Annex 2

Summary of scientific accomplishments

1. Introduction

In this paper I present my academic achievements after obtaining the Ph.D. degree in economics in 2008. In the next section, I outline my academic and professional career. Then, in section three, I describe a topically related series of publications, which is the basis for applying for a habilitation degree in economics. Next, in section four, I characterize my other scientific publications. Later, in section five, I summarize my academic achievements using standard biometric indicators and briefly discuss my other activities.

2. Scientific and professional career

The beginnings of my scientific career go back to the last year of my master studies at the Warsaw School of Economics, where I was an intern at the Institute of Econometrics during 2004. Then for 2004-2005 I got the *Marie Curie Fellowship* and worked at the *Center for Operations Research and Econometrics, Louvain-la-Neuve, Belgium*. Soon after coming back to Poland, in 2005-2006 I worked as an Assistant in the Department of Theoretical and Applied Economics at SGH. Next I got *Fulbright Scholarship* thanks to which I visited *Department of Economics, Arizona State University, USA* during 2006-2007. After coming back, in 2008 I obtained a PhD degree in economics, defending a thesis entitled *Modelling strategic interactions in public good games*, supervised by prof. dr hab. Marek Garbicz. In 2008 I was appointed an Assistant Professor in the Department of Theoretical and Applied Economics. Since 2014 I work as an Assistant Professor in the Department of Quantitatie Economics, SGH.

My research interest after obtaining Ph.D. focused on game theory and its applications to economics. In particular I have worked on game-theoretical aspects of time-consistency or costly self-control. From the technical perspective my papers were dominated by analysis of dynamic or stochastic games, super- or submodular games, principal-agent models or general equilibrium. In the recent years I got interested in the theory of large games (i.e. games with uncountable number of players).

I systematically visit foreign universities including: Department of Economics, Arizona State University (2009, 2014), Department of Economics, University of Oxford (2012), or Paris School of Economics Sorbonne (2015), where I worked on research projects, gave invited lectures, or presented my work at the seminars. My teaching activity at SGH involves mainly giving lectures at bachelor, master or PhD levels in advanced microeconomics, game theory, general equilibrium, or industrial organization. These courses are mainly taught in English.

3. Series of topically related publications

As an scientific achievement within the meaning of article 16, paragraph 2 of the Bill of 14th March 2003 on scientific degrees and titles and on degrees and titles in arts, I submit the following series of topically related publications titled: *Game theoretical analysis of time-consistency problems and limited commitments*. The series consists of the following nine papers[1]:

- **Woźny Ł.**, Growiec, J. (2012). *Intergenerational interactions in human capital accumulation*, The B.E. Journal of Theoretical Economics, vol. 12(1), p. 1-47, IF2012: 0.419, 5YIF2012: 0.442, MNiSW: 15p.
- Balbus, Ł., Reffett, K., **Woźny Ł.**, (2012). *Stationary Markovian equilibria in altruistic stochastic OLG models with limited commitment*, Journal of Mathematical Economics, vol. 48, p. 115-132. IF2012: 0.321, 5YIF2012: 0.454, MNiSW: 15p, citations: 16.
- Balbus, Ł., Reffett, K., **Woźny Ł.**, (2013a). *A constructive geometrical approach to the uniqueness of Markov stationary equilibrium in stochastic games of intergenerational altruism,* Journal of Economic Dynamics and Control, vol. 37 (5), p. 1019-1039, IF2013: 1.057, 5YIF2013: 1.347, MNiSW: 25p, citations: 9.
- Balbus, Ł., Reffett, K., **Woźny Ł.,** (2013b). *Markov stationary equilibria in stochastic supermodular games with imperfect private and public information*, Dynamic Games and Applications, vol. 3 (2), p. 187-206, IF2013: 1.041, 5YIF2013: 1.102, MNiSW 2013: 25p, citations: 2.
- Balbus, Ł., Reffett, K., **Woźny Ł.**, (2014). *Constructive study of Markov equilibria in stochastic games with complementarities*, Journal of Economic Theory, vol. 150, p. 815-840, IF2014: 1.033, 5YIF2014: 1.635, MNiSW: 30p, citations: 14.
- Balbus, Ł., Reffett, K., **Woźny Ł.**, (2015a). *Time consistent Markov policies in dynamic economies with quasi-hyperbolic consumers*, International Journal of Game Theory, vol. 44 (1), p. 83-112, IF2014: 0.579, 5YIF2014: 0.626, MNiSW: 15p, citations: 10.
- Balbus, Ł., **Woźny Ł.**, (2015). *Strategic dynamic programming methods for studying short memory equilibria in a class of stochastic games with uncountable number of states*, Dynamic Games and Applications, in print, DOI: 10.1007/s13235-015-0171-1, IF2014: 0.706, 5YIF2014: 1.013, MNiSW 2015: 25p.
- **Woźny, Ł.**, (2015), *On incentives, temptation and self-control*, Mathematical Social Sciences, vol. 74, p. 60-67, IF2014: 0.462, 5YIF2014: 0.495, MNiSW: 15p, citations: 1
- **Woźny, Ł.**, (2016). *On the price of commitment assets in a general equilibrium model with credit constraints and tempted consumers*, The B.E. Journal of Theoretical Economics , in print, DOI: 10.1515/bejte-2015-0019, IF2014: 0.300, 5YIF2014: 0.300, MNiSW: 15p.

The aforementioned papers focus on the following research topics:

- Time-consistency and limited commitment problems,

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

- Limited commitment problems with interdependent decisions,
- Costly self-control and valuation of commitment devices.

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

3.1 Time-consistency and limited commitment problems

My first approach to analyze *limited commitment* and time-consistency problems concentrated on a paternalistic bequest games in a stochastic context. In the three co-authored papers (Woźny, Growiec 2012, Balbus, Reffett, Woźny 2012 and Balbus, Reffett, Woźny 2013a) we analyzed this problem and its few extensions, characterizing the Markov Stationary Nash Equilibrium (MSNE, henceforth) in a stochastic game with a sequence of players (generations), where each lives one or two periods and derives utility from its own consumption and that of the next generation (see Phelps, Pollak (1968), Peleg, Yaari (1973) or Balbus, Jaśkiewicz, Nowak (2015) for some new existence results). Time consistency or limited commitment problem in this class of models results from the fact that each generation wants to commit the next generation to consume as high as possible level of bequest, but does not possess such commitment devices. This effect is explained in the literature thanks to time-(in)consistency of the planners problem with varying preferences, altruism or so called distributive justice.

In particular in the first work (Balbus, Reffett, Woźny 2013a) we give conditions for existence of MSNE in a class of Lipschitz continuous functions over uncountable number of states. Thanks to my observation concerning a class of stochastic transitions (between states of the world in consecutive time periods) (see e.g. Amir 1996, Nowak 2003) I managed to show that the best response operator is decreasing in a given pointwise partial order on the set of bounded, measurable functions. As a result the set of MSNE cannot have ordered elements, and consequently under some additional geometric conditions on preferences and transition functions I managed to show conditions guaranteeing uniqueness of MSNE (in a broad class of bounded, measurable functions) using Guo, Cho, Zhu theorem on fixed points of monotone mappings in abstract cones.

Not only, it is one of the first and few results on uniqueness of MSNE in this class of stochastic games with uncountable number of states and sequence of players but also a pioneering application of fixed point theorems of decreasing operators in this class of games / economies.

Other important point this paper makes is a series of results concerning: invariant distributions generated by equilibrium strategies, comparative statics of MSNE set with the exogenous parameters or numerical methods allowing to compute the unique MSNE and its

approximation by equilibria of finite horizon games. These extensions are presented in the last section of the discussed paper.

Our results and the series of examples obtained in this paper offer a set of rigorous tools for a numerical analysis of economies modelled using this class of games. Hence, this paper has also a methodological contribution, presenting how tools typical for macroeconomic analysis can be used to study a class of stochastic games.

A related paper, where we extend these results is published in *Journal of Mathematical Economics* (Balbus, Reffett, Woźny 2012). It shows how one can extend the analysis of stochastic bequest games to the case of multi-dimensional choice variable, including in particular elastic labor supply and other applications to overlapping generation models. A series of examples and algebraic counterexamples, economic applications in such fields as economic growth with limited commitment, optimal environmental policies, human capital accumulation or fertility models, as well a series of theoretical results for few cases of transition probabilities, made this paper the most highly cited in my research career so far.

An important technical point this paper makes is to define a best response operator on the space of value functions rather than (as is typically assumed) on the space of strategies. This step was crucial to obtain such strong results in the multi-dimensional choice variable case, but also an important methodological observation to use techniques from dynamic programming, to analyze MSNE in this class of games. We have used this contribution later in our next papers.

According to my point of view, an important contribution of this paper is section 5.3, where we present an idea of using strategic dynamic programming (extending Abreu, Pearce, Stacchetti 1990 method) in the class of stochastic games with uncountable number of states and a class of (non-necessarily stationary) Markov Perfect Equilibria, that was later extended by Balbus and Woźny (2015).

Finally, in a related paper by Woźny and Growiec (2012), we show a specific application of the discussed methods to analyze human capital accumulation problem, again under limited commitment possibilities between generations. From the economic perspective we show and compute (both algebraically and numerically) human capital accumulation policy in the MSNE. We show formally that human capital investment is lower in the strategic model (limited commitment) than in the model without such strategic effects (full commitment). We show, however, that using such higher human capital accumulation policy does not lead to the Pareto optimal allocation. Next, we present results on human capital accumulation policies in a *joy-of-giving* altruism model. One result, that can be implied from our paper, is a possibility of over-estimation of parameters measuring the role of human capital in such models, where strategic interactions were not accounted for.

The next paper, where we present results concerning time (in)consistency of optimal decisions was published in *International Journal of Game Theory* (Balbus, Reffett, Woźny

2015a). In this paper we analyze a classic problem of finding an optimal from time consistent policies in a quasi-hyperbolic discounting model (so called beta-delta model).

Again, our main goal was to show existence and develop a numerical technique to compute optimal from time-consistent policies. It is an important contribution to the literature (see. Harris, Laibson 2000). In this way we manage to link results on time consistency of optimal decision problems (see Strotz 1955), with their game theoretical interpretation (see Phelps, Pollak 1968, see also Balbus, Nowak (2008) or Balbus, Jaśkiewicz, Nowak (2014)). See also Caplin, Leahy 2006 for a reason why it is important. As in the previously discussed papers this one contains additional results on comparative statics, invariant distributions and examples concerning consumption / savings model, dynamic formation of preferences or environmental policies. A paper is accompanied by some numerical simulations.

Technically, using methods developed for analysis of stochastic games, we construct an increasing operator, whose fixed points are the values that can be obtained using some of the time consistent policies. Order-theoretic properties of the value set of time-consistent policies allow us to choose the greatest value time-consistent policy. From this perspective our main contribution in this paper is hence a proof of a theorem concerning existence, approximation, and comparative statics of fixed points of a family of parameterized monotone operators defined on some partially ordered sets. It offers some extensions of the fixed points theorems of: Tarski, Markowsky or Tarski-Kantorovich. This result was later used by us many times in our research on large games (e.g. Balbus, Dziewulski, Reffett, Woźny 2014 and 2015).

Finally, Balbus and Woźny (2015) in the first part of their paper in *Dynamic Games and Applications*, present a computational method, also useful to prove existence of time consistent (not necessarily stationary) Markov policies in the same (beta-delta) model. This construction resembles that mentioned in our *Journal of Mathematical Economics* paper. We show how one can modify a technique of Abreu, Pearce, Stacchetti (1990), applied to repeated games or Mertens and Parthasarathy (1987) technique applied to stochastic games to our decision problem and Markovian equilibrium defined over uncountable number of states. In particular we prove existence of such policy, show some characteristic of the set of all values in any Markovian time consistent policy using a family of descending sets as well as a numerical method for a class of all short memory (Markov) equilibria. These two last results are important contributions to the literature and differ our method from the ones of Cole, Kocherlakota (2001), Judd, Yeltekin, Conklin (2003), Doraszelski, Escobar (2012), Feng, Miao, Peralta-Alva, Santos (2014) or Sleet, Yeltekin (2015). Again this paper is methodological and this application (beta-delta discounting model) is not the only one possible (a second example is presented in the next subsection).

3.2 Limited commitment problems with interdependent decisions

Another aspect analyzed in my research concerns limited commitment and time-consistency of interdependent decisions modelled using stochastic games with n-players (Shapley 1953), making simultaneous decisions each period. I analyze such model in a paper published in *Journal of Economic Theory* (Balbus, Reffett, Woźny 2014), where we use assumptions guaranteeing that an analyzed game is of strategic complementarities and exhibits positive external effects (see Curtat 1996, Nowak 2007). In economics such class of games is used to analyze dynamics of oligopolistic markets or search models (e.g. labor market search). In our paper we present some additional applications concerning: time-consistency of optimal tax policies or symmetric equilibria in games with individual provision of a public good.

Again, our assumptions on the transition probability guarantee that the analyzed games is supermodual in its extensive form. In my opinion it is a pioneering example for such game as the general conditions for a game to be extensive form supermodular are not known (see Echenique 2004).

In this paper we present results on existence of extremal MSNE and their approximation both pointwise and in the sup-norm. Obtaining such strong results, as compared to the literature, was possible thanks to a construction of some monotone operators on the space of value functions (defined on the uncountable state space in R^n), but what is interesting, without using any fixed point theorems. The analysis presented in this paper, is hence, constructive, as we construct equilibria as limits of some sequences. Again this aspect differs our paper from the other works in the field (see Nowak 2007, Duggan 2012).

Also, our comparative statics and comparative dynamics theorems we present in the paper are important and new contributions to the field of dynamic games. To illustrate our results, we finally compute numerically stationary Markov equilibria in a simple two-players common interests coordination game.

The second paper where we analyze stochastic supermodular games was published in *Dynamic Games and Applications* (Balbus, Reffett, Woźny 2013b), where we extend results of the *Journal of Economic Theory* paper to the case of incomplete information concerning players types. Such classes of games are used to analyze dynamic of pricing between various firms with private information, R&D competition with positive spillovers or Cournot competition with learning by doing.

Here, let me draw your attention to our construction of expectations concerning others players private types in the MSNE. These are, so called, short-memory expectations, i.e. player i 's beliefs about the other players' states must depend on his private information only through his current state, both on and off the equilibrium path. It is both, intuitive and strong concept of equilibrium analyzed in other papers (see Cole, Kocherlakota 2001). Proving its existence in a class of stochastic games with uncountable number of states was an open issue so far. The results presented in our paper allow to apply models of stochastic games to many economic problem at hand.

Technically, the tools used in this paper are similar to the one used above (Journal of Economic Theory) but methodologically, different as our fixed point operator eliminates strategies and values that are never best responses. This tool is borrowed from the analysis of global games. Finally, the assumptions we put on the transition probability we use here and in the other papers were generalized by a great deal in this work.

Finally, Balbus and Woźny (2015) in the mentioned paper on a strategic dynamic programming method, also analyze a class of supermodular games with positive spillovers and characterize the set of values in any MNE given by monotone functions on the state space in R^1. This way they prove existence of (not necessarily stationary) perfect Markov equilibrium. The other characteristics of the mentioned approach were already discussed above. Finally, it is worth mentioning that extremal MSNE values computed in the *Journal of Economic Theory* paper belong to the set of equilibrium values obtained using this method, but are also two of extremal points of the MNE value set.

To sum up, the results presented in papers discussed in points 3.1 and 3.2 are, not only, important contribution to the literature of (pure) MSNE is some classes of stochastic games (see Mertens, Parthasarathy, 1987, Nowak, Raghavan 1992 or Levy, McLennan 2014 and Hen, Sun 2014), but also offer new tools for a constructive and numerical study of the actual economic problems with time consistency or limited commitment.

3.3 Costly self-control and valuation of commitment devices

New and important area of my research is an analysis of alternative representation of so called "preference reversals" observations. Instead of using models with changing preferences (e.g. quasi-hyperbolic discounting), or stochastic games generally, in my recent papers I am using a decision model developed by Gul and Pesendorfer (2001), allowing to rationalize the same empirical observations defining preferences on the subsets of consumption set and defining so called self-control costs.

In one of my recent papers (Woźny, 2015) I analyze a problem of constructing the optimal incentive scheme in the principal-agent model, where agent has preferences with costly self-control modeled using Gul and Pesendorfer approach. Using standard tools for this class of problems (see Grossman, Hart (1983)) I characterize the optimal contract to incentivize the agent to take a high effort, that apart from standard incentive compatibility conditions must also satisfy the conditions resulting from non-observable temptations and costly self-control.

An important characteristic of my paper is that some standard results concerning the optimal contract do not hold under the costly self-control. In particular the incentive compatibility condition does not need to be binding at the optimal solution, and as a result, the reduced problem solution gives the variable pay even for separable utility functions and small self-control costs. I finally show that for large self-control costs both models with observable and without observable actions yield the same solution and the moral hazard cost is mitigated.

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The intuition behind these findings results from the new channel of principal and agent interactions we identify, namely, a self-control costs that can be regulated by the principal. An interesting findings is that principal, in the optimal contract, will never reduce agents self-control costs to zero, as some strictly positive level of intrinsic motivation, resulting from agents will to reduce its self-control costs, is optimal.

My analysis can be easily extended to multiple (also continuum) of action cases and general utility functions. My results contribute to the discussion on justification of variable pay (see Holmstrom 1979), and behavioral contracting literature (see e.g. Bénabou, Tirole, 2003, 2006)).

Technically, my results can be easily extended for n-periods and have an advantage over the modelling approach based on time varying preferences (see Yilmaz (2013), where preferences are described e.g. using beta-delta model).

These results show some new areas of research that I currently pursue in my grant for the years 2014-2016 financed by NCN.

The second paper where I use the Gul and Pesendorfer (2001) model of self-control, is entitled *On the price of commitment assets in a general equilibrium model with credit constraints and tempted consumers* (Woźny, 2016). In this work I analyze a three period economy model with a single consumer and a single firm, credit constraints and a commitment asset that allows for a costly commitment to reduce or eliminate self-control costs or time-inconsistency in the next periods.

The aim of this paper was a comparison of the two models: one where agents preferences are represented using beta-delta quasi-hyperbolic discounting and the second, where preferences are modeled using Gul and Pesendorfer model. In the first part of the paper I characterize demand and supply of liquid and illiquid (but allowing for a commitment) assets and show when qualitative results of the both models are similar but also show examples where they are different. What is interesting, on the contrary to the previous results, (Kocherlakota, 2001 or Gul, Pesendorfer 2004) both models give similar results, i.e. they imply strictly positive consumption of the commitment / illiquid asset but corner consumption result of one of the liquid assets in the general equilibrium of this economy.

Technically, the beta-delta model gives more testable implications for a shape of the demand function. These implications are useful in showing the existence of the competitive equilibrium. Moreover, my model is the first that systematically, analyze preferences with costly self-control in this context.

The most important contribution of this paper, however, was showing conditions for a existence of a competitive / general equilibrium in this economy. Let me stress that since the example of nonexistence of a competitive equilibrium in economics with time-inconsistent

preferences (without recalling a measure space of consumers, like Luttmer, Mariotti, 2006) presented by Kocherlakota (2001), and later by Gabrieli and Ghosal (2013) the question of existence of equilibrium in such simple models was not answered. In particular, the corner equilibrium results implies nonexistence of equilibrium in the Kocherlakota exchange economy, and lack of commitment assets implies nonexistence in the Gabrieli, Ghosal exchange economy. In my paper I realized that by adding active firms, and hence resigning from the exchange economy assumptions I manage to recover existence of a competitive equilibrium

These results have at least two important consequences. First, they give conditions under which the private ownership economy can work and price the commitment assets. And secondly, it shows how the structure of assets can be used to identify costly self-control and establish the market prices of assets allowing for a reduction of self-control or time-inconsistency.

Finally, I want to mention that the already discussed paper by Woźny and Growiec (2012) does also belong to this area of my research. An additional value added of this paper is an early example of construction allowing to decentralize (in competitive equilibrium of a production economy) an allocation in any (stationary) Nash equilibrium (in Markov strategies) of an intergenerational game using appropriate general equilibrium prices.

In particular, we have first showed, how to appropriately define the structure of assets and aim of the firms, so that the allocation in the Nash equilibrium could be decentralized in this way. This way we apply results of Magill and Quinzii (2009) concerning firms under endogenous risks, i.e. such that is not modeled as a given probability distribution on the state space, that is independent of actions taken by agents like in the standard Arrow-Debreu model.

As compared to this paper, we extend their concept of (quasi)equilibrium to the infinite horizon economy, but what is more important, to the uncountable number of states. This extension, on the one hand complicates the analysis from the technical perspective, but is necessary to obtain our (efficient decentralization) result, i.e. existence of prices that decentralize the given allocation similarly to the second welfare theorem but here for a class of economies with time-inconsistent preferences. These are the pioneering results in the field.

4. Other important publications

In addition to the aforementioned work in the series of topically related publications I also published other papers, the most important of which I synthetically discuss below. These papers focus mainly on large games (i.e. games with uncountable number of players)[2].

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

In the first paper (Balbus, Dziewulski, Reffett, Woźny 2014) we analyze large game with strategic complementarities. We show how one can formally define complementarities in the infinite number of players case (on strategies as analyzed by Schmeidler (1973)) and in distributional games (see Mas Colell 1984)) and we show some properties of the players strategy spaces (measurable functions from players names to players actions). Similarly for distributional games we show, how to formally define complementarities on probability distributions with some partial orders and we show some technical properties of these spaces. As a result we are able to state conditions for existence of equilibrium (both Schmeidler-Nash and distributional) and a method to compute / approximate some of the equilibria. We finally show, when the extremal equilibria in both games can be characterized by comparative statics results. Our results are new and extend earlier results on small supermodular games: Topkis (1979), Vives (1990), Milgrom and Roberts (1990). We finish the paper with examples and applications to (non-aggregative) large games including social dissonance models (Akerlof 1997), large stopping games, or models with interdependent consumption (e.g. *keeping up with the Joneses*).

In the next paper (Balbus, Dziewulski, Reffett, Woźny 2015) we analyze a similar model of a large, supermodular game but with differential information. Again, we first define information structures, and complementarities in this context and present result on the existence of Bayes-Nash equilibrium, its computation and comparative statics. This way we manage to extend results of Balder, Rustichini (1994) and Kim, Yannelis (1997) to supermodular games and present applications to riot games, large beauty contests, or common value auctions. Here we also extend the methods allowing to aggregate functions with quasi-supermodularity or that have single crossing property, extending the results of Quah and Strulovici (2012).

Next, in the last paper from this series (Balbus, Reffett, Woźny 2015b) we show a counterexample to existence of a Nash equilibrium result for a large superodular games published in Games and Economic Behavior by Yang and Qi (2013). We precisely example their mistake and correct it under additional assumptions. The paper is important, as it shows how difficult the area of large games is but also establishes our position in the field of large games.

Is it worth mentioning that I analyzed models with interdependent consumptions (e.g. *keeping up with the Joneses*) even before obtaining the PhD degree in the paper with prof. Marek Garbicz (Garbicz, Woźny 2006), aggregative games and super/submodularity in the paper entitled *Charakterystyka zbioru równowag w submodularnych grach z indywidualną podażą dóbr publicznych* (Woźny, 2009a), while time-inconsistency problems in the review article from 2009 (Woźny, 2009b).

Finally I mention few review articles. In the two papers (Dziewulski, Woźny 2011, 2012) we present methods from game theory to analyze numerically firms in the oligopolistic markets.

In the next one with the same co-author (Dziewulski, Woźny 2010) we discuss possibilities to decentralize equilibrium allocations in dynamic games, ie. such construction of prices that the general equilibrium allocations are the same as Nash equilibria allocations in dynamic or stochastic games. This construction was later applied in the joint paper with dr hab. J. Growiec (Woźny, Growiec 2012).

The last paper I want to discuss, is my single empirical paper, outside my main areas of research (Łatuszyński, Woźny 2008), where we discuss differences in the remunerations of men and women on the Polish labour market (i.e. 20% higher for men) and use Oaxaca - Blinder decomposition to explain this discrepancies (up to 70%-85%), using some objective data as, employment seniority, job group, education, job level etc. This paper has 6 citations.

5. Summary of scientific achievements[3]

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

- 11 articles in scientific journals listed in the Journal Citation Reports,
- 2 articles in other scientific journals classified by the MNSiW,
- 4 chapters in books and one book, that I edited.

The current summary impact factor for these publications is 8.427, and its five-year version equals 10.147. Correcting the co-authored articles for appropriate weights reflecting the relative contributions (see Annex 5), these indicators become 3.813 and 4.629, respectively. According to the MNiSW ranking, my published papers scored 267 points, or 141.05 after adjusting for my co-authors' contributions.

My research papers are cited in national and international journals.[4] The total number of citations of my works according to Google Scholar amounts to 65, which yields the Hirsch index equal to 5. In the IDEAS/RePEc service there are 12 citations of my works (excluding self-citations), which gives the Hirsch index equal to 2. Finally, the number of citations of my papers according to the Web of Science is 22, with 13 excluding self-citations and my Hirsch index is 3.

I presented my papers at many prestigious national and international conferences, including: Society for Advancement in Economic Theory (6 times), Europen Workshop in General Equilibrium Theory (3 times), Public Economic Theory International Meeting or SING (Conference on Game Theory). On top of that I shall add invited talks at seminars in University of Oxford, Paris School of Economics, Department of Economics, Universitat Autonoma de Barcelona, or Institut Henri Poincare, Séminaire Parisien de théorie des jeux. I have also refereed papers for journals listed on Journal Citation Reports.

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

[4] The citation indicators are reported as of January, 13th 2016.

I am a principal investigator in SONATA grant and main ivestigator in the other SONATA grant (both financed by Narodowe Centrum Nauki). I was a principal investigator / project manager for 6 additional grants for Young Researchers at SGH and 3 times for Statutory Grants at SGH. I have also been awarded a scientific scholarship for outstanding young researchers by MNiSW as well as by the SGH Rector for my research publications.

Finally I want to summarize my teaching and organization activity. Apart from lecturing at the SGH, I supervised 28 bachelor theses and 10 master theses. I have lectured for PhD students at the University of Oxford as a Visiting Professor, lectured on general equilibrium for NBP bank employees, as well as co-organized four international conferences. At SGH, I am an initiator and coordinator of a double diploma with QEM network (Models and Methods of Quantitative Economics, a consortium of Universitat Autònoma de Barcelona, Universität Bielefeld, Université Paris 1 Panthéon-Sorbonne, Università Ca' Foscari Venezia and SGH as an associated partner). I teach mainly in English at the master and PhD level. My classes concern: game theory, general equilibrium, advanced microeconomics and industrial organization. In 2013-2014 I participated in the Rectors Commission on Accreditations and Rankings at SGH. I also co-organize Warsaw Economic Seminars, weekly.

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