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FIRM PRODUCTIVITY IN THE WESTERN BALKANS: THE IMPACT OF EUROPEAN UNION MEMBERSHIP AND ACCESS TO FINANCE

ABSTRACT: *This study examines the productivity performance of Balkan firms within and outside the European Union (EU), including the influence of loans. A multiple treatment model is used to compare the effects on productivity of membership and loans both separately and collectively, which in the case of loans allows a separate analysis of their influence on firms in non-member states. The use of conditional quantile regressions measures the effect on productivity of membership and loans separately as treatment variables. This provides an analysis of where the treatment influence is greatest across the distribution curve and identifies the significance of selected control variables on the outcome. In the full sample, the findings indicate that EU membership and loans have a positive effect on productivity, with membership being more important than loans. Outside the EU, firms in receipt of loans are more productive than those without. However, the significance of both membership and loans is restricted to the lower end of the productivity distribution curve. The manufacturing sample shows that EU membership has a significant positive effect across 70% of the deciles measured, whilst the influence of loans is restricted to the lower deciles, with rental capital (leasing) also positively significant in the lower four deciles. In the services sector, however, membership is significant up to 90% of the distribution, with loans at 60%.*

KEY WORDS: *Transition economies; Firm productivity, EU membership; Access to loans; Multi-level model, Quantile regression*

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INTRODUCTION[1]

The purpose of this study is to evaluate the influence of EU membership and access to finance on the productivity of firms in the Western Balkans. It analyses the productivity performance of EU firms against those within the accession process and identifies whether a strong institutional and regulatory framework is relevant. It also confirms findings in the literature (see Levine 2005; Volz 2010) that loans contribute to improved productivity and, by disaggregating the full sample, it identifies these influences across specific business sectors and examines the impact of EU membership and loans across the productivity distribution curve, identifying areas of maximum influence across both full and disaggregated samples.

It is claimed that the expansion of the EU from 15 to 27 states in the period 2004–2013 led to significant economic and geopolitical benefits for the new member states (NMS) of Bulgaria, Croatia, and Slovenia. However, the case of Albania, Bosnia and Herzegovina, Kosovo, Macedonia, Montenegro, and Serbia, countries in the pre-accession process raises the question of whether enlargement fatigue will prevent these countries ever achieving membership. In these countries in the 1990s, ethnic wars caused hardship and significant disruption to societal and institutional development, issues which must be addressed before accession can be considered (Vachudova 2014). "Since the early 2000s the EU has emerged as the primary actor in state building in the Western Balkans. Based on a dual strategy of state building and European integration, the EU has sought to replace other international organisations in the post-conflict reconstruction of the Western Balkans" (Bieber 2011, p.1783).

This study explores, at the firm level, the impact of EU membership and access to loans on firm productivity in the Balkan countries of Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, Macedonia, Montenegro, Serbia, and Slovenia. It compares the levels of output per worker in EU member countries with those outside the EU and uses capital, cost per worker, skill level, foreign ownership, size, age, bureaucracy, and competition as control variables. Bulgaria, Croatia, and Slovenia are already EU member states and Albania, Bosnia and Herzegovina, Kosovo, Macedonia, and Serbia are theoretically part of the pre-accession process.

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Significant literature exists on the macroeconomic relationship between the EU and the Balkans (see Bieber 2011; Bechev 2012; Petrovic and Smith 2013; Prokopijević and Tasić 2015). This study extends the debate and explores whether, at firm level, there are productivity opportunities to be gained through EU membership. New trade theory states that firms become more productive as a result of increasing economies of scale and network effects (Krugman 1979). The EU is a customs union of 27 counties, which facilitates the development of these attributes and provides a platform to encourage foreign direct investment and exports, the key drivers of improved productivity.

Additionally, there is evidence that lack of access to finance is a constraint on firm-level growth in non-EU member countries, whereas, with respect to leverage, there is convergence within the EU. Thus, it would appear that within the EU, as a result of improved financial intermediation, access to finance improves, while outside the EU, credit constraint continues to be a problem. However, correlation should not imply causality (EBRD 2016).

Until recently, the contribution of finance to economic growth and development was not fully recognised in economic literature, although there is now a strong theoretical foundation for the argument that finance can provide a stimulus to productivity (Levine 2005). This has been increasingly supported by empirical research, some of which specifically relates to transitional countries (Volz 2010).

However, there have been few firm-level studies on the impact of EU membership and finance on firm performance in the Balkan region (Shimbov et al. 2016; Botric 2013; Berman and Haricot 2010), and this paper contributes to this under-researched area. The study focuses on all firms and includes a disaggregated analysis of services and manufacturing. Enhancing productivity is of greater consequence in developing economies than in the developed world because improvement within a national cohort of heterogeneous firms results in the evolution of a more effective industrial base (Roberts and Tybout 1996)

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.

1. LITERATURE REVIEW

The Western Balkans are increasing their participation in international production networks (IPN) where fragmentation of the manufacturing process has created an interwoven network of inter-industry trade flows across countries, involving the transition of intermediate goods across borders until a final assembly destination is reached (Gabrisch et al. 2016; Shimbov et al. 2016). This vertical integration trend led to the new trade theory (NTT) hypothesis that the main factor determining international trade is economies of scale and the network effects occurring in key industry sectors. These can be sufficiently significant to outweigh the more traditional theory of comparative advantage. This study concentrates primarily on the 'new' trade theory originally espoused by Krugman in 1979, in which he developed his general equilibrium model of non-comparative advantage trade, arguing that returns to scale are an important determinant of growing international trade (Krugman 1979). This has led to research seeking to determine the effect of trade policy and multi-factor content on productivity, profitability, exports, firm size, imports, and the effect on local producers.

In his literature review, Tybout (2003) concludes that foreign competition causes price cost markups to fall and locally based firms to contract or even exit the market. International trade allows larger, more productive firms to expand their market base, thus creating greater efficiency, while exporters increase in size, are more efficient, and supply better quality products. Hence, unfettered access to the EU 15 developed market economies, allied to increased competition because of imports from the same source, conforms to Tybout's findings and new trade theory. It would therefore be prudent to evaluate the success of those Balkan countries which are members against those which are not. At the macroeconomic level, convergence between the EU 15 (countries joining before 2004) and the Balkan countries appears to be occurring at a slow pace. This might indicate that some key determinants are not in place (Botric 2011). Conflicting views in the literature relate to the advantages of EU accession (Börzel 2011), and whilst his paper emphasises governance issues, which could be interpreted as political failure, others claim that there is an inherent developmental divide between the Western and Eastern European states which the EU is failing to rectify. Epstein (2014) claims that in areas of consumption and FDI the type of investment encouraged by the EU has contributed to both a division of labour and exclusion from innovative processes, thus depriving the Eastern states of economic gains. She further

criticizes the World Bank and other supra-national institutions for having an overly optimistic view of the benefits of EU expansion, resulting from the imperative of supporting the neoliberal agenda (see also Epstein and Jacoby 2014). Furthermore, the internalisation of the Washington Consensus paradigm and its application throughout the customs union provides a further justification for an alternative view of the potential benefits of membership (see Lutz and Kranke 2014; Fitoussi and Saraceno 2012).

Borocz (2012) claims that Hungary has failed to capitalise on EU membership due to the dominance of EU capital in assembly plant manufacturing, resulting in high import content in relation to exports allied to labour market failure. The unrelenting claims of supra-national institutions and the tendency amongst economists to accept the neoliberal agenda as a given drowns out the discordant views of dissenting voices. Thus, we test the following hypothesis:

Hypothesis 1: EU membership provides a productivity advantage to firms within the new member states.

Recent academic literature reveals the relevance of the link between finance and firms' productivity growth, and whilst this study is not confined to research on SMEs, they represent 90% of the sample (Levine 2005). A study by the World Bank (2014) reveals that in emerging markets, more than 50% of SMEs are credit-constrained, 70% do not use external financing from banking or equity financial institutions, and of the 30% receiving credit, 15% are underfinanced from these sources (Hölscher et al. 2016).

Wagner (2014), in his survey of credit constraints and international trade, suggests that work carried out in this area is itself constrained because results to date cannot be compared because of the different econometric models used, with an added limitation that there is a paucity of sound measures of credit constraint for smaller companies.

Access to finance by SMEs has long been problematical. Debate has focussed on whether the existence of information asymmetries creates credit shortages or credit gluts (EBRD 2015). In this study the basis of the analysis of loans on firm-level performance is contained in Levine's (2005) review of the theoretical and empirical literature on finance and growth. Levine identifies five main ways by which, in theory, finance contributes to economic growth: the availability of savings, investment information, the management of risk, the existence of a due

diligence process, and the facilitation of trade in economic commodities and services. Such considerations provide a good reason for suggesting that finance has an important role to play in development, but they do not, as Levine (2005) argues, constitute a rationale for preferring banks over other forms of finance.

According to Levine (2005), the dominant form of empirical research has been a cross-country study linking economic growth to a measure of financial development. The potential importance of firm-level studies in resolving a number of issues, including better detailed information, causality, and firm heterogeneity, have long been acknowledged in the literature. Nonetheless, there are few firm-level studies on the effects of finance on productivity and other aspects of firm performance (Hölscher, et al. 2016).

A recent study by Levine and Warusawitharana (2014) makes a significant contribution, in part by enhancing the theoretical foundations for the link between finance and productivity growth, and finds that financial frictions affect both investment and output per worker. There is some evidence that, following the accession of the new member states, credit constraint was responsible for the lack of productivity improvements in relation to the more established members of the EU. In relation to the transitional economies, Djalilov and Hölscher (2016) find evidence that banks and the financial sector provided the early transition economies, namely the new member states, with greater credit availability than the states of the old Soviet Union. Furthermore, they had lower loan loss provisions and less reliance on equity, indicating a level of greater efficiency and strength in depth within the banking sector. Literature suggests that the predominance of foreign banks with enhanced credit scoring criteria, allied to the necessity to improve capital ratios at home, may be contributory factors, together with the underdevelopment of capital markets (Caviglia et al. 2002; Thimann 2002; Volz 2010; Estrin and Uvalic 2016). There is little evidence of exploration of the relationship between the level of productivity, accession to EU membership, and access to finance, although work done suggests a reduction in productivity due to misallocation and credit constraint. Gabrisch (2015), however, maintains that a major factor in credit constraints is the level of nonperforming loans and the reluctance of policymakers to confront the issue; and this, together with a poor level of financial intermediation, lies at the heart of the problem of access to finance. This paper contributes by identifying the effect of membership and receipt of loans both inside and outside the EU, and through the use of quantile regression

measures where along the productivity distribution curve the greatest influence lies. Therefore, we formulate the following hypotheses:

Hypothesis 2a: The availability of loans enhances the effect of EU membership.

Hypothesis 2b: The availability of loans improves performance in firms outside the EU.

Hypothesis 2c: The availability of loans improves productivity.

Since Slovenia and a further eight Eastern European transitional economies acceded to the EU in 2004, followed by Bulgaria and Romania in 2007 and Croatia in 2013, the question has arisen whether the countries of the Western Balkans could be integrated more promptly. Barriers to membership remain within the Balkan five (Albania, Bosnia Herzegovina, Kosovo, Montenegro, and Serbia) and whilst this paper does not focus on foreign direct investment (FDI), there is empirical evidence that a negative attitude towards investing in the Balkans can be alleviated, to some degree, by EU membership (Estrin and Uvalic 2016). Other factors include the size of the economies and distance from investment hubs, but principally the paucity of institutional processes. There is "a negative 'Western Balkans' effect" on FDI (Estrin and Uvalic 2013, p.5), resulting in the need for firms to find alternative sources of finance, either from an internal capital market or in the form of loans. The Western Balkans were, however, the recipients of substantial capital inflows prior to the financial crisis of 2008, but were subjected to significant outflows thereafter (Gabrisch et al. 2016), and it is plausible to suggest that different investor priorities rather than a negative attitude to the Balkans may be an alternative rationale for the paucity of FDI. There was an assumption amongst economists that the privatisation programme undertaken by the Eastern European transition economies would result in a significant improvement in firm-level performance. The result has been more nuanced, with firms bought by foreign investors being significantly more productive than those in domestic ownership (see Gabrisch and Hölscher 2006; Wagner 2012; Estrin et al. 2009; Irdam et al. 2015; Waldkirch 2014). From the theoretical arguments and empirical evidence we formulate the following:

Hypothesis 3: FDI has a positive influence on firms' productivity in both the manufacturing and service sectors.

In relation to exports, a survey of 54 micro-econometric studies in 34 countries published between 1995 and 2006 shows that exporting firms are more productive than non-exporters (Fryges and Wagner 2007). Thus, it is important to control for exports in any study relating to productivity. Using firm-level data, Berman and Héricourt (2010) find that productive efficiency, when allied to access to finance, increases the propensity to export. Minetti and Zhu (2011), using Italian firm-level data, find that firms facing credit constraints exhibit weaker export performance.

Hypothesis 4: Exports positively affect firms' productivity in the manufacturing and services sectors.

The EBRD Transition Report for 2014 focuses on innovation as a driver of productivity, but recognises that capital intensity (capital per worker), proximity to the main business centre (infrastructure), skilled labour, competition, and foreign ownership are also important determinants. Additionally, firms trading nationally or internationally are more productive than firms primarily targeting local markets (EBRD 2014). The literature also reveals that a more competitive market results in improved productivity (Bridgman 2010). Clearly, membership of the EU significantly increases the competitive environment. Within the transitional economies there were concerns about the development of competition policy, although these have been largely allayed (Gabrisch and Hölscher 2006). Within the new member states there is evidence that "a well-designed and well implemented competition policy has a significant impact on TFP growth" (Buccirossi et al. 2013, p.1334). It is assumed that the greater the skill base the more productive the firm and, evidence suggests, the greater the proportion of highly skilled workers the more positive the result for labour productivity and profit. A more comprehensive review of Western Balkan competitiveness and productivity constraints can be found in Gabrisch et al. (2016), who emphasise the necessary improvements required in infrastructure and institutional development. These additional determinants have an influence on the productive environment and are therefore legitimate covariates to EU membership and loans, which are the treatment variables in this paper.

The regression analysis controls for capital, skilled labour, competition, exports, and foreign ownership, together with infrastructure and institutional development. The outcome variable 'productivity', measured as output per worker, is selected as a measure of firm-level performance due to its importance for economic growth. A comprehensive review of the literature suggests that

whilst managers have a good deal of control over the endogenous determinants of production, they can do little about exogenous influences (Syverson 2011). Whilst a large body of literature exists on the subject (see Syverson 2011 for more detail), the majority deals with the specific issues grounded in theory: little exists that examines the relative performance of firms subjected to significant economic change, the materiality of fund flows, and capital allocation.

Besides EU membership as a treatment variable (which is self-explanatory), the second treatment variable, loans, is constructed from the question in the Business Environment and Enterprise Performance Survey 2013 (BEEPS): "At this time, does this establishment have a line of credit or a loan from a financial institution?" This then allows the comparison of the productive performance of those in receipt of loans with those with none. Campos et al. (2014) investigate whether EU membership improved both per capita income and labour productivity, using synthetic counterfactual methodology which measures the outcome against a synthetically produced counterfactual of the outcome if membership had not been achieved. They find that membership of the EU provided benefits for all countries with the exception of Greece. This study is an important contribution to the debate on the efficacy of EU membership and adds to that debate by comparing two groups of countries, one members and the other in the accession process, providing an insight into the differing performance of EU membership, non-EU membership, and loans in each of the two groups, augmented by an identification of the effect of observed variables on the outcome variable (output per worker) across the quantile distribution curve. Additionally, the scant literature analysing the effect of EU membership, and key determinants of firm level performance including access to finance, justify the claim that this paper contributes to filling a gap in research.

METHODOLOGY

This paper compares the influence of EU membership and, jointly and severally, receipt of loans on productivity (dependent variable) performance, measured as output per worker, of firms in the Western Balkans. The use of output per worker as a measure of productivity follows other papers which have used BEEPS data and log of sales divided by total employees for measurement purposes (see D'Souza et al. 2017; Pfeifer 2015; Waldkirch 2014; Dutz and O'Conell 2013; Gorodnichenko and Schnitzer 2013; Ricci and Trionfetti 2012). The comparison is between firms in EU member states and those outside, with the objective of measuring performance differences. The analysis identifies the

influence of membership and loans at points across the productivity distribution curve in order to include the significance of control variables selected with reference to the theory and literature. The selected methodology fulfils the key objective of ensuring a robust estimator to reduce bias on unobservables.

We use a multiple treatment approach (with two treatment variables – EU membership and loans) and perform quantile regressions using the IVQTE Stata command, which has the advantage of producing analytical standard errors that are also consistent in the event of heteroscedasticity (Frölich and Melly 2010). Two distinct techniques are used, the Inverse Probability Weighted Regression Adjustment (IPWRA) estimator and quantile treatment effects (QTE) modelling. The former is based on the premise that the effect of EU membership and receipt of loans must be estimated as a treatment assignment – the Average Treatment on the Treated (ATT) effect. Essentially, the research follows the most common approach by matching, by means of propensity scores, EU firms and/or firms receiving loans ('treated firms') to non-EU firms with similar characteristics which have not received a loan ('untreated firms') – which thus constitute a comparison group – and then estimating the difference between output per worker (productivity) for treated firms and non-treated firms (Cerulli 2010).

To safely attribute the estimated difference to a treatment assignment, treated firms must be similar to untreated in all respects except for EU membership and/or loan receipt. This depends on two identifying assumptions: the conditional independence assumption (CIA), or selection on observables, which posits that the outcome in the case of no treatment is independent of treatment assignment, conditional on covariates X (Imbens 2004; Imbens and Wooldridge 2009), and the overlap or common support condition, whereby the estimated propensity scores take positive values (Heckman and Vytilacil 2007).

Treatment effects are estimated in a multiple treatment context to ensure that EU membership and non-membership are carried out simultaneously. Lechner (2002) first introduced a matching approach with multiple treatments. There are M+1 treatments, whereby treatment equal to zero denotes the absence of both EU membership and loan receipt. The average treatment effect on the treated (ATT) effect is then calculated as:

$$ATT = E\left(Y^m \middle| T = m\right) - (Y^l \mid T = m) \tag{1}$$

where m denotes the treatment level, l represents the comparison group (the treatment level to which m is compared), and Y^m and Y^l denote outcomes in states m and l respectively.

The inverse probability of treatment weighting regression adjustment (IPWRA) estimator is employed, the main advantage being its double robust property. 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 IPWRA estimator consists of three steps. Firstly, for each firm in the sample the treatment model estimates the propensity score, which is each firm's probability of participating ('treatment assignment'). Given that multiple treatment effects are evaluated, the propensity scores are estimated by a multinomial logit model, incorporating all four treatment levels: no EU membership and no loan, no EU membership with loan, EU membership and no loan, and EU membership with loan. The choice of the model is motivated by the nature of the treatment variable, which has more than two outcomes with no natural ordering. The propensity scores enable firms to be matched within each treatment level. Secondly, regressions are estimated by the fractional logit model, as the outcome variable is the inverse of the estimated propensity scores and is used as weights on covariates X and the treatment dummies. Thirdly, from each regression the ATT effect is computed as the difference in the weighted averages of the predicted outcomes. Valid standard errors (of the Huber/White/sandwich type) are reported, which take into account that the estimates are computed in a three-step approach (Emsley et al. 2008).

Typically, the response variable y is some function of predictor variables X, so that $y = f(X)$. Most regression applications focus on estimating rates of change in the mean of the response variable and are defined for the expected value of y conditional on X, $E(y|X)$. This poses problems for regression models with heterogeneous variances, such as for firms across countries and industry sectors. Heterogeneous variances imply that there may be some changes that do not focus exclusively on the mean and others that impact differently across the probability distributions. Focusing exclusively on changes in the mean may underestimate, overestimate, or fail to distinguish real non-zero changes in heterogeneous distributions (Cade et al. 1999).

The introduction of quantile treatment effects (QTE) allows the measurement of the effect on the outcome variable (productivity) across the different percentiles of the productivity distribution curve, using median as opposed to the mean. The use of quantile regressions continues to evolve, and model selection is dependent on whether the QTE is conditional or unconditional and the treatment variables exogenous or endogenous. The conditional model is estimated, thus controlling for firm and market characteristics, and due to the lack of valid instruments in the datasets it is not possible to estimate conditional endogenous models. Thus, EU membership and access to loans are regarded as exogenous. This restricts the estimation strategy to the application of the estimator proposed by Koenker and Bassett (1978).

The standard for linear quantile regressions is a conditional model assuming selection on observables. It is assumed that *Y* is a linear function of *X* and *D*. The model for potential outcomes is:

$$Y_i^d = X_i \beta^\tau + d\delta^\tau + \varepsilon_i and\, Q_{\varepsilon i}^\tau = 0 \tag{2}$$

So *X* is a vector of the conditional exogenous variables, *i*=1,……,*n,* and $d \in (0, 1)$ is a set membership of the treatment variables EU membership or loans. Q_ε^τ refers to the τ^{th} quantile of the unobserved random variable ε_i . . It is assumed that Qτ (εi| β, xi) = 0 and is introduced to ensure that the random errors are centred on the τ -th quantile (Marino and Farcomeni 2015). $\beta^\tau and\, \delta^\tau$ are the unknown parameters of the model. δ^τ represents the conditional QTEs at quantile τ . . The linearity assumption above is insufficient to identify the QTEs because the observation D_i may be correlated with ε_i . The assumption is that *D* and *X* are exogenous. The selection on observables with *X* can be taken to be:

$$\varepsilon \perp\!\!\!\perp (D, X) \tag{3}$$

ng Equations (2) and (3) together implies that $Q_{Y|X,D}^\tau = X\beta^\tau + D\delta^\tau$, which allows the recovery of the unknown parameters of the potential outcomes from the joint distributions of the observed variables *Y*, *X,* and *D*. The estimator by Koenker and Basset (1978) can now be utilised to estimate the unknown coefficients:

$$\left(\hat{\beta}^{\tau},\hat{\delta}^{\tau}\right)=\arg\min\beta,\delta\sum\rho_{\tau}\left(\mu\right)\left(Y_{i}-X_{i}\beta-D_{i}\delta\right) \quad (4)$$

where $\rho_{\tau}\left(\mu\right)=\mu^{*}\left\{\tau-1(\mu<0\right\}$. The IVQTE model used generates analytical standard errors that are also consistent in the event of heteroscedasticity (Frolich and Melly 2010).[2]

DATA

The data for this study was taken from the Business Environment and Enterprise Performance Survey (BEEPS) produced by the World Bank and European Bank for Reconstruction and Development (EBRD). BEEPS is a firm-level survey based on face-to-face interviews with managers and examines the quality of the business environment. The survey data has been used in more than 450 papers since 2012, which are published in a number of highly ranked journals (for a comprehensive list of examples see the methodology section p.10). The survey offers a representative picture of the business climate experienced by private firms together with firm performance and characteristics. The survey sample provides comparative data across time, countries, and firms, and allows disaggregation to size, sector, and regions. The data is used in academic and policy papers, with more than 300 papers written to date (World Bank 2016). Data was obtained from the 2013 survey consisting of nine countries in the Balkan region, three of which were EU members at the time of the survey.[3] The sample allows the evaluation of the effect of EU membership on firm performance and the significance of loans and access to finance on firms in the EU and in countries in transition. Additionally, the influence of certain key determinants was measured (for the variable description, see Table A1 in the Appendix).

The descriptive statistics in Table A2 in the Appendix indicate that the majority of the sample is service firms. Of a total of 2,433 firms, 90% (or 2,179 firms) are SMEs, as noted earlier, which, on the assumption that this reflects the total population, demonstrates their importance to the economy. Output per worker

[2] A more comprehensive explanation of the estimation of quantile treatment effects in Stata can be found in Frolich and Melly (2010).

[3] The inclusion of Croatia as an EU member in this study may be controversial, since the accession date and survey results coincide. However, we believe that EU membership is the formal end to a process that has taken many years in transition and the economic conditions within the country would already conform to the Acquis Communautaire (Börzel 2011).

is broadly similar, with service firms being marginally more productive. Manufacturing companies have a larger capital base and a greater propensity to export. Between service and manufacturing firms the gap between costs per worker is significant.

MODEL SPECIFICATION

To estimate the individual and joint effects of EU membership and access to loans on productivity (measured as output per worker), the variable 'treatment' was created, with the following values:

- Treatment (T) =0 if a firm is not in the EU and has not received a loan (57%);
- Treatment (T) =1 if a firm is in the EU but has not received a loan (53%)
- Treatment (T) =2 if a firm is not in the EU but has received a loan; (43%)
- Treatment (T) =3 if a firm is in the EU and has received a loan (47%)

The use of EU membership as a treatment variable allows a comparison of the productivity of firms within and outside the EU. This allows an analysis of the effect of the economic shock of joining a significantly more productive economic bloc.

The outcome variable 'productivity' (measured as output per worker) is analysed in relation to EU membership and receipt of loans, whose relationship, as factors of production, is predicated on the premise that misallocation of capital following the adoption of the euro and a reduction in interest rates led to a reduction in productivity in Southern Europe (Gopinath et al. 2015).

The selection of matching variables is predicated by reference to relevant literature where each has been identified as influencing firm-level performance.[4] To minimise the selection on unobservables the models include a large number of control variables (see Epifani 2003; Segerstrom and Gustafsson 2006; Bellack et al. 2008; Melitz and Ottaviano 2008; Bridgeman 2010; Covers 2014; Levine and Warusawitharana 2014; Waldkirch 2014; Estrin and Uvalic 2016). The list of matching (control variables) and their definitions is presented in Table A1.

[4] Where values are monetary, they are measured in different currencies requiring conversion into a common currency. Using 2013 official exchange rates, national currencies were converted into US dollars.

There is some evidence that the NMS are beginning to achieve convergence with the original EU 15, albeit that due to economic stagnation within the Eurozone this is proceeding at a comparatively slow pace (Havlik 2015). Equally, the EBRD 2016 believes that progress in the Balkans is being retarded as a result of financial imbalances, credit constraint, and a lack of FDI (see also Estrin and Uvalic 2016). The misallocation of capital may be an additional constraint (Gopinath et al. 2015). This justifies the use of the second treatment variable: access to finance, measured as receipt of loans.

Closing the productivity and technology gap between the transition countries of Eastern Europe and the EU is an important element in the need to achieve economic convergence and European cohesion. The influence of capital accumulation is critical, since it will both improve labour productivity and reduce the technology gap (Filippetti and Peyrache 2013). It is therefore important to control for capital in relation to the measurement of productivity, and since the BEEPS allows for the disaggregation of capital into 'balance sheet', 'replacement', and 'rental' (leasing), it enables an analysis of the significance of each of these variables on the outcome.

The justification for including 'exports' and 'skilled workers' in the control variables is based on Wagner (2012), who found that exporters were more productive and wage premia were statistically significant, indicating that skilled workers have a positive effect on firm productivity. Equally, in relation to skilled workers, there is evidence that Balkan industry lacks skill due to a mismatch between demand and supply, exacerbated by the educational failings of individual states (Gabrisch et al. 2016, Bartlett 2013).

Employment rates in the Balkan region are problematical, with new EU member states at 64% and non-EU member states at 46%. Evaluating these figures, one might anticipate cost per worker to be suffering some downward pressure. However, a combination of labour market rigidity, incomplete reform programmes, a strong social welfare net, and migration of skilled workers has raised wages in relation to productivity, particularly in non-EU member states (Kovtun et al. 2014). To control for this, the variable 'cost per worker' is modelled.

Foreign ownership is a reflection of FDI, and evidence exists that it increased in the period before accession to the EU, peaking on the date of accession and declining slightly thereafter. EU member countries have proved a more

attractive FDI destination than the Western Balkan states, evidenced by a negative effect in this region. This is possibly a result of the lack of institutional reform and the establishment of strong structural controls (see Krugman 1979; Epifani 2003; Estrin et al. 2009; Gustafsson and Segerstrom 2011; Estrin and Uvalic 2016; Okafor and Webster 2015). To control for this effect, the variable 'foreign ownership' is included.

The Acqui Communitaire (accumulated body of EU law and protocols since 1958) has guaranteed the development of bureaucratic institutions within the new member states, although this process is also evident in Western Balkan countries in accession, where it is more prominent in Serbia, Montenegro, and Macedonia than in Albania, Bosnia and Herzegovina, and Kosovo (Petrovic and Smith 2013). To control for this, the model variable 'bureaucracy' is included, but the inclusion should not imply that this of itself limits productivity (see Table A1 for variable description).

With respect to firm characteristics, the model also includes firm size and firm age. The inclusion of competition is predicated on the new trade theory and specifically Tybout's (2003) conclusion relating to the effect of foreign firms in relation to local pricing and firm survival. The influence of competition also resonates with international trade, which suggests that larger, more productive firms increase in size and are more efficient. Finally, to account for sectoral heterogeneity, the model includes dummy variables for low tech, mid-tech, and services.

EMPIRICAL RESULTS

The first stage of the exercise is to use the IPWRA estimator to provide a comparison between EU firms and non-EU firms and for those with and without loans, and the second stage is to use quantile regression to identify where along the productivity distribution curve the effect of EU membership and loans is significant. The evidence can be laid alongside the influence at each quantile of selected control variables, which further informs the debate by allowing conclusions to be drawn as to the significance of the effects at certain points along the distribution curve. The disaggregated analysis allows an increased microeconomic evaluation of the result.

Treatment effects of any matching estimator based on the propensity score are only estimated in the region of common support. Thus, it is necessary to check

the overlap of the propensity scores at different treatment levels. The overlap plots, reported in Appendix A (figures A1 to A3), reveal that the predicted probabilities are not concentrated near 0 or 1, which implies that the overlap assumption is not violated (Cattaneo et al. 2013). Descriptive statistics are included in Table A2.

Step 1 of the estimation procedure is the treatment (selection) model, which shows the effects of covariates on the probabilities of different levels of treatment, whereby the base is treatment at level 0. Step 2 is the outcome model, which estimates the impact of covariates on the outcome variable. The coefficients in the models are not of interest in themselves, as the purpose of specifying the model is to facilitate the estimation of treatment effects (Cattaneo et al. 2013). Table A3 reports results for the model estimated in the full sample.[5]

Table 1 below shows the estimated treatment effects using the IPWRA estimator. For ease of interpretation the results have been transposed into percentage point increases or decreases in productivity and expressed as a percentage in the text. The analysis covers the full sample of firms in all member states and disaggregated samples of services and manufacturing firms. The results from the full sample have been included for completeness. However, the paucity of observations for capital and skilled workers in the services sector has significantly truncated the observations and thus make the results of limited value. This limitation also applies to the quantile regression modelling. Tables 1 to 4 below show different levels of observations. This is due to missing data for capital and skilled workers within the BEEPS dataset.

[5] Results for manufacturing and services are not reported but available on request.

Table 1. Estimated ATT effects using the IPWRA estimator with two treatments: EU membership and access to loans.

Outcome variable	Full sample			Service sector			Manufacturing sector		
	T= 1 vs T=0	T=2 vs T=0	T=3 vs T=0	T= 1 vs T=0	T=2 vs T=0	T=3 vs T=0	T=1 vs T=0	T=2 vs T=0	T=3 vs T=0
	1.	2.	3.	4.	5.	6.	7.	8.	9.
Output per worker	0.616*** (0.095)	0.386*** (0.104)	0.735*** (0.134)	0.704*** (0.100)	0.440*** (0.092)	0.833*** (0.107)	0.597*** (0.121)	0.360*** (0.125)	0.560*** (0.141)
Output per worker (in %)	0.061*** (0.012)	0.039*** (0.011)	0.074*** (0.014)	0.068*** (0.010)	0.043** (0.009)	0.081*** (0.019)	0.059*** (0.012)	0.036*** (0.120)	0.056*** (0.015)

The analysis indicates that compared with treatment 0 (firms located outside EU which have not received loans) (T = 0), EU firms that have not received loans are more productive by 6.1% (percentage points)[6] ($p<0.01$; Column 1). The effect of receiving a loan after EU membership is a 1.3% increase (Column 3), indicating that loans provide a marginal boost to output. However, the joint effect of EU membership and loan receipt is not statistically different from the individual effect of EU membership (Column 1), as their 95% confidence intervals overlap. This indicates that H1 is supported by these results, but H2 is not supported in relation to firms in EU member countries but is supported in non-EU firms, since the effect of a loan receipt is 3.9% ($p<0.01$; Column 2), indicating the efficaciousness of loans to firms in non-EU states. However, the joint effect of EU membership and loan receipt is not statistically different from the individual effect of a loan receipt, as their 95% confidence intervals overlap. This indicates that EU membership rather than receiving a loan is the key productivity driver in NMS, and whilst loans provide a marginal advantage within the EU they are critical to improving productivity in firms outside the EU. Thus, the efficacy of EU membership on productivity is proven for H1, but the influence of loan receipt is restricted to firms in non-member states (hence supporting H2c).

In relation to the service sector the results are not statistically significantly different at 6.8% ($p<0.01$; Column 4). This effect increases to 8.1% when a loan is added to EU membership ($p<0.01$; Column 6). However, the joint effect of EU membership and loan receipt is not statistically different from the individual effect of EU membership, as their 95% confidence intervals overlap. Non-EU firms receiving loans are 4.3% more productive than non-EU firms without loans ($p<0.01$; Column 5), yet this effect is not statistically different from the joint effect of EU membership and loan receipt (Column 6). Thus, our results suggest that either EU membership or loan receipt has a positive impact on firm productivity, while the joint impact of EU membership and loan receipt does not result in additional productivity increase relative to their individual effects, and hence H1 is only partially supported.

Within the manufacturing sector, EU firms without a loan are 5.9% more productive than non-EU firms without loans, indicating that there is no statistically significant difference between the full sample and each of the sectors

[6] For reasons of brevity, percentage results are shown as a percentage, but should be interpreted as a percentage point increase.

($p<0.01$; Column 7). However, EU membership combined with a receipt of loans has a statistically significant impact ($p<0.01$), although not larger than the impact of EU membership alone (Column 9). The effect of receiving a loan on productivity in non-EU firms is 3.6% ($p<0.01$; Column 8), indicating the greater importance of loans to non-EU firms.

The IPWRA results test H1 and H2, including their subsections, and support H1, H2b, and H2c, showing that EU membership provides a productivity advantage, but there is little evidence that a combination of EU membership and loans (H1 and H2b) has an enhanced effect on membership alone; therefore, the enhancing effect of loans is unproven. However, H2b and H2c are supported in relation to firms outside the EU, concluding that loans improve productivity.

The IPWRA results are concerned with mean effects and may not reveal the array of effects. The use of quantile regressions allows the analysis to identify where along the distribution curve the effects of EU membership and loans are significant and allows an evaluation of the influence of other key variables. The distribution of the dependent variable may change in many ways that are either not revealed or only partially revealed by an examination of the mean (Frolich and Melly 2010). This study applies selection models based on observables, uses a conditional treatment model based on Koenker and Basset (1978), and regresses on two treatment variables, EU membership and loans. The regressions in these analyses are carried out on the full Balkan sample and the disaggregated samples of services and manufacturing. The outcome variable is productivity (output per worker) and the treatment variables of interest are EU membership and loans. The control variables have been interpreted to provide a comprehensive picture of the significant influences extant in each quantile. For ease of observation, in all the QTE models below the first and last two quantiles have been included, since they either reflect the significant results across the productivity distribution or demonstrate a trend which either ends or continues before or after the 8th quantile.[7] The estimates shown illustrate the significance of the results in each quantile across each of the distributions. The monetary values have been rescaled (actual number/1000) to provide a coefficient greater than zero where the results are significant.

Table 2 below shows the results for the effect of EU membership (treatment variable) and the control variables on productivity performance over each point

[7] The tables with the results for all the deciles are available on request.

(1st to 9th decile) of the productivity distribution curve. EU membership is positive and highly statistically significant ($p<0.01$) in the 1st to the 6th decile, with the coefficients decreasing in magnitude over the productivity distribution curve. This would suggest that firms at the lower end of labour productivity distribution enjoy the greatest benefit from membership, with no significant results being seen at the upper end of the scale. The importance of capital is also seen as significant, with 'rental capital' ($p<0.01$ to $p<0.05$) being important across the 1st to the 4th decile. This may suggest that below the median point of the distribution, equity, as a means of capitalisation, is in short supply (Estrin and Uvalic 2016). The negative coefficient on 'age' ($p<0.05$) in the 9th decile may indicate that older firms are less productive than more modern enterprises, indicating that they may be privatised firms at the top end experiencing issues with dated equipment and/or practices. The negative coefficient 'replacement value of capital' ($p<0.01$) is reported in the 5th and 8th deciles, which may indicate that firms are struggling to modernise in parts of the distribution curve. The positive significance of 'bureaucracy' ($p<0.05$) in the 1st and 9th deciles indicates that at the lower and top end of the distribution curve there is an awareness of the impact of institutional development, whilst 'size' ($p<0.1$) in the 2nd and 8th deciles reveals that this may be restricted to the larger firms. The negative coefficient on skilled workers ($p<0.01$ to $p<0.1$) is possibly a reflection of a skills mismatch, allied to a failure of appropriate levels of educational training (Gabrisch 2016; Gabrisch et al. 2016). An OECD working paper concludes that "the main results suggest that higher skill and qualification mismatch is associated with lower labour productivity, with over-skilling and under qualification accounting for most of these impacts" (McGowan and Andrews 2015, pp.32). The positive coefficient of cost per worker ($p<0.1$) may be a reflection of the comparative advantage of cheaper labour.

In relation to the services sector, all capital- and skill-based variables have been removed from the model due to a paucity of observations. In contrast to the full sample, the services sector indicates that the impact of EU membership is positive and highly statistically significant ($p<0.01$) for the 1st to 8th decile with no significance only amongst the most productive firms. This supports H1 and would suggest that the services sector as a whole has received a significant boost from EU membership. As in the full sample, a declining magnitude is found for the coefficient on EU membership variable, suggesting that the least productive firms enjoy the most benefit. 'Foreign ownership' has a positive and statistically significant ($p<0.01$ to $p<0.05$) effect throughout the distribution, supporting H3 and indicating the relevance of FDI in tandem with EU membership. 'Age' and

'size' also have positive and statistically significant effects ($p<0.01$ to $p<0.1$ and $p<0.01$ to $p<0.05$ respectively), suggesting that larger, older firms are attractive to foreign investors. Outside the bottom first two deciles of the distribution curve the negative and highly statistically significant ($p<0.01$) influence of competition in the upper deciles of the distribution indicates that, in this sector, the competitive environment of the expanded EU is creating pressure for the most productive firms in the NMS. 'Cost per worker' has a positive and highly statistically significant ($p<0.01$) impact on firm productivity throughout the whole distribution range.

Table 2. Results from the QTE model with EU membership as the treatment and output per worker as the outcome variable[8]

	Full sample				Manufacturing sector				Service sector			
Independent variable	**q.1**	**q.2**	**q.8**	**q.9**	**q.1**	**q.2**	**q.8**	**q.9**	**q.1**	**q.2**	**q.8**	**q.9**
EU membership	0.477***	0.352***	0.080	0.024	0.575***	0.321***	0.130	0.117	0.839***	0.647***	0.178**	0.011
	(0.132)	(0.109)	(0.081)	(0.093)	(0.135)	(0.124)	(0.081)	(0.090)	(0.118)	(0.101)	(0.085)	(0.093)
Capital (assets)	0.002	0.002	0.001*	0.002*	0.0020**	0.002	0.001*	0.002				
	(0.001)	(0.001)	(0.001)	(0.001)	(0.127)	(0.124)	(0.081)	(0.092)				
Capital	0.000	-0.000	-0.000*	-0.000	0.000	-0.000	-0.000***	0.000				
(replacement)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
Capital (rental)	0.070***	0.062***	-0.002	0.020	0.073***	0.061***	0.006	0.016				
	(0.021)	(0.018)	(0.014)	(0.047)	(0.0250)	(0.018)	(0.015)	(0.038)				
Exports	0.493*	0.183	0.131	-0.068	0.206	0.192	0.051	-0.022	0.401	-0.121	0.367	0.390
	(0.255)	(0.282)	(0.306)	(0.358)	(0.314)	(0.303)	(0.265)	(0.353)	(0.407)	(0.392)	(0.388)	(0.369)
Skilled workers	–0.348*	–0.511**	–0.519***	–0.780***	–0.500**	–0.479**	–0.364**	–0.711***				
	(0.211)	(0.202)	(0.189)	(0.217)	(0.244)	(0.216)	(0.176)	(0.215)				
Cost per worker	0.013***	0.015***	0.014***	0.010***	0.012***	0.016***	0.016***	0.011***	0.015***	0.016***	0.022***	0.024***
	(0.002)	(0.003)	(0.002)	(0.001)	(0.001)	(0.004)	(0.002)	(0.002)	(0.002)	(0.005)	(0.006)	(0.005)
Foreign-owned	-0.001	0.001	0.002	0.001	-0.001	0.003	0.001	0.001	0.004	0.008***	0.004**	0.007**
	(0.003)	(0.004)	(0.002)	(0.002)	(0.005)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)

[8] Note that the observations for the full, manufacturing, and services samples differ. This is because omitting the variables 'capital' and 'skilled workers' from the services sector has reduced the service sector contribution to 100 firms. The 450 observations in the manufacturing sector are the total available, and the service sector observations have been increased by omitting capital and skilled workers from the regression.

Firm age	−0.004	−0.005	−0.001	−0.006**	−0.011*	−0.004	−0.002	−0.007***	0.015***	0.015***	0.010**	0.009
	(0.004)	(0.004)	(0.002)	(0.002)	(0.006)	(0.004)	(0.002)	(0.002)	(0.005)	(0.005)	(0.005)	(0.006)
Bureaucracy	0.213**	0.105	0.082	0.172*	0.213**	0.091	0.158*	0.246**	0.158	0.143*	0.126*	0.089
	(0.092)	(0.084)	(0.077)	(0.097)	(0.104)	(0.088)	(0.084)	(0.102)	(0.102)	(0.080)	(0.069)	(0.079)
Firm size	0.115	0.146*	0.081	0.125*	0.212**	0.125	0.099*	0.150**	0.333***	0.291***	0.118**	0.099*
	(0.092)	(0.083)	(0.060)	(0.069)	(0.094)	(0.090)	(0.059)	(0.066)	(0.088)	(0.069)	(0.052)	(0.059)
Competition	−0.037	0.014	−0.098	−0.099	−0.136	0.021	-0.095	−0.116	−0.047	−0.139	−0.233***	−0.259***
	(0.128)	(0.111)	(0.084)	(0.091)	(0.131)	(0.116)	(0.086)	(0.094)	(0.118)	(0.097)	(0.081)	(0.091)
Low-tech	−0.339**	−0.407***	−0.283**	−0.219*	−0.176	−0.361**	−0.378***	−0.260**				
	(0.150)	(0.137)	(0.110)	(0.129)	(0.181)	(0.165)	(0.116)	(0.130)				
Mid-tech	−0.291	−0.287*	−0.216*	−0.265**	−0.184	−0.250	−0.248**	−0.287**				
	(0.180)	(0.153)	(0.111)	(0.128)	(0.208)	(0.167)	(0.119)	(0.123)				
Services	−0.286	−0.471	0.374	0.883*	1.025	0.680	−0.257	−0.527**				
	(0.369)	(0.320)	(0.370)	(0.523)	(0.974)	(0.703)	(0.690)	(0.218)				
Constant	9.022***	9.603***	10.894***	11.477***	9.027***	9.581***	10.642***	11.296***	7.920***	8.673***	11.033***	11.562***
	(0.260)	(0.244)	(0.183)	(0.207)	(0.297)	(0.270)	(0.190)	(0.240)	(0.155)	(0.132)	(0.141)	(0.174)
No of obs.	550	550	550	550	450	450	450	450	1,370	1,370	1,370	1,370

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

With respect to the manufacturing sector, the 1st and 2nd deciles of the distribution finds EU membership to have a positive and highly significant ($p<0.01$) effect, although significance levels and the magnitude of the coefficients decline above the 2nd decile, with the evidence suggesting support for H1 up to the 7th decile. 'Balance sheet capital' has a positive and significant effect in the 1st decile and the 8th decile ($p<0.01$ and $p<0.1$ respectively). 'Rental capital' is positively significant ($p<0.05$) across the first half of the distribution curve, suggesting that leasing is an important source of finance up to the median. The negative coefficients on replacement capital in the 3rd decile and 8th decile ($p<0.05$ and $p<0.01$ respectively) indicate that replacing ageing assets may be problematical and points to a difficulty raising capital within the manufacturing sector, particularly amongst the least productive firms. 'Firm size' is statistically significant at the conventional level (from 1% to 10%) throughout the distribution, suggesting the importance of economies of scale, whilst 'firm age' has a negative effect in the 9th decile. In the upper and lower deciles the positive effect of 'bureaucracy' ($p<0.05$ to $p<0.1$) indicates the importance of institutional development. Negative effects of skilled workers and positive effects of cost levels per worker feature significantly (at the 1% and 5% levels) throughout the distribution and these findings are consistent with the earlier findings in this study.

Table 3 below shows the results when loan receipt is the treatment variable. In the full sample, loans are only significant in the 1st and 2nd decile ($p<0.01$ and $p<0.05$ respectively), suggesting that efficacy is confined to the least productive firms, and therefore support for H2c is restricted to the bottom 20% of the productivity distribution curve. 'Rental capital' has positive and significant ($p<0.01$) effects in the 1st and 2nd deciles, confirming the necessity for borrowed capital below the median of the productivity distribution. 'Bureaucracy' and 'firm size' are positively significant in the 1st and 9th decile, whilst 'firm age' is negatively significant ($p<0.05$ and $p<0.1$ respectively), which may be indicative of older firms being less productive and larger ones having a greater realisation of the influence of institutional development. The positive but marginally significant ($p<0.1$) effect of 'balance sheet capital' in the 1st and 9th decile and the negative, but marginally significant ($p<0.1$) effect of 'replacement capital' in the 9th decile may emphasise the impairment to productive development. The negative coefficient on skilled workers ($p<0.01$ to $p<0.05$) and positive coefficient of cost per worker ($p<0.01$) are features of results throughout the quantile regression models; possible explanations have been given earlier in this study.

Table 3. Results from the QTE model with loan receipt as the treatment variable and output per worker as the outcome variable.

Independent variable	Full sample				Manufacturing sector				Service sector			
	q.1	q.2	q.8	q.9	q.1	q.2	q.8	q.9	q.1	q.2	q.8	q.9
Loan	0.463***	0.232**	0.100	-0.016	0.410**	0.241**	0.054	0.063	0.284**	0.319***	0.080	0.074
	(0.137)	(0.105)	(0.084)	(0.092)	(0.159)	(0.115)	(0.086)	(0.096)	(0.141)	(0.102)	(0.083)	(0.088)
Capital	0.001	0.001	0.001	0.002**	0.002	0.002	0.002	0.002				
(assets)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)				
Capital	0.000	–0.000	–0.000	–0.000	0.000	–0.000	0.000	0.000				
(replacement)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
Capital	0.076***	0.068***	-0.002	0.019	0.079***	0.059***	0.011	0.010				
(rental)	(0.011)	(0.027)	(0.016)	(0.044)	(0.024)	(0.000)	(0.019)	(0.002)				
Exports	0.418	0.088	0.191	–0.045	0.205	0.098	0.225	0.037	0.285	-0.164	0.220	0.425
	(0.295)	(0.278)	(0.305)	(0.336)	(0.339)	(0.284)	(0.274)	(0.278)	(0.406)	(0.441)	(0.390)	(0.383)
Skilled	–0.602***	–0.567***	–0.407**	–0.803***	–0.632***	–0.272	–0.434**	–0.717***				
workers	(0.212)	(0.207)	(0.186)	(0.219)	(0.237)	(0.225)	(0.179)	(0.217)				
Labour cost	0.014***	0.019***	0.013***	0.010***	0.014***	0.019***	0.015***	0.011***	0.016***	0.019***	0.027***	0.024***
	(0.002)	(0.003)	(0.002)	(0.001)	(0.003)	(0.003)	(0.002)	(0.002)	(0.004)	(0.006)	(0.006)	(0.005)
Foreign	–0.001	–0.004	0.003	0.001	–0.001	0.001	0.002	0.001	0.004	0.009***	0.004**	0.008**
-owned	(0.003)	(0.005)	(0.003)	(0.002)	(0.006)	(0.004)	(0.002)	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)
Firm age	–0.007*	–0.002	–0.002	–0.006**	–0.009	–0.001	–0.001	–0.005**	0.013**	0.015***	0.011**	0.005
	(0.004)	(0.004)	(0.002)	(0.002)	(0.006)	(0.003)	(0.002)	(0.002)	(0.006)	(0.005)	(0.005)	(0.006)
Bureaucracy	0.175**	0.078	0.080	0.157*	0.115	0.044	0.141	0.210*	0.083	0.109	0.131*	0.104
	(0.085)	(0.077)	(0.080)	(0.094)	(0.090)	(0.076)	(0.087)	(0.108)	(0.137)	(0.089)	(0.070)	(0.079)

Firm size	0.200**	0.181**	0.046	0.120*	0.245***	0.091	0.052	0.100	0.396***	0.291***	0.121**	0.106*
	(0.087)	(0.075)	(0.060)	(0.063)	(0.088)	(0.079)	(0.059)	(0.069)	(0.105)	(0.073)	(0.055)	(0.061)
Competition	–0.019	0.002	–0.143*	–0.096	–0.033	–0.063	–0.097	–0.166*	–0.113	–0.156	–0.284***	–0.295***
	(0.116)	(0.103)	(0.086)	(0.091)	(0.129)	(0.109)	(0.086)	(0.097)	(0.131)	(0.102)	(0.081)	(0.089)
Low-tech	–0.376**	–0.352**	–0.335***	–0.221*	–0.293*	–0.169	–0.382***	–0.269*				
	(0.151)	(0.143)	(0.112)	(0.118)	(0.162)	(0.161)	(0.115)	(0.142)				
Mid-tech	–0.245	–0.107	–0.215*	–0.261**	–0.231	0.004	–0.286**	–0.315**				
	(0.179)	(0.148)	(0.117)	(0.116)	(0.198)	(0.162)	(0.116)	(0.129)				
Services	–0.167	–0.263	0.393	0.837*	1.210	0.786***	–0.378	–0.490				
	(0.278)	(0.254)	(0.406)	(0.501)	(0.957)	(0.252)	(0.753)	(0.876)				
Constant	9.018***	9.367***	10.908***	11.519***	9.038***	9.265***	10.773***	11.433***	8.022***	8.745***	11.045***	11.570***
	(0.251)	(0.232)	(0.179)	(0.200)	(0.258)	(0.257)	(0.185)	(0.231)	(0.171)	(0.142)	(0.145)	(0.169)
No of obs.	550	550	550	550	450	450	450	450	1,370	1,370	1,370	1,370

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

In relation to the service sector, the capital and skill set variables have been omitted due to paucity of observations. Receipt of loans is positively significant ($p<0.01$) for the 1st to the 6th decile. This suggests that support for H3 is limited to just beyond the 60% median and that more productive firms have a limited benefit. With the exception of the 1st decile, 'foreign ownership' is positively significant throughout the distribution ($p<0.01$ to $p<0.05$), with the exception of the 9th decile where it is insignificant. This indicates that there is strong support for H3 within the services sector and emphasises its importance to the Balkan region's economy. 'Age' is now seen as a positive attribute ($p<0.01$ to $p<0.05$). 'Firm size' (at the conventional levels of significance, i.e., $p<0.1$) is positive throughout the distribution, indicating that together with age, it is seen as an important influence on firm productivity. The negative coefficient on 'competition' appears significant across the distribution from the 3rd to the 9th decile ($p<0.01$ to $p<0.1$), increasing in magnitude at higher levels of the distribution curve. This indicates that the higher up the productivity curve, the greater the pressure from competition, affirming that larger, older firms are feeling the greatest competitive pressure. Loans appear to be more important below the median, which is the case even under foreign ownership. This may be the result of the provision of loans by the transnational companies, or the availability of collateral to lenders who are themselves foreign-owned banks. However, these findings support H2c and H3 and emphasise the importance of FDI in the sector, together with the availability of loans at the lower end of the spectrum. The importance of firm age and size suggests that older, larger, and more experienced firms are attractive to FDI. Above the 1st and 2nd decile the negative effect of competition is a reflection of increasing competitiveness within the enlarged EU, encouraged by the presence of foreign ownership. The ever-present positive significance of cost per worker ($p<0.01$) indicates that the service sector is comfortable with its cost per worker ratios.

Regarding the manufacturing sector, loans are positively significant ($p<0.05$) in the 1st and 2nd decile, suggesting that within the sector the least productive firms are loan-dependent, and this view is supported by the positive effect of 'rental capital' ($p<0.01$ to $p<0.05$) in the same deciles. Therefore, the availability of loans and rental capital should be viewed in tandem. The results provide limited support for H2b and H2c, with no significant effect being seen above the median. 'Size' is positive and highly statistically significant ($p<0.01$) in the 1st decile and 'foreign ownership' ($p<0.1$) in the 3rd decile, together with the negative coefficient of replacement capital ($p<0.05$). 'Age' is negatively significant ($p<0.05$) in the 9th decile. This suggests that larger firms, possibly

privatised, see the opportunities of economies of scale but struggle to achieve productivity improvement, whilst foreign ownership and the negative perspective of replacement capital may reflect foreign owners confronted with the scale of modernisation required. The negative impact of firm age in the 9th decile may indicate that older firms have difficulty with ageing assets and the required cultural changes. Negative effects of skilled workers and positive effects of labour costs feature significantly throughout the distribution and give credence to the possible explanations given earlier in this paper.

The IVQTE model has tested H2c, H3, and H4, and concludes that the availability of loans improves productivity up to the 6th decile of the distribution curve, suggesting that the least productive firms are the beneficiaries. This may be because the most productive firms are better capitalised or are less reliant on debt. The key is membership, and this is particularly true of the services sector, where firms up to the 8th decile have strong statistical significance. The effect in manufacturing is more muted beyond the first two deciles, with weaker coefficients and significance. Equally, the service sector appears to have a greater reliance on loans (H2), with the first six deciles enjoying the benefits, as opposed to manufacturing where loans are only significant in the first two deciles. However, in this sector, rental capital (leasing) is significant up to the median, which may indicate that leasing is used as an alternative to loans since the equipment leased provides its own collateral. The effect of FDI on productivity (H3) is highly significant but is only supported in the services sector with significance across the productivity distribution curve. This may be due to the strength of the services sector in the economy, where it accounts for 66% of added value in Serbia and Kosovo, increasing to 79% in Montenegro, and is therefore likely to be a more attractive target for FDI. Manufacturing, on the other hand, at least in BEEPS, is populated by low-tech SMEs, and with the increasing cost of labour in the Balkan region, firms may be losing some of their comparative advantage. Equally, it has to be recognised that prior to the financial crisis the Balkan region enjoyed significant inflow of funds, but this has reversed since then, and the 2013 BEEPS may well be reflecting this trend (Gabrisch et al. 2016). A puzzling result is the lack of support for H4, on the effect of exports on productivity, which is not significant in any sector. This may be due to the low level of exports from seven of the eight countries, where they account for no more than 20% of GDP, and, whilst there is evidence some countries are well integrated in international production networks, some 60% of exported goods are from low-tech industries and tourism, where increasing labour costs diminish any comparative advantage (Gabrisch et al. 2016).

Figures A4 to A9 in Appendix A confirm that the effect of EU membership and loans declines as the productivity of firms increases; the only exception being in the loan model, where the efficacy of loans in the service sector rises to the median point and then rapidly declines.

Throughout the conducted quantile analyses, negative skill levels and positive cost per worker feature throughout the distribution, and whilst the positive cost per worker reflects the comparative advantage of cheap labour, driven by high levels of unemployment in the Western Balkans, the negative coefficient of skilled labour is the result of a mismatch between the demand of the burgeoning services sector and new technologically based businesses. This is due in part to a failure of the education system to adapt to the changing skill set required in the working age population (Bartlett 2013).

CONCLUSIONS

Our results indicate that EU membership contributes to improved productivity because of unfettered access to the customs union, which promotes opportunities for improved economies of scale and the advantages of network effects. The significance of loans and rental capital in relation to firm productivity is consistent with the findings in Levine and Warusawitharana (2014). The first hypothesis that EU membership provides a productivity advantage to firms in member states is supported by the findings of the IPWRA model; however, the additional provision of loans has no significance. The IVQTE model, whilst not designed to provide comparative measurements, does indicate that membership has the greatest benefit in the services sector, with significance in all but the 9th decile. Manufacturing is more muted, with support restricted to the first six deciles against a background of diminishing significance. The second hypothesis that loans improve productivity, enhance EU membership, and improve productivity outside the EU is only supported in the latter case. The IVQTE model indicates that loans are significant to the 6th decile in the services sector but only the first two deciles in manufacturing, suggesting that there is greater utilisation of loans in the former. However, rental capital (leasing) is significant to the 5th decile, which may suggest that loans are significant for firms in both sectors at the lower end of the productivity distribution curve, with those beyond the median being better capitalised. The third hypothesis that FDI has a positive influence on firm productivity is only tested in the IVQTE model, and we find that it has a positive influence in the services sector across all the deciles except for the first.

This indicates that FDI has a positive influence throughout the sector, apart from in the least productive firms. No significance has been found in manufacturing, which may reflect the low-tech nature of the Balkan region manufacturing sector proving of no interest to foreign investors (Gabrisch et al. 2016). Surprisingly, given the evidence of literature, the fourth hypothesis that exports positively influence productivity has no support in either the manufacturing or services sector. This may echo Gabrisch et al.'s 2016 findings that exports in the region constitute a small percentage of GDP.

These results have several policy implications for both member and non-member states. There is little doubt that further enlarging the EU to include the Western Balkans would be a major boost to their economic development and provide a route out of localism rooted in the ethnic and ideological forces in the region. Both membership and loans appear to benefit the least productive firms, except for in the service sector, where both have universal appeal. There is a need for greater emphasis on the manufacturing sector, where rental capital is positively effective amongst the least productive firms and where enhanced financial intermediation would improve supply and provide capital for technical innovation to improve productivity. Whilst intermittent, the negative influence of replacement capital is problematical in manufacturing across the distribution and support for an asset-replacement programme appears desirable. The fact that 90% of the sample consists of SMEs provides clear evidence of where improvement can be achieved amongst the least productive in this sector. The clear success of the service sector in attracting FDI should encourage governments to improve the manufacturing environment and provide a platform to emulate this performance. A programme of modernisation incentives should encourage productivity improvements and lead to an encouraging environment for FDI. The paucity of skilled workers must be addressed, and whilst labour costs would appear to be a comparative advantage, income levels may need to be increased to encourage the development of an improved skill base. Equally, the issue may be one of management, where the need is to improve quality and ensure that a more skilled cadre of managers is provided with an appropriate slice of the economic cake (Adalet McGowan and Andrews 2015, p.32). A further conclusion can also be drawn from the results that indicate that the disparity in relation to output per worker is sufficiently constrained as to suggest that, at least at the firm level, the rest of the Balkans states are ready to embrace the accession process.

Notwithstanding its contribution, this study suffers from limitations that serve as avenues for further research. Firstly, causality issues may result from any unobservables not identified within the matching model. This may also arise from the cross-sectional nature of the data. Secondly, because of the limited number of countries studied, the paucity of observations for service sector capital and skilled workers means that it was not possible to measure the influence of capital on the service sector. Thirdly, the influence of the control variables across the productivity distribution curve merits further investigation. Finally, tracking progress from accession to 2013 would also allow the creation of longitudinal data and contribute to the question of whether the Balkans are different (Estrin and Uvalic 2016, p.1). Further research, utilising the BEEPS data over a longer period and including the 27 Eastern European transitional economies, may allow these omissions to be addressed.

REFERENCES

Adalet McGowan, M. and D. Andrews (2015). *Skill Mismatch and Public Policy in OECD Countries*. OECD Economics Department Working Papers, OECD Economics Department Working Papers, No. 1205.

Bartlett, W. (2013). Structural Unemployment in the Western Balkans: Challenges for Skills Anticipation and Matching Policies. *European Planning Studies*, 21:6, 890-908, DOI: 10.1080/09654313.2012.722933

Bechev, D. (2012). *The Periphery of the periphery: the Western Balkans and the Euro Crisis*. London: European Council on Foreign Relations.

Beck, T., Demirgüç-Kunt, A.S.L.I. and Maksimovic, V., (2005). Financial and legal constraints to growth: Does firm size matter? *The Journal of Finance*, *60*(1), pp.137–177.

Berman, N., and Héricourt, J. (2010). Financial factors and the margins of trade: Evidence from cross-country firm-level data. *Journal of Development Economics*, *93*(2), pp.206–217.

Bieber, F. (2011). Building Impossible States? State-Building Strategies and EU Membership in the Western Balkans. *Europe-Asia Studies* 63 (10), pp.1783–1802.

Böröcz, J. (2012). Hungary in the European Union. *Economic & Political Weekly*, 47(23), pp.23–25.

Börzel, T. (2011) *Move closer! New modes of governance and accession to the European Union*. Working Paper No. 01/2011. Institute for European Integration Research.

Botric, V. (2013). Output Convergence between Western Balkans and EU-15. *Research in Economics and Business: Central and Eastern Europe* 5 (1), pp. 46–62.

Bridgman, B. (2010). *Competition and Productivity*. Working paper. US Bureau of Economic Analysis.

Buccirossi, P., Ciari, L., Duso, T., Spagnolo, G. and Vitale, C. (2013). Competition policy and productivity growth: an empirical assessment. *Review of Economics and Statistics* 95.4: pp.1324–1336.

Busso, M., DiNardo, J., and McCrary, J. (2014). New Evidence on the Finite Sample Properties of Propensity Score Reweighting and Matching Estimators. *Review of Economics and Statistics*, 96: pp.885–897.

Cade, B.S., Terrell, J.W. and Schroeder, R.L. (1999). Estimating effects of limiting factors with regression quantiles. *Ecology*, *80*(1), pp.311–323.

Cattaneo, M.D., Drukker, D.M. and Holland, A.D., (2013). Estimation of multivalued treatment effects under conditional independence. *Stata Journal*, *13*(3), pp.407–450.

Caviglia, G. Krause, G. and Thimann, C. (2002). Key Feature of the Financial Sectors in EU Accession Countries. *In* Thimann, C., *Financial Sectors in EU Accession Countries*. Frankfurt am Main Germany: European Central Bank, pp.15–30.

Cerulli, G. (2010). Modelling and Measuring the Effect of Public Subsidies on Business R&D: A Critical Review of the Econometric Literature. *Economic Record*, 86: pp.421–449.

Coad, A., Segarra, A. and Teruel, M. (2013). Like milk or wine: Does firm performance improve with age? *Structural Change and Economic Dynamics*, *24*, pp.173–189.

Corvers, F. (1997). The impact of human capital on labour productivity in manufacturing sectors of the European Union. *Applied Economics* 29.8: pp.975–987.

Djalilov, K. Hölscher, J. (2016). Comparative Analyses of the Banking Environment in transition countries. *Economic Annals*, Volume LXI (No. 208).

D'Souza, J., Megginson, W.L., Ullah, B. and Wei, Z., (2014). Growth and growth obstacles in transition economies: Privatized versus de novo private firms. Journal of Corporate Finance.

Dutz, M.A. and O'Connell, S.D., 2013. Productivity, innovation and growth in Sri Lanka: An empirical investigation. World Bank. Policy Research Working Paper 6354.

EBRD (2013) *Transition Report 2013: Stuck in Transition?* London.

EBRD (2014) *Transition Report 2014: Innovation in Transition*. London.

EBRD (2016) *Transition Report 2015/16 Rebalancing Finance*. London.

Emsley, R., Lunt, M., Pickles, A., and Dunn, G. (2008). Implementing Double-Robust Estimators of Causal Effects. *Stata Journal*, 8: pp.334–353.

Epifani, P. (2003). Trade Liberalization, Firm Performance and Labor Market Outcomes in the Developing World What Can We Learn from Micro-Level Data? *Centro Studi Luca d'Agliano-World Bank project*. World Bank Working Paper, All.

Epstein, R. A. (2014). Overcoming 'Economic Backwardness' in the European Union. *Journal of Common Market Studies* 52: pp.17–34. doi:10.1111/jcms.12078

Epstein, R.A. and Jacoby, W., 2014. Eastern Enlargement Ten Years On: Transcending the East–West Divide? *Journal of Common Market Studies*, 52(1), pp.1–16.

Estrin, S. and Uvalic, M. (2013). Foreign direct investment into transition economies: Are the Balkans different? *LEQS Paper*, (64).

Estrin, S. Uvalic, M. (2016). Foreign Direct Investment in the Western Balkans: What Role Has it Played During Transition? *Comparative Economic Studies*. 10 (1) p.1.

Filippetti, A. and Peyrache, A., (2013). Is the convergence party over? Labour productivity and the technology gap in Europe. *Journal of Common Market Studies*, *51*(6), pp.1006–1022.

Fitoussi, Jean-Paul, and Francesco Saraceno, (2013). European economic governance: the Berlin–Washington Consensus. *Cambridge Journal of Economics* 37.3: pp.479–496.

Frölich, M. and Melly, B. (2010). Quantile treatment effects in the regression discontinuity design: process results and Gini coefficient. *IZA Discussion Paper* 4993.

Fryges, H. and Wagner, J., 2008. Exports and productivity growth: First evidence from a continuous treatment approach. *Review of World Economics*, *144*(4), pp.695–722.

Gabrisch, H., 2015. Financial constraints on growth: comparing the Balkans to other transition economies. *Eastern European Economics*, *53*(4), pp.309–327.

Gabrisch, H., Hanzl-Weiss, D., Holzner, M., Landesmann, M., Pöschl, J. and Vidovic, H., 2016. *Improving Competitiveness in the Balkan Region –Opportunities and Limits* (No. 411). The Vienna Institute for International Economic Studies, wiiw.

Gabrisch, H., and J. Hölscher. (2006). *The Success and Failures of Economic Transition – The European Perspective*. Palgrave Macmillan, London and New York, pp.281–312.

Gopinath, G., Kalemli-Ozcan, S., Karabarbounis, L. and Villegas-Sanchez, C., (2015). *Capital allocation and productivity in South Europe* (No. w21453). National Bureau of Economic Research.

Gorodnichenko, Y. and Schnitzer, M., 2013. Financial constraints and innovation: Why poor countries don't catch up. *Journal of the European Economic Association*, *11*(5), pp.1115–1152.

Gustafsson, P. and Segerstrom, P.S., 2011. North–South trade with multinational firms and increasing product variety. International Economic Review, 52(4), pp.1123-1155.

Havlik, P., (2015). Patterns of Structural Change in the New EU Member States. DANUBE: Law and Economics Review, 6(3), pp.133-157.efficiency among import competing firms (Rodrik 1988).

Heckman, J. J., and Vytilacil, E. J. (2007). Econometric Evaluation of Social Programs, Part I: Causal Models, Structural Models and Econometric Policy Evaluation'. *In* Heckman, J. J. and Leamer E. E. (eds.) *Handbook of Econometrics*, vol. 6, pp. 4779–4873. Amsterdam: Elsevier.

Hirano, K., Imbens, G. W., and Ridder, G. (2003). Efficient Estimation of Average Treatment Effects Using the Estimated Propensity Score. *Econometrica*, 71, pp.1161–1189.

Hölscher, J. Howard-Jones, P. Webster, A. (2016). The impact of loan financing on SMEs from transitional countries. *Bournemouth University Working Paper*. 13 (1).

Imbens, G.W. (2004). Nonparametric Estimation of Average Treatment Effects under Exogeneity: A Review. *Review of Economics and Statistics*, 86, pp.4–29.

Imbens, G.W. and Wooldridge, J. M. (2009). Recent Developments in the Econometrics of Program Evaluation. *Journal of Economic Literature*, 47, pp.5–86.

Irdam, D. Scheiring, G. King, L. (2015). Mass Privatisation. *In* Hölscher, J. Tomann, H., *Palgrave Dictionary of Emerging Markets and Transition Economics*. Palgrave Macmillan, Basingstoke UK, pp. 488–507.

Koenker, R. and Bassett Jr, G. (1978). Regression quantiles. *Econometrica: Journal of the Econometric Society*, Vol. 46, No. 1. pp.33–50.

Kovtun, D. Cirkel, A. Murgasova, Z. Smith, D and Tambunlertchai, S (2014). Boosting job growth in the Western Balkans. No. 14–16. *International Monetary Fund*.

Krugman, P. R. (1979). Increasing returns, monopolistic competition, and international trade. *Journal of International Economics* 9.4, pp.469–479.

Lechner, M. (2002). Program heterogeneity and propensity score matching: An application to the evaluation of active labor market policies. *Review of Economics and Statistics* 84.2, pp. 205–220.

Levine, O. and Warusawitharana, M. (2014). Finance and Productivity Growth: Firm-level Evidence. *Available at* SSRN 2023668.

Levine, R. (2005). Finance and growth: theory and evidence. *Handbook of economic growth*, *1*, pp.865–934.

Lütz, S., and Kranke, M., (2014). The European rescue of the Washington Consensus? EU and IMF lending to Central and Eastern European countries. *Review of International Political Economy* 21.2, pp.310–338.

Marino, M.F. and Farcomeni, A., (2015). Linear quantile regression models for longitudinal experiments: an overview. *Metron*, *73*(2), pp.229–247.

Melitz, M. J., and Ottaviano, G. (2008). Market size, trade, and productivity. *The Review of Economic Studies* 75.1, pp. 295–316.

Minetti, R., and Zhu, S. C. (2011). Credit constraints and firm export: Microeconomic evidence from Italy. *Journal of International Economics*, *83*(2), pp.109–125.

Noutcheva, G. (2006). EU conditionality, state sovereignty and the compliance patterns of Balkan States. *The 3rd Pan-European Conference on EU Politics European Consortium for Political Research*.

Okafor, G. and Webster, A (2015). Foreign Direct Investment in Transition Economies. *In* Hölscher, J. Tomann, H., *Palgrave Dictionary of Emerging Markets and Transition Economics*. Palgrave Macmillan, Basingstoke UK, pp. 413–434.

Parrotta, P., Pozzoli, D. and Pytlikova, M., (2012). Does labor diversity affect firm productivity? Discussion Paper Series, *Forschungsinstitut zur Zukunft der Arbeit,* No. 6973.

Petrovic, M., and N. R. Smith (2013). In Croatia's slipstream or on an alternative road? Assessing the objective case for the remaining Western Balkan states acceding into the EU. *Southeast European and Black Sea Studies* 13.4, pp.553–573.

Pfeifer, C., (2015). The nexus between top managers' human capital and firm productivity. *Applied Economics Letters*, *22*(12), pp.982–986.

Prokopijević, M., and S. Tasić. (2015). Classical Liberal Economics in the Ex-Yugoslav Nations. *Econ Journal Watch* 12.2, pp.260–273.

Ricci, L.A. and Trionfetti, F., (2012). Productivity, Networks, and Export Performance: Evidence from a Cross-country Firm Dataset. *Review of International Economics*, *20*(3), pp.552–562.

Roberts, M. J & Tybout, J.R (1996). Industrial evolution in developing countries: a preview. Washington: World Bank. Chapter 1: 1–16.

Segerstrom, Paul S., and Peter Gustafsson (2006). *Trade Liberalization and Productivity Growth*. CEPR Discussion Paper No.5894.

Shimbov, B, Maite, A and Suárez, C. (2016). International Production Networks and Economic Growth: The Case of the Western Balkan Countries. *Eastern European Economics*, 54:1, pp.49–70.

Stiglitz, Joseph E. (1985). Credit markets and the control of capital. *Journal of Money, Credit and Banking*: 17(2), pp.133–152.

Syverson, C., (2011). What determines productivity? *Journal of Economic literature*, *49*(2), pp.326–365.

Thimann, C (Editor) (2002). *Financial Sectors in EU Accession Countries*. Frankfurt: European Central Bank. p.12.

Tybout, J. (2003). Plant- and Firm-Level Evidence on "New" Trade Theories. *In* Kwan Choi, E. Harrigan, J., *Handbook of International Trade*. Blackwell Publishing, Oxford. pp. 388–411.

Vachudova, M.A. (2014). EU leverage and national interests in the Balkans: The puzzles of enlargement ten years on. *Journal of Common Market Studies*, *52*(1), pp.122–138.

Volz, U. (2010). An Empirical Examination of Firms' Financing Conditions in Transition Countries. *International Journal of Emerging and Transition Economies* 3.2, pp.167–193.

Wagner, J. (2012). International trade and firm performance: a survey of empirical studies since 2006. *Review of World Economics* 148.2, pp. 235–267.

Waldkirch, A. (2014). *Foreign Firms and Productivity in Developing Countries*. Available at: http://ses.wpdev.cahnrs.wsu.edu/wp-content/uploads/2014/09/Waldkirch_Forfirmsprod.pdf. Last accessed 17th July 2017.

World Bank (2014). The Global Findex Database 2014 − Measuring Financial Inclusion around the World. Washington.

World Bank (2016). *List of Literature using Enterprise Survey Data*. Available at: www.enterprisesurveys.org/~/media/GIAWB/EnterpriseSurveys/.../ES-research-uses.xlsx. Last accessed 8th July 2017.

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Table A1: Variable Descriptions.

Variable name	Variable description
Treatment variables in the QTE model	
EU member	DV=1 if firm operates in an EU member state; zero otherwise.
Loan receipt	DV=1 if firm received a loan; zero otherwise.
Outcome variable	
Output per worker	Log of output per worker derived by dividing total sales by total full-time equivalent employees
Independent variables	
Capital (net assets)	Net asset value in US dollars.
Capital (replacement)	The cost of replacing current capital stock at 2013 values in US dollars.
Capital (rental)	The cost of renting land property and equipment in US dollars.
Exports	The percentage of exports to total sales.
Skilled workers	The number of skilled production workers employed.
Cost per workers	The total cost of operations per worker in US dollars.
Foreign-owned	Percentage of the firm owned by foreign investors
Firm age	Age of firm derived by subtracting the date of formation from 2013.
Bureaucracy	The average of a Likert scale score (0 – no obstacle to 4 – very severe obstacle) of perceived problems with customs, tax administration, business licencing, and labour regulations.
Firm size	Categorical variables = 0 if a firm has less than five employees; = 1 if a firm has more than four and less than 20 employees; = 2 if a firm has between 20 and 99 employees; = 4 if a firm has more than 100 employees.
Competition	DV=1 if a firm reported that the number of its competitors was less than 15; zero otherwise.

Table A2: Descriptive statistics for the full sample, manufacturing and service sectors.

Variables	Full sample				Manufacturing sector				Service sector			
	No of obs.	Mean (standard deviation)	Min	Max	No of obs.	Mean (standard deviation)	Min	Max	No of obs.	Mean (standard deviation)	Min	Max
Output per worker	2,433	10.53 (1.32)	3.63	19.86	660	10.36 (1.12)	6.16	13.32	1,596	10.64 (1.39)	3.63	19.86
Capital (net assets)	2,433	7,221.24 (30,447.94)	0	43,333	660	25,592.77 (53178.97)	0	433,333				
Capital (replacement)	2,433	16,284.1 (95,846.51)	0	3,253,219	660	57,919.65 (176,441.6)	0	3,253,219				
Capital (rental)	2,433	207.17 (2,149.33)	0	94,162	660	693.34 (3,984.12)	0	94,161.96				
Exports	2,433	0.13 (0.27)	0	1	660	0.26 (0.36)	0	1	1,596	0.07 (0.20)	0	1
Skilled workers	788	0.60 (0.24)	0	1.1	647	0.60 (0.24)	0	1.1				
Cost per worker	2,433	16,913.1 (36,010.42)	0	769,953	660	34,261.48 (56,507.75)	0	769,953.1	1,596	9,937 (19,648)	0	307,910
Foreign-owned	2,433	6.82 (23.78)	0	100	660	7.51 (24.55)	0	100	1,596	6.78 (23.84)	0	100
Firm age	2,418	16.83 (13.11)	1	153	659	18.87 (17.12)	1	153	1,583	15.8 (10.32)	1	68
Bureaucracy	2,433	0.56 (0.56)	0	3	660	0.56 (0.55)	0	2.6	1,596	0.57 (0.56)	0	3
Firm size	2,433	1.46 (0.73)	0	3	660	1.62 (0.77)	0	3	1,596	1.38 (0.69)	0	3
Competition	1,966	0.43 (0.49)	0	1	455	0.40 (0.49)	0	1	1,380	0.44 (0.50)	0	1
EU member	2,433	0.34 (0.48)	0	1	660	0.4 (0.49)	0	1	1,596	0.34 (0.47)	0	1
Loan receipt	2,433	0.44 (0.50)	0	1	660	0.52 (0.50)	0	1	1,596	0.42 (0.49)	0	1

Table A3: Estimated treatment and outcome models in the full sample (with treatment level 0 as the base category in the treatment model) (N=786)

Variable	Step 1. Treatment model			Step 2. Outcome model			
	Treatment =1	Treatment =2	Treatment =3	Potential -outcome model for treatment =0	Potential -outcome model for treatment=1	Potential -outcome model for treatment =2	Potential -outcome model for treatment =3
Capital (net assets)	0.000*	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Exports	0.820**	0.062	1.310***	-0.351	-0.191	0.005	0.324
	(0.344)	(0.324)	(0.338)	(0.354)	(0.311)	(0.298)	(0.249)
Foreign-owned	0.001	-0.012**	-0.009*	0.004	0.001	0.009***	0.006
	(0.004)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.004)
Skilled workers	-0.681	-0.867**	-1.020**	-0.743**	-0.734**	-0.732**	-0.688**
	(0.464)	(0.375)	(0.497)	(0.327)	(0.339)	(0.367)	(0.345)
Firm age	0.018**	0.007	0.031***	-0.006	0.006	0.001	0.002
	(0.008)	(0.008)	(0.008)	(0.005)	(0.006)	(0.004)	(0.004)
Bureaucracy	-0.610***	0.235	-0.115	0.240	0.410***	0.012	0.246*
	(0.211)	(0.165)	(0.208)	(0.146)	(0.146)	(0.144)	(0.145)
Firm size	-0.011	0.605***	0.456***	-0.024	0.141	-0.168	-0.036
	(0.171)	(0.145)	(0.165)	(0.112)	(0.120)	(0.105)	(0.120)
Low-tech	-0.630*	0.085	-0.673**	-0.907***	-0.840***	-0.222	-0.523**
	(0.325)	(0.285)	(0.335)	(0.234)	(0.207)	(0.217)	(0.212)
Mid-tech	0.118	0.052	-0.296	-0.447**	-0.447**	-0.065	0.113
	(0.317)	(0.305)	(0.343)	(0.211)	(0.218)	(0.213)	(0.259)
Services	-0.830	-0.338	-0.349	-0.772*	0.377	0.036	1.110***
	(0.706)	(0.563)	(0.644)	(0.404)	(0.429)	(0.482)	(0.308)
Constant	-0.242	-0.929**	-1.354***	10.986***	11.019***	10.994***	10.752***
	(0.459)	(0.405)	(0.467)	(0.332)	(0.288)	(0.354)	(0.320)

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

APPENDIX A

Figure A1: Checking the overlap assumption (common region) for the full sample.

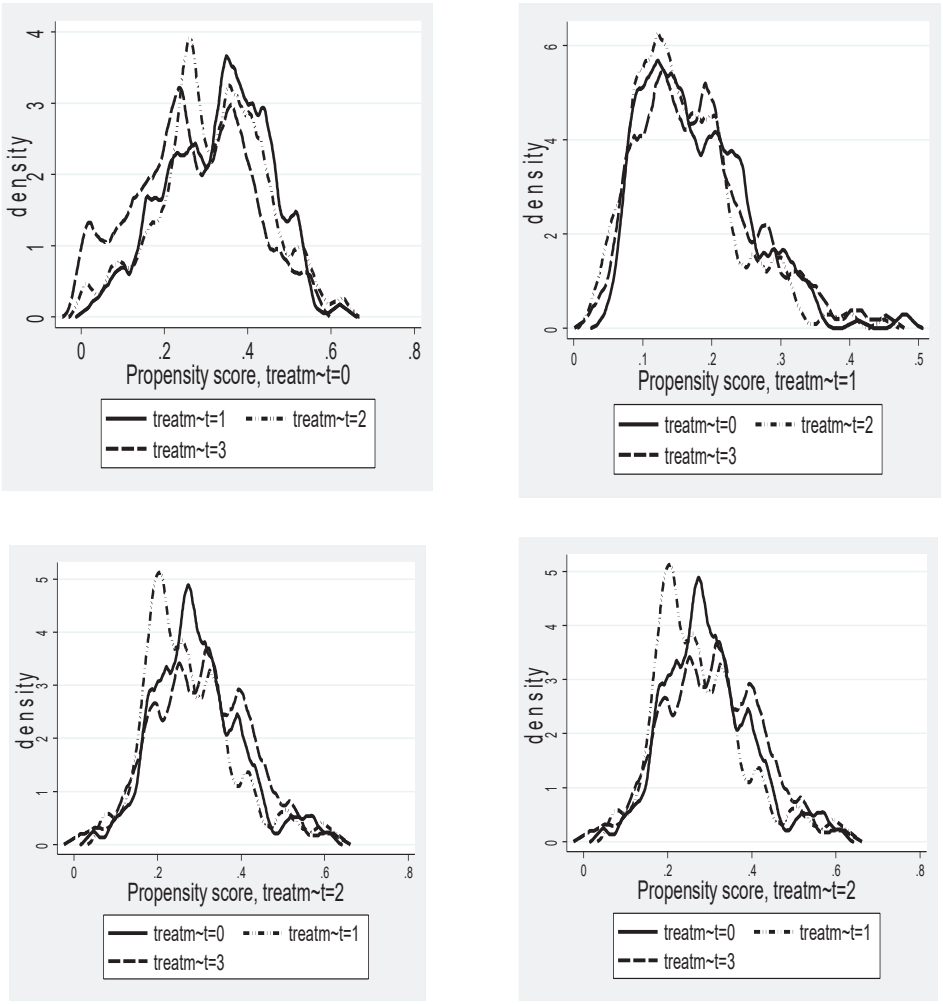


Figure A2: Checking the overlap assumption (common region) for the subsample of firms in the service sector.

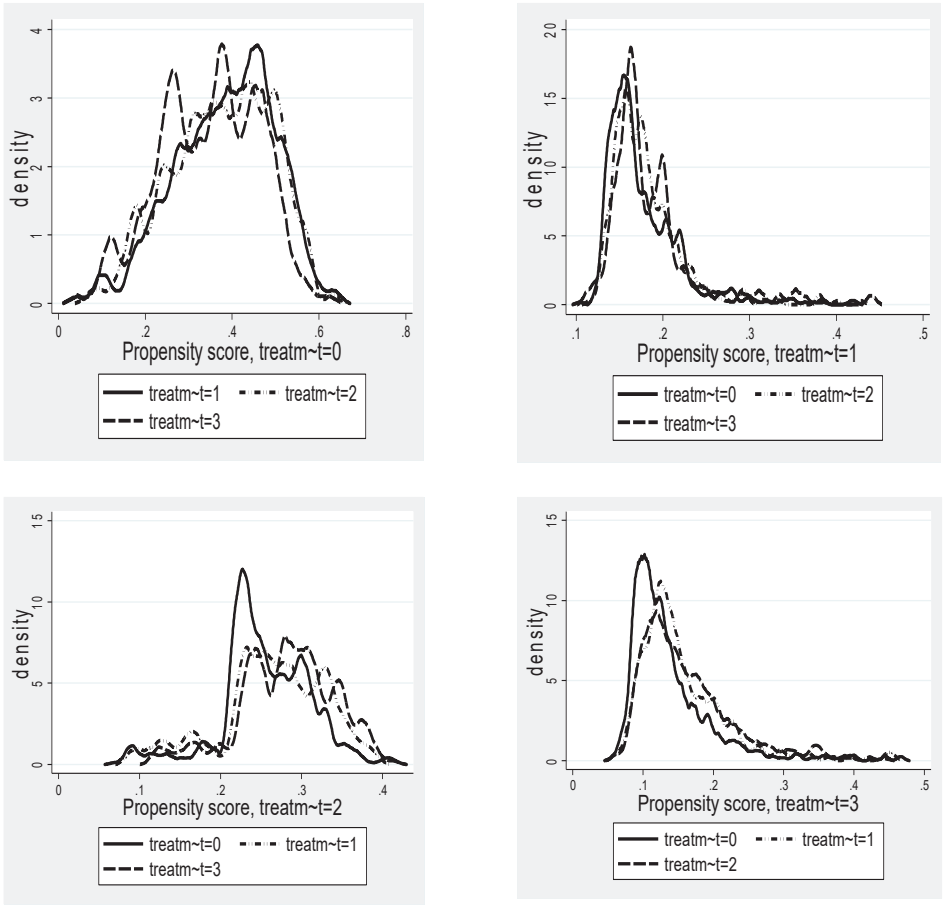


Figure A3: Checking the overlap assumption (common region) in the subsample of firms from the manufacturing sector.

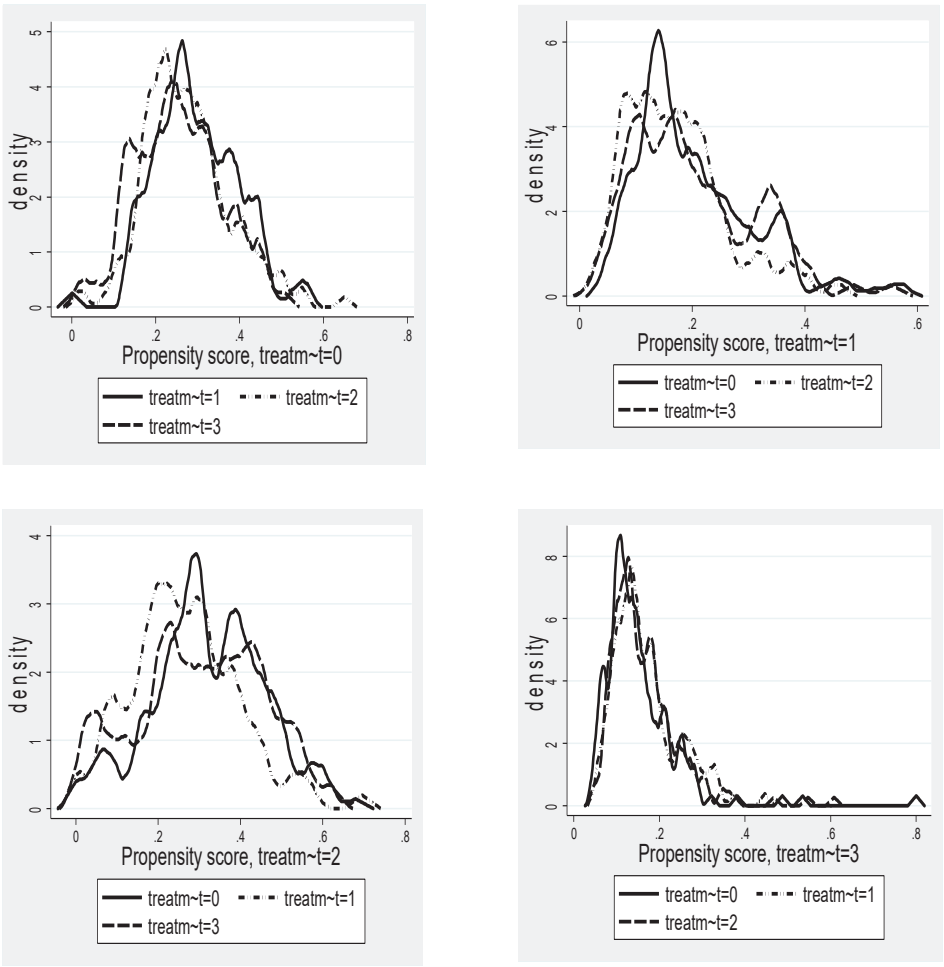
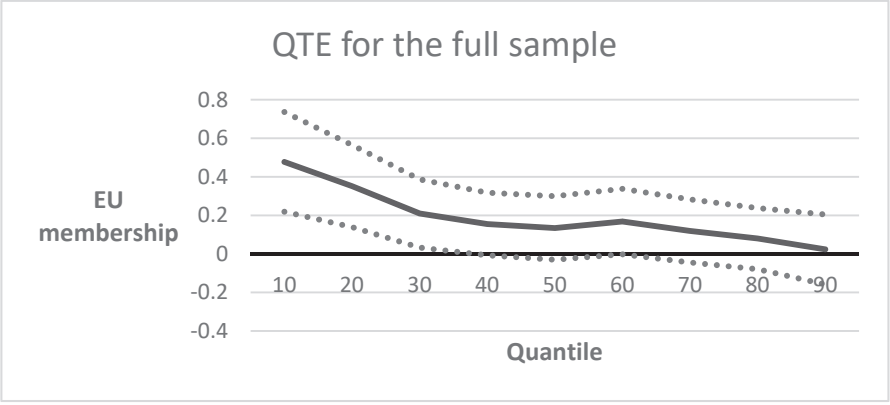
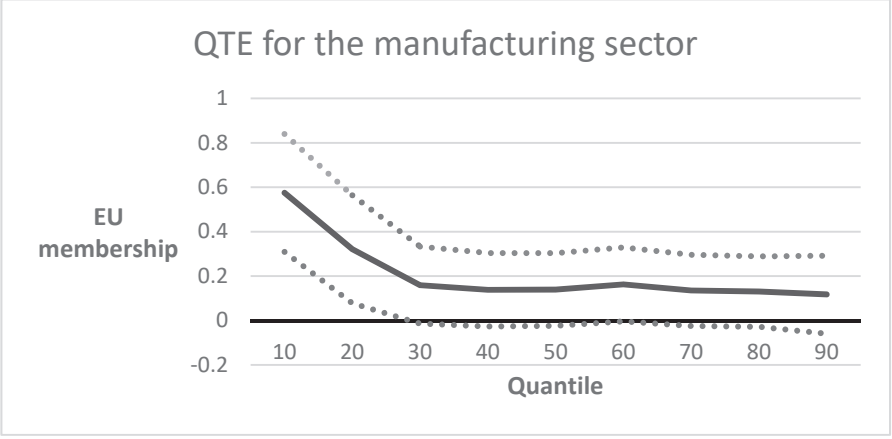


Figure A4: Results from the QTE model for the full sample with EU membership as a treatment variable.



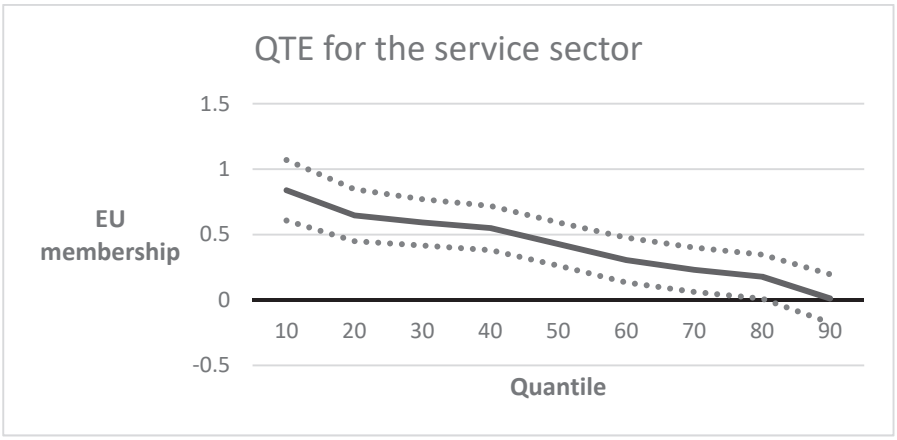
Note: Dotted lines show upper and lower limits of the 95% confidence interval.

Figure A5: Results from the QTE model for the manufacturing sector with EU membership as a treatment variable.



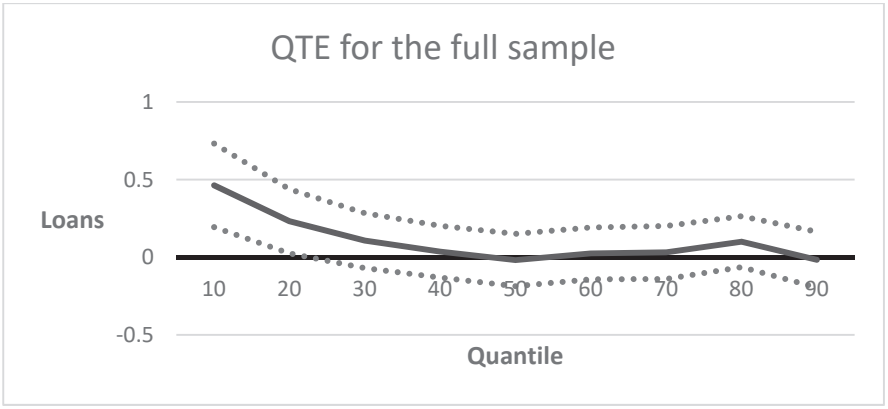
Note: Dotted lines show upper and lower limits of the 95% confidence interval.

Figure A6: Results from the QTE model for the service sector with EU membership as a treatment variable.



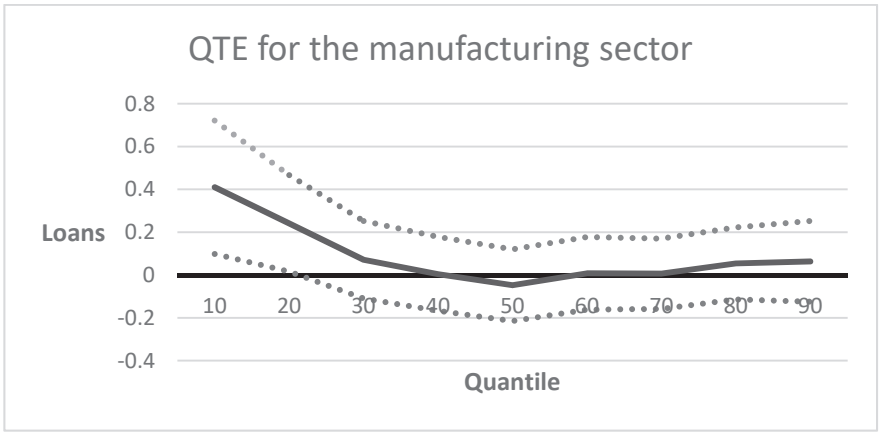
Note: Dotted lines show upper and lower limits of the 95% confidence interval.

Figure A7: Results from the QTE model for the full sample with access to loans as a treatment variable.



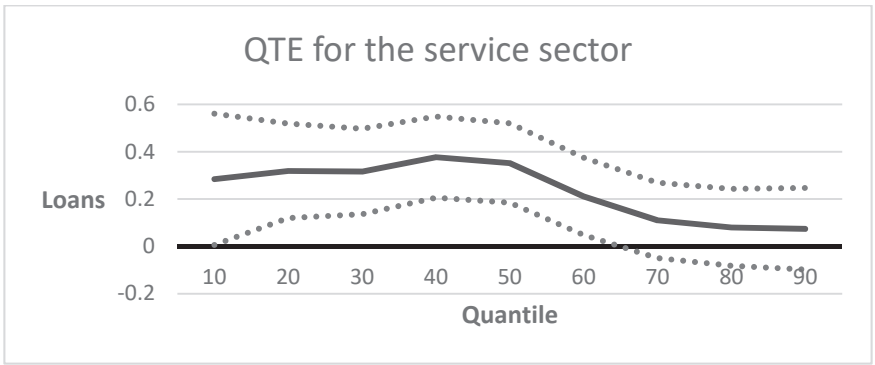
Note: Dotted lines show upper and lower limits of the 95% confidence interval.

Figure A8: Results from the QTE model for the manufacturing sector with access to loans as a treatment variable.



Note: Dotted lines show upper and lower limits of the 95% confidence interval.

Figure A9: Results from the QTE model for the service sector with access to loans as a treatment variable.



Note: Dotted lines show upper and lower limits of the 95% confidence interval.