ambitious – that the program would contribute to the creation of new solutions to enable businesses to compete on international markets rather than limit themselves to buying new machines and equipment. However, it was evident that there was an extremely strong demand for such investment among entrepreneurs. A planned *ex-post* evaluation of the program will be of key importance in assessing the impact of OPIE on the innovativeness of the Polish economy.

In addition to financing innovative projects, innovative processes are based on people whose creativity determines the creation of innovation. Therefore the Innovative

Economy Operational Programme was supplemented by the Human Capital Operational Programme 2007–2013 (HCOP), which focused on professional development and on developing the potential of enterprises and their employees to adapt to changes. Other goals of HCOP were to raise the level of education in society and reduce social exclusion. Under Priority Axis 2 of HCOP, a key to increasing the innovativeness of the economy, entrepreneurs and startups were supported by being provided with high-quality business services. This was accompanied by specific solutions implemented in enterprises and support for entrepreneurs' efforts to improve the skills of employers and employees in selected areas, along with advice on key aspects of sustainable development (Ministry of Regional Development, 2007b). Training programs available under Measures 2.1 and 2.2 of HCOP were positively evaluated in 2012. The evaluators said the knowledge and skills acquired through participation in training programs met the needs of companies and were used in the workplace. Most beneficiaries (75% on average) said the knowledge and skills acquired or developed by employees through participation in training programs were often or very often used in practice. The evaluation found that 88% of beneficiaries gave high ratings to the training programs, describing them as worth the money and time spent and as not very troublesome in terms of paperwork.

The survey showed that the two most common changes made by enterprises that participated in the training programs were the introduction of new or significantly improved products and services, and new ways of managing and organizing work (PARP, 2012).

The main lesson learned from implementing HCOP was that instead of supporting many different general training courses, which are often organized centrally, authorities should focus on offering tailor-made specialized training programs better adapted to the needs of entrepreneurs. That recommendation is fundamental to the new Financial Perspective, which includes a different Operational Programme focused on human resource development.

New approach to innovation policy through 2020

In March 2010, the government adopted a plan to reduce the number of medium- and long-term development strategies and policies from 42 to nine. The Strategy for Innovation and Efficiency of the Economy (SIEE) is one of the nine new strategies. It seeks to make the Polish economy more innovative, efficient and open by 2020. Its priorities include job creation and growth based on trust.

The strategy presents four "horizontal rules" by which the economy should function. They are knowledge creation; partnership cooperation; efficient allocation of

resources; and strategic management and responsible leadership. Stressing the importance of "framework conditions" for doing business (including innovation activity), the strategy emphasizes the need to eliminate unnecessary burdens and barriers to entrepreneurship. It focuses on deregulation through enabling companies, especially SMEs, to access capital, including venture capital, at all stages of their development cycle.

The strategy highlights the role of ties between science and business as crucial for the development of a knowledge economy in Poland. It posits that science-business collaboration can be improved by creating a system of technology brokers, by promoting research apprenticeships in enterprises, and by enlisting business practitioners for research and teaching projects.

The strategy seeks to give priority to research consortia over single applicants and enable SMEs to take advantage of innovations developed by large companies. According to the government, greater mobilization of private capital should be accompanied by efforts to improve the efficiency of public spending on research and development and innovation (R&D&I). The concept of "smart specialization," based on supporting the development of areas and technologies with the greatest growth potential, will supplement the "horizontal" approach with regard to innovation policy. "Smart specializations" will be identified based on the results of what are known as foresight projects. The implementation of the strategy will be based on partnerships bringing together all stakeholders, including entrepreneurs, technology platforms, and clusters. The strategy includes measures designed to support the internationalization of the Polish economy through better promotion abroad and a well-developed system of support instruments adapted to different stages of company development. This includes support for the globalization of innovative companies. The strategy also highlights the need to attract investment that meets national scientific and technological development priorities (Drobniak, M., Świetlik, J., 2014).

The implementation of SIEE will be monitored with special input and output indicators. Poland's performance in terms of innovation will be measured on the basis of Innovation Union Scoreboard rankings. Poland is expected to join the group of "innovation followers" by 2020. Another indicator will be Poland's position among EU countries based on the Global Competitiveness Report's innovation index. This target calls for the country to advance from 22nd to 15th place by 2020. The most carefully monitored indicator is general expenditure on R&D as a percentage of GDP, which is expected to reach 1.7% by 2020 (Ministry of Economy, 2013).

Based on SIEE, the Ministry of Economy followed up with a detailed program of measures designed to implement the strategy. The program – called the Enterprise Development Programme (EDP) – laid down the concept of a comprehensive enterprise support system that places special emphasis on innovation. The EDP refers to the

specific objectives outlined in the SIEE and identifies precise tools and measures for achieving these. The main objective of the EDP is to achieve high and sustainable productivity growth among enterprises, leading to their increased international competitiveness. The following principles underlie the implementation of the detailed provisions of the EDP:

- Financial support will mainly be targeted at boosting the growth of innovative enterprises and at increasing the number of risky but potentially rewarding projects.
- Public support should not crowd out private funds available on the market.
- Public support must be matched by an adequate financial contribution from enterprises.
- The effectiveness of support should be continuously monitored and then transferred directly into decisions concerning economic policy and project design.
- There is a need to upgrade the system of services for enterprises.
- Greater use should be made of public-private partnerships.
- Support should be decentralized wherever possible.

The EDP identified measures aimed at creating favorable conditions for enterprises. These include better regulations, deregulation of professions, a "new chance" policy, protection of intellectual property rights, use of public procurement procedures to boost innovation, prioritizing investment in R&D in order to increase innovativeness, drawing a demarcation line between grants and revolving instruments, reaching an agreement on a tax credit for R&D, giving priority to consortia of enterprises and research centers, introducing training/educational vouchers for entrepreneurs, creating a system in which entrepreneurs would influence and work with formal education institutions, professionalizing BEI services, developing clusters including Key National Clusters, developing an e-economy, and helping entrepreneurs create and implement environmental technology and go global (Ministry of Economy, 2014).

An inherent part of the Enterprise Development Programme was the National Smart Specialization (NSS) document, which identified national R&D&I priorities through 2020. The document outlined the process of selecting smart specializations at the national level and the monitoring and updating process. For many years various Polish strategic documents had hinted at the need to concentrate spending on priority areas, but the NSS was the first document to list specific R&D&I priorities through 2020. The European Commission strengthened the significance of this strategic document by deciding that projects financed under new Operational Programmes would have to be in line with the NSS.

There are 19 smart specializations grouped into five areas: healthy society; agri-food, forestry/timber and environmental bioeconomy; sustainable energy, natural

resources and waste management; innovative technology; and industrial processes. Here is the full list of smart specializations:

Healthy Society

1. Medical engineering technology, including medical biotechnology
2. Diagnosis and treatment of lifestyle diseases and personalized medicine
3. Production of medicinal products

Agri-Food, Forestry/Timber and Environmental Bioeconomy

4. Innovative technology, agri-food and forestry/timber industry processes and products
5. Healthy food (high quality and organic production)
6. Biotechnological processes and household chemistry and environmental engineering products

Sustainable Energy

7. High-efficiency, low-emission and integrated energy production, storage, transmission, and distribution systems
8. Smart, energy-efficient construction
9. Environmentally friendly transport solutions

Natural Resources and Waste Management

10. Modern technology for sourcing, processing, and using natural resources and production of substitutes
11. Minimizing waste, including waste unfit for processing, and using waste as material and for energy purposes (recycling and other recovery methods)
12. Innovative technology for processing and recovery of water and reducing water consumption

Innovative Technology and Industrial Processes (A Horizontal Approach)

13. Multifunctional materials and composites with advanced properties, including nanoprocesses and nanoproducts
14. Sensors (including biosensors) and smart sensor networks
15. Smart grids and geo-information technology
16. Electronics based on conducting polymers
17. Automation and robotics
18. Optoelectronic systems and materials
19. Innovative creative technologies (Ministry of Economy, 2014).

The EDP is expected to influence future government legislative initiatives and the provisions of national Operational Programmes for 2014–2020. The programs affected are: Infrastructure and Environment (with a budget of €27.41 billion), Smart Growth (€8.61 billion), Digital Poland (€2.17 billion), Knowledge, Education, Development (€4.69 billion), Eastern Poland (€2 billion), and Technical Assistance

(€700.12 million). In terms of EDP objectives, the most important Operational Programmes are Smart Growth (OPSG), Knowledge, Education, Development (OPKED), and the 16 Regional Operational Programmes.

Smart growth, understood as economic growth based on knowledge and innovation, is one of the three key priorities of the EU's Europe 2020 strategy, which was the inspiration for the Smart Growth program. Experience resulting from the implementation of OPIE and the evaluation studies described above influenced the content of Smart Growth, which will differ from OPIE in that it will:

- focus on supporting R&D and smart specializations,
- focus on using existing resources and strengthening research centers through networks and joint projects rather than through increasing funding for new research and technology infrastructure,
- divide support instruments depending on the level of risk of a specific project (grants will be used to fund the most risky phases of R&D projects, while "revolving instruments" will support the implementation of R&D results and new technology),
- give preference to joint projects undertaken by research centers and businesses,
- give preference to R&D projects with high potential in terms of going commercial with research results,
- professionalize the services of BEIs, consolidate and better coordinate the entire BEI system, and support a selected group of Key National Clusters.

The main objective of the Smart Growth Operational Programme (SGOP) is to support the innovativeness and competitiveness of the Polish economy, which is expected to be achieved by implementing measures listed in four Priority Axes. *Priority Axis 1: Support for companies' R&D activities* will support enterprise R&D and sector R&D programs that address the needs of specific sectors of the economy. It will support research and development conducted with the participation of venture capital funds. *Priority Axis 2: Support for the innovation environment and the potential of innovative enterprises to run R&D&I* will cover investment in enterprises' R&D infrastructure, investment in open innovation to help promote technology transfer, and investment in innovation-oriented services. Support will be granted to intensify cooperation within the national innovation system. *Priority Axis 3: Support for innovations in enterprises* will finance the implementation of R&D results, the activities of venture capital funds, business angel networks, and seed capital funds as well as the promotion and internationalization of innovative companies. *Priority Axis 4: Increasing research potential* will focus on financing research and development work by research centers and addressing the needs of businesses. It will support the development of modern research infrastructure, mainly what is included in the Polish Roadmap for Research Infrastructure. This Priority Axis will support the emergence of international research agendas and

the development of human resources in the R&D sector (Ministry of Infrastructure and Development, 2014).

It is important that the new program take full advantage of the experiences of OPIE. This includes upgrading the project assessment system to evaluate innovative projects in a framework that allows for implementation of the most risky and potentially most profitable undertakings. A key task will be to select projects in which public funds will not be crowding out private money but instead act as an enabler of innovative investments.

The growth of businesses determines the development of human resources. The Knowledge, Education and Development Operational Programme (OPKED), designed under the new "financial perspective" and approved by the European Commission on Dec. 17, 2014, aims to counter negative trends in areas such as integration of young people on the labor market, the adaptability of workers, higher education, and social innovation. OPKED seeks to implement the following goals under five Priority Axes (*Axis 1: Young people on the labor market; Axis 2: Effective public policy for the labor market, the economy, and education; Axis 3: Higher education for the economy and development; Axis 4: Social innovation and transnational cooperation; and Axis 5: Support for health*):

- support transition of small businesses to the next level of development,
- increase awareness of the benefits of workforce development and human resource management,
- increase the participation of adults in education and training,
- increase the involvement of employers in the process of defining and shaping competencies needed on the market,
- increase the level of new technology skills,
- create a coherent system for the validation of informally acquired skills,
- increase the employability of graduates and strengthening the ties between universities and their socioeconomic environment,
- increase the monitoring of the market in terms of demand for skills and systematic monitoring of graduates,
- increase the international mobility of students and researchers,
- increase the number of doctoral students and doctoral degrees granted (Ministry of Infrastructure and Development, 2014b).

The program will chiefly support "systemic" projects. The most popular form of support, training programs for employees in enterprises, is available as of 2015 under the umbrella of regional Operational Programmes.

Conclusions

A full-fledged innovation policy based on previous experience emerged in Poland along with the "Strategy for Increasing the Innovativeness of the Economy for 2007–2013." This policy and accompanying strategy set the scene for Operational Programmes 2007–2013 and turned out to be an essential tool for boosting the innovativeness of the Polish economy. The Innovative Economy Operational Programme (OPIE) had ushered in some highly desirable instruments, but its popularity among entrepreneurs varied. Businesses were mainly interested in using instruments associated with buying new machines and equipment. Companies showed little interest in instruments related to intellectual property protection, cooperation and networking within clusters, and venture capital. This is one of the weaknesses of the Polish national innovation system.

When it comes to support for skill development and training programs, the Human Capital Operational Programme 2007–2013 (HCOP) was insufficiently adapted to the needs of individual businesses.

In 2007–2013, two key institutions developed within Poland's national innovation system, the Polish Agency for Enterprise Development and the National Center for Research and Development. The Polish Agency for Enterprise Development was given responsibility for the promotion of innovativeness and implementation of most OPIE instruments, under a law on supporting selected forms of innovation. The National Center for Research and Development developed into a leading provider of financing for both research centers and entrepreneurs undertaking R&D. These institutional changes should be evaluated very positively. The 2007–2013 Operational Programmes have helped Poland weather the economic crisis nearly unscathed. Structural funds were almost entirely used to implement an anti-crisis package.

The latest innovation strategy, adopted in 2013, broadened the approach to innovation and addressed the need to make key changes in the innovation support system. It gave priority to investment in R&D instead of the absorption of existing technology and fostered the use of revolving instruments for less risky projects. The strategy became the basis for new programs, the Smart Growth Operational Programme and the Knowledge, Education and Development Operational Programme, which focused on enterprises conducting comprehensive, ambitious R&D and innovation projects. This marks a step in the right direction and promises to produce some radical change. However, even the best-designed programs may fail due to changing market conditions and evolving business needs unless they are carried out effectively and flexibly.

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Summary and Conclusions

Toward Sustainable Competitiveness: An Overall Assessment of Changes in the Innovative Position and Competitiveness of the Polish Economy in 2007–2014

Marzenna Anna Weresa

The end of the first decade of the 21st century was a turbulent period in the global economy. The international economic crisis, which began in 2007, painfully affected many countries. Some of them are still reeling from the effects of the recession. The crisis also caused changes in the positions of countries in terms of competitiveness. Due to differences in the level of internationalization of individual economies and their sectors and due to their unequal resilience to external shocks, the effects of the crisis were deeper in some countries and less severe in others. How did the Polish economy change in this turbulent international environment? How did the global economic crisis impact the innovativeness and competitiveness of the Polish economy? Was the global crisis a driver of change allowing Poland to overcome the limitations of the development process? To what extent did innovation become the basis for competitive capacity building at the beginning of the post-crisis period? The analysis conducted in this book seeks to provide answers to these questions.

Before an overall assessment is made of the innovativeness and competitiveness of the Polish economy in 2007–2014, the broader context should be examined in terms of the impact of the global crisis on competitiveness. The crisis revealed new problems in the world economy, such as growing income inequalities, social exclusion, and environmental threats. These new challenges have triggered an evolution in the concept of competitiveness, and as a result the definition of competitiveness has been extended and reinterpreted, and new measures have been introduced to study this complex issue.

Sustainable competitiveness: the concept and measurement methods

The notion of competitiveness at the macroeconomic level, which constitutes the basis for analyzing the competitive position of economies, refers to changes in the

productivity with which a country uses its resources. Competitiveness is closely related to the current trends in economic development, which determine the production of goods and services offered at home and on international markets. Benefits derived from participation in the international division of labor are transformed into the growth of real incomes and improvements in the quality of life of citizens (Porter 1990; Lubiński, Michalski, Misala, 1995; Bieńkowski, Weresa & Radło, eds., 2010; Misala 2014).[1]

In recent years, in order to respond to new challenges that emerged as a result of the crisis, researchers have begun to recognize the need to go beyond economic dimensions such as productivity and add a broader perspective to the competitiveness concept. This discussion has led to the emergence of the concept of sustainable competitiveness, which is associated with sustainable development. While competitiveness in the traditional sense focuses on improving the productivity of resources and the efficiency of institutions, the concept of sustainable competitiveness focuses on other important elements that enhance the well-being of a society in a sustainable way, such as environmental and social issues.

Sustainable competitiveness is defined "as the set of institutions, policies, and factors that make a nation productive over the longer term while ensuring social and environmental sustainability" (Corrigan *et al.* 2014, p. 55). Social sustainability means that the institutions, policies and other factors should ensure that all members of society can participate and can enjoy the best possible health and security. Environmental sustainability is understood as the institutions, policies, and all other factors that guarantee an efficient management of resources in order to secure prosperity for present and future generations (Corrigan *et al.* 2014, p. 55).

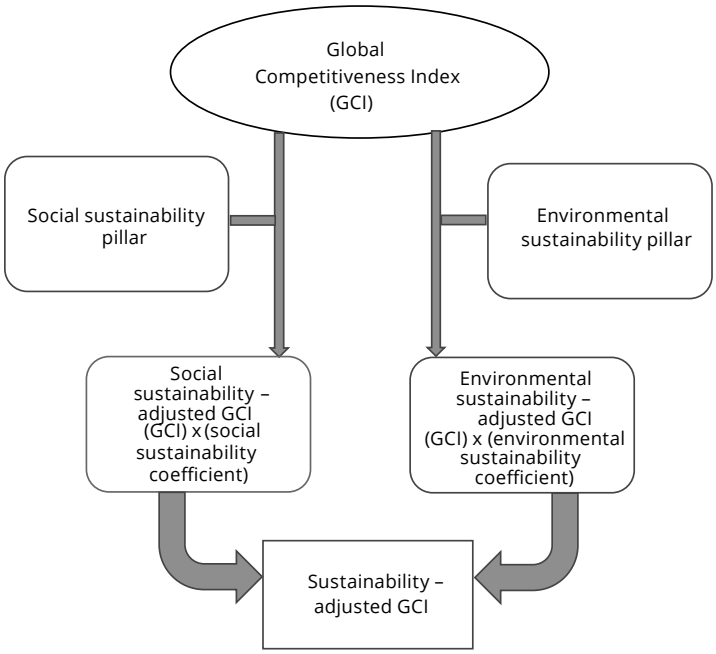
This new, extended definition of sustainable competitiveness has implications for measuring this phenomenon. The World Economic Forum, which has been compiling competitiveness rankings based on the Global Competitiveness Index (GCI) for many years, has modified the index in order to include sustainability issues. The adjusted GCI takes into account both aspects of the concept of sustainable competitiveness: social sustainability and sustainable use of the environment (Figure 1).

As shown in Figure 1, two new pillars have been added to the calculation of the adjusted GCI: the social sustainability pillar and the environmental sustainability pillar.[2] Measures that make up the GCI have been supplemented by indicators describing these two additional pillars.

[1] There are other dimensions of competitiveness ("micro" and "meso") widely discussed in the literature (see: Krugman, 1994; Porter, 2006; Misala 2014). However, in this study, the macroeconomic perspective is used and Poland's competitiveness is assessed from the perspective of the entire economy. Space constraints make it impossible to extend this analysis to cover regions or companies.

[2] Previous methodology for measuring competitiveness was based on 12 pillars (see: WEF, 2014, pp. 49–51).

Figure 1. The concept of sustainable competitiveness and the sustainability-adjusted Global Competitiveness Index (GCI)



Source: Corrigan *et al.* 2014, p. 64.

In the first pillar, which deals with social sustainability, there are three main groups of indicators related to:

1) Access to basic necessities,
2) Vulnerability to economic exclusion,
3) Social cohesion.

The first group consists of indicators describing access to sanitation, access to improved drinking water, and access to healthcare. The second group includes indicators of vulnerable employment, the extent of the informal economy, and social safety net protection. The importance of the third group, social cohesion, is measured by the income Gini index, social mobility, and youth unemployment.

The social sustainability pillar includes three conceptual elements:

1) Environmental policy,
2) Use of renewable resources,
3) Degradation of the environment.

Environmental policy is measured by indicators reflecting the stringency and enforcement of environmental regulations and the extent to which land is protected.

Moreover, the number of international environmental treaties is taken into account. The second group, covering the use of renewable resources, is measured by indicators of baseline water stress, wastewater treatment, forest cover change, and fish stock overexploitation. Measures of degradation of the environment include the level of particulate matter concentration, CO_2 intensity, and the gauges of the quality of the natural environment (Corrigan *et al.* 2014, pp. 65–66).

This new competitive research methodology developed by the World Economic Forum complements measures traditionally used by this organization in its competitiveness rankings by adding two new pillars to assess the level of social and environmental sustainability. As a result, besides the traditional annual competitiveness ranking compiled by the World Economic Forum, in 2014 the WEF for the first time offered a sustainable competitiveness league table (Corrigan *et al.*, 2014, pp. 68–69).

In part, this book employs this new methodology in its assessment of Poland's competitiveness. Some aspects of sustainable competitiveness were analyzed in previous editions of this report. For example, the Human Development Index was used to describe the social dimension of Poland's development, and the Gini index was used to illustrate changes in income inequality. Various previous editions studied and compared the social dimensions of sustainability on an annual basis, while some elements of environmental sustainability were analyzed as an additional issue. The 2014 edition of *Poland: Competitiveness Report* examined issues related to the use of energy.

This year's edition explores selected aspects of sustainable competitiveness, such as social innovation and eco-innovation, with a focus on the role of innovation in shaping the competitive advantages of the Polish economy. However, a summary of the results of these studies should be preceded by a wider theoretical analysis of the role of innovation in development. This is provided in the section below.

Overall, the new concept of sustainable competitiveness calls for a new approach in research on the competitiveness of the Polish economy. The changing international environment and social changes mean that social and environmental sustainability issues need to be included more broadly in the methodology used in this series. This will be done in subsequent editions of this book.

Innovation and competitiveness: selected theoretical aspects

Since this year's report on the competitiveness of the Polish economy focuses on innovation, the empirical research conducted in this volume should be supplemented

with some theoretical background on the relationship between innovation and competitiveness.

The analysis of the role of innovation in shaping the competitive advantages of nations began with a study by Michael Porter (1990), which is still used as the basic research methodology applied by the World Economic Forum in its competitiveness reports. According to M. Porter, countries as well as regions, industries and enterprises can gain a competitive advantage through the implementation of innovation. These advantages are primarily reflected in an increased productivity of factors of production, which leads to higher levels of socioeconomic development (Porter, 1990, p. 71).

The relationship between innovation and competitiveness can be examined in a comprehensive way using the concept of innovation systems. In this concept, innovation is the result of cooperation and interaction of many elements related to the creation, accumulation and transfer of knowledge as well as its application in the economy (Weresa, 2012). By linking innovation and competitiveness within such a broad conceptual framework, it is possible identify three different dimensions of the impact of innovation on the competitiveness of countries: technological, institutional and international. The technological dimension is based on the fact that some elements of innovation systems, such as technology, innovation, human capital, and institutions, influence the competitiveness of economies. The institutional dimension is based on the fact that businesses, research centers, and administration bodies that constitute the so-called triple helix of innovation systems directly and indirectly shape competitiveness through their economic activity. The international dimension is related to foreign economic cooperation, which is an important channel for the transfer of new knowledge and innovation and thus influences innovation and the competitiveness of economies (more on this subject in Weresa 2012).

When analyzing the relationship between innovation and the sustainable competitiveness of countries, it is worth asking about the role of innovation in the creation and distribution of socioeconomic well-being, understood as quality of life (Ruskin 1905/1996, pp. 131–132). Socioeconomic well-being can be regarded as the main component of macroeconomic competitiveness. The relationship between innovation and prosperity can be presented in a simplified form as a linear model with the following sequence: creativity, invention, innovation. Innovations contribute to the growth of labor productivity and help bring new goods, of better quality and often lower prices, to the market. This promotes consumption and increases consumer satisfaction, leading to a rise in wealth and greater prosperity (Swann 2009). In this linear model, innovations are transformed into well-being mainly through increased productivity.

In a broader perspective, taking into account the non-economic dimensions of life, other elements can be distinguished through which innovations affect the well-being

of a society. These include the quality of the environment, health, and education. An extended model proposed by P. Swann (2009) points to five areas of the impact of innovation on wealth creation – creativity, the labor market, the market of goods, consumption, and the environment – and these interactions are not linear. Interrelations among these areas and their impact on others may have different intensity and produce either positive or negative effects (Swann 2009, pp. 236–238). The environment is an important element of this model, which makes the model similar to the concept of sustainable competitiveness.

As the world grapples with environmental protection challenges, eco-innovations are being introduced to solve this problem. These are defined as new solutions that allow cost-effective and responsible use of natural resources and help reduce the negative effects of human activity on the environment (Carley & Spapens 1998). However, not all innovations are friendly to the environment; some can lead to its degradation. For example, certain ways to improve soil fertility may have a negative impact on the fauna. In the long term, such changes negatively contribute to socio-economic development. Therefore, state intervention in the form of innovation policy is needed to promote environmentally friendly solutions.

Another aspect of well-being improvements concerns efforts to reduce income inequality. Inclusive innovations and frugal innovations can play a role in this respect. These two types of innovations are designed to offer new solutions (usually cheaper and simpler versions of the new product) to groups of users that for various reasons were unable to take advantage of new products or services. The reasons for such exclusion may be related to low income, age, physical disability, and cultural or ethnic factors. Developing new solutions that enable those less affluent and other excluded groups to make use of these innovations can produce either direct or indirect benefits and contribute to well-being (Foster, Heeks, 2013; OECD, 2013). However, frugal innovations need not necessarily have a social mission. Sometimes their aim is primarily to reduce the use of financial or material resources. New products are not only cheaper, but often better than the original solutions, and they are available to a larger group of users (Bound, Thornton 2012 p. 14).

To wrap up this theoretical discussion of the relationship between innovation and sustainable competitiveness, it should be observed that social and environmental sustainability implies an increase in the role of new forms of innovations, such as social innovations, inclusive and frugal innovations, and eco-innovations.

Innovation and the competitive position of the Polish economy during the global crisis and in the post-crisis period

The impact of the crisis on innovation and on the competitiveness of economies may be different in the short and long term. On the one hand, a crisis requires adjustments in an economy and stimulates innovation and the search for efficiency gains. On the other, crises force enterprises to reduce investment and squeeze spending on research and development (R&D), thus restraining their innovative activity. Under the theory of economic growth (both neoclassical and "new" growth theory), innovation can contribute to recovery from an economic crisis, but only in the long term. In the short term, the introduction of innovations requires investment. Raising funds in times of crisis can be difficult because enterprises lack financial resources of their own and have limited access to credit. In addition, an economic slowdown means cost reductions, in particular cuts related to long-term, risky projects, such as R&D projects. Therefore many companies change their innovation strategies during a crisis, postponing or even canceling research projects (Voigt, Moncada-Paternò-Castello 2009). Empirical studies show that increased financial barriers during a crisis hamper entrepreneurship and reduce the propensity to take risks, which can reduce the number of new businesses and curtail the innovation activity of existing businesses (OECD 2009). Moreover, a crisis slows the growth of international trade and foreign direct investment flows. As a result, international technology transfer and the diffusion of innovations can be reduced, which may hamper the rate of economic growth, in particular in countries whose development strategies are based on imitation.

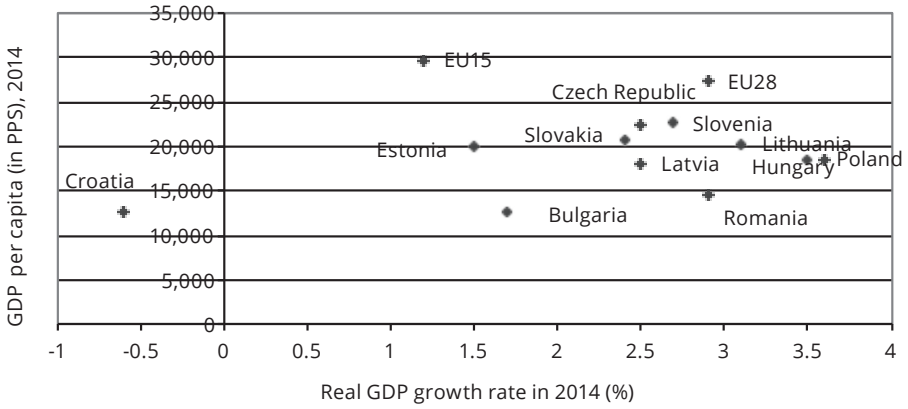
Some questions arise with regard to the impact of a crisis on innovation: To what extent did the global economic crisis affect innovation processes in Polish enterprises? How did it influence Poland's competitiveness? What is the basis for the competitive advantages of the Polish economy in the post-crisis period?

The analyses presented in this monograph show that Poland proved to be relatively resilient to the crisis, but its competitiveness did not change in a spectacular way in the post-crisis period. However, Poland's competitive position has improved gradually since 2007. In terms of GDP measured by the current exchange rate, Poland's position among the world's largest economies improved slightly (by two spots to 23rd position). When it comes to the value of GDP calculated in purchasing power parity terms, Poland's position did not change in 2007–2014. Taking into account the changes that took place in the international environment during the global crisis, especially the rapid growth of many emerging economies and developing countries (such as China), it

can be concluded that Poland experienced relatively fast economic growth. Moreover, Poland's GDP did not decline during the crisis, contributing to an improvement in the country's competitive position. In the World Economic Forum's league table Poland moved up from 51st place in 2007 to 43rd place in 2014, surpassing countries such as Italy, Greece, Hungary, and Slovakia.

The development gap separating Poland from most other EU countries and measured by GDP per capita has narrowed over the past several years. From 2004 to 2014, the development gap between Poland and the EU15 average was reduced by 20 percentage points; in 2014 alone it decreased by 2 points. In 2014, Poland's GDP per capita measured in purchasing power parity terms represented 63% of the EU15 average. However, Poland's position in the EU was not particularly high in 2014. Poland was one of the least developed EU28 countries, with a GDP per capita of €18,600, ahead of only Hungary, Latvia, Croatia, Romania, and Bulgaria (Figure 2).

Figure 2. Relative development measured by GDP in 2014: Poland and selected other EU member states compared



Source: Author's calculations based on data from Chapter 1.

When assessing prosperity, apart from the current income levels, it is necessary take into account income disparities. These can be measured by household income inequalities and the incidence of poverty. Income disparities in Poland remained large in 2014, somewhat above the EU average, but they have steadily decreased since 2007. Moreover, Poland had one of the lowest absolute poverty lines in the EU.

Poland's position in the World Economic Forum's sustainable competitiveness ranking is worth a closer look. This league table is based on an adjusted GCI index and covers social and environmental sustainability. It turns out that Poland performs relatively better in sustainable competitiveness than in "traditional" competitiveness

rankings. In 2014, Poland's GCI index was 4.48 points, while its sustainability adjusted GCI was 4.77 pts. (WEF 2014, p. 68). To what extent can this positive shift be attributed to innovation, in particular social and eco-innovations?

The analyses conducted in this monograph show no convergence trend in the development of Poland's national innovation system as measured by the Summary Innovation Index (SII), despite the fact that Poland gradually transformed its R&D sector in the previous decade. This means that the convergence of Poland's real GDP per capita relative to the EU average has not been accompanied by positive changes in innovation performance.

It seems that one of the main problems of Poland's innovation system is the incomplete transformation of the public R&D sector. Changes have been too slow and not profound enough. The development of human resources for R&D and the quality of education have been insufficient for the needs of the economy. R&D expenditures have been too low to have a significant impact on the country's innovation performance.

The global economic crisis, which began at the end of the previous decade, had no significant effect on the overall level of innovation in the Polish economy. The crisis accelerated Poland's income convergence with the EU average in terms of GDP per capita, but at the same time the Polish economy failed to keep pace with other EU economies in terms of innovation performance measured by the SII. This was despite a significant inflow of EU funds in 2007–2013 and their use for financing research and innovation.

Therefore, a long-term economic policy challenge for Poland is to create a framework for achieving competitiveness through innovation. To meet this challenge, it must develop its human capital and make better use of it. Human capital development requires a significant increase in employment, improvements in the demographic structure and population health, and efforts to develop skills and stimulate creativity and innovation. To make the Polish economy more competitive, long-term policy aims should include significant investment in education and science, healthcare reform, and further institutional changes. Short-term policy measures should complement these efforts by improving the business environment, reducing bureaucracy, and implementing new ways of managing the public sector. There is a growing need for innovation in the public sector in order to bring higher quality to public services. Only a comprehensive short- and long-term approach to the development of human resources, accompanied by improvements in the quality of institutions, can enable Poland to achieve sustainable competitiveness in the long term.

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