

Attachment 4.

Summary of professional accomplishments presenting scientific publications and achievements

Scientific and professional career

a) Before the doctorate

On completing the master level studies in the Warsaw School of Economics in 1998 I took up full time doctoral level studies in the Collegium of Economic Analysis. In November 2000 I was employed as the assistant in the Institute of Statistics and Demography of the Warsaw School of Economics. Before obtaining the degree of doctor in economics, my academic record included the following publications:

1. E.Frątczak, A.Ptak-Chmielewska: Bongaarts-Feeney Formula – Applications for Poland, Demographic Studies No 2(136)1999.
2. E.Frątczak, J.Jóźwiak, J.Balicki, A.Ptak-Chmielewska: The evaluation of changes in attitudes and reproductive behaviours of young and middle generations of female and male Poles and their influence on the process of family and household formation and dissolution, Polish Population Review, No 21, 2002, Polish Demographic Society, Central Statistical Office.
3. E.Frątczak, J.Jóźwiak, K.Latuch, L.Nowak, Z.Strzelecki, T.Toczyński, J.Witkowski, L.Zalewski, A.Ptak-Chmielewska, National Censuses of the Republic of Poland 1921-2002, PTD, Central Statistical Office, Warsaw 2002.(762 pages)
4. A.Ptak-Chmielewska: Studies of three parallel careers in demography with the uses of three-dimensional model of competing risks, Demographic Studies No 2(144)2003.
5. A. Ptak-Chmielewska, W.Kozłowski, G.Zyśk, Introduction to the analysis of latent classes, Papers of Demographic Analysis Section, KND, PAS No 8/2003 (no points)
6. A.Ptak-Chmielewska (elaboration), Descriptive Statistics – basic formula, Publishing House of the Warsaw Management University (31 pages).

I was a leader of research conducted in the scope of own research in the Institute of Statistics and Demography of the Collegium of Economic Analysis:

1. 2001: Studies of parallel careers with the use of non-parametric analysis models.
2. 2002: Cause-reason mechanism – studies of parallel careers with the use of semiparametric models.
3. 2003: First and Second Births Process in Poland before Economic Transition Period. Analysis Based on Polish Retrospective Surveys 1988 and 1991.

I was also the member of research teams of grants/research:

1. 2000-2002: Grant of the State Committee for Scientific Research (no 1 H02F 00419) led by prof. dr hab. Janina Jóźwiak: The assessment of changes in attitudes and reproductive behaviours of young and middle generations of Poles and their influence on the process of formation and dissolution of families and households.
2. 2000: Own research (03/S/0062/00) led by dr hab. Ewa Frątczak: Forecasting families and households.
3. 2001: Statutory research (No 03/S/0007/99) led by hab. Ewa Frątczak: Modelling of phenomena and demographic processes with the application of event history analysis methods.

I spend two semesters (October 2001-February 2002, and October 2002-December 2002) in the Max Planck Institute in Rostock in Germany, in the European Doctoral School for Demography. I completed during these semesters the certified courses:

1. MP 300. Introduction to Event-History Analysis (lecturer: F.Billari)
2. MP 199. Research Tools and Presentation Skills (lecturer: Ch. Wilson)
3. MP 302. Advanced Event History Analysis (lecturer: J.Hoem)
4. MP 209. Measures and Models of Demography (lecturer: Ch. Wilson)
5. MP 182. Life course approach in demography (lecturer: J.Jóźwiak, E.Frątczak)

I participated in conferences in Poland and abroad presenting papers from the field of my research activity.

1. Demographic Analysis Section, Committee of Demographic Sciences, PAS, 19.06.2000, Warsaw; Paper A.Ptak-Chmielewska: Multilevel Analysis in social sciences.
2. Demographic Analysis Section, Committee of Demographic Sciences, PAS, 26.03.2001, Warsaw; Paper A.Ptak-Chmielewska: Studies of parallel careers in demography – PhD thesis.
3. EuroConference on The Second Demographic Transition in Europe, 23-28.06.2001, Bad Harrenalb, Niemcy; Poster E.Frątczak, A.Ptak-Chmielewska: Fertility and family life cycle changes in Poland and the Second Demographic Transition.
4. 1st Demographic Congress in Poland, 15.09.2001, Warsaw, Poster E.Frątczak, A.Ptak-Chmielewska: Changes in fertility and family cycle in Poland in the context of second demographic transformation.
5. 1st Demographic Congress in Poland – Final session, 25-26.11.2002, Warsaw, Poster E.Frątczak, J.Jóźwiak, J.Balicki, A.Ptak-Chmielewska, K.Latuch, K.Sienkiewicz: Changes in attitudes and reproductive behaviours of young and middle-age generation of Poles.
6. European Population Conference, 26-30.08.2003, Warsaw, Paper A.Ptak-Chmielewska: Study of Parallel careers in Demography. First and Second Births Process before Economic Transition.
7. Demographic processes in ageing societies, 22-24.09.2004, Dobczyce, Demographic Analysis Section, Committee of Demographic Sciences, PAS, Paper A.Ptak-Chmielewska: Studies of parallel careers in demography – theses and results of PhD dissertation.
8. Plenary Meeting of Committee of Demographic Sciences, PAS, 27.09.2004, Warsaw, Paper A.Ptak-Chmielewska: Status, structure and dynamics of Poland's population according to the Central Statistical Office forecast for years 2003-2030 and the UNO forecast for years 2000-2050.

I took part in organising activities of the international conference European Population Conference 2003. I was in years 2002-2004 the representative of dependent academics in the Board of Collegium of Economic Analysis of the Warsaw School of Economics. During this time I also held the function of the member of the Board of the Warsaw Branch of the Polish Demographic Society (2000-2004).

b) After the doctorate

In March 2004 I defended the doctoral dissertation entitled "Studies of parallel careers in demography" in the Collegium of Economic Analysis of the Warsaw School of Economics. The PhD dissertation constituted also the basis to obtain the Award in the name of prof. Holzer for young scientist in 2003. After obtaining the degree of doctor in economic sciences I was employed in November at the position of Assistant Professor in the Institute of Statistics and Demography, Collegium of Economic Analysis of the Warsaw School of Economics. I was giving lectures for the students of bachelor level and master level studies. I was the supervisor of 74 MSc theses and 6 BSc theses as well as several dozen papers at the postgraduate level studies. I was the co-author of elaborating the subjects constituting the specialisation and certificate „Statistical Analyst with SAS”. I had classes also at the Postgraduate Studies and Doctoral Studies. I took part in over 80 scientific conferences, including 30 international, presenting the results of my own research activities. My publications from that time are mainly articles published in Polish papers in the Polish and English language as well as articles in international papers. I participated in organisational works, receiving for my activity the Award of the Rector of the Warsaw School of Economics. In years 2007-2011 I was the Secretary of the Committee of Demographic Sciences of PAS, in years 2013-2016 I held the function of the Attorney of the Dean of Master Level Studies. For many years I have been the representative of the dependent academics in the Board of the Collegium of Economic Analysis of the Warsaw School of Economics. Since October 2015 I have been employed at the position of Senior Lecturer in the same Institute.

Description of scientific accomplishments which fulfil the requirement mentioned in Article 16 paragraph 2 of the Law

1. The title of the scientific accomplishment, author, title of publication, year of issue, name of the publishing house

Scientific monograph

Aneta Ptak-Chmielewska:

Determinants of the survival of micro and small enterprises in Poland, Warsaw 2016, Publishing House of the Warsaw School of Economics, 230 pages.

2. The scientific purpose of the a/m paper and results achieved along with the discussion on their potential application

Scientific purpose, research hypotheses:

The main purpose of the paper is to assess the influence of external factors, connected with the market and the sector of activity, and internal factors connected with the enterprise and the entrepreneur on the survival of micro and small enterprises in Poland. The object of research is the micro and small enterprise defined as the enterprise that employs fewer than 50 persons. The specifics of activities of micro and small enterprises causes that this type of research is very difficult, but at the same time especially valuable for the economy. The scope of research involves a five-year survival of the enterprises with a special focus on the first-year activity which is crucial for the survival of enterprises. The external factors taken into consideration are most of all the factors from the range of economic environment such as: the territory boundary of the activity, export expansion and the factors from the range of sector environment (industry of activity). From among the internal factors, the ones which are characteristic for the enterprise can be enumerated, such as: legal status, number of employees, profits/losses and the factors which are typical for the entrepreneur (main owner) such as: sex, age, education, previous job of the owner and factors which are to a great extent dependent on the assessment and decision of the owner: the way the enterprise originated and its financing side, investments and reported barriers. The range of external and internal factors under consideration is to a great extent limited by the availability and statistical data in the analysed sample. The research sample covered micro and small enterprises (up to 50 persons working in the enterprise) from the panel study of the enterprises carried out in the Central Statistical Office. The sample to this paper was selected on purpose and it was the sample covering one of the panels of the study. The enterprises selected for this research were taken from the panel studies in 2005, i.e. they were the enterprises registered during 2004. The analysed period covered years 2005-2009.

The theoretical and cognitive purpose was a review of literature, systematics and review of methods employed in the survival analysis of enterprises, the review theories applied in the survival analysis of enterprises.

On reviewing the literature, the following conclusions were drawn:

- a) The existing research and publications derive mainly from the Western Europe and American markets. The reasearch of the Polish market is not available to a greater extent. The papers pertaining to the Polish market are the papers of: Markowicz (2012), Szymański (2011), to a smaller extent of Dominiak (2005) or Dehnel (2010).
- b) In the Polish literature regarding the survival of enterprises I did not find the reference to the theories connected with the human capital theory and social capital theory. The mechanisms connected with the so- called „*liability of smallness*”, „*liability of newness*” or „*liability of adolescence*” theories were not empirically verified with regard to enterprises although these mechanisms were referred to (Poznańska 2008).

- c) In the Polish literature there is not a wider approach to the taxonomy of determinants of the survival of enterprises. Therefore, I presented a detailed taxonomy of determinants which appear mainly in English language literature. I proposed to apply a division of factors into external factors connected with the market environment (closer and distant) as well as internal, connected with the enterprise and the entrepreneur. The pattern to elaborate the taxonomy of determinants was the article by Manjon-Antoli M.C., Arauzo-Carod J-M., *Firm Survival: Methods and Evidence*, „Empirica” 2008, no 35.
- d) The review of applicable research methods and estimated models convinced me that the selection of methods and event history analysis models for the analysis of determinants of the survival of enterprises was correct. The event history analysis methods are still less frequently adopted than the cross-sectional models which do not require the access to individual data.

The practical purposes consisted in the building of non-parametric, parametric and semi-parametric survival models, to describe the determinants of survival of micro and small enterprises, particularly to build models which are adjusted to correlated panel data.

Additionally, a typical survival analysis was juxtaposed to methods and models based on data with discrete time, i.e. logistic regression models.

In the modelling procedure, the individual data database was used, with the sample of enterprises registered in 2004, the time of their operations since the commencement of activities till the liquidation (the observed period covered years 2005-2009) and the characteristics describing the enterprise and demographic data regarding the entrepreneur.

The research issues were detailed through the analysis of the following matters:

- a) Estimating the risk of enterprise liquidation in a specific time frame with the application of non-parametric, parametric and semi-parametric models. This problem was referred to in papers of Markowicz (2012), Szymański (2011) and in the paper of such authors as: Kaniowski, Peneder (2008), Mata, Portugal (1994, 2002), Saridakis (2008), Rinaldi (2008).
- b) Taking into account of censored data (i.e. the situation of incomplete observation of a given economic entity) in modeling the survival of the enterprises. This matter was referred to in papers of Polish authors such as Markowicz (2012), Szymański (2011) and foreign authors such as: Kaniowski, Peneder (2008), Mata, Portugal (1994, 2002), Saridakis (2008), Rinaldi (2008).
- c) Taking into account various manners of including variables dependent on time, e.g. the number of employed workers, the number of locations of the activity, the range of activity, etc. that have the influence on the survival of enterprise which is variable in time. Time-dependent variables were also considered in much smaller extent in the paper of Szymański (2011).
- d) The correction of estimations of the estimators for correlated observations characteristic for panel data. As I know, this issue has not been discussed in Poland with regard to the survival analysis of the enterprises.
- e) To a smaller extent, taking into consideration the heterogeneity of the sample. The sample used in the research was not strongly differentiated. The correction for the heterogeneity of the sample was also applied by Szymański (2011) in his paper. This issue was referred to in foreign publications in the paper by: Esteve-Pérez, Mañez-Castillejo, Sanchis-Llopis (2008).
- f) The use of discrete data instead of continuous time. The models based on the discrete time appeared in the paper by Markowicz (2012) and in the paper by Esteve-Pérez, Mañez-Castillejo, Sanchis-Llopis (2008).
- g) Taking into consideration various ways for exiting the market. The application of competitive risk models requires the knowledge how to exit the market, it was taken into ac-

count in papers by Harhoff, Stahl, Woywode (1998), Wheelock, Wilson (2000), Mata, Portugal (2000).

In my monograph I formulated seven research hypotheses which I classified into three groups of issues:

Group I. Hypotheses regarding the functioning of an enterprise in macroeconomic environment and sector environment in line with the concept of ecology theory and economics of enterprises:

Hypothesis 1. The survival of enterprises depends on the size and age of an enterprise. The liquidation risk of an enterprise is getting lower along with the age of an enterprise. In line with the „*liability of smallness*” theory, small enterprises will be characterised by a higher liquidation rate. The survival of enterprises will be also strongly dependent on the age of the enterprise – „*liability of newness*”. The rule related to the age and the size of the enterprise is derived from the ecology theory of enterprises. The manner in which the enterprise originated is significant in such deliberations. The enterprises that were established as totally new are small enterprises, and, therefore, they are exposed to a higher liquidation risk. Along with their growth and duration of operations the enterprises are subject to laws of „*liability of adolescence*” and they utilise the experience acquired as well as the market reconnaissance. The liquidation risk is getting lower along with the duration of life of the enterprise.

Hypothesis 2. The enterprises acting in the area of manufacturing sector are exposed to higher initial outlays, hence bigger barriers of entering the market in comparison with the enterprises acting in the service and commercial sectors. The manufacturing enterprises will be characterised by a lower liquidation rate. They are entities which are basically bigger and stronger, with more outlays for development, but also generating higher profits. However, this does not constitute an obvious rule in the case of activities which require advanced technologies. For the sector of small and medium enterprises, where the investments in research and development are significantly smaller than in the case of large corporates, the manufacturing enterprises will have a bigger survival rate than enterprises operating in services and commercial sectors. The entry barriers that have to be overcome by the enterprises from these sectors cause that only stronger entities will be able to enter, and, therefore, will stay longer on the market.

Hypothesis 3. The liquidation risk of the expanding enterprise is much lower than the liquidation risk of a single-person family enterprise. This rule is in line with the ecology theory of an enterprise. According to this theory, the basis for the survival of the enterprise is its dynamic development and the activity restricting the bankruptcy risk of the enterprise. The dynamics of development and the expansion of the enterprise determines its strength and market position. These enterprises which export their goods and services, act on international markets and have a developed network of units are the successful ones. Such enterprises will be characterised by a lower liquidation risk, i.e. the higher rate of survival. They will be acting longer on the market (longer survival time).

Group II. Hypotheses regarding the functioning of the very enterprise, with references to ecology theories:

Hypothesis 4. The ability to invest in fixed assets, generating profit and gaining funds for development define the success of the enterprise. The first period of activity, just after entering the market is a key factor to survive in the market. In line with the *liability of newness* theory, the new entities are exposed to the highest failure risk. If the enterprise overcomes the barriers and increases the profits from the activity, wins with the competitors, then its chances of survival will significantly grow. It is the start of the process in line with the rule of *liability of adolescence*, the enterprises are learning. In contrast, the enterprises focuses on the consumption of profits instead of investments are doomed to failure.

Hypothesis 5. The enterprises which are able to overcome demand and supply barriers are the enterprises whose survival rate will be higher than the weak and non-expanding ones which are not able to overcome the barriers created by the market. A significant obstacle for young and small enterprises are the demand barriers. The supply barriers will be a bigger obstacle for companies already existing on the market, because in the situation of a large demand for goods

and services they undoubtedly constitute an obstacle in the development and in satisfying this demand limiting further development of the enterprise. In the situation when the competition is strong, it can happen that the lack of development will be equivalent to the end of activity. The influence and diversification of sectors were not taken into consideration due to high homogeneity of the data

Group III. Hypotheses regarding the person of an entrepreneur – the owner of the enterprise, related to social theories:

Hypothesis 6. The human capital personalised in the entrepreneur determined the survival of the enterprise as an entity on the market. The human capital can be measured by means of education, age, sex, origin, training of the entrepreneur. The enterprise managed by an older person, with higher education, experienced at the managerial positions will demonstrate higher chances for the survival. In turn, persons with engineering education will be prone to transferring their experience and innovative ideas to the enterprise activities. The persons of such a profile have technical skills and more chances to implement modern solutions in the company.

Hypothesis 7. The social capital of the entrepreneur will be manifested in his/her relations with the environment, the network of connections and his/her abilities to utilise the network of connections in managing the enterprise. The persons who can obtain external funding to start the activities (e.g. from banking loans), instead in relying solely on own savings, are the entrepreneurs who can use their skills to be successful on the market. The analysis of the profile of the entrepreneur will allow for determining whether they are pragmatic entrepreneurs, risk-taking entrepreneurs, hesitant entrepreneurs, entrepreneurs continuing their family business or ambitious entrepreneurs. The profile of pragmatic entrepreneur, risk-taking and ambitious indicates more chances for survival. The hesitant entrepreneur, continuing family business, not ambitious is a profile of the entrepreneur who is doomed to failure.

The scope of the monograph (the summary of the contents)

The monograph consists of six chapters, introduction and summary with the reference to the research hypotheses presented. The literature contains more than 200 items.

The first chapter presents the basic notions and definitions used in the survival analysis of the enterprises. An attempt was made to classify the factors that have an influence on the survival of enterprises. The factors were grouped into external factors (environment) and internal factors characteristic for the enterprise. A review was made of the basic theories of an enterprise and an indication was made with regard to theories that are useful to determine the influence of these factors on the behaviour and the survival of the enterprises. The end of the chapter presents the research hypotheses.

The second chapter consists of the presentation of the models of the event history analysis as the most useful tool to assess the survival of the enterprises. Although the models of event history analysis are derived from experimental and medical sciences, the dissemination of their applications in social and economic sciences is constantly growing. The methods were quite widely discussed by various Polish scholars (e.g. Frątczak et al. 2005, Markowicz 2012, Szymański 2011, Landmesser 2013, Balicki 2006), therefore the review provided is rather synthetic. An extension of the approach typical for the event history analysis was proposed in the paper with regard to semiparametric models by models aiming at analysing correlated events. The models for correlated panel data with the use of the so-called *sandwich estimators* were presented as well as the models with non-observable heterogeneity (with random effects). The review of methods for verifying the assumptions and the quality of the models was made.

The third chapter presents the panel study of small and microenterprises in Poland that has been carried out by the Central Statistical Office since 2002. The sample based on a selected panel constituted the basis of the survival of the enterprises presented in this paper. The chapter also contains the descriptive characteristics of the research sample.

The fourth chapter presents the results of estimating the models of event history analysis according to the scheme shown in the second chapter which is dedicated to the review of methods and models. The initial analysis was a univariate analysis based on the Kaplan–Meier surviv-

al functions and the non-parametric tests. The layers were defined by variables available in the research.

The next step was the parametric analysis on the basis of the log-normal model and gamma model, presented in the fifth chapter. The parametric models were also estimated in the form of piecewise constant models, where the hazard rate was estimated for one-year sections of time.

The sixth chapter contains the results of the semi-parametric analysis with the use of the Cox model with variables dependent on time. Variables dependent on time were included in several various ways and the results were compared with the models with the variables described at the beginning of the period of analysis. As the last step, the correction of the estimators was proposed taking into account the specifics of the correlated panel data and non-observable heterogeneity. The data involved the enterprises registered at the same time (2004), so it was not justified to include the macroeconomic variables that define the changeable external conditions at the start of the enterprise's activities.

At the end, the results were summed up and related to the research hypotheses raised at the beginning of the paper. The majority of the hypotheses were proven by means of the proposed research material and the statistical methods applied. The conclusions resulting from the paper can be useful for determining the policy aiming at the support for micro and small enterprises in Poland.

The results achieved with a reference made to the possibilities to utilise them

The monograph *Determinants of the survival of micro and small enterprises in Poland* was to define the determinants of the survival of the enterprises and to indicate the possibilities of utilising for this purpose the methods and models of event history analysis.

The achieved results can be grouped into two areas:

- a) defining the determinants of the survival of micro and small enterprises,
- b) using the event history analysis showing in a dynamic view the survival process of micro and small enterprises in Poland.

Determinants of the survival of micro and small enterprises can be characterised by external and internal factors. The external factors which have the influence on the survival of the enterprises are most of all the macroeconomic environment and the sector environment. The enterprises acting in the period of a good economic cycle have bigger chances of survival, and therefore, remain longer on the market. Due to homogeneous sample (enterprises registered within one year) these deliberations were given less consideration than in the case of trying to define the influence of the sector in which the enterprise operates. The small enterprises acting in the manufacturing sector have bigger chances of survival than the enterprises operating in the service or commercial sectors.

Internal factors are most of all the factors such as the manner the enterprise originated, the legal status, the area of activity, the expansion of activities onto foreign markets, number of persons working in the enterprise. The survival time of enterprises of natural persons carrying out business activity was significantly shorter than the survival time of the companies. The enterprises the activity of which was limited to the local and regional market had a significantly higher liquidation risk, their time of staying on the market was significantly shorter than in the case of enterprises acting on domestic and international market. Similarly, the enterprises exporting their goods and services had bigger chances of survival than non-exporters. The expansion in the form of several locations of the activity was also favouring the development of the enterprise. The entities which were limiting their activity into a single location only were much more exposed to a liquidation risk than the entities acting in several locations. The more people were working in the enterprise, the lower was the liquidation risk. The differences between the groups of enterprises in which less than 5 persons worked, or from 5 to 9, or more than 9 are statistically significant. The sector of activity does not differentiate significantly the enterprises in terms of their liquidation risk. The differences appear only between the group "other activity"

and other groups: building, commerce, manufacturing, services. Staying on the market is also supported by the situation when profits are generated as early as in the first year of activity.

The second group of internal factors constituted the characteristics of the entrepreneur (main owner): sex, age, education and the type of the previous work. Additionally it was checked whether the work in the enterprise is the main source of maintenance for the owner, and the manner the enterprise originated as well as the source of funds to start the activities. There are no significant differences in the survival of the enterprises managed by men or women. There are differences only when compared with the companies (irrespective of the company type). The significant factors are, however, the age of the entrepreneur, the main owner. The biggest differences are between the youngest and the oldest age group. The age of 35 is the marking point of the difference. Differences in education are significant only for higher and secondary level. There are no differences reported in the case of lower levels of education. The character of the previous job of the owner did not significantly differentiate the liquidation risk of the enterprise. The motivating fact, was, however, the main source of maintenance. The work in an enterprise being the main source of maintenance was significant in terms of lowering the liquidation risk of the enterprise. The enterprises established as new ones were generally demonstrating higher liquidation risk than the enterprises that were started a result of mergers or acquisitions. The going concern was also supported by the entrepreneurship of the owned in terms of acquiring funds from credit to start the activities.

The last group of characteristics were as follows: allocating funds for investments and reported demand and supply barriers in the first year of activity. Investments in assets support the situation that the enterprise will stay on the market. A significant role is also played by the fact that there are investments in the assets from bank credits, subsidies or loans etc. A more significant role is played by the supply barriers, which lower the possibilities to develop production. The demand barriers do not significantly differentiate the survival of the enterprises.

The application of the event history analysis shows the survival process of enterprises in a dynamic view. The course of this process and the changes of the dynamics of the process while it last is known. The biggest changes are happening during the first two years of the market operations of the enterprise. Most of all, the first year of activity is crucial. In the case when logistic regression is applied, we know the liquidation risk of the enterprise only generally, however, the event history analysis shows how this risk changes in time. Additionally, the explanatory variables were included as time-dependent variables. The influence of the variables such a e.g. the area of activity, the number of persons working in the enterprise, the age of the owner is in a natural way changeable with time and only if this variability is taken into consideration, the picture of how this factor affects the survival process of the enterprises is complete.

The sample of enterprises used in the research was derived from a panel study. Data from the panel study cause that the observations are correlated. (correlation between the panels). Lack of correction for the correlation of the data results in the fact that the estimation of the errors of estimators are biased, and therefore, the values of statistics used for evaluating the significance of parameters are lowered. The effect will be the significance of the variables which as a matter of fact are not significant in the model. The use of correction by means of including the so-called *sandwich estimators* was proposed. Some of the variables appeared to be insignificant after correction.

Defining the main external and internal factors determining the survival of the enterprise on the Polish market allows for better directing the supportive activities for micro and small entities in Poland.

3. Own contribution list

My contribution into the development of economics can be:

1. The application of the event history analysis for the assessment of the survival of the enterprises. The determinants of the survival of micro and small enterprises are still very seldom subject to research and with regard to that relatively insufficiently recognised in

literature, especially Polish. The main limitation results from the availability of individual data on enterprises.

2. My work is one of the first applications of the methods and models of event history analysis for the purposes of the survival analysis of the enterprises (2010 and further). So far, only two important publications have been published in this field. It was the monograph of Iwona Markowicz (2012), and the PhD dissertation of Dariusz Szymański published in the spring of 2013. The cross-sectional analyses on aggregated data have been applicable (and are still applied) in the analysis of the survival of the enterprises. The papers regarding the survival analysis require that the access to individual data is provided. I made the effort to obtain such data and I received the access to data from panel study of the Central Statistical Office. When I was finishing the writing of the monograph, the publication of Szymański (2011) was in the course of preparation, and it was published on www of Warsaw University in May 2013. It appeared that the scope of works and used data are similar, but my monograph does not duplicate the work by Szymański, since it differs partially in the methodology of the research, theoretical view and the range of research sample. When I learned about the existence of Szymański's paper, I made significant extensions and I confronted the results obtained. With regard to some issues, we independently reached similar findings while adopting different methods, so similar parts appear. Some of Szymański's conclusions, however, were not confirmed, and, also, additional conclusions appeared.
3. I proposed the application of the semiparametric Coxa model involving a different approach to include the time-dependent variables (it is the first such proposal in Polish literature). The semiparametric Cox model is quite widely used in the literature, but they are mostly application of medical data and additionally without taking into account the time-dependent variables. Basing on the approach described by Allison (2010) I proposed five ways to of including time on t-dependent variables into the model. Including time-dependent variables makes it possible to analyse the influence of the changes in time in independent variables on the dependant variable.
4. The use in the parametric survivals models of the estimators resistant to correlated panel data (so-called „sandwich estimators”). The correlation of data in the case of panel data results from the character of the research. Lack of correction for the correlation of data results in erroneous conclusions on the significance of the determinants in the assessment of the survival of the entities. The correction for the data correlation by means of resistant estimators is the first such application in the survival analysis of enterprises.
5. I proposed as one of the first applications of the event history analysis in the analysis of the bankruptcy risk of the enterprise (2012 and further). So far, the static models based on the logistic regression, discriminant analysis and *data mining* models were used. The series of articles and chapters in monographs regarded the comparison of the currently applied static models and the dynamic approach proposed by me for analysing bankruptcies. I proposed to apply models that take into account also the macroeconomic variables, so I extended the approach of modelling taking into consideration the micro and macro contexts. The approach that involves the macroeconomic variables makes it possible to assess the influence of the economic situation on the bankruptcy risk of the enterprises.
6. I deepened the research in the micro and small enterprises' sector. The limited availability of data in this area results in still insufficiently deep studies of the reasons of market failures of enterprises. The access to individual data made possible to carry out reason-and-effect analysis of the survival of enterprises, defining the factors (determinants) at the level of the enterprise and the entrepreneur. They were both models based on the financial data of small enterprises as well as the models based on the qualitative data.

Other scientific accomplishments

1. The series of articles and chapters in monographs in the are of „business demography” and the survival of enterprises.

a) series of publications in the field of so-called „business demography” based on the empirical data from the statistical register of business activity REGON and the aggregated data of the Central Statistical Office GUS from the panel study of small and micro enterprises.

1. A.Ptak-Chmielewska (2009): *Business Demography in Poland – a draft of the subject published in the Papers of the Section of Demographic Analysis of the KND PAS no 20b/2009*, pp. 26-67 (no points).
2. A.Ptak-Chmielewska (2010): *The assesment of the dynamics of the population of the enterprises in Poland. Studies and Elaborations of the Collegium of Finance and Management of the Warsaw School of Economics, Scientific Paper no 101*, pp. 193-203.
3. A. Ptak-Chmielewska (2010): *The life cycle and liquidation of enterprises – quantitiative dimension. A comparative analysis of Poland and the EU*, in: Mączyńska E. (ed.), *Life cycles and bankructcies of enterprises. Publishing House of the Warsaw School of Economics, Warsaw*, pp. 65-88.
4. A. Ptak-Chmielewska (2010): *Life cycles of enterprises in the aspect of demography of enterprises – a synthesis of the existing scientific domestic and foreign publications*, in: Mączyńska E. (ed.), *The life cycles and bankructcies of enterprises. The Publishing House of the Warsaw School of Economics, Warsaw*, pp. 41-64.
5. A.Ptak-Chmielewska (2011): *Business demography issues and empirical research on dynamics of enterprises’ population in Poland*, *Acta Oeconomia* 10(1)2011, pp. 69-82.
6. A.Ptak-Chmielewska (2012): *The enterprise’s life cycle in the context of the demography of enterprises, Organisation and Management, Quartetly, Committee of Organisation and Management Sciencies of the Polish Academy of Sciences, No 1A (149)/2012*, pp. 191-202.
7. A.Ptak-Chmielewska (2012), *Territorial differentiation in dynamics of enterprises’ population in Poland – cluster analysis. Acta Oeconomia no 11(3)/2012*, pp. 55-64.
8. A.Ptak-Chmielewska (2012), *The Relation between Enterprise Population Dynamics and Economic Cycle, International Journal of Business, Humanities and Technology Vol. 2 No. 2*.
9. A.Ptak-Chmielewska (2012), *Liquidation and bankructcy of enterprises in Poland*, in: S.Morawska (ed.) *Economy and bankructcy law of enterprises. The management of an enterprise in crisis, Warsaw School of Economics, Warsaw 2012*, pp. 194-206.

After the doctorate, my scientific interests were focused on the so called *business demography*. A series of my publications appeared, dedicated to the methodology promoted by Eurostat and OECD as well as the empirical analyses dedicated to the assessment of the dynamics of the population of enterprises in Poland.

The origins of the papers in this field were marked by the article of A.Ptak-Chmielewska (2009): *Business Demography in Poland - a draft of the subject published in Papers of the Section of Economic Analysis of KND PAS no 20b/2009 (no points)*. It was a wide article summing up the research in the scope of own research in the Collegium of Economic Analysis in the Warsaw School of Economics. This article was the introduction into the topics of „business demography” presenting the genesis and the background of this research are that was new in Poland. The trends observed in Poland and in Europe in the field of number of „births” and the ratios of „births”, number of „deaths” and the ratios of „deaths” and the survival ratios were presented. The influence of the changes in the ratios on the employment rates on the job market was determined. The background of the delibertions was a discussion dedicated to the specifics of the economic situation in Poland after the period of transition from the centrally planned economy into the market economy. The factors supporting the entry of the enterprise into the market were discussed, as well as those relating to its staying on the market or exit. At the end, the basic

sources of data and the possibilities to acquire them in Poland were the subject matter of the discussion.

The next analysis, this time empirical, of the dynamics of the enterprises' population in Poland was included in the article by *A. Ptak-Chmielewska (2010): The assessment of the dynamics of the population of enterprises in Poland. Studies and Elaborations of the Collegium of Management and Finance of the Warsaw School of Economics, Scientific Paper no 101*. The article discusses the basic measures of the dynamics of the enterprises' population, points at the limited access to reliable data on the status and structure of enterprises. The empirical analysis regarded years 1997-2008 and indicated a decreasing dynamics of the enterprises' population. In years 1997-2003 the ratio of „births” and the ratio of „deaths” was characterised by a downward tendency, however in the period 2004-2008 the ratio of „births” and the ratio of „deaths” by an upward tendency which caused the approximation of these ratios, and in fact a strong decrease in dynamics. The far-fetched conclusions as to the reason and effect mechanisms can be drawn only upon making in-depth analyses on the micro level, i.e. on the level of the enterprise and the entrepreneur. Such research can provide the answer for the question about the real reasons why the enterprises declare bankruptcy and in connection with the market situation. The necessity of taking up actions aiming at the improvement of the quality of data of statistical registers such as REGON was pointed at. Only when the quality of the public statistics is good, the research can be used in international comparisons. The results obtained from the analysis of data of registers such as REGON must be rather dealt with care, although the methods of analysis from „business demography” are a good research tool.

In the scope of the undertaken research topic, I took part in the statutory research carried out by prof. Elżbieta Mączyńska. The result of the search were two chapters in the monograph: Mączyńska E. (ed.), *The life cycles and bankruptcies of enterprises*. Publishing House of the Warsaw School of Economics, Warsaw.

Chapter 2. *A. Ptak-Chmielewska (2010): The life cycle and liquidation of enterprises – quantitative dimension. Comparative analysis of Poland and the EU*.

Chapter 3. *A. Ptak-Chmielewska (2010): Life cycles of enterprises in the aspect of demography of enterprises – synthesis of the existing domestic and foreign scientific publications*. The chapters contain the analysis of the basic demographic ratios with regard to enterprises and define the influence of the specific processes on the population of enterprises. The enterprise as an entity and its life cycle shape the population of enterprises.

The second chapter includes a review of publications and the results obtained from research in the field of „business demography”. The development of this field supports the analyses dedicated to the life cycle of enterprises. The measurement of changes that appear in the population of enterprises by demographic analyses is a tool to verify both the economic and social (behavioural) theories. The chapter consists of a review of basic theories connected with the life cycle of the enterprise and the „business demography”. The reference of theories to the empirical results was illustrated on the data about basic demographic ratios in relations to enterprises for Poland and Europe. The third chapter of this monograph, however, provides a detailed analysis of the availability in Poland of the data which are necessary for the „business demography”. The possibilities of using the existing registers and Central Statistical Office research were discussed. The data were used to assess the ratios of „births”, „deaths” and the „survival” ratios. These measures were used both to assess the trends of changes in time as well as to assess the influence on the employment. Determining the relation of dynamics of enterprises' population to macroeconomics is not unequivocal. The information on the influence of macro and micro factors on the life cycle of the entity can be provided by research based on the methods and models of event history analysis.

In the article *A. Ptak-Chmielewska (2011): Business demography issues and empirical research on dynamics of enterprises' population in Poland, Acta Oeconomia 10(1)2011* a reference was made to „business demography” as the tool to measure the behaviour of enterprises in economy. The case of a country in the period of transformation, such as Poland, is very interesting. Lack of data and low quality of data are still a problem, in spite of entering the European Union back in 2004. The data available in the publications of the Central Statistical Office contain

only information on companies registered in the statistical register REGON which are much different from the data on enterprises that are really active on the market. The number of active enterprises constitutes c.a. 60% of all the registered ones. The research aims at finding qualitative and quantitative factors determining „births” and „deaths” of enterprises in the context of economic transformations during the system changes. The subject of analysis were both the changes in ratios of „births”, „deaths” and the „survival” of enterprises. The analyses were conducted also in the basic sections of the sectors of activity. The most important results of analyses indicate a very low dynamics of the population of enterprises in the last years of the analysed period of 1997-2009.

In turn, the article by *A.Ptak-Chmielewska (2012): The life cycle of the enterprise in the context of the demography of the enterprises, Organisation and Management, Quarterly, Committee of Organisation and Management Sciences of the Polish Academy of Sciences, No 1A (149)/2012*, refers to the theoretical bases of „business demography”. The ecology theory of enterprises was discussed, with regard to the mechanisms of the „liability of smallness” and „liability of newness” which were later developed in the papers dedicated to the analysis of the survival of micro enterprises. The empirical analysis applied extended the data range covering years up to 2010 conducting still personally a correction on the active numbers of enterprises on the basis of, among other, REGON databases.

The territorial differentiations in the view of voivodships was a subject matter of an article published in the English language in the same year *A.Ptak-Chmielewska (2012), Territorial differentiation in dynamics of enterprises' population in Poland – cluster analysis. Acta Oeconomica no 11(3)/2012*. The article shows the territorial differentiation (at the level of voivodships) of the processes that appear in the population of enterprises and their connection with the differentiation of the economic development of the country. The techniques of data clustering were adopted for this purpose. The techniques of cluster analysis were applied for this purpose. The variables adopted in the analysis were the measure of the dynamics of the population of the enterprise („churn” ratio, the sum of the ratio of „births” and „deaths”) and the macroeconomic data: GDP, unemployment, inflation. The division of voivodships into 4 groups (clusters) was made by means of the hierarchical and k-average methods. The analysis was carried out for two points in time 2002/2003 and 2008/2009 (depending on the utilized delays in data). A clear-cut division into groups was obtained. The so-called „eastern wall” is characterised by high turnover „churn” ratios (the total of the „births” and „deaths” of enterprises), low GDP level, high level of unemployment and low inflation. The dynamics is determined as the difference between the „births” and „deaths” is the lowest in this region compared to other regions. In the „central western” region, the „churn” ratio is at an average level, much as the GDP and unemployment rate in comparison with other regions. The Mazovian voivodship constitutes a separate group where the „churn” ratio is the lowest but the dynamics of enterprises is the highest. The GDP in this region is the highest, and the unemployment rate the lowest with a high inflation figure. In years 2008/2009, in comparison with years 2002/2003, there were not any significant changes, with a small shift in the „central western” region.

The Schumpeter's creative destruction theory is also referred to in the last article in this series, published in the international paper *A.Ptak-Chmielewska (2012), The Relation between Enterprise Population Dynamics and Economic Cycle, International Journal of Business, Humanities and Technology Vol. 2 No. 2*. In 2009 it was possible to notice in Poland the echoes of the financial crisis which affected Europe and resulted in economic slow down. Poland, however, as one of few European countries, generated positive economic growth. The GDP dynamics in our country decreased to 1.8%, inflation to 3.5% in 2009, and the unemployment rate increased to 11.9%. The ratios such as the „births” and „deaths” rates of enterprises can be used as a measure preceding the changes of cycles because they are strongly correlated with changes in GDP, inflation and unemployment. For European countries the strongest correlation was reported for the „deaths” rate and the unemployment rate in 2005 and in the case of the dynamics of enterprises (the difference between the „deaths” rate and „births” rate) and the unemployment rate in 2007. A significant relations was also confirmed for the „births” rate and GDB since 2007 (without the effect of the delay). The GDP increase stimulated the creation of new enterprises. For inflation, the

strongest seems to be the relation with the dynamics of enterprises from 2005 although it is a weaker relations in comparison with other macroeconomic figures. For Poland, the relations between the dynamics of the enterprises' population and the unemployment is not unequivocal. However, the negative relations between the unemployment and the „churn” ratio can be confirmed (the total of the „births” and „deaths” of enterprises). The high unemployment favours the creation of enterprises supporting the entrepreneurs decisions with regard to taking up business activity on their own as the alternative to unemployment. After the period of high unemployment the absorption of the market grows, leading to the increase in retention of enterprises (mainly start-ups) and hence to the drop in unemployment rate in subsequent years. This is the phenomenon in line with the Schumpeterian theory of creative destruction. The dynamics of enterprises in Poland is certainly dependent on the GDP dynamics. The evaluation of the long-term relations is impossible because of too short observation periods (availability of data), but similar observations for other European countries confirm the relations between the dynamics of the population of enterprises and the basis macroeconomic measures.

The relation between the dynamics of the population of enterprises and the macroeconomic factors was also the subject-matter of a chapter in the monograph: *A.Ptak-Chmielewska, Liquidation and bankruptcy of enterprises in Poland, in: S.Morawska (ed.) Economy and bankruptcy law of enterprises. Managing an enterprise in crisis, Warsaw School of Economics, Warsaw 2012.* The bankruptcy of an enterprise is one of the ways the firm can exit the market. The share of bankruptcies in the total number of market exits constitutes only from a few to several permilles. The reported bankruptcies, however, constitute only a fraction of the real failures and regard only large companies, although recently also the medium ones. A strong relations can be seen between the registered unemployment growth and the growth in the number of bankruptcies. Similarly, in the period of strong decrease of GDB, the growth in the number of bankruptcies can be seen. A strong pro-cyclicality appears, howeverm there is not an unequivocal relations between the inflation and the number of bankruptcies. The determination of the population of active enterprises is crucial for the state's policy. The influence by means of relevant instruments can affect the decrease or the increase in the dynamics of the growth of the population of enterprises. In the situation when the growth dynamics is subject to a decrease, which is observed in Poland in the recent years, the activation is necessary. The natural selection of unprofitable an incompetent enterprises is strongly recommended. Always a certain deaths rate will be existing, as a natural phenomenon resulting from the Schumpeterial theory of relocation of the assets in economy. The inefficient enterprises are replaced by more competitive ones, and the resources relocated in this way are more efficiently used. In this aspet, part of liquidations (including bankruptcies) can be treat as a natural rate, a too high level should be alerting.

In the article in Statistical News *A.Ptak-Chmielewska (2012), Availability and usefulness of data for the survival analysis of enterprises, Statistical News no 6/2012*, I refer to the discussion which was intitiated in connection with the topic of „business demography” (Domański, Szreder 2010, Paradysz 2011) and in this way finalising the sensitive approach connected with the „demography” of enterprises and focusing on the „survival” of enterprises referring to the assessment of chances and factors that affect the survival of the enterprise on the market. The effect of further work is the monograph and the cycle of articles in the field of the survival of enterprises.

b) a series of publications in the field of survival of enterprises based mainly on the retrospective study conducted under the NCN grant ("Business demography. Micro-macro analysis of the life cycle of enterprises in Poland in the context of the EU." NCN Agreement no 3739/B/H03/2011/40).

1. *A.Ptak-Chmielewska (2011), Potential use of the event history analysis in analysing the survival of enterprises - additive i multiplicative models of relative survival ratios, in: (ed.) M. Balcerowicz-Szkutnik, The contemporary demographic issues in the globalisation time – Positive and negative aspects. „Economic Studies” Departamental Scientific Papers of the Economic University in Katowice no 95/2011, pp. 73-80.*

2. A.Ptak-Chmielewska (2012), *Availability and usefulness of data for the survival analysis of enterprises*, *Statistical News* no 6/2012, pp. 1-15.
3. A.Ptak-Chmielewska (2010): *The survival analysis of enterprises in Poland on the example of a selected voivodship in Poland*, in: Dittmann P. E. Szabela-Pasierbińska (ed.) *Forecasting in company's management. Scientific Papers of the Economic University in Wrocław PN103*, pp. 155-174.
4. A.Ptak-Chmielewska (2012) *The employment, industry, region of activity: The survival analysis of enterprises on the example of selected voivodships* in: B.Pawetek (ed.) *Modelling and forecasting of social and economic phenomena. The current status and the development outlook*, pp. 189-209.
5. A.Ptak-Chmielewska (2013) *Semiparametric Cox Regression Model in Estimation of Small and Micro Enterprises' Survival in the Malopolska Voivodeship*, *Quantitative Methods in Economics*, Vol. XIV, No. 2, pp. 169-180.
6. A.Ptak-Chmielewska (2015) *Entrepreneurs - demographic profile, who has higher chances of survival? International Journal of Management Science and Information Technology*, NAISIT Publishers, Special Issue: ICIE 2014, pp. 46-60.
7. A.Ptak-Chmielewska (2015): *The survival analysis of small and medium enterprises in Poland with the use of non-parametric models of event history analysis*, in: D.Appenzeller (ed.), *Mathematics and IT in the service of economy. Economic analytics. Methods and tools*, pp. 130-145.
8. A.Ptak-Chmielewska (2016): *The survival models as the tool of the analysis of the influence of human capital of the entrepreneur on the survival of microenterprises*, in: D.Appenzeller (ed.), *Mathematics and IT in the service of economy. Selected problems of modeling and forecasting economic phenomena*, pp. 104-116.

The main area of my further and current research are most of all the enterprises and their survival. Apart from the monograph containing the results of the analysis based on the data obtained in the panel study (received from the Central Statistical Office), a significant role is played by the series of articles dedicated to the survival of enterprises: methodology, the assessment of the availability of data and the empirical results. The empirical analyses are mainly based on data from retrospective study conducted on the sample of micro and small enterprises registered in 2004 in the Małopolskie voivodship¹ and the data from the register REGON. In my monograph I refer to the data from the panel study conducted by the Central Statistical Office (purchases from the Central Statistical Office for the purposes of research), and in the articles and other publications I use only the sample of enterprises in which the owned was working, without any other additional staff employed.

The series of articles starts with the methodological article dedicated to the event history analyses A.Ptak-Chmielewska (2011), *Potential use of the methods of the event history analyses for the analysis of the survival of enterprises – additive and multiplicative models of relative survival ratios*, in: (ed.) M. Balcerowicz-Szkutnik, *The contemporary demographic issues in the globalisation time – Positive and negative aspects. „Economic Studies” Departmental Scientific Papers of the Economic University in Katowice no 95*. The article discusses the basic assumptions of event history analysis and two types of models: additive and multiplicative models of relative survival ratio. The possibility to use them in the survival analysis of enterprises was indicated, without the predominance of any types of models.

Next stage was a discussion of the potential sources of data for the survival analysis of the enterprises. A.Ptak-Chmielewska (2012), *The availability and usefulness of data for the survival analysis of the enterprises*, *Statistical News* no 6/2012. The article discusses main sources of data for the survival analysis of enterprises in Poland. The usefulness of some sources such as REGON is very limited, which results from i.a. the fact that the purpose why the REGON register was established was not the assessment of the real number of entities and the time they function on

¹ The research was conducted under the NCN grant ("Business demography. Micro-macro analysis of the survival of enterprises in Poland in the EU context." NCN Agreement no 3739/B/H03/2011/40).

the market but rather the taxonomy of the economic entities in Poland. Hence, the usefulness of the register in the survival analysis of the enterprises is small. The more credible source is BJS, is the Statistical Units Base, in which the range of information on the entities is very limited but it shows the enterprises that really operate on the market as well as their liquidation time. The data from questionnaires „SP- annual questionnaire of the enterprise” will rather be used to assess the structure of enterprises acting in Poland. To assess the factors which influence the survival chances of the enterprise one can adopt the panel study on the sample of small and micro enterprises. In this view, i.e. longitudinal (cohort), the panel study is a valuable source of information on the life cycle of the enterprise, its chances of surviving next years on the market and the assessment of the influence of particular factors on the survival

The empirical analyses were started in the article *A.Ptak-Chmielewska (2010): The survival analysis of enterprises in Poland on the basis of selected voivodship in Poland*, in: *Dittmann P. E. Szabela-Pasierbińska (ed.) Forecasting in company's management. Scientific Papers of Economic University in Wrocław PN103*. The data from the REGON register were used, showing also the defects of this register. The non-parametric analysis was presented with the use of life tables estimated by the Kaplan-Meier method, and the semiparametric analysis with the Cox regression to assess the survival process of enterprises in Poland on the basis of selected voivodship. In the analysis a cohort of enterprises was selected, of those registered in 2003. The bigger chances for survival were demonstrated by those enterprises which were registered in urban municipalities (in comparison to rural), similarly, bigger changes of survival were reported by larger enterprises that employed 10 and more persons at the registration as the share of active enterprises after 5 years among the enterprises employing less than 10 persons amounted to almost 57%, however this share for enterprises employing more than 9 persons at the moment of registration amounted to 89%. The legal status of the enterprises which commence their activities is of much importance (for natural persons carrying out business activity the share of enterprises which are active after 5 years constituted only 53%, and in the case of companies over 72%, for state institutions and other forms the rate amounted to 90%, but the numbers for these groups were very small – lower than 3.5%), much as the type of activity declared at the registration of the enterprise (the longest lifespan was characteristic for companies dealing with education and culture, information and communication, however the enterprises dealing with finance, gastronomy or hotel management, commerce or transport had a much bigger liquidation risk). The results obtained for the semiparametric model confirmed the results obtained in the non-parametric analysis and allowed for considering all factors simultaneously. The defects and limitations resulting from the REGON register were indicated. The conclusions drawn from the analysis are, however, equivocal and provide information on the survival process of enterprises in Poland.

The chapter in the monograph *A.Ptak-Chmielewska (2012) Employment, industry, region of activity: The analysis of the survival of enterprises in Poland on the basis of selected voivodships in: B.Pawełek (ed.) Modelling and forecasting of social and economic phenomena. Current status and development outlook* was a next step of the analyses in this range. The scope of data used in the analysis included information from the REGON register for entrepreneurs registered in the system in 2003 in the Małopolskie voivodship and, for comparison, in the Śląskie voivodship. The non-parametric analysis was presented with the use of life tables estimated by Kaplan-Meier method and the semiparametric analysis with the Cox regression to assess the survival process of enterprises in Poland on the example of selected voivodships. The average life cycle for the liquidated enterprises for the Śląskie voivodship was slightly higher. The results confirmed the conclusion from the study conducted for the Małopolskie voivodship.

Being aware of the insufficient data from the REGON register, I tried to obtain individual data. In 2011 I received NCN grant under which I conducted the empirical study on the sample of over one thousand micro and small enterprises registered in 2004 in the Małopolskie voivodship. Such a sampling causes that it is a homogenous sample, but the empirical results must be dealt with care while interpreting in the context of behaviour of enterprises nationwide. The results of the research were disseminated by me in the form of presentations during domestic and international conferences and in the form of publications of articles in domestic and in-

ternational papers. The example of such an article can be *A.Ptak-Chmielewska (2013) Semiparametric Cox Regression Model in Estimation of Small and Micro Enterprises' Survival in the Malopolska Voivodeship, Quantitative Methods in Economics, Vol. XIV, No. 2*. The article attempted at the determination of factors (external and internal) affecting the ability of the enterprise to survive on the market. The basis of the analysis were the results of the mentioned retrospective survey conducted on 2012 on the sample of enterprises from the Małopolskie voivodeship. The research aimed at showing the influence of economic conditions onto the entry and exit from the market of small enterprises, the factors were considered from the macro and microeconomic perspective. The survival of enterprises can be affected by external stimuli but also internal ones, its technological equipment, staff education, the size of the enterprise at the start of activities. The semiparametric Cox regression model was used in the analysis of the survival of enterprises. The approach based in on the event history analysis in contrast to the existing models in statistics and econometry (e.g. logistic regression) additionally gives the possibility to take into consideration the dynamics of the phenomenon. The application of the Cox regression model allows for answering not only „if” but also „why” a given phenomenon appeared. The results of analyses gave information on the influence that factors such as the size, the sector of activity, the territory of the market, legal form and the internal conditions: characteristics of the owner, investments, achieving profits, reported barriers and problems with sale of goods and services have on the survival of enterprises.

In turn, the results of the empirical analysis were placed in the international paper *A.Ptak-Chmielewska (2015) Entrepreneurs - demographic profile, who has higher chances of survival? International Journal of Management Science and Information Technology, NAISIT Publishers, Special Issue: ICIE 2014*. The purpose of this article was to define the demographic profile of the entrepreneur. The main question was: who has bigger chances for survival? The data from the panel study of the Central Statistical Office were used. The study involved the period of five years of the history when the company was active. For the purposes of the analysis only the sample of 1518 enterprises were selected, those which at the beginning of their activity did not employ workers, i.e. only the owner worked in the enterprise. Such a selection of sample results in easier determining the demographic profile, as the features of the main owner are equivocally assigned to one person. The semiparametric Cox regression model with the variables which are constant and variable in time was applied. On the basis of analysis of demographic characteristics of the entrepreneur (main owner) the following conclusion was drawn: the enterprises whose owner is the person with higher education, having managerial experience have bigger chances of survival, i.e. the lower liquidation risk. The enterprises whose owner is a man have bigger chances for survival in comparison with enterprises managed by women, although in non-parametric analysis these differences were not significant. The age of the entrepreneur has the influence of an opposite direction than the expected, since the enterprises managed by older persons (over 35 years) have bigger liquidation risk, but this effect is time-variable and indicates that the truncation point is placed too low, i.e. 35 years of age. The entrepreneurs investing in resources in the first year increase the survival chances of the enterprise. The rule is confirmed that the first year of activity is critical for the survival of the enterprise.

The next results of the empirical analysis were placed in a chapter of the monograph *A.Ptak-Chmielewska (2015): The analysis of the survival of small and medium enterprises in Poland with the use of the non-parametrical event history analysis, in: ed. D.Appenzeller, Mathematics and IT in the service of economy. Economic analytics. Methods and tools*. The subject-matter of the survival of enterprises is a quite new issue in Polish science, in spite of the long history and good recognition in literatures of Western Europe and the USA. The success or failure of micro and small enterprises are strongly conditioned by the behaviour and potential of the very entrepreneur. Such behaviour is often explained by means of behavioural mechanisms and theories, evolution theories or the ecological theory. The person of the entrepreneur and his share in the survival of enterprises is explained in turn by means of theories of human capital and social capital. The non-parametric approach was proposed in the event history analysis with the use of Kaplan-Meier lifespan tables. The source of data to assess the survival of enterprises was a panel Central Statistical Office panel study. The data and results of a single panel of enterprises registered in

2004 covering only the entrepreneurs and not including workers, were the basis to estimate non-parametric models of the event history analysis. In the article two research hypotheses were put forward which were subject to verification on the basis of the results of the non-parametric models of event history analysis.

Hypothesis 1: Small and young enterprises are the enterprises whose survival rates are lower than when compared with bigger enterprises and those which operate longer on the market. The experience of barriers, both on the demand and supply side decreases the chances for the survival of the enterprise on the market. The newly established companies, without employees, are the enterprises that are characterised by a weaker market position than the bigger enterprises and those that function longer on the market. The enterprises that were established as a result of mergers or acquisitions will be characterised by a higher survival. The results of the analysis confirmed the significance of the differences between the survival of the enterprises originated as new in comparison to entities originated as a result of mergers and acquisitions, i.e. already existing on the market. A significant obstacle for young and small entities are the demand barriers. The supply barriers will be the bigger obstacle for enterprises already functioning on the market as in the situation of large demand for goods and services they constitute a visible obstacle in the development and in the satisfaction of this development, restricting the further development of the company. The data from the first panel indicated that the demand barriers were not significant, however reporting the supply barriers was the factor significantly increasing the liquidation risk of the enterprise. The hypothesis was not, therefore, verified positively.

Hypothesis 2: The human and social capital in the person of the entrepreneur determines the survival of the enterprise as the entity on the market. The human capital can be measured by means of education, age, sex, origin, education of the entrepreneur. The human capital determines the survival of the enterprise as the market entity. The following variables were used in the non-parametric analysis: sex, age, education of the main owner and the character of the previous job. The accumulation of the experience went in line with the age, the enterprises managed by older persons had lower chances of liquidation. The significant differences between the survival of the enterprises whose main owner was a woman in comparison with enterprises managed by men were not reported. The biggest influence on the survival out of this group of variables was demonstrated by the level of education. The enterprises managed by persons with higher education or secondary education and the companies had much lower liquidation risk. If the main owner used to manage a private or state company or was a clerk, then the liquidation risk of the enterprise was lower than in the remaining cases. The influence of the human capital on the survival of enterprise was evident in the case of age, education and experience of the main owner. The social capital of the entrepreneur confirms his/her skills and the knowledge of the social network which makes it possible to acquire funds from external financing to start the activity and investments in the first period. Acquiring resources from credit to commence activity and for investments in the initial period of activity is a factor significantly increasing the survival chances of the enterprise on the market. The research involved such features of the entrepreneur as: the origins of funds to commence activities and for investments in fixed assets in the first period of activity. The differences were statistically significant. The hypothesis was verified positively.

The last paper in this series was a chapter in the monograph *A.Ptak-Chmielewska (2016): The survival models as the tool to analyse the influence of the human capital of the entrepreneur in the survival of the microenterprises*, in: ed. D.Appenzeller, *Mathematics and IT in the services of economy. Selected issues of modeling and forecasting economic phenomena*, also dedicated to the assessment of the influence of the human capital of the entrepreneur on the survival of the enterprise. The analysis utilised the sample of microenterprises from the retrospective study. Only the microenterprises were used where at the beginning of activity the workers were not employed. In such a situation it is possible to directly link the human capital of the entrepreneur-owner with the human capital of the enterprise. The purpose of the article was a verification of the research hypothesis. The human capital of the entrepreneur increases the chances of staying of the microenterprise on the market. The results obtained confirmed the hypothesis on the positive influence of the human capital of the entrepreneur on the survival of the enterprise on the

market. The measure of the human capital in the enterprise is a complex issue. The application of simple measures such as age, education, experience of the entrepreneur is one of the proposals of the measurement of the influence that the human capital gathered in the enterprise has on its success on the market (survival). Of course, the proposal does not exhaust the subject matter of the measurement of the human capital of the entrepreneur and the influence on the survival of the entity on the market of enterprises. The in-depth research of both the market and the very enterprise in this matter is necessary.

2. Series of articles and chapters in monographs in the field of enterprises' bankruptcy models with relations to small and medium enterprises in Poland.

1. A. Ptak-Chmielewska (2012), *The use of models of the models of relative survival ratios to the assessment of efficiency of models forecasting the bankruptcy of enterprises in Poland*, D.Appenzeller (ed.), *Mathematics and IT in the service of economy. Methods- analyses – forecasts*, pp. 163-176.
2. A. Ptak-Chmielewska (2012), *The use of the survival models and discrimination analysis to assess the bankruptcy risk of the enterprises*, *Econometrics* 4(38)2012, pp. 157-172.
3. A. Ptak-Chmielewska (2013), *The statistics of bankruptcy processes and recovery processor of enterprises in Poland in the context of European countries in: E.Mączyńska (ed.), Bankruptcy and recovery proceedings in Poland in the context of the experiences of the European Union*, pp. 319-332.
4. A. Ptak-Chmielewska (2014), *Models predicting SME bankruptcies in Poland – the analysis with the use of Cox survival model and logistic regression modelj*, *Econometrics* 4(46)2014, pp. 9-21.
5. A. Ptak-Chmielewska (2014), *Models of survival and methods of data mining in the assessment of bankruptcy risk of the enterprises*, in: D.Appenzeller (red.) *Mathematics and IT in the services of economy*, pp. 50-66.
6. A. Ptak-Chmielewska (2014), *The use of statistical models in the assessment of bankruptcy risk of enterprises*, in: P.Dec (ed.) *The uncertainty of functioning of enterprises. Bankruptcies, restructuring, liquidation*, pp. 41-55.
7. A. Ptak-Chmielewska (2016): *Statistical models for corporate credit risk assessment – rating models*, *Acta Universitatis Lodzianis, Folia Oeconomica; Vol 3, No 322/2016*, pp. 87-111.

The survival of enterprises is inseparably connected with the bankruptcy and liquidation topics. The subject of bankruptcy regards rather average and large enterprises. Due to easier access to data on bankruptcies and financial data of enterprises in this field, this subject is much better recognized in literature. In my scientific work this subject constituted a parallel research topic. The new thing was to take up work in this field in the area of medium and small enterprises. The topic of bankruptcy for large corporates based on the models using financial ratios is known, however, this type of analysis for small and medium enterprises is still insufficiently recognized in Poland. The availability of financial data for small and medium entities (data made available by one of the Banks in Poland) helped me to take up this topic. In a chapter of the monograph: A.Ptak-Chmielewska (2012), *The use of models of relative survival ratios to the assessment of the efficiency of the models forecasting the bankruptcy of the enterprises in Poland*, D. Appenzeller (red.), *Mathematics and IT in the service of economy. Methods – analyses – forecasts*, a discussion is provided on the use of models of relative survival ratios for the purposes of assessing the models forecasting the bankruptcy of enterprises in Poland (in a dynamic view). The models of relative survival ratios are used mainly in biostatistics to assess the risk of a given reason of death. A relative survival ratio is a proportion of a general survival ratio to the ratio expected for entities from homogenous population of reference. Currently there are many models in literature that forecast the bankruptcy of enterprises. The research used the sample of small and medium enterprises, including enterprises in relation to which the bankruptcy petition was submitted. The sample of enterprises specified the entities which according to the applied model fore-

casting the bankruptcy have a high bankruptcy risk, and then their life cycle from the moment of diagnosis was analysed (statement date) up to „death” (declaring bankruptcy) or to the moment of truncation. The remaining entities from the analysed sample, for which a high bankruptcy risk was not reported were the population of reference. The analysis conducted provides the assessment of the effect of a given reason of „death” (i.e. the occurrence of high bankruptcy risk according to the model) on the survival of entities in the sample of the study. The applications of the models of the relative survival ratio to assess the efficiency of the models used to assess the bankruptcy risk of enterprises in Poland, showed differences in the efficiency of models depending on the time of the forecast. Most of all it must be underlined that the application of the methods of event history analysis in assessment of the efficiency of models that forecast bankruptcies allows for extending the standard approach based on question „whether” by a question „when”. The models that forecast bankruptcies can be in this approach subject to the assessment with regard to the correctness of forecast in a given time horizon (the correctness of forecast is changing depending on time which passes from the moment the event happens).

The application of dynamic approach (survival models) in contrast with the traditional methods for forecasting bankruptcies offers the following possibilities:

- possibility to include censored data, if the client for some reason will be eliminated from observation before registering the event,
- avoiding the instability caused by the necessity to choose a fixed length of time during which the occurrence of the event is observed,
- obtaining a „dynamic” forecast of the probability that the event will occur (correctness of the forecast depends on time),
- The possibility of taking into consideration the changes in economic environment in the risk assessment thanks to using models allowing for including the time-dependant accompanying variables.

The article which discussed the research on bankruptcies for small and medium enterprises was *A.Ptak-Chmielewska, Application of the survival models and discriminant analysis for assessing the bankruptcy risk of the enterprises, Econometrics 4(38)2012*. The article presets the uses of logistic regression, discriminant analysis and the Cox model to assess the occurrence of the bankruptcy of the enterprise. The main subject of interest and the purpose of this article is the identification of the influence of co-occurring on the bankruptcy risk and the possible difference in results depending on the approach adopted: static and dynamic. The results of the empirical study are presented which was conducted for the sample of 1,536 przedsiębiorstw (including 456 bankruptcies) based on selected financial variables. The application of the classification models such as logistic regression, discriminant analysis, semiparametric Cox regression model does not lead to a considerable differentiation of the forecasting power. The differences that appear are potentially resulting from a difference manners how the forecast of the classification of probability is expressed, in the form of logistic transformation, posteriori probability or the relative risk. While compared to the logistic regression model, in the Cox regression model the variable which expressed the value of the turnover proved to be statistically significant. From the description presented before of the methods of event history analysis there appear several reasons why it is worth applying them as the alternative to the traditionally applicable static models (e.g. logistic regression models). Most of all it must be stressed that using the methods of event history analysis in modeling the bankruptcy risk of enterprises allows for extending the standard static approach by the dynamics of the phenomenon. The application of the methods of event history analysis as the alternative approach to modeling the bankruptcy risk of the enterprises allows for wider application of the results of these methods than it is possible in the case of applying static methods, and thanks to which, improving the models that forecast the bankruptcy of enterprises.

The next paper on the subject of bankruptcies is a chapter in the monograph : *A.Ptak-Chmielewska (2013), The statistics of the bankruptcy proceedings and recovery proceedings in Poland in the context of European countries, in: E.Mączyńska (ed.), The bankruptcy and recovery proceedings in Poland in the context of experiences of the European Union*. This time however, more focus was dedicated to the subject matter of bankruptcies of large enterprises. The effi-

ciency of the bankruptcy proceedings and recovery proceedings in Poland is on a much lower level than in the European Union countries, despite the smaller number of reported bankruptcy proceedings in comparison to other European countries. In 2010 in Europe there were not manifested the drops in the numbers of bankruptcies. It shows that the economic crisis was not stopped, because the economic recovery is rather limiting the number of reported bankruptcies. The downward trend in the number of corporate bankruptcies is observed in 2011 but its rate is moderate. This drop is strongly diversified depending on the country. It was expected that the number of corporate bankruptcies will stay above the level from before the crisis at least to 2012. The bankruptcies of enterprises in Poland in 2010 were characterised by a stabilisation, which was confirmed in bankruptcy statistics. The number of bankruptcies in the total 2010 slightly dropped in comparison with the crisis year 2009. According to statistics of the numbers of bankruptcies, it is possible to observe the first signs of the end of the crisis, but generally the number of bankruptcies has not reached the levels observed in years 2002-2003 when it was the highest.

The next article from this series refers to the possibility of using the bankruptcy models of small and medium enterprises (SME) in banking activity to assess the credit risk of the clients: *A.Ptak-Chmielewska, Models predicting SME bankruptcies in Poland – the analysis with the use of Cox survival model and logistic regression model, Econometrics 4(46) 2014*. The credit risk is one of the most important types of risk, that the bank is exposed to. The bankruptcy risk of an enterprise is usually modelled with the use of discriminant analysis or the logistic regression, however, the requirements with regard to that issue are changing, the methods used in the banking sector are insufficient. The new ways and techniques of more effective bankruptcy prediction are sought. One of these methods is the survival analysis. The popularity of this method considerably grew in recent years. The analysis presented in this article aims at comparing new methods of bankruptcy prediction (survival methods) with the traditional models such as logistic regression. The advantages and disadvantages of these methods and the proposal to extend the survival analysis by variables which are time-dependent (macro variables) of the regression model by nominal variables are presented. Including the macro variables dependent on time increases the predictive power of the models. The models were estimated by means of the sample of Polish SME (turnover above 8 million PLN) consisting of 1,561 enterprises, including 807 bankrupts (financial statements for years 2002-2010). The purpose of the research was achieved, by comparing the Cox survival models with the logistic regression models and pointing at the advantages and disadvantages of these two research approaches. The biggest discriminant power was obtained for the logistic regression model and Cox regression including the macroeconomic variables (GDP, inflation, unemployment). The discriminant power of the logistic regression model with the nominal variable (sector) increased by the growth was slight.

This topic of using statistical models in the bankruptcy analysis was continued in a chapter in the monograph: *A.Ptak-Chmielewska (2014), Models of survival and data mining methods in the assessment of the bankruptcy risk, in: D.Appenzeller (red.) Mathematics and IT in the services of economy*, and a chapter in the monograph: *A.Ptak-Chmielewska (2014), Application of the statistical models in the assessment of bankruptcy risk of the enterprises, in: P.Dec (ed.) Uncertainty of the functioning of enterprises. Bankruptcies, restructuring, liquidation*. The insufficient effect of using in Polish conditions the foreign models of forecasting bankruptcy contributed to the development of studies on domestic models. The biggest popularity, like abroad, was won by models based on the discriminant analysis. In the 90s, actions were taken to build and implement the models adjusted to the specifics of the Polish economy (they were among others papers by such authors as Hadasik [1998] and Gajdka and Stos [1996]). The models were build based on the multidimensional discriminant analysis, logistic regression models, neural networks, decision trees. Among the authors of the bankruptcy models who were publishing their papers in the following years we can distinguish: Stępień and Strąk [2004], Strąk [2005], Hołda [2001], Hamrol, Chodakowski [2008], Gruszczyński [2005, 2012], Mączyńska and Zawadzki [2006], Mączyńska [2005, 2008, 2010], Korol [2005, 2010], Prusak [2011]. The articles were also published in which the advantage of the survival analysis and the Cox model was shown in relations to logistic regression and discriminant analysis [cf. Ptak-Chmielewska i Schab 2008, Ptak-

Chmielewska 2012]. The publications contained analyses conducted without the verification of the reasons to apply the specific statistical methods. This article indicates the basic limitations of two methods used in the models predicting the bankruptcy of the enterprises. They are the methods of the survival analysis and the methods of data exploration.

The logit analysis in terms of the difficulties connected with the application is an intermediary technique between the linear multidimensional discriminant analysis and the artificial neural networks. In this case it is not necessary to fulfil so restrictive assumptions for explanatory variables as in the case of discriminant analysis. However, it is not necessary to fulfill so restrictive assumptions for explanatory variables as in the case of discriminant analysis. However, good estimations are obtained for samples containing big numbers. As in the case of discriminant analysis, also here there should not appear missings of data. The technique of linear multidimensional discriminant analysis is adequate for smaller units, of limited knowledge, financial resources and databases, hence its popularity in the 90s. Big entities such as banks can decide to build systems with the use of methods which are more advanced, such as neural networks or logit analysis, most of all due to the access to large databases (the possibility to test the models in a better way) and large financial means and IT resources. Currently there are not limitations with regard to IT resources or database resources, so a dynamic development is predicted in methods and models that are more advanced such as event history analysis and *data mining* techniques (decision trees, neural networks).

The article: *A.Ptak-Chmielewska: Statistical models for corporate credit risk assessment – rating models, Acta Universitatis Lodziansis, Folia Oeconomica; Vol 3, Nr 322/2016*, discussed the possibilities to use statistical models in the assessment of credit risk and the characteristics was provided of the *rating models*. Rating models based on the elaborated models of bankruptcies constitute a key element in managing credit risk. The article attempted at assessing critically the applicable statistical models and indicated the advantages and disadvantages of various approaches to model building. A comparative empirical analysis was conducted on the sample of enterprises. The possibility to use statistical models to assess credit risk of the enterprises was indicated (rating models). It is important to critically review and take into consideration the advantages and disadvantages of specific statistical models used in the rating models. The access to large databases in banks makes it possible to develop own internal advanced methods, models and techniques of assessment. Also the regulator requires the application of more advanced methods, models and techniques of assessment. The lack of information and technical restriction will result in developing advanced models and methods of data analysis in rating models in banking. The significance of the newest methods such as event history analysis or data mining methods in the credit risk assessment of the enterprises increases.

3. Series of publications connected with the credit risk in banking:

1. *A.Ptak-Chmielewska, E. Walisiak (2007), Influence of the short-term and long-term risk management on the competitiveness of the bank, in: scientific ed. Dariusz Zarzecki, Finance Management. Risk management and creating values, Scientific Papers No 455 Papers of the Institute of the Economics and Organisation of Enterprises No 50, pp. 171-177.*
2. *A.Ptak-Chmielewska, I.Schab (2008): Application of the logistic regression models and hazard to define the determinants of negligence of liabilities, in: Pocięcha J. (ed) Contemporary issues of modeling and forecasting social and economic phenomena. Studies and Papers of Economic University in Kraków no 2, pp. 167-180.*
3. *A.Ptak-Chmielewska, D.Stala (2010): Tests of extreme conditions in banking, in: Pocięcha J. (ed) Current issues in modeling and forecasting social and economic phenomena. Studies and Papers of Economic University in Kraków no 10, pp. 331-341.*
4. *A.Ptak-Chmielewska, A.Matuszyk (2014), Default prediction for SME using discriminant and survival models, evidence from Polish market, Quantitative Methods in Economics, Quantitative Methods in Economic Studies, Volume XV, pp. 369-381.*
5. *A.Matuszyk A.Ptak-Chmielewska (2015), Profile of the fraudulent customer, Secure Bank, no 2(59)/2015, pp. 7-23.*

Another topic of research, also connected with the liquidation and bankruptcy of enterprises are the papers strictly connected with the credit risk in banking.

The series of publications are presented in the article: *A. Ptak-Chmielewska, E. Walisiak (2007), The influence of the short term and long term credit risk management on the competitiveness of the bank, in: scientific ed. Dariusz Zarzecki, Finance Management. Risk management and creating values Scientific Papers No 455 Papers of the Institute of Economics and Organisation of Enterprises No 50*, in which the rating system and credit process and its role in risk management was presented. The main topic of the article was to indicate the differences in the approach, the so-called *point-in-time* and *through-the-cycle* to the management of credit risk and the influence of the adopted way of management on the competitiveness of the bank.

The subsequent article from this series: *A. Ptak-Chmielewska, I. Schab (2008): Application of the logistic regression models and hazard to define determinants of negligence of liabilities, in: Pocięcha J. (ed.) The contemporary issues of modeling and forecasting social and economic phenomena. The Studies and Papers of the Economic University in Kraków No 2*, presents the deliberations regarding the possibility to use the logistic regression and the Cox model in assessing the forecast of the occurrence of the event consisting in failure to meet the liabilities by the enterprise. The main subject matter of interest and the purpose of the paper was the identification of the influence of co-occurring variables on the risk connected with failure to meet liabilities and the possible differences in results depending on the approach adopted: static and dynamic. The results of the empirical study conducted for the portfolio of enterprises were presented based on the selected financial variables, traditionally presented in the literature as significant for credit risk assessment of the enterprises.

The article *A. Ptak-Chmielewska, D. Stala (2010): Stress tests in banking, in: Pocięcha J. (ed) Current issues in modeling and forecasting of social and economic phenomena. Studies and Papers of Economic University in Kraków no 10* discussed the methods of testing extreme conditions in the context of supervision requirements. Stress tests are a managing tool aiming at, among others, to assess the influence of specific events in the portfolio. The probability of the events of this type is very small but possible to appear and can cause considerable losses. Hence, in the recent time (in the context of observed changes on the financial markets) this type of analyses was of much importance. The article presents significant theoretical elements of the issue. The assumptions are presented with regard to build stress tests, the manner of conducting and modelling and the application of the results obtained in risk management. The application of stress tests was shown on the example of approach applicable on foreign financial markets, and also the examples of hypothetical applications of test in the conditions of Polish banking were discussed. The application of methods and analyses such as stress tests are connected with a lot of problems linked with the accessibility of data (too short time series) as well as methodological constraints.

In turn, the article in English: *A. Ptak-Chmielewska, A. Matuszyk (2014), Default prediction for SME using discriminant and survival models, evidence from Polish market, Quantitative Methods in Economics, Quantitative Methods in Economic Studies, Volume XV*, the comparison was made with regard to efficiency of discriminant analysis and survival models in the so called *rating models*. Bigger access to wider client information causes that banks reach newer and newer methods and models of assessing the individual credit risk. In the context of the last financial crisis the banks considered the necessity to include the macroeconomic variables into the applicable risk rating models as the macroeconomic environment has the influence on the clients ability to repay liabilities. The classical methods applicable so far do not give the possibility to include the time-dependant variables hence the necessity to look for such methods. Such requirements are fulfilled by the methods of event history analysis, the so called survival analysis. In the credit models, the event is when the event occurs that is connected with nonperformance on the part of the borrower of his/her liabilities due to the bank. In the empirical analysis the Altman model was used (Z-Score) and the application of the ratios from the Altman model in semiparametric Cox survival model without and with the macroeconomic variables (and the assumption of proportionality was checked). The efficiency of the models (discriminative power) was compared. Due to high heterogeneity of the sector of the applied data sample for Polish

SMEs, a low discriminant power (AUC=0,699) was obtained for original Altman model (Z-Score bis). The discriminative power of the Cox model with the variables from the Altman model was higher and amounted to AUC 0,746. For three out of five ratios the assumption of proportionality of the hazard was not fulfilled. Including the interaction with time for these ratios increased the discriminant power to 0,827. The highest discriminant power, however, was obtained for the Cox model with the macroeconomic variables (GDP, unemployment, inflation – insignificant effect).

In this research, the issues of fraud and the client profile, the so-called fraudulent, in the bank. In the article in English: *A.Matuszyk A.Ptak-Chmielewska (2015), Profile of the fraudulent customer, Bezpieczny Bank, nr 2(59)/2015*, the methods of *data mining* and logistic regression were adopted to determine the profile of the client who is most frequently involved in credit fraud. The neural network model was compared with the classification tree model and the logistic regression model. The models were estimated on the basis of real data made available by one of the banks. The best adjusted model proved to be the neural network model but due to a very low classification error one can assume that it was *overfitted*. Taking into consideration the simplicity of interpretation and higher stability, the logistic regression model is more recommended. The decision tree model provided the description of the profile of the client who commits a fraud. A typical person involved in a fraud is a man (single/divorced/widower) who is applying for a credit for five years or longer. In turn, the borrower with regard to whom additional detailed check is not necessary is a woman (regardless of marital status) or a married man who is applying for a credit to purchase a car providing own contribution of above 40%. Information can be used to lower the costs of additional checking of all clients, focusing only on clients who demonstrate high defraudation risk. In the article the model was applied that makes it possible on the basis of the client characteristics to save time and costs of specific verification of credit documentation.

4. Series of publications in the field of demography

The side topic of my research was a series of publications in the field of demography involving the articles and monographs, and also the translation of dictionary of demography written by Roland Pressat.

2004. A. Ptak-Chmielewska Status, structure and dynamics of the population of Poland according to the national forecast prepared by the Central Statistical Office for years 2003-2030 and according to the UNO forecast for years 2000-2050, in: Demographic Situation of Poland 2003. The Report of the Government Population Council, Warsaw: Government Population Council, pp. 39-60.

2005. A. Ptak-Chmielewska, The course of parallel careers of women in Poland in the period preceding system transformation in Poland in the light of retrospective studies from years 1988 and 1991 with the use of parametric and semiparametric models. Demographic Studies 1(147)2005 pp. 72-103.

2006. E. Frątczak, A. Ptak-Chmielewska, The application of Bongaarts-Feeney formula to assess the changes in the process of concluding first marriages and births in Poland, Papers of the Demography Analysis KND PAS No 13/2006.

2007. Kalev Katus, Allan Puur, Asta Põldma, Ewa Frątczak, Kamil Sienkiewicz, Aneta Ptak-Chmielewska, A Fertility and family formation and dissolution: Comparing Poland and Estonia 1989-2005, Demographic Studies 1/2007.

2009. E. Frątczak, A. Ptak-Chmielewska „Demographic dimension of abortion” in: Scientific Ed. Chazan, W. Simon: Abortion. Reasons, consequences, therapy, Publishing House. Vectors 2009, pp. 63 – 73.

A two-volume bilingual publication in English and Polish connected with the annex in the form of tabled on CD containing more than 1000 pages of tables:

2011 E. Frątczak A. Ptak-Chmielewska, M. Pęczkowski, Fertility in Poland – the cohort analysis: birth cohorts 1911-1986. Volume I. Warsaw School of Economics. Warsaw. (a bilingual publication, English and Polish).

2011. E. Frątczak, A. Ptak-Chmielewska, M. Pęczkowski, I. Sikorska, The fertility and marriages in Poland – cohort analysis: birth cohorts 1911-1986. Volume II. Warsaw School of Economics. Warsaw. (a bilingual publication, English and Polish)

2013. E. Frątczak, A. Ptak-Chmielewska: Chapter 5. The Interplay of Fertility Intentions, Female Employment and Work–Life Balance Policies in Contemporary Poland: Can Gender Equity, Preference and Social Capital Theories Provide a Better Insight? w: L.Sz.Olah, E.Frątczak (red.) “Childbearing Women’s Employment and Work-Life Balance Policies in Temporary Europe”, Palgrave and Macmillan. Str. 135-178.

2014 R. Pressat, Słownik Demograficzny. The Dictionary of Demography, elaboration: E.Frątczak, A. Ptak-Chmielewska. Publishing House of the Warsaw School of Economics, Warsaw 2014.

5. Coursebooks

I am the author of a single academic coursebook regarding advanced statistical methods and the co-author of three coursebooks concerning multidimensional statistical analysis and data programming in SAS.

1. A.Ptak-Chmielewska: The generalised linear models. Publishing House of the Warsaw School of Economics, Warsaw 2013.

2. W.Grzenia, A.Ptak-Chmielewska, K.Przanowski, U.Zwierz: Data programming – SAS. Publishing House of the Warsaw School of Economics, Warsaw 2012. Second edition, amended.

3. W.Grzenia, A.Ptak-Chmielewska, U.Zwierz: Data programming – SAS. Publishing House of the Warsaw School of Economics, Warsaw 2009.

4. E.Gołata, E.Frątczak, T.Klimanek, A.Ptak-Chmielewska, M.Pęczkowski: Multivariate statistical analysis. Theory and examples of applications with SAS system. Publishing House of Warsaw School of Economics, Warsaw 2009.

6. The participation and management of scientific projects

In 2011 I submitted an application and received habilitation grant from the National Centre of Science (2011-2013) The habilitation research grant entitles: "Business demography. Micro-macro an in the context of the UE." NCN Agreement no 3739/B/H03/2011/40. The grant was successfully completed and settles by me in December 2013.

The study on the survival of enterprises requires the knowledge of the exact time when the activity was commences and the exact date of terminating the activity. The data regarding this information available in administration registers such as REGON, which are covering all the economic entities are not updated and they cannot be used in the studies on the survival of enterprises. Under the grant, in 2012 the retrospective survey was conducted on the sample of 1.077 enterprises from the Małopolskie voivodship. The range of the research involved the basic information on the enterprise, the status of the activity (after 5 years from commencing the activity), the sector of its activity, legal form, number of employees, the territorial market of activity

and the changes within 5 years after commencing the activity. Additionally the questions were asked regarding the demographic and social characteristics of the main owner (entrepreneur) and the reported limitations and barriers in functioning of the enterprise. The main aim of the research was to establish the basic factors which influence the change of the number of entrepreneurs active in Poland (on the basis of the Małopolskie voivodship). The research aimed at showing the influence of the economic conditions on the entry and exit from the market of the small enterprises, the factors considered from the perspective of active enterprises in Poland (on the basis of the Małopolskie example). The research aimed at showing the influence of the economic conditions on the entry and the exit of small enterprises from the market, the factors considered from the perspective of macro and microeconomic view. In the survival analysis of the enterprises the methods and models of the event history analysis were adopted, including nonparametric models of lifespan tables estimated by the Kaplan-Meier method and the semi-parametric Cox regression model. The application of the Cox regression model allows for answering the question not only „why” but also „when” a given phenomenon appeared. The results of the analyses on the empirical data regarding the sample of enterprises registered in 2006 in the Małopolskie voivodship were presented on national and international conferences and published in the form of articles. The data from the panel study of the Central Statistical Office were also used, those consisting of the selected panel of small and micro entities registering in 2004. The sample consisted of 2.349 enterprises. The analysis of the results of the research the advanced models of the event history analysis were applied. The methods and specifics of data correlated by panel data were adopted. The application of the advanced models for panel data allows for taking into consideration in the estimation the correction for the correlated data (models with the constant and random effect). Summing up, it must be stated that the application of the event history analysis methods as the alternative approach to modeling the liquidation risk of the enterprise offers the opportunity to a wider application of the results of these methods, than it is possible in the case of application of static methods, and thanks to which, improving the process of support for enterprises. The results obtained both from the retrospective study on the sample from both the Małopolskie voivodship and the nationwide sample from the study of the Central Statistical Office (PL-1 i PL-2) constituted the basis to write the habilitation dissertation. The obtained research effected also in publishing 3 articles in national and international papers, 1 chapter in the monograph, 1 article in the post-conference materials and 1 report (manual) which was not published and 6 presentations during conferences:

- A.Ptak-Chmielewska: Territorial differentiation in dynamics of enterprises' population in Poland – cluster analysis, *Acta Oeconomia* number 11(3) year 2012, pages of the article from 55 to 64.
- A.Ptak-Chmielewska: The Relation between Enterprise Population Dynamics and Economic Cycle, *International Journal of Business, Humanities and Technology*, Vol. 2 No. 2 rok 2012, pages of the article from 17 to 25 .
- A.Ptak-Chmielewska: Employment, sector, region of activity: The analysis of the survival of enterprises in Poland on the basis of selected voivodships, in: (ed.) B.Pawełek, *Modeling and forecasting the social and economic phenomena. The current status and development outlooks*, The Publishing House of the Economic University in Kraków, Kraków, 2012.
- Retrospective research of enterprises in the Małopolskie voivodship – SAS User Manual - material not published
- A.Ptak-Chmielewska: Semiparametric Cox regression model in estimation of small and micro enterprises' survival in the Malopolska voivodeship, *Quantitative Methods in Economic Studies (Quantitative Methods in Economics)*, 2013, Vol. XIV, No. 2.
- A.Ptak-Chmielewska: Entrepreneurship - successes and failures of start-up SMEs on regional and international markets, article was published in the post-conference materials E-Book ISBN: 978-1-909507-61-6, E-Book ISSN: 2049-1069.

- Presentation of the paper: A.Ptak-Chmielewska: Enterprises' market conditions. The statistics of the survival of the companies, Polish Statistics Congress, 18-20.04.2012, The Warsaw School of Economics, The Economic University Poznań
- presentation of the paper entitled A.Ptak-Chmielewska: Business demography in Poland and the EU (poster) The Conference Population Association of America 2012 Annual Meeting, 3-5 May 2012, San Francisco, PAA USA
- presentation of the paper: A.Ptak-Chmielewska: Entrepreneurship as a part of a human life history - Poland and USA, ICIE, Jordan 4-5 March 2013.
- Presentation of the paper: A.Ptak-Chmielewska: Semiparametric Cox regression model in estimation of small and micro enterprises' survival in the Malopolska voivodeship, XIV International Scientific Conference: Quantitative Methods in Economic Studies, 20-21 June 2013, Warsaw.
- Presentation of the paper: A.Ptak-Chmielewska: Entrepreneurship - successes and failures of start-up SMEs on regional and international markets, 8th International Conference on Innovation and Entrepreneurship – ECIE 2013, 19-20 September 2013, Brussels.
- Presentation of the paper: A.Ptak-Chmielewska: The survival analysis of small and medium enterprises in Poland on the basis of panel study, Nationwide conference „Statistics in the service of business and social sciences” on the occasion of the celebrations of the International Year of Statistics 2013, 25-26 November 2013, Warsaw.

In years 2010-2015 I was the leader of statutory research in the Institute of Statistics and Demography of the Collegium of Economic Analysis (topic 03/S/0041) in the areas:

1. Year 2015 – Methods and statistical models in the assessment of the particular credit risk of the enterprises . 03/S/0041/2015 Statutory research ISiD KAE (leader)

„Rating” models based on the elaborated bankruptcy models constitute a key element in managing the credit risk. The research covered the attempt of a critical assessment of the applied statistical methods and indicated the advantages and disadvantages of various approaches to building rating models. A comparative empirical analysis on the sample of enterprises was conducted. The possibility was indicated that the statistical models can be used for assessing credit risk of the enterprise in the so-called *rating models*. The results of the research were popularised in the following form:

1. wide, not published report (English language), which received a positive review: Statistical models for corporate credit risk assessment – rating models
2. article published: (2) Statistical models for corporate Credit risk assessment – rating models / Aneta Ptak-Chmielewska; Folia Oeconomica Lodziensias; No 322/2016, pages 87-111.

2. Year 2014 – New methodological solutions in the analysis of credit risk and the liquidation risk of the enterprises from SME sector. 03/S/0041/14 The statutory research ISiD KAE (leader, elaborated by A.Matuszyk)

The aim of the research was the assessment of the existing and the proposal of new models to assess the credit risk (insolvency risk) and the liquidation risk of the enterprises from SME segment in Poland. Currently on the market there are many models that forecast the bankruptcy of enterprises or the chances of their insolvency (credit risk assessment models). The study assessed the efficiency of the existing solutions based mainly on the discriminant analysis and logistic regression. The application of new solutions and methods was proposed based mainly on the survival analysis as well as on the data exploration and została ocenie efektywności istniejących rozwiązań opartych głównie na analizie methods (decision trees and neural networks). The results of the studies were popularised in the following form:

1. Unpublished report, positive review: A.Ptak-Chmielewska, A.Matuszyk, The influence of heterogeneity of the sample on the discriminant power of the model – on the example of data for Polish SME

2. Default prediction for SME using discriminant and survival models, evidence from Polish market/ Aneta Ptak-Chmielewska, Anna Matuszyk; Quantitative Methods in Economics; Vol XV No 2, 2014, p. 369-381.

3. Year 2013 – Survival models in the assessment of the enterprises' liquidation risk. 03/S/0041/13 Statutory research ISiD KAE (leader)

The aim of the research was to apply advanced methods of the survival analysis to assess the models forecasting bankruptcy and liquidation of the enterprises in Poland. In the study, the advanced models of relative survival ratios are used for assessing the efficiency of the models that forecast the bankruptcies of enterprises in Poland. The application of the models of relative survival allows for assessing the efficiency of the models applied to assess the bankruptcy risk of the enterprises in Poland. The results of the research were popularised in Poland in the following form:

1. article, presented at the conference: Economy and bankruptcy law of the enterprises – „Bankruptcies, liquidation and restructuring of enterprises – the newest trends and phenomena”, 26 March 2013 and then published as a chapter in the monograph: A.Ptak-Chmielewska, Statistics of the liquidation and recovery processes in Poland in the context of European countries, in: E.Maczyńska (ed), The bankruptcy and recovery proceedings in Poland in the context of EU experiences, The publishing House of the Warsaw School of Economics 2013, pp. 319-331.

2. and the article which was presented at the conference: Mathematics and Informatics in the service of economy, 26th April 2013, and then published as a chapter in the monograph: A.Ptak-Chmielewska, Models of survival and *data mining* methods in the assessment of bankruptcy risk of the enterprises, in : D.Appenzeller (ed) Mathematics and Informatics in the service of economy, The Publishing House of the Economic University in Poznań, Poznań 2014, pp. 50-66.

4. Year 2012 – The statistics of the survival of companies with the use of multidimensional survival models. 03/S/0041/12 Statutory Research ISiD KAE (leader)

The main aim of the research was to utilise the event history analysis including nonparametric analysis (lifespan tables estimated by Kaplan-Meier method and the semiparametric analysis with the use of Coxa regression) to assess the survival of the enterprises in Poland. The research utilised also the multidimensional models including the models of relative survival rates to assess the efficiency of the models forecasting the survival of enterprises in Poland. The results of research were popularised in the following form:

1. article published „The life cycle of an enterprise in the context of the business demography” – the article published in Organisation and Management, Quarterly, The Committee for Organisation and Management Sciences of the Polish Academy of Sciences, No 1/2012, Warsaw 2012.

2. „The use of relative survival rates to assess the efficiency of the models forecasting the bankruptcy of enterprises in Poland” – the article presented at the Conference in Poznań and then published as a chapter in the monograph: A.Ptak-Chmielewska, the Application of the models of relative survival ratio to assess the efficiency of models forecasting the bankruptcy of enterprises in Poland, the Economic University in Poznań, ed. . D. Appenzeller, Mathematics and Informatics in the service of economy. Methods – analyses – forecasts, The Publishing House of the Economic University in Poznań, Poznań 2012, pp. 163-176.

5. Year 2011 – Conditions of the market of enterprises in Poland. The statistics of the survival of companies. 03/S/0041/11. Statutory research in ISiD KAE (leader)

The research attempted at assessing the influence of the market environment and changes appearing on the market on the dynamics of the population of enterprises. The assessment of the population dynamics of enterprises utilises the demographic ratios with regard to enterprises and the analysis on the micro level i.e. on the level of the enterprise and the entrepreneur. The nonparametric analysis was used involving the tables of lifespans estimated by Kaplan-Meier method and semiparametric analysis with the use of Cox regression to assess the survival process of enterprises in Poland. The research of this type provide the answer to the

question about the real reasons for the bankruptcy of the enterprises and the connection with the situation on the market. The results of the research were popularised in the following form:

1. a presentation delivered at the conference: „Application of the methods of demographic analysis in the survival analysis of the enterprises – additive and multiplicative relative survival ratios models.” – a presentation at the conference „Contemporary demographic issues in the globalisation time – positive and negative aspects” 19-21st September 2011, Ustroń.
2. a publication in the form of the article A.Ptak-Chmielewska „Availability and usefulness of data in the survival analysis of enterprises” *Statistical News*, no 6/2012.
3. a publication in the form of the article A.Ptak-Chmielewska, The Relation between Enterprise Population Dynamics and Economic Cycle, *International Journal of Business, Humanities and Technology* (ISSN 2162-1357(Print), ISSN 2162-1381(Online)) Vol. 2 No. 2; March 2012. Pp. 17-25. <http://www.ijbhtnet.com/>
4. a publication in the form of the article A.Ptak-Chmielewska, Potential use of event history analysis in the survival analysis of the enterprises – additive and multiplicative models of relative survival rates. In: (ed.) M. Balcerowicz-Szkutnik, The contemporary demographic issues in the globalisation time – The positive and negative aspects „*Economic Studies*”, Departmental Scientific Papers of the Economic University in Katowice no 95, Katowice 2011, pp. 73-80.

I also participated in the statutory research of other units in the Warsaw School of Economics:

1. Year 2013 – The possibilities to apply scoring models to detect credit extortions KZiF/S/36/13 Statutory research of the Collegium for Management and Finance, leader Anna Matuszyk.

The result of joint elaboration was a report and the presentation delivered at the conference: A.Ptak-Chmielewska, A.Matuszyk: Warning signals in credit fraud detection, EURO XXVI Credit Scoring and Credit Control XIII Conference, 28-30 August 2013, Edinborough, Great Britain.

2. Year 2011 – The efficiency of the bankruptcy proceedings and recovery proceedings in Poland in the context of EU experiences, the statutory research in the Collegium of Sciences about the Enterprise of the Warsaw School of Economics, leader: prof. Elżbieta Mączyńska.

My activities resulted in a chapter in the monograph: A. Ptak-Chmielewska, Statistics of bankruptcy and recovery proceedings of enterprises in Poland in the context of European countries, in : E. Mączyńska (ed), The bankruptcy and recovery proceedings in Poland in the context of experience of the European Union, The Publishing House of the Warsaw School of Economics, pp. 319-331.

3. Year 2010 – Lifecycles of enterprises in Poland, statutory research in KNOP SGH, leader: prof. Elżbieta Mączyńska.

The result of my activities were two chapters in the monograph: Lifecycles and bankruptcies of enterprises/ scientific ed. Elżbieta Mączyńska (OW SGH, Warsaw 2010):

Chapter 2: Lifecycles of enterprises in the aspect of business demography – a synthesis of the existing publications in Poland and abroad/A. Ptak-Chmielewska, p. 41-64

Chapter 3. The life cycle and liquidation of enterprises – quantitative dimension. The comparative analysis Poland – European Union/A. Ptak-Chmielewska, p. 65-88.

In years 2007-2010 I conducted own research (as the research leader) in the Institute of Statistics and Demography in the Collegium of Economic Analyses of the Warsaw School of Economics in the area of:

1. Year 2010. "Liquidation and bankruptcy of an enterprise – methodological studies on the basis of the enterprises' market in Poland "
2. Year 2009. "Application of the methods of demographic analysis to assess the dynamics of the population in Poland"

3. Year 2008. "Business demography – application for Poland"
4. Year 2007. "Business demography – new possibilities".

I also participated in the international project:

2007-2011 Reconciling Work and Welfare in Europe: RECOWE Network of Excellence. Priority 7- Citizens and governance in a knowledge based society. Sixth Framework Program, 2006-2011: www.recwowe.eu.

Within the activities taken under the project, the following publication was published:
E.Frątczak, A.Ptak-Chmielewska: Chapter 5. *The Interplay of Fertility Intentions, Female Employment and Work-Life Balance Policies in Contemporary Poland: Can Gender Equity, Preference and Social Capital Theories Provide a Better Insight?* w: L.Sz.Olah, E.Frątczak (ed.) "Childbearing Women's Employment and Work-Life Balance Policies in Temporary Europe", Palgrave and Macmillan. pp. 135-178.

I also participated in the scope of the project in international conferences organised within the project RECOWE and presented the results of the research conducted in this project at other international conferences.

The other national research projects I participated were following:

Year 2015: The title of the project: Creating the Center of Research and Analyse, Project No: UDA-POKL.05.05.02-00-250/13, Priority V „Good management”, Activity 5.5. „The development of social dialogue”, Subactivity 5.5.2 „Enhancing the participant of social dialogue”. Within the participation in this project, the elaboration appeared: A.Ptak-Chmielewska: *The cost of ageing of the society in the area of expenditures for health care – regional differentiation*.

Year 2011: A.Ptak-Chmielewska: *The expertise in the field of demography for the purposes of the project: The analysis of training needs of the medical staff and employees performing non-medical professions in the scope of health care in Poland*”, under the Project: „The analysis of training needs of the medical personnel and the employees performing non-medical professions in the scope of the health care system in Poland”. The evaluation research performer on commission of the Ministry of Health co-financed by the European Union from the funds of European Social Fund. IBC Group Central Europe Holding S.A. Warsaw 2011.

2006-2011: Project No PBZ-MEiN-8/2/2006 „Epidemiology of the procreation threats in Poland – multicentered prospective panel study” run by the Institute of Labour Medicine in the name of Nofer in Łódź. Leader: prof. dr hab. med. Wojciech Hanke. The participation in the performance of Purpose 1.1. Setting the population trends having influence on the course of procreation. In the scope of this Purpose two research tasks were performed under the direction of prof. Ewy Frątczak (The Main School of Economics): Task 1.1.1. The demographic and socio-economical conditions of the low fertility and number of children in Poland (postponing the decision about procreation, descriptive and modeling analyses). The past, the current status, outlooks and research Tasks 1.1.2. The diagnosis of late fertility and number of children (postponing the decision on procreation, plans and preferences) – cohort prospective research (quantitative and qualitative) of the demographic conditions, social and economical conditions as well as health conditions.

2006-2008: Multidisciplinary studies of changes „Families and Generations” – panel I. A contextual database. The project of the Ministry of Science and Higher Education, registration number N118 001 31/00/78 granted by the decision of the Minister of Science and Higher Education no 0078 /H03/2006/31. Period: IX.2006 – VIII.2008, under direction of prof. Ewy Frątczak. Within the scope of the project I participated in preparing the questionnaire and conducting the survey.

2003-2006: Research project KBN no 2H02B 006 25, Transformations of the reproductive behaviours in Poland and their consequences for creating and breaking up families, relations and households. The panel research – II.stage. In the scope of the project I participated in preparatory works and the conducting of the survey.

In the last years I also started cooperation with the medical environment. The cooperation gives the possibility to excel the statistical workshop. In the scope of cooperation I participate in the projects:

Year 2015: The assessment of the prognostic factors with the patients suffering from ovarian cancer treated in Poland on the basis of National Health Fund databases and the National Register of Neoplasms, Oncology Clinics of the Military Medical Institute in Warsaw, the leader: prof. Lubomir Bodnar.

Year 2015: The assessment of the efficiency and toxicity of treatment by inhibitors of tyrosine kinases and inhibitors of mTOR kinases with patients suffering from kidney cancers in the generalised stadium treated under the the therapeutic programmes of the National Health Fund. The Oncology Clinic of the Military Medical Institute in Warsaw, the leader of the research: dr of medical sciences. Marcin Świerkowski.

Year 2015: The assessment of the efficiency and toxicity of the treatment of antibodies anti-EGFR and anti-VEGF with patients suffering from the colorectal cancer in the generalised stadium treated under the therapeutic programmes of the National Health Fund. The Oncology Clinics of the Military Medical Institute in Warsaw, the leader of the research project: dr of medical sciences Marcin Świerkowski.

I also participated in conferences and publications:

1. Jose Manuel Ruiz-Morales, Marcin Swierkowski, J. Connor Wells, Anna Paola Fraccon, Felice Pasini, Frede Donskov, Georg A. Bjarnason, Jae-Lyun Lee, Hao-Wen Sim, Andrzej Sliwczyński, Aneta Ptak-Chmielewska, Zbigniew Teter, Benoit Beuselinck, Lori A. Wood, Takeshi Yuasa, Carmel Pezaro, Brian I. Rini, Cezary Szczylik, Toni K. Choueiri, Daniel Y.C. Heng; First-line sunitinib versus pazopanib in metastatic renal cell carcinoma: Results from the International Metastatic Renal Cell Carcinoma Database Consortium. „European Journal of Cancer”; ISSN: 0959-8049, No 65(2016), p. 102-108. (IF=6.08)

2. L.Bodnar, P.Knapp, J.Sznurkowski, R.Mądry, A.Gąsowska-Bodnar, M.Sikorska, A.Timorek, A.Ptak-Chmielewska, R.Jach; Early initiation of chemotherapy after primary surgery as an adverse prognostic factor in patients with ovarian cancer, “International Journal of Gynecological Cancer” ISSN: 1048-891X (in review)

3. Marcin Świerkowski, A. Śliwczyński, T. Czeleko, Z. Teter, Gabriel Wcisło, Anna M. Czarnecka, A. Ptak-Chmielewska, Cezary Szczylik; National Health Care RCC database / Database of patients suffering from RCC- of the National Health Fund. In: International Scientific Symposium "Kidney cancer. New epoch in the treatment of the carcinoma renis"; Prostate cancer. Patients with negative prognostic factors. How to cure? A book of abstracts. Warsaw. Foundation of Experimental and Clinical Oncology, 2014

Pages: p. 34. Conference: Foundation of Experimental and Clinical Oncology, Serock, 2014.10.16; ISBN: 978-83-938491-1-6. Type of publication: ZSZ (summary/abstract at the international gathering). The language of publication: EN. Paper affiliated by WIM.

4. Marcin Świerkowski, A. Śliwczyński, T. Czeleko, Z. Teter, Gabriel Wcisło, Anna M. Czarnecka, A. Ptak-Chmielewska, D. Heng, Cezary Szczylik; NFZ mRCC TKI treated patients Polish database - Final Report / National Health Fund Database of patients with mRCC treated with inhibitors of TKI. In: Kidney cancer 2015 – New challenges, Serock, 23-24 October 2015: The book of abstracts. Warsaw: Editor. Foundation of Experimental and Clinical Oncology, 2015, Pages: p. 13.

Conference: Foundation of Experimental and Clinical Oncology, Serock, 2015.10.23. ISBN: 978-83-938491-2-3

Type of publication: ZSZ (summary/abstract at the international gathering). The language of publication: EN. Paper affiliated by WIM.

Address url: <http://www.sympozjum-raknerkirakprostaty.pl>

5. A. Śliwczyński, Marcin Świerkowski, T. Czeleko, Z. Teter, Gabriel Wcisło, Anna M. Czarnecka, A. Ptak-Chmielewska, D. Heng, Cezary Szczylik; TKI-Everolimus sequence - PFS and OS. Data from Polish NFZ database / Sequential treatment TKI-Everolimus - PFS and OS. The analysis of data from therapeutic programme to treat kidney cancer of the National Health Fund. In: Kidney cancer, Prostate cancer 2015 – New challenges, Serock, 23-24 October 2015: The book of abstracts. Warsaw: Editor. Foundation of Experimental and Clinical Oncology, 2015

Pages: p. 23. Conference: Foundation of Experimental and Clinical Oncology, Serock, 2015.10.23. ISBN: 978-83-938491-2-3. Type of publication: ZSZ (summary/abstract at the international gathering). The language of publication: EN. Paper affiliated by WIM.

6. Ruiz-Morales JM, Swierkowski M, Wells JC, Fracon AP, Pasini F, Donskov F, Bjarnason GA, Lee JL, Sim HW, Sliwczynski A, Ptak-Chmielewska A, Teter Z, Beuselinck B, Wood LA, Yuasa T, Pezaro C, Rini BI, Szczylik C, Choueiri TK, Heng DY; First-line sunitinib versus pazopanib in metastatic renal cell carcinoma (mRCC): Results from the international metastatic renal cell carcinoma database consortium (IMDC). The International Congress of the American Society of the Clinical Oncology (ASCO) in Chicago 03-07 June 2016

Session Type and Session Title: Poster Discussion Session, Genitourinary (Nonprostate) Cancer; Abstract Number: 4510; J Clin Oncol 34, 2016 (suppl; abstr 4510).

Additional information

Participation in conferences

a) Participation in national conferences (2005-2016):

1. 35th Scientific conference Multivariate Statistical Analysis, MSA 2015, The Institute of Statistics and Demography, Institute of Statistical Methods of the Łódź University, Łódź, 7-9.11.2016
(presentation) *Models of credit risk assessment of the enterprises – theory and practice.*
2. 12th Scientific conference: Forecasting in company's management, The Economic University in Wrocław, Szklarska Poręba 19-21 September 2016
(presentation) *Application of the statistical models in the credit risk assessment of the enterprises*
3. 5th Nationwide Scientific Conference Mathematics and Informatics in the service of economy, the Economic Univ i informatyka na usługach ekonomii, The Economic University in Poznań, Poznań 24 April 2015
(presentation) *The influence of the human capital of the entrepreneur on the survival of the microenterprises – the application of survival models.*
4. 30th Scientific conference Multivariate Statistical Analysis, MSA 2015, The Institute of Statistics and Demography, The Institute of Statistical Methods of the Łódź University, Łódź, 16-18.11.2015
(presentation) *The application of the methods of multivariate statistical analysis in banking* (presentation in English language session).
5. 4th Nationwide Scientific Conference: Mathematics and Informatics in the service of economy in the name of Prof. Zbigniew Czerwiński, The Economic University in Poznań, Poznań, 25.04.2014
(presentation) *The survival analysis of small and medium enterprises in Poland*

6. 3rd Nationwide Scientific Conference Modeling panel data: theory and practice, Institute of Econometrics, KAE, Warsaw School of Economics, Warsaw, 16.05.2014
(presentation) *The application of semiparametric Cox regression model for data correlated for the survival analysis of the enterprises in Poland.*
7. 27th Conference of Social Politicians „Social policy in a life cycle. Theory-research-practice”, Economic and Sociological Department, The Łódź University . Institute of Labour and Social Policy of the UŁ, Łódź-Brzeziny, 16-18.06.2014
(presentation, delivered by the co-author E.Frątczak) *Family policy in Poland in the context of the life cycle (REFLECTIONS).*
8. 15th Conference Quantitative Methods in Economic Studies, Institute of Econometry and Statistics of The Life Sciences University SGGW, Warsaw, 23-24.06.2014
(presentation) *The application of the cluster analysis for segmentation of the nominal variables category on the basis of credit risk models.*
9. 11th Scientific conference: Forecasting in company’s management, Institute of Forecasts and Economic Analysis of the EU in Wrocław, Karpacz, 22-24.09.2014
(presentation, not delivered) *Bankruptcy prediction models for SME in Poland – The survival analysis with the use of the Cox model with time-dependent variables.*
10. Conference Economy and bankruptcy law – “Bankruptcies, liquidations and restructuring of enterprises – the newest trends and phenomena”, Collegium of Sciences about the Enterprise, Warsaw School of Economics, Warsaw, 26.03.2013
(presentation) *Application of the statistical models in the assessment of the bankruptcy risk of the enterprises*
11. 3rd Nationwide scientific conference „Mathematics and Informatics in the service of economy” WIGE 2013, Economic University in Poznań, Poznań 26.04.2013
(presentation) *Survival models and data mining methods in the bankruptcy risk assessment*
12. 14th Conference Quantitative Methods in Econometric Studies, University of Life Sciences SGGW in Warsaw, Warsaw 20-21.06.2013
(presentation) *Semiparametric Cox regression model in the estimation of the survival of micro and small enterprises in Poland*
13. 4th Nationwide Conference „Family policy in Poland and experiences of other European countries. Social and macroeconomic aspects”, Polish Social Policy Society (PTPS), Warsaw, 28-29.10.2013
(presentation, delivered by co-author E.Frątczak) *Family policy in the situation of low fertility. The situation of Poland in the context of EU countries.*
14. Nationwide conference “Statistics in the service of business and social sciences”, Higher School of Management in Warsaw, Warsaw, 25-26.11.2013
(presentation) *The survival analysis of small and medium enterprises in Poland on the basis of panel study data.*
15. Congress of Polish Statistics, The Central Statistical Office, Economic University in Poznań, Poznań, 18-20.04.2012
(presentation) *The conditions of the market of the enterprises. The statistics of the survival of companies.*
16. Conference Summer School of Management 2012. Theory and practice of management. Development, barriers, challenges, Committee of Organisation and Management Sciences of the Polish Academy of Sciences and the Warsaw School of Economics, Jachranka 14-16.05.2012
(presentation, without delivering) *The life cycle of an enterprise in the context of business demography.*
17. 2nd Nationwide scientific conference „Mathematics and Informatics in the service of economy” WIGE 2012, Economic University in Poznań, Poznań , 25-26.05.2012
(presentation) *Application of the models of relative ratio of transition to the assessment of efficiency of models forecasting bankruptcy and liquidation of enterprises in Poland.*

18. **10th Scientific Conference:** Forecasting in company's management, Institute of Forecasts and Economic Analysis of the Economic University in Wrocław, Karpacz, 19-21.09.2012 (presentation) *The application of the survival models and the discriminant analysis to the assessment of bankruptcy risk of the enterprises.*
19. 5th International Scientific Conference in the name of Prof. Zelias. Modelling and forecasting social and economic phenomena, Economic University in Kraków, 10-13.05.2011, Zakopane (poster) *Employment, sector, region of activity: The survival analysis of enterprises in Poland on the example of selected voivodships.*
20. Scientific conference „Contemporary demographic problems in the globalisation time – positive and negative aspects”, KND, Institute of Statistical and Mathematical Methods in Economy, Economic University in Katowice, Ustroń, 19-21.09.2011 (presentation) *Potential utilisation of event history analysis in the survival analysis of enterprises – additive and multiplicative models of relative survival ratios.*
21. Demographic processes and social and economic development of Poland in the transformation period. 1st Nationwide Scientific Conference of Demographers – after the accession to the EU, Committee of Demographic Sciences at Department I. PAS, Central Statistical Office, Economic University in Katowice, Kliczków, 26-28.04. 2010 (presentation) *Relationship (marriage, cohabitation) – division of duties, satisfaction, marriage plans.*
(presentation, delivered by the co-author E.Frątczak, D.Bartosińska, M.Pęczkowski) *Fertility and marriages in Poland – birth cohorts 1911-1986.*
22. Scientific conference: The strategic breakthroughs in the enterprise, Institute of Management in Economy, Warsaw School of Economics, Kazimierz Dolny, 19-21.05.2010 (presentation, not delivered) *The influence of the economic crisis on the dynamics of the population of enterprises in Poland.*
23. 29th Conference Multivariate Statistical Analysis MSA 2010, PTS and the Łódź University, Łódź, 10.11.2010 (presentation) *Spatial diversification of the dynamics of the enterprises dynamics in Poland – cluster analysis.*
24. **Scientific conference** Bankruptcies and liquidations. Experiences and conclusions from the first decade of the 21st century, Institute of Sciences about the Enterprise, Warsaw School of Economics, Warsaw, 25-26.11.2010 (presentation) *Liquidation and bankruptcy of enterprises in Poland.*
25. „The phenomenon of late fertility rate. Procreation plans – policy supporting procreation” Plenary gathering of of joint PAS Committees: Sociology Committee and Demographic Sciences Committee at Department I. PAS, Warsaw, 28.04. 2009 (presentation) *Diagnosis of late fertility rate – cohort prospective study of demographic factors, social, economic and health – selected results of Panel I. Procreation-friendly policy.*
26. 3rd International Scientific Conference in the name of Prof. Zelias „Modeling and forecasting social and economic phenomena”, Economic University in Kraków, Zakopane, 5-7.05.2009 (poster, co-author D.Stala) *Tests of extreme conditions in banking in the economic crisis epoch.*
27. 27th Scientific Conference of Social Politicians" International Social Policy – Comparative Aspects", Academy of Economy in Katowice, Committee of Sciences on Labour and Social Policy Department I.PAS, Institute of Labour and Social Matters, Ustroń, 19 -20.05.2009 (presentation, delivered by the co-author E.Frątczak) *Family policy in the situation of low fertility. Experiences of other countries, Poland's situation.*
28. **Social and economic consequences of the changes of demographic processes.** Annual conference of young demographers, Section of Demographic Analysis KND, Polanica Zdrój, 21-23. 09. 2009

- (presentation) *The application of lifespan tables to the assessment of the survival of enterprises in Poland on the example of selected voivodship.*
29. Flying School of Demography: Changes of demographic structures and their implication for future development, Institute of Econometrics and Statistics of the Szczecin University, Pobierowo near Szczecina, 24-26.09.2008,
(presentation) *Business Demography in Poland – draft of the topic.*
 30. Scientific conference Innovations in Finances and Insurance – Mathematical, Econometric and Informatics Methods, Academy of Economy in Katowice, Ustroń, 19-20.11.2008
(presentation, delivered by co-author D.Stal) *Stress tests – application in risk.*
 31. Scientific conference Metodology of demographic studies, KND PAS, Academy of Economy in Poznań, Zielonka near Poznania, 22-24.05.2006
(presentation) *A comparative synthesis of selected results of two Polish retrospective studies: „Transitions of fertility and family 1991” and „Polish Retrospective Study 2001”.*
 32. 2nd Nationwide Scientific Conference: Managing Financial Risk in Insurance, The Łódź Technical University, Łódź, 4-6.09.2006
(presentation, co-author M.Czupryna) *Selected methods of calibration of rating models.*
 33. Conference: Transitions of fertility and family in the transformation period, SAD KND PAS, PTD, Palczew near Warszawy, 22-24.09.2005
(presentation, co-author E.Frątczak) *The applicatin of the Bongaarts-Feeney formula to the assessment of changes in the process of concludng first marriages and births in Poland.*

b) The participation in international scientific conferences (2005-2016):

1. 10th Scientific Conference in the name of Professor Aleksander Zelias. Modeling and forecasting the social and economic phenomena, Economic University in Kraków, Zakopane 10-13.05.2016
(poster) *Semiparametric Cox regression model in the assessment of credit risk of the enterprise.*
2. The 3rd International Conference on Innovation and Entrepreneurship - ICIE 2015, Academic Conferences and Publishing International; eThekwini Municipality; UKZN Innovation Centre, Durban, RPA 19-20.03.2015
(presentation) *Entrepreneurship: Do Demand and Supply Barriers Matter?*
(presentation, co-author: A.Chetty and S.Wahee) *Profile of the Successful Entrepreneur - Similarities and Differences Across Three Continents.*
3. Workshop: A long-run approach to entrepreneurship. The demography of Firms and Industries in Europe: Past, Present and Future perspectives, Södertörn University, Stockholm, Sweden, 28-29.05.2015
(presentation) *Semiparametric Cox regression model for correlated data in survival analysis of enterprises.*
4. Credit Scoring and Credit Control 14th Conference, Credit Research Centre, University of Edinburgh, Business School, Edinborough, Great Britain, 26-28.08.2015
(presentation) *The analysis of the micro enterprise failures using survival models.*
5. Advanced Analytics and Data Science, 3rd International Workshop, Collegium of Economic Analysis of the Warsaw School of Economics, SAS Institute Polska, Warsaw, 20.10.2015
(presentation) *Statistical models for corporate credit risk assessment – rating models.*
6. 3rd International Conference on Innovations and Entrepreneurship ICIE-2014, Academic Conferences and Publishing International, Bangkok University, Bangkok, Thailand, 06-07.02.2014
(presentation) *Entrepreneurs: Demographic Profile, who has higher chances of survival?*
(conducting the session): *Public/Industry Collaboration.*
7. 2014 IMRA-Kean International Conference, Theme: “Globalization and the Convergence of Creativity, Innovation and Entrepreneurship”, International Management Research Academy (IMRA) London, United Kingdom, in collaboration with Kean University, New Jersey, United States of America, New Jersey, USA, 29-31.05.2014

- (presentation, co-author A.Matuszyk) *Logistic regression and Cox regression models – comparison made on empirical credit defaults data.*
 (conducting the session) *Technical Session-2: Societal Impact of Entrepreneurship.*
8. International Risk Management Conference, Seventh Edition “The Safety of the Financial System: From Idiosyncratic to Systemic Risk”, New York University - Stern School of Business, University of Florence, The Risk, Banking and Finance Society (permanent organisers) and the Warsaw School of Economics (host organiser), Warsaw, 23-24.06.2014
 (poster, co-author A.Matuszyk) *Default prediction models for SMEs using discriminant and survival analysis, evidence from Polish market.*
 (conducting the session) *B6. Market Structure and taxes.*
 9. IFORS. 20th Conference of the International Federation of Operational Research Societies. IFORS, Barcelona, Spain, 13-18.07.2014
 (presentation, co-author A.Matuszyk) *Rating models using - logistic and Cox regression: Medium and Large Companies case.*
 10. 1st International Conference on Innovation and Entrepreneurship (ICIE 2013), Academic Conferences and Publishing ACPI, The Hashemite University, Amman, Jordan, 4-5.03.2013
 (presentation) *Entrepreneurship episode as a part of a human lifetime in Poland and USA.*
 11. Population Association of America 2013 Annual Meeting, Population Association of America USA, New Orleans, USA, 11-13.04.2013 (travel award)
 (poster) *Episode of Entrepreneurship as a part of human lifetime.*
 12. EURO XXVI Credit Scoring and Credit Control XIII Conference, University of Edinburgh, Edinburgh, Great Britain, 28-30.08.2013
 (presentation, delivered by the co-author A.Matuszyk) *Warning signals in credit fraud detection.*
 13. 8th European Conference on Innovation and Entrepreneurship, ECIE 2013, Academic Conferences and Publishing ACPI, Hogeschool-Universiteit Brussels, Belgium, 19-20.09.2013
 (presentation) *Entrepreneurship – successes and failures of start-up SMEs on regional and international markets.*
 14. Population Association of America 2012 Annual Meeting, PAA USA, San Francisco USA, 3-5.05.2012
 (poster) *Business demography in Poland and UE.*
 15. 6th International Scientific Conference in the name of Prof. Aleksander Zelias, Modelling and forecasting social and economic phenomena, Economic University in Kraków, Zakopane, 15-18.05.2012
 (poster) *The lifespan of enterprise in times of upward and downward business cycle.*
 16. European Population Conference 2012, EAPS, Stockholm, Sweden, 13-16.06.2012
 (presentation, co-author E.Frątczak) *Gender equality and preference theories in fertility intentions’ explanation – the case of Poland.*
 17. APA 2012. Asian Population Association Conference. APA, Bangkok, Thailand, 26-29.08.2012
 (poster, co-author E.Frątczak) *Fertility and nuptiality in Poland – cohort perspective, birth cohorts 1911-1986.*
 18. RECOWE Final Conference, RECOWE - Maison des Sciences de l’Homme Ange Guépin, Nantes, France, Brussels, Belgium, 15-17.06.2011
 (presentation, co-author E.Frątczak) *Fertility intentions in Poland in the context of gender-equality, preference and social capital theories.*
 19. European Population Conference 2010, EAPS, Vienna, Austria, 1-4.09.2010
 (poster, co-author E.Frątczak) *Fertility intentions In Poland In the context of: preference theory, gender equality and social networks (results based on the qualitative survey supported by quantitative ones).*
 (poster, co-author E.Frątczak, M.Pęczkowski) *Cohort fertility in Poland – birth cohorts 1911-1986.*

- (poster, co-author E.Frątczak) *Family policy in the situation of low fertility – situation of Poland and the experience of other countries.*
20. 26th International Population Conference IUSSP 2009, IUSSP - The International Union for the Scientific Study of Population (IUSSP), Marrakesh, Morocco, 27.09-2.10.2009
(poster, co-author E. Frątczak, D.Bartosińska, I.Sikorska) *Late Fertility Diagnosis, Socio-Economic and Health Determinants in Poland. Results of Cohort Prospective Survey 2007.*
(poster) *Business demography – application for Poland.*
 21. 2nd International Scientific Conference in the name of prof. Zelias „Modeling and forecasting social and economic phenomena”, Economic University in Kraków, PAS, Zakopane, 22-25.04.2008
(presentation, delivered by the co-author I.Schab) *The application of the logistic regression models and hazard to define the determinants of liability negligence.*
 22. European Population Conference, EPC 2008, EAPS, Barcelona, Spain, 9-12.07.2008
(poster, co-author E.Frątczak) *Fertility and family formation and dissolution, comparing Poland and Estonia 1989-2005.*
(poster) *Business demography in Poland.*
 23. 8th International Scientific Conference „Managing finances. Risk management and creating values”, Institute of Investments and Valuation of Enterprises, Szczecin University, Międzyzdroje, 18-20.04.2007
(presentation, delivered by the co-author E.Walisiak) *The influence of short-term and long-term credit risk management on the competitiveness of the bank.*
 24. European Population Conference, EPC 2006, EAPS, Liverpool, UK, 21-24.06.2006
(presentation) *Changes in the selected life course events of the Polish Females and Males. Evidence from two Polish Retrospective Surveys: 1991 and 2001.*
 25. 25th IUSSP International Population Conference, IUSSP, Tours, France, 18-23.07.2005
(presentation) *Occupational career of young and middle-aged Poles based on the 2001 FFS.*

Additionally I participated in 16 national conferences and 5 international conferences without delivering the presentation.

Educational activity

I run lectures, exercises and laboratories at the Bachelor Level Studies in the area of:

1. Statistics (lecture and exercises)
2. Projecting research and methods of statistical analysis I (set of: lecture and exercises)
3. Programming SAS (computer laboratory)

I run lectures, exercises and computer laboratories at the Master Level Studies in the area of:

1. Statistical analysis methods II (subject of the major field of study, subject coordinator)
2. Multivariate statistical analysis with the use of SAS tools (lecture and computer laboratory, subject coordinator)
3. Statistical methods of multivariate comparative analysis (subject of the major field of study)
4. Credit scoring in SAS Enterprise Miner (lecture and computer laboratory, author of the subject)
5. Data Mining (lecture and computer laboratory)
6. Advanced data mining (lecture and computer laboratory)
7. Advanced and High Performance Data Mining (lecture and computer laboratory in English language, subject coordinator)
8. Advanced methods of statistical analysis (set of: generalised linear models, author of the set of exercises)

I ran a lecture at the Doctoral Level Studies:

1. Statistical analysis methods – examples of the application of multivariate statistical analysis

I run lectures at the Postgraduate Studies in the area of:

Postgraduate Statistical Analysis and Data Mining in Business

1. Multivariate statistical analysis (lecture and computer laboratory)
2. Model of the multivariate linear regression (lecture and computer laboratory)
3. Statistical conclusions: methods of data imputing, bootstrap
4. Logistic regression (exercises)

Postgraduate Studies Analytical Academy – Statistical Analysis and Data Mining in Business

1. Generalised linear models (lecture and computer laboratory)
2. Credit Scoring – case study

Postgraduate Studies Credit Risk Management

1. Modeling Client Risk (PD) *Credit rating* (lecture and computer laboratory)

Postgraduate Studies Risk Management in financial institutions

1. Modeling credit risk with the application of IT tools (lecture and computer laboratory).

I ran a 30 hour course „Business Analytics” in the scope of International Summer School Management Development Institute MDI IRO (Gurgaon, India) in the period from 1st to 12th June 2015. The lectures in the foreign location were financed by the organiser MDI IRO. During the course I also ran the seminar for doctoral level students.

I received the individual Award of the Rector of the Warsaw School of Economics of the 2nd type for achievements in the area of education in 2013, for the textbook Generalised linear models Warsaw 2014.

The list of promoted and reviewed theses

Type of thesis	Studies	Promotor	Reviewer
BA theses	Full-time studies	3*	6
BA theses	Extramural studies	3	2
MSc theses	Full-time studies	55**	
MSc theses	Extramural studies	19	
MSc theses	Double diploma studies – English		1
TOTAL		80	9

* including 1 thesis in English

** including 1 thesis in English.

Master thesis written by the student Sandra Włodarczyk under my supervision was rewarded with 1st Prize in the competition for best thesis in the III edition of the Programm „Do a diploma with Heat-Tech Center” September 2015.

I am the supervisor of four stipendist in the Programm S.Banacha.

Additionally I was the supervisor of at least dozen of thesis in Postgraduate Studies: PS Statistical Analysis and Data Mining in Business, PS Analytics Academy - Studies: PS Statistical Analysis and Data Mining in Business, PS Credit Risk Management

Organisational activity

1. In years 2013-2016 I held the function of the Attorney of the Dean of the Master Level Studies of the Warsaw School of Economics in Warsaw.
2. In 2014 I held the function of the Secretary of the Team regarding the accreditation of the field Quantitative Methods in Economy and Information Systems (MIESI) Collegium of Economic Analysis of the Warsaw School of Economics.

3. In years 2002-2005 and 2008-2016 and currently 2016-2020 I was and I am the Representative of the dependent academics in the Board of the Collegium of Economic Analysis of the Warsaw School of Economics.
4. In years 2007-2011 I held the function of the Scientific Secretary of the Committee of Demographic Sciences of the Polish Academy of Sciences.
5. In years 2004-2006 I held the function of the Chairman of the Board of the Warsaw Branch of Polish Demographic Society.
6. I was the Secretary of Postgraduate Studies Statistical Analysis and Data Mining in Business at the Collegium of Economic Analysis of Warsaw School of Economics in edition 7, 8 and 9
7. I was the Secretary of Postgraduate Studies Analytics Academy Statistical Analysis and Data Mining in Business at the Collegium of Economic Analysis of Warsaw School of Economics in edition 1 and 2.
8. I was the Secretary of Postgraduate Studies Data Engineering – Big Data Collegium of Economic Analysis of Warsaw School of Economics in 1st edition.
9. In 2014 I was the member of the organisational committees of the International Conference: International Risk Management Conference organised in Warsaw.
10. In 2009 I was the member of the secretariate of the 1st Nationwide Demographic Conference organised in Kliczków.
11. In years 2003-2011 I held the function of the technical editor of the Papers of the Section of Demographic Analysis of the Committee of Demographic Sciences PAS, and the co-organised of the cycle of conferences/seminars „Flying school of demography”.

Awards granted by the Rector of the Warsaw School of Economics for the organisational activity:

1. Award of the Rector of the Warsaw School of Economics, individual of the 3rd grade in the area of organisational activity in 2013, Warsaw 2014.
2. Award of the Rector of the Warsaw School of Economics, individual of the 3rd grade in the area of organisational activity in 2014, Warsaw 2015.
3. Award of the Rector of the Warsaw School of Economics, in a group, of the 3rd grade in the area of organizational activity in 2014, for the participation in organising the Conference of IRMC, Warsaw 2015.
4. The award of the Rector of the Warsaw School of Economics, individual of the 2nd grade in the area of organisational activity in 2015, Warsaw 2016.

Summary

Quotations and H index

Source*	Hirsch Index	Number of quotations
Web of Science	-	-
Publish or Perish	5	93
Google Scholar	5	66
BazEkon	2	23

* access on 14 October 2016

The juxtaposition of achievements in a table

No	Specification	
	PUBLICATIONS	In total 58 (293 points of the Ministry of Science and Higher Educa- tion)
1	In papers having the Impact factor (list A)	1*
2	In papers not having the Impact factor (list B)	16
3	In other foreign English papers	2
4	Presentations from interational conferences indexed in Web of Science	3
5	Monographs	2
6	Participation in multi-author monograph	1
7	Chapters in monographs	18
8	Editing multi-author monograph	2
9	Publications without points (including working papers)	13
	CONFERENCES	Total 82
1	National conferences with the presentation	31
2	National conferences with the poster	2
3	National conferences without the presentation	16
4	International conferences with the presentation	18
5	International conferences with the poster	7
6	International conferences without the presentation	5
7	International conferences - running the session	3
	REVIEWS	Total 7
1	Reviews of articles in English language papers	4
2	Reviews of presentations at international conferences	3
	PROJECTS	Total 22
1	International projects (participant)	1
2	Statutory research (leader)	5
3	Statutory research (participant)	3
4	Own research (leader)	4
5	NCN projects (leader)	1
6	NCN projects (KBN, Ministry of Science and Higher Education) (participant)	3
7	Other projects (participant)	5
	ORGANISATIONAL ACTIVITY	Total 11
1	Member/Secretary of the recruitment commission	2
2	Member of the committee/organisational committee of scientific conferences	2
3	Attorney of the Dean of the Master Level Studies (3 years)	1
4	Secretary of the Committee of Demographic Sciences PAS (4 years)	1
5	Secretary of Postgraduate Studies (6 editions)	1
6	Secretary of the Team regarding the accreditation of the field MIESI Collegium of Economic Analysis of the Warsaw School of Economics	1
7	Representative of dependent academics in the Board of Collegium of Economic Analysis (11 years)	1
8	The Chairman of the Board of the Warsaw Branch of Polish Society of Demographers	1

9	Technical edition and DTP of the Papers of the Section of Demographic Analysis of the Committee of Demographic Sciences of PAS	1
	AWARDS	Total 6
1	The award of the Rector of the Warsaw School of Economics for organisational achievements	4
2	The award of the Rector of the Warsaw School of Economics for achievements in didactics	1
3	The award in the name of Prof. Holzer for young scholars	1

* publication from outside the field

Summary of achievements, future plans

For 16 years I have been working at the Warsaw School of Economics. A specific achievement in my scientific work in my opinion is the monograph dedicated to the survival of enterprises, in which the survival analysis with regard to micro and small enterprises is presented. A significant weight is played by the series of articles regarding the survival of enterprises and the bankruptcy of enterprises with the use of the survival analysis. This method is still underestimated in the field of statistical analyses. There are not also available publications concerning the determinants of the survival of the enterprises. This gap is partially bridged by my publications but these issues require further research.

The publications in reputable papers, including foreign ones are also considered by me to be a success. I widely disseminated the results of my work at the international scientific conferences (including conferences, from which the post-conference materials were indexed in Web of Science). I presented the results of my activities during more than 20 international conferences in the recent 12 years.

I also actively joined the organisational and educational activity. I promoted 74 Masters of Science and their papers were receiving awards. Every year I try to promote 10-20 masters in the area of *data mining* and *big data* analysis as well as the multivariate statistics. The coursebooks I wrote are the help for the students.

At the next stages of my activity I would like to continue the research undertaken in the area of determinants of the survival of the enterprises. The range of my interests I would like to extend on the statistical models of the assessment of credit risk of small and micro enterprises. It is still the topic which requires deepening due to its specifics and variability, it is a difficult subject matter.

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