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Summary of professional accomplishments

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1. Education, doctoral thesis, employment

In 2007, I graduated from the Master studies at Warsaw School of Economics at the major of Quantitative Methods in Economics and Information Systems and obtained a distinction diploma. My Master thesis was entitled „Estimation of weights for the Monetary Conditions Index (MCI) in Poland”. In the same year, I started doctoral studies, from which I graduated in

2010, and in January 2012 I defended my Ph.D. thesis entitled „Adjustment mechanisms in a heterogeneous monetary union: the euro area experience 1999-2009”, prepared under the scientific supervision of dr hab. Ewa M. Syczewska, Prof. SGH.

During my studies, I actively participated in the students' scientific initiatives (in 2003-2007 as a member, and subsequently as the head of Students' Scientific Association of Statistics and Demography). At that time, I was also engaged in the popularization of science, i.a. as a volunteer editor of the economic education portal created at that time at the National Bank of Poland. In the academic year 2006/2007, I completed a teaching internship in the Institute of Statistics and Demography (SGH), teaching the courses: Statistics and Data analysis in social research with the statistical packages SPSS and Statistica. In the same year, I completed a half-year internship at the research and development center of the company IBM in Germany (Böblingen near Stuttgart), where I took part in the development of analytical modules of the DB2 database. This work resulted later, in the years 2011-2012, in the co-authorship (with A. Dorneich and M. Görgens) of patents number 8200454 (*Method, data processing program and computer program product for time series analysis*) and 8055465 (*Method, data processing program and computer program product for determining a periodic cycle of time series data*), granted by the United States Patent and Trademark Office.

During my doctoral studies, I started the econometric research on the European monetary integration, including the potential costs and benefits of Poland's participation in that process. In the years 2007-2009, I worked in the National Bank of Poland, in the Bureau for the Integration of Poland with the Euro Area, and co-authored the “Report on full membership of the Republic of Poland in the third stage of the Economic and Monetary Union”, published by the National Bank of Poland in 2009. After this publication, I started my work in the Bureau of Government Plenipotentiary for the Euro Adoption in Poland in the Ministry of Finance. I authored and co-authored publications related to the monetary integration policy, including “Monitor of nominal convergence” (“Monitor konwergencji nominalnej” in Polish) and “Strategic Framework for the National Euro Changeover Plan”.

After obtaining the Ph.D. degree, and after the suspension of the monetary integration workstreams in the public administration, I extensively applied my experience with economic and econometric modelling in the field of regulatory impact assessment (RIA). Since August 2012 till now I have been working in the Economic Analysis Team at the firm EY (former Ernst & Young), since 2013 as a manager. During that period, I have supervised multiple analytical projects of regulatory or economic impact assessment. In these projects, I have been applying

the tools of time series, panel, spatial and Bayesian econometrics, as well as general equilibrium and input-output models.

From August 2012 till now I have been employed as assistant professor in the Department of Applied Econometrics in the Institute of Econometrics at Warsaw School of Economics.

2. Scientific accomplishment presented for assessment

As the habilitation accomplishment, I present for assessment the following cycle of thematically linked articles, according to Art. 1 par. 2 p. 1 of the Act on academic degrees and academic title and degrees and title in art (Art. 16 ust. 2 pkt. 1 *Ustawy o stopniach naukowych i tytule naukowym oraz o stopniach i tytule w zakresie sztuki*) of 14 March 2003, entitled: „**Quantitative methods of economic regulatory impact assessment on the central, local and sectorial level**”:

1. Torój, A., "**Managing external macroeconomic imbalances in the EU: the welfare cost of scoreboard-based constraints**", *Economic Modelling*, 2017, 61, pp. 293-311.
 - Impact factor 2017: 1.696; MNiSW: list A, 25 p.
2. Dybka, P., Kowalczyk, M., Olesiński, B., Rozkrut, M., Torój, A., "**Currency demand and MIMIC models: towards a structured hybrid model-based estimation of the shadow economy size**", *International Tax and Public Finance*, 2018, DOI: <https://doi.org/10.1007/s10797-018-9504-5>.¹
 - Impact factor 2017: 0.967; MNiSW: list A, 25 p.
3. Dybka, P., Olesiński, B., Pękała, P., Torój, A., "**To SVAR or to SVEC? On the transmission of capital buffer shocks to the real economy**", *Bank i Kredyt*, 48(2), 2017, pp. 119-148.
 - MNiSW: list B, 14 p.
4. Torój, A., "**Regional Economic Impact Assessment with Missing Input-Output Data: A Spatial Econometrics Approach for Poland**", *Central European Journal of Economic Modelling and Econometrics*, 2016, 8(2), pp. 61-91.
 - MNiSW: list B, 14 p.
5. Torój, A., "**Generation of regional input-output tables: a spatial econometric approach with illustrative simulations for France, Germany and Poland**", article

¹ *Online first* version. According to the information obtained from the editors, the paper version will be published in the first half of 2019 as part of a special section devoted to the shadow economy.

under review in the journal *Regional Studies* (MNiSW: list A, 35 p., Impact factor 2017: 3,147), first decision: accept after revision, revised, awaiting the final decision (previous version published as Collegium of Economic Analysis Working Paper Series, 2018/37, May 2018).

6. Karska M., Torój A., "**Strategiczne interakcje przestrzenne między decyzjami wydatkowymi gmin w Polsce w latach 2008-2014**", *Roczniki Kolegium Analiz Ekonomicznych SGH*, Oficyna Wydawnicza SGH, Zeszyt 53/2018, 2018, pp. 29-46.

- MNiSW: list B, 9 p.

7. Kowalczyk M., Torój A., "**Does it pay to pay for health? How health expenditure translates into GDP growth in OECD countries**", *Roczniki Kolegium Analiz Ekonomicznych SGH*, Oficyna Wydawnicza SGH, Zeszyt 39/2015, 2015, pp. 103-117.

- MNiSW: list B, 9 p.

8. Torój A., Mela, A., "**Indirect costs of diabetes and its impact on the public finance: the case of Poland**", *Expert Review of Pharmacoeconomics & Outcomes Research*, 2018, 18(1), pp. 93-105.

- Impact factor 2017: 1.797; MNiSW: list A, 25 p.

9. Torój A., "**Why Don't Blanchard-Kahn ever "Catch" Flu? And how it Matters for Measuring Indirect Cost of Epidemics in DSGE Framework**", *Central European Journal of Economic Modelling and Econometrics*, 2013, 5(3), pp. 185-206.

- MNiSW: list B, 8 p.

Since the systemic transformation in Poland in 1989, and especially since the accession of Poland to the European Union (EU), one can observe a systematic increase in the role of regulatory impact assessment (RIA) in the legislative process, which was made evident by the government programme "Better regulation 2015" ([Ministry of the Economy, 2009](#)). This is also the case for other EU countries and EU-wide legislation. The increase of accuracy and credibility of the quantitative assessment, intended to draw insights on the socio-economic consequences of the proposed solutions, has also been supported by the development of various quantitative tools in the social sciences.

There is no universal RIA algorithm, applicable to every single regulation. It does not appear to be possible (nor justified) to elaborate a handbook of RIA methods, going beyond the general guidelines on the reliability and quality management in the RIA process (cf. [Szpringer and Rogowski, 2007](#)). The key decision taken by the authors of RIA documents that ultimately

translates into the value of these documents for decision makers is thereby the selection of the analysis method that is adequate for the analysed regulation. The role of economics, and especially econometrics, boils down to the elaboration of standards of analysis in these specific contexts, and that was my *modus operandi* during the work on the presented cycle.

In the cycle of publications presented for assessment, I included the articles in which I apply quantitative (mainly econometric) methods for the evaluation of selected, complex regulatory questions, as well as the articles focused on the propositions regarding the development of the methods themselves, those particularly useful and broadly applied so far in the RIA process. For the clarity of presentation, I differentiate between three classes of problems, related to the:

1. national and international level (articles [1], [2], [3]);
2. local level (articles [4], [5], [6]).
3. sectorial level – regarding the healthcare sector (articles [7], [8], [9]).

At the start of work on the publication cycle, I set myself the following objectives related to the quantitative tools of regulatory impact assessment:

C1. The extension of selected Dynamic Stochastic General Equilibrium (DSGE) models to the form in which they could serve as a regulatory impact assessment tool:

- a. in the situation when the macroeconomic policy is forced to stabilize multiple indicators that affect many sectors;
- b. for regulations that affect a single sector characterized by its own, specific channels of impact on the rest of the economy (going beyond the standard input-output mechanics). This is what i.a. the healthcare sector appears to be, as a producer of the health stock in the population.

C2. The use of econometric modelling for assessing the impact of regulations on the size of unobservable economy (shadow economy), especially the synthesis of two complementary approaches dominant in the related literature – i.e. the cross-section or panel Currency Demand Analysis (CDA) model and the structural model of unobservable variables of the type MIMIC (*Multiple Causes Multiple Indicators*; see [Tanzi, 1983](#); [Schneider, 2005](#)) – into a single econometric framework, so as to profit from their advantages and minimize the limitations related to their application.

C3. Studying the applicability of alternative methods of econometric modelling for different horizons of the assessment, i.e. the differentiation between short- and long-run impact of the regulations.

C4. Elaboration of the RIA method for regulations affecting only selected regions of a country. For instance, it is predominantly the Silesia region in Poland that can be affected by various regulations on coal mining and steel mill industry. The interregional input-output model appears to be the standard in the literature (see e.g. [Jahn, 2017](#)), but the interregional tables are not published in Poland and should be estimated. In turn, the existing methods – such as the Location Quotients technique – do not take a satisfactory account of the distance between regions, which frequently leads to non-intuitive results. Against this background, I set myself the objective to construct a dedicated method based on the empirical analysis of spatial links and patterns.

C5. The extension of the interregional input-output model, developed under objective [C4], by additional causal inference tools that take into account the spatial links. This is because the endpoint of *input-output* simulation analysis is the vector of incremental global output (or value added) in individual sectors and regions, which does not necessarily translate in a simple (e.g. proportional) way into other economic variables of interest for the researcher, characterising the same sectors of regions. For example, the location of investment in a given region can affect the labour market situation, as well as the financial situation of the local government subsector, in the neighbouring regions.

C6. Limiting the endogeneity in the econometric models that serve the purpose of regulatory impact assessment on the macroeconomic level or the analysis of sectorial regulations that are so impactful that they materially translate into the macro level (thereby feeding back to the sector). The inference based on such model estimates can make the resulting quantitative RIA biased and inconsistent.

2.1. Regulatory impact assessment: country and international level

The cycle is opened by the article [1] entitled “Managing external macroeconomic imbalances in the EU: the welfare cost of scoreboard-based constraints”, related to the international level regulations. The research is focused on the consequences of the introduction of a new EU-wide macroeconomic governance procedure in 2011, described as *Macroeconomic Imbalance Procedure* (MIP; see [European Commission, 2016](#)). As part of it, the European Commission defined i.a. a scoreboard of macroeconomic indicators that have to remain within

a given value range in all the EU Member States. Otherwise a procedure is initiated, in which the macroeconomic policy of a state is subject to an in-depth analysis by the European Commission, and that can ultimately lead to sanctions. In the article, I propose the welfare impact assessment (as measured by a linear-quadratic approximation of the utility function, derived from microeconomic foundations) regarding the compliance with the constraints on three key indicators of external imbalances: current account balance (in relation to GDP), real exchange rate and unit labour cost dynamics. As regards the method, the article belongs to the strand of literature on the business cycle costs, initiated by the seminal work of [Lucas \(1987\)](#), and consists in implementing the constraints on economic policy in the MIP regime into a small open economy DSGE model, analogically to the method proposed by [Woodford \(2003, ch. 6\)](#) for the case of the zero lower bound on nominal interest rates. According to the obtained results, the welfare cost of the new procedure measured as the equivalent decrease in the long-run consumption level, remains very limited, but it might considerably rise in inelastic and closed economies, especially in the countries on the path of real convergence and for the euro area members. The computations are based on the parameter estimates obtained for Poland and the euro area with Bayesian methods.

The next two articles ([2], [3]) are devoted to selected issues of quantitative RIA assessment on the national level.

The first of them, “Currency demand and MIMIC models: towards a structured hybrid model-based estimation of the shadow economy size” [2] investigates the relationship between the regulatory framework and the shadow economy problem in the economy. The starting point is the critical review of the previous literature on the application of currency demand models (CDA; see [Tanzi, 1983](#)) and structural unobservable variable models (MIMIC; see [Schneider, 2005](#)), in which the knowledge of the relationship between the shadow economy and the selected elements of the regulatory framework is exploited for the purpose of the shadow economy measurement. Against this background, we proposed the synthesis of the previously applied CDA and MIMIC into a single, coherent econometric model, in which the parameter estimates of the panel CDA model serve as the algebraic just-identifying conditions of the MIMIC model. The standard list of regulatory variables included into CDA models (such as e.g. the tax rate) has been expanded so as to include the variables describing the quality of regulations related to doing business (e.g. World Bank’s *World Governance Indicator: Rule of Law*) and electronic payment system variables. It has been additionally demonstrated that the

applicability of the previous MIMIC models to the measurement of the shadow economy, as well as to the impact assessment of the regulations targeted at its reduction, is very limited.

In the article [3] “To SVAR or to SVEC? On the transmission of capital buffer shocks to the real economy” we perform an econometric assessment of the economic impact stemming from various regulations that directly affect the size of the capital buffer of banks. Such regulations include both the ones that change the capital requirements in nominal terms (capital thresholds) and the ones that can have system-wide balance sheet effects in the financial sector, thus translating directly into the size of capital buffer and, in consequence, on the volume of the new credit. It has been confirmed that the previous literature using time series models of the class SVAR lays ground for an adequate simulation of the short-run economic impact (up to approximately 4 quarters), but does not serve as a satisfactory basis for simulation nor statistical inference regarding the differences between simulation scenarios in the long run (up to approximately 5 years). Instead, it has been proposed to use SVEC models with multivariate cointegration analysis, which allowed to obtain much more stable and credible paths of GDP in different scenarios, along with bootstrap confidence intervals.

Article [3] had a high practical relevance because of the link to the public debate on the difficulties of a material part of households with paying back foreign currency credits after the sudden appreciation of the Swiss currency (the so called „Swiss franc borrowers problem”) and the impact assessment of different possible scenarios of regulatory remediation.

2.2. Regulatory impact assessment: local level

Local level RIA problems (in the sense of sub-state territorial unit level, e.g. subregions NUTS-3, poviats NUTS-4 or communities NUTS-5) are much less investigated in the literature than the national-level problems. The reason for that is the limited data availability (Miller and Blair, 2008, ch. 3 and 9), as well as the fact that spatial econometrics – often necessary to analyse such data – is a relatively young field of econometrics. The local level is, however, usually crucial from the perspective of the social policy, i.e. even the regulations generating a relatively low impact for a country as a whole can lead to serious social disruptions, as long as the economic impacts (e.g. worker’s lay-offs) are concentrated on a small territory.

The impact of the regulations that lead to an increase or decrease of economic activity of a given type only in some areas (e.g. creation of zones where investors are privileged in terms of special tax conditions, regulations affecting the coal mining or big cities) is usually evaluated by means of interregional input-output tables. Since the European statistical offices, including

the Central Statistical Office in Poland, usually publish only country-level input-output tables (by sectors), the expansion of such tables into interregional tables is only feasible through estimation. In the proposed cycle of publications, a novel approach to tackling the problem of input-output table regionalization has been formulated ([4], [5]), based on spatial econometric modelling. Its main advantage is taking into account the physical distance as a determinant of economic linkages (as opposed to the Location Quotients method), a highly empirical character of the method, as well as the applicability to the high-resolution questions (in terms of spatial disaggregation; NUTS-3 level).

In the article [4] “Regional Economic Impact Assessment with Missing Input-Output Data: A Spatial Econometrics Approach for Poland” I presented the econometric formulation of the input-output table extension problem as a modified, multi-equation, spatial Durbin problem. The innovative structure of the model is based on the fact that the structural parameters of the equations are treated as known and calibrated on the basis of input-output ratios on the country level, while the spatial weight matrix W is based on a parsimoniously parameterized function of the distance. I selected the functional form, based on the gamma probability distribution function, so as to ensure the compliance with [Tobler’s \(1970\)](#) paradigm that the objects located in the proximity are linked to each other more than those in distant locations, and at the same time so as to ensure a flexible fit to the sectors with different specificity: strong or weak focus on nearby suppliers, or the reliance on suppliers within a given range. In the article, I present an illustrative simulation of a regulation that reduces the activity of a construction enterprise in the Lublin subregion and its impact of the other subregions (NUTS-3 level units) in Poland.

The article [5] “Generation of regional input-output tables: a spatial econometric approach with illustrative simulations for France, Germany and Poland” is an immediate extension of the article [4] including further countries (Germany, France) and new validation tools of the proposed model: verification of the functional form, stochastic properties of the error term, as well as a revised strategy of taking into account the supply constraints of individual regions. The main conclusions of the article involve: confirming the superiority of the function based on the gamma probability distribution function over the alternative functional forms (in terms of the models’ information criteria), as well as a relatively high similarity between Poland and Germany in terms of the role of distance in shaping the estimated map of supplies in individual sectors. According to the obtained results, the public administration, health and education services – but also agriculture and, to some extent, construction – supply mainly in the nearby areas; whereby the financial services, professional services and real estate activities – supply to

various locations, regardless of the distance; in the case of manufacturing, a range of tolerance within 100-200 km has been identified.

A major advantage of interregional input-output models is their applicability for the regulatory impact assessment problems in which the expected endpoint of the research is the estimation of the incremental revenue of the local government sector on different levels of the local administration. Under such circumstances, the spatial links between the enterprises in the supply chain can lead to the spatial clustering of positive or negative fiscal effects on the revenue side, which further translated into the spatial clustering effects of the expenditure side due to the budget constraint and expenditure rules of the local government subsector. This is, however, not the only reason for such clustering. In the article [6] “Strategiczne interakcje przestrzenne między decyzjami wydatkowymi gmin w Polsce w latach 2008-2014” (“Strategic interactions between the expenditure decisions of communities in Poland in 2008-2014”) another hypothesis about the source of high- or low-expenditure community spatial clusters has been verified. A theory of yardstick competition regarding the expenditures of communities up to 50 km away has been confirmed, after controlling for a wide range of variables describing the economic and financial situation of a community. This means that the regulations bringing a substantial economic impact on a limited territory can spill over into the financial situation of further communities in the proximity of those directly affected. In the article, the panel spatial method with the correction of endogeneity by [Yu et al. \(2008\)](#) has been applied.

2.3. Regulatory impact assessment: sectorial level – the healthcare sector

RIA questions with a strong sectorial focus are also associated with specific challenges on the level of research methods. Technically, the impact of sectorial policies on the national economy, including the public finance sector, can be adequately simulated using the aforementioned input-output models, as well as multi-sector general equilibrium models (or CGE models, being the hybrid of the two approaches). It might often be the case, however, that such an analysis ignores some channels of impact of a given sector on the economy. It is then necessary to build dedicated econometric models or extend the theoretical models to incorporate the new mechanisms. Such an approach has been presented in further three articles on the healthcare sector regulations, as the healthcare sector is of particular social importance, and also remains highly specific in terms of RIA methods because of the interdisciplinary character (cf. [Byszek, 2016](#)).

WHO (2009) defines the economic role of that sector predominantly as a producer of the stock of health in the population. If the healthcare regulations raise the efficiency of this function, then they affect in a twofold way the public finance sector: firstly, reducing the direct costs of diseases, i.e. the expenditure of i.a. the general government sector on the treatment and care; secondly, they reduce the indirect costs of diseases, i.e. increase the number of people active in the labour market and their labour efficiency, thus expanding the tax base.

In the article [7] “Does it pay to pay for health? How health expenditure translates into GDP growth in OECD countries” a sequence of panel models has been estimated, illustrating the flow of dependencies initiated by the increase in the private healthcare spending, possibly due to e.g. a regulation promoting the private health insurances. It leads through different variables that affect the stock of health in the economy, up to the increase in the economic activity level. This approach has mitigated the endogeneity problem, usually arising in the questions related to the impact of a single sector on the entire economy, and this method has additionally allowed for decomposing the simulated economic effects accordingly to the individual components of the indirect costs, such as permanent or transitory labour inability, presenteeism and mortality.

The analysis of indirect costs has been developed in the next article [8]: “Indirect costs of diabetes and its impact on the public finance: the case of Poland”. It presents the substantial size of economic and financial impact that is attainable through various public health policies related to diabetes (especially type II). The indirect cost of diabetes in the Polish economy, measured with the human capital method on the basis of a unique dataset obtained from the National Health Fund (NFZ) and the Social Insurance Institution (ZUS), amounts to approximately 2 bn PLN per year. The method of the work is based on the EY (2013) report on the methods of indirect cost measurement in the Polish healthcare system that I co-authored. The report has been developed jointly with the representatives of the public administration (including the Ministry of Health, the Chancellery of the Prime Minister and the Ministry of Finance), and I presented the method i.a. in the workshop on model regulatory impact assessments organized in the Chancellery of the Prime Minister in 2013.

The cycle is closed by the article [9] “Why Don't Blanchard-Kahn ever "Catch" Flu? And how it Matters for Measuring Indirect Cost of Epidemics in DSGE Framework”, in which – in line with the WHO (2009) recommendation – I construct a dynamic stochastic general equilibrium model, supplemented with a block of equations related to the stock of health. The Bayesian estimates of this model's parameters are based on another article co-authored by me

(Torój and Konopczak, 2012; number [14] in Attachment 3b). This model has been applied to estimate the indirect cost of the seasonal influenza in the Polish economy, which is meaningful both for the labour market regulatory framework (because this framework defines the mechanism of loss redistribution between households, enterprises and the government sector) and for the rationale and costs of public health policies (targeted at increasing the vaccination rate). Two major conclusions emerge from the article: firstly, when the mechanism of epidemics described with the standard SIR model (*Susceptible-Infectious-Recovered*) from the field of mathematical epidemiology is fully endogenized, then it is impossible to exploit the local perturbation methods widely applied in the contemporaneous macroeconomics (e.g. solution of the log-linearized model around the steady state with the Blanchard-Kahn algorithm). Secondly, the mechanics of the New Keynesian models extended by the health stock does not necessarily replicate the logic of the human capital method, but is closer to the alternative friction cost method, also applied to the measurement of the indirect costs.

2.4. Main results and conclusions

Bottom line, the major results and conclusions from the proposed cycle of publications can be formulated in the following way:

- The selection of the appropriate quantitative method is the key element of the economic regulatory impact assessment. One should take into account both the hypothesized channels of the impact on the economy and the level on which of the impact can materialize most strongly (international, national, sectorial or local).
- Spatial models provide a valuable (i.e. unbiased and consistent) tool for the local impact assessment of a given impulse, as well as a tool for decomposing the impact of a regulatory country-level impulse between regions. This is especially the case for the construction of interregional input-output tables which I demonstrated using Monte Carlo simulations.
- In the case of the sectorial regulatory impact assessment, special attention in econometric modelling should be devoted to the endogeneity, related to the link between the sector in question and the rest of the economy. This requires an in-depth theoretical analysis, the use of instrumental variables, an adequate disaggregation, the use of time series models with endogenous variables only and an adequate impulse structuralization, and possibly other techniques.

- Comprehensive RIA studies for innovative regulations usually require the synthesis of many approaches into a single statistical model or building analogies to previous regulatory problems. The examples of such an approach in the proposed articles are: the synthesis of CDA and MIMIC approaches into a hybrid shadow economy model, the adaptation of the Woodford's approach to address the zero lower bound problem in the field of MIP regulations, the synthesis of the input-output model and the spatial econometric methods, and the synthesis of the New Keynesian DSGE model with the methods of measuring the indirect costs of diseases.

In the context of the aforementioned objectives **C1-C6**, I consider the following achievements from the proposed cycle of publications to be of particular value:

- The elaboration of a method for estimating the interregional input-output tables with spatial modelling tools. The application of this method makes it possible to take into account the spatial distance criterion to a satisfactory extent when performing RIA analyses on the local level ([4], [5]; achieved objective **C4**). On top of that, the advantages of the proposed method include: parametrization based on empirics (as opposed to the case of the Location Quotients technique where theoretical calibrations are usually applied), the possibility of relatively simple replication for different states, as well as the adequacy for high spatial resolution problems.
- The derivation of the hybrid CDA-MIMIC model for the measurement and simulation analyses of the shadow economy level in various states and under different regulatory scenarios related to the tax system, payment systems or the institutional frameworks (achieved objective **C2**). At the same time, it has been demonstrated that the usefulness of the MIMIC-related component – dominant in the previous literature – is negligible, which suggests that the research effort should be put on the development of the CDA-class models of the shadow economy (see [2]).
- The presentation of consequences that might follow a misuse of a model designed for short-run analyses (SVAR) for the inference on long-run regulatory impacts [3] and at the same time – in the case of banking sector regulations – the proposition of SVEC-type modelling as an alternative (achieved objective **C3**). This has stabilized the estimated impact of capital buffer shocks on the GDP in the long run.
- Extension of the typical, New Keynesian DSGE model incorporating the theoretical microfoundations related to the stock of health [9] and the subsequent use of this model for the impact assessment of the epidemics of influenza on the Polish economy – which

mostly allowed to achieve the objective **C1-b**. The articles [8] and [9] have additionally demonstrated that the stock of health fluctuations in the population can have a considerable economic impact, which confirms that the sectorial regulations in the field of healthcare exert a strong and multi-channel impact on the economy.

- At the same time, I regard the objectives **C5** and **C6**, related – respectively – to the extension of the inference on regional RIA and limitation of the endogeneity problem due to macroeconomic and macro-sectorial linkages as partly achieved. In the former case, the objective is partly addressed by the article [6], in which it has been demonstrated that the change in the financial situation of a given community triggered by a regulation that has the most impact on its own territory can spill over into the financial situation of the surrounding communities not only through the economic linkages (e.g. connections between the nearby labour markets), but e.g. additional linkages related to the local political cycle. However, further analyses are necessary that would allow to extend this inference to more variables (than the expenditure of the communities only), e.g. to the employment and attractiveness for investment purposes. In the latter case (the endogeneity problem), it was proposed to extend the reduced-form model by the network of additional linkages identified in the theoretical analysis [7]. Another approach that has been applied, common in the strand of VAR model literature, was to avoid the *ex ante* classification into exogenous and endogenous variables and declare all the variables as potentially endogenous, and then to analyse the impulse-response functions [3]. It would be difficult, however, to treat these proposals as universal, which leaves space for future research.

3. Further scientific achievements

3.1. Further publications after obtaining the Ph.D. degree

In the period immediately after obtaining the Ph.D. degree, I continued the research on the **participation of Poland in the European monetary integration process**, publishing the following articles:

- Torój, A., Konopczak, K., “**Crisis Resistance Versus Monetary Regime: A Polish-Slovak Counterfactual Exercise**”, *Central European Journal of Economic Modelling and Econometrics*, 2012, 4, pp. 1-22.

In this article, a counter-factual simulation has been conducted related to the development of economic activity measures and inflation rate in Poland and Slovakia during the crisis period 2008-2009 in different monetary regimes. This selection of states under investigation was justified by the fact that the global economic and financial crisis stroke immediately after setting the conversion rate of the Slovak *koruna* against the euro, and then the euro adoption by Slovakia. In Poland, at the same time, the home currency strongly depreciated. The simulation results indicate that, in both analysed economies, the currency depreciation would be (or would have been) stabilizing the aggregate demand, whereby the efficiency and sustainability of this mechanism depends on a number of structural characteristics of both economies, such as: degree of openness, sectorial composition and nominal rigidities. The article conclusions are based on a DSGE model with parameters estimated using the Bayesian methods.

- [Torój, A., Osińska, J., “Greek ricochet? What drove Poles' attitudes to the euro in 2009-2010”, *Bank i Kredyt*, 43\(4\), 2012, pp. 29-84.](#)

In this text, ordered and multinomial logit models were applied to explain the social support for the integration with the euro area in Poland in the years 2009-2010 on the micro level. The unique dataset of surveys commissioned by the Ministry of Finance in Poland has been analysed. A number of determinants of the support for the euro adoption have been identified, including the respondent's demographic characteristics, political views, economic knowledge and income. An interesting finding is that the political views are only one of many determinants of the support for the euro adoption in Poland – and not necessarily the dominant one – despite the strong polarization of the views represented by the leading political parties in Poland in this respect (at least at the time when the survey was conducted).

- Roszkowski, P., Sławińska, K., [Torój, A., “BEER tastes better in a panel of neighbours. On equilibrium exchange rates in CEE countries”, *Roczniki Kolegium Analiz Ekonomicznych SGH*, Number 34/2014, Oficyna Wydawnicza SGH, 2014.](#)

This article belongs to the strand of literature on modelling the equilibrium złoty/euro exchange rate prior to setting the central parity in the ERM II system, and then the irrevocable euro/*złoty* conversion rate. The previous approach dominating in the Polish literature on the behavioural effective exchange rate (BEER), i.e. time series analysis, has been extended to a cointegrated panel. The FM-OLS (fully-modified least squares)

estimator has been applied. It has been demonstrated that the estimation of BEER model on the basis of a panel of Central and Eastern European countries representing floating exchange rate regimes leads to more stable and economically intuitive estimates as compared to the estimates obtained in the time series framework, using the data for a single country.

- Torój, A. (ed.), Bednarek, E., Beza-Bojanowska, J., Osińska, J., Waćko, K., Witkowski, D., **“EMU: the (post-)crisis perspective. Literature survey and implications for the euro-candidates”**, *MF Working Papers*, Ministry of Finance in Poland, 11, 2012, URL: https://www.finanse.mf.gov.pl/documents/764034/1209344/mf_wp_11.pdf.

In this overview article, an extensive body of literature on the first years of fiscal and institutional crisis in the euro area has been summarized. This crisis has materialized itself mainly around the solvency problems facing some Southern euro area countries, especially Greece. The reasons and phases of the crisis have been discussed, as well as the EU-level efforts to overcome it and further actions suggested by the literature. Special emphasis has been put on the countries that, according to the signed treaties, are obliged to adopt the euro in the future, though without a specific target date (including Poland).

I co-authored further work on the **optimum fiscal and monetary policy conduct**:

- Cizkowicz, P., Rzońca, A., Torój, A., **“In search for appropriate lower bound. Zero lower bound vs. positive lower bound under discretion and commitment”**, *Materiały i Studia NBP (National Bank of Poland Working Paper)*, Number 215, 2015. Article under review in the journal *German Economic Review* (MNiSW: list A, 25 p.; first decision: accept after revision, revised, awaiting the final decision).

This article presents the hypothesis that zero as the lower bound on nominal interest rates could be suboptimal because it creates incentives leading to inefficient allocations of the capital in the economy. Using stochastic and deterministic simulations in a DSGE model, it has been demonstrated that it is possible and justified to set a more restrictive, positive lower bound on nominal interest rates.

- Olesiński, B., Rozkrut, M., Torój, A., **“How Time-Varying Elasticities of Demand Translate into the Excise Related Laffer Surface”**, under review in *Argumenta Oeconomica* (MNiSW: list A, 15 p.).

In this article, the unobservable variable model and Kalman filtration have been applied in order to capture a pattern of time variation in the price elasticity of demand for tobacco products. It is noteworthy that the regulatory impact assessment regarding the tobacco excise tax policy has been conducted not only with respect to the level, but also to the structure of the tobacco excise tax. The estimated model was applied to analyse the tobacco excise policy i.a. through the construction of the Laffer's surface (two-dimensional curve), dependent on the two components of the tobacco excise tax: quota and *ad valorem*.

- Pękała, P., Torój, A., **“Wpływ czynników cenowych i niecenowych na konsumpcję tytoniu – analiza danych panelowych”**, *Roczniki Kolegium Analiz Ekonomicznych SGH*, Number 47/2017, Oficyna Wydawnicza SGH, 2017, pp. 157-175.

This article uses panel econometric models to decompose the decline in demand for tobacco products over the recent decades into price-related determinants and other, non-price consumer trends. Such a decomposition is difficult to perform on the basis of time series analysis for Poland due to strong collinearity between the prices of tobacco products (which depend mainly on the systematically growing excise tax rates in Poland) and various proxies for consumer trends. It is crucial, however, for the understanding of the health and financial impacts of different excise tax policy scenarios that could be adopted by the government.

Other articles belong to the fields of health economics, corporate management and electoral geography:

- Sławińska, K., Torój, A., **“Take (health)care of yourself: what international experience predicts about drivers and structure of Polish health expenditure”**, *Roczniki Kolegium Analiz Ekonomicznych SGH*, Number 30/2013, Oficyna Wydawnicza SGH, 2013, pp. 291-303.

The above article contains a panel econometric analysis of health-related expenditure in the European states. The simulation results – constructed on the basis of demographic and economic determinants of such expenditure, as well as the scenarios of probable future developments of these determinants – indicate that the mismatch between healthcare needs of the Polish population and the public expenditure on healthcare would be gradually increasing in the course of the next decades. Under such

circumstances, a considerable rise in private expenditure on healthcare should be expected.

- Olesiński, B., Rozkrut, M., Torój, A., “**Measuring the consequences of short-termism in business - the econometric evidence for a sample of European countries**”, *Roczniki Kolegium Analiz Ekonomicznych SGH*, Number 41/2016, Oficyna Wydawnicza SGH, 2016, pp. 63-78.

Based on the unique dataset of 1024 largest European listed companies, it has been demonstrated that the short-termism of stockholders with respect to the corporate management is, on average, detrimental to the financial performance of the companies. It should be stressed in particular that an important hypothesis has been empirically confirmed: the companies in which the leadership rotation is less frequent perform better in terms of return on equity (ROE) and market capitalization. In order to limit the endogeneity problem, i.a. the system GMM estimation method has been applied.

- Lasoń, A., Torój, A., “**Anti-establishment, anti-liberal or constituencies-driven? Spatial econometric investigation of Polish parliamentary elections in 2015**”, article under review in the journal *European Spatial Research and Policy* (MNiSW: list B, 14 p.).

In this article, the results of Polish parliamentary elections in 2015 have been investigated with spatial econometric tools on the level of poviats. The most notable achievement in this case is the empirical confirmation of the hypothesis that the unobservable quality of candidates proposed by the electoral committees in individual constituencies is a significant determinant of the voting results. It has been verified with mixed- W models with two spatial weight matrices, controlling for a wide set of socio-economic determinants of support for individual electoral committees (selected by means of the Bayesian Model Averaging procedure). This effect is responsible for a significant portion of spatial dependency in the voting results, whereby the controlling factor for this correlation is represented by the second W matrix that follows the typical neighbourhood criterion.

I also edited and co-authored the following book, discussed in more detail in the section on achievements in the field of teaching (see Section 4):

- Torój, A. (red.), “**Zastosowania ekonometrii. 10 niegroźnych przykładów**”, ISBN 978-83-8030-158-0, Oficyna Wydawnicza SGH, 2017.

Finally, I translated two chapters: Nonparametric methods and chi-squared tests (ch. 14) and Sampling methods (ch. 16) in the translation of the following handbook into Polish:

- Aczel A.D., Sounderpandian J., “Statystyka w zarządzaniu”, translation ed.: Bartosz Witkowski, 2017, PWN, Warszawa, ISBN 978-83-01-19510-6.

3.2. Publications prior to obtaining Ph.D. degree (up to 2012)

In my previous research on the monetary integration in Europe (i.e. prior to obtaining the Ph.D. degree), I investigated the following issues:

- Conduct of the common monetary policy by the European Central Bank under structural heterogeneity and asymmetric shocks in individual euro area countries. I paid particular attention to the institutional reform of the euro area, i.e. the rotation in the European Central Bank’s Governing Council. In the publications below, I delivered a proof of an analytical method introducing the impact of these reform into general equilibrium models (of type DSGE). I also presented the impact of introducing the rotation system into ECB’s Governing Council on the macroeconomic volatility in the euro area states:
 - Torój, A., “**Model z racjonalnymi oczekiwaniami a wspólna polityka pieniężna w strefie euro**”, *Bank i Kredyt*, 40(5), pp. 21-48.
 - Torój, A., “**Solving forward-looking models of cross-country adjustment within the euro area**”, *Central European Journal of Economic Modelling and Econometrics*, 3(1), pp. 211-241.

A particularly valuable achievement in this case was proposing the analytical method of solving log-linearized DSGE models that is also applicable in other contexts, e.g. when deterministic seasonality patterns are to be introduced into such models.

- Stabilising and destabilising mechanisms in the aftermath of asymmetric shocks in a monetary union, with a special focus on the anticyclical competitiveness channel and the procyclical mechanism of real interest rate variability:
 - Torój, A., “**Macroeconomic adjustment and heterogeneity in the euro area**”, *Materiały i Studia NBP (National Bank of Poland Working Paper)*, Number 54, 2009.
 - Torój, A., “**Competitiveness channel in Poland and Slovakia: a pre-EMU DSGE evaluation**”, *Materiały i Studia NBP (National Bank of Poland Working Paper)*, Number 86, 2011.

- Torój, A., **“Adjustment capacity in a monetary union: a DSGE evaluation of Poland and Slovakia”**, in: A. Welfe (ed.), *Modelling Economies in Transition* 2009, 2010.
- Role of expectations as a standalone, significant determinant of the adjustment speed after asymmetric shocks in a monetary union (in this case, a particular achievement appears to be the conclusion that the rationality of expectations is at least as important as the optimum currency area criteria traditionally enumerated in the literature):
 - Torój, A., **“Rationality of expectations: another OCA criterion? A DSGE analysis”**, *Central European Journal of Economic Modelling and Econometrics*, 2(1), 2010, pp. 117-150.
- Real convergence proces in the situation when the convergence club forms, or could form, a monetary union:
 - Konopczak, K., Torój, A., **“Estimating the Baumol-Bowen and Balassa-Samuelson effects in the Polish economy - a disaggregated approach”**, *Central European Journal of Economic Modelling and Econometrics*, 3(1), 2010, pp. 205-252.
- Evaluation of the relative impact of the exchange and interest rate on the level of economic activity in Poland:
 - Torój, A., **“Estimation of weights for the Monetary Conditions Index in Poland”**, *Department of Applied Econometrics Working Papers Series* No. 6-08, 2008.

The conclusions from the bulk of the abovementioned publications were included into the official documents of the Polish economic policy institutions on the strategy of Poland’s participation in the European monetary integration. This was particularly the case for the **“Report on full membership of the Republic of Poland in the third stage of the Economic and Monetary Union”** by the National Bank of Poland (2009) and **”Strategic Framework for the National Euro Changeover Plan”** by the Ministry of Finance (2010).

3.3. Statistics of research

1. My publications after Ph.D. include the following (prepared individually or in co-authorship):
 - 14 articles in journals (national and international), including 12 in English and 3 in journals ranked by JCR (MNiSW – list A),
 - 1 working paper in a refereed, prestigious series of the National Bank of Poland,
 - scientific edition and authorship of 1 chapter in an academic handbook,

- participation in scientific edition of 2 monographic editions of *Annals of KAE SGH* (Roczniki KAE SGH).

Furthermore, under review are the following:

- 4 articles, all in English, including 3 in journals ranked by JCR.
2. My publications before Ph.D. include the following (prepared individually or in co-authorship):
 - 5 articles in journals (all national), including 4 in English,
 - 1 chapter in monograph in English,
 - 2 *working papers* in a refereed, prestigious series of the National Bank of Poland.
 3. The parametric description of my publications can be summarized by²:
 - Hirsch index: 6 (according to Google Scholar), 2 (according to BazEkon), 1 (according to Scopus and Web of Science Core Collection).
 - Total impact factor for publications: 4.46.
 - Total number of MNiSW publication points: 209 (after the co-authorship correction³: 184.5), including:
 - after Ph.D.: 182 (after the co-authorship correction: 162), including:
 - for journal publications: 172 (after correction: 152),
 - for chapters in monographs and editions: 10.
 - before Ph.D.: 27 (after correction: 22.5), including:
 - for journal publications: 23 (after correction: 18.5),
 - for chapters in monographs: 4.
 4. Position in the ranking *Ideas RePEc Poland Top 25%* (as of November 2018):
 - for the last 10 years: *Rank* 62, *W.Rank* 43,
 - for all years: *Rank* 92, *W.Rank* 72.
 5. Total number of conference presentations (at least the national stage) and research seminars: 38, including⁴:
 - after Ph.D.: 25, including:
 - in English: 8,
 - at foreign conferences: 2,
 - at international conferences in Poland: 6,
 - at research seminars: 6,
 - Before Ph.D.: 14, including:
 - in English: 6,

² See **Attachment 3a** prepared by the SGH Library.

³ In the case of articles prepared in co-authorship, the full number of points is granted for the articles co-authored with authors holding a different affiliation from KAE SGH and partial proportional points are granted in the case of co-authors holding affiliation at KAE SGH.

⁴ The detailed list included in the Attachment 4, point II I).

- at foreign conferences: 3,
 - at international conferences in Poland: 3,
 - at research seminars: 5.
6. The number of prepared journal reviews: 34, including:
- 14 for journals ranked by JCR (MNiSW – list A):
 - *Economic Modelling* (8),
 - *Economic Systems* (1),
 - *Emerging Markets Finance and Trade* (1),
 - *Kyklos* (1),
 - *International Journal of Tax and Public Finance* (1),
 - *Argumenta Oeconomica* (2),
 - 20 for the journals included in the list B by MNiSW:
 - *Bank i Kredyt* (3),
 - *Central European Journal of Economic Modelling and Econometrics* (4),
 - *Acta Universitatis Lodzianensis Folia Oeconomica* (2),
 - *Roczniki Kolegium Analiz Ekonomicznych SGH* (10),
 - *Ekonomia* (currently: *Central European Economic Journal*; 1).

4. Achievements in the field of teaching

Teaching is a substantial part of my professional activity.

From the year 2012 till now, I have supervised 24 Bachelor theses and 16 Master theses⁵. This scientific supervision was frequently followed by the creation of research teams dedicated to specific problems: a few of the Master students under my supervision (M. Karska, A. Mela, P. Roszkowski) and one Bachelor student (A. Lasoń) have subsequently become co-authors of the research discussed in part 2 and 3 of this document. The Master thesis prepared under my supervision, authored by Mr Marcin Kujawski and entitled „Pułapka średniego dochodu – czy kraje Europy Środkowej są nią zagrożone?” (“Middle income trap – is it a threat for Central European countries?”) was honoured with a distinction in the IXth edition of the Competition for the Prize of the President of the National Bank of Poland for the best Master thesis.

My scientific supervision over the Students’ Scientific Association of Econometrics, effective from the beginning of 2013, resulted in writing a handbook entitled “Zastosowania ekonometrii. 10 niegroźnych przykładów” (“Applications of Econometrics. 10 Harmless Examples”) edited and co-authored by me. It is a unique attempt to combine an academic

⁵ Detailed list included in **Attachment 4**, point III J).

handbook in Econometrics and a popular text. It is composed of 10 chapters, authored – beyond myself – by the students, members of the Students’ Scientific Association of Econometrics. Every chapter describes a separate research problem that can be solved through the use of econometric tools, and demonstrates this solution using the dataset and codes that are also made available to the readers (e.g. the solution to the hedging problem of an investor by means of the quantile regression, estimation of the output gap using the Kalman filter, or the incorporation of the parameter sign restrictions into the modelling by means of the Bayesian methods). The book was published in 2017 by the SGH Press (Oficyna Wydawnicza SGH) and is widely used in teaching, which led to re-prints. It was also honoured with a teaching award by the Rector of SGH in 2018.

Since the academic year 2013/2014, the Master and Ph.D. students from the Students’ Scientific Association of Econometrics represent SGH Warsaw School of Economics every year in the prestigious competition *Econometric Game*. Throughout that period, the SGH representation has been qualified to the grand finale of the competition for 3 times (2014, 2016, 2017), ranking 4-10 in the years 2014 and 2017. In 2016, the representation of SGH earned a particular achievement, ranking as 2, only behind the Harvard University and winning with a number of prestigious universities from all over the world. This achievement was honoured with the teaching award of the Rector of SGH in 2017. The *Econometric Game* has been organized every year since 1999 and enjoys huge popularity among the most prestigious universities in the world. It consists in solving two case studies under a strict time limit (one in the first stage, the other in the grand finale), composed by the top econometricians from the Dutch universities. The organizers describe this contest as the unofficial “world championship in Econometrics” (according to www.econometricgame.nl).

In Bachelor and Master studies, I teach on a regular basis, individually and in teaching teams, the following courses:

- Spatial Econometrics (Master studies),
- Bayesian Econometrics (Master studies),
- Applied Econometrics (Bachelor and Master studies),
- Time Series Econometrics (Master studies),
- Advanced Macroeconomics (Master studies),
- Econometric Methods (Bachelor studies).

My most important contribution to the teaching offer of SGH Warsaw School of Economics is, in my opinion, the creation of two courses: Econometric Methods (in 2012, in the *Global SGH* programme, I hold this lecture till now in English) and Spatial Econometrics (from the year 2017/2018, on the Master level). The latter course, in the Polish and English language version, is highly appreciated by the students of the majors Quantitative Methods in Economics and Information Systems, as well as Data Analysis – Big Data, and there is a growing interest in the enrolment.

On top of that, I co-authored the concept and the syllabus of the new lecture Practical Econometrics, targeted at the Bachelor students and largely based on the handbook “Zastosowania ekonometrii. 10 niegroźnych przykładów” (“Applications of Econometrics. 10 Harmless Examples”; edited by myself).

I also teach at the doctoral level. My offer for Ph.D. students includes the following lectures: Introduction to Econometrics II (lecture for the students of the Economic Analysis of the Financial Markets studies, covering the topics of advanced time series analysis) and the Quantitative Approach in Scientific Research (lecture for the Ph.D. students at the Collegium of Management and Finance in SGH).

At SGH Warsaw School of Economics, I coordinate the following courses: Spatial Econometrics (Master studies) and Introduction to Econometrics II (Ph.D. studies). In 2017, in the course of re-organization of teaching in the major Quantitative Methods in Economics and Information Systems, I was appointed (jointly with Prof. dr hab. Marek Gruszczyński) as the coordinator of the new teaching path “Econometrics for business” targeted at the Master students.

I participate in the supervision over Ph.D. students: in the formal role of the supporting supervisor for M.Sc. Paweł Pisany (Collegium of the World Economy SGH, chief supervisor: dr hab. Cezary Wójcik, Prof. SGH) and informally supervise the following students (with the intention to take over the role of the supporting supervisor once the formal procedure is opened) in three other cases: M.Sc. Bartosz Olesiński (chief supervisor: dr hab. Emilia Tomczyk, Prof. SGH; the start of the formal doctoral procedure scheduled for January 2019), M.Sc. Ewelina Zając (Collegium of Economic Analyses SGH, chief supervisor: Prof. dr hab. Marek Gruszczyński) and M.Sc. Jaba Phutkaradze (Collegium of the World Economy SGH, chief supervisor: dr hab. Cezary Wójcik, Prof. SGH)⁶.

⁶ Details in the [Attachment 4](#), point III K).

I taught econometric modelling courses following the invitations of the Ministry of Finance, Central Statistical Office and – twice – the National Bank of Poland. I get actively engaged in the initiatives aimed at quality improvements in the fields of teaching and research at SGH Warsaw School of Economics. In the years 2013-2015, I was involved in a series of workshops in quantitative methods for the SGH researchers from other units than Collegium of Economic Analyses, in the role of the instructor.

5. Organizational achievements, cooperation with business, popularization of science

Throughout the term 2016-2020, I am participating in the work of the Council of the Collegium of Economic Analyses at SGH, elected as a representative of the post-doc academic staff.

In 2016, I participated in the electoral procedure at SGH Warsaw School of Economics as a member of the vote-counting committee when appointing the electors representing the Collegium of Economic Analyses in the university-wide electoral assembly.

In 2018 I was elected into this assembly myself.

Since 2016, I have been participating in the Organizing Committee of the cyclical, National Scientific Conference „Modelling Panel Data: Theory and Practice”. Since the first edition in 2012, this conference has established itself as an important event in the environment of Polish econometricians and raised an entire generation of panel data scientists, including myself as a regular participant and reviewer of many works submitted to the conference. Since 2017, I also participate in editing the monographic editions of the Annals of KAE SGH, publishing the articles submitted to the conference.

In December 2018, I applied for the grant in the NCN Sonata 14 competition with the intention to take over the role of manager of the research project „Using geolocation data in the construction of interregional input-output tables with spatial econometric methods”. Furthermore, I managed six research grants financed from Badania Młodych Naukowców (Research of Young Scientists) grants, and participated in the Statutory Research at SGH.

In the year 2018, I took part in the trial implementation of the anti-plagiarism procedure of students' final reports submitted for course evaluation, introducing the procedure in the courses Spatial Econometrics and Bayesian Econometrics that I teach.

The concept of the path „Econometrics for Business”, as well as some self-authored lectures discussed in Section 4, are a result of my long-standing cooperation with the business sector. In the course of my professional career, I put a lot of emphasis on the practical applicability of the research results, and the adequate allocation of research efforts. Such an approach resulted in my long-standing (since 2012) cooperation with the Economic Analysis Team at EY (previously Ernst & Young). Since 2013, I act as manager, supervising dozens of analytical and research projects on Regulatory Impact Assessment, the impact of an enterprise or a branch on the economy, as well as the measurement and reduction of the shadow economy – *inter alia*:⁷:

- impact assessment of the following branches on the Polish economy: construction, coal mining and steel mills (in the last case, on the NUTS-3 subregion level) and analogous assessments for a number of enterprises and investment projects;
- impact assessment for the construction of the container terminal in Świnoujście for the local and national economy;
- evaluation of the indirect cost of influenza, chronic obstructive pulmonary disease, cardiovascular diseases and neoplasms, as well as the elaboration of the method of indirect cost calculation for the Polish healthcare system;
- estimation of the shadow economy level in the Polish economy and in the following markets: tobacco products, alcohol beverages, fuel market and steel industry; estimation of the shadow economy level in dozens of countries from all over the world;
- Regulatory Impact Assessment (both *ex ante* and *ex post*) for the regulations targeting the shadow economy reduction through the development of the electronic payment market and the VAT reverse charge in the reinforcing bars market.

I presented the results of the abovementioned analyses as an EY and SGH Warsaw School of Economics expert in the national media (television Polsat Biznes, Polish Radio Program 1 and 3) and in the thematical conferences (i.a. in the conference on electronic payments in November 2015, in the discussion panel by PKPP “Lewiatan” with the government representatives in July 2014, twice in the Voivodship Social Dialogue Council in Katowice in 2016 and 2017, and in the workshop on the indirect costs in healthcare involving 7 government sector institutions, including the Chancellery of the Prime Minister, Ministry of Finance and Ministry of Health in August 2013).

⁷ References to selected expert reports can be found in [Attachment 4](#), point III M).

6. Awards and distinctions

- In 2018 I was honoured with a prestigious Award of the President of the National Bank of Poland for the best article published in the journal *Bank i Kredyt* in 2017 – the article [3] from the scientific accomplishment presented for assessment (see Section 2).
- For the articles [1] and [3] I received the scientific award of the Rector of SGH Warsaw School of Economics in 2018.
- As the editor of book [22] (according to the list in **Attachment 3b**), I was honoured with a teaching reward of the Rector of SGH Warsaw School of Economics in 2018.
- In 2017 I was honoured with the prestigious, international *Olga Radzyner Award*, granted by the Bank of Austria to the young economists from the Central and Eastern Europe for the best articles on the European monetary integration for the article [1] from the scientific accomplishment list presented for assessment (see Section 2).
- The Master thesis prepared by Marcin Kujawski under my scientific supervision, entitled „Pułapka średniego dochodu – czy kraje Europy Środkowej są nią zagrożone?” („Middle income trap – is it a threat for Central European countries?”) was honoured with a distinction in the IXth edition of the Competition for the Prize of the President of the National Bank of Poland for the best Master thesis.
- For my scientific supervision of the Students’ Scientific Association of Econometrics, that ranked as 2 in the prestigious international competition *Econometric Game* in the academic year 2015/2016 (see Section 4), I was honoured with a teaching reward of the Rector of SGH Warsaw School of Economics in 2017.
- In 2010, I was awarded the Cup of 10th Doctoral Workshop in Econometrics and Statistics by Prof. Władysław Welfe for the article [18] (according to the list in the **Attachment 3b**).

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