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Drivers of Integration into a Regional Trade Bloc and their Impact on Productivity

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Abstract

This paper studies how the integration into a deep Regional Trade Agreement affects sector level productivity. Using the EU as an example, we construct an integration indicator that measures integration into the Single Market relative to global value chains. The results of a simultaneous equation model show an overall positive effect of integration on labour productivity, which is driven by upstream integration. Market distortions in regional value chains accumulate downstream and negatively affect productivity. Better domestic institutions facilitate the integration process at the industry level for both Member States and Non-Member States. Then again, better institutions seem to be more favourable to the integration of industries with less complex product portfolios and lower levels of knowledge cumulativeness.

Keywords: Regional trade agreements, EU integration; productivity; institutions

JEL: F13, F14, O25, O43, O52

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1. Introduction

The integration of into global value chains is generally associated with a productivity enhancing effect at the firm and industry level. Yet, the views on how the integration in a regional trade bloc may affect economic performance are discussed more controversially. Some authors argue that regionalism, as the establishment of Regional Trade Agreements (RTAs) is often referred to, undermines the trade liberalisation pursued by multilateral trade liberalization (MTL). RTAs would reduce the welfare effects of trade since they imply higher trade costs, limit competition and negatively affect the economic performance of exporters. This perspective emphasises the divergence of economic cost of trading within an RTA and trading in an MTL setting. This view is incomplete, however.

RTAs often take the form of "deep" agreements, i.e., they go beyond tariff-based agreements for market access and cover a large set of policy areas both at and behind the border with the aim to harmonise regulations affecting the mobility of commodities and factors of production across its member states. If the harmonisation of these common rules is incomplete, hard to monitor or enforce, then inefficiencies may arise. In other words, if a deep RTA has the characteristics of an incomplete contract, inefficiencies also affect companies and industries trading inside the RTA. Another aspect worth considering is the quality of domestic institutions. Due to their wide regulatory reach, the implementation and subsequently the impact of deep RTAs rely on well-functioning regulations. These institutions concern both countries that are already part of the trade bloc and countries aspiring to join a particular RTA. If they are complementary to the provisions of the RTA, they may facilitate integration, but could also hold up integration if they are diverging.

In this paper we examine the interplay of these arguments focusing on the European Union and its enlargement to Central and Eastern European Countries (CEEC) in the 2000s. The EU's differences in economic performance, quality of domestic institutions and degrees of integration across its Member States provide us with a viable setting to paint a differentiated picture of integration. The debate about integration and economic performance is particularly relevant from a policy perspective in the European Union (EU). The vastly asymmetric economic performance has put strain on the European project as a whole. What used to be labelled a convergence engine (Gill and Raiser 2011) seems to have stalled. Regulatory harmonisation facilitating deeper economic integration has been proposed as a potential remedy (Wolfmayr et al. 2019).

Against this backdrop, we pose three research questions. Firstly, we study how the integration into the EU in contrast with global value chains has affected sector level productivity. We distinguish between forward and backward integration to obtain a differentiated picture. Secondly, we examine the role of the RTA membership status and domestic institutions on both forward and backward integration. Finally, given the simultaneous nature of value chain integration and productivity development, our approach provides insights on how industry-level productivity affects regional and global value chain integration.

The results indicate that the upstream integration into a deep RTA such as the EU has a positive impact on the labour productivity of industries. However, forward integration into the regional trade

bloc has a negative impact on productivity. This suggests that market distortions accumulate in downstream regional value chains. The propensity to integrate into the regional trade bloc increases with industry level productivity, but not linearly. The most productive industries increasingly move out of the regional trade bloc and integrate into global value chains. Hence, the regional trade bloc is not necessarily the environment where the most productive industries thrive. Finally, domestic institutions have an important impact on the integration process at the industry level for both member states and non-member states. Domestic institutions seem to be more favourable to the integration of industries with less complex product portfolios and lower levels of knowledge cumulativeness. While this may be driven by the specific characteristics of the EU and the architecture of the Single Market, it indicates that the provisions of the RTA and their interplay with domestic institutions may induce selection effects that favour some industries over others which may lead to unwanted specialisation outcomes.

2. Economic performance and the participation in regional value chains

Global value chain participation and economic performance

Over the past thirty years global supply chains have become globally dispersed (Timmer et al. 2014). The international fragmentation of value chains measured in terms of the foreign value-added content of domestic production has steadily increased. This process was accompanied by a shift towards value being increasingly created by capital and high-skilled labour, where developed countries have specialised more in activities carried out by highly-skilled workers, whereas emerging economies have specialised in capital-intense activities. The fragmentation is driven by several factors such as offshoring or the intensification of trade relationships over longer distances. This is supported by both research at the industry and the firm level.

A central aspect of the increase in the international division of labour is offshoring, i.e. the relocation of business activities to other countries. At the sector level, Amiti and Wei (2009) show that both service offshoring and the offshoring of material inputs have a positive effect on productivity. Winkler (2010)) reports similar findings for Germany using input-output data for 1995-2006. Egger and Egger (2006) instead analyse the impact of offshoring on the productivity of low-skilled workers in the EU manufacturing sector and find a negative impact on productivity in the short run and a positive impact in the long run. Combining industry-level data on offshoring from the WIOD with firm-level data for nine European countries between 1995 and 2008, Schwörer (2013) finds that offshoring of services and of non-core manufacturing activities contributed to an increase in productivity, whereas no significant effect is found for offshoring of core manufacturing activities.

More recent work finds that offshoring significantly increases labour productivity and total factor productivity at the sector level in countries that rely on global sourcing. The effect on total factor productivity depends on the structure of global value chain from which intermediates are sourced. Sourcing in long chains drives technology improvement whereas sourcing in wide chains leads to a reallocation of resources to more productive firms (Formai and Vergara Caffarelli 2016). Finally, a paper by Constantinescu, Mattoo, and Ruta (2019) that is closely related to the present work and uses similar data shows that participation in GVCs is a significant driver of labour productivity. The

authors distinguish between the effects of forward and backward integration into global value chains and find that backward linkages, i.e. the reliance on imported inputs to produce for exports, is relatively more important for economic performance at the sector level than forward linkages. Both linkages are associated with higher levels of labour productivity.

Firm level studies largely confirm these results and shed light on the potential channels through which the participation in global value chains translates into higher labour productivity. Using plant-level data for Irish manufacturing, Görg, Hanley, and Strobl (2008) find, for instance, that productivity gains from outsourcing are larger for firms that are more heavily embedded in international markets. Similarly, McCann (2011), also using Irish data, finds that increases in the outsourcing intensity are associated to productivity gains of foreign affiliates and indigenous exporters. The literature identifies multiple transmission channels through which trade affects productivity. The integration in global markets provides firms with greater access to better-quality or more diversified imported inputs, fosters competition at each stage of global value chains (Amiti and Konings 2007; Goldberg et al. 2010), and drives productivity through learning by exporting (Loecker 2013).

Firm level studies have also shed light on the relationship between value chain integration and productivity. Increased participation in global value chains does not always lead to higher productivity. Given that value generation through capital and skill intensive activities has markedly increased, one should expect that more productive firms and industries self-select into GVC participation. This is in line with the theory of trade by heterogenous firms under market imperfection (Melitz 2003) and with the “pecking order” hypothesis advanced by Helpman, Melitz, and Yeaple (2004) that establishes that only the most productive firms engage in horizontal foreign direct investment (FDI). There is increasing evidence for a co-evolving relationship between higher productivity leading to self-selection into trade and value chain integration through investment on the one hand, and a positive impact of trade and value chain integration on productivity (Farinas and Martín-Marcos 2010). It has not only been shown that the most productive companies select themselves into international markets and supply chains, but also that geographical distance has almost no effect on their export activities. The export portfolio of these companies shows greater geographical diversification, and they are more able to benefit from opportunities in remote destinations (Martin and Mayneris 2015).

There is strong evidence of a positive association between value chain integration on the economic performance of firms and industries, albeit issues about the identification of the directionality persist. However, the question whether this relationship is equally strong for value chain integration into regional trade clubs driven by RTAs and integration into global value chains favoured by MTL remains unanswered.

There is a broad body of research about a potentially conflicting relationship between RTAs and MTLs. Starting with an early contribution by Krugman (1991) theoretical exercises have raised concerns that the discriminatory character of RTAs would curtail the gains from trade. Especially if RTAs are often designed as customs unions which control a large share of global trade. Special interest groups could induce governments to engage into distortionary agreements with third parties. Such development could cause trade diversion, limit competition and induce inefficiencies, which ultimately results in lower productivity and welfare of firms and industries integrating into the

regional trade bloc. RTAs would then act rather as a stumbling block than as a building block of global trade.

Evidence about the impact of integration into global or regional value chains driven by trade agreements on trade and value creation remains mixed, however. There is also little evidence on how this affects productivity. While there is some empirical evidence for a stumbling block effect - also for the European Union (Limão 2006; Dai, Yotov, and Zylkin 2014; Bureau, Guimbard, and Jean 2019), a recent theoretical contribution by Jorzik and Mueller-Langer (2020) argues that there is a complementary relationship between RTAs and MTL. This is supported by work focusing on the impact of deep trade agreements on value creation which shows that regional trade agreements such as NAFTA or the EU complement multilateral integration. Albeit they promote trade and value chain integration mostly within the bloc, they also exert a trade enhancing effect with partners outside the regional blocs covered by the respective RTA (Mattoo, Mulabdic, and Ruta 2017; Laget et al. 2018).) (Mulabdic, Osnago, and Ruta (2017) find that the depth of the EU and its trade agreements greatly supported trade with third countries. Thanks to EU membership, the UK's services trade more than doubled and the country could increase its domestic value added in gross exports by 31% and the foreign value added in its exports by 37%.

Integration into regional value chains through deep regional trade agreements and the role of domestic institutions

Global value chains operate at different geographical scales. Value chain integration is driven by international comparative advantages in production and unbundling costs. These are driven by technological and institutional factors which also shape the ways the different stages of production are linked. Following the long-standing research on centripetal and centrifugal forces (Venables 1996, 199), (R. E. Baldwin 2012) distinguishes between forces driving dispersion and agglomeration.

Among the factors driving dispersion, technological progress and initial productivity levels are predominant. The marked reduction of transport and communication costs in the past decades, and trade liberalisation have been main accelerators of global trade integration (cf. Amador and Cabral (2016) for an overview). The WTO (2018) estimates that these factors have contributed to a reduction of overall trade costs by fifteen percentage points between 1996 and 2014. An equally important and related factor is productivity. As highlighted in the previous discussion, high productivity contributes to self-selection of firms into international markets and into long-distance trading and investment relationships.

Other factors limit economic dispersion through agglomeration advantages. These are related to industry characteristics and specific institutional framework conditions that favour specific trading relationships, such as RTAs. Baldwin and Venables (2013)) argue that high-value added tasks are likely to cluster in space under the presence of strong local complementarities which may lead to discontinuities in the global fragmentation of value chains. The institutional factors contributing to a more regionalised supply chain trade are related to deep RTAs, bilateral investment treaties or unilateral reforms leading to regional production networks (R. E. Baldwin 2011; R. Baldwin and Lopez-Gonzalez 2015).

Deep RTAs typically go beyond tariff-based agreements for market access and cover a large set of policy areas both at and behind the border. Baldwin (2011) summarises the basic bargain typically

comprised by RTAs as "foreign factories for domestic reforms". On the one hand, this highlights the character of global value chain integration in the 21st century as a process driven not only by traditional trade of goods and services, but also by a continuous flow of people, intellectual property rights and investments. On the other hand, it underscores the importance of specific institutional and legal arrangements to assure property rights, rights of establishment and prevent anticompetitive practices. Given the pervasive nature of deep RTAs with their impact on many policy areas, specific national regulations and institutions translating these international agreements into domestic legal norms are therefore a substantial, even though not a formal part of deep RTAs (Ruta 2017; Laget et al. 2018).

Domestic institutions are thus likely to play an important role in the process of value chain integration in two different ways. Firstly, institutions affect value chain integration through their impact on the implementation of an RTA at the national level. The transposition of RTAs into domestic law requires the adoption of new or the adjustment of existing regulations. Depending on the specific institutional set up and the quality of given domestic institutions, they will either tame or enhance their impact on value chain integration. For instance, if the judicial system of a country comes with considerable red tape, a country may well implement all measures to protect the intellectual property of foreign investors, but their enforcement may be complicated and time consuming, which reduces the effectiveness of these measures.

Secondly, institutions affect value chain integration through the specialisation channel. There is a broad body of literature showing that institutional quality of contracting and property rights, labour market regulations and the development of and access to financial markets have industry-specific effects on comparative advantages (see Nunn and Trefler (2014) for an overview). The effect of institutions depends on industry characteristics, such as the technological or factor intensity of an industry specific national institutional (Rajan and Zingales 1998). The local settings favour the development and maintenance of comparative advantages in some industries while having little, no effect even adverse effects on others.

Research questions and key findings

Cognisant of these different strands of literature, the paper will address three research questions focusing on the European Union and enlargement to Central and Eastern European Countries (CEEC) in the 2000s.

First, the present paper examines how the integration into a regional trade bloc driven by a deep RTA affects sectoral labour productivity. The analysis focuses on the developments in the European Union over the period 2000-2014 covering also the accession of several new member states. We find that the total effect of integration into the regional trade bloc on labour productivity is positive. However, we uncover asymmetric effects with respect to value chain integration. The impact of backward integration is larger than for forward integration and the effect is positive. The impact of forward integration is smaller and negative. This would indicate that some inefficiencies accumulate as an increasing share of sectoral value added is induced by final demand from other EU countries.

Second, we examine the role of RTA membership and domestic institutions on both forward and backward integration. The results suggest that the process of accession to the EU was more important in promoting both forward and backward integration into the RTA rather than actual

membership. As deep RTAs require comprehensive legal adjustments in member countries many legal adjustments take place or are anticipated already in earlier stages. This promotes regional integration already before an RTA or accession to an RTA becomes legally effective. Such lead structures in the regulatory reform process (Sedelmeier 2008).

Finally, the paper examines the role of productivity and sectoral product complexity as a driver of regional and global value chain integration. The results provide evidence on the self-selection of the most productive industries into global value chains. Our analysis suggests that – at least in the European context -- there is a non-linear relationship: while less productive industries tend to integrate into the EU and therefore try to reap the benefits of this deep RTA, the most productive industries integrate in global value chains outside this RTA. The results for sector-level complexity are limited to the manufacturing sector due to the data availability. The results show that product complexity is inversely related to RTA integration. This indicates that, over the observed period, manufacturing industries with complex product portfolios have integrated in global value chains rather than the regional trade bloc. This development was facilitated by market-based labour market institutions.

3. Data and indicators

Industry level indicators on performance, industry characteristics, and European market integration are required to address the research questions. In addition, we draw on indicators capturing the institutional characteristics of countries in which these industries operate. Table 1 presents descriptive statistics of the dependent variables as well as of all explanatory variables included in the subsequent regressions. The relationship between value chain integration into the EU and productivity will be estimated using a system of equations accounting for the endogeneity of these parameters. The econometric approach will be described in the next section.

Table 1: Descriptive statistics

	Mean	Standard Dev.	Min.	Max.	Obs.
Endogenous Variables					
Labour productivity	74959.34	171051.50	-61337.74	6609037.00	21238
Forward integration	0.05	0.28	-0.97	0.95	22581
Backward integration	0.11	0.22	-0.90	0.74	22607
Exogenous Variables					
Non-EU member	0.16	0.37	0.00	1.00	22680
Rule of Law (ROL)	1.36	0.63	0.00	2.39	22680
Labour market restrictions	6.14	1.16	2.87	8.48	22680
Domestic credit to private sector	87.93	45.35	0.19	255.19	22680
Technology shock	0.00	1.00	-3.35	3.32	13168
Demand shock	0.00	1.00	-3.31	3.14	13168
Investment per employee (in k EUR)	17.37	48.88	0.00	3823.50	22680
Share of tertiary educated employed	0.27	0.09	0.08	0.49	22680
BERD in % of GDP	0.03	0.10	0.00	7.39	22680

Labour productivity

The performance variable with which we explore the impact of forward and backward integration into the EU rather than global value chain integration is labour productivity. We compute the variable at the industry level using data on deflated value added per person employed provided by the World Input-Output Database (WIOD). Value added was deflated using the industry-level deflator with the base year 2010 provided by WIOD. The sample covers 54 sectors of all 27 current EU member countries and the United Kingdom between year 2000 and 2014. The main reason for using labour productivity is that the indicator can be calculated in a straightforward fashion for a larger number of countries.[1] This is a single-factor productivity measure. To account for the sensitivity of to changes in the use of other inputs and relative factor prices, we control for technology and demand shocks at the sector level.

Composition of value chain integration into the Single Market

The measures of the forward and backward value chain integration into the EU as a regional trade bloc have been computed at the industry level using the WIOD data. The indicators of trade-related market integration reflect the effective economic interrelations within the EU. These indicators have been proposed by Friesenbichler et al. (2020) to study the impact of European integration on producer prices. They have been constructed as follows: First, the difference between the value-added share of imported intermediate goods along the value chain from EU member countries and from non-EU countries is calculated representing an industry's backward integration into the Single Market. The larger this difference, i.e. the higher the backward integration indicator, the greater the value-added content of foreign intermediates from the EU used in domestic production becomes. The benchmark is the value-added content of non-EU countries. Second, relying on a sector's value added that is consumed abroad, a measure of forward integration is constructed. It is defined as the differences between the value-added share whose final use is in another EU Member State and whose final use is in an extra-EU country. If an industry's final demand is in an EU Member States rather than in non-EU countries, the indicator is positive. A detailed description is provided in the appendix.

EU Membership Status

The analysis uses information about the national EU membership status that captures legal and institutional aspects that pave the way for economic integration. Following Böheim and Friesenbichler (2016), the indicator (Non-EU Member) is constructed as a binary variable and captures the year in which the final step of accession takes place, i.e. after accession countries have implemented the Community Acquis and join the Single Market. In using the information about the official full membership status, the legal and institutional aspects of the single Market that directly influence transaction costs and, thus, economic integration can be considered in the analysis.

[1] The literature critical of the use of total factor productivity derived using aggregate production functions should not go unmentioned (Felipe and Fisher 2003).

Institutional quality

We have argued that there is a two-pronged nexus between domestic institutions and integration in a regional trade bloc. Firstly, through their impact in the transposition of RTA related provisions into domestic regulations. Secondly, through their impact on comparative advantages. The literature typically identifies three dimensions of institutions that potentially exert such an influence: (1) contracting and property rights, (2) labour market regulations and (3) development of and access to financial markets. We follow the established literature (Nunn and Trefler 2014) and use different measures for the quality of national institutions in these fields.

The first country-level indicator measures both de jure and de facto aspects of the rule of law and is obtained from the World Bank's Governance Indicators. Using an unobserved components model, it captures perceptions of the extent to which agents have confidence in and abide by society's rules (Kaufmann, Kraay, and Mastruzzi 2010). It reflects the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Higher values indicate better institutions.

Second, the measure for labour market regulations provided by the Fraser Institute account for the presence of minimum wage setting, hiring and firing regulations, centralised collective bargaining, mandated cost of hiring, mandated cost of worker dismissal, working hours' regulations and mandatory conscription (Gwartney et al. 2019). The components are weighted equally for transparency and simplicity. High values of this indicator designate labour markets determined by market forces rather than national regulations.

Last, to account for the functionality of financial markets we include information on financial resources provided to the private sector by banks.[2] The channels comprise for instance loans, purchases of nonequity securities, and trade credits and other accounts receivable that establish a claim for repayment (Rajan and Zingales 1998; Beck 2003; Levine 2005). Domestic credits to the private sector by banks as a proportion of GDP is obtained from the World Development Indicators (WDI) database.

Complexity of exported products

We separately estimate the model for the manufacturing sector. In these regressions we use an indicator capturing the average complexity of the exported products of a sector to analyse the relationship between the technological intensity of a sector's output and its forward and backward integration into the EU as opposed to global value chains. We use the complexity measure advanced by (Hidalgo and Hausmann 2009), which has been shown to capture the technological and human capital intensity of the exporting sectors. Due to the problematic convergence properties of the original algorithm, we rely on the alternative approach proposed by Klimek, Hausmann and Thurner (2012). The complexity scores have been calculated at the level of HS-6-digit product lines and were aggregated at the sector level using the export share of the product line in each sector as weight.

[2] i.e. deposit taking corporations except central banks

Other factors influencing labour productivity

Labour productivity can be criticised as a measure of economic performance on the grounds that a single-factor productivity measure is sensitive to changes in the excluded inputs and relative factor prices, and that it confounds changes in technology and the degree of capacity utilisation as well as factor accumulation (Bernard and Jones 1996; Syverson 2011). To account for the potential impact of these factors on labour productivity and to provide an accurate a picture about the impact of value chain integration into the EU, several control variables are included in the productivity equation.

First, we calculate sectoral technology and demand shocks following the approach proposed by Hölzl and Reinstaller (2007). We use sectoral time series on hourly productivity and hours worked in a structural vector autoregressive model (SVAR) with long-run restrictions to identify productivity and demand shocks. The identifying restriction is that demand shocks have only a transitory effect on hourly productivity. This technique was originally developed in the realm of business cycle research by Gali (1999). Several studies have provided robust evidence that these productivity shocks are genuine autonomous technology-driven productivity advances (Francis and Ramey 2005; Alexius and Carlsson 2005). Similarly, the identified demand shocks reflect output changes induced by (cyclical) fluctuations in demand for the domestic production of a sector, and therefore allow controlling for variations in labour productivity induced by changes in capacity utilisation.

Second, we use Eurostat data sector level business expenditures on research and development (BERD) as a percentage of GDP to control for a sector's knowledge intensity. In addition to monetary expenditure on research, the percentage of highly educated employees serves as a measure of a sector's knowledge intensity. Drawing on sectoral Eurostat data, we use the share of employees with tertiary education in the total number of persons employed.

Eventually, to complete the picture, a complementary measure of sectoral capital intensity was used. Based on data provided in the structural business statistics database by Eurostat the amount of investments per person employed is included in the productivity equation.

4. Empirical strategy

Given the simultaneous nature of productivity being both a potential driver of value chain integration and an outcome of the integration processes, we use a simultaneous system of equations to answer the research questions. We estimate (i) the relationship between labour productivity and economic integration along the (regional) value chain, as well as (ii) the role of national institutions on the integration process. Using the forward and backward integration indicators described above allows us to (iii) differentiate between the effects of upstream and downstream integration in regional value chains compared to global ones. Thus, the following three equations are estimated simultaneously using a three-stage least square estimator accounting for endogenous variables and allowing for correlation of disturbance terms from different equations.

$$LP_{ijt} = \beta_0 + \beta_1 FI_{ijt} + \beta_2 BI_{ijt} + + \nu_1' X_{ijt} + \lambda_{j1} + \tau_{j1} + \varepsilon_{ijt1}, \quad (I)$$

$$FI_{ijt} = \beta_4 + \beta_5 LP_{ijt} + \beta_6 LP_{ijt}^2 + \beta_7 ROL_{it} + \beta_8 LMR_{it} + \beta_9 Credit_{it} + \beta_{10} nonEU_{it} + \lambda_{j2} + \tau_{j2} \varepsilon_{ijt2} \quad \textit{(IIa)}$$

,

$$BI_{ijt} = \beta_{11} + \beta_{12} LP_{ijt} + \beta_{13} LP_{ijt}^2 + \beta_{14} ROL_{it} + \beta_{15} LMR_{it} + \beta_{16} Credit_{it} + \beta_{17} nonEU_{it} + \lambda_{j3} \tau_{j3} + \varepsilon_{ijt3} \quad \textit{(IIIa)}$$

,

with ε_{ijtk} being a random error term such that $E[\varepsilon_{ijtk}\varepsilon_{ijto}] = \sigma_{ko}$ where k and o indicate the equation number. While equation (I) focuses on comparative advantages and competitiveness measured by labour productivity, LP_{ijt}, that varies over countries *i* and industries *j* and year *t*, equations (II) and (III) describe the level forward and backward integration into the Single Market, FI_{ijt} and BI_{ijt} respectively. LP_{ijt}, FI_{ijt} and BI_{ijt} are endogenous to the system.

Equation (I) allows us to test the first research question how value chain integration into a regional trade bloc affects sector level labour productivity. According to the literature, the effects of forward and backward integration into the Single Market on productivity are mixed. A positive sign of β_1 and β_2 would point at a significant reduction in transaction costs due to the Common Market, while negative signs would indicate that technology, quality and efficiency improvements from global sourcing outweigh the positive effects of the regional trade agreement. X_{ijt} is a vector of exogeneous control variables: we expect a positive impact of business expenditure on R&D, investment and the share of tertiary educated on industry-level productivity. Similarly, technology and demand shocks should positively affect productivity. All three equations include industry and time fixed effects, λ_j and τ_t, controlling for unobserved variation at the sector level and over time.

Equation (IIa) and (IIIa) consider integration as the outcome of both the comparative advantages and competitiveness measured by labour productivity as well as the regulatory environment. In this model, the trade-related integration indicators FI_{ijt} and BI_{ijt} are affected by labour productivity and legal or institutional aspects. However, the level of competitiveness could affect integration into the Single market in a non-linear manner: for instance, more productive firms might source internationally while less productive firms, which do not have the possibilities and might not be large enough to be globally active, source regionally (Altomonte and Ottaviano 2011).[3]

To account for the process of integration at different levels of competitiveness, we include both the sector level-productivity, LP_{ijt} , as well as its square, LP_{ijt}^2, in the equations (IIa) to (IIIa). Thus, the regression model allows for non-linear effects of labour productivity on integration into the Single market. We expect positive coefficients β_3 and β_{12}, since integration in the regional value chain should be boosted by an increasing competitiveness at the sector level. However, as competitiveness is growing, global markets might become more attractive leading to an inverse u-shaped relationship between productivity and integration in regional value chains. This self-selection of more productive firms being active in the global value chain (in contrast to regional sourcing) should be reflected on the aggregate industry level. Hence, we expect β_6 and β_{13} to be negative.

[3] While this explanation of the potential endogeneity between market integration and productivity refers to micro-economic processes, one should think, given that sector data are weighted averages of company level data that such an explanation can carry over also to the industry level.

National institutions are denoted by the quality of contract enforcement and property rights, i.e. the rule of law (ROL_{jt}), labour market regulations (LMR_{jt}) and a measure of financial intermediaries' development, such as the amount of credits given by banks to the private sector ($Credit_{it}$). Of course, the measures for the institutional framework only vary between countries and over time. Domestic institutions (β_7-β_9 and β_{14}-β_{16}) will either tame or strengthen their influence on value chain integration, depending on the specific institutional structure and the quality of the respective national institutions. To account for the role of the supranational legal framework driving the economic integration into the Single market, the binary variable $nonEU_{it}$ is included. It takes on the value of one in the years in which a country was not an official EU Member State, and zero otherwise. Not being an official EU Member State implies that a country is not (yet) required to implement the Acquis Communautaire to full extent. We expect β_{10} and β_{17} to be negative.

In a second step, interaction terms between the EU membership dummy and the measures for domestic institutional quality are included in equations (IIb) and (IIIb) in order to capture the role of EU membership on national institutions, which again affect the economic integration into the Single market. We expect the effects of domestic institutions on economic integration into the Single Market to become more pronounced after full accession to the EU.

$$FI_{ijt} = \beta_4 + \beta_5 LP_{jit} + \beta_6 LP_{jit}^2 + \beta_7 ROL_{it} + \beta_8 LMR_{jt} + \beta_9 Credit_{it} + \beta_{10} nonEU_{jt} + \beta_{19} ROL_{it} nonEU_{it} + \beta_{19} LMR_{it} * nonEU_{jt} + \beta_{20} Credit_{it} * nonEU_{it} + \lambda_{j2} + \tau_{j2} + \varepsilon_{ijt2} \quad \text{(IIb)}$$

,

$$BI_{ijt} = \beta_{11} + \beta_{12} LP_{ijt} + \beta_{13} LP_{jit}^2 + \beta_{14} ROL_{it} + \beta_{15} LMR_{it} + \beta_{16} Credit_{jt} + \beta_{17} nonEU_{it} + \beta_{21} ROL_{it} * nonEU_{it} + \beta_{22} LMR_{jt} * nonEU_{it} + \beta_{23} Credit_{it} * nonEU_{it} + \lambda_{j3} + \tau_{j3} + \varepsilon_{ijt3} \quad \text{(IIIb)}$$

,

Finally, we control for different moderating effects of national intuitions on integration into the Single Market depending on the complexity of a sector's product portfolio.[4] The forward and backward integration equations are therefore extended by (1) the product complexity indicator (IIc and IIIc) and by (2) its interaction terms with our main institutional variables indicating a country's quality of contract enforcement and property rights, labour market flexibility and credit constraints (IId and IIId). We expect the coefficients of the complexity of an industry's product portfolio (β_{24} and β_{25}) to be negative, because low-tech and less sophisticated production is more prone to occur within RTAs like the EU. However, these effects might be shaped by national institutions, particularly labour market regulations, which is identified by coefficients β_{26}-β_{31}.

$$FI_{ijt} = \beta_4 + \beta_5 LP_{ijt} + \beta_6 LP_{ijt}^2 + \beta_7 ROL_{it} + \beta_8 LMR_{it} + \beta_9 Credit_{jt} + \beta_{10} nonEU_{it} + \beta_{24} Complexity_{jj} \lambda_{j2} + \tau_{j2} + \varepsilon_{ijt2} \quad \text{(IIc)}$$

,

$$BI_{ijt} = \beta_{11} + \beta_{12} LP_{ijt} + \beta_{13} LP_{jit}^2 + \beta_{14} ROL_{it} + \beta_{15} LMR_{it} + \beta_{16} Credit_{jt} + \beta_{17} nonEU_{it} + \beta_{25} Complexity_{jjt} + \lambda_{j3} + \tau_{j3} + \varepsilon_{ijt3} \quad \text{(IIIc)}$$

,

[4] Thereby, we restrict the sample to the manufacturing sector.

$$FI_{ijt} = \beta_1 + \beta_5 LP_{ijt} + \beta_6 LP_{ijt}^2 + \beta_7 ROL_{it} + \beta_8 LMR_{it} + \beta_9 Credit_{it} + \beta_{10} nonEU_{it} + \beta_{24} Complexity_{ij} \beta_{26} ROL_{it} * Complexity_{ijt} + \beta_{27} LMR_{it} * Complexity_{ijt} + \beta_{28} Credit_{it} * Complexity_{ijt} + \lambda_{jt} + \varepsilon_{ijt} \quad \text{(IIId)}$$

,

$$BI_{ijt} = \beta_{11} + \beta_{12} LP_{ijt} + \beta_{13} LP_{ijt}^2 + \beta_{14} ROL_{it} + \beta_{15} LMR_{it} + \beta_{16} Credit_{it} + \beta_{17} nonEU_{it} + \beta_{25} Complexity_{ijt} + \beta_{29} ROL_{it} * Complexity_{ijt} + \beta_{30} LMR_{it} * Complexity_{ijt} + \beta_{31} Credit_{it} * Complexity_{ijt} + \lambda_{jt} + \tau_{jt} + \varepsilon_{ijt} \quad \text{(IIId)}$$

,

5. Results

We present the regression results of the system of equations (I)-(IIIa) to (I)-(IIId) in Table 2.[5] Starting with the regression results of equation (I) we find that forward integration into the Single Market negatively affects industry-level labour productivity, while backward integration is positively related to productivity. Both coefficients are significant in all specifications. All other control variables' coefficients show the expected signs. The higher the share of employees with tertiary education, investments per person employed, and business expenditures in R&D the higher is industry-level productivity. Technology and demand shocks also have a positive impact on labour productivity, however, the coefficients of demand shocks are not significant. The regression results of equation (I) is robust to the various SEM specifications.

Next, the regression results of equation (IIa) in column SEM 1 reveal that an industry's level of productivity has a positive and significant impact on forward integration into the Single Market. However, indicated by the negative and significant coefficient of LP_{ijt}^2 the effect decreases with increasing productivity. The results on the effects of domestic institutions on integrations are mixed. While the coefficient of Rule of Law is not statistically significant, the coefficients of labour market restrictions are positive and significant in all specifications. The more market forces determine the labour market instead of regulations the higher the level of forward integration. In contrast, the higher the share of domestic credits to the private sector by banks in GDP the lower is the forward integration into the Single Market. Finally, the coefficient of non-EU membership (i.e. countries that hold accession candidate status prior to full EU membership) is positive and significant. The regression results of equation (IIIa) reflect the results from equation (IIa) in SEM1, however, the only measure for institutional quality with significant effect on backward integration is the degree of labour market regulations (LMR_{it}). Also, EU membership shows no significant impact.

The regression results of equations (IIb) and (IIIb) in column SEM 2 provide a differentiated picture of the impact of national institutions and EU membership on economic integration into the Single market. The negative coefficient of the interaction term 'LMR*Non-EU member' indicates that the positive effect of a deregulated labour market on forward and backward integration is dampened in case of non-EU countries. In contrast, the effects of credit market constraints on forward integration into the Single market are even stronger for non-EU members. Moreover, the results reveal that a

[5] The first-stages pass the Kleibergen-Paap rank LM statistic (for underidentification), the Kleibergen-Paap rank and the Cragg-Donald Wald F statistic (for weak identification).

negative effect of domestic credits to the private sector by banks on backward integration only holds for non-EU members, while no effect can be observed for EU member countries.

Finally, the regression results of equation (IIc) to (IIId) are presented in columns SEM 3 and SEM 4 in Table 2. As expected, the overall effect of 'complexity' on forward and backward integration in (IIc) and (IIIc) is significantly different from zero and negative, indicating that industries characterized by more sophisticated and high-tech product portfolios are less integrated in the Single Market, but rather source and sell globally. However, column SEM 4 provides a deeper insight in the interaction of the degree of complexity of industries and prevailing national institutions and their impact on integration processes. It shows that complexity has a positive impact on forward as well as on backward integration, but this effect is dampened and even superposed by national institutions, particularly labour market flexibility. The more complex the industry's product portfolio and the more flexible the domestic labour market the less integrated is the industry in the Single Market. In terms of all other control variables the regression results are robust.

Robustness Check

The three-stage least squares (3SLS) approach used to estimate the system of equations has one caveat. All estimated parameters depend on the consistency of the covariance matrix estimates. If one of the three equations was misspecified and the estimated error covariance was therefore inconsistent, the coefficients of the 3SLS approach would be biased and inconsistent. Hence, in Table 3 we use a two-stage least squares (2SLS) estimation approach and estimate each equation separately as a robustness check. Without the covariance matrix estimation, the 2SLS estimates are still consistent, but less efficient than their 3SLS counterparts. The results are largely robust in terms of the signs of the coefficients and their significance. Only the coefficient of the share of domestic credits to the private sector by banks in GDP turns insignificant in the estimations of equations (IIa) and (IIIa). However, in the case of non-EU members, the share of credits still shows a significant and negative impact on forward and backward integration into the Single Market.

Table 2: Three-stage least squares regression results

	SEM 1			SEM 2			SEM 3			SEM 4		
Explanatory Variables	**(I)**	**(IIa)**	**(IIIa)**	**(I)**	**(IIb)**	**(IIIb)**	**(I)**	**(IIc)**	**(IIIc)**	**(I)**	**(IId)**	**(IIId)**
ln(FI)	-1.206***			-1.737***			-1.395***			-1.381***		
	(-5.17)			(-6.26)			(-4.32)			(-3.89)		
ln(BI)	4.004***			5.527***			3.879***			3.893***		
	(12.89)			(19.31)			(9.76)			(9.15)		
Technology shock	0.0431***			0.0540***			0.0375*			0.0368*		
	(4.26)			(4.49)			(2.28)			(2.23)		
Demand shock	0.0103			0.0173			0.0141			0.0139		
	(1.15)			(1.64)			(0.82)			(0.81)		
ln(Investment per person employed)	0.0251***			0.0242***			0.0251***			0.0253***		
	(5.55)			(4.13)			(4.18)			(4.17)		
ln(Share of teriary educated employed)	1.114***			1.158***			1.263***			1.268***		
	(16.86)			(15.54)			(16.77)			(15.63)		
ln(BERD in % of GDP)	0.0298***			0.0213***			0.0411***			0.0411***		
	(8.81)			(4.67)			(8.15)			(8.11)		
ln(LP)		7.190***	8.730***		8.994***	10.19***		7.137***	12.68***		7.437***	12.98***
		(9.14)	(9.64)		(11.42)	(12.02)		(6.47)	(7.50)		(6.33)	(7.37)
ln(LP)^2		-0.345***	-0.415***		-0.431***	-0.486***		-0.337***	-0.593***		-0.351***	-0.607***
		(-9.38)	(-9.91)		(-11.55)	(-12.24)		(-6.60)	(-7.57)		(-6.46)	(-7.43)
ln(ROL)		0.0136	0.0127		0.0512	0.101*		0.0141	0.00377		0.0611	0.0429
		(1.37)	(1.04)		(1.20)	(2.18)		(1.02)	(0.18)		(1.58)	(0.80)
ln(LMR)		0.443***	0.296***		0.504***	0.361***		0.674***	0.828***		1.439***	1.877***
		(9.88)	(6.58)		(10.47)	(7.29)		(9.69)	(8.98)		(6.43)	(5.47)
ln(Credit)		-0.0839***	0.00749		-0.0631***	0.0209		-0.0710***	-0.0331		0.0125	0.159
		(-5.39)	(0.62)		(-4.49)	(1.62)		(-4.71)	(-1.63)		(0.26)	(1.77)
Non-EU member		0.0973**	0.0345		1.037*	1.525***		0.248***	0.334***		0.261***	0.349***
		(2.70)	(0.86)		(2.42)	(3.42)		(4.44)	(3.75)		(4.71)	(3.98)
ln(ROL)*Non-EU member					-0.0294	-0.0932*						
					(-0.67)	(-1.98)						
ln(LMR)*Non-EU member					-0.321*	-0.415*						
					(-2.05)	(-2.51)						
ln(Credit)*Non-EU member					-0.107*	-0.210***						
					(-2.13)	(-4.12)						
ln(Complexity)								-0.485***	-0.978***		1.441***	2.064**
								(-4.07)	(-4.38)		(3.74)	(3.16)
ln(Complexity)*ln(ROL)											-0.0593	-0.0522
											(-1.46)	(-0.93)
ln(Complexity)*ln(LMR)											-0.855***	-1.180***
											(-4.48)	(-3.97)
ln(Complexity)*ln(Credit)											-0.0898	-0.205*
											(-1.93)	(-2.35)
Constant	11.49***	-37.17***	-45.74***	11.63***	-46.64***	-53.40***	11.78***	-37.51***	-67.32***	11.78***	-40.80***	-71.60***
	(132.84)	(-8.88)	(-9.44)	(119.07)	(-11.26)	(-11.88)	(93.04)	(-6.35)	(-7.50)	(91.65)	(-6.29)	(-7.34)
Observations	13151			13151			6658			6658		

Time and industry fixed effects; Bootstrapped standard errors; t statistics in parentheses; * p<0.05, ** p<0.01, *** p<0.001

Table 3: Two-stage least squares regression results

	2SLS 1			2SLS 2			2SLS 3			2SLS 4		
Explanatory Variables	**(I)**	**(IIa)**	**(IIIa)**	**(I)**	**(IIb)**	**(IIIb)**	**(I)**	**(IIc)**	**(IIIc)**	**(I)**	**(IId)**	**(IIId)**
ln(FI)	-1.206***			-1.730***			-1.386***			-1.375***		
	(-5.25)			(-6.44)			(-4.27)			(-3.87)		
ln(BI)	4.017***			5.500***			3.935***			3.948***		
	(12.86)			(18.88)			(9.75)			(9.15)		
Technology shock	0.0398***			0.0367**			0.0462**			0.0462**		
	(4.07)			(3.02)			(3.27)			(3.27)		
Demand shock	0.00985			0.0108			0.00963			0.00964		
	(1.10)			(1.00)			(0.61)			(0.61)		
ln(Investment per person employed)	0.0289***			0.0301***			0.0368***			0.0368***		
	(6.14)			(5.09)			(5.96)			(5.95)		
ln(Share of teriary educated employed)	1.111***			1.157***			1.256***			1.260***		
	(17.11)			(16.26)			(16.54)			(15.54)		
ln(BERD in % of GDP)	0.0285***			0.0229***			0.0352***			0.0350***		
	(8.83)			(5.96)			(7.02)			(6.90)		
ln(LP)		10.81***	8.134***		12.51***	9.344***		9.790***	10.95***		10.18***	11.31***
		(9.35)	(8.89)		(10.34)	(10.25)		(5.97)	(6.38)		(5.86)	(6.29)
ln(LP)^2		-0.520***	-0.387***		-0.601***	-0.445***		-0.462***	-0.511***		-0.480***	-0.528***
		(-9.58)	(-9.05)		(-10.30)	(-10.21)		(-6.06)	(-6.39)		(-5.94)	(-6.30)
ln(ROL)		0.00890	0.0135		0.103	0.0881*		0.00648	0.00874		0.0516	0.0487
		(0.66)	(1.21)		(1.82)	(1.99)		(0.40)	(0.50)		(1.07)	(1.07)
ln(LMR)		0.666***	0.259***		0.730***	0.307***		0.902***	0.680***		1.884***	1.605***
		(11.68)	(6.47)		(11.88)	(6.97)		(8.24)	(6.31)		(5.36)	(4.58)
ln(Credit)		0.0253	-0.0105		0.0337	-0.00230		-0.0227	-0.0645**		0.133	0.0851
		(1.41)	(-0.75)		(1.56)	(-0.14)		(-1.27)	(-3.15)		(1.84)	(0.95)
Non-EU member		0.0411	0.0438		1.752***	1.353***		0.280***	0.313***		0.296***	0.328***
		(0.83)	(1.16)		(3.58)	(3.31)		(3.88)	(3.99)		(4.11)	(4.23)
ln(ROL)*Non-EU member					-0.0992	-0.0764						
					(-1.70)	(-1.64)						
ln(LMR)*Non-EU member					-0.474*	-0.379*						
					(-2.57)	(-2.40)						
ln(Credit)*Non-EU member					-0.240***	-0.178***						
					(-4.18)	(-4.01)						
ln(Complexity)								-0.740***	-0.813***		1.963***	1.746**
								(-3.69)	(-3.71)		(3.29)	(2.81)
ln(Complexity)*ln(ROL)											-0.0590	-0.0524
											(-1.15)	(-1.06)
ln(Complexity)*ln(LMR)											-1.096***	-1.033***
											(-3.82)	(-3.64)
ln(Complexity)*ln(Credit)											-0.166*	-0.159
											(-2.39)	(-1.90)
Constant	11.47***	-56.52***	-42.56***	11.62***	-65.47***	-48.89***	11.71***	-51.78***	-58.04***	11.71***	-56.23***	-62.18***
	(139.60)	(-9.22)	(-8.76)	(124.59)	(-10.40)	(-10.26)	(92.02)	(-5.92)	(-6.36)	(90.53)	(-5.81)	(-6.19)
Observations	13151			13151			6658			6658		

Time and industry fixed effects; Bootstrapped standard errors; t statistics in parentheses; * p<0.05, ** p<0.01, *** p<0.001

6. Discussion

The results on the forward and backward integration into the European Union show an interesting pattern. Forward integration has a negative and significant impact on labour productivity at the sector level, while backward integration shows a positive and significant impact. The latter effect is considerably larger than the former. Given the value-chain trade structures in which downstream integration plays a bigger role than forward linkages (see descriptive statistics), this implies that integration into the EU as a regional trade bloc has an overall positive effect on productivity.

Looking at the backward linkages first, prior research shows that trade in imported inputs has a positive impact on firm level performance and that trade liberalisation has a particularly positive impact on the performance of firms importing inputs (Amiti and Konings 2007; Kasahara and Rodrigue 2008; Ramanarayanan 2020). This implies that industries integrating into a regional trade bloc through a deep RTA should reap the benefits of integration mostly through backward integration into that region. Our results are in line with these findings.

Forward linkages in turn have the opposite effect on industry level productivity, even though they are considerably smaller. The factors that could negatively influence industry level productivity through the forward integration into value chains could be related to the cumulation and propagation of inefficiencies in input-output economies, which has been highlighted in recent contributions by Liu (2019) or Baqaee and Farhi (2020). These authors focus on how the topology of production networks affects market distortions and inefficiencies accumulate along supply chains. The costs of market distortions accumulate through downstream linkages implying that costs propagate to and accumulate in upstream sectors. Hence, integrating forward into a value chain may have a negative impact on the performance of a sector or, more specifically, its labour productivity. This is in line with recent findings by (Friesenbichler, Kügler, and Reinstaller 2020) who find, using identical indicators for forward and backward integration as the ones used in this paper, that forward integration into the EU increases producer prices whereas backward integration decreases them.

This perspective differs from the prevalent approach in prior literature on the impact of deep RTAs on global trade. The stumbling block hypothesis for global trade in deep RTAs is controversial, but it builds on the idea that the coordination of the RTA member states will essentially lead to the creation of trade barriers and trade diversion between the trade bloc and the rest of the world trading adhering to the rules set out in MLTs. This literature fails to stress that inside deep RTAs coordination problems abound, and that these are likely to lead to a loss of efficiency inside the common market. While RTA members are likely to have aligned interests concerning the provisions regarding the relationship of the trading block to the outside world, interests may not be so well aligned when it comes to the provisions concerning the internal market.

To protect domestic industries, RTA members have an incentive to deviate from the treaty, especially in domains where direct enforcement of the treaty is difficult. This may result in weaknesses in the legal and practical implementation of the RTA, including the monitoring and enforcement of the rules. Indeed, a recent study finds that the elimination of the lacking harmonisation of rules and regulations in the EU Single Market could result in intra-EU trade effects of up to +7.6 percent (Wolfmayr et al. 2019).

Deviations from RTA rules are reflected, for instance, in specific national product norms, safety regulations, phytosanitary standards and so forth. Access to different markets inside the trade bloc therefore comes with compliance costs that may act as barriers to entry, and they are effective for goods consumed inside these markets. Hence, the inefficiencies arising from market distortions caused by national deviations from the rules of the RTA propagate downstream through the forward integration of industries into the RTA. Despite the negative effect forward integration into the RTA may have, industries still have an incentive to do so, as the benefits of integration are largely reaped through backward integration, and the access to the larger market allows to seize business opportunities.

The results of the factors driving integration into the RTA point toward a positive, but concave relationship with the productivity of an industry. The level of forward and backward integration of industries increases with its productivity. The most productive companies and industries select into export markets, but this drive to internationalisation is constrained by "gravity". For the most productive industries, trade distance and the market size of nearby trading partner are of lesser importance both as a constraint and a criterium for market selection, and they increasingly sourcing inputs and seeking business opportunities globally. This is in line with the literature reviewed in Section 2 of this paper.

For the manufacturing industries, a higher product complexity and thus a higher technological intensity is negatively related to both forward and backward integration. In other words, producers of complex products tend to integrate into global value chains rather than regional ones. This indicates that the regional market is either not as attractive for both sourcing input and selling final products, or that the institutional set up of the RTA does not favour these sectors.

Regarding RTA membership, the results show that not being an EU member has a weak and positive effect on forward integration. At first this result seems puzzling - the opposite sign for the coefficient might be expected. However, the result is plausible if one considers that accession to the EU, like most deep RTAs, is a long and gradual process in which lead structures in reforms have been documented. After accession the incentive structure changes insofar that, ceteris paribus, post-accession compliance with EU law is likely to deteriorate (Sedelmeier 2008) which hampers deeper integration. Once countries have joined, reform efforts may slow down (Berglof 2013) leading to a partial reversal of value chain integration. Countries are required to implement the Acquis Communautaire, which implies domestic reforms and legal provisions required to become part of the trade bloc before becoming an actual member. The accession process may also comprise preceding treaties which affect the legacy of value chain structures. For instance, agreements like the Pan-European Cumulation System (PECS) have also favoured integration into the Common Market through the adoption of common rules of origin allowing regional cumulation as early as 1997. After this, EU producers have increasingly sourced inputs from industries in CEEC countries therefore promoting their forward integration into the European market (Kaminski and Ng 2005; Behar and Freund 2011; Marin 2006).

The relationship between the EU membership indicator and backward integration is statistically not significant.

The role of domestic institutions in the process of EU integration is mixed. First, the estimated elasticities of the domestic labour market institutions have by far the largest impact on forward and

backward integration outcomes. The rule of law should play a potentially important role in the implementation of deep RTA provisions into national regulations, since imperfectly enforced contracting and property rights entail higher costs and uncertainty (Anderson and Marcouiller 2002; Anderson and Young 1999). This is particularly important for industries which rely on relationship-specific investments or which are characterised by a complex product portfolio and high job task complexity (cf. Levchenko 2007; Nunn 2007; Chor 2010, Antràs and Chor 2013). In other words, the rule of law and the quality of contract enforcement is particularly important for industries with high levels of intangible investments and high technology intensity.

If industries with lower technological intensity integrate deeply into the RTA, one would expect a relatively weak impact of this indicator on forward or backward integration. The opposite can be expected for the integration of high-tech industries. On the other hand, if a broad spectrum of industries with different technological intensities integrate, one would expect the effects to be likely to be very heterogeneous. We might not observe any significant effect, which is the case if the rule of law indicator is not interacted with the EU membership status. This is in line with recent research showing that the quality of legal institutions bears heterogeneous impacts on the organisation of global supply chains across different industries (Bolatto et al. 2019). Once the two indicators are interacted, we find a statistically weak but positive effect for industries in EU Members States and still a positive, albeit strongly dampened effect of backward integration for industries in countries that were not (yet) Member States. Hence, the process of backward integration into the EU was stronger for industries in countries with a higher quality of contract enforcement and better legal institutions. This suggests that these are particularly important for supplier relationships and the supply chain organisation. They have no bearing on forward integration, however.

Industries located in countries with more flexible, less regulated labour markets integrate more deeply with respect to both backwards and forwards linkages. The literature on the relationship between labour market institutions and trade suggests that employment protection and stable industrial-relation systems support the constitution of industry-specific cumulative knowledge bases. This supports the development of comparative advantages in sectors with complex product portfolios and greater export volatility (Bassanini and Ernst 2002; Costinot 2009; Tang 2012; Cuñat and Melitz 2010). Reversely, our results seem to imply that the integration into the EU rather favours industries with less complex product portfolios and a lower degree of knowledge cumulativeness. However, if this effect is examined separately for member- and non-member countries, one observes a more differentiated outcome. For industries that are part of the club, market-based labour markets are an important driver of both forward and backward integration. However, for industries in non-member countries, market-based labour markets rather act as stumbling-blocs for regional integration.

More market-based domestic labour market institutions have an adverse effect on manufacturing sectors producing more complex products. If one controls for the potential impact of institutions on the impact of product complexity on the integration measures, the results indicate a positive effect on both forward and backward integration into the EU. However, this effect is strongly dampened for industries in countries with more market-based domestic labour market institutions. Hence, while flexible labour markets favour integration into the regional trade bloc, they adversely affect the regional integration of more technology intense manufacturing sectors.

Turning to the financial development indicator, our results indicate that industries located in countries where banks provide a higher share of domestic credit to the private sector tend to be less forward integrated into the Single Market. Controlling for industry characteristics, integration into the EU was therefore less attractive for industries in countries with more developed financial markets. Integration into the regional trade bloc may therefore select against industries and companies that are relatively more dependent on external financing, i.e. with larger capital expenditures relative to cash flow from operations (Manova 2008; Beck 2003; Chor 2010; Svaleryd and Vlachos 2005).As industries with a high cumulative knowledge are typically also capital intense, this result reinforces the evidence gained for labour market institutions. Forward integration into the EU is more favourable for industries with less complex products and a lower degree of knowledge cumulativeness. This outcome is not driven by the level of institutional development of the accession countries, since both interaction terms point into the same direction. This is however the case for backward integration, where the effect is only significant for accession countries.

Conclusions

The results presented in this paper show that the integration into a deep RTA like the EU is likely to have a positive impact on economic performance. Yet, the effects of integration are highly differentiated underneath the surface. The aggregate effects are driven by upstream integration, while the most productive industries have a decreasing propensity to integrate into the regional trade bloc. In addition, national institutions have a significant impact on the integration process. Integration into the EU is particularly facilitated by flexible labour market regimes. The quality of legal institutions and contract enforcement was found to be important for upstream supplier relationships. The institutional set-up of the EU seems to promote the integration of industries with less complex product portfolios and lower levels of knowledge cumulativeness. This may have adverse effects on the overall performance and the competitiveness of the regional trade bloc. While this may be driven by the characteristics of the EU and the architecture of the institutions of the Single Market, it indicates that RTA and their interplay with domestic institutions may give rise to specific, potentially unwanted specialisation outcomes.

From a policy perspective, these mixed findings shed light on the economic performance asymmetries across the EU's industries and Member States. These seem to be – at least partly – the result of national institutions, which also shape the value chain integration into the EU's Single Market. Especially labour market regulations appear as an institutional factor. We uncover weaker effects of other institutions such as the rule of law or access to credit. This may indicate that the achievement of a minimum quality of institutions is part of the accession process.

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