Summary of scientific accomplishments

1. Introduction

In this paper I present my academic achievements after obtaining the Ph.D. degree in economics in 2006. In the next section, I outline my academic and professional career. Then, in section three, I describe a topically related series of publications, which is the basis for applying for a habilitation degree in economics. Next, in section four, I characterize my other scientific publications. Later, in section five, I summarize my academic achievements using standard biometric indicators. Finally, in section six, I briefly discuss my other activities.

2. Scientific and professional career.

I decided to follow a scientific career while I was studying at the Warsaw School of Economics. When I was a fifth year student I started working in the Office of the Government Plenipotentiary for Social Security Reform. After the reform was implemented and the Bureau was liquidated in 1999, I continued to work at the Ministry of Labour and Social Policy as an analyst, up to 2000. In September 2000, I began my Ph.D. studies at the University of Minnesota in Minneapolis. In 2006, I defended my thesis titled *Essays in Macroeconomics* and I obtained a PhD degree in economics. After graduating in 2006, I started working in the Department of Macroeconomic and Structural Analyses (now Economic Institute) of Narodowy Bank Polski. In 2007 I was appointed Assistant Professor in the Chair of Economics I in Warsaw School of Economics. In 2014 I moved to the newly established Chair of Quantitative Economics at the same school.

My research interest after obtaining Ph.D. was focused on business cycle, macroeconomic policy, and macroeconomic effects of financial frictions. Recently, I also started to study pension systems. In my works, I use extensively general equilibrium models.

3. Series of topically related publications.

As an scientific achievement within the meaning of article 16, paragraph 2 of the Bill of 14th March 2003 on scientific degrees and titles and on degrees and titles in arts, I submit the following series of topically related publications titled:

Macroeconomic policy in the business cycle and the importance of financial frictions.

The series consists of the following nine papers:[1]

- Brzoza-Brzezina, M. Kolasa, M., <u>Makarski, K.</u> (2015a) *Macroprudential policy and economic imbalances in the euro area,* Journal of International Money and Finance 51: 137-154; earlier versions circulated as ECB Working Paper (Brzoza-Brzezina, Kolasa and Makarski, 2013b) and NBP Working Paper (Brzoza-Brzezina, Kolasa and Makarski, 2013c).
- <u>Makarski, K.,</u> (2015), *Mnożniki fiskalne w modelu z ograniczeniami kredytowymi,* Materiały i Studia nr 318.
- Brzoza-Brzezina, M., Kolasa, M., <u>Makarski, K.</u> (2015b). *Monetary and macroprudential policy with foreign currency loans,* Working Paper Series No. 1783, European Central Bank; earlier versions circulated as NBP Working Paper (Brzoza-Brzezina, Kolasa and Makarski, 2014).
- Brzoza-Brzezina, M., <u>Makarski, K.,</u> Wesołowski, G. (2014). *Would it have paid to be in the eurozone?,* Economic Modelling 41(C): 66-79; earlier version circulated as NBP Working Paper (Brzoza-Brzezina, Makarski and Wesołowski, 2012) and as Department of Applied Econometrics Working Papers (Brzoza-Brzezina, Makarski and Wesołowski, 2013).
- Gradzewicz, M., <u>Makarski, K.</u> (2013). *The business cycle implications of the euro adoption in Poland,* Applied Economics 45(17): 2443-2455; earlier version circulated as NBP Working Paper (Gradzewicz and Makarski, 2009)
- Brzoza-Brzezina, M., Kolasa, M., <u>Makarski, K.</u> (2013a). *The anatomy of standard DSGE models with financial frictions,* Journal of Economic Dynamics and Control 37(1): 32-51; earlier version circulated as NBP Working Paper (Brzoza-Brzezina, Kolasa and Makarski, 2011)
- Macias, P., <u>Makarski, K.</u> (2013) *Stylizowane fakty o cenach konsumenta w Polsce,* Materiały i Studia nr 295.
- Brzoza-Brzezina, M., Kolasa, M., <u>Makarski, K.</u> (2013d). *A penalty function approach to occasionally binding credit constraints,* National Bank of Poland Working Papers 159; earlier version circulated as Dynare Working Paper (Brzoza-Brzezina, Kolasa and Makarski, 2013e) (revise and resubmit in Economic Modelling).
- Brzoza-Brzezina, M., <u>Makarski, K.</u> (2011) *Credit crunch in a small open economy,* Journal of International Money and Finance 30(7): 1406-1428; earlier version circulated as NBP Working Paper (Brzoza-Brzezina and Makarski, 2010)

The papers aforementioned focus on the following research topics:

- Monetary policy in the business cycle.
- Macroeconomic effects of the financial frictions.

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[1] The details on how each individual contributed to the coauthored works is shown in Annex 5.

- Macroprudential policy,

Then, I will characterize my series of topically related publications following the above topical division.

3.1 Monetary policy in the business cycle

Two papers in the series Gradzewicz and Makarski (2013) and Macias and Makarski (2013) focus on the monetary policy in the business cycle. The first one is devoted to the effects of the loss of autonomous monetary policy after the euro adoption in Poland. We focus on two aspects related to the loss of autonomy in monetary policy: (1) interest rates respond to macroeconomic variables in the whole monetary union (rather than to domestic variables as in the case of an autonomous monetary policy); (2) exchange rate, which can be a shock-absorber or the source of shocks in itself, vanishes.

To this aim, we build a two-country dynamic stochastic general equilibrium model (DSGE) with sticky prices and wages. The model is estimated using Bayesian methods with Polish and the euro area data (this method was popularized by Smets and Wouters, 2003). In the paper, we estimate the impact of monetary union on the business cycle and consumer welfare. Our simulations suggest that the entry to the eurozone would increase the volatility of all main macroeconomic variables except inflation. The decline in inflation volatility is due to two factors. First, according to our estimations, monetary policy in the euro area is more inflation oriented than in Poland. Second, fixing the nominal exchange rate stabilizes the inflation rate. Our results differ from Karam et al. (2008), who find that joining the eurozone increases the volatility of both GDP and inflation. However, their results have been obtained on the basis of the model (developed at the International Monetary Fund) loosely calibrated to the Czech economy (which the authors consider to be representative of the region).

Furthermore, our simulations shows that the welfare loss resulting from the euro adoption, expressed in consumption equivalent is equal to 0.124% of permanent consumption. These results are close to the estimate Ferreira-Lopes (2014). In the latter study the results were obtained using a first-order approximation of the DSGE model without wage rigidity calibrated to the Polish economy. In contrast, our results are based on an the second order approximation of the DSGE model with wage rigidities (estimated with the Polish data).

Our contribution to the literature is to show the effect of the loss of an independent monetary policy due to accession of a small open economy (such as, e.g. Polish economy) to the euro zone. In our paper we show how joining the euro area affects the basic economic variables, as well as welfare of agents.

The second of the aforementioned articles is devoted to the empirical estimation of the degree of nominal price stickiness. Nominal rigidity is one of the main determinants of the business cycle properties and of the role of monetary policy in the business cycle. In this study, we identified the following features of the process of price setting in the Polish economy. First, consumer prices change relatively infrequently, monthly on average 18.8% of prices is changed, and the implied average price duration equals 10.9 months. Second, the frequency of price changes is characterized by considerable heterogeneity across sectors of the economy. The least likely to change are the prices of services (only 6.6% per month), the prices of commodities and processed foods change more often (respectively 15.1% and 20%), and the most likely to change are prices of energy and unprocessed food (respectively 25.8% and 39.2%). Thirdly, there is no asymmetry between downward and upward price stickiness. As many as 40% of the price changes are price cuts. Since, in the analyzed period, the average inflation was equal to 2.7%, it means that the price are lowered relatively frequently.

The results described above are important for our understanding of the business cycle and the role of monetary policy. Our results indicate that the degree of price stickiness is slightly lower than in the euro area, and higher than in the United States. For comparison, the frequency of price changes in the euro area is 15.3% (see Dhyne et al., 2006), and in the US 26.1% (see Bils and Klenow, 2004). These results indicate that the impact of monetary policy on inflation in Poland is higher than in the euro area and smaller than in the US, and on GDP lower than in the euro area and larger than the US. At the same time, monetary policy lags in Poland are lower than in the euro area and larger than the US.

In contrast, the heterogeneity of price stickiness across sectors means that the effects of monetary policy vary between sectors, eg. the response of product in services is different than in case of commodities. The lack of asymmetry in downward and upward stickiness suggests that price setting process does not generate asymmetry in the transmission mechanism of monetary policy.

Our contribution to literature is to document the stylized facts about the process of price setting in Poland.

3.2 Financial frictions and business cycle.

The financial crisis and triggered by it the Great Recession has shown the need to further research on macroeconomic models that take into account financial markets. A better understanding of the linkages between financial frictions and business cycle has become the key to understanding the events during the recent crisis, as well as for the future making of monetary policy. The economists starter also a debate about the need to use a new type of macroeconomic policy, macroprudential policy.

The first article dedicated to the importance of financial frictions in the business cycle was Brzoza-Brzezina and Makarski (2011). The Great Recession affected the developing economies through multiple channels: (1) a decrease in external demand for exported goods and services; (2) increase in the risk premia expected by foreign investors; and (3) a change in credit policy of domestic banks (manifested in the increase in credit spreads and the credit requirements for borrowers). In our work we investigate the role that financial distress played in a small open economy during the Great Recession. Proper identification of the sources of the slowdown is crucial from the point of view of finding the right economic policy response to the crisis.

To this aim we use a DSGE model of a small open economy with the banking sector. The banking sector is characterized by two important frictions (see Iacoviello, 2005, and Gerali et al., 2010). First, households and firms can obtain loans collateralized by, respectively, housing and capital (in the form of collateral constraints defining the value of a loan to the value of collateral - LTV ratio). Second, the borrower's and lender's interest rates are different. In the model, both the LTV as well as the interest rate spreads are exogenous shocks. It allows to identify these shocks through Bayesian estimation techniques with the data for the Polish economy and the euro zone from the period 1Q: 1996-2Q: 2009.

We use our model to answer our main question to what extent the financial friction contributed to the economic slowdown. To this end, we conduct counterfactual simulations excluding all financial shocks from 3kw2008 (Lehman Brothers collapse). According to our simulations, financial shocks decreased GDP by up to 1.5% (if there were no financial shocks GDP would have been higher by 1.5%). For comparison, we check the extent to which external shocks have contributed to the economic slowdown. Our analysis shows that they have lowered GDP by 2%. This means that the financial shocks had a substantial impact on the GDP during the Great Recession.

This paper contributes to the literature by quantifying the impact of financial frictions on a typical small open economy using Bayesian methods. It is also the first model of an open economy with collateral constraints proposed by Kiyotaki'ego and Moore (1997) and built into standard DSGE model by Iacoviello (2005)

In the next article (Brzoza-Brzezina, Wesołowski and Makarski, 2014), we examined the extent to which remaining outside of the euro area contributed to the situation of the Polish economy during the Great Recession. On the one hand, an independent monetary policy and a floating exchange rate absorb external shocks, on the other hand, the exchange rate (in an environment of increasing risk aversion in the financial markets) may be an additional source of disturbances in the economy. Moreover, entering the euro zone may bring credibility and bring benefits of international currency.

Unlike many other works (e.g. Calmfors, 1997, NBP, 2009) extrapolating past experience regarding the economic structure and/or shocks hitting the economy to predict the future

behavior of the economy in the monetary union - an ex ante perspective - our research is carried out with an ex post perspective. In our work we conduct a series of counterfactual simulations, assuming Poland had been a member of euro zone during the financial crisis (2007-2011). Literature investigating the effect of joining the euro zone from the ex post perspective is relatively poor. Amisano, Giammarioli and Stracca (2009) estimate that had Italy stayed out of the euro zone their GDP would have be higher but more volatile. Pesaran et al. (2005) estimate that had Britain entered the euro area, initially their GDP would have increased to decline in the long run. Mazumder and Pahl (2012) estimate that GDP in the UK would have been lower and unemployment higher. Aspachs-Bracons and Rabanal (2011) paint similar picture for Spain. Soderstrom (2008) shows that had Sweden joined euro area in 1999, the consequences for the economy would have been small. Grabek and Kłos (2008) estimate that had Poland been in the euro area in the period of 1997-2005 inflation would have been more stable, but GDP more volatile.

Our contribution to the literature is that we examine the major problems arising from the global financial crisis using the model that accounts for the financial friction. This period is particularly interesting because the financial crisis has put the stability of the euro area in question, and the monetary policy of the European Central Bank was hampered by zero lower bound (ZLB) on the interest rates. These factors could be crucial from the point of view of the consequences of staying in the euro area or outside of it. In our opinion, in order to understand this particular period requires taking the financial frictions under consideration. In contrast to the previously cited literature we explicitly model the financial frictions in our paper.

In our study we use a small open economy DSGE model. Our model, in addition to the standard rigidities present in the new-Keynesian models, features financial frictions in the form of credit constraints (Kiyotaki and Moore, 1997) and stochastic interest rate spreads (Gerali et al., 2010). The model is estimated with Bayesian techniques using quarterly data from the period (1q2007: 4q2011). Then we use the model to conduct counterfactual simulations assuming Poland had entered the eurozone in 2007. Our simulations suggest that the volatility of GDP and inflation would have greatly increased. These results indicate that in the analyzed period independent monetary policy and, especially, floating exchange rate played an important role in stabilizing the Polish economy.

In the next article (Brzoza-Brzezina, Kolasa and Makarski, 2013a) have addressed the data fit of the models with financial frictions. At the time of writing the paper literature was dominated by two basic models developed before the Great Recession. The first one is a model of financial accelerator (Bernanke, Gertler, and Gilchrist, 1999). The second one is a model with collateral constraint for loans (proposed by Kiyotaki'ego and Moore, 1997 and adapted to the DSGE model by Iacoviello, 2005).

In our study, we undertake a detailed analysis of both frameworks. For this purpose, we examine the behavior of these frictions in a standard, medium size new-Keynesian DSGE

model. Both models as well as the standard new Keynesian model are calibrated to the US economy. Because our goal is to compare the business cycle properties of the two ways of modeling financial frictions, all three models are identical in all respects except of course for the financial sector. Calibration is also done in order to achieve comparability of the two approaches. Then, we compare the data fit of the standard moments of basic macroeconomic aggregates from three models to data, we analyze the responses to the standard shocks (technological, financial and government spending) and use the business cycle method as proposed by Chari, Kehoe and McGrattan (2007).

Our simulations show that both financial frictions models better replicate the behavior of main macroeconomic variables than the basic new Keynesian model. First, they improve the volatility of investment, consumption and output upon the standard model. Second, they manifest themselves in the investment wedge getting closer to the data. However, both modelling frameworks have significant differences that indicate the superiority of the financial accelerator model: (1) the collateral constraints model implies the behavior of some macroeconomic variables (e.g. the price of capital and return on capital) which is far from that observed in the data; (2) the collateral constraint model have weak propagation mechanism of stochastic shocks (this manifests itself in too strong and short-lived responses to shocks, which is inconsistent with the empirical evidence, based on vector autoregression models); and (3) the collateral constraint model has a few minor undesirable traits, e.g. initial decline of output after a positive productivity shock.

These results have inspired us to investigate whether the properties of the collateral constraint model would improve if they were occasionally, not eternally binding. We analyse this subject in another study in Brzoza-Brzezina, Kolasa and Makarski (2013d). Much of the literature on the impact of financial frictions on the business cycle, optimal monetary policy or macro-prudential policy is based on the models with eternally collateral constraint (see e.g. Iacoviello and Neri, 2010, Brzoza-Brzezina and Makarski, 2011, Curdia and Woodford, 2008, Carlstrom, Fuerst and Paustian, 2010, Angeloni and Faia, 2013).

Brzoza-Brzezina, Kolasa and Makarski (2013a) show that the eternally binding collateral constraint generate symmetric, strong and short-lived responses of macroeconomic variables to stochastic shocks. These features of the model are, unfortunately, incompatible with empirical data. In particular, the housing market is characterized by lack of symmetry (skewness of important basic variables related to the housing market). Housing investment, housing stock, changes in mortgages and housing price inflation are skewed down, i.e. the events on the left tail of the distribution are relatively more frequent. This skewness can originate from skewed shocks or asymmetric responses of the economy to symmetric shocks. In our work, we focus on examining the latter. The natural source of this skewness are occasionally binding collateral constraints (non-binding in normal times and binding in times of crisis).

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Occasionally binding collateral constraints are used in several e.g. Christiano and Fisher (2000), Mendoza (2010), Brunnermeier and Sannikov (2011). However, due to their non-linearity solving them requires using global methods. Unfortunately, due to the curse of dimensionality global methods allow to solve models with only a relatively limited number of variables. This means they are unable to solve typical models for economic policy analysis (e.g. as model used by central banks, Smets and Wouters, 2003). At the same time examining the effects of macroprudential policy requires a medium-sized model that can be solved only by using local methods (approximation around the steady state).

In our work, we study if occasionally binding collateral constraints can be approximated with a penalty function method. This method involves converting the constraint in a form of inequality into a constraint in form of equality, so that you can use the standard approximation methods. To this end, we construct a DSGE model with a standard set of frictions (in the style Iacoviello, 2005), in which the collateral constrains are introduced with a smooth penalty function. The model is parameterized in such a way that the constraint does not play a significant role in the steady state (the value of the penalty function in the steady state is very small). However, in the case of a large shock constraint becomes large.

Our simulations show that the deterministic model solved with local methods should be addressed through local methods generates asymmetric and non-linear responses of the economy to shocks, but only if it is solved by at least third order approximation. In the stochastic case, problems with the stability of the model arise that make this method not applicable in practice. This means that the penalty function method is attractive in the case of deterministic models (e.g. GEM, see Bayoumi et al., 2004 or EAGLE, see Gomes et al., 2012). However, its use in the case of stochastic models proves impossible.

Article contribution to literature is to study the possibility of using the penalty function method for solving a medium-sized DSGE models with local methods.

In another work, Makarski (2015), I study fiscal multipliers in a credit crunch. During the Great Recession the topic of the role of fiscal policy in a business cycle reemerged. On the one hand, due to the ZLB problem, the United States attempted to stimulate the economy with fiscal policy. On the other hand, some European countries due to fiscal tensions have been forced to substantially reduce their budget deficits (usually through tax increases). Because the crisis originated in the financial sector, it seems that analyzing the effectiveness of fiscal policy one cannot ignore financial frictions.

The size of fiscal multipliers is one of the most widely discussed topics in the literature. In the seminal paper Barro (1981) argues that government spending multiplier is equal to about 0.8. Empirical literature (based on vector autoregression models) shows both values greater than one and smaller than one. E.g. Blanchard and Perotti (2002) estimate that government spending multiplier is 0.96, Fatas and Mihov (2001), a little more than 1, and Ramey (2011) puts it in the range of 0.6 - 1.1.

In literature based on the DSGE models the multipliers are much smaller. Baxter and King (1993) show that the multiplier in a standard real business cycle model is close to zero which results from the crowding our effect on private consumption. Linnemann and Schabert (2003) show that despite the increase in the value of the multiplier, the crowding out effect on consumption in the new Keynesian model remains. Therefore, the multipliers in these models at hardly ever exceed one (see Cagan et al., 2007). However, these results are inconsistent with the empirical literature, Gali, Gertler and Lopez-Salido (2007) show that consumption is increasing after an increase in government spending. One way of modelling it is adding the *hands to mouth* consumers (see eg. Gali, Gertler and Lopez-Salido, 2007). This solution, however, lacks theoretical foundations.

In recent years the appreciation of the role of financial frictions can be observed. However, despite the obvious importance of financial frictions for the fiscal multipliers (they cause failure of the Ricardian equivalence) there is little work researching their impact on the value of fiscal multipliers. The natural financial friction to study in this context are collateral constraints, proposed by Kiyotaki and Moore (1997) and later introduced into the DSGE models by Iacoviello (2005).

So far, in the literature one of the main ways of modeling non-Ricardian households was an overlapping generations model (OLG model, Blanchard, 1985). In these models, however, the size of the fiscal multiplier does not increase drastically, e.g. Devereux (2011) reports the value of multiplier (with balanced buget) equal to 1. It increases only if the zero lower bound on the nominal interest rates (ZLB) is assumed. In such a case the deficit financed multiplier increases to 2. Similar values are also shown in Christiano, Eichenbaum and Rebelo (2011)

The work that is the closes to mine is Eggertsson and Krugman (2012), who show how the value of the multiplier changes as the proportion of credit constrained households increases. In their paper, the value multiplier reaches 2 with a 50% share of credit constraint households. Andres, Bosca and Ferri (2012) achieve a similar result in a model with financial and labor market frictions (based on the search model of labor market).

In my paper, I show how accounting for collateral constraints changes the value of fiscal multipliers. To this end, I compare the size of multipliers in three models calibrated to the US data: the standard new Keynesian model; the new Keynesian model with collateral constraints, and the new Keynesian OLG model. My calibration that minimizes the differences between three frameworks allows for model comparisons.

My contribution is to examine whether introduction of collateral constrains into a DSGE model eliminates the crowding out effect of government expenditure on private consumption, thereby increasing the size of the multiplier. My simulations show that it is possible and that the increase in the size of the multiplier is noticeable. Relating this result to the OLG model I show that the latter does not give similar results. Additionally, my simulations show that the multiplier depends on monetary rule, which suggests that the

government multiplier with collateral constraints would be even greater on the ZLB. My result suggests that the effectiveness of fiscal policy in times of financial crisis is greater than in "normal" times.

3.3 Macroprudential policy.

The last research area in my series of topically related publications is devoted to macro-prudential policy. It is a policy which until now has been used only sporadically. One of the few examples of this policy was the use of the LTV ratio for mortgage loans as stabilizing instrument in Hong Kong, South Korea and Singapore. Due to this the number of empirical studies devoted to macroprudential policies are largely limited. This makes an analysis based on models with theoretical foundations an important option.

As argued by Faust (2012), DSGE models may play a role of laboratory rats (or other mammals). As in the biological sciences substances prior to use on humans (who are very complex, imperfectly understood reality) are tested on rats (which are an imperfect models of a human) and as part of the natural experiments. Similarly, in economic policies prior to use in practice should be tested in imperfect models of reality (which are DSGE models). DSGE models are helpful despite of all.the identified omissions literature, simplifications or rough approximations, which can be important from the point of view of economic policies (such as the results of experiments on rats are useful in the biological sciences despite the fact that rats represent a very imperfect model of human).

The first paper (Brzoza-Brzezina, Kolasa and Makarski, 2015a) is devoted to the possibility of using macroprudential policy to stabilize heterogeneous monetary union. Since its creation euro area experienced accumulation of economic imbalances. These imbalances were particularly evident in the housing market and contributed to significant differences in the growth rates within the euro area. Growth in countries experiencing housing boom was relatively fast, but ended with a sudden economic collapse.

As has been established in the literature, the main source of these asymmetric developments were asymmetric changes was the sharp drop in interest rates in the peripheral economies following their accession to the eurozone. As empirical studies based on DSGE models shown, an important factor contributing to the emergence of these imbalances were asymmetric productivity and preferences shocks (Andres et al., 2010) and the price shocks in the housing market (in't Veld et al., 2012). Preventing these type of imbalances is crucial for the future of the euro zone. Clearly, a common monetary policy cannot react to events in the periphery of the asymmetric monetary union and will not provide stability. The devaluation of the currency (a tool used before the euro area creation) is also not an option within the monetary union. Finally, the usefulness of fiscal policy is limited by due to the high levels of government debt of the peripheral countries.

In this paper we check if appropriately designed macroprudential policy may increase macroeconomic stability in the peripheral countries of the euro area. For this purpose we build two country DSGE model in the spirit of Iacoviello (2005). In the model, household access to credit is limited by the collateral constraint (credit is determined by the LTV ratio multiplied by the value of housing). LTV ratio is fully controlled by the macroprudential authorities.

Selecting the LTV ratio as an instrument of policy is motivated as follows: (1) the main source of imbalances was the real estate market; (2) the LTV ratios are not mentioned among the pan-European macro-prudential policy tools (CRD IV/CRR 2013).

Our study can be placed in the growing literature on macroprudential policy. Lambertini, Mendicino and Punzi (2013) show that in a model in which news shocks lead to overaccumulation of debt, countercyclical LTV policy (responding to credit growth) stabilizes the economy better than the interest rate. Funke and Paetz (2012) argue that non-linear LTV policy restricting credit in response to high growth rates in the real estate prices may limit the transmission of the real estate price cycles on the real economy. Conducting experiments on three macroeconomic models, Angelini et al. (2011) report that countercyclical capital buffers (introduced by Basel III) bring a significant increase in the stability of the GDP. In turn, Christensen et al. (2011), point out that the countercyclical policy governing banks' balance sheets stabilizes the economy, especially in the face of financial shocks. Darracq-paries et al. (2011) come to similar conclusions. On the other hand, Angeloni and Faia (2013) claim that the best combination of monetary and macroprudential policies are a slightly countercyclical capital ratios combined with monetary policy responding to asset prices and leverage of banks. The paper, which is the most similar to our study is the Quint and Rabanal (2014), who use the financial accelerator model (Bernanke, Gertler and Gilchrist, 1999) to show that macroprudential policy can reduce macroeconomic volatility, improve welfare and partially replace an independent monetary policy.

Our simulations show that the LTV policy can significantly reduce the volatility of credit and output in the peripheral countries. This policy best stabilizes the shocks originating from the real estate sector and (common) monetary policy shocks, namely those shocks that were an important factors contributing to accumulated imbalances in the euro area. Moreover, this policy in order to be effective must be decentralized. These results do not change if we use consumer welfare, rather than the volatility of GDP, as a macroprudential policy goal.

Our contribution to literature is to show that in a model with collateral constraint macroprudential policy (using LTV ratio) can stabilize heterogeneous monetary union but must be decentralized. This policy is particularly effective in stabilizing the shocks stemming from the housing sector, which was one of the main culprit in the recent financial crisis.

The last of my papers in the series (Brzoza-Brzezina, Kolasa and Makarski, 2015b) is devoted to the effect that of foreign currency denominated loans (FCLs) have on the effectiveness of

macroprudential and monetary policy as well as the effects of reduction of these loans with the use of macroprudential policy.

In the beginning of the twenty-first century, foreign currency loans have become quite popular in many developing countries, as well as in some developed countries. In the European Union this was the case in i.a. Bulgaria, Hungary, Romania, Poland, and even Austria. This problem was acute in the market for mortgage loans in Poland, over 50% of these loans were denominated in foreign currencies. Historically interest rates on foreign currency were lower but they became a source of systemic risk. The effect of foreign loans on the economy draws the interest of policymakers, including banking supervision, macroprudential authorities and monetary authorities (Dubel and Walley, 2010, ESRB, 2011, Dell'Ariccia et al., 2012, Lim et al., 2011).

In our work, we study the effect of foreign currency loans on the economy building on the two important strands of the literature: (1) modeling of financial frictions; and (2) empirical studies on the relationship between foreign currency loans and macroeconomic policy. We extend a pioneering model of Iacoviello (2005) for foreign currency loans. This model is particularly suitable for our study because it contains housing loans and allows for LTV policy. The empirical literature points to some interesting relationships. Magud, Reinhart and Vesperoni (2011) document that a fixed exchange rate and large interest rates differentials are conducive to high shares of foreign currency loans. The latter finding was confirmed by Egert, Backe and Zumer (2007) as well as Rosenberg and Tirpák (2009). Brzoza-Brzezina, Chmielewski and Niedźwiedzińska (2010), based on a panel of four Central European countries show that after the tightening of monetary policy, more than 50% of eliminated domestic currency loans come back in the form of foreign currency loans. Lim et al. (2011) suggest that some supervisory activities effectively reduced the share of foreign currency loans.

In contrast to the existing literature, our work is based on a theoretical model, but provides quantitative answers. Our model is calibrated to Polish economy, a typical small open economy with a relatively large share of foreign currency loans. Our contribution to literature is to show the impact of foreign currency loans on monetary policy, macroprudential policy and consumer welfare.

Our simulations show that, first, foreign currency loans negatively affect the monetary policy transmission mechanism, but the impact on the effectiveness of macroprudential policy is negligible. Second, they improve welfare when the dominant source of risks are interest rate shocks and reduce welfare when the risk premium (foreign exchange) shocks dominate. In the calibrated model of the Polish economy, these loans reduce consumer welfare. Thirdly, the elimination of them through the regulatory policy has a transitory negative impact on the economy. To the best of our knowledge, this is the first paper analyzing foreign currency loans from the normative perspective. Moreover, the effects of such loans on macroprudential policy has also not been previously analyzed.

4. Other major publications

In addition to the aforementioned work in the series of topically related publications I also published other papers, the most important of which I synthetically discuss below. These papers focus on two main areas: monetary policy and the pension system as well as one paper on the state of the economy after the crisis[2]. In Brzoza-Brzezina et al. (2013) we show that how abandoning the representative agent assumption affect the results of studies on such topics as the optimal inflation rate, the welfare cost of inflation, the monetary transmission mechanism or the distribution effects of monetary policy. In another paper Gerke et al. (2013), we compare simulation results in 5 different central banks' models with financial frictions. We show that these models generate some common results, which allows us to infer that research carried out in recent years on the impact of financial frictions on the macroeconomy have brought some progress.

Four of my papers focus on the pension system. Hagemejer, Makarski and Tyrowicz, (2015a) look at the impact of the method of financing (fiscal closures) pension reform involving the conversion from a defined contribution Pay-As-You-Go (PAYG) system to a defined contribution partially funded system on welfare (our model is calibrated to the Polish pension reform of 1999.). In case of all fiscal closures the reform improves overall welfare of the society, although generations working at the time it takes place lose and future generations gain. Public debt can (partially) shift the burden of the reform from current generations to the future ones. In the next paper (Bielecki et al., 2015), we check how the number of assumptions (utility function, time inconsistency of preferences, redistribution of the unintended bequests, work divisibility and perception of the link between pensions and contributions) affects the estimate of the effects of pension reforms. Our study shows that these assumptions have a significant impact on both the magnitude and sign of macroeconomic and welfare effects of the pension reform. The magnitude of this error estimate is significant and comparable to the effect of the reform itself.

In the following paper (Hagemejer, Makarski and Tyrowicz, 2015b) study the effect of changes to the pension system introduced in Poland in 2011 and 2013. We show these changes provide some fiscal relief in the early years, but since they reduce pensions their welfare effect is negative. These results do not change if we allow for time inconsistent preferences of individuals. This is mostly a policy paper and is dedicated to actual policy changes[3]. Last but not least, Goraus, Makarska and Tyrowicz (2014) show that with aging population pensions system reform does not substitute for extending the retirement age.

In another paper, Gradzewicz, Makarski and Tyrowicz (2009), we contribute to the discussion on the state of the economy after the financial crisis. In this article, we point to some of the simplifications of mainstream economics, which proved to be excessive. At the same time,

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[2] The full list Publications is contained in Annex 3.

[3] On Nov. 18th 2013 the results of this paper were presented to the Economic Council in the Chancellery of the Prime Minister.

we argue that the economics as a science is not such a bad shape as critics would like to see it, and we point out to the steps taken both in the mainstream economics as well as on its outskirts, which significantly improve our understanding of the economic world.

5. Summary of scientific achievements[4]

My scientific achievements at the moment of submitting this document include:

- 10 articles in scientific journals listed in the Journal Citation Reports,
- 5 articles in other scientific journals classified by the MNSiW,
- 1 chapter in a book,
- 12 articles published in reviewed working paper series.
- 5 articles published in non-review working paper series.

The overall impact factor of the published by me articles equals 8,676 (*2-year impact factor*) or 10,904 (*5-year impact factor*). My publications according to the current MNiSW ranking scored 289 points.

My publications are cited in both domestic and foreign publication. According to Google Scholar the total number of citations equals 132 and the Hirsch index equals 6. IDEAS/RePEc has identified 50 of mine citations (without self-citations) and the Hirsch index (according to IDEAS/RePEc) equals 4. In the Web of Science database the number of my citations (without self-citations) equals 20 and the Hirsch index equals 3 [5] In the ranking of economists with the Polish affiliation done by IDEAS / RePEc (based on the quality of journals in articles were published as well as citations) I am classified in 18th place (meaning that I belong among the best 5% classified economists with the Polish affiliation).

6. Remaining information[6]

My research discussed above was presented in both domestic and international conferences and seminars. These include i.a. such prestigious conferences as the International Conference on Computing in Economics and Finance, Annual Symposium of the Society for Nonlinear Dynamics and Econometrics, Annual Meeting of the Society for Economic Dynamics, the Central Bank Macroeconomic Modeling Workshop, Annual Conference of the Money Macro and Finance Research Group and World Congress of the International Economic Association.

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[4] Details on the indicators presented here are included in Annexes 3, 4 and 5.

[5] Web of Science database was searched using the "Cited references search" and the above numbers contain also citations in Web of Science journals of the Working Papers versions (of articles published later). Detailed data can be found in Annex 4.

[6] Details are included in Annexes 3, 4 and 5.

The article of mine (Makarski, 2012) was granted the President of the Narodowy Bank Polski award for the best article published in the scientific journal "Bank i Kredyt" in 2012. I am a principal investigator in grant obtained in the OPUS 7 competition and I am the main investigator in grants SONATA 1, OPUS 3 and SONATA 7 (all financed by *Narodowe Centrum Nauki*). Also, I received awards and research grants from the Rector of the Warsaw School of Economics for scientific activity and publications in journals listed in JCR.

At the end I will present my organizational and in knowledge dissemination achievements. During my academic career I was teaching (including doctoral studies) at the following schools: Warsaw School of Economics, University of Minnesota. I supervised 6 bachelor thesis and 3 master thesis. In Warsaw School of Economics I am a coordinator for Advanced Macroeconomics II (QEM) course. I was also a tutor within *Collegium Invisible*. I translated four chapters (of which two independently and two in collaboration) of the textbook "Trade and International Finance" by R. E. Caves, J. A. Frankel and R. W. Jones. I also co-organized the first three editions of the Summer Workshops of NBP which aim at integrating the Polish economists affiliated with foreign and domestic institutions. Currently I co-organize the very prestigious Annual Meeting of the Society for Economic Dynamics, which will take place in Warsaw on 25-27 June 2015. I prepared the lecture notes for Advanced Macroeconomics which are available at: http://akson.sgh.waw.pl/~kmakar/SkryptZawMakro/SkryptZawMakro.htm.

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