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Firm Performance in the Western Balkan States: 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). In addition to evaluating the efficacy of membership it also studies the influence of loans, since evidence suggests a correlation between the macro-economic element of EU membership and the micro influence of loans. A multi treatment model is used to compare the effect 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, which divide a frequency distribution into equal groups each containing the same fraction of the total population, measures the effect on productivity of membership and loans separately as treatment variables. This provides an analysis of where the treatment influence is greatest and identifies the significance of selected control variables on the outcome. The analyses are conducted for firms in all states and disaggregated to provide results for the manufacturing and service sectors. Within the full sample, the findings indicate that EU membership and loans have a positive effect on productivity; 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 membership is positive across 70% of the distribution, while loans are restricted to the bottom quantiles, with rental capital also positively significant. In the services sector however, membership is significant up to 90% of the distribution, with loans at 60%. Foreign ownership, age and size are also significant across the productivity distribution curve. Policy implications indicate the advantages of EU membership allied to improvements in financial intermediation, particularly within the manufacturing sector.

Key Words: Transition economies; Firm productivity, EU membership; Access to loans; Multi-level model, Quantile regression

JEL Classification C, D, E, F, G, O

1. INTRODUCTION

The expansion of the EU from 15 to 27 states in the period 2004-2013 has led to significant economic and geopolitical benefits to the new member states (NMS) of Bulgaria, Croatia and Slovenia and to the EU as a whole. However, Albania, Bosnia and Herzegovina, Kosovo, Macedonia, Montenegro and Serbia, in the pre-accession process, bring into question whether enlargement fatigue will prevent these countries ever achieving membership. 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 2000’s 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).

The question remains whether the EU’s leverage can achieve the necessary reform, particularly when the institutional robustness of Bulgaria and Romania continue to provide significant challenges (Vachudova, 2014). The problem of access to finance and the paucity of foreign direct investment (FDI) is also highlighted in the transition report of the European Bank for Reconstruction and Development (EBRD), which expresses concern at the immaturity of equity markets and the credit constraint suffered, in particular, by small and medium sizes enterprises (SME’s). These factors are seen as a major constraint to growth (EBRD, 2016; Estrin and Uvalic, 2016).

This study explores, at firm level, the impact of EU membership and access to loans on 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 in contrast to those outside and uses capital, cost per worker, skill level, foreign ownership, size, age, bureaucracy and competition, to control for bias on unobservables. 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.

In addition to the perceived desirability of EU membership for all Balkan countries, the European Central Bank (ECB) expressed the view that financial development was important for economic development and that integration in relation to banks “was held to accelerate concentration, raising competition and pressure for efficiency, raising the extension of services and strengthening the competition for deposits” (Thimann, p. 12 ECB 2002 workshop). In its 2015/16 Transition Report, the European Bank of Reconstruction and Development (EBRD, 2015)

emphasises the need to “rebalance finance” in transition countries, expressing concern about the lack of credit availability (EBRD, 2015). It is therefore important to analyse the efficaciousness of EU membership, alongside the development of the financial systems and to identify differences in performance and access to finance.

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 countries, 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 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. (EBRD, 2016). The emphasis of the EBRD on access to finance and the influence of EU membership justify an analysis of their individual and joint effect on firm level productivity (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, the emphasis has been on the macroeconomic contribution of finance and little work exists at the micro level, particularly using firm-level empirical analysis. By looking at EU membership, the issue of market access is examined and the effects of loans on firms are considered.

To a larger degree, economic growth in the NMS economies was related to improvements in structural supply-side factors such as productivity, innovation and competitiveness (Havlik, 2015). Therefore, a timely analysis of the empirical evidence on the impact on productivity of both EU membership and finance will contribute to literature since ultimately, it is firms that are the driving force in determining productivity and the propensity to export goods and services. The Balkan countries provide a unique perspective, having a mix of EU members and prospective candidates. In the post-conflict Balkan economies, the influence of the EU provides a timeline in which each country analysed is at some stage in the journey to membership, albeit that there is some scepticism

as to the EU's pace of integration: what Bieber describes as "enlargement fatigue" (Bieber, 2011; p. 1799).

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

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 firstly identifies the relevance of a strong institutional and regulatory framework, using the EU as a proxy. Secondly, it analyses the productivity performance of firms within member countries against those within the accession process. Thirdly, it confirms findings in 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. Fourthly, it examines the impact of EU membership and loans across the productivity distribution curve and identifies areas of maximum influence across both full and disaggregated samples.

The remainder of the paper is organised as follows. Section 2 of this paper provides a review of the relevant theoretical and empirical literature. Section 3 outlines data and methodology and Section 4 presents the empirical results. Section 5 concludes.

2. LITERATURE REVIEW

Evidence exists that 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 (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 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 were 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 review of literature, Tybout (2003) concludes that foreign competition causes price cost mark ups 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 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 as a result of imports from the same source, conform 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. The six Western Balkan states moving towards accession may be reluctant to embrace neoliberal values, in addition to the possible "fatigue effect" of the EU's Eastern expansion programme (Noutcheva, 2006; Bieber, 2011). 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). Bieber (2011) suggests that the problem arises from the conflicting demand of the technocratic accession process and state building responsibilities, focussed on conflict management. Conflicting views in literature relate to the advantages of EU accession (Bezel, 2011) and this study intends to determine whether, at firm level, such benefits exist.

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 is not focussed 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.

Whilst this study is not confined to research on SMEs, they represent 90 per cent of the sample. Loan accessibility is an important element of SME development. It forms an intrinsic part of the economy and contributes significantly to economic growth. Access to finance is essential to fund investment, ensure businesses reach their full growth potential and facilitate new business start-ups (EBRD, 2015). A study by the World Bank (2014) revealed that, in emerging markets, more than

50% of SMEs are credit constrained, 70% do not use external financing from formal financial institutions and of the 30% receiving credit, 15% are underfinanced from formal sources (Hölscher et al., 2016).

Access to finance by SMEs has long been problematical. Debate has focussed on whether the existence of information asymmetries creates circumstances of credit shortages or credit gluts (EBRD, 2015). According to Stiglitz and Weiss (1981), information asymmetries, considered under a basic theoretical analysis of conditions of imperfect information, suggest the existence of credit gaps and that there will be insufficient credit available for all but ‘bankable’ propositions. They argued that the problem of adverse selection and finance rationing can also occur when banks require collateral. Their most important conclusion being that information asymmetry, in the form of adverse selection and moral hazard, is the source of market inefficiency in developing countries leading to low risk borrowers, such as SMEs, being sidelined or even excluded from the stream of potential lenders (Stiglitz and Weiss, 1981).

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 good reason to suggest that finance has an important role to play in development, but they do not, as Levine (2005) argues, constitute a rationale to prefer banks over other forms of finance.

Although some authors argue in favour of a bank based system over equity (see Stiglitz, 1985), the reason for the emphasis on loan financing is rooted in Estrin and Uvalic’s (2016) hypothesis that the paucity of FDI into the Balkans may mitigate against an equity based system. They conclude that even when there is FDI, there is little evidence of spillover effects and suggest that this is “explained by various factors – institutional, economic, and political – that have constrained FDI effects in the Western Balkan economies in comparison to the Central East European countries” (Estrin and Uvalic, 2016; p.1).

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 literature. Nonetheless, there are few firm-level studies on the effects of finance on productivity and other aspects of firm performance (Hölscher, et al., 2015).

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, finding that financial frictions affected both investment and output per worker. 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 establish a link between exports, EU membership and productivity. Using firm-level data, Berman and Héricourt (2010) found that productive efficiency, when allied to access to finance, increased the propensity to export. Minetti and Zhu (2011), using Italian firm level data, found that firms facing credit constraints exhibited a weaker export performance. This poses the question whether exports promote greater productivity, or more productive firms are more likely to export.

In relation to the transitional economies, Djalilov and Hölscher (2016) found evidence that the early transition economies, namely the new member states, had greater credit availability from banks and the financial sector 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.

In the Balkan region, the number of firms experiencing credit constraints vary from Bosnia and Herzegovina 25% to Montenegro 67%, with EU member firms faring no better than non-EU; a position which has deteriorated since the financial crisis (EBRD, 2015). 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).

As a driver of productivity, the EBRD Transition Report for 2014 focussed on innovation but recognised 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). It is assumed 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. This implies that firms with lower levels of skill base are underinvesting in human capital (Covers, 1997) and evidence suggests that where there is a high degree of ethnic and demographic diversity within the work force, there is a negative effect on productivity (Parrota et al., 2012), which is an interesting finding in relation to the labour force composition of the Balkan states.

Literature reveals that a more competitive market results in improved productivity (Bridgeman, 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” (Buccirosi et al., 2013; p.1334).

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 paper compares the productivity performance and the influence of loans on firms in both member and non-member states and seeks to measure differences arising, whilst also measuring effects across the productivity distribution curve of both treatment and control variables. The loan variable is constructed from the question in BEEPS 2013 “At this time, does this establishment have a line of credit or a loan from a financial institution?” It then allows the comparison of the productive performance of those in receipt of loans against those with none. The scant nature of literature analysing the effect of EU membership, allied to access to finance and other key determinants to firm level performance, justifies the claim that this paper is a contribution to the research gap.

METHODOLOGY

The paper compares the influence of EU membership and jointly and severally, receipt of loans on the productivity (dependent variable) performance of firms in the Western Balkans. The comparison is between firms within EU member states and those without, with the objective of measuring performance differences. The analysis identifies the influence of membership and loans at points across the productivity distribution curve to include the significance of control variables selected with reference to theory and literature. The selected methodology answers the key objectives of ensuring a robust estimator to avoid bias on unobservables, allows the ability to achieve a multi valued treatment approach (EU membership and loans) and perform quantile treatment modelling consistent in the event of heteroscedasticity.

Two distinct techniques are used – the Inverse Probability Weighted Regression Adjustment (IPWRA) and quantile treatment effects (QTE) modelling. The former is based on the premise that the effect of EU membership and receipt of loans as a treatment assignment – the Average Treatment on the Treated (ATT) effect – must be estimated. Essentially, the study follows the most common approach by matching, by means of propensity scores, EU member or loan receipt (“treated”) firms to non-EU member and no loan receipt (“untreated”) firms with similar characteristics– which thus constitute a comparison group– and then to estimate the difference between output per worker (productivity) (outcome of interest) (Y_1) for EU member/ loan receipt firms and the outcome for non-member/loan receipt (Y_0) (Cerulli, 2010).

To attribute the estimated difference to a treatment assignment safely, 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 (Y_0) is independent of treatment assignment (T), 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 Vyttilacil, 2007).

Treatment effects are estimated in the multi-treatment context to ensure that EU membership and non-membership are carried out simultaneously. A matching approach with multiple treatments is first introduced by Lechner (2001). There are $M+1$ treatments, whereby treatment equal to zero denotes the absence of the EU membership and receipt of loans. The average treatment effect on the treated (ATT) effect is then calculated as:

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

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). Busso et al. (2014) conducted a Monte Carlo simulation of the finite sample properties of a range of matching and reweighting estimators – which include the IPWRA – in the estimation of ATTs. Their findings support the use of IPWRA. Firstly, normalised reweighting was used, which exhibits overt bias of the same magnitude as pair matching but much smaller variance; secondly, normalised reweighting outperforms matching estimators when the overlap is good, which is the case in this study (see Figures 1, 2 and 3 in the Appendix).

The IPWRA estimator consists of three steps. Firstly, for each firm in the sample, the treatment model estimates the propensity score, which is the probability for each firm of participation (“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 (treatment=0); EU membership and no loan (treatment=1); no EU membership with loan (treatment=2); and EU membership with loan (treatment=3). 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 (QTEs) allows the measurement of the effect on the outcome variable (productivity) across the 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:

$$Y_i^d = X_i \beta^\tau + d\delta^\tau + \varepsilon_i \text{ and } Q_{\varepsilon_i}^\tau = 0 \quad (2)$$

So $i=1, \dots, n$ and $d \in (0, 1)$. Q_{ε}^τ refers to the τ th quantile of the unobserved random variable ε_i . β^τ and δ^τ are the unknown parameters of the model. δ^τ represents the conditional QTE's at quantile τ . The linearity assumption above is insufficient to identify the QTE's 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:

$$\varepsilon \parallel (D, X) \quad (3)$$

Taking 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:

$$(\hat{\beta}^\tau, \hat{\delta}^\tau) = \arg \min \beta, \delta \sum \rho_\tau(\mu) (Y_i - X_i\beta - D_i\delta) \quad (4)$$

where $\rho_\tau(\mu) = \mu * \{\tau - 1(\mu < 0)\}$. 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 Survey* (BEEPS) produced by the World Bank and European Bank for Reconstruction and Development (EBRD). The BEEPS dataset is a firm-level survey based on face-to-face interviews with managers and examines the quality of the business environment. 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, at the time of the survey, were EU members.³ The sample allowed 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.

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

³ The inclusion of Croatia as an EU member in this paper 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).

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 services firms. From a total of 2,433 observations, 2,179 are SMEs (BEEPS, 2013) which, on the assumption that this reflects the total population, demonstrates their importance to the economy. Output per worker 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 the costs per worker is significant. In manufacturing firms, which also are older than those in the service sector and are more likely to be in receipt of loans, foreign ownership is more pronounced.

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 EU and did not received a loan (38 % of firms);
- Treatment (T) =1 if a firm is in EU but did not receive a loan (18% of firms)
- Treatment (T) =2 if a firm is not in EU but has received a loan; (28% of firms)
- Treatment (T) =3 if a firm is in EU and has received a loan (16% of firms)

The dependant 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 evidence 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). There is some evidence that, following the accession of new member states, credit constraint was responsible for the lack of productivity improvements in relation to the more established members of the EU. It is suggested that funds flow to firms with higher net worth who are more prepared to risk investing in a climate of uncertainty, although their balance sheet status does not automatically imply that they are amongst the most productive (Gopinath et al., 2015; EBRD 2013). 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. This paper will contribute by identifying the effect of membership and receipt of loans both in and out of the EU, and through the use of quantile regression, measure where, along the productivity distribution curve, the greatest influence lies.

The selection of matching variables is predicated by reference to 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 outcome variable productivity, measured as output per worker, has been selected as a measure of firm level performance due to its importance to economic growth. The harnessing of the productive inputs of capital, labour and technology are at the heart of a successful economy. A comprehensive review of 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 good deal 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 geopolitical economic shocks, the materiality of funds flow and capital allocation.

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 block. There is some evidence that the NMS are beginning to achieve convergence with the original EU 15, albeit at a lower base due to economic stagnation in the Eurozone (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 of the need to achieve economic convergence and European cohesion. The influence of capital accumulation is critical since it will improve both 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 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.

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

The justification for including *exports* and *skilled workers* amongst the control variables is predicated on Wagner's (2012) comprehensive review of International trade and firm performance literature, which found that the direction of significance in a large number of empirical studies indicated that exporters were more productive and wage premia were statistically significant, pointing to a greater level of skilled workers. 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 (Bartlett, 2013).

Employment rates in the Balkan region are problematical with new EU member states at 64% and non -EU member states 46%. Evaluating these figures, one might anticipate cost per worker to be suffering some downward pressure, however, a combination of labour market rigidities, incomplete reform programmes, a strong social welfare net and migration of skilled workers have 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.

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, 2006; Estrin et al., 2009; Irdam et al., 2015; Waldkirch, 2014).

Foreign ownership is a reflection of FDI and evidence exists that it increased in the period before accession into 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 as 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 those countries of the Western Balkans in accession. This is more prominent in Serbia, Montenegro and Macedonia than Albania, Bosnia and Herzegovina and Kosovo (Petrovic and Smith, 2013). To control for this, the models variable *Bureaucracy* is included (see Table A1 for variable description).

Firm size is controlled as economies of scale are an important aspect of firm level performance and size is a critical ingredient. Additionally, evidence exists that financial and

institutional development have a significant influence on firm growth with smaller firms being more adversely affected by any obstacles in this area (Krugman, 1979; Beck et al., 2005).

Firm age has an influence on firm size and performance. There is evidence that firms improve with age and achieve higher levels of productivity and profitability, although this trend is usually associated with increased size. They can also display deteriorating trends with reduced performance and a propensity to become smaller. Given the heterogeneity of firms this is unsurprising but is nevertheless an important factor in relation to firm productivity (Coad et al., 2012).

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. The use of competition as a control variable is justified in any analysis of firm level performance within the EU.

Sector dummy variables (low tech, mid tech and services) are also included in the model.

EMPIRICAL RESULTS

The empirical results analyse the effect of EU membership and loan receipt on firms within the European Union. The IPWRA estimator allows a comparison in percentage terms between firms in membership and firms without and provides a comparison between member firms with loans and those none. In non-member states firms with and without loans are also compared.

The second stage of the exercise is to use quantile regression to identify where the effect of EU membership and loans is significant along the productivity distribution curve. The evidence can be laid alongside the influence, at each quantile of selected control variables, which will further inform 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 will allow an increased micro economic 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).

Table 1 below shows the estimated treatment effects using the IPWRA estimator. The results have been transposed into percentage increases or decreases for ease of interpretation. The analysis

covers the full sample of firms in all member states and disaggregated samples of services and manufacturing. The full sample results 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 makes the results of limited value. This limitation also applies to the quantile regression modelling.

Table 1. The estimated ATTs 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	0.308*** (0.095)	0.229** (0.098)	0.143 (0.159)	0.531*** (0.111)	0.272*** (0.094)	0.590*** (0.110)	0.407*** (0.103)	0.242** (0.107)	0.082 (0.184)
Output per worker (in %)	0.030*** (0.009)	0.022** (0.010)	0.014 (0.015)	0.050*** (0.011)	0.026*** (0.009)	0.056*** (0.011)	0.040*** (0.010)	0.024** (0.011)	0.008 (0.018)

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

The analysis indicates that against treatment 0, interpreted as a firm that has neither been treated with EU membership nor loans ($T = 0$), firms within EU are 3 percentage points (%) ($p < 0.01$) more productive (Column 1). The inclusion of loans shows no significant effect (Column 3). Receiving loans for firms in non-member states (Column 2) indicates a 2.2% ($p < 0.05$) productivity advantage against firms not receiving a loan. This indicates that membership of the EU and not a loan is the key driver to productivity within the NMS, although loans are critical to productivity improvement for firms outside the EU.

In relation to the service sector, firms inside the EU with no loan (Column 4) are 5.0% ($p < 0.01$) more productive than similar firms in non-member states. This advantage increases to 5.6% ($p < 0.01$) when a loan is added to membership (Column 6). Non-member firms with a loan are 2.6% ($p < 0.01$) more productive than their peer group (Column 5) indicating that access to finance is a key determinant of productivity.

Within the manufacturing sector, firms operating in EU member states without a loan (Column 7) are 4% ($p < 0.01$) more productive than the equivalent in non-member states with the inclusion of loans being insignificant and thus having no impact on productivity (Column 9). Non-member firms in receipt of a loan have a 2.4% ($p < 0.05$) productivity advantage over their peer group (Column 8), indicating the greater importance of loans to firms in non-member states.

The IPWRA results are concerned with mean and may not reveal other types of effects. The use of quantile regressions allows the analysis to be taken to another plane where the importance of the distributional effects can be evaluated. 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 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 in these analyses 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. The estimates shown illustrate the significance of the results in each quantile across each of the distributions.

Table 2 below shows the results for the effect of EU membership (treatment variable) and the control variables on productivity performance over each point (quantile 1 to 9) of the productivity

distribution curve. EU membership is positively significant (at the conventional levels of significance) in quantiles 1 to 6 with the coefficients weakening 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 q1 to q4 distribution. This may suggest that below the median point of the distribution, equity, as a means of capitalisation, is in short supply. The negative coefficient on *age* ($p < 0.05$) in q9 may indicate that older firms are less productive within their quantile 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 q5 and q8, which may indicate that in parts of the distribution curve, firms are struggling to modernise. The positive significance of *Bureaucracy* ($p < 0.05$) in q.1 and q.9 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 q.2 and q.8 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. An OECD working paper concluded 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 EU membership ($p < 0.01$) is positively significant for q1 to q8, with no significance only amongst the most productive firms. This would suggest that the services sector as a whole has received a significant boost from EU membership. As in the full sample, the declining magnitude of the coefficient on EU membership variable is found, suggesting that the most benefit is enjoyed by the least productive firms. *Foreign ownership* ($p < 0.01$ to $p < 0.05$) is positively significant throughout the distribution, indicating the relevance of FDI in tandem with EU membership. *Age* ($p < 0.01$ to $p < 0.1$) and *size* ($p < 0.01$ to $p < 0.05$) are also positively significant, suggesting an attraction for larger, older firms to foreign investors. Outside the bottom 20% of the distribution curve the negative influence of competition ($p < 0.01$) in the upper quantiles of the distribution indicates that, in this sector, the competitive environment of the expanded EU is creating pressures within the NMS for the most productive firms. *Cost per worker* ($p < 0.01$) is positively statistically significant 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.

Independent variables	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
EU membership	0.477*** (0.132)	0.352*** (0.109)	0.080 (0.081)	0.024 (0.093)	0.575*** (0.135)	0.321*** (0.124)	0.130 (0.081)	0.117 (0.090)	0.839*** (0.118)	0.647*** (0.101)	0.178** (0.085)	0.011 (0.093)
Capital (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)	0.000 (0.000)				
Capital (replacement)	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)	0.000 (0.000)				
Capital (rental)	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)	0.000 (0.000)				
Export	0.493* (0.255)	0.183 (0.282)	0.131 (0.306)	-0.068 (0.358)	0.206 (0.314)	0.192 (0.303)	0.051 (0.265)	-0.022 (0.353)	0.401 (0.407)	-0.121 (0.392)	0.367 (0.388)	0.390 (0.369)
Skilled workers	-0.348* (0.211)	-0.511** (0.202)	-0.519*** (0.189)	-0.780*** (0.217)	-0.500** (0.244)	-0.479** (0.216)	-0.364** (0.176)	-0.711*** (0.215)				
Cost per worker	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)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Foreign owned	-0.001 (0.003)	0.001 (0.004)	0.002 (0.002)	0.001 (0.002)	-0.001 (0.005)	0.003 (0.003)	0.001 (0.002)	0.001 (0.002)	0.004 (0.003)	0.008*** (0.002)	0.004** (0.002)	0.007** (0.003)
Firm age	-0.004 (0.004)	-0.005 (0.004)	-0.001 (0.002)	-0.006** (0.002)	-0.011* (0.006)	-0.004 (0.004)	-0.002 (0.002)	-0.007*** (0.002)	0.015*** (0.005)	0.015*** (0.005)	0.010** (0.005)	0.009 (0.006)
Bureaucracy	0.213** (0.092)	0.105 (0.084)	0.082 (0.077)	0.172* (0.097)	0.213** (0.104)	0.091 (0.088)	0.158* (0.084)	0.246** (0.102)	0.158 (0.102)	0.143* (0.080)	0.126* (0.069)	0.089 (0.079)
Firm size	0.115 (0.092)	0.146* (0.083)	0.081 (0.060)	0.125* (0.069)	0.212** (0.094)	0.125 (0.090)	0.099* (0.059)	0.150** (0.066)	0.333*** (0.088)	0.291*** (0.069)	0.118** (0.052)	0.099* (0.059)
Competition	-0.037 (0.128)	0.014 (0.111)	-0.098 (0.084)	-0.099 (0.091)	-0.136 (0.131)	0.021 (0.116)	-0.095 (0.086)	-0.116 (0.094)	-0.047 (0.118)	-0.139 (0.097)	-0.233*** (0.081)	-0.259*** (0.091)
Low-tech	-0.339** (0.150)	-0.407*** (0.137)	-0.283** (0.110)	-0.219* (0.129)	-0.176 (0.181)	-0.361** (0.165)	-0.378*** (0.116)	-0.260** (0.130)				
Mid-tech	-0.291 (0.180)	-0.287* (0.153)	-0.216* (0.111)	-0.265** (0.128)	-0.184 (0.208)	-0.250 (0.167)	-0.248** (0.119)	-0.287** (0.123)				
Services	-0.286 (0.369)	-0.471 (0.320)	0.374 (0.370)	0.883* (0.523)	1.025 (0.974)	0.680 (0.703)	-0.257 (0.690)	-0.527** (0.218)				
Constant	9.022*** (0.260)	9.603*** (0.244)	10.894*** (0.183)	11.477*** (0.207)	9.027*** (0.297)	9.581*** (0.270)	10.642*** (0.190)	11.296*** (0.240)	7.920*** (0.155)	8.673*** (0.132)	11.033*** (0.141)	11.562*** (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 bottom 20% of the distribution finds membership positively significant ($p < 0.01$), although above that, confidence levels and the strength of the coefficient are declining. *Balance sheet capital* is positively significant in q1 ($p < 0.01$) and q8 ($p < 0.1$). Across the first half of the distribution curve *rental capital* ($p < 0.05$) is positively significant, suggesting that leasing is an important source of finance up to the median. The negative coefficient of replacement capital in q3 ($p < 0.05$) and q8 ($p < 0.01$) indicates that replacing aging 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 throughout the distribution, suggesting the importance of economies of scale, whilst firm age in q1 and q9 is a disadvantage. In the upper and lower quantiles, the positive significance of *bureaucracy* ($p < 0.05$ to $p < 0.1$) indicates an awareness of the importance of institutional development. Negative skill levels and positive cost levels per worker ($p < 0.1$) feature significantly throughout the distribution and this is consistent with the earlier findings in this paper.

Table 3 below shows the results when loan receipt is the treatment variable. In the full sample, loans are only significant in the first two quantiles ($p < 0.01$ in q1, and $p < 0.05$ in q2) suggesting an efficacy that is confined to the least productive firms. It could also reflect a misallocation of capital. At the conventional levels of significance, *rental capital* ($p < 0.01$) is positively significant up to the fourth quantile, confirming the necessity for borrowed capital in the lower quantile of the productivity distribution. *Bureaucracy* ($p < 0.05$ to $p < 0.1$) and *size* ($p < 0.05$ to $p < 0.1$) are positively significant in q1 and q.9 whilst *age* ($p < 0.05$ to $p < 0.1$) is negative, 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 significance of *balance sheet capital* ($p < 0.1$) in q.1 and q.9 and the negative significance of *replacement capital* ($p < 0.1$) in q.9 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 and possible explanations have been given earlier in this paper.

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

Independent variables	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*** (0.137)	0.232** (0.105)	0.100 (0.084)	-0.016 (0.092)	0.410** (0.159)	0.241** (0.115)	0.054 (0.086)	0.063 (0.096)	0.284** (0.141)	0.319*** (0.102)	0.080 (0.083)	0.074 (0.088)
Capital (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)	0.000 (0.000)				
Capital (replacement)	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)	0.000 (0.000)				
Capital (rental)	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)	-0.000 (0.000)				
Export	0.418 (0.295)	0.088 (0.278)	0.191 (0.305)	-0.045 (0.336)	0.205 (0.339)	0.098 (0.284)	0.225 (0.274)	0.037 (0.278)	0.285 (0.406)	-0.164 (0.441)	0.220 (0.390)	0.425 (0.383)
Skilled workers	-0.602*** (0.212)	-0.567*** (0.207)	-0.407** (0.186)	-0.803*** (0.219)	-0.632*** (0.237)	-0.272 (0.225)	-0.434** (0.179)	-0.717*** (0.217)				
Labour cost	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)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Foreign owned	-0.001 (0.003)	-0.004 (0.005)	0.003 (0.003)	0.001 (0.002)	-0.001 (0.006)	0.001 (0.004)	0.002 (0.002)	0.001 (0.003)	0.004 (0.004)	0.009*** (0.002)	0.004** (0.002)	0.008** (0.003)
Firm age	-0.007* (0.004)	-0.002 (0.004)	-0.002 (0.002)	-0.006** (0.002)	-0.009 (0.006)	-0.001 (0.003)	-0.001 (0.002)	-0.005** (0.002)	0.013** (0.006)	0.015*** (0.005)	0.011** (0.005)	0.005 (0.006)
Bureaucracy	0.175** (0.085)	0.078 (0.077)	0.080 (0.080)	0.157* (0.094)	0.115 (0.090)	0.044 (0.076)	0.141 (0.087)	0.210* (0.108)	0.083 (0.137)	0.109 (0.089)	0.131* (0.070)	0.104 (0.079)
Firm size	0.200** (0.087)	0.181** (0.075)	0.046 (0.060)	0.120* (0.063)	0.245*** (0.088)	0.091 (0.079)	0.052 (0.059)	0.100 (0.069)	0.396*** (0.105)	0.291*** (0.073)	0.121** (0.055)	0.106* (0.061)
Competition	-0.019 (0.116)	0.002 (0.103)	-0.143* (0.086)	-0.096 (0.091)	-0.033 (0.129)	-0.063 (0.109)	-0.097 (0.086)	-0.166* (0.097)	-0.113 (0.131)	-0.156 (0.102)	-0.284*** (0.081)	-0.295*** (0.089)
Low-tech	-0.376** (0.151)	-0.352** (0.143)	-0.335*** (0.112)	-0.221* (0.118)	-0.293* (0.162)	-0.169 (0.161)	-0.382*** (0.115)	-0.269* (0.142)				
Mid-tech	-0.245 (0.179)	-0.107 (0.148)	-0.215* (0.117)	-0.261** (0.116)	-0.231 (0.198)	0.004 (0.162)	-0.286** (0.116)	-0.315** (0.129)				
Services	-0.167 (0.278)	-0.263 (0.254)	0.393 (0.406)	0.837* (0.501)	1.210 (0.957)	0.786*** (0.252)	-0.378 (0.753)	-0.490 (0.876)				
Constant	9.018*** (0.251)	9.367*** (0.232)	10.908*** (0.179)	11.519*** (0.200)	9.038*** (0.258)	9.265*** (0.257)	10.773*** (0.185)	11.433*** (0.231)	8.022*** (0.171)	8.745*** (0.142)	11.045*** (0.145)	11.570*** (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, capital and skill set variables have been omitted due to paucity of observations. Receipt of loans is positively significant for the lower 60% of the distribution. With the exception of q1, *foreign ownership* ($p < 0.01$ to $p < 0.05$) is positively significant throughout the distribution and, with the exception of q9 where it is insignificant, *Age* ($p < 0.01$ to $p < 0.05$) is now seen as a positive attribute. *Firm size* (at the conventional levels of significance) is positive throughout the distribution indicating that, together with age, it is seen as an important influence of firm productivity. The negative coefficient of *competition* appears significantly across the distribution from q.3 to q.9 ($p < 0.01$ to $p < 0.1$) increasing 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 pressures. Loans appear to be more important below the median, which is true even under foreign ownership. This may be the result of the provision of loans from the transnational companies, or the availability of collateral to lenders who are themselves foreign owned banks. The importance of firm age and size suggests that older, larger and more experienced firms are attractive to FDI. Above the bottom two quantiles, the negative significance of competition is a reflection of increasing competitiveness within the enlarged EU, encouraged by the presence of foreign ownership. The persistently positive significance of cost per worker ($p < 0.01$) indicates that the service sector is comfortable with its cost per worker ratios.

In relation to the manufacturing sector, loans are positively significant (at conventional levels) in q1 and q2 suggesting that, within the sector, the least productive firms are loan dependent. Across the bottom half of the distribution at conventional levels, this view is supported by the positive significance of *rental capital* ($p < 0.01$ to $p < 0.05$) in q.1 and q.2 whose availability within manufacturing, where the replacement of productive assets is a major consumer of capital, could well depress the demand for loans. Therefore, the availability of loans and rental capital should be viewed in tandem. *Size* ($p < 0.01$) is positively significant in q1 and *Foreign ownership* ($p < 0.1$) in q3, together with the negative coefficient of replacement capital ($p < 0.05$). *Age* ($p < 0.05$) is negatively significant in q.9. 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 aspect of the age of firms in q.9 may indicate that older firms have difficulty with aging assets and the required cultural changes. Negative skill levels and positive labour costs ($p < 0.1$) feature significantly throughout the distribution and give credence to the possible explanations given earlier in this paper.

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

CONCLUSIONS

This study investigates the effects of EU membership and access to loans on productivity of firms in the Balkan region. The factors used are relevant to the “new” trade theory, which has gained traction since Krugman’s original paper in 1979 and all resonate with the findings of Tybout (2003). It compares the influence of the treatment variables on output per worker in EU and non-EU firms, using multiple treatment models. Quantile regression models are used to analyse the effect of the same treatment variables on productivity across the distribution curve, together with the influence of conditional (second order) variables on the outcome variable (productivity). Results are reported for the full sample together with the disaggregated service and manufacturing sectors.

The multiple treatment models indicate that firms within the NMS are more productive than their non-EU member peer group; the addition of loans to membership having no effect on the result. Thus, EU membership rather than access to loans is the key contributor to firm productivity. Within non-member states, firms in receipt of loans are more productive than those without indicating that the key driver of productivity is a loan. Within the service sector, firms within the EU have an advantage over firms in non-member states and that increases when the receipt of loans is included. Non-member firms in receipt of loans are more productive than those without, which suggests that within this sector loans are important across the region but have a greater influence outside the EU. Within manufacturing, member firms without a loan are more productive than their counterparts in non-member states; the inclusion of loans having no impact on productivity. The dynamics of loans in member states are clearly different. Firms with loans are no more productive than those without providing confirmation that, within the EU, loans do not appear to be a key driver of productivity. Non-member firms in receipt of loans have a productivity advantage over their peer group, confirming their importance in non-member states.

The quantile regression analyses reveal that EU membership is not significant throughout the productivity distribution curve. Within the full sample, the indications are that firms at the lower end of productivity distribution enjoy the greatest benefit from membership; no effect being seen at the upper end of the scale. However, the disaggregated results indicate that EU membership is positive in the services sector, with the top 90 per cent of the distribution enjoying the benefit. In the manufacturing sector, the effect is more muted with 70 per cent showing benefit. The importance of

rental capital (leasing) is positive below the median in all sectors. This may explain the muted response to loans seen within the EU in the multiple treatment models, with a more sophisticated financial intermediary facility providing an alternative. Replacement capital is intermittently negative, although the effect is confined to manufacturing, indicating that in part of the distribution curve, firms in this sector are struggling to modernise.

Loans are only positive in the first two quantiles for the full sample and manufacturing firms, suggesting that their efficacy is confined to the least productive. In the services sector loans are positive in the first six quantiles, suggesting that they are attractive only at the lower spectrum of the distribution curve. Rental capital follows the same pattern for the full sample and manufacturing firms, whereas the service sector appears content to rely on loans. This indicates that rental capital (leasing) is a key requirement amongst manufacturers of all sizes, although it is primarily confined to the least productive firms. Foreign ownership is positive within the service sector with age and size mirroring the result, suggesting that foreign owned firms enjoy a greater degree of leverage. The positive result for age and size in this sector, when allied to foreign ownership, indicates that FDI is attracted to older, larger firms. An alternative view is that funds flowing to high net worth companies, which are not necessarily more productive, are distorting the picture (Gopinath, 2015).

Throughout the disaggregated results, size (positive) and age (negative) primarily appear in either the top or bottom quantiles. Different dynamics may be at play in each of these distributions suggesting that, regardless of size, older firms outside the service sector have a problem with productivity improvement programmes. The negative effect of competition is primarily restricted to the services sector where foreign ownership encourages a more competitive environment; a finding that conforms to new trade theory. The positive result for bureaucracy is more pronounced within the EU membership than the loan model. In both its effect is seen only in the lower and higher quantiles of the distribution curve. This indicates that amongst the least and most productive firms there is an enhanced awareness of institutional development, with those within the EU indicating a more positive stance. Throughout the quantile analyses conducted, 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 amongst the working age population (Bartlett, 2013).

Literature relating to the Balkans has emphasised the macroeconomic benefits of EU membership, FDI and the paucity of credit availability. This study contributes by analysing the

behaviour of firms both within and outside membership and those in and not in receipt of loans. It concludes that EU membership contributes to improved productivity as a result of unfettered access to the customs union, which promotes opportunities for improved economies of scale and the advantages of network effects. Additionally, the EU provides some protection to developing economies from external competitors. The significance of loans and rental capital in relation to firm productivity is consistent with the findings in Levine and Warusawitharana (2014). This study allows conclusions to be drawn as to where the emphasis should be placed by encouraging improved firm performance amongst the lower quantile of productivity distribution.

These results have a number of policy implications for both member and non-member states. There is little doubt that further enlargement of 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 within the region. Both membership and loans appear to benefit the least productive firms, with the exception of 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 and where enhanced financial intermediation would improve supply. Whilst intermittent, the negative influence of replacement capital is seen as problematical within manufacturing across the distribution and support for an asset replacement programme would appear desirable. The fact that 90% of the sample is SMEs provides clear evidence of where improvements can be achieved amongst the least productive in this sector. The clear success of the service sector in attracting FDI should encourage government to improve the environment for manufacturing 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 the quality and ensure that a more skilled cadre of managers are provided with an appropriate slice of the economic cake (Adalet, McGowan and Andrews, 2015; p.32).

Notwithstanding its contributions, 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 as a result of the cross-sectional nature of the data. Secondly, as a result of the limited number of countries studied, the paucity of observations for service sector capital and skilled workers means that the influence of capital on the service sector has been immeasurable. The influence of the control variables across the productivity distribution curve merit further investigation. Further research, utilising the BEEPS data over a longer period with the

inclusion of 27 Eastern European transitional economies, may allow these research gaps to be addressed. It would also allow the creation of longitudinal data to track progress from accession to 2013 and allow a contribution to the question “are the Balkans different?” (Estrin and Uvalic, 2016, p.1).

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Table A1. Variable Description.

Variable name	Variable description
<i>Treatment variables in the QTE model</i>	
EU member	DV=1 if a firm operates in an EU member state; zero otherwise.
Loan receipt	DV=1 if a firm received a loan; zero otherwise.
<i>Outcome variable</i>	
Output per worker	Log of output per worker derived by dividing total sales by total full time equivalent employees
<i>Independent variables</i>	
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.
Export	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				
Export	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 workers	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

Appendix A

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

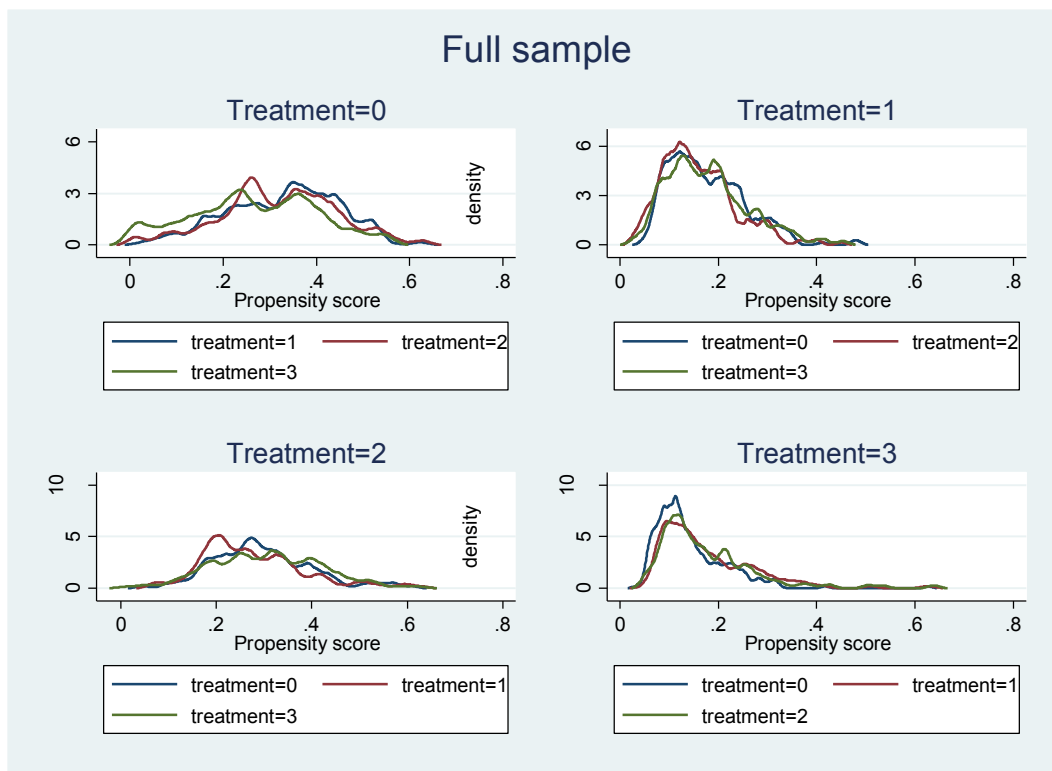


Figure A2. Checking the overlap assumption (common region) for the subsample of firms in the service sector.

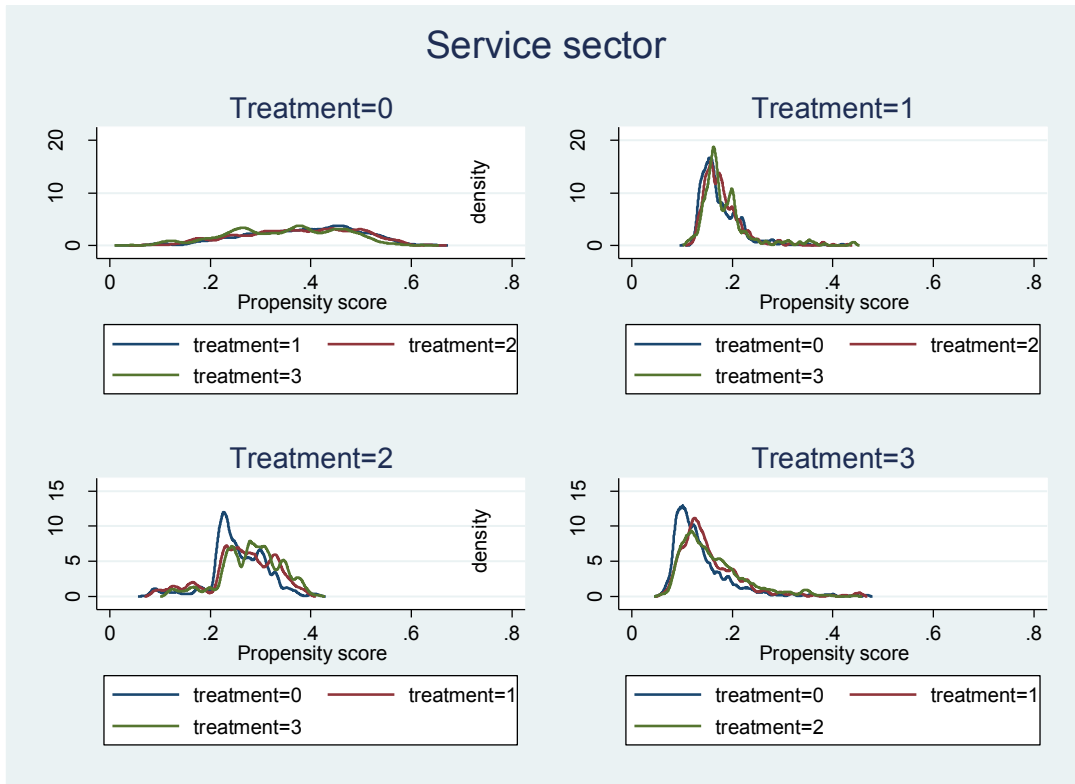


Figure A3. Checking the overlap assumption (common region) in the subsample of firms from the manufacturing sector.

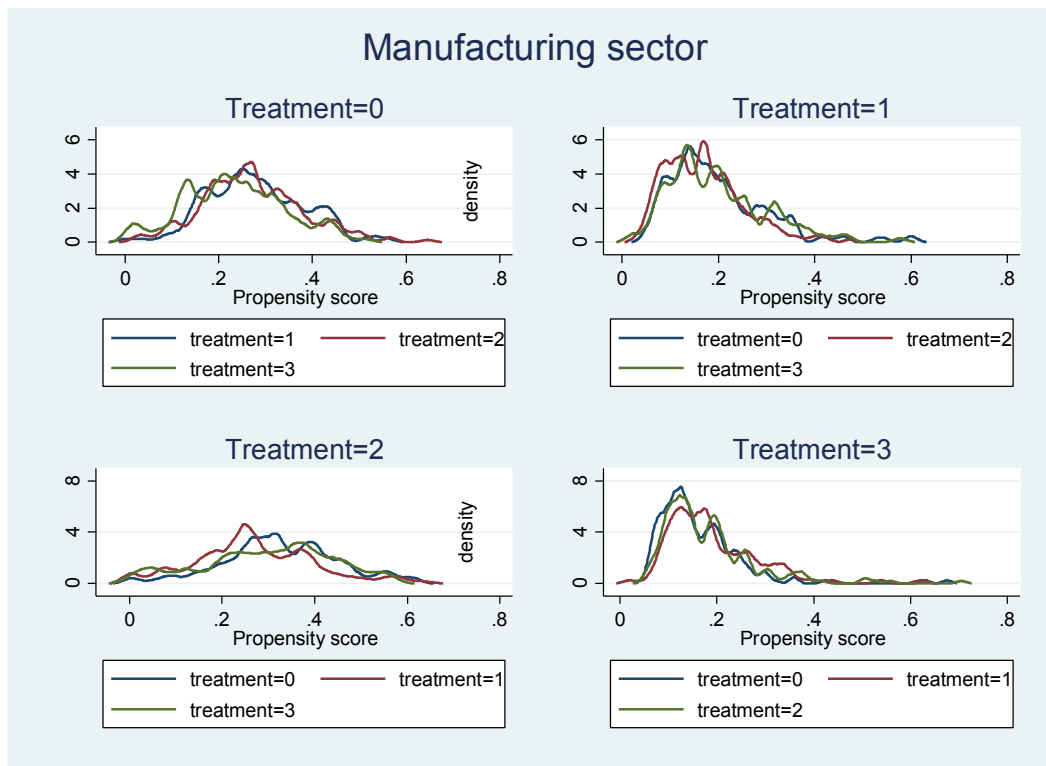
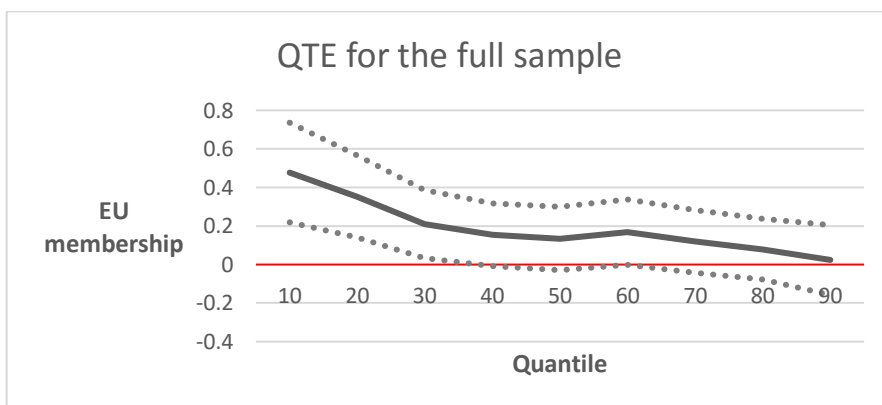
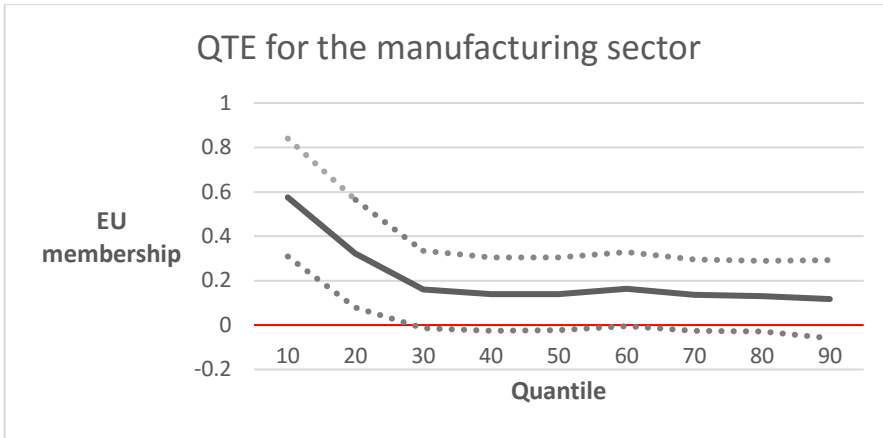


Figure A4. Results from the QTE model for the full sample with EU membership as a treatment variable.



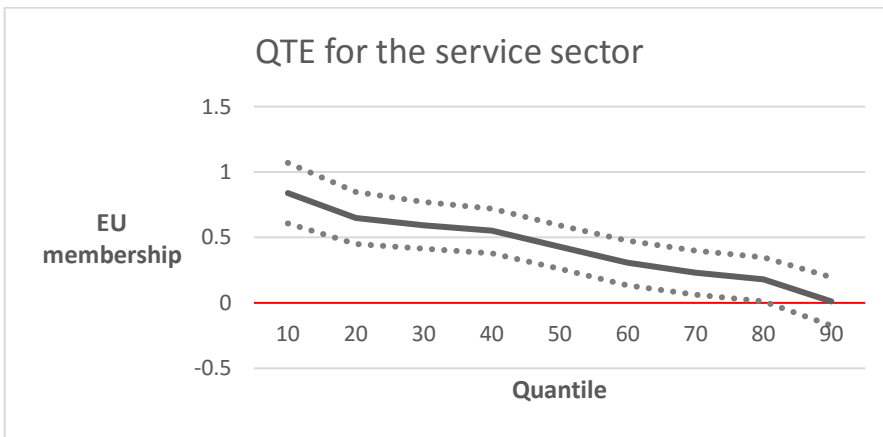
Note: Dotted lines show upper and lower limits of the 95% confidence interval.

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



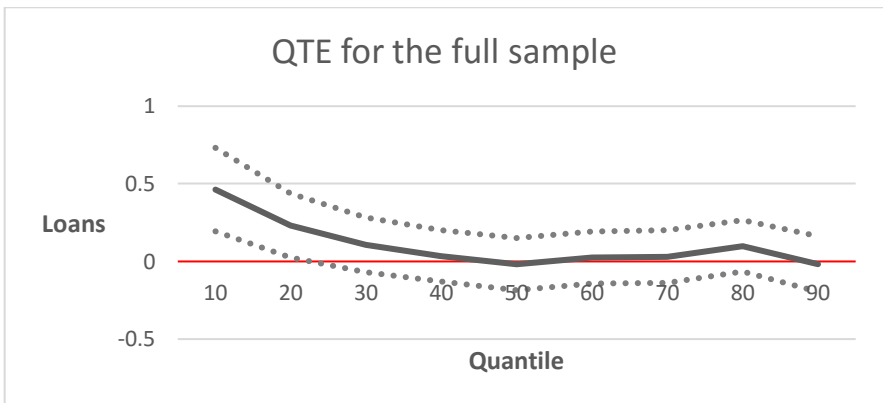
Note: Dotted lines show upper and lower limits of the 95% confidence interval.

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



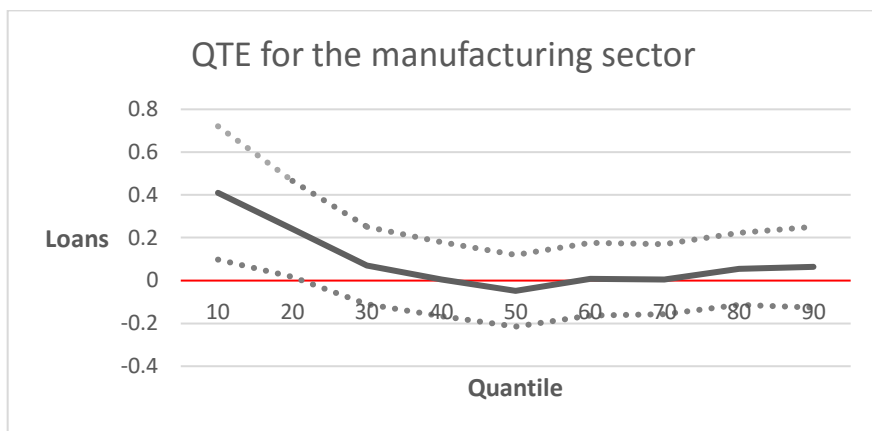
Note: Dotted lines show upper and lower limits of the 95% confidence interval.

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



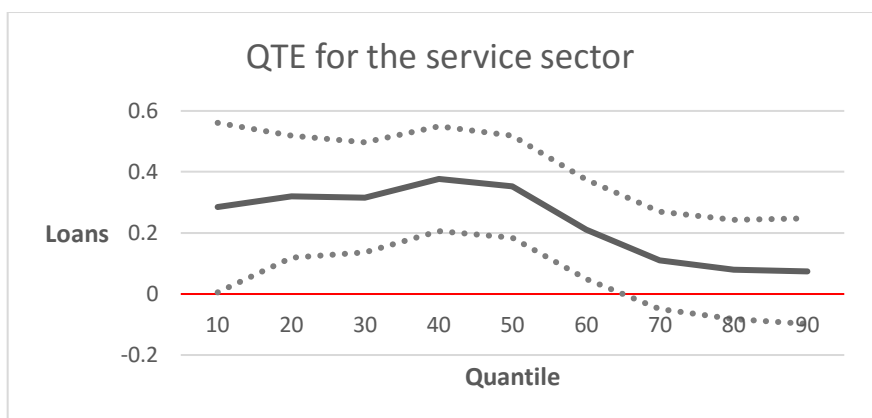
Note: Dotted lines show upper and lower limits of the 95% confidence interval.

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.