

SGH WARSAW SCHOOL OF ECONOMICS
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**What determines international competitiveness of
the economy? A panel data approach.**

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The goal of the dissertation is to establish what determines *international competitiveness of countries*. Given various measures of international competitiveness in the literature as well as its potential determinants, it starts by describing what the competitiveness is. The broadest definition of international competitiveness is based on productivity. For example, the World Economic Forum writes that economic competitiveness is “the set of institutions, policies and factors that determine the level of productivity of a country”¹. In turn, Fagerberg (1988) notes that a country cannot increase its productivity per se, so it focuses on the realisation of economic policy goals, such as increasing GDP or employment levels. This, in turn, creates another challenge, which is avoiding macroeconomic imbalances that could lead to a destabilisation of an economy. The discussion on the importance of macroeconomic imbalances leads to the first measure of competitiveness analysed in the dissertation: the current account balance. In my opinion, it is the most general measure, as it describes whether a country increases or decreases its net international investment position. The second measure analysed in the dissertation is more specific and is based on the export market share, defined as the share of exports of a given economy in the value of global exports. I chose this measure as it becomes increasingly important due to the growing trade openness of economies resulting from globalisation. The exchange rate is the last competitiveness variable analysed in the dissertation.

As regards the methodology, I analyse international competitiveness of countries within the panel data regression framework. The use of panel data allows for both, comparison of competitiveness across countries and observing its changes in time. Since the economic literature provides different explanations regarding critical determinants of international competitiveness of a country, I apply the Bayesian Model Averaging (BMA) framework. The main advantage of the BMA approach is that it allows to estimate all the possible models for the given combinations of available variables instead of a single model. For each model in the BMA framework, there is a posterior probability measure, which allows obtaining the posterior inclusion probability for each variable, which is a straightforward measure of variables' importance.

The main result of the dissertation is that good economic policy, including sound institutions, is the crucial determinant of international competitiveness over long-term horizon. Enhancing international competitiveness is a gradual process that requires institutional and technological changes rather than short-term adjustments in relative prices. Price factors turned out to exert limited effect on three measures of international competitiveness.

¹<https://www.weforum.org/agenda/2017/09/what-is-economic-competitiveness/>

Literature review and contributions

I begin the dissertation with the current account balance analysis. There is a broad consensus among economists that unfavourable current account (CA) developments, through the accumulation of foreign financial assets and liabilities, had been one of the key drivers of the global financial crisis of 2008-2009 (Obstfeld and Rogoff, 2009; Blanchard and Milesi-Ferretti, 2010) and the European debt crisis (Alessandrini et al., 2014; EC, 2012; Chen et al., 2012; Ca' Zorzi and Rubaszek, 2012). Nowadays it is justified to argue that current account deficits and surpluses observed in the past in the euro area countries before the crisis were a sign of growing macroeconomic imbalances. This is reflected, among others, by including the CA to GDP ratio in the European Commission Macroeconomic Imbalance Procedure Scoreboard.

Even though there is a broad consensus on the importance of CA developments for macroeconomic stability, agreement is not reached in the discussion on what determines the external balance. On the one hand, the traditional elasticity approach focuses predominantly on intratemporal factors such as relative demand and relative prices. On the other hand, the intertemporal approach, such as intertemporal current account (ICA) models presented in Sachs (1981), Ca' Zorzi and Rubaszek (2012) or Obstfeld and Rogoff (1995) emphasises the role of variables that affect decisions on investment and savings. It is worth looking at the strain of literature that uses econometric models to establish empirical links between current account and various potential determinants. For instance, Chinn and Prasad (2003) examined medium term determinants of CA imbalances using panel data regressions and showed that the effects of public spending are significant only for developing countries. Furthermore, it is also worth to mention the Macroeconomic balances (MB) approach developed by Faruqee et al. (1999) and further extended by the IMF within the External Balance Assessment (EBA) framework (Cubeddu et al., 2019). In the Macroeconomic Balances approach there are two variables of interest: the real effective exchange rate (REER) and the current account balance. The key research question is evaluating at what level the current account would stabilise, assuming that the exchange rate remains unchanged and the output gap is closed.

As regards current account regressions within the Bayesian Model Averaging framework, it was introduced to the current account literature by Ca'Zorzi et al. (2012). In particular they used Bayesian Averaging of Classical Estimates (BACE) methodology proposed by Sala-I-Martin et al. (2004). The next milestone in the application of BMA methodology to analyse the current account was the study of Moral-Benito and Roehn (2016). The authors investigated current account developments with the use of a BMA method proposed by Moral-Benito (2012), which enables the inclusion of the lagged dependent variable in the set of regressors.

The contribution of this dissertation to the current account literature is threefold. First, I have created a relatively large, balanced panel dataset that covers 101 countries over 15 years. Second, I did not use averages over several years to balance the dataset which enabled me to provide results at higher frequencies. Third, research question is novel as I focus on the comparison of the relative importance of intra- and inter-temporal factors for the current account fluctuations.

In the second part of the dissertation I focus on the determinants of EU countries' export performance. From the theoretical perspective, price factors such as the relative unit labor costs intuitively seem to be the major source of international competitiveness. However, Kaldor (1978) pointed to the fact that countries experiencing faster growth in relative unit labor costs and export prices had often outperformed other countries in terms of their export dynamics. This finding has sparked interest in non-price sources of international competitiveness. Fagerberg (1996) reports that such analyses were undertaken already in the late 1960s "following the advent of the neo-technological trade theories". Over time, with the increased availability of more detailed data, the literature evolved from analyses focusing on differences across countries (Magnier and Toujas-Bernate, 1994; Madsen, 2008) or sectors (Amable and Verspagen, 1995; Montobbio and Rampa, 2005) to firm-level investigations (for a review of firm-level studies see Dosi et al. 2015).

As regards the importance of institutions, it is well-established in the economic growth literature (North, 1989; Acemoglu et al., 2005; Rodrik, 2008). However, the question remains whether institutions are also important for international trade. Only a few recent studies look for sources of a competitive advantage in institutional characteristics of exporting countries, and in particular the environment faced by exporters. Bournakis and Tsoukis (2016) and Bierut and Kuziemska-Pawlak (2017) provide evidence that price and non-price factors traditionally highlighted as important determinants of export performance, i.e. relative unit labor costs, R&D expenditure as a share of GDP and patent applications per million population, maintain their significance. Both papers also document the significance of institutional factors for export performance. Bournakis and Tsoukis (2016) also point to the importance of human capital and a non-linear, hump-shaped impact of government size on export activity.

The lack of consensus on major determinants of export performance is the main motivation of this part of the dissertation, which claims to unify previous findings. My main contribution to the existing literature involves the application of Bayesian Model Averaging, which (according to my best knowledge) has not been used in the context of export performance before. To fully utilise the BMA approach I have created a large database with various potential determinants of export performance identified on the basis of a literature review.

Next, I have analysed exchange rates' determinants. The economic literature contains various theories regarding key determinants of the exchange rate movements that indicate existence of different types of mechanisms describing the relationship between macroeconomic fundamentals and changes in the exchange rate.

First, there is a variety of Behavioural Equilibrium Exchange Rate (BEER) models, which aim to establish a link between the real rate and relevant economic variables (see e.g. MacDonald 1998). Exchange rates can also be studied using relative purchasing power parity (PPP), which indicates that the exchange rate reacts to the changes in the intercountry price levels differences. Ca' Zorzi et al. (2016); Ca' Zorzi et al. (2020) showed that the long-term mean of the exchange rate can approximate the PPP equilibrium rate and it can successfully be used to forecast exchange rates.

Another potential extension of the exchange rate model can be based on the Taylor (1993) rule fundamentals. The exchange rate can also be modelled using the Uncovered interest parity (UIP). According to this theory, the exchange rate should adjust accordingly to the difference in interest rates between two countries. This theory alone seems to be insufficient to explain exchange rate movements, however, some studies (see e.g. Chinn and Meredith, 2004) indicate that UIP can be used for long-term forecasts.

There is also a strain in the literature that focuses on expectations and animal spirits. For instance, Kaltenbrunner (2015); Barbosa et al. (2018) indicate that aggregate expectations, that can be approximated by yield curve or liquidity premium differential, also have a profound impact on the exchange rate movements, especially in the case of developing and emerging countries. In general, the literature on the relation between the macroeconomic fundamentals and exchange rates is continually growing, and therefore the summary above provides only a brief discussion on different modelling approaches. Nevertheless, it allows the identification of a list of potential exchange rate determinants.

As regards estimation, the relation between exchange rates and fundamentals can be measured using cointegration relation between the macroeconomic framework (Wdowiński, 2011), VAR model (Grabowski and Welfe, 2019) or the panel data framework (Dąbrowski et al., 2014).

The complexity of the relation between the macroeconomic variables and the exchange rate leads to a situation that economic models based on macroeconomic fundamentals often fail to outperform the forecasting capabilities of the random walk, which is called *exchange rate disconnect puzzle*. As a result, I have decided to extend the analysis to include exchange rates' forecast evaluation that constitutes additional contribution to the literature.

Research objectives and hypotheses

The aim of the dissertation is to identify the determinants of *international competitiveness of countries*. The first possible source of international competitiveness can stem from the relative price channel. According to this hypothesis, the increase in prices would lead to a deterioration of international competitiveness of a country. Although this explanation seems to be very intuitive, it does not account for the variety of other plausible sources of international competitiveness. The second potential source of competitiveness results from technological capacity and the quality of human capital of a country. From a more general perspective, investments that lead to the technological or educational transformation of the economy can also be a vital source of (comparative) advantage. As a result, factors affecting decisions on investment and savings, such as credit availability or general government debt or budget balance, can also have a profound impact on international competitiveness. Another compelling hypothesis focuses on the importance of institutions quality. Last but not least, establishing the critical determinants of international competitiveness poses another important research question: is there a universal set of its determinants for all the countries. It might be the case that vital determinants of international competitiveness among the developed countries are somewhat different from those in emerging economies.

In the dissertation I have tested the following additional research hypotheses:

1. Relative prices affect international competitiveness of countries.
2. Technological capacity and the quality of human capital are important source of competitiveness.
3. The quality of institutions influence competitiveness.
4. Determinants of international competitiveness might be diverse across countries and vary in time.

Results and conclusions

The answer to the main research question is as follows:

Good economic policy the crucial determinant of international competitiveness. Increasing international competitiveness is a gradual process that requires institutional and technological changes rather than a short-term adjustments in relative prices.

In the case of the current account, I have found that intratemporal factors seem to exert smaller effect on the current account than intertemporal factors. The investment rate, budget balance or relative stage of development, can be viewed as key drivers of the current account balance. The importance of the intertemporal factors leads to a conclusion that a permanent (stable) adjustment of the current account balance requires changes in factors related to economic development and therefore it is a time-consuming, gradual process. In addition to this, it is worth noting that there are some profound differences between developing and developed countries in terms of current account drivers. High-income countries are, to a considerable extent, financing investment and government expenditures with external resources. In turn, for developing countries, the quality of institutions was found to play a more prominent role than in the case of developed countries. All in all, these results would indicate that the analysis of current account dynamics should take into account both systematic fundamentals – mostly intertemporal factors – as well as country-specific developments.

As regards export performance, I have examined three types of its potential determinants: price, technological and institutional factors. The observed effects can be divided into two types: direct and transformational effects. The first category includes situations, where improvement of the investigated measure directly stimulates exports. In contrast, the second type of impact leads to structural changes (improvement leads to shifting from less to more technologically advanced exports). The main finding is that technological factors have a significant impact on the export market share in contrast price factors. While some technological factors only have a significant transformational impact on the export structure, other factors significantly benefit overall export performance. For example, at first glance on the overall value of manufactures, it seems that the R&D intensity is more likely to be only indirectly beneficial for export performance, i.e. when it is successful, resulting in a higher number of patent applications. However, a more detailed analysis of different types of manufactures' exports indicates that R&D expenditure can have a significant transformational impact on the export structure. Higher R&D intensity tends to decrease the share of less technology-intensive exports while giving a more substantial boost to more skill- and technology-intensive exports. Furthermore, the production capacity, measured by potential GDP, also seems vital for export performance. The next result is that institutions also play an essential role in shaping the international position of exporters. The Freedom to Trade Internationally variable has the highest overall positive impact on manufactures' exports, which seems to be related to the significant impact of lower regulatory trade barriers as well as tariffs. It is also associated with the transformation of export structures (specialisation in more skill- and technology-intensive manufactures). Another crucial institution for

export performance is the quality of regulations. The regulatory environment has a direct positive impact on overall exports. Finally, the results show that Sound Money, notably a low and stable inflation, also appears to have a strong positive direct impact on overall exports.

In the case of exchange rates, I have demonstrated that Terms of Trade, General Government debt and the GDP per capita are crucial macroeconomic determinants. In addition to this, Consumer Price Inflation also has a substantial posterior inclusion probability. I have also tested the usefulness of the (dynamic) Bayesian Model Averaging in the exchange rate forecasting. The results show that nominal exchange rate determinants can substantially differ both in time and across the countries. Moreover, the recent Great Recession and the European sovereign debt crisis saw a substantial increase in the volatility in the exchange rates leading to some structural changes in the set of crucial determinants of currency movements. Although macroeconomic variables can offer substantial predictive power, it is conditional on the quality of the macroeconomic variables forecast. The foreign exchange market seems to react to changes in the macroeconomic environment instantaneously. As a result, forecasting exchange rates requires good quality forecasts of the macroeconomic variables included in the model.

Overall, the results of this dissertation indicate that the focus of policy-makers on price competitiveness might be exaggerated. In particular, regression results based on a rich panel data clearly indicate that current account balance as well as export market shares are only loosely related to real exchange rate developments. Moreover, real effective exchange rate fluctuations were found to be driven by macroeconomic fundamentals. On the contrary, the results unambiguously imply that institutions as well as human capital are crucial factors for international competitiveness of countries over long term horizon.



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Appendix: Research and academic activity

Education

1. M.A. in Economics

Warsaw School of Economics

Thesis: Panel data study of Current Account Imbalances

Advisor: dr hab. Michał Rubaszek

2. B.A. in Economics

Warsaw School of Economics

Thesis: The influence of reference groups on the market choices

Advisor: dr hab. Michał Ramsza

Publications

1. Bierut B., Dybka P. (resubmitted), Institutional determinants of export competitiveness among the EU countries: evidence from Bayesian model averaging, *Economic Modelling*

MNiSW points: 100; Impact factor: 1.930

2. Dybka, P., Kowalczyk, M., Olesiński, B., Torój A. and Rozkrut M. (2019), Currency demand and MIMIC models: towards a structured hybrid method of measuring the shadow economy, *International Tax and Public Finance*, vol. 26(1), p. 4-40.
MNiSW points: 70; Impact factor: 0.925
3. Dybka P., Rubaszek M. (2017), What Determines the Current Account: Intra-temporal versus Intertemporal Factors, *Czech Journal of Economics and Finance (Finance a uver)*, vol. 67(1), p. 2-14.
MNiSW points: 40; Impact factor: 0.625
4. Dybka P., Olesiński B., Pękała P., Torój A. (2017), To SVAR or to SVEC? On the transmission of capital buffer shocks to the real economy, *Bank i Kredyt*, vol. 48(2), p. 119-148.
MNiSW points: 40; Impact factor: -
1st prize for the best article published in *Bank i Kredyt* in 2017.
5. Chojnowski M., Dybka P. (2017), Is Exchange Rate Moody? Forecasting Exchange Rate with Google Trends Data, *Econometric Research in Finance*, vol. 2(1), p. 1-21.
MNiSW points: -; Impact factor: -

Grants

1. National Science Centre, Poland, grant No. 2017/25/N/HS4/01424
What factors determine the export competitiveness? Analysis based on Bayesian model averaging.
Role: Principal investigator
2. National Science Centre, Poland, grant No. 2019/33/B/HS4/01923
Predictive content of equilibrium exchange rate models.
Role: Investigator

Working papers

1. Dybka P., (2020), One model or many? Exchange rates determinants and their predictive capabilities, Working Papers 2020-053, Warsaw School of Economics, Collegium of Economic Analysis.
2. Dybka P., Olesiński, B., Torój A. and Rozkrut M. (2020), Measuring the uncertainty of shadow economy estimates using Bayesian and frequentist model averaging, Working Papers 2020-046, Warsaw School of Economics, Collegium of Economic Analysis.
3. Bierut B., Dybka P. (2019), Institutional determinants of export competitiveness among the EU countries: evidence from Bayesian model averaging, NBP Working Papers 306, Narodowy Bank Polski, Economic Research Department.

Conferences and Workshops

1. Econometric Research in Finance Workshop, 2020, Warsaw
Presentation: One model or many? Exchange rates determinants and their predictive capabilities
2. NBP Workshop on Forecasting, 2020, Warsaw
Presentation: One model or many? Exchange rates determinants and their predictive capabilities
3. 39th International Symposium on Forecasting, 2019, Thessaloniki, Greece
Presentation: Institutional determinants of export competitiveness among the EU countries: evidence from Bayesian model averaging
4. The 2nd Workshop on Macroeconomic Research, 2019, Cracow
Presentation: One model or many? Exchange rates determinants and their predictive capabilities
5. The 10th International Conference Economic Challenges in Enlarged Europe, 2018, Tallinn
Presentation: Institutional determinants of export competitiveness among the EU countries: evidence from Bayesian model averaging
6. Econometric Research in Finance, 2017, Warsaw
Presentation: Measurement of economic sentiments and their impact on monetary policy
7. Econometric Research in Finance Workshop, 2016, Warsaw
Presentation: Is exchange rate moody? Estimating the influence of market sentiments with Google Trends.

Teaching

1. Ekonometria I (Econometrics I)
Introductory Econometrics workshops and lectures
2. Ekonometria praktyczna (Practical Econometrics)
Intermediate econometric workshops and lectures
3. Ekonometria Bayesowska (Bayesian Econometrics)
Guest lectures on Bayesian Model Averaging

