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SUMMARY OF PROFESSIONAL ACCOMPLISHMENTS

Table of Contents

1. Education, professional career.....	2
2. Research work	2
3. Scientific accomplishment presented for assessment.....	8
4. Statistics of research work	20
5. Other research activity.....	22
6. Achievements in the field of teaching.....	23
7. Organizational achievements.....	24
8. Awards and distinctions	25
9. Bibliography.....	26

1. Education, professional career

In 1994, after graduating from Adam Mickiewicz high school in Poznan, I began my studies at the Warsaw School of Economics (SGH) in the field of Quantitative Methods and Information Systems. I completed my studies in 1999 graduating with distinction. In the academic year 1997/1998 I was awarded a one-year DAAD scholarship at the Humboldt University in Berlin, where I studied at the faculty of Volkswirtschaftslehre. During my studies at the Warsaw School of Economics I did an internship at the Institute of Econometrics of the Warsaw School of Economics, participating in the research work of the Institute and teaching Econometrics.

I began my professional work in 1999 as an assistant in the Department of Applied Econometrics at the Institute of Econometrics of the Warsaw School of Economics, where I have worked until now, since 2005 as an assistant professor. In 2005 I defended my PhD thesis on "Analysis of the long-run relationship between prices and money in the Polish economy using the concept of seasonal cointegration" written under the scientific supervision of Prof. Marek Gruszczyński at the Collegium of Economic Analysis of the Warsaw School of Economics.

At the same time in 1999 I started working in the Market Risk Department at Powszechny Bank Kredytowy SA in Warsaw, where I worked until 2001. In 2001-2007 I was employed in the Financial Markets Research Unit at BRE Bank SA, first as an economist and then as the head of the team. My tasks included preparation of reports and market analysis as well as forecasting the financial and macroeconomic developments in Poland and in the global economy.

In 2007 I was appointed Deputy Director General of the Economic Institute at Narodowy Bank Polski, where I have worked until now. Within the scope of my responsibilities is oversight of the forecasting process, including preparation of the forecasts of the main macroeconomic variables, as well as supervision on the preparation of documents related to the strategy and communication of monetary policy

2. Research work

2.1. Research before obtaining PhD degree

I started with my research activities while I was still a student at the Warsaw School of Economics during my internship at the Institute of Econometrics. During this internship, as well as in the early days of my work in the Department of Applied Econometrics of the Institute of Econometrics I investigated the usefulness of the results of the business survey conducted by the Research Institute for Economic Development (RIED) for the purposes of economic policy recommendations. In particular, the subject of my interest was to evaluate the predictive power of business survey results for the future economic developments.

I presented the results of my research at the CIRET conference in 2000 and published them in works [H.5] and [I.1]. During this period, I went also on a study visit to the OECD in Paris in order to get expert knowledge on selected methods of time series seasonal adjustment. On the basis of the experience gained during this visit I wrote an article [H.2] - the first one on this subject in Polish - in which I described the methodology of seasonal adjustment of time series within the X12 ARIMA approach.

The second area of research which I focused on in the initial period of my research work was to analyze the relationship between money and prices in the Polish economy during the transition period. Within this stream of study I investigated the stability of the long-run money demand function, as well as whether the changes in the money supply have a long-run impact on inflation in Poland. These analyses were conducted in the framework of the P-star model, originally proposed by Hallman, Porter and Small (1991). Initially, I used the classical methods of cointegration analysis. I published the results of this part of my research in the article [H.4]. In my further work, due to the presence of strong seasonal fluctuations in the behavior of the majority of the studied variables, for the first time in literature, as a research method to analyze this topic I used the concept of seasonal cointegration. This approach initially proposed by Hylleberg et al. (1990) and developed by Engle et al. (1993) allows for the presence of the long- and medium-run relationships between the selected variables, not only for the zero frequency, as is the classic concept of cointegration, but also for the seasonal frequencies.

The results of my research confirmed the existence of the long-run equilibrium relationship between the broad measure of monetary aggregate M3 and the level of consumer prices in Poland, specified in the framework of the proposed P-star model. They also pointed to the presence of cointegration relationship between these variables for the annual frequency, which means that these variables also reveal a common medium-run seasonal pattern. Subsequent results of this study were published in [H.1], [J.1] and [J.2].

In the course of the research on the long-run relationship between money and prices, I encountered the problem of obtaining quarterly time series of the potential output for the Polish economy. Using the extension of the method proposed by Blanchard and Quah (1989) I estimated the time series of this variable for the years 1995-2001, which was one of the first studies in Poland dealing with the issue of measurement of potential GDP time series on the quarterly basis for that period. These estimates were presented in the paper [J.3].

The analysis of the long-run relationship between money and prices in the Polish economy became the subject of my dissertation, which in a revised and extended version was published as a monograph [A.2]. In this monograph, in addition to the discussion of my empirical results, I presented the theoretical baselines of the P-star model and described the concept and methods of testing for seasonal cointegration.

2.2. The research work after obtaining PhD degree

In the first period of research work after obtaining my PhD degree, I still continued the investigation of the relationship between money and prices in the Polish economy, using that time other methods of seasonal cointegration analysis than previously and thus ending some topics started before the submission of the dissertation. The recapitulation of my study resulted in the form of two works [D.2] and [F.3].

At the same time, I investigated the behavior of the enterprises surveyed by the Research Institute for Economic Development using selected microeconomic methods, referring to my previous studies with RIED data. In particular, I assessed the degree of association of selected answers given by the entrepreneurs to the questions asked in the business survey. In these studies I confirmed, among others, that companies assess the overall situation of the economy largely through the prism of their own situation. The results of this research are published in the article [C.2].

My further research activities in the period after obtaining my PhD focused on issues of macroeconomics and monetary policy, with particular emphasis on the analysis of inflationary processes. I divided them into three main areas that I present below.

2.2.1. The role of forecasts and projections in monetary policy

The first strand of my research focused on the role of forecasts and projections in the monetary policy. In the first study in this field, the subject of my interest were the individual reaction functions of the particular members of the decision-making body in the central bank, namely the Monetary Policy Council of the second term of office at NBP.

In the study, the results of which are described in [C.3] and [F.4] and to which I refer in the monograph [A.1] I analyzed different variants of reaction functions of the MPC members applying multiple choice models. The subsequent variants differed by a set of proposed variables, whose behavior could potentially have an impact on the decisions of the Council members, as well as by the way of incorporation the inflation in the reaction functions. In particular, I checked whether the Council members took into account the forecasts, or only the past values of inflation. This study therefore enabled me to assess whether the monetary policy pursued by individual members of the Council can be described as forward-looking and whether it was a strict or flexible form of direct inflation targeting (IT) strategy.

I continued the same research topic in the subsequent analysis, expanding the set of variables that could potentially influence the decisions of the Council. In this case the preliminary selection of the variables has been carried out on the basis of public statements of individual members of the decision-making body. In addition to the analysis of individual reaction functions, in this study I estimated the aggregated reaction function of the whole Council, and then compared whether the forecasts of the whole MPC decisions obtained as

a sum up of the individual MPC members forecasts are more accurate than the forecasts derived on the basis of the aggregate MPC reaction function. The results, which are described in [G.1] indicated that for the majority of MPC members the essential information for decision-making were, in addition to inflation, the developments in the labor market – in particular wage growth in the enterprise sector, which may result from a large weight, which in the analyzed period, the members of the Council attributed to the risk of second-round effects. Another important finding obtained in this study was that the forecasts of the joint decision of the Council, obtained as a combination of individual forecasts proved to be more accurate than the predictions determined on the basis of the aggregated MPC reaction function.

In the next study in this area of research I focused more on the analysis of the aggregated reaction functions of central banks. In particular, I examined the impact of projections prepared and publicly announced by NBP and some other central banks on their own decisions on monetary policy parameters. In this way I assessed not only the effectiveness of the macroeconomic projection as a communication tool of monetary policy, but I could also answer the question of how forward-looking are central banks, i.e. which forecast horizon they take into account when setting the interest rates. The results obtained in this study were presented in the article [B.6] and paper [E.5]. I also discuss them broader in the monograph [A.1].

Positive verification of the hypothesis about the important role of projection in the decision making process on interest rates done by selected central banks, prompted me to pose another question about the meaning of the projection as a communication tool, but this time in respect of its impact on expectations and forecasts formulated by the private sector economists. For this reason, in the last of the remaining studies in this area of research, I assessed the role of the inflation and GDP projection published by Narodowy Bank Polski for the process of convergence of forecasts formulated by professional forecasters. The results of this study are described in [B.2] and [E.2]. I refer to them also in the monograph [A.1].

2.2.2. The usefulness of the disaggregated data in monetary policy

The second strand of the my research relates to the assessment of the usefulness of disaggregated data in the conduct of monetary policy aimed at stabilizing inflation. In this field of research, basing on the Phillips curve model, specified for disaggregated data, I identified the goods and services in the CPI basket in Poland, the prices of which respond to changes in the domestic demand. Next, through the aggregation of price indices of these goods and services, I constructed a new inflation index, which may be used as a measure of demand pressures in the economy complementary to the output gap. The results of this study are described in [B.4] and [E.4] and in more detail discussed in the monograph [A.1].

This study evidenced also the presence of a large group of goods in the CPI basket, mainly tradable goods, whose prices do not react to changes in the domestic output gap and only slightly change in response to exchange rate fluctuations. This inspired me to formulate a research hypothesis that the prices of these goods are affected to a large extent by the ongoing globalization process in the recent decades. This hypothesis has been verified in another study described in [B.1] and [E.1]. This study, as the first in the literature, investigates the impact of global shocks not on aggregated inflation, but on their individual components. In this study I confirmed that in each of the analyzed economies (Poland, Czech Republic, Sweden), there is a large group of durable and semi-durable goods in the CPI inflation basket, including clothing, footwear, electronics and household appliances, with prices actually reacting to non-commodity supply shock interpreted here as the globalization shock.

I also used the information contained in the disaggregated inflation data in my next study, in which by employing the approach proposed by Reis and Watson (2007) based on the factor analysis, I estimated for Poland the new measure of inflation - inflation excluding changes in relative prices. Following Reis and Watson I called this index pure inflation. The comparison of the behavior of this index with the CPI inflation allows the central bank to assess whether the observed changes in inflation occur due to changes in relative prices or due to too expansionary or too tight monetary policy. In particular, I showed that in 2006-2008 the acceleration of inflation in Poland resulted not only from the increase in commodity prices on the global markets, but also from the fast growing demand pressure in the domestic economy. I discuss the obtained results in [C.1] and [F.1].

The last study, in which my inference was based on disaggregated data, concerned the use of the dynamic factor models in forecasting inflation. The concept of factor models involves extraction from a broad set of data - both aggregated and disaggregated - common factors, which can then be used as regressors in forecasting models. I found that for one- and three-month horizon the forecasts obtained from the factor models have a smaller mean square error than the forecasts obtained from other competitive models. This was the first study in Polish literature investigating the usefulness of dynamic factor models for forecasting inflation in the Polish economy. The results of this research are described in the two subsequent publications [D.1] and [F.2].

2.2.3. The interest rate as an instrument of macroeconomic stabilization

The third area of my research relates to the role of interest rate as an instrument of macroeconomic stabilization. Within this stream of research I conducted two studies. In the first one, I introduced into economic discourse an entirely new economic category - the natural yield curve. I identified the natural yield curve for the US economy and constructed on the basis of this curve a new measure of the restrictiveness of monetary policy.

This measure expresses the difference between the levels of the actual and natural yield curves. My study showed that in the countries where central banks apply non-standard monetary policy instruments, this new measure is more accurate in reflecting the actual monetary policy stance in comparison to the difference between short-term interest rate and its equilibrium level. I presented the results of this study in [B.5] and [E.6]. I refer to them also in the last chapter of the monograph [A.1].

In the second study in this field of research, using selected methods of panel data analysis, I calculated the equilibrium levels for long-term interest rates in the euro area countries, consistent with the equilibrium level of the current account balance in these countries. This study was the first in the literature, in which the attempt was made to estimate the hypothetical differences in levels of long-term interest rates for the euro area countries, which potentially could have prevented the rise in external imbalances in some of these countries before the crisis in 2008. My results confirmed the statistical significance of the impact of the long-term interest rates on the current account balance in the euro area countries and showed that to maintain the external balance by peripheral euro area countries the long-term interest rates in these countries before the crisis should have been at the higher levels than the euro area average from 0.6 to 5.5 percentage points. The summary of this research was the publication of its results in [B.3] and [E.3].

2.3. Current and future research work

Currently, I have undertaken a new direction of research in which I focus on the analysis of the factors determining the country's risk premium. In my first study, so far, in this area, I investigate how the changes in the country's external balance are reflected in the investors' assessment of the country's risk premium, which I define here as the difference between the yields on long-term sovereign bonds of the country and US treasury bonds. I verify the hypothesis that the examined relationship may be non-linear, and its strength can increase with the build-up of debt level, when investors realize that there is a risk of a country falling into the debt trap. I investigate a broad panel of countries, both developed and developing economies, and as a research method I propose the Panel Smooth Transition Regression (PSTR) model. The preliminary results confirm the non-linear impact of changes in the level of external imbalance, which is measured here by the net foreign asset position (NFA) on the valuation of the credit risk of the country, while pointing out that the risk premium starts to grow rapidly at a time when the NFA exceeds the level of approx. 70% of GDP. My paper, which was written in co-authorship, describing the results of this study, was presented at the following conferences: CEF, *Ecomod* and *Dynare Conference*. At the moment I am finalizing the text of the article which I intend to submit for publication. I would like to continue this research topic in the future, focusing on other non-linearities related to the perception of country's risk by investors.

2.4. The research done at Narodowy Bank Polski

The research work is also one of my main activities at Narodowy Bank Polski. Within my duties at NBP I supervise the process of forecasting and I am responsible for the development of econometric forecasting tools at the Economic Institute of NBP. Among the tools used at NBP there are both models used for medium-term forecasting (i.e. NECMOD model using cointegration techniques) and models designed for the formulation of short-term forecasts. In my professional career at the central bank I have dealt with many research topics, such as the search for optimal methods of combining forecasts from different classes of models, the issue of integrating short-term forecasts into the medium-term projection, the developments of methods of quantifying uncertainty of projection as well as associated with this topic the methodology of constructing the so-called fanchart.

Three times a year I present to the public the results of the projection of future inflation and the GDP growth prepared by the NBP economists. Within my activities related to popularization of economic topics I have often spoken on economic issues in the mass media, including radio and television.

3. Scientific accomplishment presented for assessment

As the scientific achievement within the meaning of article 16, paragraph 2 of the Bill of 14th March 2003 on scientific degrees and titles and on degrees and titles in arts, I submit the following monograph titled: Kotłowski J. (2016), *Polityka pieniężna zorientowana na przyszłość. Wybrane aspekty analityczne*. Oficyna Wydawnicza SGH, Warszawa. The publishing reviewer was Prof. Dariusz Filar.

The subject of the monograph are the issues relevant for the effectiveness of the forward-looking monetary policy. The forward-looking monetary policy means that when setting interest rates the central bank targets not the current, but the expected future economic situation and not the present, but the forecasted inflation. As pointed out by most researchers (i.e. Rudebusch and Svensson 1998, Bernanke et al. 1999), due to the presence of significant lags in the transmission mechanism of changes in interest rate to inflation, GDP and other important macroeconomic categories, such policy is perceived to be more effective than taking decisions on the basis of only past information.

The subsequent chapters of the monograph refer to the results of my research published in Polish and international scientific journals. Each study was motivated by dilemmas arising over last years associated with the effective conduct of monetary policy. I argue in the monograph that the economic processes taking place in the past two decades in the global and Polish economy, including the acceleration of globalization and the amplification of the commodity shocks, as well as the change in the conduct of monetary policy by central banks

resulting from the global economic crisis, require new methods of analysis of both inflation and the related monetary policy.

In the first two chapters of the book I analyze the role of the macroeconomic projection in conduct of monetary policy. In the first chapter I focus on the usefulness of the projection in the process of communication with the public, while the second chapter raises the question of the role played by this projection in the central bank decision-making process on its own interest rates.

In the monograph I discuss two main groups of the potential benefits from preparing and announcing the macroeconomic projection. First I emphasize that the accurate forecasts of future economic situation and future inflation allow the central bank to conduct more effective forward-looking monetary policy and react not to the current deviations of inflation from the target and the production from the potential output - which, due to the already mentioned lags in the transmission mechanism would cause that the actions of the central bank would usually be late and reactive - but to their forecasted values.

The second group of benefits from publishing the projection is attributed to the opportunity of using it as a communication tool of monetary policy. If the central bank indeed conducts forward-looking monetary policy, the projection can be a useful tool to explain to the market participants the background and motivation of the decisions taken on interest rates. The central bank can then explain the tightening or easing of monetary policy by indicated by the projection deviation of inflation from the target or the future shape of the output gap.

The first chapter of the monograph is based on the results of the study published initially in my article: Kotłowski (2015) and relates to impact of the publication of the inflation and the GDP projection by Narodowy Bank Polski on the forecasts formulated by economists from the financial sector professionally dealing with forecasting. In the study, to which I refer in this chapter, I check whether the disclosure of the projection decreases discrepancy in analysts' forecasts on future inflation and the GDP growth in the Polish economy, as well as whether after projection release the median of these forecasts moves toward the central path of the projection. The finding of the statistically significant relationship between the publication of the NBP projection and changes in the forecasts of economists would indicate that the central bank is able to influence directly the expectations of economic agents, thus shortening the length of the transmission mechanism of monetary policy and reducing the uncertainty associated with the future state of the economy and inflation (Woodford 2001, 2005). In this study, I also identify other macroeconomic factors affecting the dispersion of forecasts of inflation and GDP, formulated by the economists from the private sector.

The conducted study combines two streams present in the literature. The first concerns the impact of the central bank's communication on forecasts of economic agents, namely the

possible reduction in discrepancies between forecasts. The second stream of literature focuses more on identifying other macroeconomic factors that influence the dispersion of forecasts of economic agents, in particular the professional forecasters. This latter group is of particular importance in the communication process of the central bank, because the forecasts formulated by them are used and to a large extent replicated by other private agents as it is assumed among others by Carroll (2003) in his theoretical model.

I also introduce in the study the asymmetry in the impact of the publication of projection on the discrepancy of individual GDP forecasts formulated by professional forecasters with respect to the phase of the business cycle. Woodford (2001) in his theoretical model assumes that the information revealed by the central bank helps private agents to extract signals about the current and future macroeconomic situation from the noise contained in the data. If, therefore, I assume that the noise and the associated uncertainty may be time-varying and depend on the phase of the business cycle – in particular they grow during the recession – as evidenced by, i.e. Bloom et al. (2012), the projection may also affect the forecasts of economists with varying strength, depending on the phase of the business cycle.

I test the above mentioned hypothesis applying the Smooth Transition Regression (STR) model, in which the values of the parameters related to the selected explanatory variables may be different for different regimes (states). As a transition variable in this model I choose the variable expressing the annual growth rate of industrial production, which allows me to classify different regimes with respect to different levels of economic activity and interpret them as the different phases of the business cycle (slowdown and recovery).

My findings show that Narodowy Bank Polski, by announcing the macroeconomic projection reduces discrepancies in forecasts of the future GDP growth, formulated by economists from the financial sector. Moreover, the obtained results allow me to conclude that the central bank by announcing its own GDP forecasts, also affects the median of forecasts of economists, which, after the publication of projection converges towards projection's central path.

The outcome of my research does not confirm, however, the presence of the causal relationship between the publication of the NBP projection and the forecasts of economists on future inflation. Combined with the results of other studies (eg. Łyziak 2013) it can be explained in such a way that the focal point for the inflation forecasts formulated by the professional forecasters is rather an inflation target and the promise of the bank to bring inflation back to target, than conditional forecasts of this variable published by the central bank. Nevertheless, I identify other factors affecting the dispersion of inflation forecasts. I confirm that, as in other more developed economies, the dispersion of inflation forecasts depends on its level and volatility (see Mankiw, Reis and Wolfers, 2003 among others). Moreover, similarly as in the case of the GDP forecasts, the dispersion of inflation forecasts

increases in the slowdown phase and decreases in the course of recovery. The discrepancy in the forecasts of this variable also depends positively on the volatility of oil prices, but despite high openness of the Polish economy it is not influenced by exchange rate fluctuations.

The study, which I discuss in this chapter is the first one raising an important issue of the impact of projection published by Narodowy Bank Polski on the convergence process of forecasts formulated by the economists from the private sector. The research question whether a central bank of a country with a relatively short history of low inflation, publishing their forecasts for only a decade, is able to influence the expectations of the private sector, in particular those formulated by professional forecasters, is a crucial one from the point of view of the effectiveness of the monetary policy conducted by NBP within the direct inflation targeting framework. This strategy attributes a key role to the central bank communication with the public, the efficiency of which depends to a large extent on the credibility of the bank in respect of the accurate assessment and proper forecasting of the future course of economic developments.

However, this part of my research, in which I test the asymmetry in the impact of the publication of projection on the dispersion of the forecasts with respect to the phase of the business cycle, is the first in the world literature verifying such a hypothesis. My findings evidence for the exponential form of the transition function in the STR model and emphasize stronger impact of publications of the projection on the process of convergence of the economists' forecasts in a period when the economy moves from one phase of the business cycle to another, than in the period of mature recovery or a deep slowdown. Following Woodford's (2001) interpretation that the information delivered by the central bank helps to extract the signals from the information noise contained in the data, I conclude that since the noise and uncertainty are the highest in the recession, the role of projection in affecting private sector forecasts grows with the increase of the expected rather than the current uncertainty.

The subject of the second chapter of the monograph is the analysis of the impact of the NBP projection as well as the projections of other selected central banks on their decisions on monetary policy parameters. In this chapter, I refer to the results of my study, published initially in the article: Brzoza-Brzezina, Kotłowski, Miśkowiec (2013). I present them against the discussion about optimal horizon of forecasts, used in conducting monetary policy. The aim of my research is to check whether the central banks in their decisions take into consideration the results of their own projections, that is, whether they change monetary policy parameters, if the projection shows the deviation of inflation from the target or future GDP growth above or below potential output growth. As I have already mentioned, the projections of the future inflation and GDP derived by the central banks are an important tool of communication with the public, and their publication could help to explain the current decisions. For this reason, the existence of a statistically significant relation between

the results of projections and current decisions of the central banks would mean that the projections apart from providing information about future economic developments can also act as a communication tool of monetary policy.

My study is also an empirical verification of the hypothesis on the pursuing by central bank forward-looking monetary policy. Moreover it allows me to identify the horizon of forecasts considered in the decisions taken by the central banks. This research has a form of a comparative study while the subject of my analysis is not only the monetary policy conducted by Narodowy Bank Polski, but also the policy of the Bank of England and the Swiss National Bank.

The motivation for undertaking this study was the fact that although the idea of conducting forward-looking monetary policy (in terms of reacting to the forecasted, not the past inflation and GDP) firmly has taken root already in thinking about monetary policy, the works on the forecast horizon taken into account by central banks in practice when making decisions are still quite rare.

As a research method I propose an ordered probit model where the dependent variable is of qualitative nature, but the subsequent categories of this variable can be ordered from the smallest to the largest. The choice of this model stems from the need to take into account both standard (short-term interest rate) and non-standard (quantitative easing) monetary policy instruments. For most of the period, the basic instrument of monetary policy of each bank was a short-term interest rate. However, in the second part of the sample on which the study is based, both the Bank of England and the Swiss National Bank encountered the problem of zero lower band (ZLB) for the nominal short-term interest rate and decided to use non-standard monetary policy tools.

In the reaction functions investigated in this study the explanatory variables are the forecasts of inflation and GDP published by central banks in the form of projection. In the proposed models I aggregate the forecasts formulated by the banks for each of several quarters covered by the projections. The weights assigned to forecasts for subsequent quarters have been calculated using the density function of a normal distribution. Therefore the whole paths of inflation and the GDP forecasts, ranging from eight to twelve quarterly forecasts can be compressed into the single variables, each of which is described by only two parameters determining the shape of the density function of a normal distribution: mean and standard deviation.

The inference drawn in this study consists in estimation of subsequent variants of reaction functions, which take into account all the possible combinations of aggregated forecasts of inflation and GDP, obtained for different weights derived from a normal distribution for different values of mean and standard deviation. Finally the model is chosen that fits the data the best. The results obtained in the study allow me to conclude that each of the

analyzed central banks conducts monetary policy taking into account to some extent its own forecasts of future inflation and GDP, which allows me to assess the policies of these banks as forward-looking.

My study is one of the first in the literature that in the assessment of the reaction functions of central banks takes into account the use of non-standard monetary policy instruments and combines them into a single model with the basic instrument, which used to be the short-term interest rate. In this way, I can estimate reaction functions of central banks also for the period in which the short-term interest rate had already ceased to be the basic instrument of monetary policy.

The method of aggregation the whole path of forecasts formulated for each of several quarters into a single variable, using the density function of a normal distribution proposed by me is an entirely novel idea in the literature. This way of combining the forecasts derived for subsequent quarters, due to free shaping of the mean and standard deviation in the distribution adopted to determine weights for these forecasts, allows me to identify both the forecast horizon, which to the greatest extent is taken into account by the analyzed central banks, as well as its importance in relation to other projection horizons.

In the third chapter of the monograph I continue the discussion on the shape of the reaction function of the central bank, but in this part of the book I focus more on the individual reaction functions of representatives of the decision-making body. The basis for the discussion led in this part of the monograph are the results of my study, presented in the article: Kotłowski (2006). In this study I compare different variants of the reaction functions of individual members of the Monetary Policy Council at NBP of the second term of office, which describe the attitude proposed by them when voting on interest rates. In particular, I check empirically whether members of the Council, deciding on the preferred level of interest rates consider in their decisions the forecasts of future inflation, or rather take into account only its past values. In the study, to which I refer in this chapter I verify the hypothesis according to which the members of the Council in setting the interest rates or changing the formal bias in monetary policy take into account other variables than inflation only, such as industrial production or exchange rate.

The choice of research method adopted for the analysis of how decisions are made by individual members of the Monetary Policy Council was once again determined by the necessity to take into account the decisions of both quantitative and qualitative nature when constructing the model of reaction function. In the analyzed period, the Monetary Policy Council used the formal bias in the monetary policy as an indicator of future changes in the level of the central bank interest rate. The change in the bias resulted in a shift of the yield curve comparable to those that accompanied the changes in the actual interest rate level. For this reason, I use a variable of a qualitative nature as the dependent variable in the

reaction functions, which reflects both the changes in the reference rate and changes in the formal bias proposed by the respective member. As a result, in this case I also apply microeconomic approach, using the multiple choice model to describe the behavior of particular members.

The results of the research indicate that for all members of the MPC of the second term of office the form of decision-making can be described as forward-looking. The particular members attributed greater importance to the forecasts of inflation than to its past values, which - as already noted - is a more efficient way of conducting monetary policy. For all MPC members their policy can be characterized also as a flexible form of the inflation targeting strategy. In their decisions, they take into account not only changes in inflation forecasts, but also the development of real variables, in particular the industrial production.

This study, as the first in Poland in such a broad manner analyzes the decision-making process of individual members of the decision-making body in the central bank. The research method – the multiple choice model – I propose here is so flexible, that it allows to incorporate into the reaction function of central bank both the decisions directly related to the current level of the reference rate as well as the decisions of a qualitative nature indicating the direction of future changes in interest rates (formal bias). Moreover this method can be successfully used to evaluate the monetary policy of the central banks, which are currently using other communication tools than a formal bias, including the so-called forward guidance, which stands for a conditional or unconditional promise to maintain interest rates at low levels. The approach I propose, may also be used to incorporate into the reaction function of the central bank, other non-standard monetary policy instruments, such as quantitative easing, just as it is shown in the second chapter of this book. In the monograph I point out that the growing importance of non-standard monetary policy instruments in the recent years will strengthen the role of the multiple choice models used by me as a tool for the analysis of the reaction functions of central banks.

In the fourth chapter of the book I analyze to what extent the inflation in a small open economy, like Poland, is determined by changes in domestic output gap. In this part of the monograph I base on the results of my research also discussed in the article: Hałka, Kotłowski (2014). I was motivated to undertake this research subject by the observation of the increasing importance of global factors in shaping inflation in many economies all over the world in the recent years as advocated by many authors. Some economists, including Rogoff (2003) and Borio and Filardo (2007) see the causes of this phenomenon in the intensification of the globalization process, defined by them as an growing integration of the world economy, combined with the liberalization of trade and capital flows. Although in recent years the globalization process affected prices of a relatively large group of goods and services included in the CPI basket, from the point of view of the overall inflation variability greater importance can be attributed to the second

shock of a global nature, namely the commodity shock. In the second half of the first decade of the 21st century the prices of oil as well as some agricultural commodities rapidly increased and then remained for several years at the elevated level, despite the outbreak of the global financial crisis and plunging the most developed economies into recession. As a result, inflation in many countries, in particular small open economies, developed in the years 2007-2012 at an elevated level, regardless of the economic situation in these countries.

The appearance of both of these shocks, thus acceleration of globalization process and strong fluctuations of commodity prices, prompted economists to pose the question to what extent the inflation in particular economies still depends on changes in domestic demand pressure, which could be potentially affected by the central bank, and to what extent it is merely the result of common price trends in the global economy. The study, which I discuss in this chapter is an attempt to answer this question.

My research method involves disaggregating the basket of consumer goods and services prices to the four-digit COICOP classification and analyzing thus obtained individual price indices within the Phillips curve model specified for an open economy. Based on the assessment of the statistical significance of parameters related to the output gap, I classify the different categories of goods and services into two categories - those with prices reacting to the changes in the output gap and those with prices insensitive to it. Similarly, I carry out the classification of the components of the CPI basket into the categories of goods and services with prices sensitive and insensitive to movements in the exchange rate.

Next, I aggregate these groups of goods and services whose prices change in reaction to movements in domestic output gap and I construct a new inflation index for the Polish economy, which can be interpreted as an inflation of goods and services with prices sensitive to changes in domestic demand. In my opinion, this indicator can serve as a measure of demand pressure in the economy, complementary and more up-to-date in comparison to the commonly used output gap variable.

This is the first study for a small open economy like Poland, which raises the issue of identification of the categories of goods and services included in the inflation CPI basket, whose prices change in response to fluctuations in domestic demand pressure. In contrast to the study most similar to mine, carried out by Froehling and Lommatzsch (2011) for the euro area, I included in the Phillips curve model explicit exchange rate, which could play an important role in shaping prices in the economy with a relatively large degree of openness as compared to the euro area.

The results of the study allow me to formulate some research conclusions important for monetary policy conducted by NBP, which may potentially also be useful for other central

banks operating in economies with similar structural features, and which could not be formulated on the basis of analysis of aggregate inflation only.

First, despite the increasing role of global factors in shaping inflation in small open economies pointed to by many authors, in Poland still more than half of the CPI inflation basket reacts to the changes in domestic demand pressure and thus can be influenced by the monetary policy of NBP.

Second, drawing conclusions about the demand and inflationary pressure in the economy by observing only the aggregate CPI index may lead to erroneous findings. A significant part of the CPI basket are in fact goods, the prices of which in the light of my results are influenced more by structural factors, such as e.g. the ongoing globalization process, leading to permanent changes in relative prices in the economy. For this reason, for the assessment of inflationary pressure it is useful to apply also other inflation measures such as the price index proposed in the study, covering the categories of goods and services with prices reacting to cyclical fluctuations in the domestic demand, as well as to conduct the analyzes of disaggregated price indices.

Third, the core inflation measures constructed by excluding from the CPI basket food and energy prices may not reflect adequately the demand pressure in the economy, which results from the fact that the prices of some categories related to food and energy react to the changes in domestic demand, while prices of some categories left in the basket (mainly of durable and semi-durable goods) do not. The results of my research confirm, therefore, that as pointed out by Bryan and Cecchetti (2004), core inflation measures should be considered rather as an approximation of the long-term trend in inflation than reflect cyclical fluctuations in demand pressure in the economy.

In the final (fifth) chapter of the monograph I present the concept of natural yield curve – a new economic category originally proposed in the article: Brzoza-Brzezina, Kotłowski (2014). The premises which accompanied us in formulating the concept of the natural yield curve, which is the generalization of the natural interest rate, were both theoretical and empirical. First of all, in the literature there are discrepancies as to the period to which the definition of the natural rate of interest refers. Although some authors treat it as a long-term category (as Wicksel 1898), most contemporary studies (including Woodford 2003, Laubach and Williams 2003) associate the natural interest rate with the short-term rate, equivalent in maturity to central bank reference rate. Our concept, which assumes the existence of the entire term structure of equilibrium interest rates allows to combine these two approaches.

In the approach, which identifies the natural interest rate with the short-term rate, this category is generally understood as the rate at which inflation in the medium term converges to the target (or a level which the central bank perceives as appropriate), and the output gap converges toward zero. Before the outbreak of the crisis, this variable was

a reference point for the central bank rate when assessing the restrictiveness of monetary policy (see eg. Brzoza-Brzezina 2006). The current real interest rate being below the equilibrium interest rate meant then that the monetary policy is expansionary and leads to increase in future inflation, while the positive difference between the current and the natural rate of interest indicated a restrictive monetary policy, causing a decline in inflation.

The course of the crisis, however, has changed the role of the central banks short-term interest rate as the main monetary policy instrument. The decrease in production, which took place in many developed countries, was in fact so big and long that effective stimulation of economy would have required a reduction in long-term interest rates to very low levels. Due to very high risk premium that time it would require the central bank to determine the short-term real interest rate rebalancing the economy significantly below zero (the estimates of such a rate shows Dupor 2015). In an environment of low inflation expectations, central banks, due to the zero lower band for the nominal interest rate, have not been able to cut real short-term interest rate to a level corresponding to the equilibrium interest rate and by implementing programs of quantitative easing decided to affect directly the long end of the yield curve.

I argue in the monograph, that for this reason the gap between short-term interest rate and its natural counterpart no longer reflects the actual level of restrictiveness of monetary policy in several economies, which in fact is much more expansionary. Quantitative easing policy conducted in these countries allowed to lower long-term funding costs for private sector and increased the valuation of their assets. Therefore, I put the thesis that in countries pursuing a quantitative easing policy, the level of restrictiveness of monetary policy is better reflected by the difference between the entire term structure of interest rates, and given its equilibrium level.

In the study presented in this chapter, I identified the natural yield curve for the US economy. The analysis is performed in two steps. In the first step I estimate the parameters of the dynamic Nelson-Siegel (1987) model and fit this model to the observed actual real yield curve in the US economy in the years 1983 to 2011. As a result I obtain time series of three factors describing the shape of the curve during this period: the level, slope and curvature. Then treating time series of these parameters as given, I identify the parameters of natural yield curve, extending the model proposed by Laubach and Williams (2003) to estimate the natural rate of interest. Unlike Laubach and Williams, the model I propose relates the behavior of the output gap and inflation in the economy to the deviation of the whole term structure of interest rates from the its equilibrium level, and not only to gap in short-term rates.

The results of my research confirm the hypothesis that the difference between the observed and estimated natural level of the yield curve has a statistically significant impact on the

output gap and inflation. Using this new measure of restrictiveness of monetary policy, which is the difference between the actual and the natural level of the whole yield curve I also show that in 2009-2011 the monetary policy of the Federal Reserve was actually expansionary, which cannot be proved by observing only a short-term rate and its equilibrium level.

This chapter is the only one which does not refer directly to monetary policy conducted recently by Narodowy Bank Polski, however the findings, presented here could potentially be useful also for NBP, if the central bank in Poland would hit in the future zero lower band for its short-term interest rate.

Although the subsequent chapters of the monograph are based on the results of studies published previously in scientific journals, however, in each case I extended the discussion of the results as well as broadened the economic background of the research, which was not possible in the respective journals due to the specific nature of the articles and their limited space.

In particular, in the first chapter of the monograph I discuss the construction and the role of the main instruments used for central bank's communication with the public and present the successive stages of evolution of the macroeconomic projection with respect to changes in the assumptions on the interest rate in projection. In this part of the monograph I also undertake a discussion on the benefits and risks associated with the publication of the central bank's future interest rates path.

In the second chapter of the book I discuss the issue of the optimal horizon for the forecasts used in conducting monetary policy, pointing out the differences between the optimal feedback horizon and optimal policy horizon, to determine the latter besides the loss function of the central bank one need to know the whole model describing the economy and the structure of shocks affecting the economy. In relation to the article: Brzoza-Brzezina, Kotłowski, Miśkowiec (2013), in which I published originally the part of the results discussed in this chapter I also present in the monograph additional sensitivity analysis of results with respect to the assumptions undertaken in the study.

In the third chapter of the monograph broader than in the article: Kotłowski (2006), I provide an overview of possible forms of reaction functions of the central bank proposed in the literature. I also refer to the discussion on the role of the exchange rate and asset prices in the reaction function. I also compare the results of the study described in this chapter and the study discussed in the second chapter of the book and I form common conclusions stemming from both analyses. These both studies consider the reaction functions of the NBP Monetary Policy Council, although in one case it is an aggregated function, while the second study investigates individual reaction functions of particular MPC members.

In the fourth chapter of the book I present a much more extensive discussion than in the article: Hałka, Kotłowski (2014), on the possible causes of the weakening of the relationship between inflation and various measures of the domestic output gap. I elaborate more on the benefits for the forward-looking monetary policy from calculating a new measure of inflation for the Polish economy, which is proposed here – the index of goods and services, whose prices are sensitive to changes in domestic demand. I show here that the information stemming from the observation of the index allows to reduce the lags in the transmission mechanism of monetary policy in this part, which Przybylska-Kapuścińska (2008) classifies as a so-called phase of internal reconciliation.

Finally, in the last fifth chapter of the monograph I discuss the aims and the structure of subsequent programs of quantitative easing conducted by the Federal Reserve, together with possible channels through which they affect the yield curve in the US economy, which issue has been not discussed in the article.

In the discussion of my research results led in the monograph, I also take into account more recent literature, as well as reformulate and synthesize previous conclusions of the studies, in order to emphasize their importance for the conduct of forward-looking monetary policy and to take advantage of the current state of knowledge about particular issues. The confrontation of the results of individual studies allows me also to assess more comprehensively the legitimacy of the hypotheses posed in the studies and formulate more convincing findings, in particular with regard to such research topics as the role of the projection as a communication tool (the research described in chapters 1 and 2) or the analysis of the monetary policy pursued by Monetary Policy Council of the second term of office (the studies in chapters 2 and 3). Above all, by presenting the results of research conducted by me in the form of a monograph, I show also the diversity of issues and problems that may come to the central bank willing to conduct monetary policy oriented to the future.

Summing up the most important conclusions of the analyzes presented in this monograph, which I treat as my significant scientific achievement are as follows:

- Central banks in accordance with their declarations conduct the monetary policy oriented to the future (forward-looking), which is perceived to be a more effective way of stabilizing inflation than basing only on the information from the past. A similar conclusion relates to individual decisions made by particular members of one of the decision making body at the central bank, in this case, the NBP Monetary Policy Council of the second term.
- The projection of inflation and GDP is an effective communication tool of monetary policy - central banks set the interest rates basing on the results of their projections, although the forecast horizon considered by individual banks is different. Central

banks may therefore explain current decisions on interest rates with the results of their projections.

- The central bank through the publication of their own projection affects the GDP forecasts derived by economists from the private sector. The impact of the projection on the dispersion of GDP forecasts depends on the phase of the business cycle and is the strongest when the economy moves from one phase of the business cycle to another: from recovery to slowdown, and vice versa.
- The multiple choice models are a useful tool to describe the reaction function of the central bank in the case when the central bank uses both standard (interest rate) and non-standard (quantitative easing, extraordinary exchange rate policy, a formal policy bias) monetary policy instruments.
- Despite the increase of the role of global factors in shaping inflation in individual economies in recent years, in the Polish economy still the prices of more than a half of goods and services categories in the CPI basket react to changes in domestic economic activity.
- Core inflation measures constructed by excluding from the CPI basket the categories referring to food and energy goods and services may not reflect adequately the demand pressure in the economy. It results from the fact that the prices of some categories related to food and energy react to changes in domestic demand, while prices of some groups left in the core inflation - mainly of durable and semi-durable goods - are not sensitive to domestic demand, remaining largely under the influence of globalization process.
- In the economy, in which the central bank conducts quantitative easing, the monetary policy stance is more accurately reflected by the difference between the actual and natural yield curve - proposed by me new economic category – than widely used before the crisis, the difference between the short-term interest rate and its equilibrium level only.

4. Statistics of research work

4.1. My publications after obtaining the PhD cover the following (prepared individually or in co-authorship):

- 2 monographs¹,
- 6 articles in English, published in international scientific journals ranked by *Journal Citation Report*, having the Impact Factor (list „A” MNiSW),
- 3 articles in Polish published in national scientific journals (list „B” MNiSW),
- 2 chapters in monographs in English,
- 6 articles in the NBP *Working Papers* series (reviewed, in English),

¹ One of the monographs is a book based on the dissertation (it underwent a full publishing review process).

- 4 articles in Department of Applied Econometrics of Econometric Institute SGH *Working Papers* series (not reviewed, in English).

4.2. My publications before obtaining the PhD cover the following:

- 5 articles in Polish, published in national scientific journals (list „B” MNiSW),
- 1 chapter in monograph in English,
- 3 chapters in monographs in Polish.

4.3. Parametric description of my publications can be summarized as follows:

- Total Impact Factor for publications: 3.214.
- Hirsch index according to Google Scholar: 5 (excluding self-citations).
- Number of citations in Google Scholar: 76 (excluding self-citations).
- In the Web of Science database 6 of my publications are included. The number of citations in WoS database amounts to 1 (excluding self-citations) while the Hirsch index equals 1 as well.
- Total number of MNiSW publication points: 226.8 (without the co-authorship correction: 244), including²:
 - after PhD: 177.5 (without the co-authorship correction: 182),
 - for journal publications: 127.5 (without the co-authorship correction: 132),
 - for monographs and chapters in monographs: 50,
 - before PhD: 49.3 (without the co-authorship correction: 62),
 - for journal publications: 36 (without the co-authorship correction: 45),
 - for chapters in monographs: 13.3 (without the co-authorship correction: 17).
- Total number of conference and research seminar presentations (at least national and international stage) after PhD: 28, including:
 - at foreign conferences: 17,

² In accordance to the current rules, in the case of co-authored articles, I give the full number of points for the articles prepared in collaboration with authors with affiliation other than Collegium of Economic Analysis of Warsaw School of Economics (KAE SGH). In the case of co-authors affiliated with KAE SGH the percentage of points awarded by the Ministry of Science and Higher Education for publication reflects their contribution and the number of co-authors. I take into account the affiliation of co-authors at the moment of submitting articles for publication. One of the co-authors, Prof. M. Brzoza-Brzezina joined KAE only in 2014, so after the last of the indicated joint publications had been submitted for publication. For publications before 2010, without the Impact Factor rating and located on the so-called "B" list, the score reflects the rating of journals by the Ministry of Science and Higher Education of 2010 after the change of the rating system. In the case of publication of 2016 (article B.1 in Annex 3) I applied the Impact Factor ratio for the year 2015 and the number of points specified by the Ministry of Science and Higher Education in 2014 (the last available).

- at foreign research seminar: 1,
- at international conferences in Poland (in English): 6,
- at national conferences in Polish: 2,
- at national research seminars in Polish: 2.

The detailed list of my scientific publications is shown in Annex 3. I provide the values of Impact Factor (five-year) for these journals that are included in the *Journal Citation Reports* database as well as the number of points allocated to them by the Ministry of Science and Higher Education (MNiSW).

5. Other research activity

5.1. Scientific conferences and grants

I presented the results of my research at national and international scientific conferences, including these organized by *The Society for Nonlinear Dynamics and Econometrics*, *Society for Computational Economics (Computing in Economics and Finance)*, *Computational and Financial Econometrics*, *International Institute of Forecasters*, *the International Symposium in Computational Economics and Finance*, *Ecomod*, *Macromodels*, *FindEcon* and *Warsaw International Economic Meeting (WIEM)*. My co-authored papers were also presented at the conferences: *Dynare Conference* and the conference of the *European Economic Association (EEA)*. I was also a speaker at seminars and conferences organized by central banks, including *Narodowy Bank Polski*, the *Swiss National Bank* and *Sveriges Riksbank*. In total, I took part in 25 international conferences where I presented my papers. A detailed list of the papers I wrote or co-authored presented at the conferences can be found in Annex 4.

I also participated in research under the NBP grant "Measuring the natural (neutral) yield curve", awarded under the second competition for research projects in 2010, which was culminated by submission of the report entitled "Measuring the Natural Yield Curve". I also managed and conducted several research projects – initially the projects for young researchers and later on the statutory research projects conducted at the Collegium of Economic Analysis at the Warsaw School of Economics.

5.2. Participation in review process

As part of this activity, I reviewed articles for the following journals:

- *Economic Modelling*,
- *Empirical Economics*,
- *Czech Journal of Economics and Finance*,
- *Central European Journal of Economic Modelling and Econometrics*,
- *Gospodarka Narodowa*,
- *Bank i Kredyt* (4 articles).

At the same time I have been several times a reviewer of the works submitted for publication in a series of *Materiały i Studia* of Narodowy Bank Polski and the NBP Working Papers.

5.3. Participation in editorial committees

Since 2008 I have been a member of the editorial board of the series *Materiały i Studia* of NBP (English versions are published as the NBP Working Papers). The *Materiały i Studia* of NBP is a publishing series with the status of a working paper. The works published in this series go through a formal review process and on several occasions I participated in this process as a reviewer.

5.4. Foreign internships and trainings

During my professional career I have participated in numerous courses and trainings in economics and econometrics, and particularly useful for my scientific development have been:

- one-week course "Panel Data Econometrics", conducted in CEMFI (2012) by Prof. Steve Bond on advanced methods of panel data analysis,
- two-week training "Inflation Forecasting and Monetary Policy" held at the training center of the Swiss National Bank in Gerzensee (2010), during which I could become acquainted with the theoretical and practical aspects of forecasting macroeconomic variables, including inflation. The lectures were conducted both by established academics and practitioners in forecasting at the Swiss National Bank,
- one-week course "Modern Monetary Economics" at the International Monetary Fund (2009) conducted by Prof. Carl Walsh, dedicated to the theoretical foundations of the New Keynesian models, now widely used in the monetary policy analyses.

6. Achievements in the field of teaching

During 18 years of work at the Institute of Econometrics of the Warsaw School of Economics I have taught the following subjects at the bachelor and master studies, and also doctoral studies in the Collegium of Economic Analysis:

- Econometrics (in Polish),
- Applied Econometrics (in Polish),
- Time Series Analysis and Forecasting (in Polish and English),
- The Theory of Forecasting (in Polish),
- Advanced Econometrics of Time Series (in Polish).

At the Warsaw School of Economics I have held bachelors and masters seminars. I am a supervisor of 8 master and 27 bachelor theses. Many times I have reviewed bachelors and masters theses defended at SGH and presided over examination committees during these examinations at bachelor courses. Currently I am an auxiliary supervisor in doctoral proceedings of MA Karol Szafranek, whose supervisor is Prof. Andrzej Sławinski.

In the course of my work at university (Warsaw School of Economics – SGH) I have also taught advanced methods of econometrics at the Postgraduate Studies in Macroeconomic Analysis, conducted by the Warsaw School of Economics. Also I taught at the Postgraduate Studies for journalists, organized jointly by the Institute of Economic Sciences of the Polish Academy of Sciences and Narodowy Bank Polski, making the participants acquainted with issues related to the monetary policy and the use of quantitative methods at the central bank. Within cooperation with students' scientific organizations I also gave lectures for the Students' Scientific Association for International Finance (the so-called shadow cabinet of the MPC). In 2003-2004, several times I conducted trainings in advanced methods of econometrics for the employees of Narodowy Bank Polski.

I co-authored the chapter "Econometrics of Time Series. Stationarity, integration, ARIMA" pp. 189-220, of the textbook: "Econometrics and Operations Research. Textbook for bachelor studies" edited by M. Gruszczyński, T. Kuszewski and M. Podgórska and published in 2010 by PWN (in Polish). The book has high reputation among academics and students, and has been reprinted many times.

I have taken part in the preparation of other didactic publications. In particular, in 2003 I prepared teaching materials in econometrics for the e-learning system, introduced at that time by the Warsaw School of Economics. These materials included lectures and tasks and problems to be solved individually by students. In the years 2012-2013 I participated in the project "Innovative SGH - development and internationalization programme" (Global SGH), co-funded by the European Union from the European Social Fund. In this project, I prepared teaching materials in English (syllabus, lectures, tasks, database descriptions) used for teaching the subject *Time Series Analysis and Forecasting*.

7. Organisational achievements

My organizational achievements include both the work for the Warsaw School of Economics, as well as organizational activities in the broader dimension, with significance for the development and popularization of economic sciences in Poland.

As my special organizational achievement I would like to point out co-creation of the competition for the best macroeconomic analysts, conducted since 2010 jointly by Narodowy Bank Polski and the editorial boards of the newspapers "Rzeczpospolita" and "Parkiet". In 2012 I was appointed by the President of NBP a member of the Competition

Jury, which role I have fulfilled ever since. This competition has nationwide coverage and is addressed both to economists in the private sector and academic centers. The aim of the competition is to select annually the best team of forecasting professionals. The participants forecast in advance the main macroeconomic categories in the Polish economy, including GDP growth and inflation, and the accuracy of these forecasts is assessed both in absolute terms and in relation to the consensus of the forecasts. This competition aims to popularize the econometric forecasting tools that are used by the majority of participants.

Since 2014 I have been a member of the organizing committee of the annual conference organized by Narodowy Bank Polski - NBP Workshop on Forecasting, whose subject include theoretical and practical aspects of macroeconomic forecasting. This conference has become an important scientific event for both Polish and foreign academia, with papers presented by a number of recognized experts in the field of forecasting, working in both academic institutions and central banks. So far, there have been two editions of the workshop, this year the next will take place.

I have also cooperated with students' scientific organizations. In 2011-2012, I cooperated with the Students' Scientific Association for International Finance at the Warsaw School of Economics presenting at their meetings issues related to various aspects of the monetary policy and forecasting at the central bank.

In the period 2005-2006 I was Secretary of the Scientific Seminar of Econometric Modelling SENAMEK conducted in the Department of Applied Econometrics of the Institute of Econometrics at the Warsaw School of Economics under the direction of Prof. Aleksander Welfe.

In addition, as part of my organizational activities at the Warsaw School of Economics in the years 1999-2016, almost every year I have been involved in the recruitment process first for the uniform and then master's studies, as Chairman, Secretary and Member of the recruitment subcommittees.

In the academic year 2012/2013 I was the coordinator of the Econometrics subject. This subject was taught at bachelor courses at the Warsaw School of Economics simultaneously for the entire year, including approx. 1,000 students. My tasks included, inter alia, appointment of teaching staff in this subject and the organization of a uniform examination for all students.

8. Awards and distinctions

- 2015 Diploma of Recognition of the Rector of the Warsaw School of Economics for the best publishing results in 2014.
- 2014 Diploma of Recognition of the Rector of the Warsaw School of Economics for the best publishing results in 2013.
- 2013 Diploma of Recognition of the Rector of the Warsaw School of Economics for

- the best publishing results in 2012.
- 2010 First-Degree Team Award of the Rector of the Warsaw School of Economics in teaching activities for the book "Econometrics and Operations Research. Textbook for bachelor courses".
 - 2007 Second-Degree Individual Award of the Rector of the Warsaw School of Economics for achievements in the field of scientific research for the book "Money and Prices in the Polish economy. Seasonal cointegration analysis" (in Polish).
 - 2007 The winner of the annual award "Bull and Bear" granted by the „Parkiet” newspaper in the "Economist of the Year 2006" category. The award was granted for winning the first place in the accuracy rating of the short-term forecasts in 2006 by the two-person team of the BRE Bank economists under my leadership. The forecasts were prepared using a variety of econometric tools.
 - 2006 Second-Degree Individual Award of the Rector of the Warsaw School of Economics for achievements in the field of scientific research for the doctoral dissertation "Analysis of long-run relationship between prices and money in the Polish economy using the concept of seasonal cointegration" (in Polish).
 - 2005 Third-Degree Team Award of the Rector of the Warsaw School of Economics for achievements in the field of teaching.
 - 2005 The Cup of the Fifth Doctoral Workshop organized in 2004 by the Chair of Econometric Models and Forecasts of the University of Lodz for the best paper presented at the workshop.
 - 2000 First-Degree Team Award of the Rector of the Warsaw School of Economics for achievements in the field of scientific research for the research paper "Survey data as a source of information for policy recommendations: A logit analysis".
 - 1999 The first place in the competition for the best graduate of SGH organized by Procter & Gamble.

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