Szkoła Główna Handlowa w Warszawie
Kolegium Analiz Ekonomicznych

Essays on ineffectiveness of central bankers, commercial forecasters and international financial institutions – evidence from macroeconomic forecasting and policymaking.

Tytuł Polski:
Eseje o nieefektywności bankierów centralnych, analityków komercyjnych i międzynarodowych instytucji finansowych – przykłady na podstawie prognoz makroekonomicznych i konstrukcji polityki gospodarczej.

Autoreferat

Jakub Rybacki

Promotor: dr hab. Dobromił Serwa, prof. SGH

Executive summary:

This thesis is divided into two parallel blocks. First one is dedicated to the analysis of forward guidance policies. Author analyses reasons of low effectiveness of these policies for example in the context of inflation target. The aim of this chapter is to confirm that forward guidance has rather small benefits, while maintenance of low interest rates has its negative social consequences. Author verifies following hypothesis.

1. *Communication policies of the central banks in the small open economies has low effect on the interest rate expectations.*
2. *Maintenance of accommodative monetary policy in the euro area inflated real estate bubbles on the major European Markets.*
3. *Adverse effects of loose monetary policy and undershooting of inflation targets in major economies was results from insufficient work of research departments in the central banks.*

The second block analyses macroeconomic forecasts' errors of the commercial analysts and international institutions such as European Commission. Authors analyses the most important figures including GDP growth and government net lending. The aim of this block is to highlight problems. Authors verifies following hypothesis:

4. *Macroeconomic forecasts of GDP growth provided by the commercial economists in Poland are inefficient – they contain systematic biases.*
5. *International institutions are applying double standards in the fiscal assessment of the EU governments – forecast errors of some countries contains biases.*

Botch blocks consist of 4 chapters. Each chapter contains independent article published or accepted for publication in the peer-reviewed journal. Therefore, thesis is composed of 8 articles

Block 1: *forward guidance policy*

Forward guidance policy was expected to resolve problems of low economic growth and low inflation in the advanced economies. Policymakers started to communicate their expectations about change in interest rates and unconventional policies in order to manage the level of long interest rates. So far policy was used to permanently lower the rates. Additionally, forward guidance reduces risk premia related to the uncertainty about future monetary authorities' decisions. (Narodowy Bank Polski, 2013).

Forward guidance is fully conditional – central banks' commitments do not create any legal obligations for its realization. However, policymakers need to be careful about their credibility. Declarations have different forms – they can be presented as interest rate projections, written statement or presented verbally during the Q&A answers at the press conferences. Literature distinguishes between two types of forward guidance Delphic and Odysseian (e.g. Cambpell et al. 2012). Delphic guidance is more

general[1], while Odysseian[2] provides detailed information about macroeconomic conditions required to change the policy.

The introduction of *forward guidance* was accompanied by strong expectations. Macroeconomic models (e.g. Smets & Wouters, 2007) suggested prompt recovery of activity and inflation, after interest rate expectation had been anchored below the natural levels. So far, realized effects of these policies was much weaker. US Fed monetary authorities were incapable to influence long term interest rate, despite the consistent declarations about short term interest rates (Swanson 2017). The causes of these failures have not been clearly identified – problem of correct identification became knowns as a *forward guidance puzzle* (Del Negro et al, 2012).

So far, the research on the forward guidance inefficiency was focused on the advanced economies. Authors highlighted lack of possibility to hedge risks related to unexpected policy change (Mc Kay et al, 2016), adaptative expectations of financial markets' participants regarding timing of the accommodative policies (Gertler, 2017) and inconsistent goals between *forward guidance* and strict inflation targeting (Cole 2018). This dissertation is focused on the experiences of small open economies including Poland.

The first chapter analyses National Bank of Poland's (NBP) communication policies conducted in the years 2013-2014 and 2017-2019. Our research highlights that monetary authorities' declarations successfully lowered interest rates forecasts uncertainty reported ex-ante by the commercial analysts in the cyclical surveys. Article was published in the Bank i Kredyt journal (Rybacki, 2019a).

The second chapter provides less encouraging conclusions about management of the long interest rate level by the monetary authorities. Analysis of quantitative projections provided by the Riksbank (Sweden), Norges bank (Norway) and Czech National Bank suggest that forward guidance has relatively small impact in shaping the yield curves. Much greater influence was related to the expectations about European Central Bank policy. The research confirms conclusions regarding spillovers reported earlier in case of the United States and Canada (Jones et al, 2018). Article was published in the Econometric Research in Finance journal (Rybacki, 2019b).

Third chapter analyses adverse economic effects of permanent maintenance of low interest rates in the euro area. The research highlights that accommodative monetary policy increased real estate bubble risk. This article was accepted for publication in the peer-reviewed monography *Recent trends in the real estate market and its analysis 2019* (Rybacki, 2020a).

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[1] E.g. FOMC policy statement from August 2011.
[2] E.g. FOMC policy statement from December 2012.

Fourth chapter answers the question whether failure of forward guidance policies was related to the groupthink of central bank staff (Janis 2008). This research analyses motivational biases of central banks' staff and presents methodology for measuring ideas concentration. Article highlights that central banks with more dispersed research were capable to better realize inflation targeting strategy. This paper was accepted for publication in the Gospodarka Narodowa journal (Rybacki, 2020b).

Blok 2: Inefficiency of macroeconomic forecasters

The second block is devoted to macroeconomic forecasting. Theoretically each economist should aim to provide forecasts with (1) totally random errors, (2) unpredictable direction of the future revisions based on the past information (Nordhaus 1987). However, real life provides multiple situations where the above-mentioned goals are not met.

Academic literature highlights problem of motivational biases. Macroeconomic forecasts are not produced in a vacuum – analysts often tend to provide estimates, which do not deviate from economic consensus in order to avoid bigger mistakes – the phenomenon is knowns as a *herding behavior (*e.g. Elliott et al 2006, Marinovic et al 2013, Pierdzioch et al 2012). Some analysts may deliberately produce controversial estimates to acquire greater publicity (Lamont 2002). Finally, forecast produced by the commercial forecasters or economists from the public institutions are often expressing interest of their employers (Ashiya 2009). This results in existence of statistical artefacts. The dissertation provides few interesting examples.

The fifth chapter analyses Polish GDP forecast errors made by the commercial analysts in the years 2013-2019, based on the dataset related to Rzeczpospolita's competition for the best macroeconomic analysts. The research shows that analysts systematically underestimate growth outlook in the years 2016-2019. Secondly economists tend to excessively revise their estimates. Finally, author identifies strategic behaviours presented in the previous paragraph. All of the mentioned problems may be related to monopoly of the commercial financial institutions on the forecasts' market. Therefore, author recommends greater engagement of the public institutions in the economic debate. Article was accepted for the publication in the Bank i Kredyt journal (Rybacki, 2020c).

The sixth chapter provides greater insights on the motives of macroeconomic forecasters. The research analyses result of the 2nd most prestige macroeconomic contest from the Rzeczpospolita daily, where economists predict monthly short-term variables. Authors shows that analysts are more awarded for correct forecasts of variables, where disagreement is low. On the other hand, the function, which assess forecasts accuracy, provides small benefits for better predictions in case of elevated uncertainty. This article was published in the Central European Economic Journal (Rybacki, 2020d).

The seventh chapter shows that systematic biases and autocorrelation of errors are also present in the fiscal forecast of the international financial institutions such as the International Monetary Fund,

European Commission or the OECD. Author highlights that European Union's (EU) fiscal rules related to Stability and Growth Pact are generating statistical forecasts – institutions are censoring their forecast in case when exist a risk that government deficit could slightly exceed 3% of GDP (Rybacki, 2019c).

The eight chapter compares fiscal forecasts errors of European Commission and EU's national government. Analysis shows that accuracy of those estimates is similar – greater differences are present mainly in the very small economies like for example Luxembourg. Article was published in the Central European Economic Journal (Rybacki, 2020e).

The detailed description of the research is present in the next sections.

Chapter I: *Forward guidance* and interest rates forecast uncertainty.

During this chapter author analysis effects of NBP's forward guidance policy on ex-ante interest rate uncertainty reported in the survey of professional forecasters. The null hypothesis states that its impact should be marginal. Research done in the 90's and at the beginning of the new millennium highlighted that greater transparency should improve predictability of monetary policy. Positive effects were reported after introduction of inflation targeting strategy (Mankiw et al 2003, Levin et al 2004, Crowe 2010), communicating the MPC sentiment during press conferences (for example Swanson 2006) and publication of macroeconomic projections (Romer & Romer 2000, Hubert 2015).

Contemporary research was less optimistic – according to the recent papers forward guidance policy had relatively small effect on the commercial economists' forecasts (Kool & Thornton 2015, Jain & Sutherland 2018). Authors explained that new information does not provide material news – their effects were consistent with the output of the forecasters' analysis.

Author proposed model for calculating uncertainty based directly on a Taylor rule (1993). Reported ex-anted interest rate forecast uncertainty is explained by a variance of macroeconomic forecast (GDP growth and inflation), interest rates volatility and binary variables corresponding to the periods where forward guidance was present. The research rejects the null hypothesis – communication policy of the NBP has statistically significant and strong positive effects.

Chapter II: International monetary policy spillovers vs. forward guidance.

The second chapter highlights the problem of interest rate expectations management in the small open economies. In such countries, maintenance of interest rates at the different level than in the major economics may result in instability of foreign exchange rate. (importance of both factors is presented e.g. in Ball, 1999). The null hypothesis states that interest rate and expectations of financial markets are not flexible and do not follow the projections from the central bank. As a result, central bank cannot manage expectations.

Research papers usually show heterogenous impact of central bank communication over time in small open economies (Detmers & Nautz 2012, Leif et al. 2017, Svensson 2015). Although publication of interest projection can have substantial market impact, interest rate expectations can sometimes totally diverge from central banks declarations. The aim of the research is to present evidence that the yield curve in countries such as Sweden, Norway or Czechia is more likely to mimic expectations regarding European Central Bank policy rather than forward guidance of the central banks. Mentioned countries constitute most developed small economies in Europe and simultaneously has the longest history of publishing interest rate projections.

Author presents an event study, where he screens yield curve in the day directly following publication of monetary policy or inflation report by the central bank. Changes in the implied short-term interest rates are directly compared with central bank projections and ECB yield curve. Implied interest rates are derived by the Nelson-Siegel model (Diebold & Li 2006). Author calculated two discrepancies: 1) between changes of implied interest rates in the small open economy and change of rates in the projection of the central bank, 2) between changes of implied interest rates in the small open economy and the eurozone

Both discrepancies were compared with Diebold-Mariano test for forecast accuracy (Diebold & Mariano 1995, Harvey et al 1997). Research shows that the shape of the eurozone curve better explains market expectations regarding interest rate in the small open economy than the central bank's projections. Therefore, author confirms the null hypothesis.

Chapter III: Adverse effects of accommodative monetary policy.

The third chapter discusses side effects related to unconventional monetary policies. Research papers shows that contrary to the traditional interest rate policy, asset purchases have strong distributional effects of wealth. Authors show multiple examples when unconventional monetary policy results in increase of inequality (Saiki & Frost 2014, Coibion et al. 2017, Casiraghi et al 2018). This chapter analysis a connected problem of housing availability.

The research aims to quantify impact of the accommodative monetary policy on the increase of the risk of housing bubble in the major Eurozone cities. Such bubbles usually erode housing availability. In the first step Authors computes indicators describing the discretional impact of ECB's monetary authorities' decisions, defined as the difference between ECB's shadow rate (Wu & Xia 2016) and the level implied with the Taylor rule (Taylor 1993). As a next step, author estimated Vector Autoregressive model (VARX), which estimate how discretional monetary policy increased bubble risk measured by the UBS index. Research shows that indeed it increased bubble risk, but their impact was not decisive.

Chapter IV: Are central banks fragile because of the groupthink?

The fourth chapter attempts to answer the question whether failure of accommodative policies in restoring inflation was related to imperfections in research organization of those entities. Null hypothesis assume existence of groutphink (Janis 2008) – the central banks where researchers are more interconnected by common authorship of publications should have greater deviations from the inflation target.

Research papers show multiple motivational biases, which influence work of central bank researchers. First of all, analysts can be more generously rewarded for a conformism rather than resistance against wrong decision of policymakers (Silvia 2012). Secondly the promotion is strongly dependent on academic track record and assessment of opinion. This may lead to two problems: 1) analysts can formulate thesis, which support their director's opinion rather than realistically assess the reality (Frey 2003) 2) they can exaggerate both effects and importance of their research (Fanelli 2010). Finally, some problems are related to recruitment procedures – papers show that people with similar views are likely to cluster within the organization (e.g. Beyer & Pühringer, 2019).

Author uses VOS algorithm (*visualisation of similarities* - Van Eck & Waltman 2009) to construct a graph of co-authorship relationships between researchers in the working papers series and make clustering of researchers group. Based on those clusters author calculates Herfindahl-Hirschman index, which describes concertation of ideas.

The research confirms null hypothesis. Amongst central banks in developed economies National Bank of Poland is characterized with high deviation of inflation from the target and very concentrated research – working papers are published by a narrow group of economists.

Chapter V: Inefficiency of commercial GDP forecasts in Poland.

Fifth chapter attempts to answer the question why commercial forecasts systematically underestimated GDP growth in Poland the years 2016-2019.

Economic theory provides two explanations for systematic biases. First of all, forecasting of the business cycle is a hard task – economists frequently fail to correctly estimates impact of changes in the fiscal policy and they are incapable to predict severe downturns. Additionally, GDP forecast errors are greater comparing to other macroeconomic variables i.e. inflation or employments. (Ager et al. 2009, Blanchard & Leigh, 2013, Loungani 2001).

But there also exist another problem – analysts frequently are not motivated to improve accuracy of their estimates. Some analysts intentionally publish controversial estimates to attract the media attention (Ashiya, 2003), others try to express interest of the employer or manifest their political sympathies

(Ashiya, 2009). Finally, analysts are also prone to strategic behaviours (Pons-Novell, 2003) e.g. avoiding bigger deviation from the consensus in order not make a visible error (herding).

The research is based on the individual forecasts which participated in the competition for the best macroeconomic analyst in the Rzeczpospolita daily. Author estimates fixed effects panel model, which confirms existence of the systematic biases. The model indicates that commercial analysts are prone to excessively strong revise their estimate. Strong revisions are usually partially reverted in the next forecasts. For example, if economist has revised down GDP forecast by 1pp, he/she would to increase it by 0.3pp in the next quarter.

The model confirms evidence of strategic behaviours – forecasts of the analysts, who represent biggest bank in Poland, are usually placed closer to the market consensus than the others. Some economists are revising their estimates much stronger than others – probably to acquire publicity. Data shows interesting paradox – disagreement of the forecasts lower with the increasing time horizon. This is probably an effect of too excessive reliance on the NBP projections.

Chapter VI: What incentives are provided by macroeconomic competitions?

Sixth chapter extends the subject of commercial analysts' inefficiency. The research papers multiple times tried to derive mathematical models, which explains behaviour of forecasters. (for example, Marinovic et al. 2013, Ottaviani & Sørensen 2006). However, due to lack of available data theoretical models were not validated by empirical research.

This chapter analyses what incentives are shaped by the Parkiet and Rzeczpospolita's competition for nowcasting monthly variables. This competition is the second most prestige amongst the economists hired in the commercial sectors, to the extent that analysts' financial bonuses are directly linked with its results.

Author estimated logit models, which answers the question *"correct forecasting of which macroeconomic variables pays off"*. The answer is clearly different than theoretical models could suggests. Forecasts are evaluated by a function, which strongly awards correct forecasting of variables where disagreement is low such as employment, unemployment rate in the stable times and CPI inflation. The same function discourages to make greater effort in case when uncertainty is elevated. In case of strong surprises, forecasts which were statistically more accurate receives similar amount of points comparing to other estimates.

Research show that commercial analysts frequently waste a lot of time for preparing forecast, which has very small importance for policymakers or society, but helps to gain media attention.

Chapter VII: Forecasts of international institutions and the double standards?

Previous chapters highlighted failures of the commercial analysts. The current chapter shows evidence that the same problems are visible in the estimates of international organizations. Authors analysed estimates of government deficits.

Academic literature frequently favoured estimates provided by international organizations such as IMF or the OECD in comparison with governments' estimates (Brück & Stephan, 2006, Jonung et al, 2006). Economists were highlighting two problems – constant excessive optimism of national policymakers and existence of political cycle.

Next generation of papers (e.g. Pina & Venes, 2011) showed that forecast of international institutions are not free of mentioned earlier problems. Their credibility was also shattered by the sovereign debt crisis of the eurozone (Frankel & Schreger, 2013) – institution too lenient assess the situation in the most indebted countries.

The author's null hypothesis states that international institutions can also apply double standards and present excessively negative forecasts for the conflicted European cabinets. Therefore, we should see persistent biases for some group of countries.

Authors estimated fixed effects panel models. The research shows that problems reported during sovereign debt crisis has not been resolved so far. Fiscal forecasts errors are characterized by strong autocorrelation and excessive optimism for strongly indebted countries. Author also highlights existence of statistical artefact related to Stability and Growth Pact rules. Some institutions are avoiding to publish a forecast that country's deficit will only slightly exceed 3%GDP threshold – simmilar findings were also reported earlier (np. Frankel & Schreger 2013). However, author do not find convincing evidence that international organizations are exerting political pressure on European national governments by manipulating the forecasts.

Chapter VIII: Are international institutions better than national governments in forecasting?

The last chapter extends the research reported in chapter VII. Author analyses accuracy of forecasts provided by the European Commission and EU's national governments. The correct answer on this question is not straightforward. Forecasts of public finances are produced semi-annually, therefore number of observations is really small. Application of most common tests (e.g. Diebold & Mariano 1995, Harvey et al 1997) requires taking very strong assumption that forecasts variance is similar for each country, what may distort the results.

Authors proposes a simple analysis based on the fixed effects panel regression. The model results show that forecasts errors of the European Commission and national governments are comparable. Biggest

discrepancies are reported in the very small economies e.g. Baltic states – in that caser usually European Commission is performing worse than national cabinet. The weak accuracy of forecasts in such countries may provide incentives for international companies and their cabinets to allow for unfair tax optimization.

Concluding remarks.

Author analysed following hypothesis:

1. *Communication policies of the central banks in the small open economies has low effect on the interest rate expectations.*

The research does not provide unequivocal results. Polish example shows that they exist at least declarative benefits of more transparent communication. On the other hand, research for Czechia and Nordic countries showed that capability of interest rate expectations management is limited.

2. *Maintenance of accommodative monetary policy in the euro area inflated real estate bubbles on the major European Markets.*

Hypothesis was confirmed – discretional actions of ECB policymakers caused stronger growth or real estate prices on the major European markets.

3. *Adverse effects of loose monetary policy and undershooting of inflation targets in major economies was results from insufficient work of research departments in the central banks.*

The analysis show correlation, but the statistical evidence is not strong.

1. *Macroeconomic forecasts of GDP growth provided by the commercial economists in Poland are inefficient – they contain systematic biases.*

Hypothesis was confirmed – analysed forecasts contained systematic errors. Negative behaviours were supported by the media sector.

4. *International institutions are applying double standards in the fiscal assessment of the EU governments – forecast errors of some countries contains biases.*

Hypothesis was confirmed. However, the countries were systematic biases were reported were not the one suspected by the author. The research shows that international organizations avoid publishing forecasts, where countries are exceeding the Excessive Deficit Procedure thresholds. author do not find convincing evidence that international organizations are exerting political pressure on European national governments by manipulating the forecasts.

The dissertation provides reflection on empirical economics. The popular definition of economics is that it is a science how to explain bad predictions and wrong economic policies. Unfortunately, the research show it is frequently true. Strong theoretical foundations and intellectually complex macroeconomic models were frequently supporting ineffective policies e.g. forward guidance and asset purchases.

Simultaneously, the central bankers tolerate existence of parallel market for commercial forecasts, where simple and faulty solutions are executed to undermine those central bankers' work. Such inefficiency was observed in the case of Polish GDP forecasts. One should also highlight that these inefficiencies are often duplicated by the international institutions.

In the author's opinion current state of art in applied macroeconomies is similar to XIX-th century medicine. In mentioned period medical elites were conducting therapies that were lethal for their patients due to insufficient skills (author recommends especially the story of Ignaz Semmelweis). Today no one can foresee what sort of knowledge could help to improve macroeconomic forecasts to eliminate all of the systematic biases. However, it is good to know defects of the currently applied methods and their assumptions. Therefore, I would like to invite you to read full text of the dissertations.

Jakub Rybalt

Author's papers

Rybacki, J. P. (2019a). *Forward Guidance and the private forecast disagreement–case of Poland*. Bank i Kredyt, 50(4).

Rybacki, J. P. (2019b). *Does Forward Guidance Matter in Small Open Economies? Examples from Europe. Examples from Europe*. Econometric Research in Finance, 4(1), 1-26.

Rybacki, J. (2019c). *Fiscal Deficit Forecasts by International Institutions: Evidence for a Double Standard?* Collegium of Economic Analysis SGH-Working Papers, (44).

Rybacki, J. P. (2020a). *ECB policy consistency–loss of independence and the real estate bubble?*. Recent trends in the real estate market and its analysis 2019, Forthcoming

Rybacki, J. P. (2020b). *Are Central Banks' Research Teams Fragile Because of Groupthink in the Area of Monetary Policy? – Evidence of Inflation Target Realization.* Gospodarka Narodowa - The Polish Journal of Economics, Forthcoming.

Rybacki, J. P. (2020c). *Polish GDP Forecast Errors: A Tale of Inefficiency*. Bank i Kredyt, Forthcoming

Rybacki, J. P. (2020d). *Macroeconomic forecasting in Poland: The role of forecasting competitions*. Central European Economic Journal, 7(54), 1-11.

Rybacki, J. P (2020e). *Are the European Commission's forecasts of public finances better than those of national governments?* Central European Economic Journal, 7(54), 101-109.

Literature

Ager, P., Kappler, M., Osterloh, S. (2009). *The accuracy and efficiency of the Consensus Forecasts: A further application and extension of the pooled approach*. International Journal of Forecasting, 25(1), 167-181.

Ashiya, M. (2003). *Testing the rationality of Japanese GDP forecasts: The sign of forecast revision matters*. Journal of Economic Behavior & Organization, 50(2), 263-269.

Ashiya, M. (2009). *Strategic bias and professional affiliations of macroeconomic forecasters*. Journal of Forecasting, 28(2), 120-130.

Ball, L. M. (1999). *Policy rules for open economies*. Monetary policy rules (pp. 127-156). University of Chicago Press.

Beyer, K. M., Pühringer, S. (2019). *Divided we stand? Professional consensus and political conflict in academic economics* (No. 94). ICAE Working Paper Series.

Blanchard, O. J., Leigh, D. (2013). *Growth forecast errors and fiscal multipliers*. American Economic Review, 103(3), 117-20.

Brück, T., Stephan, A. (2006). *Do Eurozone countries cheat with their budget deficit forecasts*? *Kyklos, 59*(1), 3–15.

Campbell, J. R., Evans, C. L., Fisher, J. D., Justiniano, A., Calomiris, C. W., Woodford, M. (2012). *Macroeconomic effects of federal reserve forward guidance*, Brookings Papers on Economic Activity, 1-80.

Casiraghi, M., Gaiotti, E., Rodano, L., Secchi, A. (2018). *A "Reverse Robin Hood"? The distributional implications of non-standard monetary policy for Italian households*. Journal of International Money and Finance, 85, 215-235.

Coibion, O., Gorodnichenko, Y., Kueng, L., Silvia, J. (2017). *Innocent Bystanders? Monetary policy and inequality*. Journal of Monetary Economics, 88, 70-89.

Cole, S. J. (2018). *The effectiveness of central bank forward guidance under inflation and price-level targeting*. Journal of Macroeconomics, 55, 146-161.

Crowe, C. (2010). *Testing the transparency benefits of inflation targeting: Evidence from private sector forecasts*. Journal of Monetary Economics, 57(2), 226-232.

Del Negro, M., Giannoni, M., Patterson, C. (2012). *The forward guidance puzzle*. Staff Report, No. 574, Federal Reserve Bank of New York

Diebold, F.X., Mariano, R.S. (1995) *Comparing predictive accuracy*. Journal of Business and Economic Statistics, 13, 253-263.

Diebold, F. X., Li, C. (2006). *Forecasting the term structure of government bond yields.* Journal of econometrics, 130(2), 337-364.

Elliott, G., Komunjer, I., Timmermann, A. (2008). *Biases in macroeconomic forecasts: irrationality or asymmetric loss?* Journal of the European Economic Association, 6(1), 122–157.

Fanelli, D. (2010). *Do pressures to publish increase scientists' bias? An empirical support from US States Data*. PloS one*, 5*(4), e10271.

Frey, B. S. (2003). *Publishing as prostitution? –Choosing between one's own ideas and academic success*. Public choice, 116(1-2), 205-223.

Frankel, J., Schreger, J. (2013). *Over-optimistic official forecasts and fiscal rules in the Eurozone*. Review of World Economics*, 149*, 247.

Gertler, M. (2017). *Rethinking the Power of Forward Guidance: Lessons from Japan* (No. w23707). National Bureau of Economic Research.

Harvey, D., Leybourne, S., Newbold, P. (1997). *Testing the equality of prediction mean squared errors.* International Journal of forecasting, 13(2), 281-291.

Hubert, P. (2015). *Do central bank forecasts influence private agents? Forecasting performance versus signals.* Journal of Money, Credit and Banking, 47(4), 771-789.

Jain M., Sutherland C. (2018). *How Do Central Bank Projections and Forward Guidance Influence Private-Sector Forecasts?*, Bank of Canada Working Papers 18-2.

Janis, I. L. (2008). Groupthink. *IEEE Engineering Management Review*, 36(1), 36.

Jones, C., Kulish, M., Rees, D. M. (2018). *International Spillovers of Forward Guidance Shocks*. International Monetary Fund working paper no. 18/114.

Jonung, L., Larch, M., Favero, C., Martin, P. (2006). *Improving fiscal policy in the EU: The case for independent forecasts.* Economic Policy, *21*(47), 491–534.

Kool, C.,Thornton D. (2015), *How Effective is Central Bank Forward Guidance?* Review, Vol. 97, Issue 4, pp. 303-22, 2015.

Lahiri, K., Sheng, X. (2010). *Learning and heterogeneity in GDP and inflation forecasts*. International Journal of Forecasting, 26(2), 265-292.

Lamont, O. A. (2002). *Macroeconomic forecasts and microeconomic forecasters*. Journal of Economic Behavior & Organization, 48(3), 265–280.

Leif B., Ellen S., Xu H. (2017). *Forward guidance through interest rate projections: does it work?*, Norges Bank Working Paper 2017/6.

Levin, A., Natalucci, F., Piger, J. (2004), *Explicit Inflation Objectives and Macroeconomic Outcomes*. ECB Working Paper No. 383.

Loungani, P. (2001). *How accurate are private sector forecasts? Cross-country evidence from consensus forecasts of output growth*. International Journal of Forecasting, 17(3), 419-432.

Mankiw, N., Reis, R., Wolfers, J. (2003). *Disagreement about inflation expectations*. NBER macroeconomics annual, 18, 209-248.

Marinovic, I., Ottaviani, M., Sorensen, P. (2013). *Forecasters' objectives and strategies*. Handbook of Economic Forecasting, 2, 690–720.

McKay, A., Nakamura, E., Steinsson, J. (2016). *The power of forward guidance revisited.* American Economic Review, 106(10), 3133-58.

Narodowy Bank Polski (2013), *Raport o inflacji – listopad*, Link

Nordhaus, W. D. (1987). *Forecasting efficiency: Concepts and applications*. The Review of Economics and Statistics, 667-674

Ottaviani, M., Sørensen, P. N. (2006). *The strategy of professional forecasting*. Journal of Financial Economics, 81(2), 441–466.

Pierdzioch, C., Rülke, J. C., Stadtmann, G. (2012). *A note on forecasting emerging market exchange rates: Evidence of anti-herding*. Review of International Economics, 20(5), 974–984.

Pina, A., Venes, N. (2011). *The political economy of EDP fiscal forecasts: An empirical assessment*. European Journal of Political Economy, *27*(3), 534–546.

Pons-Novell, J. (2003). *Strategic bias, herding behaviour and economic forecasts. Journal of Forecasting*, 22(1), 67-77.

Romer C., Romer D. (2000). *Federal Reserve Information and the Behavior of Interest Rates* American Economic Review 90 3 429-457

Silvia, J. E. (2012). *The biases that limit our thinking about the economic outlook and policy*. Business Economics, *47*(4), 297-301.

Smets, F., Wouters, R. (2007). *Shocks and frictions in US business cycles: A Bayesian DSGE approach*. American economic review, 97(3), 586-606.

Svensson L. (2015). *Day One Keynote Address: Forward Guidance*, International Journal of Central Banking, vol. 11(4), pages 19-64

Swanson, E. (2006). *Have increases in Federal Reserve transparency improved private sector interest rate forecasts?* Journal of Money, Credit and Banking, 791-819.

Swanson, E. (2017). *Measuring the effects of Federal Reserve forward guidance and asset purchases on financial markets* (No. w23311). National Bureau of Economic Research.

Taylor, J. B. (1993). *Discretion versus policy rules in practice.* In Carnegie-Rochester conference series on public policy (Vol. 39, pp. 195-214). North-Holland.

Van Eck, N. J., Waltman, L. (2009). *How to normalize cooccurrence data? An analysis of some well-known similarity measures*. Journal of the American Society for Information Science and Technology, 60(8), 1635–1651.

Wu, J. C., Xia, F. D. (2016). *Measuring the macroeconomic impact of monetary policy at the zero lower bound*. Journal of Money, Credit and Banking, 48(2-3), 253-291.