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INTRODUCTION: SPECIAL ISSUE ON THE COMPARATIVE ECONOMICS OF TRANSITION IN SOUTH EAST EUROPE (PART II)

This issue of *Economic Annals* presents a second collection of articles from a workshop on "The Comparative Economics of Transition in South East Europe" that took place at the University of Belgrade's Faculty of Economics in September 2019. The Workshop was organised by *Economic Annals* in collaboration with the European Association for Comparative Economic Studies (EACES) and was dedicated to the memory of Professor Božidar Cerović, the former Editor-in-Chief of this journal, who sadly passed away in September 2018. The articles in this issue are revised versions of selected papers that have been through a rigorous peer review process, and which form a substantial collection of articles focusing on aspects of economic transition in Central and South East Europe.

In the first article, Peter Howard-Jones and Jens Hölscher investigate the influence of the neoliberal Washington Consensus programme, internalised by the EU as a reform agenda, on the new member states of Central and Eastern Europe in comparison with other transitional economies in the region. They analyse the effect of EU membership and set of control variables on the productivity of firms in the two groups of countries. The authors find that upon accession to the EU, the neoliberal reform agenda was instrumental in attracting increased levels of foreign direct investment (FDI), promoting trade, investment and innovation, all of which provided a productivity boost to firms in these countries. However, over time these advantages dissipated. In explaining this effect, the authors point to the role of international production networks (global supply chains) in creating an over-reliance on imported inputs which reduced value-added and hindered productivity-boosting spill-overs to domestic firms in the new member states.

The development gap between the EU member states of Central Europe and the Baltics, compared to the non-EU member states in the Balkans, is further explored in the second article by Grigorias Zarotiadis who focuses on the influence of FDI flows in explaining divergent economic performance between the two groups of countries. His analysis uses a general equilibrium model of imperfect competition to identify the macroeconomic impacts of FDI. His theoretical model addresses the ways in which endogenous factors create reinforcing effects that attract FDI to the more advanced transition countries, and conversely repel

FDI from the less advanced countries. The analysis shows how FDI interacts with initial economic conditions to produce divergent paths of development. On the basis of the model he identifies a category of 'infant economies' which, lacking substantial initial manufacturing capacity, experience difficulty in catching up with other economies.

The impact of macroeconomic policies on economic development in Serbia since the onset of transition in 2000 is analysed in the third article by Miroljub Labus. He frames the analysis within the context of three consecutive policy regimes, characterised by neo-liberal, populist and interventionist policies. He compares and evaluates these policy regimes using quarterly data on twenty macroeconomic indicators classified into five groups: macroeconomic stability, domestic, foreign, financial and labour markets. As with the article by Howard-Jones and Hölscher, he finds evidence for the beneficial effects of the Washington Consensus neo-liberal policies in the early part of the period, while the later interventionist policies appear to have had better outcomes than the populist policies. His analysis suggests that both initial conditions and subsequent macroeconomic policies matter for the outcomes of economic transition.

In the fourth article, Mile Bošnjak, Vlatka Bilas and Gordana Kordić investigate the determinants of foreign exchange reserves in North Macedonia and Serbia. They argue that this macroeconomic variable is an important instrument in providing a cushion to exogenous economic shocks. Using a quantile regression approach, they explore the determinants of foreign exchange reserves, which include the real effective exchange rate, monetary aggregates, and the level of economic output.

In the fifth and final article, Amela Kurta and Nermin Oruč investigate the effects of increasing the minimum wage on poverty and inequality in Bosnia and Herzegovina. They use data from the Household Budget Survey for 2015, to assess the effects of changes in the minimum wage using a microsimulation model. The analysis suggests that increasing the minimum wage can significantly reduce poverty, but may have only a limited effect on the level of income inequality. The authors argue that increasing the minimum wage on its own may have unexpected effects if other policies are not taken into account and appropriately adjusted.

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*Peter Howard-Jones**
*Jens Hölscher***

THE INFLUENCE OF THE WASHINGTON CONSENSUS PROGRAMME ON THE TRANSITIONAL ECONOMIES OF EASTERN EUROPE – A FIRM-LEVEL ANALYSIS

ABSTRACT: *This research explores the effectiveness of the Washington Consensus (WC) programme as a mechanism for improving national welfare in transition and emerging economies, using its internalisation by the European Union (EU) as a proxy. The results indicate that there is a positive benefit to firms with accession to the EU, leading to greater productivity improvement and performance advantages than in non-member states. Foreign direct investment directly benefitted those firms that became investees, with little evidence of spillovers to domestic companies. The vertical nature of the investment, with an emphasis on international production networks that utilise significant levels of foreign inputs, infers protection of intellectual property and a reduction in value added, with results indicating a failure to achieve an export multiplier. There is evidence of substantial benefits accruing to firms in receipt of loans, but the apparent paucity of their availability may imply market failure. The gains made by innovative firms do not appear to do justice to the initiatives undertaken and may indicate a dilution of national innovative capacity.*

KEY WORDS: *productivity, European Union, loans, Foreign Direct Investment, exports, research and development*

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1. INTRODUCTION

This research explores the effectiveness of the Washington Consensus (WC) programme as a mechanism for improving national welfare in transition and emerging economies. Williamson (1990) coined the phrase 'Washington Consensus' to explain the influence of the International Monetary Fund (IMF), the World Bank, and the G7 countries, led by the United States of America, all of whom favoured the neoliberal paradigm as a template for economic success. The view emanating from the WC is that there is a universal panacea, which improves national welfare wherever it is implemented. The WC programme was applied universally throughout the transitional countries of Eastern and South Eastern Europe and Central Asia. However, the key is how and to what extent it was applied. The WC programme was originally recommended as a policy package to South American economies suffering from the economic shock of oil price increases and the failure of the hitherto successful industrialisation policy of import substitution. This supply-side initiative failed, primarily because capacity outstripped domestic demand and the high tariff regime that had supported the process led to reciprocal tariffs, thus preventing any export of spare capacity. The subsequent economic collapse led to World Bank and IMF bailouts, which were conditional on adopting the shock therapy of the WC programme.

The fall of the Berlin Wall, the subsequent collapse of the Soviet Union, and the consequent freedom accorded to its client and satellite states led to the disintegration of the old command economies. The Western world was dominated by the neoliberal ideology of the Reagan and Thatcher era, epitomised by the term 'Washington Consensus'. The belief was that the superiority of the Western capital system had been proven, and therefore its adoption by the transition economies was a prerequisite for socioeconomic success (Gabrisch & Hölscher, 2006). There were two players in the process: the constructivists, believers in the shock therapy of rapid privatisation and price and trade liberalisation, and the Popperians, who believed in gradualism and a slow transition with the establishment of a strong institutional base as a prerequisite for further progress (Ellman et al., 1993; Kokushkin, 2011). The neoliberal thought collective ensured that the political and economic policy, supported by many in academic circles, dominated the initial implementation process throughout the transitional economies – albeit that national governments did not universally implement the shock therapy programme but picked and chose which

elements to adopt (Gabrisch & Hölscher, 2006). However, one group was coerced into adopting the prescription in its entirety, namely the New Member States (NMS) of the European Union (EU). The conditionality of accession meant that the states had to adopt both the Acquis Communitaire and the neoliberal paradigm of the Washington Consensus programme as internalised by the EU (Fitoussi & Saraceno, 2013).

This internalisation by the EU and the conditionality imposed on the NMS, whose accession was dependent on adherence to the programme, provides a viable platform to study the consensus programme when applied in its totality (Fitoussi & Saraceno, 2013). The results can be compared to other countries within the transitional economic group that did not become EU members but shared an economic, political, and (to some degree) cultural paradigm as a result of having been under the Soviet hegemon. The majority of the non-EU states adopted some elements of the WC programme, particularly privatisation and the liberalisation of markets, which also allows some analysis of whether the adoption of the whole programme is a prerequisite for economic success and the furtherance of national welfare.

A number of scholars have long criticised the WC programme as being the cause of the South American economic collapse in the 1980s, the East Asian financial crisis of the 1990s, and the severe economic problems experienced by the transitional economies. In relation to the latter, the opportunity exists to compare one group that was subject to the full programme, namely the NMS, with a group of other states, primarily from the former Soviet Union, but also other satellite states over which the Soviet Union held hegemony. This research is based on firm-level productivity performance, since this is the key to economic growth, and if firms are productive the state should by definition display signs of growth.

This paper evaluates the productivity of firms in EU states and non-EU states to establish whether the group in which the WC programme was implemented in its entirety had any clear advantage. This is established by measuring some of the tenets of the WC programme, namely access to finance, free flow of funds, trade liberalisation, and the promotion of innovation. There are two research imperatives: to fill the gap in microeconomic research as to the efficacy of the WC programme through a controlled experiment where EU membership is a

treatment effect against the control group, and to explore these effects against a background of the emerging transitional economies of Eastern Europe and Central Asia.

To achieve this a matching model is utilised to evaluate the effect of one or more treatments and compare the treated and untreated cohorts. This is approached in a quasi-experimental context, as the treatment is not randomly assigned. The objective of matching is to identify treated and non-treated units with similar observable characteristics against which the effect of the treatment can be assessed. The purpose of matching is to ensure that the treated and untreated samples are similar in every respect to eliminate bias due to confounding. This paper discusses the results of a particular outcome, namely output per worker, and compares two sets of matched firms with similar characteristics, namely firms in the NMS and those outside.

The matching model utilised also provides an opportunity to examine other key determinants of productivity by interacting EU membership with other treatment variables in a multi-valued approach. Thus, the paper not only provides a direct comparison of the productive efficiency of firms within and outside the EU in both 2005 and 2013, but also shows whether additional key determinants enhance an effect. This allows an analysis of the effect of membership to discern whether differences exist between the two years, 2005 being a year after the accession of eight of the eleven NMS, and 2013 following a period when a degree of stability had been reached, thus providing perspective.

The remainder of the paper is organised as follows. Section 2 reviews the relevant theoretical and empirical literature. Section 3 outlines the data and methodology used, and Section 4 presents the empirical results. Section 5 concludes.

2. LITERATURE REVIEW

The Washington Consensus is a description coined by John Williamson, who argued that the set of policy reforms which most of official Washington thought would be good for Latin American countries could be summarized in ten propositions. This 10-point reform programme prescribed a template by which the developing world could achieve macroeconomic stability and improve national welfare. Williamson has since argued that both supporters and

detractors have chosen, erroneously, to interpret his paper as a neoliberal gospel, although the term is now used universally to describe the actions of the Washington-influenced International Monetary Fund (IMF) and the World Bank (WB) in pursuit of their versions of global welfare (Williamson, 2000).

The most recent examples of the programme in action are found in Europe, although it is first necessary to contextualise the reference. Literature suggests that the EU has gone further than any other group of member states to embrace the principles of the WC and, while there is significant reference to the WC, what is "less widely recognised is that there really exists only one pure laboratory experiment implementing the Washington Consensus in the Western World: Europe. [It] ……. has gone very far in the internalisation of the Washington Consensus; in fact, it has devised constitutionally a form of government that has no choice but to implement it" (Fitoussi & Saraceno, 2013: 1). It can be argued that in so doing Europe laid the foundation for the poor growth it is currently experiencing. There is also some evidence of convergence of IMF and EU funding policies, with the EU adhering to a much more orthodox monetary regime than the IMF (Lütz & Kranke, 2014). Essentially, the new member states of the EU had no choice but to incorporate the Acquis Communautaire (accumulated body of EU law and protocols since 1958) into their legal and regulatory administrations. Whilst the accession states had no choice but to engage completely, it is irrelevant whether the debate is based on the WC programme or any augmented or post application: to have done otherwise would have led to denial of entry. Those Western Balkan countries in the accession process face the same dilemma in a one-sided negotiation, where the conditionality of membership is non-negotiable (Lavigne, 2000). This will result in the same systemic change as that forced on the countries of Central and Eastern Europe.

Following the eurozone crisis, the internalisation of the WC has been epitomised in the formation of a Troika consisting of the European Commission (EC), the European Central Bank (ECB), and the IMF to bail out Portugal, Italy, Ireland, Greece, and Spain (the PIIGS). The policy of austerity, demanded in return for money, is the very bedrock of the IMF's strategy of external conditionality and serves to demonstrate the extent to which the EU has internalised the WC (Featherstone, 2015). This view is further emphasised by the crises in Hungary, Latvia, and Romania in 2008/09 when the EU and the IMF cooperated to provide

a rescue package. It should be noted that the conditionality imposed by the EU was far stricter than recommended by the IMF (Lütz & Kranke, 2014).

There is universal acceptance that the NMS have benefitted economically from EU membership. Foreign Direct Investment (FDI) has been a significant influence in the privatisation process, resulting in a more competitive environment for domestic firms and leading to the introduction of international production networks (IPNs) in the manufacturing sector. This form of vertical investment has increased exports, with evidence showing that the most productive firms self-select into becoming exporters. While there is little evidence regarding technological transfers, the evidence is contradictory in relation to export premia and spillover effects, which may have led to the crowding out of domestic firms. Actions taken by NMS governments to attract FDI have led to tax breaks and infrastructure expenditure which, exacerbated by profit repatriation, have had a deleterious effect on national welfare. The NMS still fall short of the ultimate objective of full convergence with the EU15, with the danger that the whole process will stagnate (Halmai & Vásáry, 2010; Epstein & Jacoby, 2014; Bodewig & Ridao-Cano, 2018). However, in reality the economic benefits far outweigh any influence on democratic development and there is evidence of state capture on both the political and corporate fronts. While the NMS are economically more prosperous, and their actions recognise this, they continue to fall prey to populist illiberalism that pushes the boundaries of the Acquis Communautaire and tolerates corrupt practices in pursuit of its own agenda (Epstein, 2014; Houghton, 2014; Jacoby, 2010; Medve-Bálint, 2014; Innes, 2014).

This research focuses on the effect of the accession process on firms within the NMS and the outcome variable, productivity. It is clear that work on productivity is at times contradictory, with arguments both for and against the influence of FDI and trade liberalisation, particularly regarding domestic firm productivity. Studies examining single countries (Pavenik, 2002; Amiti & Konings, 2007; Topalova & Khandelwal, 2011) generally find significant evidence of productivity improvement. For cross-country regressions the results are less conclusive, with some finding that trade liberalisation has little or possibly a negative impact on country productivity (McMillan, et al. 2012; Freeman, 2004).

The harnessing of the productive inputs of capital, labour, and technology is at the heart of a successful economy. A comprehensive literature review suggests that while managers have significant control over the endogenous determinants of production, they can do little about exogenous influences (Syverson, 2011). Whilst literature does exist on the subject, the majority deals with the specific issues grounded in theory. Little research examines the relative performance of firms subjected to geopolitical economic shocks, the materiality of fund flows, and the influence of key determinants of firms' performance.

This paper provides an insight into the influence of the key elements of the WC programme on firm-level performance, measured as productivity. There is little evidence that a comprehensive analysis involving research that explores the holistic relationship of key determinants on firm-level performance has been attempted before. Overwhelmingly, the literature concentrates on work at the macro-economic level, with a leavening of either qualitative research based on non-empirical data, or econometric modelling based on simulations.[1] Equally, there is a significant body of literature relating to specific countries and particular elements of the WC, such as privatisation, FDI, and trade liberalisation (Amiti & Konings, 2007; Estrin et al., 2009; Wagner, 2012; Estrin & Uvalić, 2016; and Waldkirch, 2014). However, little research exists that examines the effect of trade liberalisation at the firm level, applying empirical data to analyse comprehensively the relationship between it and firm performance.

The neoliberal paradigm epitomised by the WC assumes that improved business performance will be distributed to all participants in the process. Krugman's hypothesis is that international trade is a key determinant of wage reduction and income inequality, refuting the belief that it is technologically driven. He claims that the vertical integration of global supply chains maintains the comparative advantage of cheap labour in the economies of developing countries (Krugman, 2008). While his main focus is trade between the US and China, this resonates

[1] On the South East Asia crisis see Wade and Veneroso (1998) and Beeson and Islam (2005); on South America see Pavenik (2002), Franko (2007), Grugel et al. (2008), Grugel and Riggirozzi (2012) and Peluffo (2014); on Eastern Europe see Gabrisch and Hölscher (2006), Ban and Blythe (2014) and see Estevadeordal and Taylor (2012) for simulations.

with the economies of Eastern Europe in the transition between a command and market economy.

Evidence in both the developing and developed world shows that an increase in the skill premium increases inequality between skilled and unskilled workers, with the more-educated benefitting most (Goldberg & Pavcnik, 2004; Acemoglu, 2003). Trade liberalisation and FDI introduce capital, technology, and intellectual property, and therefore increase the demand for skilled labour. Simultaneously, the introduction of competition causes an exit of the most unproductive domestic firms and a reduction in rents, putting pressure on the most factor-abundant element, namely, unskilled labour (Arbache et al., 2004).

The literature includes significant critical analysis of the WC, particularly in relation to income distribution and poverty alleviation. However, the approach is essentially macroeconomic, albeit based on empirical data and econometric methodology. The main findings show a duality in the labour market, with temporary and self-employed workers earning less than permanent employees who are more experienced, educated, and skilled. The WC therefore proves expensive in terms of social cost (Hölscher et al., 2011; Hölscher, 2009). In part, FDI flows appear to be driven by lower labour costs. Labour productivity is an important determinant, resulting in policies to deregulate labour markets (Bellak et al., 2008). This finding is confirmed by econometric analysis, which indicates the importance of labour market institutions over time, with deregulation improving performance and active labour market policies reducing unemployment (Lehmann & Muravyev, 2012). When competition and financial markets are underdeveloped, there is an increase in income inequality (Aristei & Perugini, 2011).

Evidence indicates that strong policymakers are as essential as the accepted tools of a market economy (Popov, 2009). However, the narrative would not be complete without examining the influence of institutional and financial development on the transitional process –essentially, which aspects assist firm outcomes and which retard development. Evidence exists showing that strong trade liberalisation, financial reform, and legal development encourages FDI, and issues such as corruption and bureaucratic and infrastructure constraints have a negative influence (LiPuma et al., 2013).

The collapse of the Soviet bloc brought about the failure of institutions built on the strong bureaucratic edifice of a command economy within the political environment of a one-party state. The work of establishing a new paradigm is ongoing, particularly outside the NMS, and has posed significant challenges to businesses and entrepreneurs that have struggled with the development process as institutions evolve to obtain legitimacy (Gelbuda et al., 2008).

In relation to firms, the impact of the Washington Consensus programme and EU accession pivots around privatisation, FDI, firm ownership, and exports. Agency theory posits that privatisation strengthens the principal–agent relationship and the management team's motivation to improve performance. Findings in the literature suggest that privatised firms with foreign ownership or investment display efficiency improvements, whereas those in domestic ownership do not. Possible reasons for this centre on governance and the strength of institutions, with foreign investors providing firms under their ownership with clear managerial and technological support to ensure compliance by local management. In the domestic arena the agency relationship is ill-defined, giving the management team too much autonomy (Buck et al., 2008; Meyer & Peng, 2005). However, the route to foreign ownership was not necessarily direct since there is little evidence of FDI at the beginning of the privatisation process, with transactions being limited to domestic participants, and it is these who subsequently encouraged the substantive flow that emerged (Bevan & Estrin, 2004).

This research will therefore approach the question of the efficacy of the WC programme as internalised by the EU from the perspective of firms that experience the actual impact of trade liberalisation, FDI, financial flows, and international trade. It will allow these determinants to be measured against firm-level performance across regions, defined as new EU member states and non-EU countries, with different experiences of the WC programme. The performance of firms can then be measured against the investment and business climate, providing an opportunity to identify financial and institutional constraints and inform policy. Furthermore, it has the advantage of measuring the WC programme against a background of similar economic histories, politics, culture, and ideologies, thus suppressing the noise created by these elements in previous studies.

In micro economic literature there is a paucity of comparison of the effect of the WC programme, either in totality or in part, on specific trading nations and groups whose stage in the transition process has already been accurately measured, and this is a research gap. Data is available that allows the comparison to be analysed over two periods, which will provide a measure of progress towards transitional goals at the firm level, and a comparison between the two regions. It will further permit the identification of the determinants of both progress and sluggishness and provide some insight into the opportunities and threats.

In addressing the research gap and using EU membership as a proxy, the analysis covers the universal efficacy of the WC programme. Additionally, using a matching model, it evaluates the other key determinants of loans, FDI, exports, and innovation emanating from the WC programme and explores the influence of institutions and corruption. The objective is to contribute a holistic assessment of the WC programme across a wide set of parameters and provide a comprehensive view unique in the depth of its analysis. It covers 2005 and 2013 and tracks performance across an 8-year period to measure transitional progress, allowing for an assessment of the success or failure of key elements of the WC programme at the firm level.

3. DATA AND METHODOLOGY

The data for this paper is taken from the Business Environment and Enterprise Performance Surveys (BEEPS) and the World Bank Development Index (WDI). The former are the result of cooperation between the World Bank and the European Bank of Reconstruction and Development (EBRD) and their objective is to obtain feedback from firms to provide robust business environment indicators that are comparable across countries and companies. These surveys provide sufficient information to evaluate the influence of each element of the WC programme on firm performance, and the progress of institutional and financial reforms (Escribano & Guasch 2005, 2008; Iarrossi et al. 2006). BEEPS have been conducted since 1999 but the two utilised in this research were conducted in 2005 (BEEPS III) and 2013 (BEEPS V), with the rationale that the former followed the initial EU enlargement round in 2004 and the latter provides a comparison of firms that have spent some post-accession time in the EU.

In the enterprise surveys the EBRD uses standardized survey instruments to collect firm-level data on the business environment from business owners and senior managers. These standardized instruments allow for firm-level, cross-country comparison and analysis. The surveys provide a rich vein of data, including information relating to firm age and size, sales, costs, loan receipt, ownership, innovation, capital investment, and export status. They also include obstacles to business development, providing information across a range of criteria together with the influence of institutions. The BEEPS is a firm-level survey based on face-to-face interviews with managers that examines the quality of the business environment. The survey offers a representative picture of the business climate experienced by firms, together with performance and characteristics.

Table 1: Countries covered in this paper

Central Eastern Europe	**South Eastern Europe**	**Commonwealth of Independent States**
Czech Republic*	Bulgaria**	Armenia
Estonia*	Croatia***	Azerbaijan
Hungary*	Romania**	Belarus
Latvia*	Albania	Georgia****
Lithuania*	Bosnia and Herzegovina	Kazakhstan
Poland*	FYR Macedonia	Kyrgyz Republic
Slovak Republic*	Serbia and Montenegro	Moldova
Slovenia*		Russia
		Tajikistan
		Ukraine****
		Uzbekistan

*EU Accession 2004 **EU Accession 2007 ***EU Accession 2013 ****Ukraine never ratified the treaty forming The Commonwealth of Independent States in 1991 and Georgia withdrew in 2008

In the 2005 round the BEEPS comprised 9,500 enterprises in 28 countries, including Turkey and Turkmenistan, although both these countries have been eliminated from the database as the former does not qualify for inclusion on geographical, political, and economic grounds and the latter has an excessive number of missing values. The 2013 BEEPS consists of 15,861 interviews in 30 countries in Eastern Europe and Central Asia, including Turkey. For the purposes

of this paper, Turkey, Mongolia, and Turkmenistan have been eliminated, Turkey because it is an outlier in relation to the research and Mongolia and Turkmenistan due to an excessive number of missing values. The 2013 survey includes Serbia, Montenegro, Bosnia Herzegovina, and Kosovo as separate entities.

The research utilises the Inverse Probability Regression Adjustment (IPWRA) Treatment Estimator using STATA 15 and evaluates, primarily, the effect of EU membership on firm performance measured as output per worker (productivity) as the dependent variable. The selection of variables, including the identification of productivity as a measure of firm-level performance, is designed to produce a different perspective on the effect of key variables identified in the literature as influential in this process. Some of the control variables selected also serve as additional treatment variables when co-joined with EU membership in the IPWRA model.

The IPWRA model using regression adjustment and propensity score weighting can be used to bring a degree of robustness to the parametric model (Wooldridge 2010). It is one of a number of available matching models for the estimation of the average treatment effect (ATE) and the average treatment effect on the treated (ATET) together with the potential outcome means, which correspond to the outcome when a unit is treated and when it is untreated. This model is a combination of a regression adjustment model (RA) and an inverse probability weighted (IPW) estimator. The RA estimators utilise separate regressions for the different treatments and then use averages of the predicted outcomes to measure the potential outcome means (POMs). In the case of the subject of interest, ATET, the results are the averages of the predicted outcomes over the treated units. The IPW estimator uses weighted averages of the treatment outcome variable to estimate POMs. The weights are the inverse of the estimated probability that a unit receives a particular treatment. The outcomes of units likely to receive treatment are given a score close to 1, and those unlikely to be in receipt of treatment are given a score greater than 1. The model predicts the outcome of the treatment in the case of the former, and the treatment status in the case of the latter.

The IPWRA model combines the outcome element of RA with the treatment status of the IPW estimator. Two models are built: a logistic regression model to

predict treatment status and a linear regression model to predict outcomes. The RA estimator uses inverse probability weights for corrective purposes when the regression model is misspecified, but if correctly specified the weights do not affect the estimated outcome. Hence, IPWRA has the advantage of being doubly robust. If either the propensity score model (the outcome model) or the treatment model is correctly specified, the estimator will yield treatment effects with a lower bias than other estimators not characterized by the double-robustness property (Hirano et al., 2003).

The methodology described so far has covered binary treatment effects when each unit either receives treatment or does not. However, this research utilises a multi-valued approach in which each unit can receive several treatments, or none. This allows an analysis of the absolute effect of one or more treatments against no treatment and the relative effect of one treatment against multiple treatments. Thus, the result is evaluated on a broader canvas that provides information on the interaction of treatments, although the regression is still controlled by conditional covariates and each treatment can be analysed separately and in conjunction with the others.

The research seeks to establish the effect of EU membership, with four additional treatment variables, and estimates the Average Treatment on the Treated (ATT) effect. Essentially, it follows the most common approach by matching, by means of propensity scores, EU member ('treated') firms to non-EU member ('untreated') firms with similar characteristics, thus constituting a comparison group. Subsequently, it estimates the difference between output (productivity as the outcome of interest) (Y_1) for these firms, which includes the addition of a further treatment, against non-EU firms (Y_0) (Cerulli, 2010). Treatment effects are estimated in a multi-treatment context to ensure that EU firms and non-EU firms are carried out simultaneously. A matching approach with multiple treatments was first introduced by Lechner (2001). There are D (EU membership) with an accompanying treatment (receipt of loans, foreign ownership, export and innovation) plus an additional treatment, equal to zero, which denotes the absence of the introduction of either EU membership or any other treatment. The average treatment effect on the treated (ATT) effect is then calculated as:

$$ATT = E(Y^D \mid T = D) - E(Y^l \mid T = D) \quad (1)$$

Where D denotes the treatment level; l represents the comparison group (the treatment level to which each treatment is compared), and Y^D and Y^l denote outcomes in states D and l respectively. Outcome D is the value of the outcome variable for the treated group and outcome l is the value of the outcome variable for the comparison group.

To estimate the individual and joint effects of EU membership and receipt of a further treatment on productivity and profit, the variable Treatment was created with the following values using receipt of loans as an example:

Treatment (T) =0 if a firm is not in EU and did not receive a loan

Treatment (T) =1 if a firm is in EU but did not receive a loan

Treatment (T) =2 if a firm is not in EU but has received a loan

Treatment (T) =3 if a firm is in EU and has received a loan

Loans are substituted in turn by foreign ownership, international trade, and research and development.

The outcome model, shown below, and the treatment models utilising the same conditional variables are run separately, the former establishing the propensity score and the latter using a logit model and specifying the average treatment effect on the treated (ATET).

$$y_i = \beta_{x1i} + \delta_{x2i} + \theta_{x3i} + e_i \quad (2)$$

The outcome variable is y_i and the treatment variable is EU membership combined with either loan receipt or foreign ownership (FDI), exports or research and development (innovation). The vector of conditional variables is predicated on the literature and includes loans, foreign ownership, exports, and research and development, omitting a variable when it becomes a treatment. A vector of control variables δ_{x2i} including firm age, firm size, bureaucracy, and infrastructure is included, with sector and technology dummies θ_{x3i} representing industry sectors and technological intensity. Table 2 below summarizes the variables utilised.

Table 2: Variable Selection by Source

Variable name	Variable description	Source
Outcome variable both models		
Output per worker	Log of output per worker derived by dividing total sales by total full-time equivalent employees	BEEPS
Independent variables		
EU Dummy	1 if the firm is in an EU country, 0 otherwise	BEEPS
Foreign ownership	Defined as an investment of 10% or more in a local entity	BEEPS
Private domestic	100% owned by indigenous owners	BEEPS
Age	Firm age. Date established – 2005 or 2013	BEEPS
Exporting firm	Total exports (direct + indirect) as a percentage of total sales	BEEPS[1]
Size	Categorical variables = 0 if a firm has less than 5 employees; = 1 if a firm has more than 4 and less than 20 employees; = 2 if a firm has between 20 and 99 employees; = 3 if a firm has more than 100 employees; = 4 when a firm has more than 1000.	BEEPS
Loans	1 if the firm is in receipt of loans, 0 otherwise	BEEPS
Sector dummy	1 if manufacturing firm, 0 if services	BEEPS
GDP growth	GDP growth per country as percentage	WDI
Inflation	Inflation rate per country in 2005 and 2013 calculated using a GDP deflator	WDI
Bureaucracy[2]	The added score of perceived obstacles in the fields of customs, tax administration, business licencing, and labour regulation	BEEPS
Infrastructure	As above in the fields of electricity supply, telecommunications, and transport	BEEPS
Tech dummies (Low, mid, high)	Derived from BEEPS using ICIC codes.	BEEPS
Service dummies (1,2,3,4)	Derived from BEEPS using ICIC codes.	BEEPS

Source: BEEPS and WDI 2005, 2013.

[2] Perception of obstacles: 0= none, 1=minor, 2=moderate, 3= major, 4= severe.

Treatment effects of any matching estimator based on the propensity score are only estimated in the region of common support. The common support assumption $0 < P(D = 1|X) < 1$ implies that the probability of receiving treatment for each possible value of the vector X is strictly within the unit interval, as is the probability of not receiving treatment. Thus, it is necessary to check the overlap of the propensity scores at different treatment levels. The overlap plots (available on request) reveal that the predicted probabilities are not concentrated near 0 or 1, implying that the overlap assumption is not violated (Cattaneo et al., 2013).

The choice of treatments is predicated on the literature. There is evidence that firm growth in Eastern Europe has been adversely affected by lack of access to finance and the models in this paper seek to estimate the effect of loans on productivity both within and outside the EU (Levine, 2005; Volz 2011; Howard-Jones et al., 2018). In the former case it is achieved by pairing receipt of loans with EU membership, and in the latter by using the single treatment variable, which can be relatively compared with both treated and non-treated firms within and outside the EU.

The inclusion of foreign ownership results from the extensive literature on the subject, as FDI is one of the key determinants of Eastern European economic growth, particularly within the NMS of the EU (Wagner, 2012). The model is constructed in identical fashion to the loans model, although loans have been substituted for foreign ownership in the conditional variables.

Exports are included since there is evidence in the literature that exporters are more productive than non-exporters, many of whom become exporters as a result of their superior productivity performance. It is claimed that exporters may self-select towards a propensity for international trade (Greenaway & Kneller, 2004). The models utilised use the same techniques as previously described, with exports eliminated from the list of conditional variables. Research and development is a proxy for innovation, an important determinant of a successful firm: evidence suggests that firms that do not innovate face underperformance or market exit (Pratali, 2003; Ramadani et al., 2013; Tse et al., 2015; Ratten, 2015). A comparison of the performance of firms that innovate and those that do not provides some insight into the relevance of innovation as a measure of firm-level performance.

The computed results allow analysis of the comparative impact on firm-level productivity of each of the treatment variables, both singly and jointly, with the expectation that the NMS firms will outperform their non-EU peer group due to more-developed institutions, an enlarged market for goods, and increased FDI and competition. It is also anticipated that, notwithstanding EU membership, the additional treatment variables of loans, foreign ownership, exports, and innovation will increase productivity in both EU and non-EU firms. The absolute results will be shown as a percentage increase or no significance against the control group of untreated firms that are not in EU countries.

4. RESULTS AND DISCUSSION

The discussion in relation to the IPWRA results centres on comparing the results for 2005 and 2013 and evaluating the full sample of firm-level observations. The analysis covers both the absolute and relative effects of the comparison of the labour productivity performance of firms within the EU and those outside, using output per worker as the dependent variable. In addition to the comparison of EU and non-EU firms, a separate comparison is made between EU firms that receive the additional variable treatment and those that do not. An identical analysis is made for non-EU firms. Thus, the effect of EU membership alone is measured together with the effect of an additional treatment variable and its influence on firms in non-EU states. This provides the opportunity to discuss the advantages of membership (institutional development) and, separately, the influence of the additional treatment variable both within and outside the EU – the objective being to record whether firms from similar economic, sociological, political, and cultural backgrounds react differently when introduced to both EU membership and an additional treatment variable.

Descriptive statistics are included in Appendix 1. In 2005 the productivity mean measured in log form is 9.9. However, the range between the minimum and maximum is significant at 1.6 to 16.4, but the standard deviation suggests a normal distribution. Thirty-seven per cent of the sample consists of firms in EU countries. The mean of exporters is relatively low with a high standard deviation, indicating a great deal of heterogeneity in the sample. Foreign ownership also shows a high standard deviation. The average age of firms is 18 years and this may indicate a higher proportion of de novo firms entering in the post-Soviet period. The average size of firms is heterogeneous and ranges between 1 (less than 10

employees) and 7 (over 1000 employees). The average firm size is between 20 and 99 employees, indicating that the sample is skewed towards small-to-medium-sized enterprises. Domestic ownership has a comparatively low score, indicating that the sample is skewed towards single owners, partnerships, and cooperatives, as opposed to fully listed companies. Research and development measured as participation or not is small at less than 1000, as evidenced by the mean score. The institutional variables of bureaucracy and infrastructure indicate a relatively high level of obstacles to business. Loan participation is low across all sectors at a mean of 43%.

Compared with 2005, in 2013 productivity is marginally higher across the sectors, while the sample of EU firms is smaller. Exports are broadly similar, but foreign ownership participation is smaller. The average age of firms has reduced, indicating the participation of more de novo companies. Firm size is on average smaller, while domestic ownership and research and development participation are broadly similar. The institutional variable scores are significantly lower, indicating a lower perception of institutional obstacles to growth, but loan participation is lower, possibly indicating continuing market failure. The correlation matrices in 2005 and 2013 show no correlated variables above 50%.

Table 3 below shows the results for the absolute and relative effects. For ease of observation, only the percentage increase between the treated and untreated is shown. The full tables, including coefficient values – which summarise covariate values relating to treatment selection into a scalar value – are included in Appendix 1. The majority of the results are at the 99% confidence interval; therefore, any exception will be reported separately, and a lack of significance highlighted.

Table 3: Absolute and Relative Effects

ABSOLUTE EFFECTS						
Full Sample						
	1 vs 0		**2 vs 0**		**3 vs 0**	
Columns	**1**	**2**	**3**	**4**	**5**	**6**
	2005	**2013**	**2005**	**2013**	**2005**	**2013**
Loans						
ATT (in percentages) Output	0.109*** (0.005)	0.048*** (0.006)	0.041*** (0.004)	0.047*** (0.005)	0.146*** (0.005)	0.072*** (0.006)
Foreign Ownership						
ATT (in percentages) Output	0.124*** (0.003)	0.042*** (0.004)	0.025*** (0.006)	0.027** (0.014)	0.156*** (0.006)	0.060*** (0.012)
Exports						
ATT (in percentages) Output	0.116*** (0.004)	0.044*** (0.004)	0.050*** (0.006)	0.057*** (0.008)	0.138*** (0.007)	0.070*** (0.006)
Research and Development						
ATT (in percentages) Output	0.124*** (0.003)	0.046*** (0.005)	0.043*** (0.006)	0.057*** (0.008)	0.168*** (0.007)	0.080*** (0.009)
RELATIVE EFFECTS						
	1 vs 2		**3 vs 2**		**3 vs 1**	
Loans						
ATT (in percentages) Output	0.069*** (0.007)	0.001 (0.007)	0.103*** (0.005)	0.025*** (0.006)	0.023*** (0.003)	0.027*** (0.005)
Foreign Ownership						
ATT (in percentages) Output	0.084*** (0.008)	0.018 (0.011)	0.134*** (0.009)	0.053*** (0.018)	0.020*** (0.006)	0.054*** (0.009)
Exports						
ATT (in percentages) Output	0.048*** (0.007)	-0.010 (0.010)	0.080*** (0.007)	0.017** (0.008)	0.024** (0.011)	0.022*** (0.007)
Research and Development						
ATT (in percentages) Output	0.090*** (0.007)	-0.000 (0.009)	0.120*** (0.007)	0.020* (0.012)	0.027*** (0.006)	0.031*** (0.007)

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.

4.1 EU membership and Loans

In 2005, EU member firms without loans are 10.9% more productive than their non-EU counterparts, increasing to 14.6% when a loan is included. The influence of a loan on non-EU firms is clear, with a productivity improvement of 4.1%, indicating that loans are a key ingredient in both EU and non-EU states, although

within the EU, membership is the most important influence with the highest coefficient value. This suggests that the key influence on firms within the NMS is institutional development, which both supports and encourages market liberalisation. The effect of loans in EU and non-EU states is 4.6% and 4.1% respectively, indicating that there is a uniform effect regardless of EU membership and the socioeconomic and political environment. The importance of access to finance is universal throughout the transition economies.

Compared with 2005, in 2013 the productivity gap has reduced to 4.8% for EU firms alone, and to 7.2% when loans are included. For non-EU firms with loans, the productivity advantage shows a marginal improvement to 4.7%. That the ratio of loan advantage remains similar in all cases suggests that loans have continued to be significant over the 8-year period, and convergence has resulted from either an improvement in labour productivity among non-EU firms, or a diminution among EU firms. Schiffbauer and Ospina (2010) find that increased competition, supported by product-market reforms, increased productivity by circa 12% to 15%, which reflects the results seen in 2005.

The results in 2013 are more likely to indicate stability in non-EU states and a slowing down of productivity improvements in the NMS as firms get closer to the production frontier, together with difficulties in accessing finance possibly retarding performance improvement.

In relation to loans, the results appear to justify claims by Levine (2005) that finance, economic growth, and productivity improvement share a strong theoretical foundation, which Volz (2010) suggests applies specifically to countries in transition. Volz also concludes that the presence of state-owned and foreign-owned banks restricts access to finance for SMEs.

The relative results indicate that, in 2005, EU firms without loans were 6.9% more productive than non-EU firms with loans, indicating that even when finance is available outside the EU, membership still has a productivity advantage, further confirming that the institutional environment created by the Acquis Communautaire is a key component in improving productivity. This is achieved by developing a competitive market, supported by a free flow of funds encouraging FDI and a service sector capable of underpinning a market economy. However, the result is not statistically significant in 2013, indicating that any

institutional advantage had dissipated. This may be because well-financed firms in non-EU states were as productive as those in the EU without loans, although given the heterogeneity of the sample and other factors such as the financial crisis reducing liquidity, this can only be supposition.

When the comparison is between firms with loans within and outside the EU, the advantage for EU firms grows to 10.3% in 2005, diminishing to 2.5% in 2013. This supports the suggestion that firms in non-EU states had achieved a degree of convergence by 2013, indicating that the period immediately post-accession provided the greatest boost to member firms, which coincides with FDI peaking in the year of accession. When EU firms with and without loans are compared, the recipients have a 2.3% and a 2.7% advantage in 2005 and 2013 respectively, indicating the efficacy of loan receipts in both periods.

4.2 Foreign Ownership

The results for EU membership and foreign ownership continue to indicate that EU membership has the greatest influence on firm-level productivity, with a 12.4% advantage over non-EU firms. When firms are foreign owned the advantage increases to 15.6%. This finding conforms with the literature, indicating that FDI introduces increased competition and managerial and technological improvements to locally acquired firms, which is particularly true of the transitional economies of Eastern Europe (Bijsterbosch & Kolasa, 2010). However, as with loans, the advantage to EU firms diminishes over time, reducing in 2013 to 4.2% and 6% respectively. A comparison of foreign and domestically owned firms outside the EU yields a much smaller advantage at 2.5% in 2005 and 2.7% in 2013, indicating that the presence of FDI outside the NMS is less influential.

A 2005 comparison of foreign-owned firms outside the EU with domestically owned firms in EU states reveals that the former are 8.4% more productive, although, as with the loans result, the outcome is not statistically significant in 2013. This indicates that in 2005, foreign investors in non-EU countries were not achieving the traction enjoyed by domestic firms within the EU, and that a greater degree of market liberalisation, increased competition, and a stronger institutional base are more important than the technological benefits accorded by FDI. This conclusion is supported when firms under foreign ownership within

and outside the EU are compared. Foreign owned EU firms are 13.4% more productive than their non-EU peer group, although this converges to 5.3% in 2013. In non-EU states an improvement in national innovation capacity together with absorptive capacity leading to improved productive efficiency could also contribute to convergence (Bijsterbosch and Kolasa, 2010). In 2005 foreign-owned firms within the EU were 2% more productive than those in domestic ownership, rising to 5.4% in 2013, indicating that structural, managerial, and technological forces improve firm efficiency over time (Bijsterbosch & Kolasa, 2010). This could also be a reflection of the lack of spillover to domestic firms, particularly from multinational enterprises (MNEs) involved in vertical investments.

The dynamics of foreign ownership and loans may well be different, as FDI peaked on the date of accession and declined thereafter. This suggests that there may have been an accelerated productivity improvement effect leading up to 2004 (Howard-Jones et al., 2018). It is also evident from the marginal productivity improvement effect of foreign ownership, which remained static between 2005 and 2013, that FDI is less effective for firms outside the EU. This may well be the result of greater institutional development within the new member states creating a positive dynamic, which emphasises the accrued benefits. Additionally, the influx of foreign-owned banks would have improved the financial intermediation environment within the EU, at least for foreign-owned firms (Beck et al., 2005; Djalilov & Hölscher, 2016), although by 2013 the eurozone crisis would have had a negative effect on both FDI and the performance of foreign-owned firms.

4.3 Exports

In relation to exports, in 2005 the full sample of EU firms is 11.6% more productive than their non-EU peer group, and this advantage increases to 13.8% for exporting firms. In 2013 this advantage is reduced to 4.4% and 7% respectively. Of note is that outside the EU the advantage of exporters over non-exporters has been maintained at and show a small gain from 5% in 2005 to 5.7% in 2013. This is a higher productivity premium than that seen in NMS firms and may reflect the dominant role of foreign owners in the NMS export market, where firm performance indicators have the potential to be distorted by transnational inputs, transfer pricing protocols, and foreign currency exchange issues. A further factor is the nature of exports from the former Soviet Union, which are

predominantly geared towards the extractive industries where the high price of the refined product provides a boost to productivity when measured as output per worker. This confirms that exporting firms are more productive than non-exporting firms – a conclusion supported in literature (see Girma et al., 2004; Greenaway & Kneller, 2007; Wagner, 2012). However, the export premium enjoyed by EU firms remains static at between 2% and 2.5%.

The relative results indicate that in 2005 EU firms were 4.8% more productive than exporting non-EU firms, the result becoming statistically insignificant in 2013. There is evidence that the most productive firms self-select as exporters (Melitz, 2003; Beck et al., 2005). On the assumption that these firms are among the most productive, this implies that EU membership provides positive productive advantages to firms that do not export and are not, by definition, amongst the most productive. It is therefore apparent that the less productive firms in the EU are more productive than those at the top of the productivity distribution curve in non-EU states and, given the high intensity of FDI into the NMS, these firms are more capital intensive than the non-EU exporters (Hunya, 1997). The fact that results for 2013 are not statistically significant suggests that productivity convergence has occurred in the intervening years. This assertion appears justified when observing the results for foreign-owned firms both within and outside the EU. In 2005, exporters within the EU have an 8% advantage over their non-EU peer group, with the differential converging to 1.7% (95% confidence interval (C.I)) in 2013. This may be the result of the eurozone crisis, as the reduction in demand in the EU15 impacted upon exporters in the NMS, allied to the possibility that the extractive industry biased exporting from non-EU states, contributing to convergence (Kronenberg, 2004).

Within the EU, in 2005 exporters had a 2.4% (95% C.I) advantage over non-exporters, reducing marginally to 2.2% in 2013. The consistency of this result over time suggests that the export productivity premium is not as significant within the NMS as evidence in the literature suggests.

This may be a function of the type of exports within a more competitive market: cheaper labour-intensive products from the most productive firms that have continued to export but which in the light of increased competition have been forced to reduce prices. Alternatively, the major exporting countries, with many

foreign-owned firms trading within the IPNs, are dealing with a significant level of imported inputs leading to a limited ability to create added value. In both cases, the result is pressure on price cost margins. Given that the dependent variable is output per worker, any pressure on price will reduce output per worker, which may give a distorted result with a different outcome if total factor productivity is used (Böröcz, 2012). There is also evidence that there are no export premia for intra-European trade (Bellone et al., 2010).

4.4 Research and Development

In 2005, firms within the EU with no research and development activity were 12.4% more productive than their non-EU peer group, increasing to 16.8% amongst innovators. In 2013, as in other results, there is evidence of convergence with non-EU firms as the advantage was reduced to 4.6% with firms without R&D activity and 8% when the innovators were compared. This confirms that EU membership is the key driver of the productivity advantage, with innovation extending that by 4.4%. Amongst firms in non-EU states, innovators were 4.3% more productive than non-innovators in 2005, rising to 5.7% in 2013, revealing the importance of innovation in relation to productivity for all firms surveyed, although confirming that innovators within the EU have the additional advantage of membership. It further suggests that the collapse of the old Soviet-style, state-run research and development system has been replaced by an effective alternative that seems to be producing results.

The relative results indicate that firms within the EU are 9% more productive than innovative non-EU firms, although this figure becomes statistically insignificant in 2013. The result is a further indication that EU membership, with the conditionality of the Acquis Communautaire as the price of accession, is key to the productivity improvements achieved by firms in 2005. When innovators in both regions are compared, EU member firms are 12% more productive, again becoming insignificant in 2013.

This result appears to justify the assertion made earlier in relation to convergence, that in 2005 innovators appear to have a circa 3% advantage when the EU membership effect is removed and, on the assumption that this has dissipated by 2013, the innovation premium appears to have been eliminated.

These figures seem to apply universally, as innovators within the EU are 2.2% more productive in 2005, rising to 4% in 2013. This suggests that the innovation premium within the EU has grown at approximately the same rate as seen in non-EU states. However, it is important to appreciate that R&D was not a new concept in the transitional economies overall and that there existed a Soviet-style R&D system based on research institutes, with comparatively little firm in-house activity. The accession of the NMS to the EU introduced an improved contribution of structural funds aimed at a harmonisation of R&D policies and strategies, which encouraged an enhanced role for the state (Suurna & Kattel, 2010). The consequent emergence of an R&D environment based on the state, industry, and universities has led to an increase in patent activity, albeit emanating from transnational sources as a result of attempts to technologically integrate the NMS (Radosevic & Auriol, 1999). This suggests the beginning of a process of acquisition by MNEs intent on integrating privatised firms into the IPNs. The process of convergence seen in 2013, with a not significant result when comparing non-innovating EU firms with innovating non-EU firms, and a significantly reduced advantage when comparing innovating non-EU firms with EU firms, is not altogether surprising. The transition region overall, and Russia in particular, maintained a high level of product innovation at the global technological frontier, as evidenced by the BEEPS 2013 data (Radosevic & Auriol, 1999).

5. CONCLUSION

This paper measures the productivity of firms in the NMS against a control group of firms in the rest of Eastern Europe that are not members of the EU, including states that were formerly part of the Soviet Union. A multi-valued matching approach was adopted to measure EU membership, allied to some of the key determinants of firm-level productivity.

The results indicate that EU membership gives firms a positive advantage, with coefficient values higher in 2005 than 2013, by which time a significant level of convergence is observed. In 2013 a number of the results are not statistically significant and these, together with the evidence of convergence, suggest that the global and eurozone crises affected EU firms by reducing fund flows and collapsing demand in the EU15. This may have played some part in the convergence process, but when the absolute and relative results are compared it

is apparent that in 2005 the primary influence was EU membership, with the additional treatment effect of loans, foreign ownership, exports, and research and development having a lesser effect. The effect of R&D seems to have been broadly universal across both EU and non-EU firms.

Clearly, regarding the contribution of institutional development the immediate post-accession period was the most important. Additional motivation was provided by the imperative to conform to the Acquis Communautaire, which was pivotal in ensuring that the rule of law, effective regulations, efficient infrastructure, and a developing and supporting service sector were in place. Further encouragement came from the opportunity for foreign direct investment and access to the enlarged EU market. In turn this encouraged competition, driving up productivity. There is evidence that a liberalised market encouraged the growth of institutions and ensured their robustness (Medve-Bálint, 2014). and, using a different dataset, model, and specification, the results in this paper confirm those findings.

By 2013 the institutional influence was dissipating and the relative effects of EU membership, with no additional treatment variable, were becoming insignificant when measured against a non-EU firm with an additional treatment variable. This suggests that the added advantage of a multi-valued treatment effect in non-EU firms was sufficient for convergence with EU firms not benefitting from an additional treatment. Hence, the conclusion is that EU firms, having suffered from the eurozone crisis, had reached a plateau of maturity where institutional development was concerned.

There is evidence that the additional treatment variables of loans, foreign ownership, exports, and research and development had an appeal both in the NMS and the non-EU states, where firms in receipt generally showed an improved performance. These findings conform to the literature, which reveals that firms in receipt of loans improve productivity, confirming the importance of access to finance for firm performance.

Foreign-owned firms were more likely to be larger (if not older), the most productive, and more likely to have committed a significant element of capital, management, and technology. Exporters were more productive than non-exporters, although there may have been a self-selection process, as those

exporting were more likely to have been the more productive firms, evidenced by both the absolute and relative results. However, when comparing the performance of NMS firms against their non-EU peer group, the results for 2013 lack significance. This may be due to the eurozone crisis dampening demand in the wider EU, or because the majority of NMS exports were IPN-related, and given the high volume of transnational inputs the scope for added value was limited, thereby reducing the opportunity for an export multiplier. The Poland and Hungary Assistance for the Restructuring of the Economy (PHARE) initiative and the EU structural fund support positively benefitted those firms prepared to undertake research and development initiatives, and in 2005 the presence of a more advanced institutional development programme gave firms in the NMS an advantage. This was dissipating by 2013, as the old Soviet-style R&D model was replaced by one more conducive to a market economy and recessionary pressure impeded R&D investment within the NMS.

The trend observed across both absolute and relative results emphasises the importance of EU membership, which is essentially a proxy for institutional development. The establishment of a strong institutional base attracted FDI, foreign owners improved the productive capacity of the NMS, and access to a wider free market and the availability of structural funds provided a platform for continuous improvement. This suggests that the basic tenets of the Washington Consensus programme are efficacious in promoting firm-level productivity. However, the absence of statistical significance in some areas, together with evidence of convergence in others, may indicate a dissipation of the effect after an initial period of productive advantage.

There are certain policy implications. In overall terms, EU membership has a beneficial effect on firm performance. However, certain aspects of the way in which the Acquis Communautaire has been implemented, particularly the lack of control of FDI flows, the underdevelopment of financial intermediation, and the exploitation of host country comparative advantage, negatively impacted the national welfare of the NMS and the productivity of domestic firms. The dominance of international production networks in manufacturing exports resulted in an over-reliance on transnational inputs, which not only reduced value added, since the only contributor was labour, but curbed the potential for technological spillovers to domestic firms. There may have been further

distortions related to transfer pricing, currency exchange, and a reliance on labour as the only value added in the mix. Businesses enjoying idiosyncratically low input prices will appear to be hiring fewer inputs per unit output and this should be addressed.

The key limitation of this research is that it is an empirical investigation based on survey data, which is qualitative by nature. There is a danger that answers will be self-serving, particularly among entrepreneurs, and therefore not indicative of the population at large. There are some other key limitations to consider. Since there is a lack of longitudinal data, this is a cross-sectional study. Panel data does exist within BEEPS, but there is no evidence of any meaningful work using it, and the change in questionnaire and methodology between 2005 and 2013 provided a degree of misgiving in relation to its use. We were therefore unable to measure the dynamics of EU membership and the effect of conditional variables over time. Instead, we present two snapshots from the two dates studied. The results are based on matching models; causality issues may thus arise from unobservables that are not identified.

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APPENDIX 1

Summary statistics 2005

	Mean	St.Dev	min	max
Productivity	9.869	1.097	1.792	16.383
EU Membership	.367	.482	0	1
Export	9.005	22.704	0	100
Foreign Owner	8.649	25.787	0	100
Firm Age	17.871	62.272	4	2005
Bureaucracy	7.969	3.201	0	16
Firm Size	2.219	1.433	1	7
Infrastructure	5.366	2.155	0	12
Domestic Owner	1.941	.645	1	5
R&D	.319	.324	0	1
loan1	.428	.495	0	1

Summary statistics 2013

	Mean	St.Dev	min	max
Productivity	10.486	2.029	.367	24.635
EU Membership	.274	.446	0	1
Export	8.381	22.595	0	100
Foreign Owner	5.44	20.902	0	100
Firm Age	34.619	200.181	1	2013
Bureaucracy	2.693	2.862	0	16
Firm Size	1.579	.718	0	7
Infrastructure	2.514	3.018	0	12
Domestic Owner	1.996	.63	1	6
R&D	.108	.311	0	1
loan1	.352	.478	0	1

APPENDIX 2

Absolute effects						
Loans – Full Sample						
	1 vs 0		**2 vs 0**		**3 vs 0**	
Columns	**1**	**2**	**3**	**4**	**5**	**6**
	2005	**2013**	**2005**	**2013**	**2005**	**2013**
ATT Output	1.035*** (0.046)	0.493*** (0.055)	0.380*** (0.040)	0.482*** (0.053)	1.378*** (0.047)	0.740*** (0.063)
ATT (in percentages) Output	0.109*** (0.005)	0.048*** (0.006)	0.041*** (0.004)	0.047*** (0.005)	0.146*** (0.005)	0.072*** (0.006)
Foreign Ownership – Full Sample						
ATT Output	1.170*** (0.023)	0.439*** (0.043)	0.232*** (0.056)	0.293** (0.146)	1.478*** (0.062)	0.640*** (0.126)
ATT (in percentages) Output	0.124*** (0.003)	0.042*** (0.004)	0.025*** (0.006)	0.027** (0.014)	0.156*** (0.006)	0.060*** (0.012)
Exports – Full Sample						
ATT Output	1.098*** (0.035)	0.452*** (0.045)	0.464*** (0.056)	0.591*** (0.084)	1.312*** (0.057)	0.724*** (0.063)
ATT (in percentages) Output	0.116*** (0.004)	0.044*** (0.004)	0.050*** (0.006)	0.057*** (0.008)	0.138*** (0.007)	0.070*** (0.006)
Research and Development – Full Sample						
ATT Output	1.157*** (0.031)	0.387*** (0.056)	0.270*** (0.088)	0.559*** (0.135)	1.384*** (0.107)	0.812*** (0.122)
ATT (in percentages) Output	0.121*** (0.004)	0.037*** (0.005)	0.028*** (0.009)	0.053*** (0.013)	0.146*** (0.012)	0.077*** (0.012)
Observations	6628	11019	6628	11019	6628	11019

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.

Relative effects						
Loans – Full Sample						
	1 vs 2		**3 vs 2**		**3 vs 1**	
	2005	**2013**	**2005**	**2013**	**2005**	**2013**
ATT Output	0.681*** (0.061)	0.009 (0.075)	1.007*** (0.049)	0.271*** (0.066)	0.245*** (0.035)	0.292*** (0.056)
ATT (in percentages) Output	0.069*** (0.007)	0.001 (0.007)	0.103*** (0.005)	0.025*** (0.006)	0.023*** (0.003)	0.027*** (0.005)
Foreign Ownership – Full Sample						
ATT Output	0.817*** (0.069)	0.190 (0.118)	1.288*** (0.080)	0.569*** (0.185)	0.216*** (0.059)	0.582*** (0.096)
ATT (in percentages) Output	0.084*** (0.008)	0.018 (0.011)	0.134*** (0.009)	0.053*** (0.018)	0.020*** (0.006)	0.054*** (0.009)
Export – Full Sample						
ATT Output	0.484*** (0.084)	–0.105 (0.110)	0.801*** (0.069)	0.184** (0.091)	0.254** (0.114)	0.241*** (0.079)
ATT (in percentages) Output	0.048*** (0.007)	–0.010 (0.010)	0.080*** (0.007)	0.017** (0.008)	0.024** (0.011)	0.022*** (0.007)
Research and Development – Full Sample						
ATT Output	0.876*** (0.066)	–0.004 (0.104)	1.162*** (0.065)	0.218* (0.127)	0.290*** (0.061)	0.340*** (0.076)
ATT (in percentages) Output	0.090*** (0.007)	–0.000 (0.009)	0.120*** (0.007)	0.020* (0.012)	0.027*** (0.006)	0.031*** (0.007)
Observations (Full Sample)	6628	11019	6628	11019	6628	11019

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.

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"INFANT" ECONOMIES IN SOUTH-EASTERN EUROPE

ABSTRACT: *Transition economies have responded quite differently to similar procedures and foreign economic and sociopolitical interventions. This is partly because of the exogenous (from the economic perspective) features of each country. In the present paper we focus on the economic explanation. Following an introductory discussion of the stylized facts of the deepening segregation within the Central and Eastern European transition economies, we proceed with a general equilibrium model of imperfect competition (a la Dixit-Stiglitz). We introduce (1) more than one imperfectly competitive manufacturing sectors and (2) capital as the 'pseudo' production factor that provokes economies of scale.*
Based on the abstract theoretical model, we argue that the supposed automatic, self-balancing process for closing cross-country disparities may not appear, even if the non-economic factors are neutralized. This is because there is a possibility of experiencing a virtuous cycle of endogenously reinforced attraction of foreign accumulated capital. Economies that do not have the necessary features for this to happen because they start from a comparatively inferior level of development and/or due to a lack of pre-existing strong manufacturing – 'infant economies' according to our proposed terminology – will experience an endogenously justified, flatter path of development and may not find it easy to catch up with others.

KEY WORDS: *FDI under imperfect competition, infant economies, South-Eastern Europe*

JEL CLASSIFICATION: F21, F41

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1. INTRODUCTION

Foreign direct investment (FDI) is a critical factor in economic catching up. Damijan and Rojec (2004) show that FDI is an important if not the main vehicle of manufacturing-sector restructuring and productivity growth in the new EU member states from Central Europe. In general, the literature confirms this pattern around the globe, though the impact of FDI depends on emerging economies' local capacity to absorb superior technologies (Glas, Hubler, & Nunnenkamp, 2015).

Even if the effect on different aspects of economic development is debatable – especially with respect to distributional and sustainability issues[1] – capital accumulation and the resulting formation of production means and soft and hard infrastructure are crucial for the strengthening of domestic growth. As domestic (primary) accumulation may be time-demanding and given the increasing spatial mobility of capital, the inflow of foreign accumulated exchange value is both unavoidable and useful, especially (yet not only) when it comes to direct productive investment.[2]

The case of Central and Eastern European transition countries (CEECs) is similar, including those in South-Eastern Europe. Nevertheless, despite the common patterns of the COMECON[3] past, the spatial, political, cultural, and structural peculiarities of the different economies generated very different responses and development paths following the historical changes at the beginning of the 1990s (Popescu, 2014).

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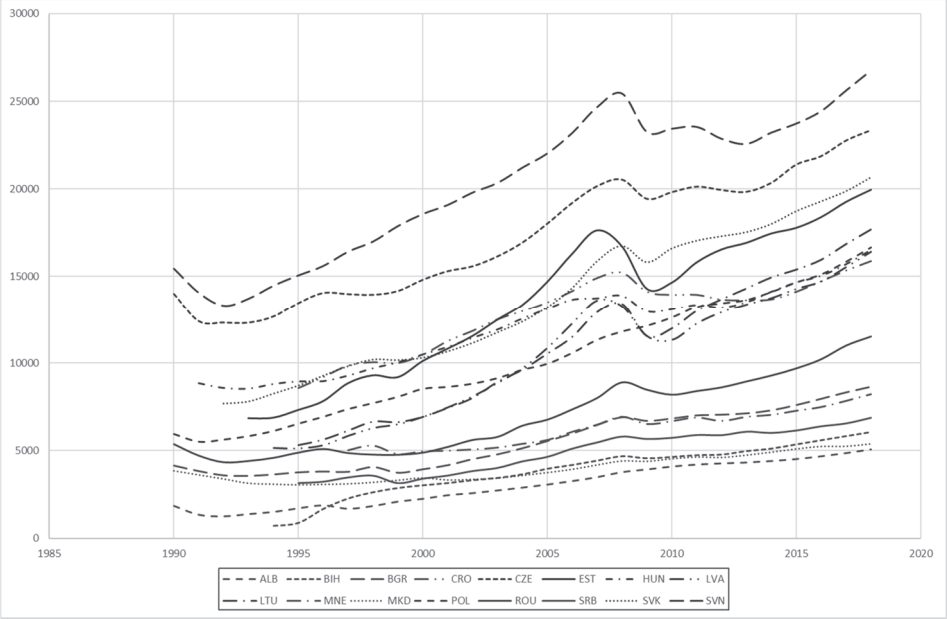
1 Think of the so-called FDI-crowding-out effect in specific sectors (Ahmed et al., 2015) and in the short run (Jude, 2017), and the cases of unsustainable exploitation of local human resources (Brandl, Strohmer, & Traxler, 2013), as well as the relevant comprehensive literature review in a report serving as a background document to the OECD-ILO Conference on Corporate Social Responsibility in 2008). Consider finally the environmental resources (Mabey & McNally, 1999), or the earnings outflow in the future.

2 See Almfraji and Almsafir (2014) for a relevant literature review

3 The Council for Mutual Economic Assistance (1949–1991) comprised the countries of the 'Eastern Block' under the economic and political leadership of the Soviet Union.

Diagram 1: Real GDP per capita in CEECs 1990–2018 (2010 US$)



Source: World Bank Development Indicators Database

The previous diagram of real GDP per capita evolution in the last decades reveals that this is especially true for the Balkans (the blue lines in the diagram and the purple line representing Romania, with the exception of Croatia, which seems to have a similar pattern to its northern neighbours). Post-imperialistic antagonisms along with local particularities induced processes quite different to those in the rest of the CEECs: dramatic migration, primary capital accumulation similar to the illicit and scandalous practices of primitive capitalism, and political disorder including heavy military interventions, large-scale crimes, and war.

The literature widely examines the special socioeconomic and political conditions referring to global circumstances and how they affected the Balkan countries along with their special characteristics. Balfour and Stratulat (2011) provide a useful review of this discussion, which, however, mainly indicates exogenous reasons for an atypical 'transition' of longer duration and dissimilar outcomes: progress in the South-Eastern Europe EU enlargement "has been uneven, marred by the persistence of unsolved statehood problems, which affect much of the

region" despite "the progress that the Balkan states have made in transforming themselves from war-torn countries into new democracies… At present, the countries in the region are still not fully effective democracies, as enforcing the rule of law remains problematic and accountability channels … are still dysfunctional" (Balfour & Stratulat, 2011: vii).

Our intention in the present paper is to analyse the macroeconomic impact of FDI inflows in an abstract theoretical way and thus to focus on an endogenous economic justification for addressing the different way that FDI worked in the South-Eastern European economies (among others). This should not be understood as a substitute, alternative explanation, but rather as an argument complementing the socio-political discussion.

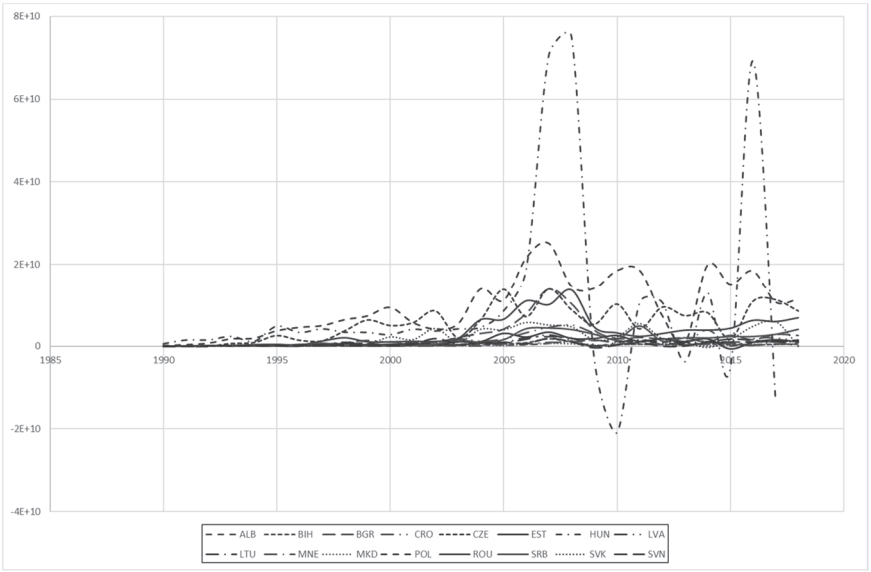
We first set up a general equilibrium model of imperfect competition (a la Dixit-Stiglitz) to analyse the macroeconomic impacts of FDI. We introduce (1) more than one imperfectly competitive manufacturing sector, and (2) capital as the 'pseudo' production factor that provokes economies of scale. Next, we derive theoretical arguments that can also be used in the Balkan economies. We expose a virtuous cycle of endogenously reinforced attraction of foreign accumulated capital. In reverse this means a case of 'infant economies', which, lacking pre-existing strong manufacturing, find it difficult to catch up with other economies. In our concluding remarks we discuss relevant policy implications and proposals for further research, especially to test the derived theoretical deductions empirically.

2. EMPIRICAL FACTS

Diagram 1 shows the clear segregation of CEECs: although they share similar socioeconomic and geopolitical starting conditions, in terms of GDP per capita there are two groups that are becoming increasingly disparate: the central/northern part and the southern part consisting of the Balkan countries (Croatia being an exception).

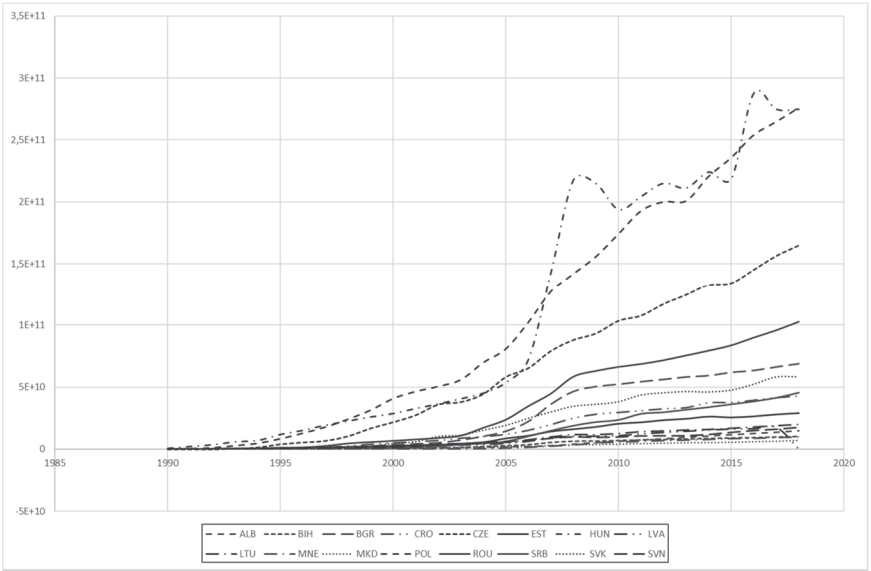
In the following we will argue that as well as the political, historical, and institutional arguments that explain the different development paths, they can also be explained by FDI, which may provoke quite different non-standard effects in host economies because of their crucial endogenous economic peculiarities.

Diagram 2: FDI net inflows in CEECs 1990–2018 (current US$)



Source: World Bank Development Indicators Database

Diagram 3: FDI net stock in CEECs 1990–2018 (current US$)



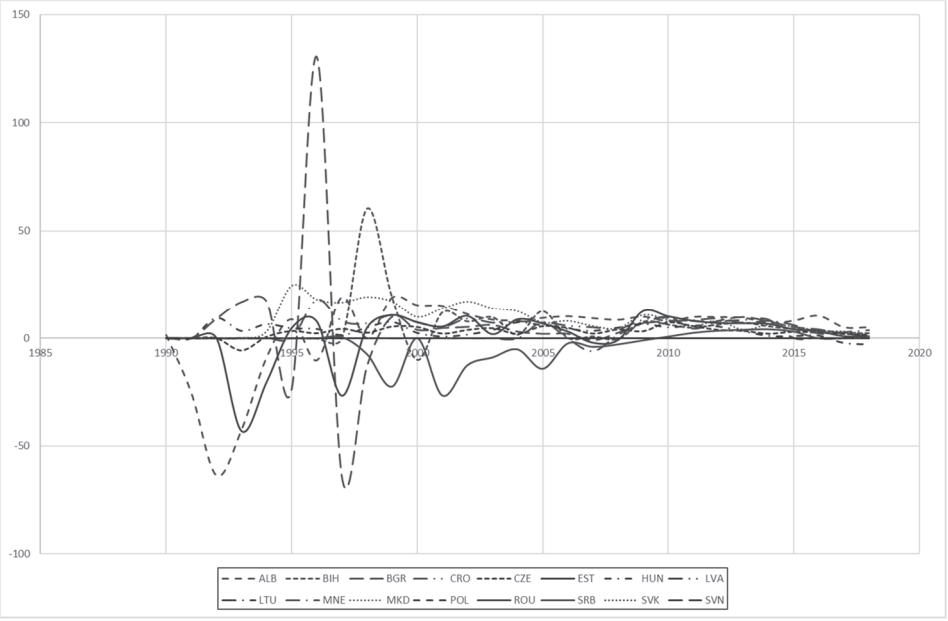
Source: World Bank Development Indicators Database

Diagrams 2 and 3 depict the evolution of FDI in CEECs over the same period (1990–2018), first in terms of annual net inflow and then in terms of the accumulated stock of foreign capital directly invested in production.

In particular the second diagram showing the evolution of the stock of FDI repeats the aforementioned segregation, with the exception of Bulgaria and Romania after their accession to the European Union. The matching of the different cross-country evolution of (real) income and the accumulation of foreign capital revealed in the present descriptive analysis is not particularly surprising. The literature has plenty of theoretical arguments for and empirical evidence of FDI being one of the most important factors in economic catching up.

The argument proposed in this paper refers to the endogenous process of reinforced FDI inflow forming this segregation, rather than a balanced process of closing the development path. As we will see, this appears mainly due to the non-standard effect on capital's remuneration in the host countries.

Diagram 4: Real interest rates in CEECs 1990–2018



Source: IMF, International Financial Statistics and data files using World Bank data on the GDP deflator

Indeed, the fourth diagram shows that despite the continuous pattern of FDI concentration in the central/northern CEECs since 1990, there is no indication of the opposite trend in real interest rates in the host countries. On the contrary, although there are significant cross-country differences, there is no certain pattern that could eventually, ceteris paribus, lead to a closure of the gap in FDI, and thereby in real GDP.

3. THEORETICAL FRAMEWORK

Relaxing the assumptions of perfect competition brings theoretical considerations closer to modern capitalist reality and allows for non-monotone, non-linear relations between the studied variables.

3.1 Basic model and autarky general equilibrium

The Dixit-Stiglitz (Dixit & Stiglitz, 1977) general equilibrium model incorporates imperfect markets by modelling monopolistic competition. It divides the economy into two sectors: one retains the classical features of perfect competition (symbolized by *A* for homogeneous products typically resulting from agriculture) and the second introduces the main manufacturing characteristic, namely products' inhomogeneity (*M*). Consumers' preferences can be represented in two interconnected equations. First, the basic utility function:

$$U = A^{1-m\mu} \prod_{i=1}^{m} M_i^{\mu} \tag{1}$$

where M_i represents a composite satisfaction derived from the consumption of the differentiated goods in the manufacturing branch $i(i=1,2,\ldots,m)$,[4] according to the following 'sub-utility function':

$$M_i = \left(\int_0^{n_i} x_{i,j}^{\rho} dj\right)^{1/\rho} \tag{2}$$

In that sense, $x_{i,j}$ is the consumption of variety j from manufacturing branch i. Note also that the differentiation of products is continuous within the specific

[4] Different to the standard version of the model, we introduce the existence of *m* different manufacturing branches in *M* sector. Still, note that the Cobb-Douglas-type utility function shows constant returns to scale.

range *[0,n_i]*. Therefore, we use the integral in the definition of M_i. Further, $0<\rho<1$ represents the intensity of consumers' preference for variety in manufactured goods and $\sigma \equiv \frac{1}{1-\rho}$ is the elasticity of substitution between any pair of varieties.

In this setting, consumer's behaviour can be solved in two steps:[5] first, we minimize costs ($\int_0^{n_i} p_{i,j} x_{i,j} dj$) for attaining a given M_i (subject to Equation 2), where $p_{i,j}$ is the price of variety j in manufacturing branch i. Thus, we obtain the compensated demand function. In the second step, consumers maximize U, subject to the following overall income constraint of the whole economy:

$$p_A A + \sum_{i=1}^{m} G_i M_i = Y_i \tag{3}$$

where G_i is an endogenously derived price index of all varieties in branch i[6]:

$$G_i = \left(\int_0^{n_i} p_{i,j}^{\rho/\rho-1} dj \right)^{\rho-1/\rho} \tag{4}$$

This yields the uncompensated aggregate demand functions:

$$A = {(1-\mu)Y}/{p_A} \tag{5a}$$

and $M_i = {\mu Y}/{G_i}$, or equally, given the minimum cost expression from the first step in Equation (3) and the already defined elasticity of substitution between any pair of varieties ($\sigma \equiv \frac{1}{1-\rho}$),

---

5 A two-stage budgeting procedure is applicable because preferences are separable between the perfect competitive sector and each manufacturing branch, M_i, the sub-utility function for manufacturers, is homothetic in the quantities m_{ij} (Deaton & Muellbauer, 1980). For a more detailed presentation of the derivation that we use here, see Fujita, Krugman, and Venables (1999).

6 For a more detailed derivation of G_i see also Fujita, Krugman, and Venables (1999). Note that in G_i the intensity of consumers' preference for variety defines the weighting of each variety's price. Moreover, the range of differentiation in each branch is also important for the price index: the higher the n_i the lower the *Gi*.

$$x_{i,j} = {\mu Y G_i^{\sigma-1}}\Big/{p_{i,j}^{\sigma}} \tag{5b}$$

Having solved the demand side,[7] the next task is to model the decision-making on the supply side. Here also we build on the Dixit-Stiglitz approach. The homogenous good in sector *A* shows constant returns to scale retaining the conditions of perfect competition. Manufacturing, however, involves fixed costs in addition to the variable labour costs, and thereby economies of scale at the level of each firm produce a specific variety.

In order to set up the cost function, we start with variable costs defined as the wage (w) multiplied by the 'amount' of labour required in a firm producing variety j of branch i ($l_{i,j}$), which in turn is a linear function of the quantity of products: $l_{i,j} = \gamma_i q_{i,j}$, where $q_{i,j}$ refers to the relevant level of production and γ_i is the branch-specific labour intensity (or in other words γ_i^{-1} is the constant labour productivity).

Next, we proceed with defining fixed costs (FC_i), which leads us to the second main innovation introduced in our model, namely the fact that $FC_i = rk_i$, where r is the remuneration of capital and k_i the amount of capital that has to be invested in order to enable production in each firm of manufacturing branch i.[8]

Therefore, (total) cost function ($C_{i,j}$) can be written as follows:

$$C_{i,j} = rk_i + w\gamma_i q_{i,j} \tag{6}$$

Note that all firms producing different varieties in branch *I* face the same cost function (the above-mentioned homogeneity with respect to production conditions). In other words, products' inhomogeneity may depend on their usability (how they contribute to consumers' utility, objectively or subjectively),

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7 For more details of the described solutions, see Fujita, Krugman, and Venables (1999) and Zarotiadis (2008).

8 Note that, next to labour, we introduce capital as a 'pseudo' production factor in the model. Although we do not explicitly discuss the type of the underlying production function, the way the cost function is structured means that while capital is necessary and useful (enables production and strengthens labour's productivity), it does not produce directly; therefore, it appears only as a fixed cost and is not related to the level of production.

but when it comes to the way how they are produced, all varieties of the same branch are equal.

To obtain producers' behaviour, we first define the profit function for each unit j in branch i ($\pi_{i,j} = p_{i,j}q_{i,j} - rk_i - w\gamma_i q_{i,j}$). After substituting $q_{i,j}$ with the demanded quantity $x_{i,j}$ and assuming that producers are price-takers considering G_i as given, we derive that the perceived elasticity of demand is σ. Therefore, marginal revenues are $p_{i,j}\rho$; setting them equal to marginal costs ($w\gamma_i$ in Equation 6) yields the π-maximizing price setting (see Zarotiadis 2008 for more details)[9]:

$$p_{i,j}^* = p_i^* = {w\gamma_i}/{\rho} \tag{7}$$

Thereafter, the maximized profit for each manufacturing firm in branch i is $\pi_{i,j} = \frac{w\gamma_i q_{i,j}}{\sigma - 1} - rk_i$. Recall that $\pi_{i,j}$ presents the excessive profits achieved, above the economy-wide adequate remuneration of capital (this is apparent in the above expression of profits). If we now assume free entry or exit, as soon as any firm j in branch i makes a positive excessive profit, new firms enter i producing a differentiated variety. As n_i increases, the branch-specific price index decreases ($\frac{dG_i}{dn_i} < 0$). Hence, the demand for each one variety in branch i (Equation 5b) shifts downwards. This continues till the maximum excessive profit that can be achieved equals zero ($\pi_{i,j} = 0$), which implies that the equilibrium output of any active firm in branch i is:

$$q_{i,j}^* = q_i^* = {r\rho k_i}\Big/{w\gamma_i(1-\rho)} \tag{8}$$

Before we proceed with solving the general equilibrium, a last point needs to be made: recall that marginal labour intensity (γ_i) and the need for fixed capital to be initially invested (k_i) are both branch-specific. We can easily imagine the different manufacturing branches ordered from the lowest to the highest capital-demanding technology: $\frac{dk_i}{di} > 0$. At the same time, as capital investments

[9] Note that the price for selling the profit-maximizing output is the same for all varieties of a branch.

strengthen labour productivity, $\frac{d\gamma_i}{di} < 0$. This means that as we move to higher-ranked branches, capital intensity increases and therefore labour intensity falls.

Having discussed all the aspects of the model, we can now proceed with solving the general equilibrium and deriving all crucial parameters. For this we need to set the three market-clearing equations, starting with the two full-employment conditions:

$$\sum_{i=1}^{m} \int_0^{n_i} k_i \, dj = \sum_{i=1}^{m} n_i k_i = K \tag{9a}$$

and

$$\sum_{i=1}^{m} \int_0^{n_i} \gamma_i q_i^* \, dj = \sum_{i=1}^{m} {n_i k_i r \rho}\Big/{w(1-\rho)} = L \tag{9b}$$

where K and L represent the country's capital and labour endowments respectively.

Further, to have autarky equilibrium, product markets also need to be cleared, which implies $q_i^* = x_{i,j}$. Substituting Equation (5b) with Equation (8) and taking the simplified version of $G_i = p_i^* n_i^{1/(1-\sigma)}$ (derived as all varieties in branch i setting the same price p_i^*) on the one hand and p_i^* from equation (7) on the other, leads to the third clearing condition:

$${rk_i}\Big/{(1-\rho)} = {\mu Y}\Big/{n_i} \tag{10}$$

We solve Equation (10) for k_i and put the derived expression in the full employment conditions (Equations 9a and 9b). We get:

$$r^* = {m(1-\rho)\mu Y}\Big/{K} \tag{9a}$$

$$w^* = {m\rho\mu Y}\Big/{L} \tag{9b}$$

Next, in equilibrium, economy's income (Y) can be determined as the sum of the produced value (note the similarity to Equation 3):

$$p_A A + \sum_{i=1}^{m} \int_0^{n_i} p_i^* q_i^* \, dj = Y^*$$

or equally:

$$p_A A + \sum_{i=1}^{m} n_i p_i^* q_i^* = Y^*$$

Next, we substitute p_i^* from Equation (7). Also, note that we can write output in terms of labour inputs, $q_i^* = {}^{l_i^*}/_{\gamma}$. Thus we get:

$$p_A A + ({}^{w}/_{\rho}) \sum_{i=1}^{m} n_i l_i^* = Y^*$$

or equally:

$$p_A A + ({}^{w}/_{\rho}) L = Y^* \tag{11}$$

Finally, we substitute *Y* from (11) in (9a) and (9b) and rearrange accordingly so that we get the endogenous definition of capital's and labour's nominal remuneration:

$$r^* = \frac{m\mu(1-\rho)p_A A\left(1+\frac{m\mu}{1-m\mu}\right)}{K} \tag{12a}$$

$$w^* = \frac{m\mu\rho p_A A}{(1-m\mu)L} \tag{12b}$$

The solution for an autarkic economy is complete. We can now derive some concluding expressions that give us a better picture of the model's behaviour. First, substituting w^* with r^* in Equation (8) and the respective rearranging yields the following derivation:

$$q_i^* = \frac{L}{K}\frac{k_i}{\gamma_i} \tag{13}$$

Second, we substitute Equation (11) with Equation (10) and replace *w* and *r* from Equations (12a) and (12b). The appropriate rearranging yields:

$$n_i^* = \frac{K}{k_i m} \tag{14}$$

We can also derive an expression for total output of branch *I* and its value:

$$n_i^* q_i^* = \frac{L}{\gamma_i m} \tag{15}$$

$$p_i^* n_i^* q_i^* = \frac{wL}{\rho m} \tag{16}$$

Based on the above, we can conclude on the comparative statics in autarky. As we move to branches of higher capital intensity (recall that $\frac{dk_i}{di} > 0$ and $\frac{d\gamma_i}{di} < 0$), we observe:

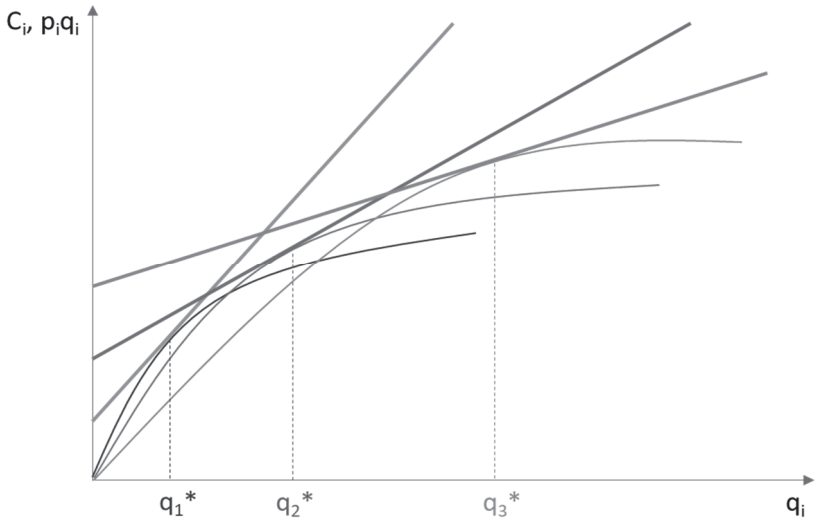
(i) fewer firms (Equation 14) and therefore
(ii) fewer differentiated products, but
(iii) higher labour input in each different firm, meaning the branch consists of bigger firms (Equation13).
(iv) Further, total output increases (Equation 15), but, because of
(v) lower prices (Equation 7),
(vi) the value of a branch's total output is the same for all branches (Equation 16).

The last deduction (vi) conforms completely to the 'logic' of the model, as the significance of each branch in consumers' preferences is the same (μ). This conformity is also obvious for all the above conclusions, with one exception: consider the fifth deduction (and see Equation 7) according to which the price of products in branches of higher capital intensity will be lower! Although the first impression is that the outcome is obscure, note that in all branches output is expressed in a common measure, namely in 'units of utility' or 'units of produced use-value'. If branch *1* produces clothes and branch *3* produces cars (with higher intensity of initial invested capital and therefore higher labour productivity, or in other words lower γ_i), Equation 7 does not imply that a shirt is more expensive than a car; rather it means that the exchange value (price) of a unit of utility (or

of use-value) produced in the clothing industry is higher than that of a unit of utility (or of use-value) produced in the automobile industry.

The following diagram depicts how the general equilibrium we presented applies in different branches simultaneously. The straight lines represent the three cost functions (Equation 6): red for firms in branch 1, blue for branch 2, and green for branch 3. As we see, firms in higher-order branches have higher initial capital investment requirements (higher fixed costs) and less labour intensity for scaling up production (smaller positive slope). Positive-sloped convex curves represent the turnover of a firm in each branch (p_iq_i) – their convexity signifies that each firm produces a differentiated variety and thereby holds a specific range of monopolistic power. Nevertheless, as we see in the diagram, in equilibrium all the firms in all branches have zero profit. Respective demands (and thereby turnover curves) have accordingly been condensed in order to be tangential to the valid cost line.

Diagram 5: Equilibrium price and output in the different branches



A final task is to determine endogenously the real income of the economy and the real compensations of capital and labour. For this we need to define the cost of living index (*CLI*)[10]:

$$CLI = p_A^{1-m\mu} \prod_{i=1}^{m} G_i^{\mu} \tag{17}$$

Next, we first put in the above-mentioned simplified version of $G_i = p_i^* n_i^{1/(1-\sigma)}$ and then we substitute p_i^* with n_i^*, from Equations (7) and (14) respectively. We get:

$$CLI = p_A^{1-m\mu} \left(w/\rho\right)^{m\mu} \left(K/m\right)^{m\mu/1-\sigma} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{\mu/\sigma-1} \tag{17'}$$

Thereafter, total real income (*RY*) for the whole economy, real wage (ω^*), and real interest (ε^*) can be attained by simply dividing respectively *Y*, *w*, and *r* by *CLI*.

$$RY = \left(m\mu/1-m\mu\right)^{1-m\mu} \left(1+\frac{1-m\mu}{m\mu}\right) \frac{A^{1-m\mu} L^{m\mu}}{\left(K/m\right)^{m\mu/1-\sigma} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{\mu/\sigma-1}} \tag{18}$$

$$\omega = \left(m\mu/1-m\mu\right)^{1-m\mu} \frac{\rho A^{1-m\mu} L^{m\mu-1}}{\left(K/m\right)^{m\mu/1-\sigma} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{\mu/\sigma-1}} \tag{19}$$

$$\varepsilon = \left(m\mu/1-m\mu\right)^{1-m\mu} \frac{(1-\rho) A^{1-m\mu} L^{m\mu}}{K\left(K/m\right)^{m\mu/1-\sigma} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{\mu/\sigma-1}} \tag{20}$$

To cross-check the above results, and also to reveal aspects of the functionality of the model, we proceed with the following exercise: we first calculate the real income produced in manufacturing by multiplying Equations 19 and 20 by *L* and *K* respectively.

$$\omega^* L + \varepsilon^* K = \left(m\mu/1-m\mu\right)^{1-m\mu} \frac{A^{1-m\mu} L^{m\mu}}{\left(K/m\right)^{m\mu/1-\sigma} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{\mu/\sigma-1}}$$

We then compare this with the previously derived Equation 18 for the economy-wide real income. Given that *RY* measures total income in real terms, which means in 'units of utility' or 'units of produced use-value', this can be interpreted

[10] For the specific definition of CLI see Fujita, Krugman, and Venables (1999).

as follows: the additional real income produced in sector A increases the economy's GDP by the multiplicator $\left(1+\frac{1-m\mu}{m\mu}\right)$. This expression takes values in the interval (1,+∞), and indicates the relevant significance of the two sectors for consumers. For instance, if the significance is the same ($1-m\mu=m\mu$), real GDP is double the real income produced in the manufacturing sector and distributed to capital and labour. (Note that in the determination of $\omega$and ε, production of A has already been considered.)

3.2 Checking the effects of FDI inflow

Our intention in the present paper is to analyse the macroeconomic impacts of FDI inflow in an abstract theoretical way and then to draw relevant conclusions for the Balkan economies. The preceding discussion provides us with all the necessary instruments for this. We have determined real income parameters and the other macroeconomic variables endogenously. What we now need is simply to study ceteris paribus all the possible changes that FDI inflow may induce (based on the relevant literature).

The first argument we can think of is that FDI apparently increases endowments of capital in the economy (K). In the relevant literature this refers to the standard trade theory, where FDI flows from origin to host country simply because of lower (relative) abundance of capital, and therefore higher interest and profit.

Based on the comparative statics studied above, we can easily see that as K increases, the total output in each branch i (Equation 15) as well as its exchange value (Equation 16) remain unchanged. Nevertheless, the number of producing units increases (Equation 14) and so does the variety of offered products (n_i). This is the reason why total real income increases too: recall that in this setting of imperfect competition, satisfaction rises not only by quantity but also by intensified quality differentiation. The first derivative of RY with respect to K verifies this:

$$\frac{\partial RY}{\partial K}=\left(\frac{m\mu}{\sigma-1}\right)\left(\frac{m\mu}{1-m\mu}\right)^{1-m\mu}\left(1+\frac{1-m\mu}{m\mu}\right)\frac{A^{1-m\mu}L^{m\mu}}{m^{\frac{m\mu}{\sigma-1}}\prod_{i=1}^{m}\gamma_i^{\mu}k_i^{\mu/\sigma-1}}K^{(m\mu/\sigma-1)-1} \qquad (21)$$

therefore, $\frac{\partial RY}{\partial K}>0$

We proceed with the effect on real remuneration. The real wage is also affected in a standard way, as the first derivative of capital inflow is positive:

$$\frac{\partial \omega}{\partial K} = \left(\frac{m\mu}{\sigma-1}\right)\left(\frac{m\mu}{1-m\mu}\right)^{1-m\mu} \frac{\rho A^{1-m\mu} L^{m\mu-1}}{m^{m\mu/\sigma-1} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{\mu/\sigma-1}} K^{(m\mu/\sigma-1)-1} \tag{22}$$

therefore, $\frac{\partial \omega}{\partial K} > 0$

Yet, when it comes to the effect on ε, things become more interesting:

$$\frac{\partial \varepsilon}{\partial K} = \left(\frac{m\mu}{\sigma-1} - 1\right)\left(\frac{m\mu}{1-m\mu}\right)^{1-m\mu} \frac{(1-\rho) A^{1-m\mu} L^{m\mu}}{m^{m\mu/\sigma-1} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{\mu/\sigma-1}} K^{(m\mu/\sigma-1)-2} \tag{23}$$

therefore, $\frac{\partial \varepsilon}{\partial K} > 0$ if $m\mu > \sigma - 1$ and vice versa.

The setting of imperfect competition allows for different effects of capital inflow in host economies: FDI-attracting countries in which domestic consumers have sufficiently low preference for variety (ρ) and/or sufficiently high preference for manufacturing products ($m\mu$) experience a non-standard increase in domestic returns to capital (ε). This means the endogenous onset of a virtuous cycle that highlights these countries against others with an analogue starting position.

Nevertheless, FDI is more than simply an inflow of foreign accumulated exchange value. Being directly involved in domestic manufacturing production, besides the increase in capital abundance that has been studied in the previous paragraphs, probably also dramatically changes the features of local production. In terms of the present model, this could mean two things: on the one hand, FDI induces a technological improvement, in other words an increase of initially demanded fixed capital investment k_i, and thereby an improvement in labour's productivity (shrinking of γ_i). This would have an impact on RY, ω, and ε through the term $\prod_{i=1}^{m} \gamma_i^{\mu} k_i^{\mu/\sigma-1}$ in the denominator of Equations 18, 19, and 20.

In order to analyse this, we link linearly γ_i and k_i: $\gamma_i = {\varphi}/{k_i^{1-\eta}}$ where $\varphi$is simply a positive constant and $\eta \in (-\infty, 1)$. Therefore, $(1-\eta) \in (0, +\infty)$ shows how strongly k_i inversely affects γ_i.

In this setting, $\prod_{i=1}^{m} \gamma_i^{\mu} k_i^{{\mu}/{\sigma-1}}$ becomes $\prod_{i=1}^{m} (\varphi k_i^{-\eta} k_i^{{1}/{\sigma-1}})^{\mu}$. To answer the question of how a change in k_i will affect the specific product is equivalent to seeing how it will affect the succeeding terms of the product. In other words, we need to check the sign of the following first derivative:

$$\frac{\partial \gamma_i^{\mu} k_i^{{\mu}/{\sigma-1}}}{\partial k_i} = \frac{\partial \varphi k_i^{\eta-1} k_i^{{1}/{\sigma-1}}}{\partial k_i}$$
$$= \left({(\eta\sigma - \eta - \sigma + 2)}/{(\sigma - 1)}\right) \varphi k_i^{\left({\eta\sigma-\eta-\sigma+2}/{\sigma-1}\right)-1}$$

Apparently, the sign of the above first derivative depends on the sign of the nominator in the expression in the first parenthesis $\eta\sigma - \eta - \sigma + 2 >< 0$,[11] which leads to the following conclusion: any increase of k_i (and thereby a decrease of γ_i) will have a positive effect on *RY* and εif $\sigma > {(\eta - 2)}/{(\eta - 1)}$. For instance, if $\eta=0$, any change in initial investment k_i has the inverse proportional effect on labour's intensity, and in order to have a positive effect on *RY* and $\varepsilon$the critical value for $\sigma$is 2. Otherwise, if ηrises towards 1, the effect on labour's productivity (γ_i^{-1}) becomes underproportional, the critical value of σgrows to infinity, and therefore having a sufficiently strong σ becomes less likely. On the contrary, if ηfalls towards $-\infty$, the effect on labour's productivity is over-proportional and the critical value of σtends to 1, which more or less secures a positive effect of FDI-induced technical improvement on *RY* and ε.

Putting the above together, when FDI triggers a process of technological improvement, the stronger the induced improvement in labour productivity is and/or the higher σ is, the more likely FDI is to also boost the real income

[11] Recall that $0<\rho<1$ and therefore $\sigma \equiv \frac{1}{1-\rho}$ is always greater than 1.

variables. To reverse this argument, induced technological improvements may also have reverse effects.

On the other hand, the expansion of manufacturing may result in the emergence of new sectors, that is, an increase in their number *m*. As we can see above, *m* plays an important yet also a very complex role in determining real income. Therefore, it is not possible to have a clear deduction, but only conditional conclusions. For this reason, we start by providing the first derivatives of *RY* and *e* with respect to *m*. Note that in this calculation of $\frac{\partial RY}{\partial m}$ and $\frac{\partial \varepsilon}{\partial m}$ we consider the expression $\prod_{i=1}^{m} \gamma_i^{\mu} k_i^{\mu/\sigma-1}$ as remaining constant, in order to focus on the other impacts:

$$\frac{\partial RY}{\partial m} = RY\left[\mu(lnL - lnA) + \frac{\mu}{\sigma-1}(lnK - lnm) - \left(ln\frac{m\mu}{1-m\mu}\right)\frac{\mu^2}{(1-m\mu)^2} - \frac{1}{m}\right] \quad (24)$$

$$\frac{\partial \varepsilon}{\partial m} = RY\frac{(1-\rho)\mu}{K}\left[m\mu(lnL - lnA) + \frac{m\mu}{\sigma-1}(lnK - lnm) - \left(ln\frac{m\mu}{1-m\mu}\right)\frac{\mu^2}{(1-m\mu)^2}\right] (25)$$

In both partial derivations in the brackets there is a clear negative effect, which comes from the simple fact that, for a given *K*, more branches simply means less variety. This is an argument that may lessen the positive impacts of the above-studied increase in *K*. Nevertheless, despite this argument, the sign of the derivations in Equations 23 and 24 may still be positive the more abundant a country is with respect to manufacturing production factors (*L* and *K*). In other words, for countries that already have a relatively expanded manufacturing sector, in the very reasonable scenario that FDI will also open new manufacturing branches, the previously discussed effects of an increase in *K* will probably be enhanced. Turning this around provides an additional argument for the case of 'infant countries'; in other words, countries at a comparatively inferior level of industrialisation get less strength from and/or utilise less effectively the inflow of accumulated exchange value from abroad.

The last important impact of FDI can be discussed if we proceed in the derivation of $\frac{\partial RY}{\partial m}$ and $\frac{\partial \varepsilon}{\partial m}$ after assuming that the significance of sector *A* (1-$m\mu$) will remain unchanged. In algebraic terms this could mean that μ is related in an inversely proportional way to *m*. Thereby, wherever *m* appears in the endogenous

determination of *RY*, *ω*, and *ε*, any change in this will be neutralised by the inversely proportional modification of μ.

Yet there is an exception, namely the term $\prod_{i=1}^{m} \gamma_i^{\mu} k_i^{\mu/\sigma-1}$, which appears in the denominator of Equations 18, 19, and 20: whatever is caused by this, the opposite results for *RY*, *ω*, and *ε*. To proceed, we first check how a change in *m* affects through μeach one of the terms of the product:

$$\frac{\partial\left(\gamma_i k_i^{1/\sigma-1}\right)^{\mu}}{\partial m} = \frac{\partial\left(\gamma_i k_i^{1/\sigma-1}\right)^{\mu}}{\partial \mu}\frac{\partial \mu}{\partial m} = \frac{\partial \mu}{\partial m}\left(\gamma_i k_i^{1/\sigma-1}\right)^{\mu}\left(\ln \gamma_i k_i^{1/\sigma-1}\right) \tag{26}$$

The sign of the above derivative depends on the natural logarithm. Given that we set $\frac{\partial \mu}{\partial m} < 0$, if $\gamma_i k_i^{1/\sigma-1} > 1$ the last parenthesis in Equation 26 will be positive and $\frac{\partial\left(\gamma_i k_i^{1/\sigma-1}\right)^{\mu}}{\partial m} < 0$. If we recall that we can define γ_i as a function of k_i, namely $\gamma_i = \varphi / k_i^{1-\eta}$, then the condition for *m* having a negative effect on each term of the product becomes:

$$k_i^{(\eta-1)(\sigma-1)+1/(\sigma-1)} > 1/\varphi.$$

As we move to higher order branches, k_i increases and so does the likelihood of having negative spillovers from *m*. On the other hand, an increase in *m* will have a positive effect for the product if the additional terms (the new branches) that are included are branches of sufficiently high capital intensity, k_i. All these make the final effect of FDI that we analysed (by checking the effects of a change in *m*) even more ambiguous. What we can keep from this discussion is only the strangely interesting result that if FDI concentrates on higher-ranked branches, this partly means negative pressure on its impact on the real income variables (*RY*, *ω*, and *ε*).

4. CONCLUDING REMARKS

In the present paper we relaxed the assumptions of perfect competition and set up a general equilibrium framework a la Dixit and Stiglitz, in order to

endogenously address the different way FDI may have worked in the South-Eastern European economies (also applicable in other cases worldwide).

Our model has two main innovative characteristics: (1) we allow m different manufacturing branches in M sector, and more importantly (2) we introduce capital as a pseudo-production factor: while necessary and useful (enabling production and strengthening labour's productivity), it does not directly produce; it appears only as a fixed cost and is not related to the level of production.

Solving the model and checking for the effects of FDI inflow in the country's real income (RY) and real compensations of labour (ω) and capital (ε) led us to the core theoretical conclusion: despite the positive effect of FDI in RY and ω,εmay also be positively affected if domestic consumers have sufficiently low preference for variety (ρ) and/or sufficiently high preference for manufacturing products ($m\mu$). In other words, countries that have a pre-existing strong (in relative terms) manufacturing sector (for whatever reason) may experience a virtuous cycle of endogenously reinforced attraction of foreign accumulated capital. Moreover, for those countries that have a relatively expanded manufacturing sector, in the very reasonable scenario that FDI opens new manufacturing branches, the effect of endogenously strengthened FDI attraction will be enhanced.

The detailed theoretical discussion revealed further arguments affecting the intensity of this process that appears due to non-standard effects on ε. For instance, when FDI triggers a process of technological change, the stronger the induced improvement in labour productivity is the more likely it is to also boost the real income variables. On the other hand, if FDI concentrates on higher-ranked branches, this partly means opposite pressures on the standard impacts on real income variables, ε included.

Overall, the message of the paper is that in an 'imperfect' economic environment – product inhomogeneity and increasing returns to scale – the supposed automatic, self-balancing process for closing cross-country disparities may not appear, even if the non-economic factors are neutralised. We revealed arguments for experiencing a virtuous cycle of endogenously reinforced attraction of foreign accumulated capital. Economies that do not have these features because they start from a comparatively inferior level of development and/or due to a lack of pre-existing strong manufacturing – 'infant economies' in our proposed terminology

– will experience an endogenously justified, flatter path of development and may not find it easy to catch up. Therefore, political intervention is needed for an energetic improvement of local production, infrastructure, and human capital, as well as to remove any pre-existing disadvantage in terms of industrialisation.

There are two paths that future research could take. First, it could proceed with more theoretical simulations – for instance, by letting the different manufacturing branches have dissimilar μ and/or by widening the presented general equilibrium model to opening product markets as well.

Second and more urgent, we need to get stronger empirical evidence for the derived theoretical arguments, either by focusing on the disparities among the CEECs or by including other regions as well. We can proceed by (1) examining the non-monotone relationship between FDI inflow and capital's compensation in time-series analysis, and (2) checking the cross-sectional differences of FDI welfare effects, in relation to appropriate control variables proxying the features revealed in the previous theoretical discussion.

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APPENDIX

A.1 Derivation of real income and real capital and labour's remuneration (Equations 18, 19, and 20)

In order to derive real (equilibrium) income (RY), divide Y^*(Equation 11) by CLI (Equation 17):

$$RY = {Y^*}/{CLI} = \frac{p_A A + ({w}/{\rho})L}{p_A^{1-m\mu}({w}/{\rho})^{m\mu}({K}/{m})^{{m\mu}/{1-\sigma}} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{{\mu}/{\sigma-1}}} =$$

$$= \frac{({w}/{\rho})^{1-m\mu} L}{p_A^{1-m\mu}({K}/{m})^{{m\mu}/{1-\sigma}} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{{\mu}/{\sigma-1}}} + \frac{p_A^{m\mu} A}{({w}/{\rho})^{m\mu}({K}/{m})^{{m\mu}/{1-\sigma}} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{{\mu}/{\sigma-1}}}$$

Next, we substitute w from Equation (12b):

$$RY = \frac{({m\mu}/{(1-m\mu)})^{1-m\mu} A^{1-m\mu} L^{m\mu}}{({K}/{m})^{{m\mu}/{1-\sigma}} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{{\mu}/{\sigma-1}}} + \frac{({m\mu}/{(1-m\mu)})^{-m\mu} A^{1-m\mu} L^{m\mu}}{({K}/{m})^{{m\mu}/{1-\sigma}} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{{\mu}/{\sigma-1}}}$$

$$= \frac{A^{1-m\mu} L^{m\mu} (\left({m\mu}/{(1-m\mu)}\right)^{1-m\mu} + \left({m\mu}/{(1-m\mu)}\right)^{-m\mu})}{({K}/{m})^{{m\mu}/{1-\sigma}} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{{\mu}/{\sigma-1}}} =$$

If we rearrange accordingly, we reach the final expression (Equation (18) in the main text):

$$RY = \left({m\mu}/{1-m\mu}\right)^{1-m\mu} \left(1 + \frac{1-m\mu}{m\mu}\right) \frac{A^{1-m\mu} L^{m\mu}}{({K}/{m})^{{m\mu}/{1-\sigma}} \prod_{i=1}^{m} \gamma_i^{\mu} k_i^{{\mu}/{\sigma-1}}}$$

Further, for real wage (ω) we divide w^* by CLI (Equation (17)):

$$\omega = \frac{w^*}{p_A^{1-m\mu}\left({}^{w}/_{\rho}\right)^{m\mu}\left({}^{K}/_{m}\right)^{{}^{m\mu}/_{1-\sigma}}\prod_{i=1}^{m}\gamma_i^{\mu}k_i^{{}^{\mu}/_{\sigma-1}}} = \frac{w^{1-m\mu}}{p_A^{1-m\mu}(\rho)^{-m\mu}\left({}^{K}/_{m}\right)^{{}^{m\mu}/_{1-\sigma}}\prod_{i=1}^{m}\gamma_i^{\mu}k_i^{{}^{\mu}/_{\sigma-1}}}$$

After substituting w^* from Equation (12b) and several rearrangements we get the final expression (Equation (19) in the main text):

$$\omega = \left({}^{m\mu}/_{1-m\mu}\right)^{1-m\mu}\frac{\rho A^{1-m\mu}L^{m\mu-1}}{\left({}^{K}/_{m}\right)^{{}^{m\mu}/_{1-\sigma}}\prod_{i=1}^{m}\gamma_i^{\mu}k_i^{{}^{\mu}/_{\sigma-1}}}$$

Similarly, we divide r^* from Equation (12a) by CLI from Equation (17):

$$\varepsilon = \frac{r^*}{CLI} = \frac{m\mu(1-\rho)p_A A\left(1+\frac{m\mu}{1-m\mu}\right)/_{K}}{p_A^{1-m\mu}\left({}^{w}/_{\rho}\right)^{m\mu}\left({}^{K}/_{m}\right)^{{}^{m\mu}/_{1-\sigma}}\prod_{i=1}^{m}\gamma_i^{\mu}k_i^{{}^{\mu}/_{\sigma-1}}}$$

Appropriate rearranging yields the final expression (Equation (20) in the main text):

$$\varepsilon = \left({}^{m\mu}/_{1-m\mu}\right)^{1-m\mu}\frac{(1-\rho)A^{1-m\mu}L^{m\mu}}{K\left({}^{K}/_{m}\right)^{{}^{m\mu}/_{1-\sigma}}\prod_{i=1}^{m}\gamma_i^{\mu}k_i^{{}^{\mu}/_{\sigma-1}}}$$

A.2 Derivation of Equations (23) and (24)

We want to discover the effect of an increase in m – the number of branches in the manufacturing sector – on real income (RY) and real compensation of capital (ε).

As m is included in all terms of the defined RY in Equation (18), we first analyse the first derivative in separate parts, as follows:

$$\frac{\partial RY}{\partial m} = \frac{\partial \left({}^{m\mu}/_{1-m\mu}\right)^{1-m\mu}\left(1+\frac{1-m\mu}{m\mu}\right)}{\partial m}\left(\frac{A^{1-m\mu}L^{m\mu}}{\left({}^{K}/_{m}\right)^{{}^{m\mu}/_{1-\sigma}}\prod_{i=1}^{m}\gamma_i^{\mu}k_i^{{}^{\mu}/_{\sigma-1}}}\right) + \frac{\partial\left(\frac{A^{1-m\mu}L^{m\mu}}{\left({}^{K}/_{m}\right)^{{}^{m\mu}/_{1-\sigma}}\prod_{i=1}^{m}\gamma_i^{\mu}k_i^{{}^{\mu}/_{\sigma-1}}}\right)}{\partial m}\left({}^{m\mu}/_{1-m\mu}\right)^{1-m\mu}\left(1+\frac{1-m\mu}{m\mu}\right)$$

The above two sub-derivatives can be analysed even further. After proceeding with all calculations, we reach the following longer expression:

$$\frac{\partial RY}{\partial m} = -\left(\left(1+\frac{1-m\mu}{m\mu}\right)\left(\frac{m\mu}{1-m\mu}\right)^{1-m\mu}\left(\frac{m\mu}{1-m\mu}\right)^{2}\ln\left(\frac{m\mu}{1-m\mu}\right) + \left(\frac{m\mu}{1-m\mu}\right)^{1-m\mu}\frac{\mu}{(m\mu)^2}\right)\left(\frac{A^{1-m\mu}L^{m\mu}}{\left({}^{K}/_{m}\right)^{{}^{m\mu}/_{1-\sigma}}\prod_{i=1}^{m}\gamma_i^{\mu}k_i^{{}^{\mu}/_{\sigma-1}}}\right) + \left(\frac{A^{1-m\mu}L^{m\mu}}{\left({}^{K}/_{m}\right)^{{}^{m\mu}/_{1-\sigma}}\prod_{i=1}^{m}\gamma_i^{\mu}k_i^{{}^{\mu}/_{\sigma-1}}}\right)\left(\mu(\ln L+\ln A) + \frac{\mu}{\sigma-1}(\ln K+\ln m)\right)\left(\frac{m\mu}{1-m\mu}\right)^{1-m\mu}\left(1+\frac{1-m\mu}{m\mu}\right)$$

Rearranging accordingly reveals RY as a common factor on the right-hand side, which leads us to the expression of Equation (24):

$$\frac{\partial RY}{\partial m} = RY\left[\mu(lnL-lnA)+\frac{\mu}{\sigma-1}(lnK-lnm)-\left(ln\frac{m\mu}{1-m\mu}\right)\frac{\mu^2}{(1-m\mu)^2}-\frac{1}{m}\right]$$

We then proceed with the same exercise for ε, where we start with appropriate rearrangements in Equation (20) so that RY also appears here as a common factor:

$$\varepsilon = \left({}^{m\mu}/_{1-m\mu}\right)^{1-m\mu}\frac{(1-\rho)A^{1-m\mu}L^{m\mu}}{K\left({}^{K}/_{m}\right)^{{}^{m\mu}/_{1-\sigma}}\prod_{i=1}^{m}\gamma_i^{\mu}k_i^{{}^{\mu}/_{\sigma-1}}} = RY\frac{(1-\rho)m\mu}{K}$$

Now the first derivative with respect to m can be derived more easily:

$$\frac{\partial \varepsilon}{\partial m} = \frac{\partial RY}{\partial m}\frac{(1-\rho)m\mu}{K} + \frac{(1-\rho)\mu}{K}RY$$

Substituting $\frac{\partial RY}{\partial m}$ with RY from above along with the algebraic transformations yields the final expression:

$$\frac{\partial \varepsilon}{\partial m} = RY\frac{(1-\rho)\mu}{K}\left[m\mu(lnL - lnA) + \frac{m\mu}{\sigma - 1}(lnK - lnm) - \left(ln\frac{m\mu}{1-m\mu}\right)\frac{\mu^2}{(1-m\mu)^2}\right]$$

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TRANSITION AND POST-CONFLICT MACROECONOMIC POLICIES IN SERBIA

ABSTRACT: *This paper evaluates the economic performance of the three distinct policy regimes that have been adopted in Serbia since the onset of transition in 2000. The conflict period from 1991 to 1999 determined the starting point of transition and its subsequent realisation. This pre-transition shock was more severe than the shock imposed by the Great Recession in 2008. Besides these shocks, the legacy of conflict, and unresolved privatisation issues, macroeconomic policies also substantially influenced the performance of the Serbian economy.*

Three distinct policies were implemented between 2000 and 2018 with clearly different approaches: neoliberal, populist, and interventionist. This paper evaluates these policies using quarterly data on 20 macroeconomic indicators classified in 5 groups: macroeconomic stability and domestic, foreign, financial, and labour markets. Regarding the achievements of the three macroeconomic policies, the neoliberal policy is usually blamed for all the deficiencies in the economy in the period between 2000Q1 and 2006Q2. To the contrary, our data indicates that this policy performed the best. The populist policy in the next period from 2006Q3 to 2012Q2 performed the worst. Finally, the interventionist policy, starting in 2012Q3 and evaluated up to 2018Q4, has been inferior to the neoliberal policy but superior to the populist policy. The analysis suggests that apart from macroeconomic policies the starting point of transition matters for a successful economic transition.

KEY WORDS: *economic policy, neoliberalism, populism, interventionism, Serbia*

JEL CLASSIFICATION: E65, O52

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1. INTRODUCTION

This paper presents empirical evidence of the achievement of the three macroeconomic policies in Serbia and analyses the effects of transition within their frameworks. It has been more than 19 years since the introduction of democratic changes in Serbia and the renewal of the transition process that began with the fall of the Berlin Wall in 1989. The period is long enough for an objective assessment of the different economic policies conducted in this period. Even as transition remained the enduring task, the macroeconomic framework changed, resulting in diverse outcomes.

It is possible to separate one economic policy from another, bearing in mind that they have been influenced by heritage, diverse theoretical backgrounds, and reactions to specific external shocks. The first, neoliberal policy was conducted between the fourth quarter of 2000 and the second quarter of 2006. The second, populist policy was in effect between the third quarter of 2006 and the second quarter of 2012. The third, state-interventionist policy, with a strong populist content, lasted from the third quarter of 2012 to the fourth quarter of 2018. In these periods, several governments were elected that pursued different economic policies.[1] To make our exposition simpler and easier to follow, we identify the 'First Government' with neoliberal policy, the 'Second Government' with populist policy, and the 'Third Government' with state interventionism.

Table 1 shows the key features of each of these macroeconomic policies schematically. The First Government conducted a neoliberal policy that deregulated prices and the exchange rate, liberalised foreign trade, imposed privatisation based on selling companies to strategic investors, restructured

[1] In the first period, ministerial cabinets were elected in two related states: the Federal Republic of Yugoslavia (FRY) and the Republic of Serbia. The writer of this article was Deputy Prime Minister of the Federal Government in the period 2000–2002, and Deputy Prime Minister of the Republic of Serbia's Government in the period 2004–2006, in both cases in charge of economic policy. Zoran Djindjić, Zoran Živković, and Vojislav Koštunica were Prime Ministers of Serbia, and Zoran Žižić and Dragiša Pešić were Prime Ministers of the FRY. Vojislav Koštunica and Mirko Cvetković were Prime Ministers during the second period of 2006–2012. In the third period of 2012–2018 Ivica Dačić and Aleksandar Vučić led the Serbian Government as Prime Ministers. Each government had a mandate of approximately six years, providing enough data for a statistical assessment of its achievements. See Labus (2018).

public debt, and rehabilitated the ruined banking sector. At the same time it increased public spending and implemented fiscal consolidation, with significant liberalisation of factor labour and capital markets. The difference between the inherited policies and these new policies was drastic. In the previous system there had been a dual exchange rate in which market and regulated foreign exchange prices were completely uncorrelated. Exports and imports were fully regulated by the licensing system, including fees for citizens entering and exiting the country. Regulating commodity prices below market levels created severe shortages and rationing of consumption. This system of full state regulation was replaced by macroeconomic policies based mostly on neoliberal doctrine.

Table 1: Main components of the three macroeconomic policies

Neoliberalism	Populism	Interventionism
Free floating currency.	Free floating currency.	Heavily managed floating currency.
Foreign trade liberalism.	Foreign trade liberalism.	Foreign trade liberalism.
Price deregulation.	Inflation targeting.	Constrained inflation targeting.
Resumed privatisation.	Postponed privatisation.	Postponed privatisation.
Large banks foreclosures.	Bank recapitalisation.	Bank regulation.
Public debt restructuring.	Public borrowing.	Public borrowing cum debt reversals.
Fiscal consolidation.	Fiscal expansion.	Fiscal expansion cum consolidation
Neoliberal market income policy.	Income redistribution.	Rising fiscal burden.
Neoliberal market industrial policy.	Industrial subsidies cum investors' discrimination.	Heavy industrial subsidies cum investor discrimination.
Policy rules.	Policy discretion.	Absolute policy discretion.

The Second Government initially continued with neoliberal policies, but later switched to a series of populist measures. It retained a floating exchange rate and free foreign trade, but introduced inflation targeting. Due to very high monetary policy rates, there was a sizeable speculative inflow of capital, which put pressure on the exchange rate and foreign exchange reserves due to the outflow of foreign currency through the Open Market Operations (OMO) of the National Bank of Serbia (NBS). Politics became discretionary. The government imposed redistribution of income, introduced subsidies for investment, and spent privatisation proceeds on consumption, postponed transition, increased public debt, and fiscal deficit. When the Great Recession came the government opened the door to state interventionism.[2]

The Third Government's interventionist policy initially continued with the populist policy, halting privatisation, postponing restructuring of public companies, and increasing fiscal deficit and public debt up to the point where the country was threatened with sovereign debt default. It then switched to fiscal consolidation, reduction of public administration wages and pensions, and tightening fiscal discipline. This policy increased the tax burden and continued to honour the subsidisation of foreign direct investment. The positive results of fiscal consolidation reversed the trend of public debt growth, but public sector salaries and other spending continued to grow. Allocation of foreign investment continued to be strongly influenced by the government.

Discretionary economic policy had turned into the absolute discretion of the state. 'Small' institutional changes were introduced that significantly changed the economic system. The exchange rate became a heavily managed float, where NBS interventions in the foreign exchange market, with frequent purchases and sales of foreign exchange, made the inflation rate and exchange rate the goals of the inflation-targeting system. The open market operations resulted in restrictions on the supply of debt certificates (CoD), creating a monetary system that controls both prices and quantities (repo rate and quantity of CoD).

As Table 1 shows, the populist policy shared some of the features and institutions of the neoliberal policy and continued to implement them for some time. The same applies to the relationship between the populist and interventionist policies.

[2] For the long-run effects of the Great Recession on the Serbian economy, see Uvalić et al. (2020).

However, interventionism gradually moved away from the neoliberal policy and abandoned all neoliberal market content except free foreign trade.

We measured the achievements of each macroeconomic policy based on 20 indicators divided into 5 groups for the period 2000–2018. We excluded the impact of the general trend and seasonal factors. We assessed policies based on the improvement they made on the inherited state of the economy. We did not consider the responsibilities and difficulties faced by the previous policy, nor did we take into account external shocks such as the breakup of the Federal Republic of Yugoslavia and the assassination of the Serbian Prime Minister (during the neoliberal policy, respectively), the Great Recession (during the populist policy), or floods and drought (during the interventionist policy). We also did not take into account institutional changes that cannot be statistically measured.

According to our estimates, the outcome of the first, neoliberal policy can be clearly distinguished from the results of the two other policies: the neoliberal economic policy was the most successful in recent Serbian economic history. The other two policies had very similar results until recently: 2017–2018 was a very successful economic period, which raised interventionist policy to second place. Unsurprisingly, the populistic policy performed the worst.

This article is organised as follows. The second section describes the starting point of all the post-conflict macroeconomic policies. The third section presents empirical evidence on the achievements of those policies. The fourth section ranks the performance of the policiess, and the fifth section concludes.

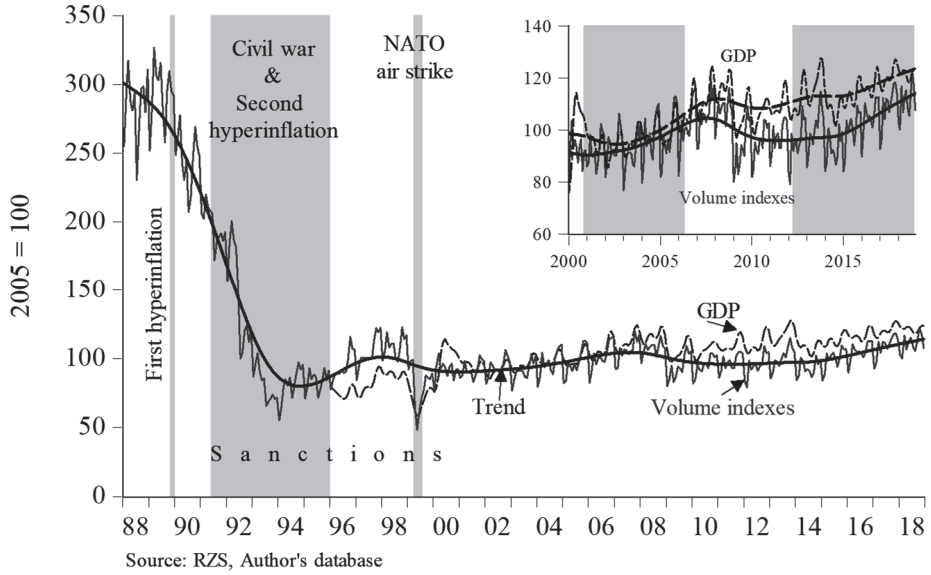
2. THE STARTING POINT

Figure 1 illustrates the starting point and history of transition in Serbia. The large graph shows the time series of industrial output and its underlying long-run trend for the period between January 1988 and December 2018. Volume indexes of industrial output are scaled to 100 points for 2005. The corresponding solid lines are coloured in blue and red. The dotted black line refers to real GDP in industry (manufacturing, mining, and electricity supply), also scaled to 100 points for 2005. These data have been published officially since the first quarter of 1996 and are not available before then; therefore we need to use volume indexes to indicate the long-term path of real GDP. The two time series have different dimensions.

GDP refers to gross value added generated in industry, while the volume indexes are quantitative measures of industrial output. Nevertheless, their cyclical pattern and trend correspond to each other pretty well. Hopefully, the path of GDP can be imagined for the entire period under consideration to give a visual impression of how deep the depression was.

The small graph in the upper right corner of Figure 1 emphasises the period of transition since the democratic changes between 2000 and 2018. We present both real GDP and output indexes in industry, as well as their short-run trends. The variability in this sub-period is greater than the long-run variability, so we nested this graph in the larger figure. The five shaded areas are of particular interest. The first refers to the first hyperinflation, which had tremendously adverse effects on the economy: the activity level dropped by 100 index points. The second shaded area corresponds to the civil war period, the breakup of Yugoslavia, and the second hyperinflation, when the activity level declined by additional 200 index points. After these adverse external shocks the economy started to recover due to a financial injection from the proceeds of privatisating the telecommunication network in 1997. However, this upturn did not last for long. The third shaded area indicates the consequences of the NATO airstrike in 1999, which cancelled all hopes of a quick recovery. The strike destroyed vital production capacity in Serbia, and industry has never fully recovered.

Figure 1: Deindustrialization and GDP [3]



The two shaded areas in the upper-right graph in Figure 2 show the short-term movements during the transition period. The first refers to the economy's development during the transition period based on neoliberal economic policies. The second relates to recovery after the Great Recession, characterised by strong government intervention. The area between these two periods reveals the impact of the Great Recession and the achievements of the populist economic policy.

Figure 1 presents a timeline of deindustrialisation, but it could also be named the destruction of Serbian industry and GDP in the last decade of the 20th century. The debacle started with hyperinflation at the end of 1989, which after a short but

[3] Data for all figures were downloaded from the web service of the RS Bureau of Statistics (RZS) https://www.stat.gov.rs/ (inflation, GDP, industry, investments, public spending, exports, imports, tradables, real wages, labour productivity, employment, unemployment), the Ministry of Finance (MF) https://www.mfin.gov.rs/ (fiscal deficit and public debt), and the National Bank of Serbia (NBS) https://www.nbs.rs/en/ indeks/index.html (exchange rate, euroisation, capital inflow, depth of financial system, bad loan provisions, and foreign exchange reserves). The problem is that these services provide monthly data from January 2004 onwards, while for the previous period they provide only annual values. To reconstruct the quarterly data for these four years we used our personal database, which we fully matched with the official annual values.

unsustainable price stabilisation turned into full-fledged hyperinflation from February 1992 to January 1994 – the second-largest hyperinflation in the world economy in the 20th century. During this period Yugoslavia disintegrated, civil war broke out, international sanctions were introduced, and in 1999 NATO bombed the country. One can hardly imagine more adverse shocks hitting an economy over such a short period of time.

These shocks are not an excuse for the failures of transition, but they clarify its starting point. Later during the transition period other external shocks would hit the Serbian economy. However, there were also internal policy shocks: one is the change from a neoliberal to a populist economic policy, and the other is the replacement of a populist economic policy with active state interventionism.

The transition in Serbia started with privatisation in 1989 in the Former Yugoslavia. The subject of privatisation was social capital, defined as an accounting counterpart to equity capital, over which the right of use was institutionally granted to self-managed establishments. The process was launched by adopting legislation transforming social property rights into insiders' equity shares, with consequent adjustments in business governance.[4] After the breakup of Yugoslavia in 1991, new legislation was adopted in Serbia, which completely undervalued equity capital under circumstances of hyperinflation. Later this legislation was amended by revalorization provisions, which virtually cancelled all previous cases of privatisation during the hyperinflation (apart from the privatisation of dwellings). Subsequently, a new model of insider privatisation was passed, under which only prime companies were attractive for privatisation. With the democratic changes the privatisation process was substantially modified. For the remaining non-privatised, socially owned businesses, a model of classical sales to strategic investors was adopted (through public auctions and public tenders). However, the privatisation proceeds were not reinvested but were

[4] The key legislation for privatisation is the following: *Law On Transformation Of Social Capital* (Official Gazette of SFRY No. 84/89 and 46/90), *Law On The Conditions And Procedure For The Conversion Of Social Property Into Other Forms Of Ownership* (Official Gazette of RS, No. 48/91), *Law On Ownership Transformation* (Official Gazette of RS No. 32/97) and *Law On Privatization* (Official Gazette of RS No. 38/01).

mostly included in the budget revenue to finance the fiscal deficit, leaving the level of productive capital unaffected.[5]

As the damage done to the physical production infrastructure had not been repaired after the civil war and NATO airstrikes, as many valuable companies were already in private hands, and as the socially owned banks were bankrupt, the scope and size of privatisation was dramatically reduced. Ignoring this fact, public expectations concerning the benefits of democratic changes and international assistance were enormous. The reality, however, was different: privatisation did not turn out to be the key driver of the Serbian transition and post-conflict development. This role had to be replaced by other unpopular government policies, which the public does not recognise. In the public perception, privatisation and neoliberal economic policy were to blame for all economic shortcomings in the post-conflict period. The public erased the civil war and its consequences from its memory.

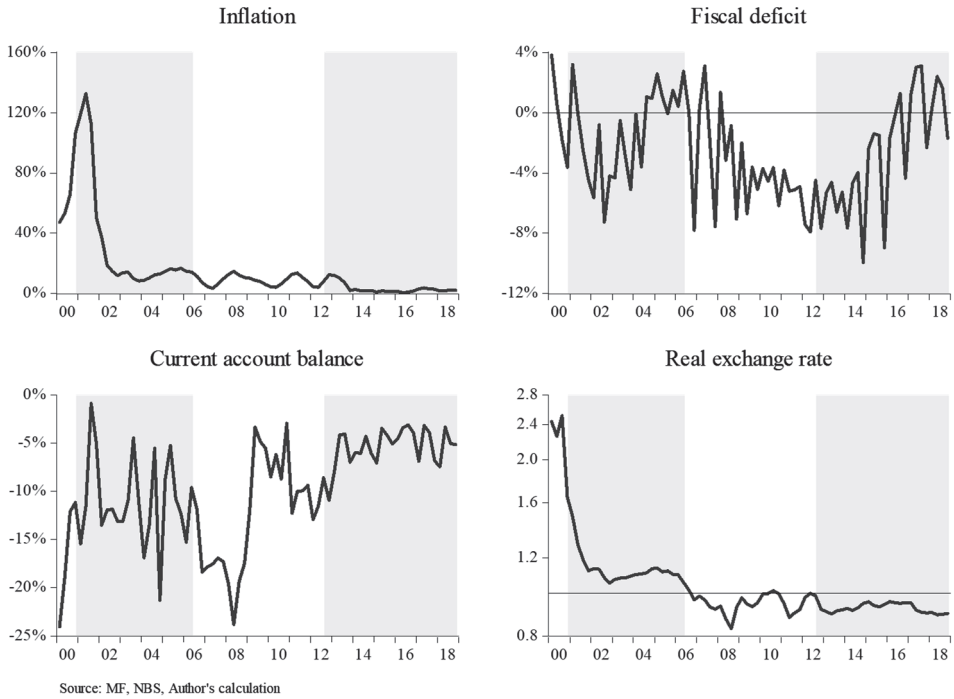
3. EMPIRICAL EVIDENCE

3.1. Macroeconomic Stability

Figure 2 shows economic policies' contribution to reducing macroeconomic imbalances based on four indicators: inflation, fiscal deficit, balance of payments, and real exchange rate. Inflation shows the imbalance in the commodity market, fiscal deficit shows the imbalance of state finances, balance of payments shows the imbalance in the external market, and real exchange rate shows the imbalance in the foreign exchange market.

[5] For further details see Uvalić (2004) and Cerović and Dragutinović Mitrović (2007).

Figure 2: Macroeconomic stability



Source: MF, NBS, Author's calculation

The neoliberal policies freed prices from administrative control and reduced inflation to a moderate level, reversed the fiscal deficit to a fiscal surplus, and restored the undervalued real exchange rate to a neutral level, but failed to reduce the payment deficit. The populist policies maintained moderate inflation, escalated payment and fiscal deficits to unsustainable levels, and overvalued the real exchange rate. The interventionist policies reduced inflation to a low level, consolidated the fiscal deficit, reduced the payment deficit to a sustainable level, and continued to overvalue the exchange rate.

Inflation. At the beginning of the transition period, inflation was very high and revealed huge imbalances in the domestic commodity market. Democratic changes took place in the third quarter of 2000 and the annual inflation rate increased to 85%. Inflation continued to grow for a year, not only due to the effect of the passing over of the previous year's prices but also because of the impact of new macroeconomic measures. During Milošević's rule, prices were controlled

and goods were rationed, creating market shortages. The supply of goods was consistently below demand. There were two options for re-establishing a macroeconomic balance: price deregulation, with the risk of further growth of already high inflation, or increasing the tax burden to subsidise prices. In the first case, the financial burden would fall on consumers, while in the second case it would fall on all taxpayers.

In line with neoliberal economic policy, the first option of price deregulation was selected. Most prices were freed from administrative controls, and the remaining prices that were still under the administrative control regime were raised to the level of market equilibrium. In 2001 the average price of railway services increased by 180%, electricity by 124%, natural gas by 103%, drugs by 80%, other public services by 70%, telephone services by 40%, and bread prices by between 50% and 80% depending on the type of bread. Meanwhile, average salaries only increased by 25%, so this economic policy was not going to be popular. In the first two quarters of 2001 the rate of inflation exceeded 100%. After that, inflation began to calm down, so that by the end of 2004 it was only 6%. However, it was slightly higher, 14%, at the end of the neoliberal period. During the period of liberalisation the inflation rate was reduced by 71%, as shown in Figure 2. In the meantime, all shortages were eliminated, and the commodity market was normalised again. Price deregulation is an unpopular economic measure, which in practice produced excellent results.

The Second Government adopted populist policies and inherited inflation of 14.0%. It managed to lower it to 5.5% by the end of its mandate in the second quarter of 2012. The interventionists took the inflation rate of 5.5% and reduced it to 2.1% by the end of the fourth quarter of 2018. After the liberalism period a monetary policy of targeted inflation was introduced, in which the main task of the National Bank of Serbia was to stabilise prices, regardless of the macroeconomic cost.[6] Under this monetary policy, one and a half billion euros were spent on defending the exchange rate and prices, and inflation was lowered by just 10%. The NBS tightened the interest rate policy (raising repo interest rates), contributed to a slowdown in economic growth, and intervened continuously in the foreign exchange market, reducing foreign exchange reserves.

6 See Šoškić (2015).

Fiscal deficit. In recent years, fiscal deficit and public debt have been at the centre of public debate, as at the end of 2014 the populist policy and its initial continuation in the period of interventionism brought Serbia to the brink of bankruptcy.[7] Neoliberal policy inherited a fiscal deficit of -1.8% of GDP but ended its mandate with a fiscal surplus of 2.7%. The movement of the fiscal deficit has been U-shaped. The largest deficit of -7.3% was achieved in the second quarter of 2002 when a three-year Stand-By Arrangement with the IMF was concluded. The result of this programme was positive. In the last eight quarters of the neoliberal policy there was a fiscal surplus, except for in one quarter.

Under the populist economic policy the fiscal surplus was turned into a fiscal deficit. This was only partly due to the Great Recession, since the negative trend was formed before the crisis. In the fourth quarter of 2006 it reached -7.8% of GDP. A similar record of 7.9% of GDP was set at the end of the populist mandate in the second quarter of 2012.

The interventionist policy continued the policy of easy public spending until it challenged fiscal sustainability. In the fourth quarter of 2014 the deficit was -10.0% of GDP, and in the fourth quarter of 2015 it was -9.0%. Therefore, a two-year Stand-By Arrangement with the IMF was concluded, supporting fiscal consolidation and eventually leading to a fiscal surplus in 2017–2018. Consequently, fiscal consolidation returned Serbia's economy to the position it had at the end of the neoliberal policy period.[8]

Balance of payments. The balance of payments shows the imbalance in the exchange of goods and services with foreign countries; i.e., in the foreign market. None of the economic policies achieved a positive balance of payments in the observed period in any quarter. This means that Serbia has a continual foreign market imbalance because it imports more goods and services than it exports.

Populist economic policies had the biggest problem with balance of payments. The largest balance of payments deficit was –23.8% in the second quarter of 2008, which was only partly due to the Great Recession. The crisis temporarily reduced

7 See also Madžar (2012).

8 See also Vujović (2018).

the deficit to –3.3% of GDP in the second quarter of 2009, but this level was unsustainable and slowly shifted to the limit of –10% of GDP.[9]

Interventionism in industrial policy had already started in the period of populist macroeconomic policy, but there were no results until a car manufacturing deal with FIAT took place, based on massive subsidies (Trifunović et al., 2009). That increased car exports and reduced the balance of payments deficit to -5%. A reduction in the price of crude oil and natural gas on the world market also contributed to a sustainable payment deficit. The current account gap was lowest in the period of pure interventionist policies, which inherited a balance of payments deficit of –12.3% of GDP and ended with a deficit of –5.1%.

The neoliberal policy did not have good results in terms of balance of payments deficit, but still managed to reduce it by 2.6 percentage points. It inherited a deficit level of -12.8% of GDP, which was decreased to -10.3% of GDP by the end of its mandate.

Real Exchange Rate. The real exchange rate is the ratio between the product of the nominal exchange rate and the price level in the eurozone on the one hand, and the price level in Serbia on the other hand. In that sense it depends on both the nominal exchange rate and relative domestic and foreign prices. We obtained the domestic price level as an implicit deflator of GDP, whose real level was normalised to the unit in 2010. We normalised foreign prices in the same way. The last thing was to normalise the nominal exchange rate to the unit value in 2010. This was done by dividing the nominal exchange rate by 103.4874, which represents the average annual RSD/EUR exchange rate calculated at the end of each month. In this sense, the long-term real exchange rate is equal to the unit. If this index value is below the unit, there is a real appreciation of the exchange rate. If the index value of the real exchange rate is above the unit it represents a real depreciation of the exchange rate. Real depreciation stimulates exports and destimulates imports. However, it also inflames inflation. Real appreciation, on the other hand, calms down inflation expectations but hurts exports.

Figure 2 shows that the neoliberal policy inherited a highly depreciated real exchange rate, but at the end of its period it had managed to stabilise it to a neutral

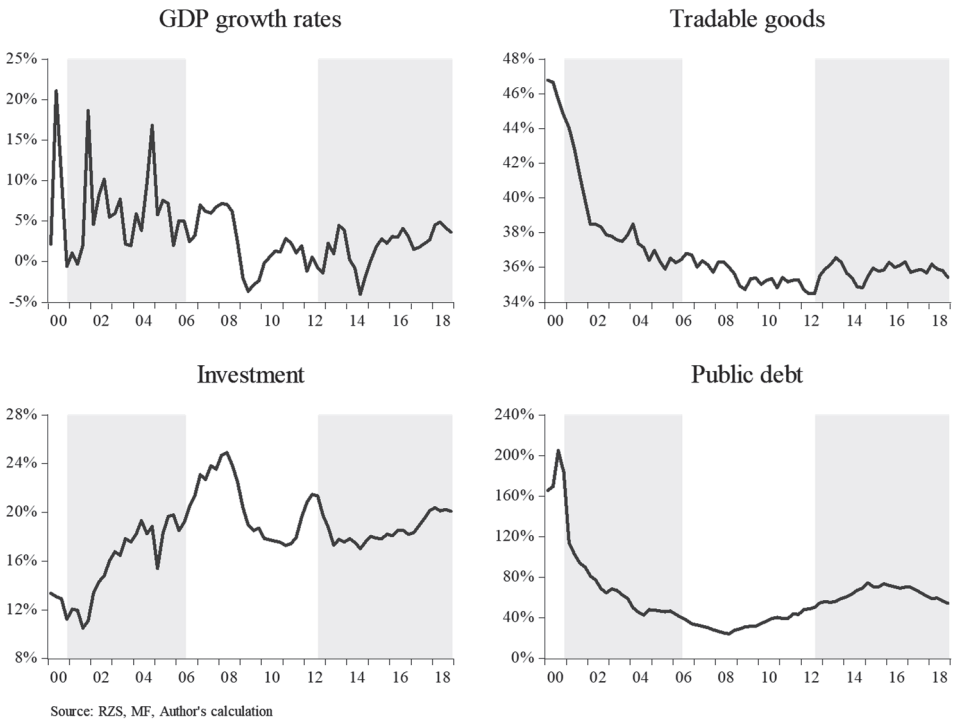
[9] See also Zildžović (2015).

level. After that, the populist and interventionist policies permanently pursued a policy of real appreciation of the exchange rate. This policy had significant support from the monetary policy of the NBS, which generally prefers an overvalued exchange rate to stabilised domestic prices.

3.2. Growth Strategy

There is a widespread belief that the Great Recession changed the economic growth strategy in Serbia. Before the recession the strategy for economic growth was based on the promotion of domestic consumption and imports, all financed by borrowing abroad. After the recession the strategy changed and began to favour exports and investment in the production of tradable goods. The facts, however, are a bit more complicated. They are shown in Figure 3.

Figure 3: Domestic market



Source: RZS, MF, Author's calculation

Growth. Growth was much faster before the Great Recession than afterwards. The average annual growth rate of seasonally adjusted GDP under the neoliberal

policy was 6.0%. It fell to 2.0% in the period of populism, while in the period of interventionism it was 1.9%. The 2017–2018 recovery significantly increased the growth rate, although many other countries had already emerged from the crisis and had begun to achieve much higher growth rates. The GDP level in the first quarter of 2008 before the Great Recession was only reached again in the first quarter of 2016. This means that the depression lasted for eight years, half of which was under populist policy and half under interventionism.

Besides, the external circumstances of the last two years in this period were far more favourable, since interest rates were historically low, the price of crude oil declined, and market prices in Europe were stable with the recovery of the eurozone and the growth of its import demand.

Tradables. Serbia has been exposed to a process of deindustrialisation since the beginning of the breakup of the former Yugoslavia, as we showed in the first part of this paper. Industry contributes significantly but not exclusively to the sector of tradable commodities. Besides most industrial output, tradable goods include goods and services from agriculture, tourism and transport, trade, and information. With the fall in the share of industry in GDP, there was also a fall in the percentage of tradable goods in GDP.

During the neoliberal policy, industrial production grew but services grew much faster, so the share of tradable goods in GDP steadily declined (from 44.7% in the third quarter of 2000 to 36.4% in the second quarter of 2006).

The trend of declining tradable goods continued during the populist policy, ending with a 34.7% share of GDP in the second quarter of 2012. This trend was partially reversed in the period of state intervention when the share of tradable goods in GDP reached 35.4% in the fourth quarter of 2018.

Investment. Neoliberalism began its mandate with a low 13% share of investment in GDP as well as a low level of real GDP generated through the investment channel. However, that changed immediately. Investment activity was significant so by the end of the mandate the share of investment in GDP had risen to almost 20%. The quarterly growth rate of investments was 3.25%, while GDP grew at a rate of 1.39%, allowing an increase in the share of investments in GDP. This trend of growth continued until the second quarter of 2008 when it reached its historical

maximum of 25.8% of GDP. Then the financial crisis suddenly halted capital inflow from the rest of the world, and the share of investment in GDP fell sharply to 18.3% in the second quarter of 2010. After that it rose to the level of 22.9% at the end of the populist period. In that period the quarterly growth rate of real GDP in investments was still positive, amounting to 1.07%. The beginning of interventionist policy in 2012 lowered the share of investment in GDP again. After that, the investment share recovered slowly so that at the end of the observation period in the fourth quarter of 2018 it was 20.1% of GDP. The quarterly growth rate of the real level of GDP for investments was negative and amounted to –0.45% for the entire period of the interventionist policy.

In the field of investment, the neoliberal policy proved to be the most effective. The populist policy was second most effective, while the interventionist policy takes third place. These results point to a far-reaching conclusion: reform and market liberalisation are more effective in attracting investment than state intervention through subsidies. After the period of neoliberalism the populist and interventionist policies pursued a policy of high subsidies for foreign direct investments, which proved to be an inferior solution. We have shown elsewhere that this policy depressed domestic investments in favour of foreign and state investments, with a more or less zero effect on the total share of investments in GDP (Labus, 2019). Moreover, the climate of weakened institutions, corruption, and a rule of law weakened through political interference in the justice system have adversely affected incentives to invest (Petrović, et al., 2019).

Public debt. All the external commercial debts of the self-managed companies were converted into public debt because the state was their guarantor. When the debts of the state are added together, at one point in 2000 public debt had reached 200% of GDP. The country was incapable of servicing its external debts. After the termination of international sanctions, restructuring the public debt was the number one issue, both for the stability of the economy and for its future growth. In the period of neoliberal policy, agreements were reached on rescheduling, including with the member states of the Paris Club of creditors and the London Club of banks to partially write-off the public debt. By the end of the second quarter of 2006 the public debt had been reduced to 40% of GDP.

The populist policy continued to reduce public debt for a while, but at the end of the second quarter of 2012 it increased to 49%. Under the interventionist policy the government kept borrowing from abroad and increased the public debt to an unsustainable 75% in the first quarter of 2015, so that the policy of borrowing had to change, or else the country would have defaulted.[10] A fiscal consolidation policy was enforced, and public debt was reduced to 55% of GDP by the end of 2018. This level was still higher than when the Third Government was elected.

3.3. The Foreign Market

We have examined the situation in the foreign market by exploring the degree of openness of the economy, euroisation of the national currency, capital inflows from abroad, and official foreign exchange reserves. The openness of the economy to the international market depends on the liberalisation of foreign trade. Liberalisation is sustainable if it is accompanied by an adequate change in the production structure and an increase in the share of tradable commodities to non-tradable goods. Euroisation is a matter of confidence in the national currency, and the level of foreign capital inflow is an indicator of the country's attractiveness for investment (direct investment and capital lending). The amount of foreign exchange reserves depends on the balance of payments and capital inflows.

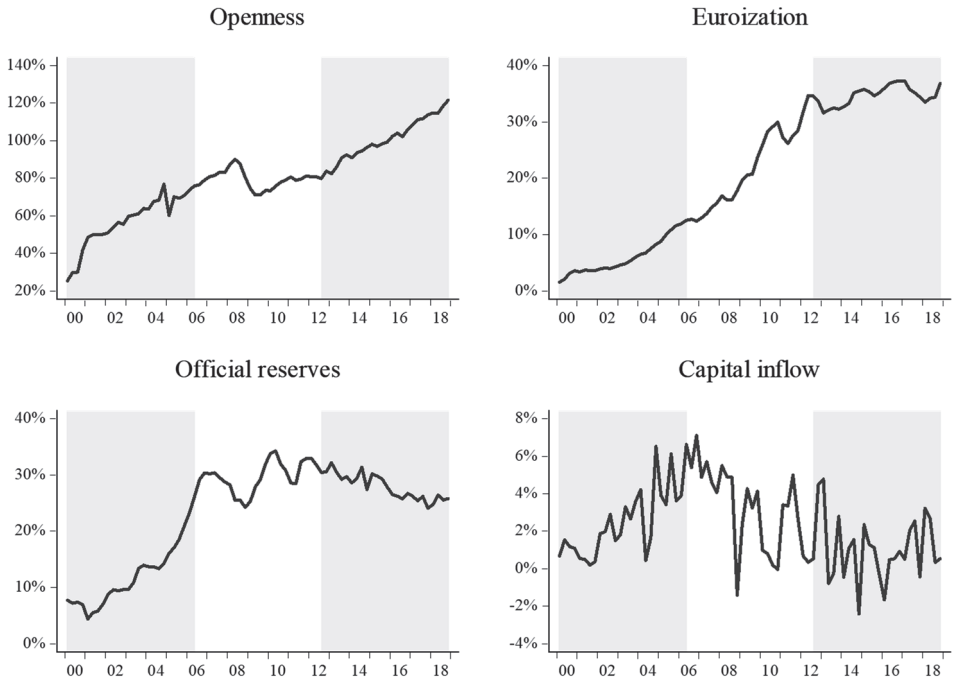
Liberalisation of foreign trade. Under the neoliberal policy the liberalisation of foreign trade was often the target of criticism. It has been claimed that after the international sanctions the Serbian economy ressembled a young industry, which the state should have protected from external competition until it was rehabilitated and became capable of fair market competition. Otherwise domestic companies would be destroyed and sold off cheaply to foreigners. Therefore, it was necessary to use quantitative restrictions and tariffs and slowly open up domestic industry to the world market.

This argument looks very attractive, with two 'small' drawbacks. First, this protectionist policy was used for years in the former Yugoslavia and never resulted in the economy matching foreign competition. There was no reason to believe that in much more difficult circumstances it would now yield different

[10] See also Andrić et al. (2016).

results. Second, after the international sanctions the domestic economy was completely bankrupt, with outdated technology and no financial capital or market connections with the world. Consumers were not ready for additional sacrifices to finance a protectionist economy, especially not when the foreign trade regime was the main generator of corruption in the country. The fixed exchange rate, set below the market level, the system of import and export licenses, and the non-transparent allocation of primary money all fuelled corruption. Moving to a flexible exchange rate, foreign exchange coverage of the dinar, and abolition of all quantitative restrictions, while at the same time lowering tariffs, eliminated corruption overnight and stabilised foreign trade. All this was supported by the unilateral trade incentives provided by the European Union, which abolished customs duties on Serbian imports, with a few exceptions related to agricultural products. Meanwhile the First Government committed itself to EU accession, which eventually led to a free trade agreement and abolition of all customs duties with the EU.

Figure 4: Foreign market



Source: RZS, NBS, Author's calculation

Bearing all this in mind, there was no alternative to liberalising foreign trade. The first graph in Figure 4 presents the openness of the Serbian economy, which we define as the ratio of exports and imports to GDP. At the beginning of the period Serbia was a relatively closed economy with a 30% level of degree of openness. Neoliberal policy rapidly raised this level to 77% of GDP. When populist and interventionist policies replaced liberalism the trend of opening the economy to the world market did not change. The Great Recession temporarily reversed the trend, but it quickly resumed and continued at the same pace. The neoliberal trade policy in Serbia has often been criticised as unfavourable for the country, but the sunsequent economic policies and governments maintained its elements.

Euroisation. Euroisation is a process that has progressed independently of the opening of the Serbian economy to the world market. Its roots are in two hyperinflations (1989 and 1992–1994), which destroyed confidence in the domestic currency. The share of the dinar has dropped continuously despite all measures aimed at strengthening its status. "Dinarisation" failed completely, irrespective of government changes and macroeconomic policy.

There are several ways to measure the level of euroisation. In this paper euroisation is defined as the ratio of foreign-currency-denominated money stock to the value of GDP. Euroisation evolved rapidly until 2016 when the NBS embarked on an active campaign of dinarisation of the monetary sector. That had minor effects and reduced euroisation only temporarily by a few index points. Its level returned to 37% of GDP at the end of the observed period.[11]

The inflow of capital. Foreign capital inflows were calculated in net terms (inflow minus outflow) and encompass four components: foreign direct investment, portfolio investments, financial derivatives, and other inflows, in which financial loans form the largest category. From the fourth quarter of 2000 to the end of 2018 around 50 billion euros entered the country: 14 billion euros under neoliberal policy, around 25 billion euros under populist policy, and 11 billion euros during the last interventionist phase. Of that amount, foreign direct investment amounted to 5 billion euros, 13 billion euros, and 12 billion euros, respectively. In the last few years there was a large outflow of capital, which was

[11] See also Bošnjak et al. (2018).

not the case before, so that foreign direct investment was higher than the total capital inflow.

Capital inflow partly depends on the state of the world financial market, and partly on the attractiveness of the country for investment (direct investment and lending). Capital inflows from privatisation depend solely on government policy, as does borrowing to finance the fiscal deficit. On the other hand, the private sector deleverages or invests depending on the attractiveness of investment and the country risk.

Foreign exchange reserves. The last indicator of the country's external position is the stock of foreign exchange reserves, which is related to the creation of primary money and the liquidity of banks and business entities. Foreign exchange reserves were meagre at the start of the observation period, but the neoliberal economic policy managed to increase them significantly. Foreign trade and exchange rate liberalisation did not pose a risk to foreign exchange reserves but, on the contrary, created an economic climate that attracted foreign capital and increased the country's foreign exchange reserves.

Under the populist policy the movement of foreign exchange reserves became cyclical. Two cycles can be seen: during the Great Recession period and later in the repeated recession in 2011. The period of interventionism changed the trend of foreign exchange reserves: they began to fall and reached a level of 24% of GDP, below the standard reached in the age of neoliberal politics.

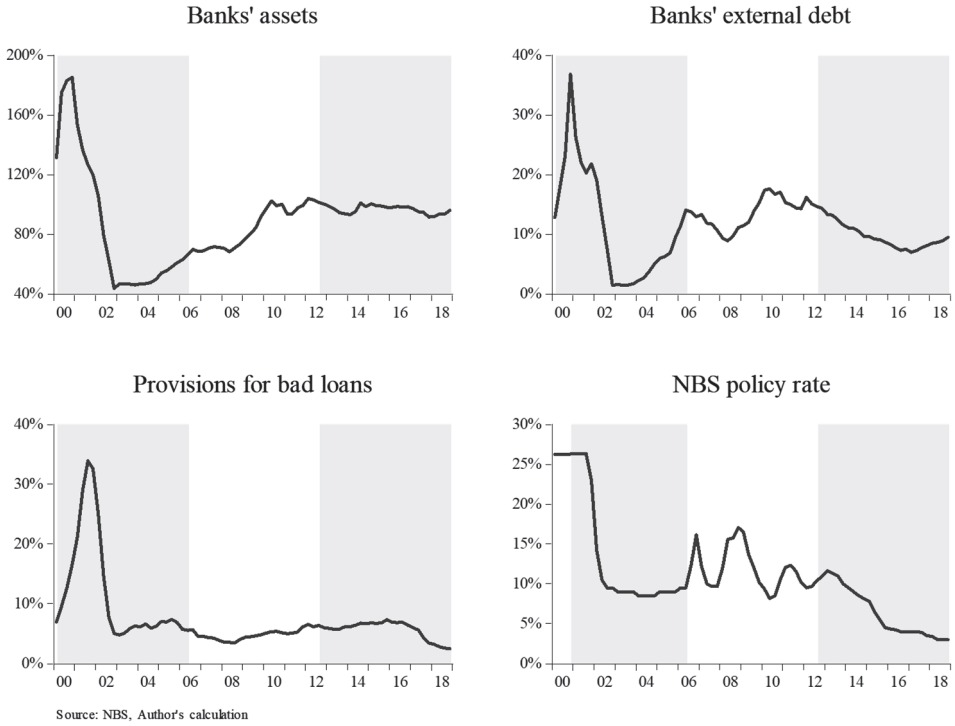
To conclude, the neoliberal economic policy was key to opening the Serbian economy to the international market, and this is a trend that can no longer be stopped. The world economy is currently in the process of renewed protectionism and a 'cold war' in which tariffs are used extensively. Serbia is not a WTO member, and bilateral agreements regulate its foreign trade relations. Irrespective of this, the crisis in world trade can negatively affect Serbia's economic growth, as it has become a small but very open economy.

3.4. Financial Market

The depth of the banking sector, the exposure of banks to external debt, the impact of bad loans, and the level of the NBS policy rate are financial market

indicators. They are shown in Figure 5. The state is heavily indebted in the domestic banking market (in dinars and foreign currencies), and its borrowing policy directly influences both interest rates and the credit potential that remains for the private sector (the crowding-out effect). The depth of the banking sector is measured by the share of banking assets in GDP. Bad loans are monitored through a series of bank reserve allocations to cover losses on bad loans. The more bad loans, the less the interest-bearing assets and the higher the banks' interest rates.

Figure 5: Financial market



Source: NBS, Author's calculation

We have already analysed the foreign exchange reserves that affect the creation of primary money. The increase in foreign currency reserves leads to a rise in money supply and, vice versa, the fall in foreign currency reserves reduces the money supply. Money supply affects the liquidity of the economy. Market interest rates largely depend on interest rates on the foreign market, but also on the monetary

policy of the NBS and the currency risk. Thus, interest rates on foreign currency loans are always lower than interest rates on dinar loans.

Depth of the banking sector. A developed banking sector is capable of financing the corporate sector and significantly supporting investment financing and investment-based economic growth. We define financial depth as the ratio of banking assets to GDP, both of which are seasonally adjusted.

The neoliberal policy inherited a formally well developed banking sector with a depth of 195% GDP, as is shown in Figure 5. However, the same figure shows huge bank losses due to non-performing loans. Practically, the five leading banks were bankrupt, and the four leading banks were declared bankrupt in the first quarter of 2002 with the dismissal of 10,000 bank employees. It was an unprecedented move, both in the country and in Eastern Europe.

Consequently, bank assets dropped dramatically. However, the credibility of the banking sector was restored, new banks quickly opened, and the banking sector as a whole recovered within a year. In the first quarter of 2002 banking assets amounted to 43% of GDP, while by the end of the mandate of the neoliberal government they had risen to 70% of GDP and the number of bank employees far exceeded the number of previously released staff. This was the cheapest and most risky banking sector reform in Eastern Europe, and probably the best reform achievement of all the economic policies.

The populist policy of the next governments continued to increase the depth of the banking sector to a level of 100% of GDP. The Great Recession only temporarily reversed this trend, with a recovery near the end of the populist policy mandate. However, the interventionist policy did not make any substantial improvements: quite the opposite, it established a slow trend of reducing the depth of the banking sector.

Banks' external debt. Foreign parent banks own most banks in Serbia. Initially the parent banks supported the credit activity of their Serbian affiliates. This was especially noticeable in the period of neoliberal policy. Populist policy could not count on this support, but banks continued to increase their foreign-based assets until 2010. After that there was a sharp deleveraging that lasted until the end of 2018. Now the external debt of banks does not exceed 10% of GDP.

Bad loans. When there are bad loans, banks need to allocate more funds from current revenue to cover potential losses. This reduces their profitability and encourages them to increase interest rates on reliable loans. Bad loans slow down credit and economic activity. In borderline cases the bankruptcy of banks (Development Bank, Universal Bank, Agro Bank, etc.) also leads to a decrease in total bank assets.

It is not surprising that under the neoliberal policy the first government inherited a high level of loss provisions, amounting to 12.9% of GDP. These provisions rose to 36% of GDP in the fourth quarter of 2001, that is, just before the closure of the four largest banks. The implementation of the banking sector rehabilitation programme reduced the share of provisions in GDP, which was 5.9% in the second quarter of 2006.

The new government that introduced the populist policy initially continued to reduce the share of bad loan provisions in GDP, but due to the adverse effects of the Great Recession they returned to the inherited level. During the time of interventionist policy the share of bad loans grew until reaching the maximum level in 2016. The NBS then decided to change its policy and stimulate the write-off of bad loans, which at the end of the observed period were no longer a significant problem for the banking sector.

NBS policy rate. After the fourth quarter of 2006, NBS monetary policy switched to targeting inflation and using the repo interest rate to manage inflationary expectations. Previously, the NBS had maintained a policy of maintaining a given level of Net Foreign Assets and used the discount rate to regulate the liquidity of banks.

In times of high inflation in 2001–2002 the reference interest rate was high, but negative in real terms. By contrast, the populist and interventionist policies pursued a policy of positive real reference interest rates. Throughout this period their average level was about 3%.

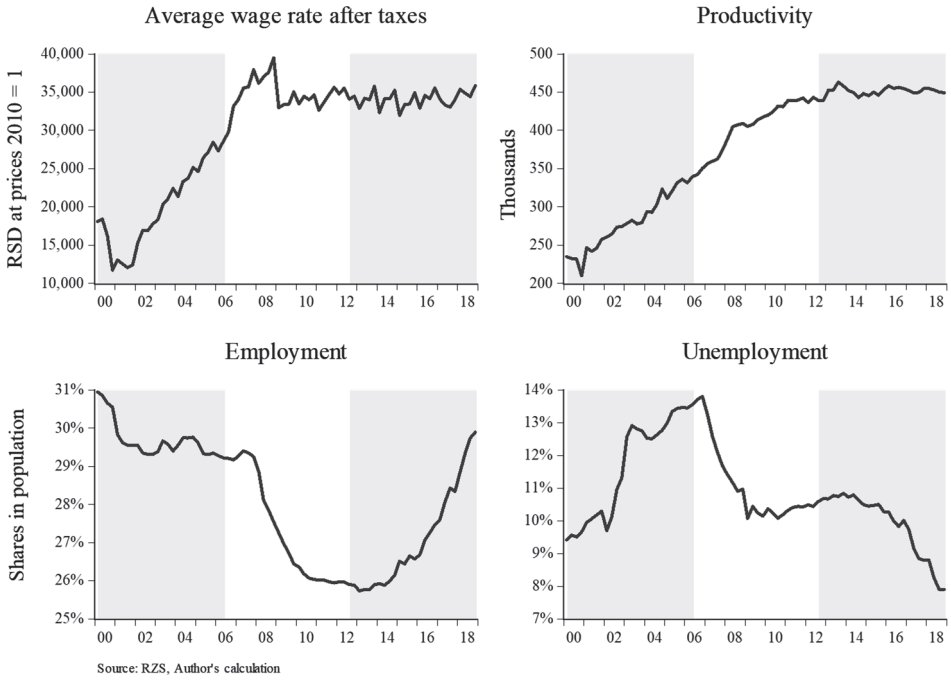
Thus, neither in the Great Recession nor during the next two recession episodes did the NBS pursue an interest rate policy that supported the recovery of the economy, but instead kept inflation at the target level at all costs. The neoliberal policy rehabilitated the banking sector with the idea that a sound banking sector

is a necessary condition for attracting and financing investment. The other two policies took on a healthy banking sector and maintained its stability standards, but used interest policy to manage inflation, not to fight the recession.

3.5. Labour Market

Real wages, labour productivity, employment, and unemployment are indicators for ranking the effect of economic policies on the labour market. In market economies, higher productivity leads to higher real wages. This principle works in the Serbian economy, where the coefficient correlation between real wage rate and productivity is 0.95.

Figure 6: Labour market



Also, higher employment means an increased supply of work, which should negatively affect the growth of real wages. That is also evident in the Serbian economy because the coefficient correlation between real wage rate and employment is –0.80. However, there is no strong statistical link between unemployment and average salary, while on the other hand the coefficient of

correlation between employment and unemployment has an unexpected positive sign, although it is a rather low 0.52.

Real wages. The level of average real wage rate (excluding taxes and contributions) was obtained by dividing the average seasonally adjusted nominal wage rate by the implicit GDP deflator, both seasonally adjusted. Thus, the real wage rate is expressed in constant 2010 prices. The graph is shown in Figure 6.

The First Government that carried out a neoliberal policy inherited an average real wage rate of 14,730 RSD.[12] In the first year of its mandate the real wage rate fell due to structural changes and deregulation of prices. However, from the next year wages and salaries started to grow and the First Government ended its mandate with an average real wage rate of 28,865 RSD (which gives an implicit quarterly growth rate of 3.0%). The next government carried out populist policies and continued to increase real wages up to the amount of 36,160 RSD, with an implicit quarterly growth rate of 0.9%. The Third Government only raised average real wages to the level of 36,270 RSD, with an implicit quarterly growth rate of 0.02%. The movement of labour productivity accompanies real wages, which is why they overgrew until the Great Recession, after which they stagnated.

Productivity. The overall labour productivity rate is the ratio of GDP to the number of employed persons. Both variables have been seasonally adjusted, and for GDP we have taken real GDP at 2010 prices. During the First Government, labour productivity grew at a quarterly growth rate of 1.67%. Under the Second Government's mandate, labour productivity grew at a slightly lower quarterly growth rate of 1.04%. However, labour productivity growth under the Third Government's mandate was negative and decreased by a quarterly growth rate of –0.06%.

Employment. Employment data was revised in 2015, and this caused controversy in professional circles (Petrović et al., 2016, Arandarenko et al., 2016).We will not go into this controversy but present the official (revised) statistical data on employment.

[12] In terms of 2010 prices.

The First Government inherited an employment rate of 2,301 million workers. During the entire mandate, employment declined due to bankruptcies and privatisations. At the end of the mandate, 2.163 million were employed under the First Government. The implicit quarterly growth rate was negative and amounted to –0.3%.

Under the Second Government the employment rate was reduced significantly due to the Great Recession. In the first quarter of 2009 less than 2 million were employed. The government completed its mandate with 1,877 million employed, giving a negative implicit quarterly growth rate of –0.6%. The Third Government reversed the declining employment trend and completed its mandate with 1,976 million workers and an implicit positive quarterly growth rate of 0.3%.

Employment improved after 2012. Serbia had taken more than a decade to deal with structural unemployment.

Unemployment. Unemployment is not the mirror of employment, as illustrated in Figure 6. Unemployment grew significantly under the mandate of the First Government. 713,000 people were registered as unemployed at the beginning of the mandate and 1,003,000 at the end. The implicit quarterly unemployment rate was 1.5%.

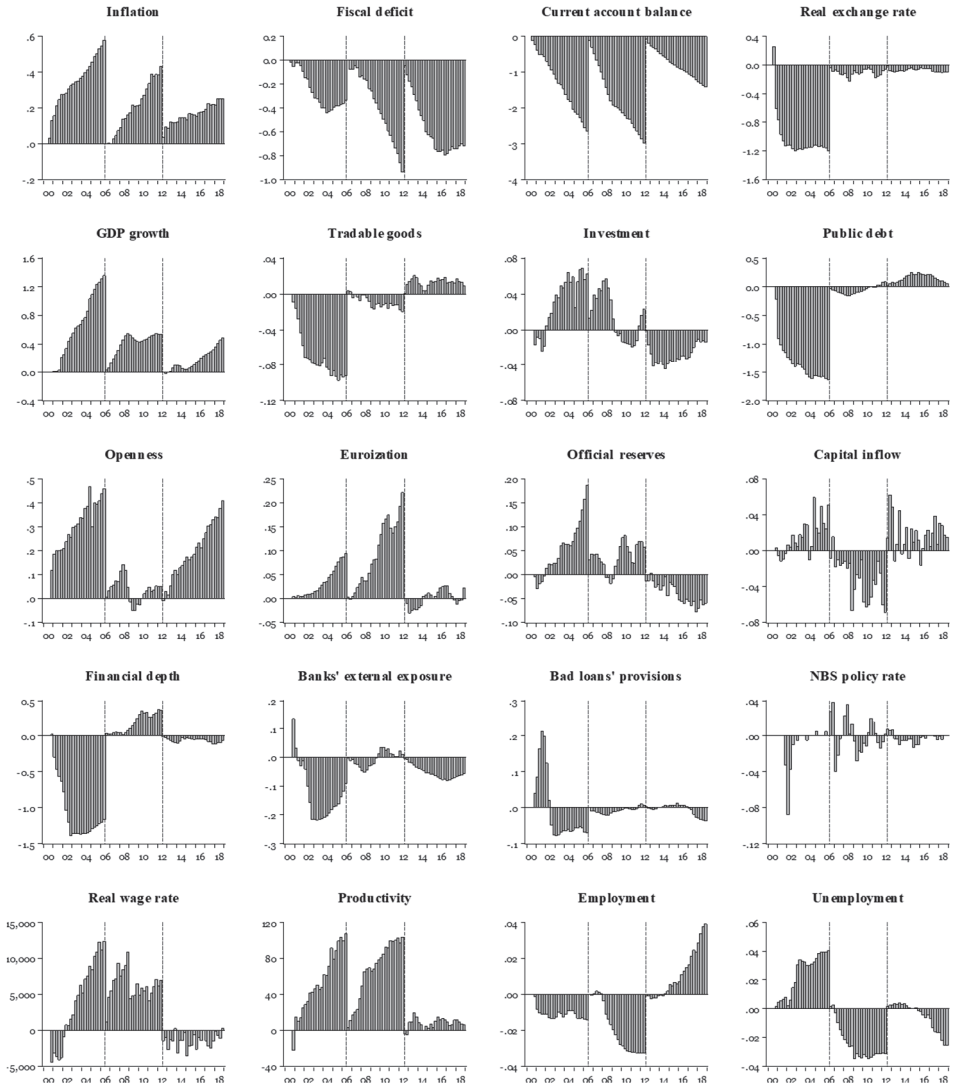
During the Second Government's mandate, unemployment dropped significantly, although employment also dropped considerably in the same period. We have no explanation for this paradox. In any case, by the end of the Second Government's mandate, unemployment had been reduced to 754,000, with an implicit quarterly growth rate of –1.2%.

During the mandate of the Third Government, unemployment fell to 646,000, which makes sense because during the period employment grew. The quarterly growth rate was –0.8%.

4. RANKING THE ECONOMIC POLICIES

We compared and ranked the three economic policies of liberalism, populism, and interventionism based on their contribution. Each indicator was treated equally. We present the policies' contributions in Figure 7.

Figure 7: The macroeconomic policies' contributions



In this approach the difference between flow and stock variables is critical. Flow variables were cumulated for each period separately. For the stock variables we first determined their marginal contributions for each quarter and then

cumulated them separately, thus obtaining the effects of each of the observed policies. Based on these effects we arrived at the ranking presented in Table 2.[13]

The average rankings are 1.65 for neoliberal policy, 2.4 for populist policy, and 1.95 for interventionist policy. The lower rank, the better. According to our estimation, neoliberal policy achieved the best results. Populist policy performed the worst. Finally, interventionist policy was inferior to neoliberal policy, but superior to populist policy.

Table 2: Ranking scores

	Liberalism	Populism	Interventionism		Liberalism	Populism	Interventionism
Macroeconomic stability				Financial market			
Inflation	3	2	1	Financial depth	3	2	1
Fiscal deficit	1	3	2	External exposure	1	3	2
Current account balance	2	3	1	Bad loans	1	3	2
Real exchange rate	1	2	3	Policy rate	3	2	1
Growth strategy				Labour market			
GDP growth	1	2	3	Real wage rate	1	2	3
Tradable goods	3	2	1	Productivity	1	2	3
Investment	1	2	3	Employment	2	3	1
Public debt	1	2	3	Unemployment	3	2	1
Foreign market							
Openness	1	3	2				
Euroization	2	3	1				
Official reserves	1	2	3				
Capital inflow	1	3	2	Average	1.65	2.4	1.95

5. CONCLUSION

The empirical evidence that we provide for Serbia in this paper shows that the starting point of transition matters as much as the proper macroeconomic policy. The conflict period from 1991 to 1999 was significant in determining that starting point. This pre-transition shock was much more severe than the shock imposed by the Great Recession in 2008. However, apart from the shocks and the delayed institutional reforms, macroeconomic policies substantially influenced the performance of the Serbian economy.

This paper outlines the long-run development in Serbia, and within it the three distinct policies. Neoliberal, populist, and interventionist policies were implemented between 2000 and 2018, with very different outcomes. This paper

[13] The scores are 1= good (first place), 2= moderate (second place), 3= poor (third place).

evaluates them using quarterly data on 20 macroeconomic indicators classified into five groups: macroeconomic stability and domestic, foreign, financial and labour markets.

Regarding the achievements of three macroeconomic policies, neoliberal policy was commonly blamed for all the economic deficiencies in the period between 2000Q1 and 2006Q2. Our data indicates quite the opposite, that this policy performed the best. The next, populist period from 2006Q3 to 2012Q2 performed the worst. Finally, interventionist policy, starting in 2012Q3 and evaluated up to 2018Q4, was inferior to neoliberal policy but superior to populist policy.

When moderating this judgement, it should be noted that external factors played an important role. External shocks hit all three policy regimes: the breakup of the Federal Republic of Yugoslavia and the assassination of the Serbian Prime Minister during the period of neoliberal policy, the Great Recession during the period of populist policy, and floods and drought during the period of interventionist policy. Future research should examine which of these had the most severe effects. This paper spreads their potential effects over twenty macroeconomic indicators, not just GDP growth. Overall, the paper shows the importance of the initial conditions that constrained policymakers' options in all three periods considered in this paper. In the future, similar constraints will apply to future governments, most notably the impact of the coronavirus pandemic, which will shape policy constraints and economic performance over the next decade.

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DETERMINANTS OF FOREIGN EXCHANGE RESERVES IN SERBIA AND NORTH MACEDONIA

ABSTRACT: *This paper employs a quantile regression approach to explore the determinants and properties of international foreign exchange reserves in Serbia and North Macedonia, at various foreign exchange levels. The observed period covers quarterly data for 2005q1–2019q1. The results reveal quantile-dependent determinants of foreign exchange reserves and enable comparison between the two countries, showing co-movements between monetary policy and economic fluctuations. Following the estimates obtained in this research, the paper compares the role of foreign exchange reserves in Serbia and North Macedonia.*

KEY WORDS: *international foreign exchange reserves, quantile regression, foreign exchange rate, GDP, monetary aggregates*

JEL CLASSIFICATION: E43, E44, E52, F34, F37, F32, G15

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1. INTRODUCTION

Foreign exchange reserves serve as a cushion that maintains foreign exchange stability and the liquidity of external positions, and consequently the overall strength of the national economy to resist exogenous shock. As national economies have become more globalised and integrated the role of foreign exchange reserves has become more important, especially in small and open economies. One strand of literature discusses the adequacy of reserve holdings (Dabla-Norris et al., 2011; Moore & Glean, 2016). Another strand examines the determinants of reserve accumulation (Sula, 2011; Fang-Yuan & Jun-Guo, 2013; Bošnjak et al., 2019) and the appropriateness of the quantile regression approach to illustrate the effects of the determinants on different levels of foreign exchange reserves. This paper uses quantile regression to compare the determinants of foreign exchange reserves in two small and open economies, Serbia and North Macedonia, thus contributing to the existing body of literature on the topic.

The rest of this paper is organised as follows. Section 2 summarises the existing literature related to the research topic. Section 3 introduces the research data and methodology, while Section 4 illustrates the empirical analysis. The final section summarizes the main findings of the research.

2. BRIEF LITERATURE OVERVIEW

The literature on exchange reserves is wide, starting with discussion of the optimality of and motivation for reserve accumulation. The growth trend in exchange reserves observed during the past decades raises numerous questions regarding its optimality and effect on the national economy, including the motivation behind reserve accumulation and reserve management (Heller, 1966; Kenen & Yudin, 1965; Kelly, 1970; Frenkel & Jovanovic, 1981; Dooley et al., 2003; Aizenman & Lee, 2007; for a detailed discussion see Bošnjak et. al. (2019)).

Rodrik (2006) observes the growing accumulation of reserves in developing countries during the late 1990s, calculates the social costs of such a strategy, and discusses the optimality of this policy. The paper concludes that the strategy of accumulating reserves in developing countries is not optimal because of the high costs, while on the other hand developing countries under-invest in reducing short-term foreign liabilities. Mohanty and Turner (2006) focus on emerging

economies and their use of exchange reserves to control appreciation of the national currency. This strategy includes risks other than inflation, such as additional costs, monetary imbalances, overheating in credit and asset markets, and potential problems in the banking sector. Moore and Glean (2016) research exchange reserve adequacy using a cost–benefit approach, starting with the common assumption that the optimal level of reserves is 12 weeks of imports. They use a dynamic random effects probit model of financial crises to evaluate the benefits and a panel growth equation to determine the costs. The results for small states show that the optimal level of reserve holdings is 25 weeks of imports and is connected to characteristics of the national economy, so that countries with a more prudent fiscal stance can hold lower levels of exchange reserves. Chutasripanich and Yetman (2015) analyse different foreign exchange intervention strategies and come to no conclusion regarding a dominant strategy, while Korinek and Serven (2016) observe the undervaluation effects of reserve accumulation. Benecká and Komarek (2018) try to solve the problem of model uncertainty when determining the factors behind holding international reserves, using Bayesian model averaging on a sample of 104 countries for the 1999–2010 period. They confirm a positive relation between the level of reserves and trade openness and broad-money-to-GDP ratio, while increased financial development decreases the need for reserves. Adler et al. (2019) find that the effects of foreign exchange intervention on FX purchases and sales are persistent and symmetric. Blanchard et al. (2015) point out that greater foreign exchange intervention corresponds to less exchange rate appreciation as a consequence of gross inflows. Aizenman et al. (2015) confirm the connection between international reserves and trends in the global economy, observing the influence of financial crisis. Bošnjak et al. (2019) use a quantile regression model to define the determinants of exchange reserves in Croatia. Jovanovikj and Andonova (2017) examine the optimality of the level of exchange reserves in Macedonia using a cost-benefit welfare model. They conclude that the existing level is below but close to the optimal level.

3. RESEARCH DATA AND METHODOLOGY

The data on Serbia's foreign exchange reserves, nominal effective exchange rate (FXN), and real effective exchange rate (with consumer prices) were retrieved from the National Bank of Serbia, while gross domestic product (GDP) and

imports at constant prices came from the Serbian Bureau of Statistics. Foreign exchange reserves, real effective exchange rate with consumer prices, and real effective exchange rate with producer prices for North Macedonia were retrieved from the National Bank of the Republic of North Macedonia, while GDP and imports at constant prices were retrieved from the State Statistical Office. The observed period covers quarterly data from 2005q1 to 2019q1. Figures A1 and A2 in the Appendix show the development of the observed series in Serbia and North Macedonia. A real effective exchange rate index above 100 is a sign of appreciation, while below100 indicates depreciation.

Tables A1 and Table A2 in the Appendix summarise the descriptive statistics of the observed series for Serbia and North Macedonia. Like previous studies (Sula, 2011; Fang-Yuan & Jun-Guo, 2013; Bošnjak et al., 2019), we follow a quantile regression approach and specify the model in Equation (1):

$$\ln\left(FXR_i\right) = \beta_0 + \beta_1 \ln\left(GDP_i\right) + \beta_2 \ln\left(REER_i\right) + \beta_3 ln\left(M2_1 / GDP_i\right) + \varepsilon_i \qquad (1)$$

where FXR_i is foreign exchange reserves of a country at quarter i, GDP_i is GDP at constant prices of a country at quarter i, $REER_i$ is real effective exchange rate (with consumer prices), and M2 is monetary aggregates of a country at quarter *i*. Depending on data availability, we further considered nominal effective exchange rate and real effective exchange rate (with producer prices) as determinants of foreign exchange reserves in Serbia and North Macedonia.

The paper also provides results from a more conventional time series approach. We employed several unit root tests to examine whether the observed time series were stationary, and then tested for the existence of a cointegrating relationship between reserves and their determinants for both countries. Since standard unit root tests are well known to have low power, in order to improve the validity of the results we employed several different unit root tests, namely the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979), the Phillips–Perron (PP) test (Phillips & Perron, 1988), the Generalised Least Squares and Dickey-Fuller test by Elliot, Rothenberg and Stock (ERS) (Elliot et al., 1996) and the Kwiatkowski, Phillips, Schmidt and Shin test (KPSS) (Kwiatkowski, et al., 1992). We then employed the Johansen (1995) cointegration approach to test the existence of cointegration between foreign exchange reserves and their determinants for each

sample country. The coverage ratio of imports by foreign exchange reserves for the recent period was obtained using Equation (2):

$$CR_i = \frac{FXR_i}{IMP_i} \tag{2}$$

where FXR_i is foreign exchange reserves of a country at year i, IMP_i is average monthly imports of goods and services at constant prices in a country in year i, and consequently CR_i represents the coverage ratio of imports by foreign exchange reserves for a country at year i.

4. EMPIRICAL ANALYSIS

Following Equation (1), we first provide estimates for Serbia, which are summarized in Table 1.

Table 1: determinants of foreign exchange reserves

Quantile	Intercept		GDP		REER		M2/GDP	
	Estimates (standard error)	p-value	Estimates (standard error)	p-value	Estimates (standard error)	p-value	Estimates (standard error)	p-value
0.10	−9.33771 (6.94758)	0.18467	0.85257 (0.53452)	0.11666	1.46086 (0.46743)	0.00288	0.33025 (0.11296)	0.00508
0.20	1.43735 (5.22328)	0.78425	0.00759 (0.39217)	0.98463	1.64073 (0.41656)	0.00024	0.42929 (0.09591)	0.00004
0.30	−2.04080 (7.08724)	0.77450	0.18454 (0.53716)	0.73255	1.85965 (0.46234)	0.00018	0.31841 (0.11125)	0.00601
0.40	−2.95392 (5.85151)	0.61578	0.39386 (0.44347)	0.37848	1.46110 (0.44234)	0.00172	0.29287 (0.09611)	0.00360
0.50	−3.74642 (5.29641)	0.48245	0.47366 (0.40744)	0.25022	1.40537 (0.36814)	0.00035	0.31160 (0.08696)	0.00074
0.60	−0.66230 (3.99844)	0.86907	0.32248 (0.23386)	0.17370	1.19518 (0.42663)	0.00709	0.25919 (0.06411)	0.00017
0.70	1.57820 (6.52056)	0.80969	0.16071 (0.44617)	0.72013	1.19314 (0.48290)	0.01673	0.28710 (0.10956)	0.01143
0.80	7.95434 (4.81329)	0.10433	−0.14170 (0.30234)	0.64122	0.71891 (0.40166)	0.07919	0.15557 (0.07544)	0.04412
0.90	6.80275 (2.14788)	0.00255	− 0.10377 (0.16021)	0.51996	0.84995 (0.19175)	0.00005	0.10017 (0.03867)	0.01234

The estimates in Table 1 illustrate the effects of real effective exchange rates (with consumer prices), GDP levels, and M2/GDP on foreign exchange reserves at different quantiles of exchange rate reserves in Serbia. Real effective exchange rate indexes above 100 indicate an appreciation of the dinar, and indexes below 100, indicate a depreciation. Therefore, the appreciation of the real effective exchange rate of the dinar corresponds to an increase in foreign exchange reserves and the relationship is statistically significant across all the considered quantiles. Serbia's GDP level was not found to be a significant determinant of foreign exchange reserves, while monetary aggregates M2/GDP was significant. Therefore, the accumulation of foreign exchange reserves in Serbia can be explained by changes in the real effective exchange rate and monetary aggregates M2/GDP, with the former showing more prominent effects.

While some papers observe the effects of real exchange rates on foreign exchange reserves (e.g. Sula, 2011), other papers (e.g., Bošnjak et al., 2019) examine the effects of nominal exchange rate on foreign exchange reserves. To get a clearer picture, we estimated the specification for Serbia with foreign exchange reserves as the dependent variable and nominal effective exchange rate level, GDP level, and monetary aggregates M2/GDP as independent variables. The results are provided in Table A3 in the Appendix, which shows that the GDP level only has a significant effect at the lowest quantile of foreign exchange reserves. The nominal effective exchange rate was a significant determinant at the lower levels of foreign exchange reserves, while M2/GDP was significant at both lower levels and the highest levels. Following the same procedure, Table 2 provides the estimates for North Macedonia.

Table 2: North Macedonia: determinants of foreign exchange reserves

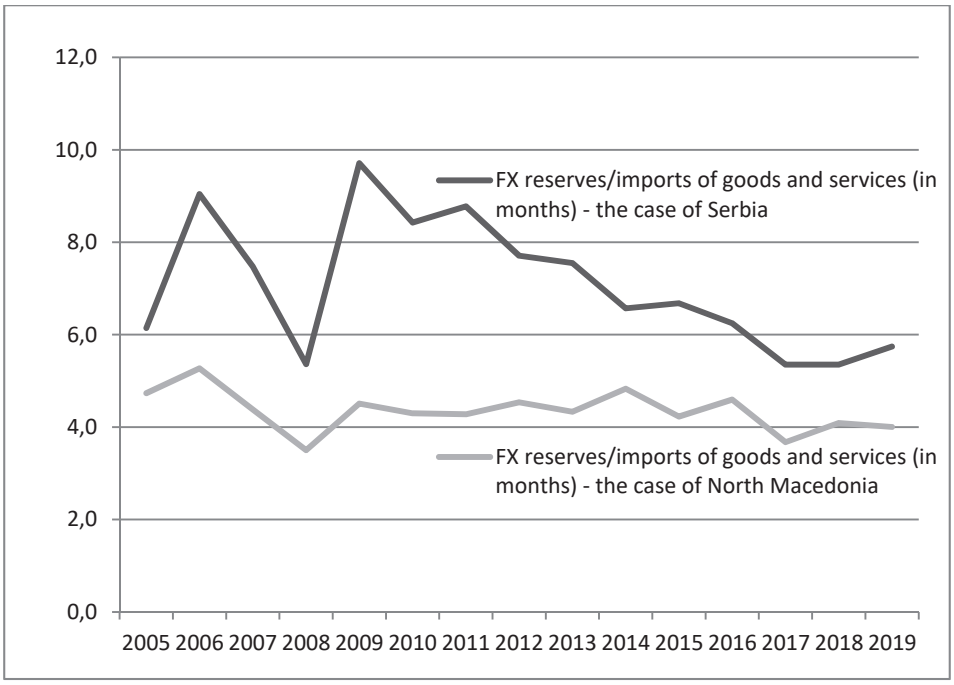
Quant.	Intercept		GDP		REER		M2/GDP	
	Estimates (standard error)	p-value	Estimates (standard error)	p-value	Estimates (standard error)	p-value	Estimates (standard error)	p-value
0.10	4.69340 (5.71781)	0.41542	1.26501 (0.19460)	0.00000	–2.70602 (1.66524)	0.11009	0.73523 (0.32918)	0.02976
0.20	3.85095 (4.75524)	0.42166	1.23635 (0.10809)	0.00000	–2.47441 (1.20060)	0.04423	1.02548 (0.18936)	0.00000
0.30	4.39448 (4.65766)	0.34971	1.20310 (0.11677)	0.00000	–2.47315 (1.19222)	0.04291	0.76264 (0.18869)	0.00017
0.40	5.46445 (5.32301)	0.30929	1.21622 (0.15105)	0.00000	–2.74379 (1.43270)	0.06088	0.84456 (0.26753)	0.00263
0.50	3.57882 (4.22092)	0.40032	1.19423 (0.12302)	0.00000	–2.27999 (1.14534)	0.05168	0.88622 (0.23590)	0.00043
0.60	1.38314 (3.94201)	0.72707	1.11096 (0.11577)	0.00000	–1.54938 (1.06314)	0.15092	0.61830 (0.21806)	0.00646
0.70	1.94031 (4.34728)	0.65718	1.08278 (0.11302)	0.00000	–1.59722 (1.10079)	0.15268	0.62275 (0.23851)	0.01171
0.80	1.02882 (4.20131)	0.80749	1.07700 (0.11066)	0.00000	–1.36043 (1.06979)	0.20904	0.47260 (0.21684)	0.03376
0.90	–0.36967 (4.22486)	0.93060	1.20822 (0.07842)	0.00000	–1.36572 (0.96190)	0.16152	0.36193 (0.17088)	0.03887

The estimates in Table 2 find a different effect of real effective exchange rates (with consumer prices) on foreign exchange reserves in the case of North Macedonia. The effects were significant below the median level of foreign exchange reserves. At the lowest level and above the median level of foreign exchange reserves the effects from the real effective exchange rate vanished. The effects of the level of GDP on foreign exchange reserves in North Macedonia were significant and counter-cyclic across all quantiles. The National Bank of North Macedonia also provides data on real effective exchange rates (with producer prices). Therefore, an alternative specification for North Macedonia has foreign exchange reserves as the dependent variable and real effective exchange rates (with producer prices) and GDP level as independent variables. The results are given in Table A4 in the Appendix, which illustrates that in North Macedonia the

effect of GDP levels on foreign exchange reserves remains significant and counter-cyclic across all quantiles. The effect of monetary aggregates M2/GDP was significant and positive across all quantiles. However, the effect of the level of real effective exchange rates (with producer prices) was positive and significant at higher levels of foreign exchange reserves.

The quantile regression results reveal the determinants of foreign exchange reserves in Serbia and North Macedonia and that the magnitude of the determinants' effects differs across foreign exchange reserve quantiles. To establish a link with the conventional approach to time series analysis, Table A5 in the Appendix provides unit root test results for Serbia and North Macedonia, which show that each of the considered series is integrated of order 1, taking intoaccount both trend and constant. Consequently, the Johansen (1995) cointegration test was performed and the results are summarised in Table A6 and Table A7 in the Appendix, for Serbia and North Macedonia respectively. The results in Table A6 indicate two significant cointegrating relationships in the case of Serbia, while the results in Table A7 show the existence of one cointegrating relationship in the case of North Macedonia. Thus, in these two cases the relationship between foreign exchange reserves and their determinants could be examined using conventional time series analysis and cointegration. In both cases, foreign exchange reserves were determined using effective exchange rate level and monetary aggregates M2/GDP, while effects from GDP were found to be significant and not pro-cyclical only for North Macedonia. However, we still know nothing about the adequacy of foreign exchange reserves. To shed some light on this we use Equation (2) in the research data and methodology section of this paper, while recognising that the international economics literature often assumes that a country should maintain sufficient reserves to cover at least one-quarter of imports (Moore and Glean 2016). The results for the case of Serbia are provided in Figure 1.

Figure 1: Coverage of imports by foreign exchange reserves



As illustrated in Figure1, in the case of Serbia foreign exchange reserves cover almost two quarters of imports, which can be considered satisfactory. The Croatian National Bank holds even higher amounts of foreign exchange reserves compared to the level of imports (Bošnjak et al. 2019). Figure 1 shows that the coverage of imports by foreign exchange reserves in North Macedonia is lower than in Serbia. However, the foreign exchange reserves cover the level of imports for more than one quarter and therefore can be considered satisfactory.

5. CONCLUDING REMARKS

Several conclusions can be drawn from the research presented in this paper. First, in North Macedonia the foreign exchange reserves are significantly determined by the real effective exchange rate, monetary aggregates M2/GDP, and the level of GDP. In Serbia the effect of GDP on foreign exchange reserves is not significant, while the level of real exchange rate and monetary aggregate M2/GDP

is significant at some quantiles. In North Macedonia the effect of foreign exchange reserve accumulation on the national economy is counter-cyclical.

The quantile regression approach was confirmed as useful for revealing the difference between effects on the foreign exchange reserves and its determinants across various quantiles, while the traditional cointegration approach to time series analysis can also provide results in these two cases. Following the usual assumption in the literature on international economics, the foreign exchange reserves in Serbia and North Macedonia are satisfactory. However, the level of foreign exchange reserves compared to the level of goods and services imports is slightly lower in North Macedonia than in Serbia. Furthermore, in both countries the reserve coverage of imports is lower than in Croatia (Bošnjak et al. 2019). These results address the question of reserve adequacy, taking into account reserves arising from foreign exchange rate stability and other economic structures as well as the standard criterion of import levels.

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APPENDIX

Figure A1: Development of the observed series, Serbia

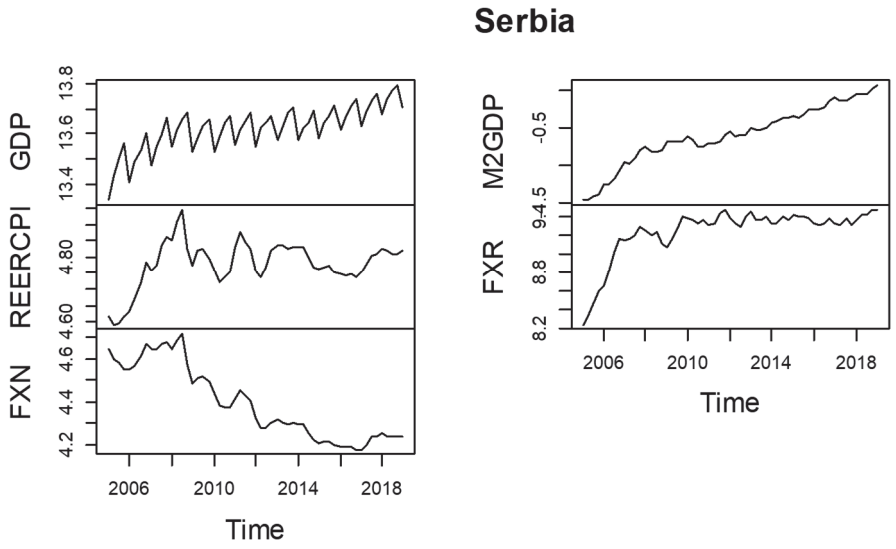

Figure A2: Development of the observed series, North Macedonia

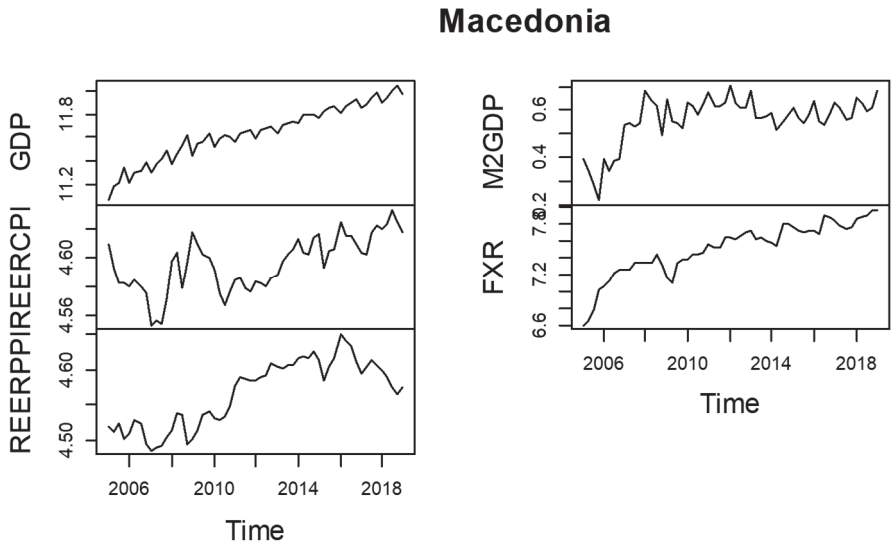

Table A1: Descriptive statistics of the observed variables in (natural) log levels, Serbia

	FXR	REERCPI	REERPPI	GDP	M2GDP
Min.	8.248	13.34	4.177	4.592	–1.46190
1st Q	9.204	13.57	4.237	4.752	–0.79017
Media	9.321	13.63	4.331	4.781	–0.58860
Mean	9.237	13.62	4.395	4.780	–0.59178
3rd Q	9.381	13.68	4.554	4.826	–0.31318
Max.	9.473	13.79	4.720	4.947	0.08809

Table A2: Descriptive statistics of the observed variables in (natural) log levels, North Macedonia

	FXR	REERCPI	REERPPI	GDP	M2GDP
Min.	6.603	4.553	4.485	11.06	0.2166
1st Q	7.328	4.582	4.524	11.49	0.5414
Media	7.571	4.598	4.584	11.65	0.5798
Mean	7.504	4.596	4.567	11.64	0.5601
3rd Q	7.726	4.609	4.608	11.82	0.6219
Max.	7.961	4.633	4.651	12.05	0.7073

Table A3: Serbia: nominal effective exchange rate, GDP, and M2/GDP as reserve determinants

Qu.	Intercept		GDP		FX		M2GDP	
	Estimates (standard error)	p-value	Estimates (standard error)	p-value	Estimates (standard error)	p-value	Estimates (standard error)	p-value
0.10	–7.43093 (5.45322)	0.17875	0.88424 (0.42601)	0.04280	1.11182 (0.27350)	0.00016	0.80319 (0.16127)	0.00001
0.20	0.73252 (8.74863)	0.93359	0.37196 (0.67151)	0.58197	0.84968 (0.28186)	0.00394	0.74532 (0.22676)	0.00180
0.30	–2.81231 (6.91174)	0.68573	0.73775 (0.51849)	0.16063	0.50716 (0.22861)	0.03083	0.51115 (0.14422)	0.00083
0.40	–2.38379 (4.94778)	0.63194	0.82129 (0.38438)	0.03726	0.13654 (0.23738)	0.56759	0.28783 (0.18201)	0.11973
0.50	3.59236 (5.25109)	0.49688	0.42715 (0.39726)	0.28714	0.00181 (0.24546)	0.99415	0.23376 (0.16558)	0.16387
0.60	4.10004 (5.70692)	0.47565	0.43209 (0.43277)	0.32261	–0.13260 (0.20438)	0.51928	0.16689 (0.14954)	0.26944
0.70	8.00665 (2.86892)	0.00729	0.17038 (0.20904)	0.41867	–0.20767 (0.16236)	0.20643	0.13657 (0.07188)	0.06289
0.80	6.89781 (5.48150)	0.21377	0.25652 (0.41085)	0.53508	–0.22375 (0.20670)	0.28394	0.09991 (0.13115)	0.44955
0.90	7.31144 (2.16869)	0.00140	0.12777 (0.16003)	0.42818	0.09703 (0.10725)	0.36970	0.14578 (0.04608)	0.00258

Table A4: North Macedonia: real effective exchange rate (PPI), GDP, and M2/GDP as reserve determinants

Qu.	Intercept		GDP		REER		M2GDP	
	Estimates (standard error)	p-value	Estimates (standard error)	p-value	Estimates (standard error)	p-value	Estimates (standard error)	p-value
0.10	–7.42079 (2.51188)	0.00467	0.97979 (0.23900)	0.00014	0.59257 (1.04446)	0.57287	1.29143 (0.23641)	0.00000
0.20	–6.66121 (1.81206)	0.00055	1.05587 (0.13676)	0.00000	0.24165 (0.60032)	0.68891	1.25202 (0.15477)	0.00000
0.30	–6.72365 (1.55650)	0.00007	1.09538 (0.09410)	0.00000	0.16382 (0.45546)	0.72052	1.19407 (0.22346)	0.00000
0.40	–6.57317 (1.60615)	0.00015	1.08722 (0.07828)	0.00000	0.20382 (0.44037)	0.64538	0.82269 (0.27860)	0.00468
0.50	–6.99333 (1.77075)	0.00023	0.97040 (0.06241)	0.00000	0.61649 (0.43811)	0.16522	0.72699 (0.22668)	0.00227
0.60	–6.91716 (1.80594)	0.00034	0.91857 (0.07046)	0.00000	0.75307 (0.44999)	0.10012	0.59413 (0.30373)	0.05573
0.70	–7.11332 (1.45986)	0.00001	0.86351 (0.06470)	0.00000	0.94995 (0.37678)	0.01474	0.52039 (0.20765)	0.01531
0.80	–7.52372 (1.17604)	0.00000	0.87828 (0.07187)	0.00000	1.00507 (0.34382)	0.00508	0.51851 (0.13987)	0.00050
0.90	–7.39751 (1.13799)	0.00000	0.81716 (0.06070)	0.00000	1.14953 (0.30430)	0.00040	0.45795 (0.15765)	0.00535

Table A5: Unit root tests results

Country	Variable	ADF test		PP test		KPSS test		ERS test	
		in levels	in first differences	in levels	in first differences	in levels	in first differences	in levels	in first differences
Serbia	FXR	–4.156628	–5.134988	–5.132148	–5.874207	0.202598	0.166133	–1.379861	–5.870315
	GDP	–2.995651	–2.434635	–7.194879	–21.21190	0.178495	0.181943	–1.665226	–0.658511
	FXN	–1.540971	–6.294224	–1.870615	–5.016980	0.131298	0.082816	–1.680600	–5.920211
	REERCPI	–3.586732	–6.333394	–2.462531	–5.242706	0.130342	0.081822	–1.956483	–5.864765
	M2/GDP	–3.297893	–2.431605	–2.522962	–6.939331	0.123176	0.122676	–2.047954	–2.546579
North Macedonia	FXR	–4.088525	–6.106526	–4.274519	–7.022392	0.152750	0.106065	–2.179140	–7.040507
	GDP	–2.552490	–4.176320	–6.944425	–20.11255	0.244564	0.124874	–0.924322	–0.745516
	REERPPI	–0.157092	–5.308247	–1.609222	–8.122750	0.176593	0.156815	–2.291124	–5.981324
	REERCPI	–3.783321	–6.521547	–3.822466	–8.850594	0.098318	0.094725	–2.673578	–6.229208
	M2/GDP	–3.882422	–2.680639	–3.070697	–16.20661	0.182085	0.135798	–2.728272	–1.632092

Table A6: Johansen (1995) cointegration test, Serbia

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 CriticalValue	p-value
None	0.632315	87.64196	47.85613	0.0000
At most 1	0.333010	32.61291	29.79707	0.0231
At most 2	0.169546	10.33903	15.49471	0.2555
At most 3	0.002198	0.121000	3.841466	0.7279
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 CriticalValue	p-value
None	0.632315	55.02905	27.58434	0.0000
At most 1	0.333010	22.27388	21.13162	0.0344
At most 2	0.169546	10.21803	14.26460	0.1980
At most 3	0.002198	0.121000	3.841466	0.7279

Table A7: Johansen (1995) cointegration test, North Macedonia

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 CriticalValue	p-value
None	0.549527	75.43532	47.85613	0.0000
At most 1	0.258549	31.57523	29.79707	0.0309
At most 2	0.168360	15.12221	15.49471	0.0568
At most 3	0.086611	4.982621	3.841466	0.0256
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 CriticalValue	p-value
None	0.549527	43.86010	27.58434	0.0002
At most 1	0.258549	16.45301	21.13162	0.1995
At most 2	0.168360	10.13959	14.26460	0.2029
At most 3	0.086611	4.982621	3.841466	0.0256

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THE EFFECT OF INCREASING THE MINIMUM WAGE ON POVERTY AND INEQUALITY IN BOSNIA AND HERZEGOVINA

ABSTRACT: *The minimum wage, as a labour market policy with distributive impact, is widely debated in Bosnia and Herzegovina (BiH). This paper estimates the effect of increasing the minimum wage on poverty and income inequality in BiH, providing the first empirical evidence on the minimum wage in the country. Using data from the Household Budget Survey (HBS) for 2015, the effects of four changes (two per entity) in the minimum wage were simulated using the microsimulation model BiH-MOD. First, the effect of the latest changes implemented in the previous period was calculated using the previous minimum wage level as the baseline. Second, the effect of recently proposed changes was simulated using the current level as the baseline. The findings suggest that increasing the minimum wage in BiH has a significant positive effect on poverty reduction, but a limited effect on the level of income inequality. The estimated effects were also calculated for different types of households. The results suggest that a single policy may have unexpected effects if other policies are not taken into account and harmonized accordingly. The findings provide empirical evidence for decision-makers and future policy debate, which is generally missing for this and similar policy issues in BiH.*

KEY WORDS: *minimum wage, simulation, poverty, inequality*

JEL CLASSIFICATION: D31, D63, E27, I32, I38

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1. INTRODUCTION

A statutory minimum wage is a tool that is often used to improve the well-being of workers. In a simplified scenario, a statutory minimum wage cuts out the left tail of the wage distribution and reduces inequality. However, possible and often neglected consequences of increasing the minimum wage that may impact the overall level of inequality include a reduction in total employment, effect of substitution of low-skilled workers with those with more human capital, and the effect of spillover on higher wages. The impact also differs in the context of a dual labour market, where labour market institutions are introduced to benefit and protect insiders, while further harming outsiders. Consequently, the overall distributional effects need to be investigated empirically. This paper offers the first empirical assessment of the distributional impact of changes in the minimum wage in Bosnia and Herzegovina (BiH), a country with some of the highest inactivity and unemployment figures, particularly among the vulnerable groups that remain outside the usual labour market arrangements, which are determined by political parties.

The labour market in BiH has the highest unemployment rate (25.4% in 2016) in the Western Balkans and a high rate of informal employment of around 30% (Oruč & Bartlett, 2018). The highest rate of informal work is among low-educated workers: around 86% of workers with no education and 62% of those with only primary education work informally (Oruč & Bartlett, 2018). Furthermore, the difference between public and private sector wages means that public sector employees in particular push decision-makers to increase the statutory minimum wage. Increasing the minimum wage in such circumstances leads to increased costs for employers and potentially to an increase in the level of unemployment and informal employment.

The minimum wage is part of the tax-benefit system in both administrative units (entities) of BiH, the Federation of Bosnia and Herzegovina (FBiH) and the Republic of Srpska (RS). The FBiH introduced a minimum wage in 2005 through the General Collective Agreement at a level of around 50% of the average salary. The Republic of Srpska introduced a minimum wage in 2006 at a lower level than in the FBiH, at around 40% of the average salary. In the following years there were several changes in the minimum wage level. In the FBiH the last change in 2016 was the most important, while in the RS there were additional increases after

2016. In both entities the minimum wage is the subject of public debate, regardless of the different legal provisions, and policymakers are pressured to increase the minimum wage level. This paper aims to produce the first empirical estimate of the effects of the minimum wage so that the discussion is informed and policy decisions are made based on the evidence.

The paper is structured as follows. The next section provides an overview of the literature analysing the relationship between the minimum wage, employment, poverty, and inequality. Section three describes the minimum wage context in BiH to give a better understanding of the empirical findings. Section four describes the model, data, and empirical strategy, and section five discusses the empirical results of the model estimation. Finally, section six concludes and provides policy recommendations.

2. LITERATURE REVIEW

There is much socio-economic debate on the redistributive effect of the minimum wage and its potential (or lack thereof) to reduce poverty and inequality. A growing body of literature explores the effect of the minimum wage on poverty and inequality as well as other consequences such as employment incentives and changes in employment and the price of goods and services. These studies reach different conclusions regarding the size and magnitude of the effect of the minimum wage. According to Moore et al. (2009), there are two main views regarding the minimum wage and its impact. The advocacy view holds that setting a fair wage can improve the economic well-being of those earning below the minimum wage, who are generally the uneducated and unskilled. However, critics argue that the negative employment effects may be large enough to offset the benefits gained from the additional income. They claim that the minimum wage does not benefit those outside the labour market such as the elderly, disabled, and unemployed. This is of particular relevance in the BiH, which has a large number of 'outsiders'. Moreover, the presence of 'envelope wages' (cash in hand) means that the minimum wage only increases the gap[1] between 'insiders'

[1] Available evidence (e.g. Vladisavljević et al., 2107) suggest that the public sector wage premium in the Western Balkans is positive and significant.

in the public sector who are not paid part of their wage in cash and 'outsiders' in the private sector who often are.

The effect can also vary according to the level of labour market development, including issues such as the presence of informal employment and an undeveloped social safety net. Gindling (2014) argues that increasing the minimum wage has a positive but modest impact in developing countries, because the statutory minimum wage applies to only a minority of impoverished workers and does not cover workers in the large informal sector. Among poor households, raising the minimum wage creates losers as well as winners: depending on wage distribution and the effect of the minimum wage on employment of the household head, some are pulled out of poverty while others are pushed into it. Raising the minimum wage should be part of a comprehensive poverty-reduction package but should not be the only, or even the main, tool to reduce poverty. Gindling finds that the magnitude of the effect depends on the difference between the average and the minimum wage. For example, when the minimum wage is low relative to the average wage (as in Brazil and Mexico), it tends to raise the wages of workers at the bottom of the wage distribution. However, when the minimum wage is high relative to the average wage (as in Colombia), it increases the wages of workers in the middle of the wage distribution but not those at the bottom.

Redistribution theory (Freeman, 1996) posits that raising the minimum wage operates through three different mechanisms: it increases the price of goods and services produced by minimum-wage employees, it decreases stakeholder profits at the higher end of the wage distribution while raising the incomes of the low-wage workers, and it acts as a price floor in the labour market, increasing the unemployment of minimum wage workers. However, Atkinson et al. (2015) argue that increased income inequality is not inevitable and can be reversed, and to this end they set out a range of concrete proposals for the UK which are tested using EUROMOD. The analysis of their likely impact on inequality and poverty yields insights of much broader relevance. In particular, one solution they propose is making the design of income tax and social insurance contributions more progressive, and they compare the role of means-tested, social-insurance-based, and universal cash transfer payments.

One explanation offered for the different estimated effects of a change in the minimum wage is that it depends on the composition of the family. The effect is different depending on who is the main breadwinner, whether he/she is a low- or high-skilled worker, and whether family members are eligible for certain social benefits depending on their disposable income. Advocates of the minimum wage argue that introducing or increasing a minimum wage at least gives low-wage earners sufficient income to support a decent life. However, they do not always take into account the fact that low-wage earners are usually not the main breadwinners but are spouses or young adults living with their parents.

3. BACKGROUND: THE MINIMUM WAGE IN BIH

The tax-benefit system in Bosnia and Herzegovina was developed under very specific circumstances. It was based on the institutional and legal framework inherited from Yugoslavia and developed in unfavourable socio-economic circumstances (civil war, dissolution of Yugoslavia, transition, etc.), with interventions by various international actors (Arandarenko, 2004). The transformation of the ideological system and total disassembly of the political system resulted in a new organisational and functional system matrix.

According to the BiH constitution (established in the Dayton Peace Accord), tax and social policies are under the exclusive jurisdiction of the lower levels of government – the two entities and the cantons. Institutions at the state level have only a limited coordinating role. The entities of FBiH and RS have different income taxation and social security contribution systems, while citizens in Brcko District can decide which system their income is taxed under. The governments of each entity define the main benefit policies, while others are defined by the lower administrative units (cantons, cities, municipalities). Personal income tax in both entities is flat at 10%. In FBiH both employers and employees pay social security contributions, while in RS they are only paid by employees.

The minimum wage policy is also different in each of the two systems. In the FBiH it is set as the minimum net hourly wage, and in the RS it is set as the minimum net monthly wage. There have been several periodic changes in the minimum wage in both the FBiH and the RS, usually implemented at the end of the year and coming into force in the following year. In the FBiH the first minimum wage was established in August 2005 through the General Collective Agreement, set at the

level of a net hourly wage of BAM[2]1.75, which was then around 55% of the average net salary. In 2008 the level of the minimum wage was changed to a net hourly wage of BAM 1.95. In the last change in FBiH in 2016, the General Collective Agreement increased the level of the minimum wage from a net hourly wage of BAM 2.05 to BAM 2.31.

There were similar changes to the minimum wage in the RS. In the RS the minimum wage was first introduced in 2006 at BAM 205.00 per month, or about 40% of the average salary. Different to FBiH, the minimum wage is, set in relation to the average monthly wage with corrections every year. The two most recent changes (included in the scenarios used for estimation of the effect in the empirical chapter) were a minimum wage increase from BAM 370.00 to 395.00 in 2016 and an increase of the minimum monthly wage from BAM 440.00 to 450.00 in 2019.

Increasing the minimum wage level as a percentage of the average monthly wage follows similar developments in the Western Balkan region. All countries in the region have a legal minimum wage policy. Moreover, all countries, except Kosovo, increased the level in the period 2015–2019. According to a World Bank report (2020),[3] in July 2019 the minimum wage was raised for the first time since 2013. At the beginning of 2019, minimum wages in the region – as a percentage of the average monthly wage (expressed in euros) – were diverse and ranged between 28% in Kosovo and almost 50% in Albania, North Macedonia, and Serbia.

[2] BAM is code for the convertible mark, a BiH national currency, set at a fixed exchange rate to euro at 1.95583 BAM for 1 euro.

[3] https://wiiw.ac.at/western-balkans-labor-market-trends-2020-dlp-5300.pdf

Table 1: Minimum wage as a percentage of average monthly gross wage on 1 January, 2015 and 2019

Country	**2015**	**2019**
Albania	45.8	48.3
Montenegro	39.7	37.3
North Macedonia	42.0	46.4
Serbia	46.4	48.4
Kosovo	33.3	28.3
Bosnia and Herzegovina: FBiH*	43.0	43.3
Bosnia and Herzegovina: Republic of Srpska*	44.5	49.5

**Data for Bosnia and Herzegovina data are calculated based on average net monthly wage*

Source: *https://wiiw.ac.at/western-balkans-labor-market-trends-2020-dlp-5300.pdf *Authors' own calculations for data for Bosnia and Herzegovina, based on official statistics.*

The increasing trend of average and minimum wages in both entities suggests that the minimum wage changed following an increase in the average wage. The share of minimum wage in the average wage is fairly stable over time and is around 50% in both entities. As governments in both entities continue to discuss future changes in the minimum wage level, we hope that the evidence presented in this paper will be useful and will inform decision-making as well as the broader public policy debate.

4. EMPIRICAL STRATEGY

As described in the literature review, a variety of methods is used to estimate the effect of changes in the minimum wage. In this paper the effect of increasing the minimum wage on poverty and inequality is calculated using BiHMOD, a microsimulation model for ex-ante evaluation of tax and social benefit policy changes, based on EUROMOD. EUROMOD-based national models have frequently been used to estimate the effects of the minimum wage in other countries, including Belgium (Penne et al., 2019), North Macedonia (Petreski & Kosovska, 2018), UK (Atkinson et al., 2017), Romania (Popescu et al., 2017), and Serbia (Ranđelović & Žarković Rakić, 2012).

BiHMOD[4] is designed to assess the expected effects of changes in different socio-economic policies on household well-being and work incentives. It is a static microsimulation model and as such produces 'day-after' effects of policy changes. The model uses the latest available data from the Household Budget Survey (HBS) and programmes a set of policy variables that are run on the data to estimate the effect of policy changes. The HBS[5] is a national household-level survey focusing on households' final consumption expenditure. The last survey was conducted in 2015 and this dataset is included in the model. The HBS[6] survey asks a representative sample of households in BiH a set of questions that allow simulation of policy changes, including questions on their demographic characteristics; their education and labour market status; their expenditure pattern, income amounts, and sources; and their social benefits. Income in the survey is presented as the net monthly wage, and this requires net-to-gross imputation of wages. For FBiH the model currently simulates the following means-tested benefits: child allowance, benefits for unemployed mothers, benefit for equipment for new-borns, up to 6 months' benefit for child nutrition, and permanent financial assistance for the disabled. For RS the simulated benefits include child allowance, benefit for equipment for new-borns, benefits for the third and fourth child in the family, and permanent financial assistance for the disabled.

In order to calculate hourly wages as used in the minimum wage legislation in FBiH, the monthly wage of full-time employees was divided by the average number of hours (40 hours per week). We excluded part-time employees because there is no data on the actual number of hours worked in the HBS survey dataset, and imputation of 25 hours per week as an average did not perform well in the model because it was not possible to distinguish between minimum-wage workers and part-time employees earning high hourly wages. Employees who reported that they received income for full-time employment but did not want to report the amount (around 10%) were also excluded. Reported incomes below the minimum wage for full-time employees (around 10%) were bottom-coded by

4 More about the model at: https://credi.ba/en/bihmod/

5 http://www.bhas.ba/saopstenja/2017/HBS_Final_17042017_bh.pdf

6 BiHMOD uses HBS instead of SILC (Survey on Income and Living Conditions), which is the data source for most other national EUROMOD-based models, since the SILC is not yet conducted in BiH.

replacing these values with the minimum wage, since the law does not allow paying workers a wage that is below the minimum wage level. We also dropped all observations from Brcko District, since the data does not allow us to identify workers by the taxation applied (either FBiH taxation or RS).

Following the methodology used in Atkinson et al. (2017), the impact of reforms on income inequality is assessed first in terms of the main inequality measures, such as the Gini coefficient, Atkinson measures (with the inequality aversion parameter set at 0.5), the mean log deviation, and the Theil index. Employing a variety of inequality measures provides more complex information, since each result offers a specific perspective. The impact on poverty is assessed in terms of the headcount ratio, with the relative income threshold set at 50% of median household disposable income (adjusted for household size using the modified OECD equivalence scale). Poverty gap measures, reflecting the distance of poor individuals from the income threshold, are also used to capture the impact on poverty, measuring not only the number of those moving above or below the threshold, but also the impact on individuals who remain below the poverty threshold but whose incomes still increase.

Before presenting the results for the poverty and inequality measures, we provide a brief descriptive analysis of the sample. The following table presents the structure of the sample by educational level.

Table 2: Structure of the sample by educational level (%)

Structure by educational level (%)	
Not completed primary	26.87
Lower-secondary[7]	19.69
Upper-secondary	44.14
Post-secondary	0.45
Tertiary	8.86

Source: Own calculation using BiHMOD

[7] There is no level of completed primary education because according to the legislation a degree cannot be obtained after primary school graduation.

The above table shows that the largest percentage has attained secondary education, while the smallest percentage is those with post-secondary education. With regards to the structure by industry sector, the highest percentage is employed in the high-skill services sector and the smallest in the sector 'Mining, Manufacturing, and Electricity, Gas and Water supply'. The structure by industry sector is presented in Table 3.

Table 3: Structure by industry sector (%)

Structure by industry sector (%)	
Agriculture	18.82
Mining, manufacturing, electricity, water supply	0.16
Construction	2.95
Low-skill services sector	34.20
High-skill services sector	43.87

Source: Own calculation using BiHMOD

The income from employment in the sample is distributed as presented in Table 4.

Table 4: Distribution of taxable income from employment

Decile	Percentage	Cumulative percentage	Mean income in decile
1	15.80	15.80	359.12
2	5.49	21.29	441.69
3	9.60	30.89	495.92
4	14.54	45.43	581.98
5	4.57	50.00	644.73
6	10.57	60.57	712.59
7	9.44	70.01	798.26
8	14.27	84.28	943.26
9	7.05	91.32	1148.91
10	8.68	100.00	1814.51
Total	100.00		766.32

Source: Own calculation using BiHMOD

The analysis of income from employment presented in the table above shows that on average around 16% of persons had a monthly income equal to or below BAM 360.00, representing minimum wage earners. It is worth noting that around 70% of the distribution had a monthly income from employment equal to or lower than around BAM 800.00, representing average wage earners in 2015.

The model is validated using the population weights from the HBS 2015 dataset. The estimates from the model were compared with the official statistics on government revenues and spending published in 2015. The comparison is presented in Table 5.

Table 5: BiHMOD macro-validation results

Indicator	Administrative records	BiHMOD	Ratio (BiHMOD/ Administrative data)
Average wage	830.00	763.30	0.92
Personal income tax (in bill. BAM)	0.56	0.38	0.68
Social security contributions (in bill. BAM)	4.31	2.89	0.67
Benefits (in bill. BAM)	5.62	3.17	0.56

Source: Own calculation using BiHMOD and www.bhas.gov.ba

As we can see by comparing official figures and the model estimates, the model produces an average wage that is 8% lower than that published by the BiH Statistics Agency. The simulated amount of personal income tax in the BiHMOD is estimated at the level of 68% of the amount collected by the Tax Authorities. It should be noted here that the net-to-gross imputation procedure is only implemented on the reported wages, while the tax deductions for dependent family members could only be computed for the household heads because the data used did not allow links to other family members in the household. The same applies for the underestimation of social security contributions by around 33% compared to the administrative data.

5. RESULTS

The results of the estimation of the effects of minimum wage changes are presented below. Two baselines and two simulation scenarios are used for each entity. The first scenario is the recent change in the minimum wage, where the previous minimum wage level is programmed in the baseline scenario and the recent change from BAM 2.05 to 2.31 net hourly wage in FBiH and from BAM 370.00 to 450.00 net monthly wage in RS are used to estimate the effect of recent changes in the minimum wage. The second scenario simulates the proposed increase of the minimum wage in FBiH to 50% of the average wage. Because the minimum wage in RS is already above 50% of the average wage we applied the same percentage increase as proposed in FBiH, which is 10%. In the second simulation the proposed net hourly wage in FBiH increases from BAM 2.31 to 2.55, while in RS the monthly minimum wage increases from BAM 450.00 to 495.00. The estimation results of the distributional impact of the two scenarios are presented in the remainder of this section. The first estimate provides empirical evidence of a recent and actual change in the minimum wage that is still policy-relevant, and the second estimate provides empirical evidence for a change that is being considered and which can be used to support the decision-making process.

5.1 Estimated effects of the recent increase in the minimum wage level

First, we present the results from the estimation of the effects of an increase in the minimum wage in scenario 1. The results presented below show the estimated distributional effects of the actual increase in the minimum wage that occurred in 2016 in FBiH and in 2019 in RS.

Table 6: Results of simulation 1

	Baseline 1	Simulation 1
Number of persons below poverty line	771,306	765,940
Poverty rate (%)	26.34%	26.15%
Gini coefficient (total disposable household income)	0.39248083	0.39250919
Atkinson index	0.204983	0.205003

Source: Own calculation using BiHMOD

The estimates from the BiHMOD model suggest that the recent increase in the minimum wage resulted in a reduction in the poverty rate of 0.19pp, and a slight increase in inequality measured by both the Gini coefficient and Atkinson index.

We present descriptive statistics of the sample of minimum wage earners in Table 7.

Table 7: Descriptive analysis of minimum wage earners in simulation 1

		Baseline 1	Simulation 1	Change (Simulation 1 – Baseline)
Number of minimum wage earners		27,072	80,484	53,412
As a share of full-time employees		3.6%	10.7%	7.1
Number of minimum wage earners who are household heads		8,568	26,744	18,176
Number of social assistance recipients		750,886	738,305	-12,581
Average number of household members		3.89	3.86	N/A
Structure by educational level (%)	Not completed primary	2.02	1.03	-0.99
	Lower-secondary	16.67	15.98	-0.69
	Upper-secondary	73.23	74.40	1.17
	Post-secondary	0.00	0.17	0.17
	Tertiary	8.08	8.42	0.34
Structure by industry sector (%)	Agriculture	6.36	6.21	-0.15
	Mining, manufacturing, electricity, water supply	0.00	0.40	0.40
	Construction	1.73	2.40	0.67
	Low-skill services sector	41.62	40.28	-1.34
	High-skill services sector	50.29	50.70	0.41

Source: Own calculation using BiHMOD

As expected, the increase in the minimum wage results in an increase in the number of minimum-wage earners. Around one-third of minimum-wage earners are household heads with on average 3.8 members in the household. Minimum-wage earners with upper-secondary educational level are most affected by the change. Increasing the minimum wage level reduced the number of social benefit recipients, since a significant number of those became socially excluded: changing the level of the minimum wage without modifying the eligibility for receiving social benefits leads to the exclusion of more than 12,500 individuals. Given that this policy change affected a large number of household heads who were the main breadwinners in households that were in receipt of social benefits, these results suggest that any social policy debate, including additionally increasing the minimum-wage level, should be considered carefully and in connection with other policies.

5.2 Estimated effects of the proposed increase in the minimum wage level

To produce evidence relevant to this debate the second simulation estimates the potential effects of a new increase in the level of the minimum wage for both entities. In this scenario the minimum wage, according to the current proposal, is increased from the current level of BAM 2.31 of the net hourly wage to BAM 2.55 in FBiH and from BAM 450.00 to 490.00 of the monthly wage in RS. Results of baseline 2 and simulation 2 are presented in Table 8.

Table 8: Results of simulation 2

	Baseline 2	Simulation 2
Number of persons below poverty line	765,940	759,946
Poverty rate (%)	26.15%	25.95%
Gini coefficient (total disposable household income)	0.39250919	0.39097591
Atkinson index	0.205003	0.204214

Source: Own calculation using BiHMOD

The results presented above suggest that a further increase in the minimum wage will further reduce the level of poverty. Moreover, it will have an impact on income inequality, as seen in the slight decrease in the Gini coefficient. A descriptive analysis of the sample of minimum wage earners in the second simulation is presented in Table 9.

Table 9: Descriptive analysis of the minimum wage earners in simulation 2

		Baseline 2	Simulation 2	Change (Simulation 2 – Baseline 2)
Number of minimum wage earners		80,484	88,177	7,693
As a share of full-time employees		10.7%	11.7%	1.00
Number of minimum wage earners who are household heads		26,744	29,112	2,368
Number of social assistance recipients		738,305	737,747	–558
Average number of household members		3.86	3.88	N/A
Structure by educational level (%)	Not completed primary	1.03	0.94	–0.09
	Lower-secondary	15.98	15.81	–0.17
	Upper-secondary	74.40	74.96	0.56
	Post-secondary	0.17	0.16	–0.01
	Tertiary	8.42	8.14	–0.28
Structure by industry sector (%)	Agriculture	6.21	6.38	0,17
	Mining, manufacturing, electricity, water supply	0.40	0.36	-0.04
	Construction	2.40	2.37	–0.03
	Low-skill services sector	40.28	40.62	0.34
	High-skill services sector	50.70	50.27	–0.43

Source: Own calculation using BiHMOD

The estimated change in the number of new minimum wage earners is smaller than in the case of simulation 1 and compared to baseline 1. Again, as expected, most of the minimum-wage earners that are most affected by the change have an upper-secondary educational level. Moreover, it should be noted that a new, additional increase in the minimum wage socially excludes even more people. Nevertheless, the effects are smaller than in the first simulation.

6. CONCLUSIONS AND POLICY RECOMMENDATIONS

The issue of the minimum wage is widely debated in BiH, despite contrasting theoretical predictions and a lack of empirical evidence. This paper produces the first estimates of the distributional impact of changes in the minimum wage using a static microsimulation model and estimating the effects of both recent and proposed changes. The evidence produced in this paper proffers helpful empirical evidence and insights for the policy debate and for further research on the effect of the minimum wage in BiH.

The results presented in this paper show that increasing the level of the minimum wage positively impacts poverty and inequality. As such, the institution of the minimum wage can be used as a tool for reducing both poverty and inequality in BiH. However, the paper suggests that the minimum wage should not be used as a stand-alone tool but should be designed in coordination with other social and employment policies. Otherwise, the results presented here show that it will produce higher levels of social exclusion. After increasing the level of the minimum wage, decision-makers should consider changing the eligibility criteria for social benefits, as some families may be excluded but still in poverty.

This research has some limitations resulting from the data used and the estimation approach. The results are produced using a static model and do not take into account behavioural responses of employers and employees with regards to working hours and envelope wages. Changing the minimum wage level may also have a spill-over effect on the wages of other workers, especially in the public sector, since their wages are often calculated based on 'coefficients' linked to the minimum wage or on the average wage, which is affected by an increase in the minimum-wage level.

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Rodrik, R., Subramanian, D., & Trebbi, F. (2004). Institutions rule: the primacy of institutions over geography and integration in economic development. *Journal of Economic Growth*, 9(2), 131-165.

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