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

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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 net-*

works 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*

JEL CLASSIFICATION: C21, D24, F19, O16

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We acknowledge valuable detailed comments by an anonymous referee of this journal.

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 Communautaire* 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 Riggiozzi (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:

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

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
<i>Outcome variable both models</i>		
Output per worker	Log of output per worker derived by dividing total sales by total full-time equivalent employees	BEEPS
<i>Independent variables</i>		
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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Received: March 09, 2019

Accepted: September 29, 2020

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.