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EXPORTS AND GROWTH IN THE NEW MEMBER STATES THE ROLE OF GLOBAL VALUE CHAINS

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Exports and growth in the New Member States

The role of global value chains

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Abstract

We analyze the determinants of value added and productivity growth of New Member States in the period between 1995 and 2009. We show that in the analyzed countries exports contributed to between 30 to over 40% of the overall growth of GDP while the contribution of the domestic component varied from negative to over 60%. We show that in the most important export manufacturing industries of the NMS, the growth in exported value added was substantial, while the growth of the domestic component of GDP was mostly due to the growth in services. We associate growth of sectoral productivity with the foreign direct investment and exporting but, more importantly, with the position of a sector/country in the global value chains. We show that sectors that have imported intermediate goods have experienced higher productivity growth. Moreover, productivity growth was found in sectors further away from the final demand and in sectors exporting intermediate goods.

Keywords:

global value chains, productivity, economic growth, openness

JEL:

C23, F21, O33

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1 Introduction

The New EU Member States have experienced a great deal of economic liberalization since the beginning of transition in 1989. Taking political reforms aside, during the last 20+ years, this economic liberalization involved opening up: to trade, to foreign capital but also to the global production networks. First in the late 1990s but even more after the EU accession in 2004 and 2007, the economies of the New Member States have been greatly involved in the creation of the global value chains (GVC). The shares of natural resources in exports fell but the overall exports of intermediate goods remained high (in all countries between 50 and 60%) but the production sectors have placed in various position along the production chains. While exports are believed to be one of the important growth drivers, those exports have become increasingly import intensive and their contribution to GDP growth became more and more unclear. Increased openness has led to a great deal of technology adoption and productivity improvements. Some have happened within firms due to spillovers from foreign direct investments and some across firms due to resource reallocation and self-selection of firms. Some of those technology improvements could have been associated with the involvement in the global production networks, both due to imports of foreign technology but also through adoption of best practices in management, supply chain management etc.

We aim to provide some evidence on the direct and indirect determinants of economic growth that are related to country openness. In order to do that, we use the modern measures of value added in trade and trade in value added to find the overall direct contribution of exports to economic growth in the period between 1995 and 2009, covering most of the period of transition and EU integration. We identify sectors where exports have contributed the most to the overall economic growth. Moreover, we decompose both exports and GDP growth into parts attributable to exports of final and intermediate goods. In the second part of the text, we look at the growth of productivity and we attempt to associate it with both the foreign direct investment and exporting but, more importantly, with the position of a sector/country in the global value chains. Besides the link between FDI, exports and higher productivity, we show that sectors that have imported intermediate goods have experienced higher productivity growth. Moreover, we show that higher productivity growth was associated with sectors further away the final demand and in the sectors exporting intermediate goods.

This paper bridges several strands of literature. We contribute to the literature on productivity growth and the role of FDI in shaping economic growth. This strand has been growing with studies performed both at sectoral level and at firm-level. The sector-level studies focusing on Central and Eastern Europe include,

among others, Bijsterbosch and Kolasa (2010) who find strong convergence effect of productivity both at the country and industry levels and attribute a large part of those effects to FDI-induced productivity improvements that are stronger in human capital-intensive sectors. Jimborean and Kelber (2014) find strong association between productivity and FDI while at the same time show larger susceptibility of FDI-intensive sectors to the global financial crisis. Bitzer et al. (2008) show for 17 OECD countries that there are productivity benefits of inward FDI at the sector-level. While those benefits are not visible for all countries, they are sizable in the two included NMS economies, ie. Czech Republic and Poland. Firm-level studies include, among others, works by Djankov and Hoekman (2000), Holland and Pain (1998) for the early transition period. More current studies focus on productivity spillovers from FDI, either horizontal (ie. own sector) or through backward and forward linkages within the host country economies centered around the methodology by Smarzynska-Javorcik (2004). Notable works in this strand include Damijan et al. (2013) or Konings (2001). Heterogeneity of the results of this extensive literature, both with respect to the evidence of the existence of spillovers, the type of spillovers and the size of spillovers is summed up and underlined in a meta-analysis by Iršová and Havránek (2013). In our work, we look for evidence on the possible shifts in the FDI-productivity nexus depending on the position of a FDI recipient sector in the global value chain.

We also contribute to the literature on the relationship between participation in the GVC, outsourcing, offshoring, and productivity. Offshoring and outsourcing can be either captured at the sectoral level by the increase in the foreign value added content of output or exports or by the increased intensity of production in the intermediate inputs. The gains from GVC participation and fragmentation of production can be due to the fact that firms/sectors specialize in their core activities and their less productive activities are performed somewhere else. Moreover, those processes are often associated with restructuring. Increased international cooperation within GVCs can also lead to knowledge spillovers. Works by eg. Winkler (2010) for Germany or Crino (2008) for selected European countries show a positive effect of offshoring on productivity, mostly due to offshoring of the supporting services with a smaller contribution of offshoring manufacturing. Schwoerer (2013) uses firm-level data for 9 countries of the EU-15 to show that offshoring of non-core activities brings large productivity gains as compared to no gains of outsourcing in the domestic market. Along similar lines, Hagemeyer (2015) shows productivity gains of domestic firms in selected New Member States economies that are associated with high foreign value added content of exports. An exhaustive review of this strand of literature can be found in Amador and Cabral (2014). While our contribution is based on sector-level data, unlike in the case of firm-level data, we can focus on longer

time dimension of analysis and base our regressions on a solid, comparable dataset for the full set of the New Member States economies.

2 Methodology and data

We use the World Input Output database to perform two kinds of decompositions. First, following Johnson and Noguera (2012) we use a forward-type decomposition, i.e. we decompose the value added produced in sector/country according to the final absorption location: home or abroad. This decomposition does not take into account how an actual good or service is exported - whether it is in the gross-exports of that particular sector or embedded (as intermediate product or service) in gross exports of another sector. In the same vein, if value added embedded in an exported intermediate good is subsequently returning home as part of other country's intermediate or final exports and then subsequently absorbed at home, it is accounted as domestically absorbed. Technically the decomposition is performed using a global input output table (such as WIOD), and is easily demonstrated using an example given by Stehrer (2012). The gross output vector x is equal to the intermediate (Ax , A is the matrix of input-output coefficients) and final demand vector f and can be written as a Leontief inverse: Lf :

$$x = Ax + f = (I - A)^{-1}f = Lf$$

For three countries (r , s and t) and an international input-output matrix A it can be written as:

$$\begin{bmatrix} x^r \\ x^s \\ x^t \end{bmatrix} = \begin{bmatrix} A^{rr} & A^{rs} & A^{rt} \\ A^{sr} & A^{ss} & A^{st} \\ A^{tr} & A^{ts} & A^{tt} \end{bmatrix} \begin{bmatrix} x^r \\ x^s \\ x^t \end{bmatrix} + \begin{bmatrix} f^r \\ f^s \\ f^t \end{bmatrix} = \mathbf{L}\mathbf{f},$$

where $\mathbf{L}$ is the inverse of the international input output matrix and $\mathbf{f}$ is the vector of global final demand. To find out the value added that is generated in a country r and exported to remaining countries, one has to multiply a (row) vector of value added generated in country by the $\mathbf{L}$ matrix multiplied by the vector of global final demand minus the vector of final demand in a country r :

$$vaexp^r = \begin{bmatrix} v^r & 0 & 0 \end{bmatrix} \mathbf{L}(\mathbf{f} - f^r)$$

The remaining portion of value added generated in each sector (va^r) that is not exported, is absorbed

at home:

$$v_{dom}^r = va^r - va_{exp}^r.$$

We use the above decomposition to decompose sectoral value added into domestic and exported components. In order to decompose the growth rates of value added, we use the WIOD Socio-Economic Indicators database that includes the value added deflators in all sectors. In order to perform the decomposition, we need to make an assumption on the equality on sectoral domestic and exported value added.

It is important to understand that this decomposition is not well suited for decomposing gross export at sectoral level. Due to the fact that it is based on the ultimate destination of final demand and not on the vehicle that leads to the final absorption (whether it is gross exports of the same sector, gross exports of another sector or re-importation), the value of exported value added may greatly exceed the value of gross exports themselves. In order to decompose gross exports into the domestic value added, the foreign value added (imported in intermediate goods) and various double counting components and to be able to split, to attribute the changes in GDP to the components embedded in gross intermediate or final goods, we use the backward looking decomposition provided by Wang et al. (2013), WWZ thereafter. This decomposition goes much beyond the Leontief inverse¹ and splits the gross exports of the sector into the following terms (grouped from original 16 terms of WWZ).

1. Domestic value added in final exports
2. Domestic value added in intermediate exports:
 - (a) Domestic value added in intermediate goods absorbed by direct importers
 - (b) Domestic value added in intermediate goods re-exported to third countries
3. Domestic value added returning home
 - (a) as final goods directly
 - (b) as final goods through third countries
 - (c) as intermediate goods

¹The original work by WWZ provides a step-by-step derivation of all measures.

4. Foreign value added
5. Pure double counting

We compute the contributions of final and intermediate goods exports to domestic value added by excluding all foreign value added components and pure double counting. We produce two estimates of domestic value added contents: one including and one excluding the domestic value added returning home. It has to be also noted that at the aggregate level, the forward and backward measures of domestic value added exported are equal to each other after correcting for the value added that returns home. For both decompositions, we use the R codes developed by Quast and Kummritz (2015).

We subsequently turn to analyze the indirect growth effects of exporting. We look at factors associated with productivity growth. We use the World Input Output Database Socio-Economic account to compute two measures of productivity. One is total factor productivity that we compute using a standard Solow residual Cobb-Douglas production function approach:

$$tfp_{ijt} = va_{ijt} - \alpha_i k_{ijt} - (1 - \alpha_i) l_{ijt}.$$

where k_{ijt} is the log of real capital stock in sector j in country i , l_{ijt} is the log of labor employment, va_{ijt} is the log of real value added, t stands for time. $(1 - \alpha_i)$ is the labor share of value added. In order to make the sectoral comparisons possible, we keep the production function parameters constant within each country. Due to unavailable deflators for value added or real capital stock, the analysis is constrained to the period of 1995-2009 and for some countries to 1995-2007. In order to compute the TFP changes, we use the above equation in log differences. Moreover, we compute standard labor productivity measures:

$$LP_{ijt} = \frac{VA_{ijt}}{L_{ijt}},$$

where VA_{ijt} is the sectoral real value added and L_{ijt} is the labor employment.

We focus on long run changes while at the same time attempting to keep the number of observation at sufficient levels. Therefore we focus on 5 year changes in TFP and labor productivity.

The literature has identified several modes of internationalization that can affect performance both at firm-level and at sector level. In this paper, we do not aim to show causal relationships. What we intend to do is to find out to what extent various modes of internationalization are associated with faster growth. Our empirical model is focused on long-run changes and on correlation patterns in a *cross-*

section of sectors. We do not explore the panel structure of the dataset, as working with long-run changes greatly reduces the effective length of the sample. At the same time, we are not interested in the short run variations of TFP and their short-run correlation with the explanatory variables as the effects of resource reallocation and technological progress may take years to materialize. Our empirical model has the following form:

$$\Delta tfp_{ijt} = \alpha + \beta tfp_{ij,t-5} + \gamma int_{ij,t-5} + c_i + t_t + \varepsilon_{ijt},$$

where α is a constant, $tfp_{ij,t-5}$ is the lagged log-level of TFP to account for the error-correction processes in TFP growth, $int_{ij,t-5}$ is the vector of lagged controls responsible for measuring the degree of sectoral internationalization and c_i and t_t are the country and time fixed effects (dummies) respectively in order to focus on the *between* sector effects while at the same time controlling for aggregate country differences

The internationalization controls include:

- The ratio of sectoral inward stock foreign direct investment to the gross sectoral output. This data are available in the two-letter NACE categories from the WIIW FDI database. For selected countries the availability of the FDI data at the beginning or at the end of the sample may be slightly lower (similarly as in the case of the data on value added). According to the literature, there may be direct or indirect positive effects of FDI in both the FDI recipient firm and the sector where it is operating through productivity spillovers.
- The ratio of gross exports to output - calculated on the basis of the WIOD database. We expect a positive correlation between output and TFP growth mainly due to selection effects of more effective firms to exports and the growth of exports of the analyze economies.

We also control for the involvement and/or position of a sector in the global value chains. We do that using several variables computed using the WIOD database.

- The upstreamness (U) measure proposed by Antras et. al. (year) in order to capture the distance to global final demand. Upstreamness included in regressions is logged to improve the performance of linear regression model. The original level of upstreamness varies between 1 and roughly 4. An inter-sectoral difference of first stage of production can correspond to a large difference in logs.
- The ratio of gross intermediate exports to output and the ratio of gross final exports to output replacing the overall exports in the regression equation (in percentage points).

- The share of intermediate exports in overall exports as a crude measure of forward participation in the GVC (in percentage points), ie. the larger is the share of intermediates of exports, the further away is the exporter from global final demand.
- The share of intermediate imports in the value of gross output as a crude measure of backward participation in the GVC (in percentage points). We use this variable instead of the value added in exports measures as the latter variable is directly related to exporting which we want to control for separately.

3 GDP and GDP growth decomposition

We begin with the decomposition of the overall value added generated in the analyzed economies into the domestic and foreign component. The foreign component includes all the value added that is absorbed abroad and therefore excludes all the value added embedded in intermediate goods that leave the country in the form of intermediate exports and then make their way back in the form of final goods. The results are shown in the top-left panel of figure 1. One can easily see that by 2009 in all of the New Member States economies, except Poland and Romania, exports were responsible for generating at least 30% of the overall GDP. In Slovakia and Czech Republic contribution of exported value added to overall value added was even closer to 40%. In most countries we observe an increase of the export contribution to overall value added, except Latvia and Estonia. This increase in some cases was substantial, especially in Hungary, Poland and Czech Republic.

To what extent those components of value added have contributed to overall GDP growth? We decompose the GDP growth within the economies of the New Member States into the growth of value added that is absorbed domestically and the growth of value added that is absorbed abroad. Figure 1 (top-right panel) shows the decomposition cumulative growth rates for all the economies in the analyzed group as well as annual decompositions (bottom panel) for selected countries (the graphs for remaining analyzed countries can be found in the Appendix). The results of the decomposition show that while the overall contribution to GDP growth of domestic demand varied substantially across the analyzed economies, in most countries, the contribution of exports to GDP growth was either similar or exceeded the one of domestic demand (except Romania, Latvia and Lithuania). In Hungary exports were responsible for most of the GDP growth, while in Poland, Estonia and Slovenia growth sources were more balanced.

Turning into the annual growth performance, one can see that it was heterogeneous across the analyzed

economies. However, for at least some of the future New Member states, the high GDP growth due to both exports and domestic demand in the late 1990s was ended by the Russian crisis of 1999. In many countries, most of the export-led GDP growth occurred after the EU accession in 2004. Those include Czech Republic, Hungary, Lithuania, Poland, Slovenia. The time distribution of the growth developments in Romania and Bulgaria was much different, in most years it was the domestic demand that drove GDP growth. A large increase in the export component is visible only in Bulgaria starting from 2006, around the time of the second wave of the EU enlargement.

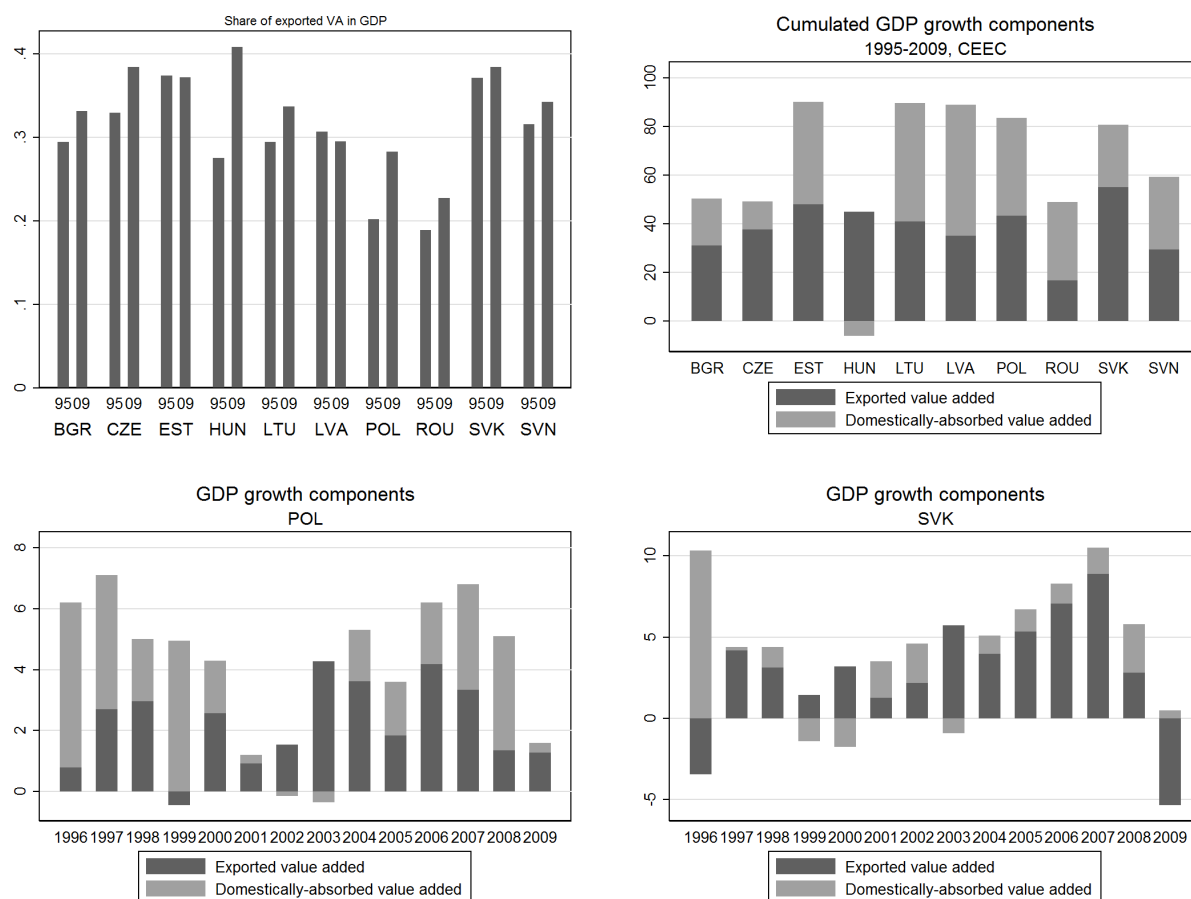
Analysis of the growth component time series allows also to observe the effects of the global economic crisis of 2009 that unequivocally had a detrimental effect on the growth rate of GDP. However, the structure of the response was indeed heterogeneous, including Poland with a positive growth rate in both domestic and export component (partially due to a deep depreciation of currency in 2009). In all other countries, the growth rate was negative, with fall in external demand responsible for most of the fall in the Czech Republic, Hungary, Slovakia and Slovenia. In the remaining countries the domestically produced value added component drove GDP down.

4 Sectoral growth contributions

We go slightly deeper into the analysis of the growth contribution of value added absorbed domestically and abroad by analyzing the sectoral structure cumulated growth performance within those two dimensions. We focus our discussion on manufacturing and also provide some results for services. The decomposition of the overall sectoral value added is based on forward linkages, ie. the export component of sector A includes the value added exported in the form of sector B gross exports if sector B uses sector A inputs in order to produce the exported product. Moreover, the value added generated by sector A that is absorbed abroad excludes the value added embedded in the imports of products of sector C that have used sector's A products as inputs in a foreign production process. All graphs show the contributions to overall sectoral growth of value added in the period of 1995-2009. The size of the circles in the scatter plot is proportional to the value added generated by a given sector in 2009. The abbreviations of all the sector names can be found in the Appendix.

The sectoral analysis shows a great deal of specialization in just some of the export sectors in manufacturing which tend to grow much faster than the rest of the industry. Moreover, in most of the analyzed cases, manufacturing sectors contribute to overall value added mainly through exports. There are some

Figure 1: GDP and GDP growth decomposition into domestic and exported components



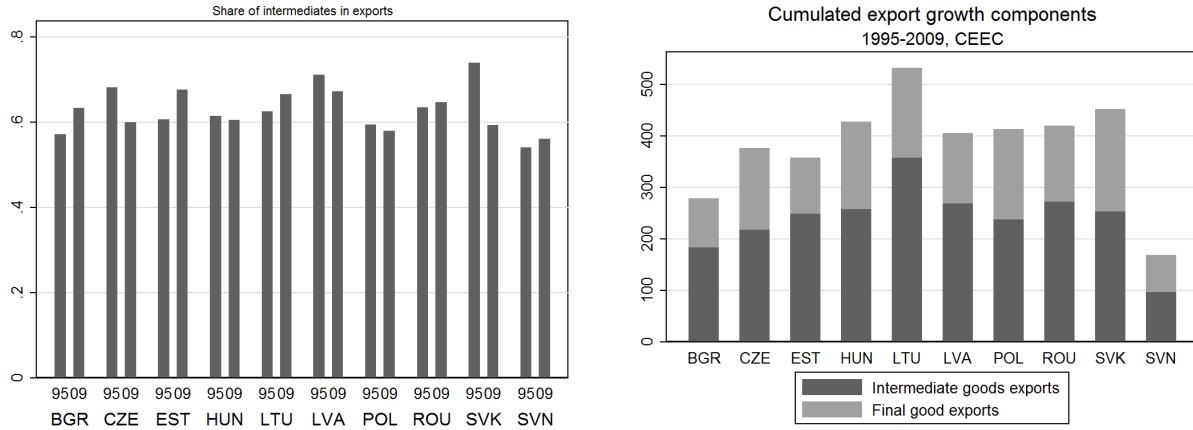
Source: own calculations using WIOD.

sectors that especially stand out and those include first of all the manufacturing of transport equipment (TRA) that includes both motor vehicles and other transport vehicles. This sector is an important driver of exported value added in Czech Republic, Poland, Hungary, Slovakia, Bulgaria, Romania and Slovenia, with very high cumulated growth rates in most countries. Other important export-oriented sectors include electrical equipment (ELE), rubber industry (RUB), machinery and equipment (MCH) and manufacturing nec (MNC). In most NMS economies, the food sector (FOO) plays an important role but mostly in driving the domestic demand.

There are, however, differences in the pattern of growth contributions across countries. Poland stands out with a clearly negative cross-section relationship between the domestic and foreign supply, ie. there are large manufacturing sectors that significantly contribute to both domestic and to a lesser extent foreign demand (such as food or non-metallic minerals - NMM) and highly export-oriented sectors with almost no domestic growth. In many other countries, the highly export-oriented industries also are the largest drivers of growth in the domestically absorbed value added. In some countries, such as Hungary, Latvia and Slovenia manufacturing industries contribute mainly to export growth and very little to domestically absorbed value added.

A similar analysis performed for services (results are shown in the Appendix) shows that in many of the analyzed countries, services are naturally oriented towards domestic market. The large service sectors such as the financial sector (FIN) and the real estate activities (EST) contributed mostly to growth in the domestic value added. The obvious exceptions are the transport industries. Air transport experienced high growth rates in both the domestic and foreign value added components in many of the analyzed countries but has a tiny overall contribution to overall growth. The inland transport sector (ITR, includes road transport), however is much larger in size and was an important growth driver in both components in many Bulgaria, Poland, Czech Republic and Slovenia. The retail and wholesale trade sectors (RSL and WSL) are important growth drivers in services, but for obvious reasons only the wholesale trade contributes to exported value added. Business services and renting of machinery and equipment (RNT) are an important contributor to overall growth both in the domestic value added component and through support to exporting industries in most of the analyzed economies.

Figure 2: Exports and export growth decomposition into intermediate and final goods



Source: own calculations using WIOD.

5 Decompositions of exports and exports growth

Figure 2 shows the decomposition of exports value in 1995 and 2009 into intermediate and final exports and the contributions to overall growth of nominal growth exports within this period. Starting from the levels, one can observe a somewhat homogeneous picture of the share of intermediate exports across the NMS economies. In most countries this share was around 60% in 2009, with exception of the Baltic countries where it was visibly higher and Slovenia where it was closer to 50%. Changes in the shares of intermediate goods over time were, in most cases, not substantial, except for Czech Republic and Slovenia where it visibly fell by at least 10 pp. over the analyzed period and Estonia and Bulgaria where a substantial increase was observed. Turning to the contributions to overall nominal export growth rate, one can see that intermediate goods were responsible for most of the growth in exports and while the component of the final exports to overall growth was similar in size across the analyzed economies (except Bulgaria, Estonia and Slovenia), the intermediate goods component varied substantially.

Since most of the growth in exports was in fact due to exports in intermediate goods, one could think that it were the intermediate goods exports that contributed the most to overall economic growth in the analyzed period. In order to shed lights on that issue, we contrast the sectoral shares of intermediate goods with the share of domestic value added in overall gross exports. We begin with simple country level cross sectional analysis to find out that there is no robust relationship at the country level. Figure 3 shows scatter plots with regression line for Czech Republic and Poland. Charts for the remaining countries are located in the Appendix. It is important to note that even though the sign of the regression relationships seems to vary from positive to negative, it is not significant in any of the analyzed cases.

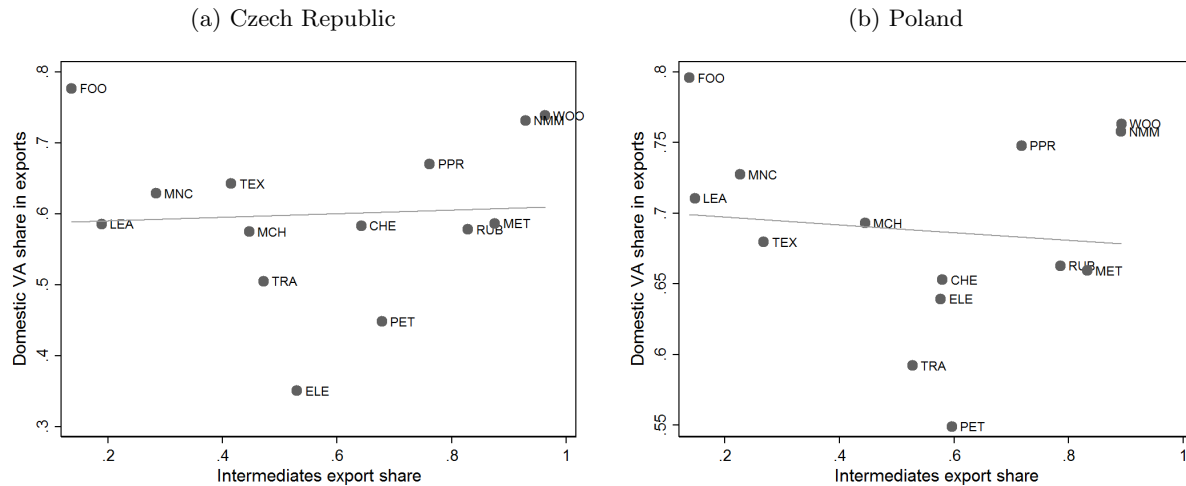
Table 1: Intermediate exports vs. domestic value added content of exports

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	2009	2009	2009	OLS	FE	FE	FE	BE
VARIABLES	OLS	countries	sectors		country	sector	cou. and sec.	
Intermediate	-0.0279	-0.0323	-0.0718	-0.0395***	-0.0385***	-0.120***	-0.0780***	-0.0370
exports share	(0.0334)	(0.0311)	(0.0886)	(0.00826)	(0.00749)	(0.0179)	(0.0165)	(0.0316)
Constant	0.647***	0.611***	0.753***	0.642***	0.601***	0.771***	0.664***	0.640***
	(0.0207)	(0.0306)	(0.0334)	(0.00530)	(0.00781)	(0.00778)	(0.00959)	(0.0202)
Observations	139	139	139	2,377	2,377	2,377	2,377	2,377
R-squared	0.005	0.204	0.400	0.010	0.194	0.419	0.010	0.010

As far as the sectoral characteristics are concerned, there are some regularities that are present in most of the analyzed countries - food, leather and the textile sectors tend to generate high domestic value added in exports while exports are mostly composed of final goods. In the top right quadrant (high value added content and high share of intermediate goods) one can find the wood products, non-metallic minerals and publishing and printing and to some extent metal products. The lower right quadrant includes the rubber products, chemicals and petroleum. Closer to the middle of the scatter plot are the large exporting sectors: transport equipment, electrical equipment and machinery. There are also important differences in the levels of sectoral domestic value added shares: e.g. Poland has overall lower spread of domestic value added exports shares than most other countries.

Using the full sample of countries and sectors we perform several checks on the time, international and inter-sectoral relationship between the intermediate exports share and the domestic value added content of exports. When we consider just the cross-sectional relationship in 2009, the coefficient between the two measures is negative but not significant. This does not change, when we additionally include country dummies or alternatively sector dummies. When we take into account the full panel, the pooled OLS estimate is negative and significant. To understand the relationship a little more, we control for different aspects of unexplained heterogeneity. The relationship remains significant when we consider country, sector and country-sector fixed effects. However, it is not when we look at the between effects model. Therefore, the relationship has a within form, i.e. increasing intermediate share exports WITHIN a given country/sector is associated with a decrease of the domestic value added share but this relationship does not work ACROSS sectors. Moreover, when we only consider sector effects (without country dummies) the relationship strengthens which suggests that in the cross-section dimension it is the “between countries” relationship that counts more than the “between sectors” relationship.

Figure 3: Exports and export growth decomposition into intermediate and final goods 2009

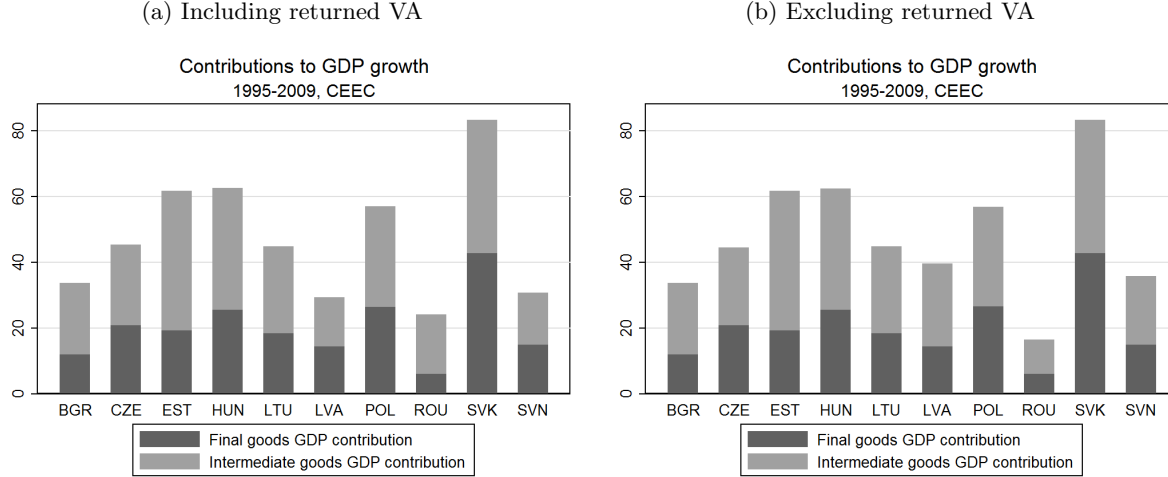


Source: own calculations using WIOD.

How does intermediate and final goods contribute to the growth of domestic value added embedded in exports? We use complete decomposition of gross exports by WWZ to compute the yearly changes in DVA embedded in intermediate and final goods deflated with a common value added deflator excluding the double counted components. We make two different assumptions on the terms included in the intermediate goods value added content in exports. In the first one, we subtract from the total value of intermediate exports the components related to foreign value added and all the double counted components. In the second formulation we also exclude the elements of value added that finally return home. The results are shown in a Figure 4.

One can observe that the two decompositions produce similar results. Only for some countries (Latvia, Romania and Slovenia), the value added that is first exported in the form of intermediate goods and then returned home has a visible contribution in growth. More importantly, both intermediate goods and final goods exports are important GDP growth drivers. In some countries, such as Estonia, Hungary, Lithuania and Romania, the intermediate goods exports contributions to GDP growth are higher than those of final goods. In the remaining cases, the growth structure is much more balanced with similar contributions to overall value added growth. This picture is consistent with the overall share of intermediate goods in the overall exports and their lower average share of domestic value added in exports. All in all, one can conclude that intermediate exports contribute to roughly half of the overall GDP growth attributed to exports in most of the New Member States.

Figure 4: Intermediate and final goods contributions to domestic value added growth



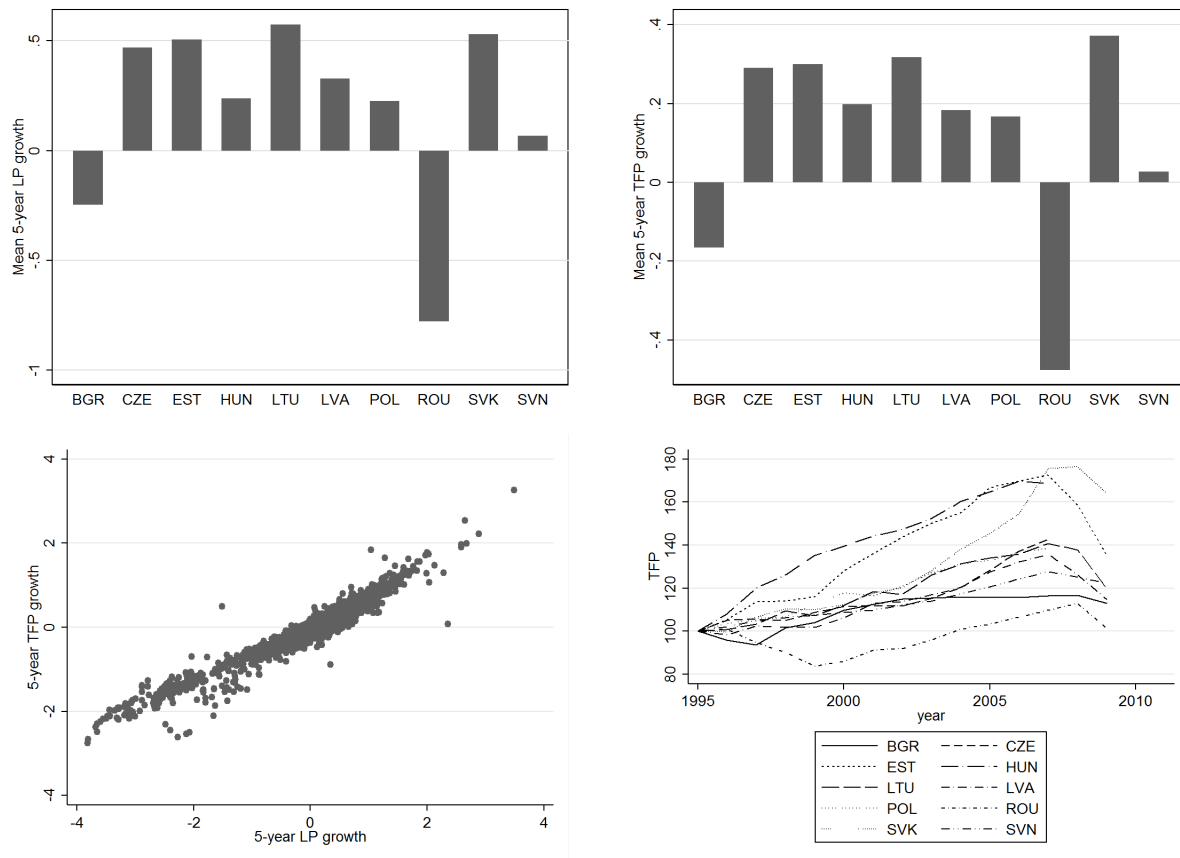
6 Determinants of productivity growth

We begin by taking a look at the estimates of productivity growth. Simple analysis of trends and long run changes in the two productivity statistics are presented in the set of charts in Figure 5. The two measures are highly correlated. The 5-year changes in TFP and LP are computed using averaging the sector level changes in TFP using value added weights and similar calculations are performed for the yearly growth of TFP in the lower right corner. Weighting does change the spread of cumulated gains over the yearly observations as compared to the 5-year averages, but the overall structure of changes is similar.

A glance on the TFP performance of the analyzed economies shows great heterogeneity in productivity growth. It can easily be seen that in the analyzed period Slovakia experienced the fastest TFP growth of over 35% per a 5-year period (mainly due to the surge in TFP that occurred between 2005 and 2008), followed by Czech Republic, Estonia and Lithuania. The growth of labor productivity was higher and the leading four countries were again the same. For Poland, Hungary and Latvia, the TFP growth was slower, slightly below 20%. However, both Romania and to a smaller extent Bulgaria experienced a significantly worse TFP performance, especially in the initial years of the sample. In our baseline analysis we will treat Romania and Bulgaria as outliers.

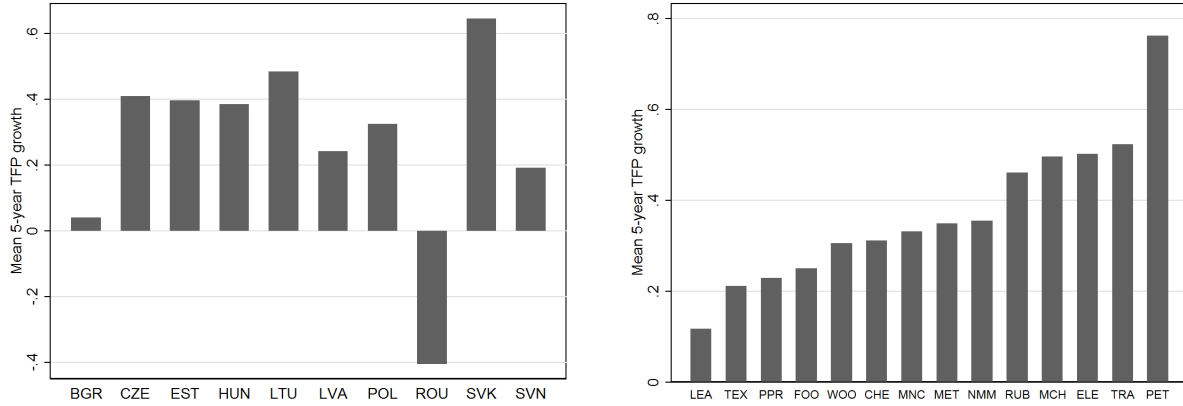
Some of the differences between the countries are due to weighting and because of the size of the manufacturing sector relative to the rest of the economy (e.g. resourced based industries such as mining, and also to some extent agriculture, and more importantly size and structure of the service sector). Figure 6 shows the average 5-year TFP rates in the manufacturing sector (excluding the petroleum sector) and the average across country sectoral TFP 5-year growth rates. In the manufacturing sector differences in

Figure 5: Total factor productivity and labor productivity



Source: own calculations using WIOD SEA.

Figure 6: TFP in the manufacturing sector



Source: own calculations using WIOD SEA.

the 5-year TFP growth rates are even more striking, ie. in Slovakia the average TFP growth rate is over 60% for a 5-year period (roughly 12% per annum). In the case of Czech Republic, Estonia and Hungary it is around 40%, lower than in Lithuania where it approaches 50%.

The average sectoral 5-year TFP growth is clearly the highest in the following sectors (besides the petroleum sectors which is an outlier): production of transport equipment, electrical appliances, machinery and rubber industries. What follows is the heavy industry - non-metallic minerals, metals and chemicals. On the lower side of the spectrum we find e.g. leather, textiles and food sectors. Most of the sectors identified are the ones that have been previously found to have a large contribution to overall growth of value added through exporting.

The baseline regression results are presented in Table 2 and the calculations include all of the countries that have entered the EU in 2004 except Malta and Cyprus. We limit the sample coverage to just manufacturing (WIOD sectors 3 to 16) while excluding the petroleum industry. The simplest specification shown in column (1) features 3 explanatory variables plus the lagged level of TFP. The coefficient on upstreamness is positive and significant, suggesting that TFP growth performance was faster in sectors that were initially further away from final demand. The 10% difference in upstreamness between sectors is responsible for a difference in TFP growth rates of 0.16pp. Export share has a positive and significant coefficient that is quantitatively large, ie. the 10pp of difference in export shares is associated with a intersectoral difference in the growth rates of TFP of the order of 0.18pp. Similarly, as found by many previous studies, FDI presence in a sector is a important determinant of TFP growth and a 10% difference in inward FDI stock relative to gross output of 10% is associated with a difference in TFP growth rate of around 0.05%. Importing intermediates is also associated with higher TFP growth and the elasticity is

Table 2: Baseline regression results

VARIABLES (lagged 5 periods)	(1)	(2)	(3)	(4)	(5)	(6)
	Δtfp	Δtfp	Δtfp	Δtfp	Δtfp	Δtfp
<i>tfp</i>	-0.250*** (0.0365)	-0.260*** (0.0370)	-0.256*** (0.0366)	-0.234*** (0.0359)	-0.250*** (0.0365)	-0.244*** (0.0364)
Upstreamness	0.160*** (0.0409)	-0.0899 (0.0874)	-0.304*** (0.111)		0.153* (0.0832)	
Export share	0.180*** (0.0471)	-0.167 (0.124)	-0.0716 (0.131)	0.157*** (0.0464)		
Inward FDI stock / output	0.0482*** (0.0123)	0.0457*** (0.0122)	0.122*** (0.0339)	0.0493*** (0.0129)	0.0480*** (0.0127)	0.0467*** (0.0128)
Intermediate imports / output	0.178*** (0.0323)	0.182*** (0.0333)	0.185*** (0.0324)	0.192*** (0.0323)	0.178*** (0.0329)	0.192*** (0.0318)
Upstreamness * Export share		0.512*** (0.169)	0.382** (0.176)			
Upstreamness * FDI			-0.107*** (0.0390)			
Intermediate exports / exports				0.0928** (0.0360)		
Final exports / output					0.173* (0.0931)	0.0467 (0.0538)
Intermediate exports / output					0.186** (0.0799)	0.284*** (0.0625)
Constant	0.218*** (0.0726)	0.402*** (0.0942)	0.552*** (0.113)	0.297*** (0.0722)	0.223** (0.0873)	0.345*** (0.0682)
Observations	768	768	768	768	768	768
R-squared	0.470	0.477	0.483	0.464	0.470	0.467

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

similar to that of exporting. We are not particularly interested in the coefficient on TFP, especially given the problems with the lagged dependent variable in a panel setting. However, the estimate is negative and significant suggesting some sort of error correction mechanism - ie. sectors with lower lagged level of TFP are subsequently growing faster (due to e.g. easiness of large improvements of low productivity and difficulty with improving already high productivity levels).

We look for possible interaction effects along the production chains, ie. ask the question if there are any significant changes in the response of the major variables along the value added chain. We include the interactions of upstreamness with exports and FDI (column 2) and FDI alone to check for robustness. Inclusion of those two interactions renders the export variables not significant and the upstreamness variable either not significant or negative, depending on a regression version, suggesting that it is mostly

the position of exports in the GVC that matters rather than the position of the sector itself, ie. upstream export sectors grew faster than the downstream export sectors, while the opposite is true for the non-exporting sectors. The regression results show that exports interacted with upstreamness correlate with higher productivity growth, ie. more upstream exports are associated with faster TFP growth. We look into that relationship a little bit further to find that it is somewhat robust to the choice of the controls: ie. when we control for intermediate export share in total exports (column 3) it turns out to be positive and significant. When instead of total exports we include the shares of both intermediate and final exports in output (columns 5 and 6), the former yields a higher coefficient if we do not at the same time control for sectoral upstreamness.

What is also interesting is that the correlation of FDI stock with TFP growth performance seems to depend on the distance from final demand. Here the results are opposite to those for exports, the more upstream was a sector, the slower it grew. This could be related to the fact that being close to the final demand is associated with higher backward spillovers from FDI that were found in a few previous studies.

We subsequently run similar regressions for labor productivity. The results presented in Table 3 are roughly in line with those for the TFP. Labor productivity growth is negatively related to its lagged logged level. LP growth turns out to be faster in the more upstream sectors and the effects of the interactions of upstreamness with FDI and exports are similar to those for the TFP. The intermediate imports to output ratio yields a similar coefficient and the same is true for the intermediate exports in total exports share. Where differences seem to be slightly more profound is when we consider the split between the final and intermediate exports separately. However, labor productivity does not control for the levels of capital, ie. given everything else equal, sectors with a higher capital to labor ratio should be more productive. In order to verify that, we regress the growth rate of capital to labor ratio on the same variables and find that indeed, sectors with higher FDI had a faster K/L growth (column 6) which explains the higher coefficient in the LP regressions. Similar reasoning can apply to the intermediate vs final exports: higher final exports were associated with a significantly lower K/L everything else equals and therefore higher intermediate exports are associated with higher LP gains than TFP gains.

We perform some robustness checks. We commence by running the baseline regressions for 10 year changes in TFP and similarly for annual TFP changes. Moreover, we do it by running the regressions on a sample including Bulgaria and Romania. In order to find out if the same relationship are present at the economy level, we include the remaining sectors: agriculture, industry and services.

The results of the regression performed on 10 year changes in TFP are presented in table 4. Most of the

Table 3: Labor productivity regression results

VARIABLES (lagged 5 periods)	(1) Δlp	(2) Δlp	(3) Δlp	(4) Δlp	(5) Δlp	(6) $\Delta \log(\frac{K}{L})$
lp	-0.0270*** (0.00339)	-0.0283*** (0.00342)	-0.0279*** (0.00339)	-0.0266*** (0.00336)	-0.0276*** (0.00339)	-0.200*** (0.0253)
Upstreamness	0.137*** (0.0462)	-0.167 (0.104)	-0.351*** (0.134)			-0.140 (0.0858)
Export share	0.202*** (0.0560)	-0.220 (0.149)	-0.135 (0.159)	0.186*** (0.0551)		
Inward FDI stock / output	0.0781*** (0.0155)	0.0762*** (0.0153)	0.142*** (0.0429)	0.0781*** (0.0160)	0.0752*** (0.0159)	0.0550*** (0.0143)
Intermediate exports / output	0.167*** (0.0401)	0.173*** (0.0412)	0.175*** (0.0404)	0.178*** (0.0398)	0.176*** (0.0389)	-0.0441 (0.0393)
Upstreamness * Export share		0.621*** (0.203)	0.507** (0.215)			
Upstreamness * FDI			-0.0926* (0.0490)			
Intermediate exports / exports				0.0942** (0.0406)		
Final exports / output					0.0648 (0.0628)	-0.216** (0.0974)
Intermediate exports / output					0.331*** (0.0732)	0.173 (0.110)
Constant	0.526*** (0.0872)	0.754*** (0.111)	0.882*** (0.135)	0.589*** (0.0866)	0.637*** (0.0815)	1.183*** (0.152)
Observations	768	768	768	768	768	768
R-squared	0.547	0.553	0.556	0.545	0.548	0.503

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4: 10 year changes in TFP

VARIABLES (lagged 10 periods)	(1) Δtfp	(2) Δtfp	(3) Δtfp	(4) Δtfp	(5) Δtfp
<i>tfp</i>	-0.369*** (0.0772)	-0.409*** (0.0790)	-0.388*** (0.0732)	-0.340*** (0.0781)	-0.369*** (0.0767)
Upstreamness	0.252*** (0.0673)	-0.162 (0.140)	-0.766*** (0.169)		
Export share	0.0938 (0.0833)	-0.506** (0.215)	-0.291 (0.232)	0.0615 (0.0849)	
Inward FDI stock / output	0.0332* (0.0192)	0.0266 (0.0197)	0.193*** (0.0433)	0.0357* (0.0203)	0.0303 (0.0206)
Intermediate imports / output	0.238*** (0.0449)	0.260*** (0.0473)	0.277*** (0.0433)	0.260*** (0.0465)	0.263*** (0.0446)
Upstreamness * Export share		0.841*** (0.253)	0.571** (0.268)		
Upstreamness * FDI			-0.234*** (0.0561)		
Intermediate exports / exports				0.130** (0.0651)	
Final exports / output					-0.122 (0.0955)
Intermediate exports / output					0.253** (0.105)
Constant	0.688*** (0.143)	1.013*** (0.175)	1.431*** (0.186)	0.824*** (0.146)	0.900*** (0.136)
Observations	270	270	270	270	270
R-squared	0.558	0.570	0.597	0.546	0.554

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

results hold to a varying degree. Surprisingly, the export share is not significant in column (1). This may be due to the fact that by computing 10-year changes, we also take into account the levels shifted back by 10 years. And the economies of the CEECs have changed over time. Therefore the initial export intensity may not play such a big role. Similar story applies to FDI where the regression coefficients are lower than those for 5-year changes. However, in the longer run regressions, the interaction terms have both the same signs and are higher as in the baseline specification. Similarly, the results for the intermediate exports share as well as for the split into the intermediate and final output hold. Moreover, the variables included in the 5-year regressions explain a higher percentage of variation in TFP than those for 5 year changes. The estimations performed on 1-year differences of TFP show (table 5 in the Appendix) that when we take into account much more time variation and shorter periods, the only variables that turn to be significant are the inward FDI intensity of output and the intermediate imports.

Inclusion of Romania and Bulgaria in the baseline specification (table 6) reduces the fit of the model slightly and shows that only some results survive this change, ie. the coefficient on upstreamness remains positive and so are the ones on export share, inward FDI and intermediate imports. The spillovers from FDI remain stronger, the closer to the final demand is the receiving sector. However, upstreamness does not seem to affect the link between lagged exports and productivity change while surprisingly the share of intermediate exports to output remains positive and significant with an insignificant coefficient on final output.

We turn to the changes in the sectoral composition of the sample. When we include all sectors in the estimation (table 7), the upstreamness coefficient remains significant and does not change its value across all estimations where it is included. However, its interaction with exports is statistically insignificant. What this regression seems to capture are the differences in upstreamness between manufacturing, services and mining (and a faster growth of TFP in the manufacturing sectors) and that does add to the within broad sector variation. The estimates of coefficients on export share, inward FDI and intermediate imports remain significant. At the same time, the share of intermediate exports turns out to be significant as well. Moreover, the difference between the coefficients on intermediate exports and final exports is positive and significant.

The same set of estimations performed on services shows the heterogeneity of the broad categories of sectors. Similarities with manufacturing include the positive coefficient on upstreamness, export share and inward FDI stock. However, it seems that when we distinguish final and intermediate goods exporting, the former is associated with much larger productivity gains. Moreover, FDI is associated with higher

productivity when it is located in more upstream sectors.

As an additional robustness check, we perform a purely cross-sectional regression where we compute the long-run averages on two sample periods, ie. 1995-2001 and 2002-2009 and we include lagged dependent variables in such regression. The results are presented in Table 9. One can see that while the number of observation drops sharply and therefore some of the previous results are not statistically significant anymore, the most important conclusions hold for the manufacturing sectors, ie. the importance of intermediate goods in exports, imported intermediate goods in output, faster TFP growth in upstream sectors as well as in output as the association of high productivity and FDI but mostly in downstream sectors.

7 Conclusions

In this paper, we have inquired into the direct and indirect contributions of openness to sectoral economic growth in the EU's New Member States economies and the role in that growth that has been played by the placement of individual sectors in the global value chains. We have analyzed the direct role of exports in shaping the economic growth with a special focus for intermediate goods. While we have found some evidence that intermediate exports have indeed a lower share of domestic value added than final goods exports, the faster growth and higher share of exports in intermediate goods have led to a larger contributions of intermediate exports to economic growth in the period of 1995-2009 than that of final goods.

The contribution of overall exports to overall economic growth in the analyzed period is substantial. Subject to some differences across countries, one can say in the countries that acceded EU in 2004, exports led to cumulated economic growth rate of at least 30 percentage points. In Czech Republic, Hungary and Slovakia, exports in fact produced most of the overall growth over 1995-2009. In other countries, such as Poland, Estonia, Latvia and Lithuania, exports were responsible for between 40 and 50 percent of overall economic growth in that period.

We have also identified sectors where the growth in exports was both large and where it contributed greatly to overall economic growth. These are mainly manufacturing sectors: transport equipment, electrical equipment, rubber industry and machinery and equipment. While economies of the NMS differ substantially in size and structure, those four sectors are the bulk of export-driven economic growth.

Subsequently we look into drivers of sectoral productivity and relate them to different openness in-

dicators. We show with a considerable degree of robustness, that while both FDI and exporting are important in shaping productivity, distance from final demand matters for the CEEC economies. The results suggest that where export industries are considered, being further away from final demand/exporting a high share of intermediate goods is associated with higher productivity gains than elsewhere. However, where productivity-FDI nexus is concerned, it is greatly enhanced close to the final demand. Therefore productivity growth is high close to the final demand and where FDI is located or further away from final demand where highly specialized sectors are located that provide sophisticated products for their subsequent use in production somewhere else along the GVC.

The most robust result is the positive association between sectoral productivity and the intermediate imports. High production intensity in intermediate imports can serve as an indicator for high overall involvement in the GVC. This may indicate productivity gains through specialization in tasks where a given country/sector has the largest advantage, productivity gains from offshoring or productivity spillovers through the GVC, ie. improvements of management practices or technology transfer that is either induced by multinational headquarters that are managing the GVCs or the effect of competition between countries for that particular position in the value chain. Inquiry in the exact nature of this channel remains an interesting issue for further research.

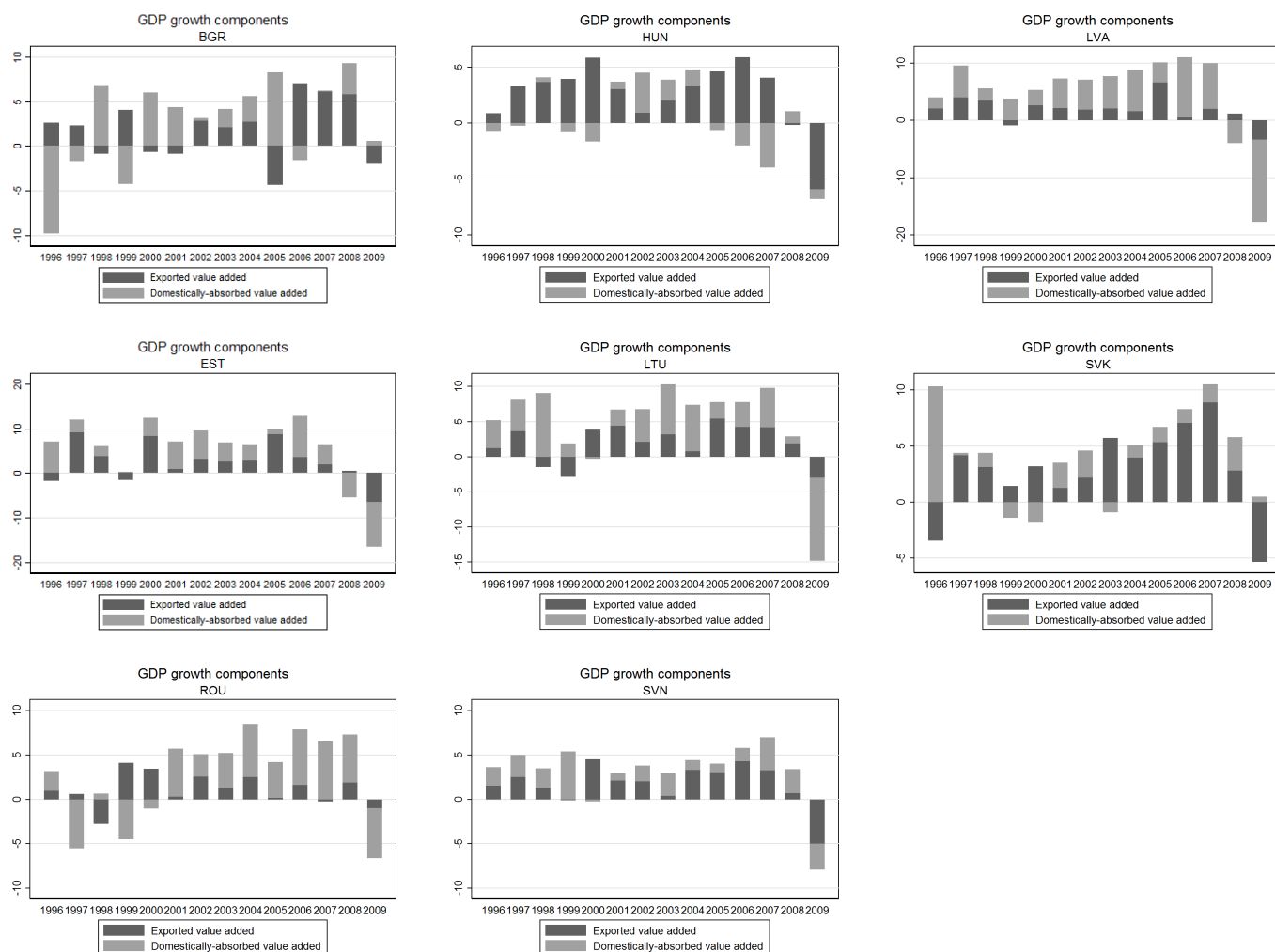
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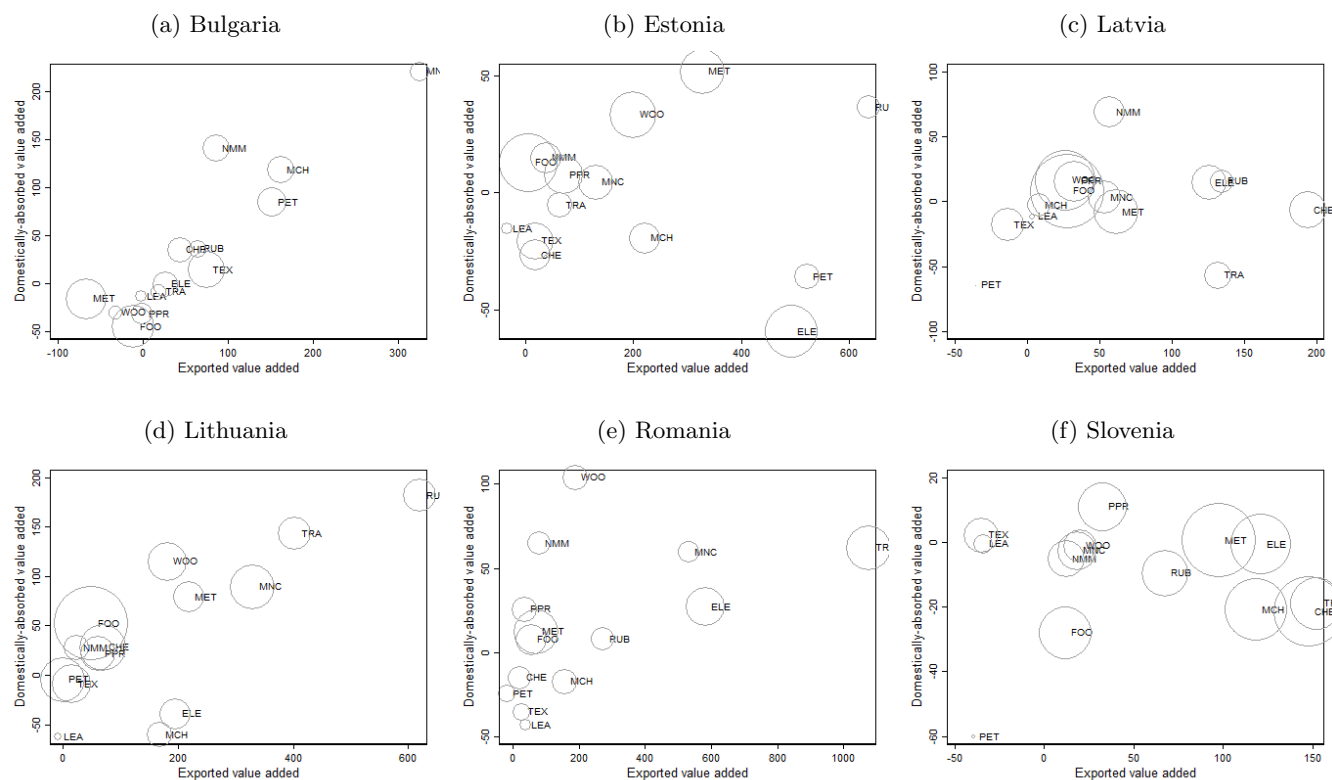
A Appendix: additional charts

Figure 7: GDP growth decomposition domestic and exported components



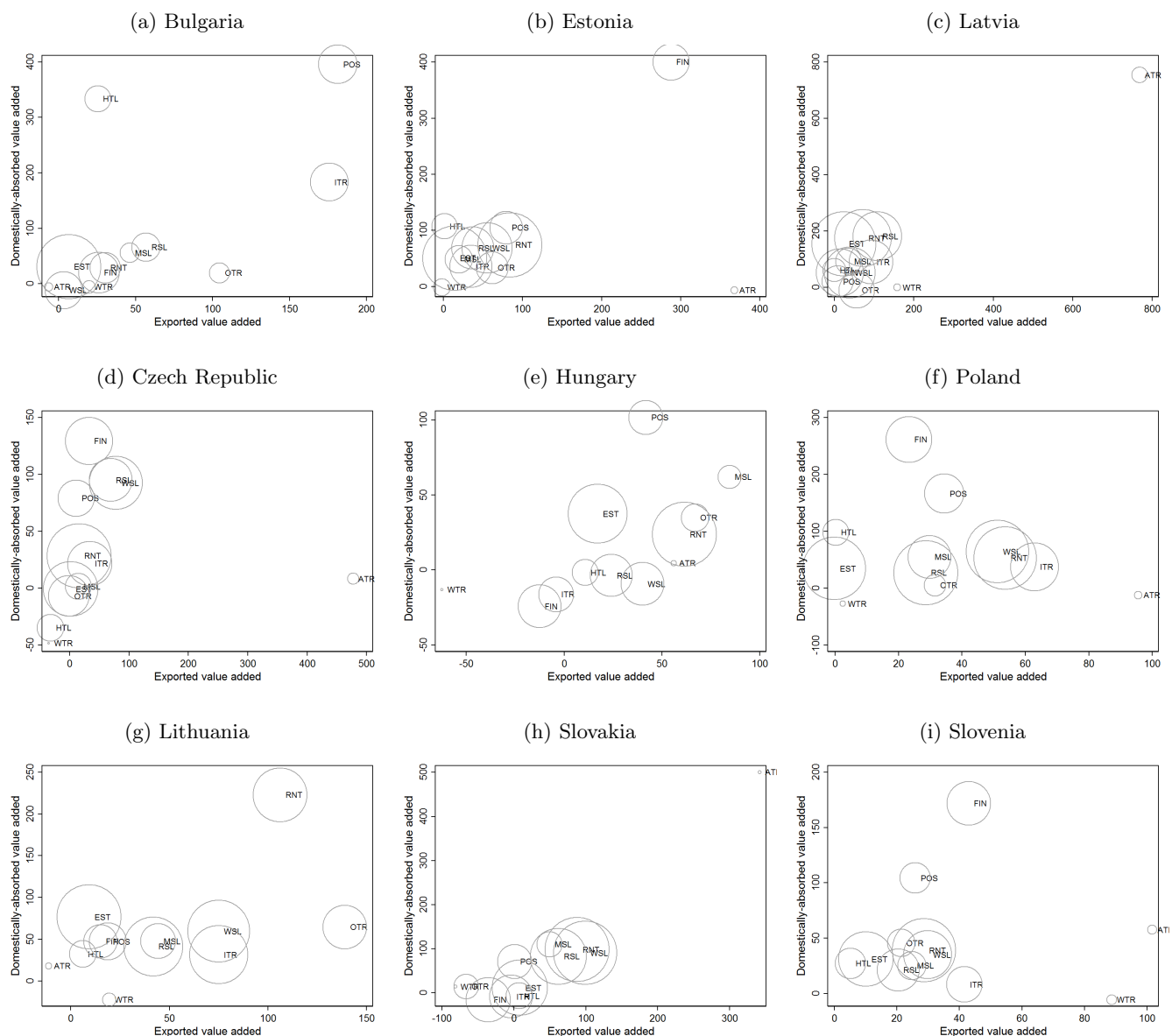
Source: own calculations using WIOD.

Figure 8: Sectoral value added decomposition into domestic and exported components: manufacturing



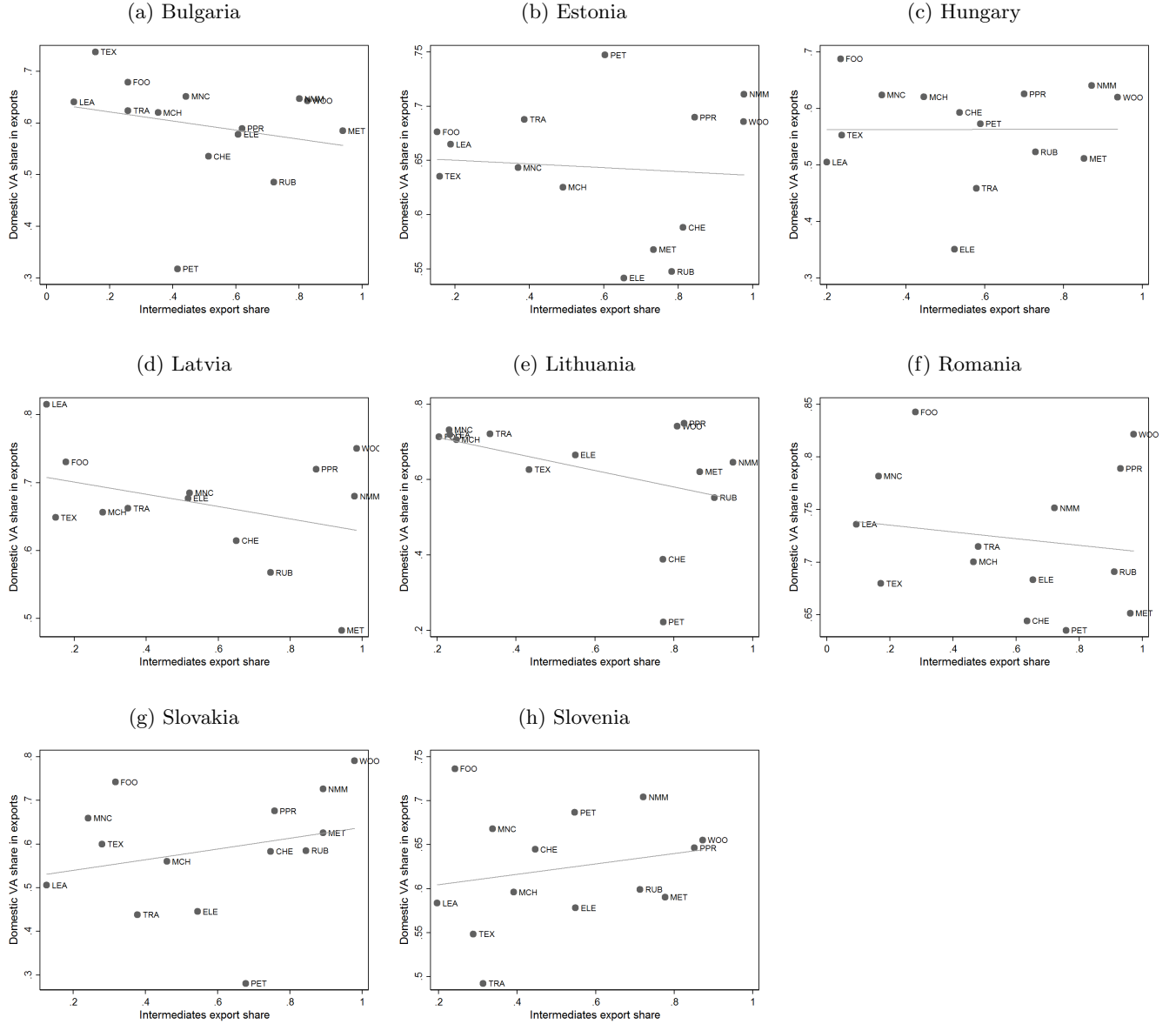
Source: own calculations using WIOD.

Figure 9: Sectoral value added decomposition into domestic and exported components: services



Source: own calculations using WIOD.

Figure 10: Exports and export growth decomposition into intermediate and final goods



Source: own calculations using WIOD.

Table 5: 1 year changes in TFP

VARIABLES (lagged 1 period)	(1) Δtfp	(2) Δtfp	(3) Δtfp	(4) Δtfp	(5) Δtfp
<i>tfp</i>	-0.0584*** (0.0132)	-0.0596*** (0.0134)	-0.0599*** (0.0134)	-0.0569*** (0.0132)	-0.0572*** (0.0132)
Upstreamness	0.00792 (0.0173)	-0.0124 (0.0420)	0.00443 (0.0499)		
Export share	0.0281 (0.0216)	0.000513 (0.0600)	-0.00617 (0.0615)	0.0253 (0.0212)	
Inward FDI stock / output	0.0158*** (0.00514)	0.0157*** (0.00514)	0.00932 (0.0131)	0.0162*** (0.00520)	0.0161*** (0.00522)
Intermediate imports / output	0.0354** (0.0144)	0.0355** (0.0144)	0.0356** (0.0144)	0.0371*** (0.0144)	0.0368*** (0.0142)
Upstreamness * Export share		0.0408 (0.0791)	0.0500 (0.0813)		
Upstreamness * FDI			0.00884 (0.0151)		
Intermediate exports / exports				-0.000291 (0.0154)	
Final exports / output					0.0246 (0.0230)
Intermediate exports / output					0.0272 (0.0290)
Constant	0.125*** (0.0329)	0.141*** (0.0452)	0.129** (0.0503)	0.133*** (0.0312)	0.132*** (0.0287)
Observations	1,167	1,167	1,167	1,167	1,167
R-squared	0.159	0.159	0.159	0.158	0.158

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 6: Estimations on a sample including Romania and Bulgaria

VARIABLES (lagged 5 periods)	(1)	(2)	(3)	(4)	(5)
	Δtfp	Δtfp	Δtfp	Δtfp	Δtfp
<i>tfp</i>	-0.217*** (0.0361)	-0.222*** (0.0367)	-0.220*** (0.0364)	-0.206*** (0.0349)	-0.209*** (0.0357)
Upstreamness	0.103** (0.0510)	-0.0279 (0.0843)	-0.229** (0.115)		
Export share	0.131*** (0.0484)	-0.0435 (0.121)	0.0201 (0.130)	0.115** (0.0472)	
Inward FDI stock / output	0.0572*** (0.0131)	0.0569*** (0.0131)	0.129*** (0.0352)	0.0584*** (0.0136)	0.0580*** (0.0136)
Intermediate imports / output	0.178*** (0.0323)	0.180*** (0.0327)	0.180*** (0.0321)	0.189*** (0.0321)	0.189*** (0.0315)
Upstreamness * Export share		0.263 (0.179)	0.187 (0.188)		
Upstreamness * FDI			-0.104*** (0.0398)		
Intermediate exports / exports				0.0531 (0.0432)	
Final exports / output					0.0600 (0.0533)
Intermediate exports / output					0.176** (0.0768)
Constant	-0.521*** (0.100)	-0.444*** (0.111)	-0.307*** (0.108)	-0.450*** (0.0983)	-0.431*** (0.0986)
Observations	815	815	815	815	815
R-squared	0.428	0.430	0.439	0.425	0.426

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 7: Estimations across all sectors regression results

VARIABLES (lagged 5 periods)	(1)	(2)	(3)	(4)	(5)
	Δtfp	Δtfp	Δtfp	Δtfp	Δtfp
<i>tfp</i>	-0.144*** (0.0174)	-0.147*** (0.0180)	-0.147*** (0.0180)	-0.145*** (0.0179)	-0.145*** (0.0179)
Upstreamness	0.144*** (0.0268)	0.119*** (0.0386)	0.142*** (0.0545)		
Export share	0.268*** (0.0276)	0.205*** (0.0738)	0.217*** (0.0769)	0.292*** (0.0292)	
Inward FDI stock / output	0.0195*** (0.00424)	0.0204*** (0.00456)	0.0164** (0.00752)	0.0280*** (0.00375)	0.0280*** (0.00374)
Intermediate imports / output	0.0687*** (0.0198)	0.0685*** (0.0197)	0.0682*** (0.0197)	0.0826*** (0.0201)	0.0836*** (0.0198)
Upstreamness * Export share		0.0938 (0.107)	0.0800 (0.110)		
Upstreamness * FDI			0.00611 (0.0112)		
Intermediate exports / exports				0.0750** (0.0311)	
Final exports / output					0.186*** (0.0442)
Intermediate exports / output					0.364*** (0.0480)
Constant	-0.0398 (0.0453)	-0.0186 (0.0532)	-0.0363 (0.0601)	0.0498 (0.0413)	0.0986*** (0.0355)
Observations	1,813	1,813	1,813	1,813	1,813
R-squared	0.437	0.438	0.438	0.430	0.430

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 8: Estimations across service sectors

VARIABLES (lagged 5 periods)	(1)	(2)	(3)	(4)	(5)
	Δtfp	Δtfp	Δtfp	Δtfp	Δtfp
tfp	-0.112*** (0.0241)	-0.107*** (0.0236)	-0.111*** (0.0226)	-0.111*** (0.0256)	-0.109*** (0.0246)
Upstreamness	0.152*** (0.0526)	0.221*** (0.0575)	0.479*** (0.0630)		
Export share	0.0336 (0.0965)	0.766** (0.300)	1.090*** (0.281)	0.0699 (0.0914)	
Inward FDI stock / output	0.0282*** (0.00658)	0.0229*** (0.00664)	-0.0178*** (0.00657)	0.0427*** (0.00502)	0.0418*** (0.00482)
Intermediate imports / output	-0.121 (0.157)	-0.106 (0.158)	-0.101 (0.148)	0.00865 (0.147)	0.0820 (0.145)
Upstreamness * Export share		-0.828*** (0.319)	-1.270*** (0.301)		
Upstreamness * FDI			0.0995*** (0.0134)		
Intermediate exports / exports				-0.0377 (0.0592)	
Final exports / output					1.000*** (0.268)
Intermediate exports / output					-0.296* (0.153)
Constant	-0.0219 (0.0725)	-0.102 (0.0761)	-0.250*** (0.0732)	0.153** (0.0680)	0.126** (0.0560)
Observations	815	815	815	815	815
R-squared	0.442	0.449	0.481	0.435	0.447

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 9: Cross section estimates on long-run averages

VARIABLES (lagged)	(1)	(2)	(3)	(4)	(5)
	Δtfp	Δtfp	Δtfp	Δtfp	Δtfp
<i>tfp</i>	-0.00963 (0.119)	-0.0240 (0.123)	-0.0284 (0.118)	0.0160 (0.116)	0.00438 (0.121)
Upstreamness	0.207** (0.0919)	0.000311 (0.244)	0.494 (0.302)		
Export share	0.146 (0.135)	-0.161 (0.357)	0.192 (0.362)	0.128 (0.135)	
Inward FDI stock / output	0.0215 (0.268)	0.0196 (0.271)	2.969** (1.171)	0.0125 (0.277)	0.00870 (0.273)
Intermediate imports / output	0.230*** (0.0832)	0.235*** (0.0874)	0.229*** (0.0798)	0.247*** (0.0867)	0.251*** (0.0849)
Upstreamness * Export share		0.452 (0.492)	0.0320 (0.482)		
Upstreamness * FDI			-3.256** (1.271)		
Intermediate exports / exports				0.141* (0.0836)	
Final exports / output					-0.0234 (0.156)
Intermediate exports / output					0.294* (0.159)
Constant	0.0915 (0.141)	0.250 (0.223)	-0.142 (0.261)	0.168 (0.134)	0.249* (0.142)
Observations	100	100	100	100	100
R-squared	0.474	0.479	0.517	0.466	0.468

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 10: Summary statistics - manufacturing in CEEC countries excluding Romania and Bulgaria

	Mean	Std. Dev.	Obs
Δtfp	0.272	0.366	894
tfp	1.344	0.546	894
Δlp	0.425	0.481	894
lp	14	10	894
Upstreamness	0.786	0.259	894
Export share	0.571	0.233	894
Inward FDI	-2.061	0.871	892
stock / output			
Intermediate	0.471	0.356	894
imports / output			
Intermediate	0.586	0.276	894
exports / exports			
Final exports	0.253	0.214	894
/ exports			
Intermediate	0.319	0.168	894
exports / output			

Table 11: Summary statistics - manufacturing in Romania and Bulgaria

	Mean	Std. Dev.	Obs
Δtfp	-0.129	0.821	133
tfp	-1.212	0.588	133
Δlp	-0.214	1.291	133
lp	0.326	0.303	133
Upstreamness	0.702	0.327	133
Export share	0.474	0.261	133
Inward FDI	-0.234	1.169	133
stock / output			
Intermediate	0.366	0.271	133
imports / output			
Intermediate	0.564	0.320	133
exports / exports			
Final exports	0.226	0.254	133
/ exports			
Intermediate	0.248	0.196	133
exports / output			

Table 12: Variables means by years - manufacturing in CEEC countries excluding Romania and Bulgaria

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
$\Delta \text{ } t/p$						-0.002 (0.335)	0.022 (0.319)	0.106 (0.305)	0.273 (0.289)	0.381 (0.282)	0.427 (0.296)	0.487 (0.261)	0.521 (0.295)	0.330 (0.355)	0.082 (0.315)
t/p	1.053 (0.538)	1.051 (0.530)	1.042 (0.523)	1.037 (0.514)	1.026 (0.504)	1.048 (0.472)	1.073 (0.451)	1.149 (0.480)	1.310 (0.486)	1.407 (0.499)	1.475 (0.532)	1.561 (0.536)	1.679 (0.548)	1.697 (0.600)	1.537 (0.594)
$\Delta \text{ } l/p$						0.017 (0.469)	0.045 (0.443)	0.182 (0.415)	0.411 (0.389)	0.560 (0.362)	0.638 (0.362)	0.713 (0.313)	0.760 (0.342)	0.624 (0.382)	0.320 (0.354)
l/p	8.176 (5.410)	8.058 (4.997)	7.846 (4.608)	7.808 (4.498)	7.794 (4.434)	7.862 (4.152)	8.015 (3.871)	9.261 (5.207)	11.629 (6.031)	13.657 (7.169)	15.473 (9.408)	17.244 (9.711)	20.703 (12.195)	23.153 (14.720)	19.528 (12.081)
Upstreamness	0.814 (0.245)	0.784 (0.245)	0.778 (0.256)	0.764 (0.262)	0.757 (0.269)	0.772 (0.266)	0.774 (0.267)	0.768 (0.260)	0.777 (0.253)	0.778 (0.256)	0.788 (0.256)	0.797 (0.257)	0.806 (0.258)	0.799 (0.260)	0.765 (0.265)
Export share	0.437 (0.204)	0.441 (0.199)	0.472 (0.214)	0.478 (0.205)	0.492 (0.215)	0.520 (0.219)	0.516 (0.222)	0.534 (0.216)	0.543 (0.223)	0.548 (0.227)	0.586 (0.243)	0.583 (0.227)	0.595 (0.228)	0.612 (0.236)	0.644 (0.257)
Inward FDI stock / output	-3.648 (1.527)	-3.261 (0.999)	-2.910 (1.030)	-2.623 (1.010)	-2.313 (0.901)	-2.257 (0.894)	-2.227 (0.860)	-2.148 (0.819)	-2.045 (0.834)	-1.947 (0.811)	-1.915 (0.884)	-2.046 (0.969)	-2.022 (0.899)	-1.961 (0.752)	-1.659 (0.743)
Intermediate imports / output	0.350 (0.340)	0.380 (0.368)	0.397 (0.357)	0.436 (0.382)	0.427 (0.379)	0.437 (0.369)	0.435 (0.342)	0.452 (0.349)	0.454 (0.361)	0.458 (0.352)	0.452 (0.338)	0.473 (0.352)	0.474 (0.352)	0.468 (0.338)	0.430 (0.294)
Intermediate exports / exports	0.597 (0.274)	0.584 (0.275)	0.581 (0.277)	0.575 (0.282)	0.573 (0.281)	0.583 (0.280)	0.577 (0.280)	0.573 (0.276)	0.586 (0.274)	0.579 (0.276)	0.579 (0.274)	0.577 (0.277)	0.583 (0.273)	0.579 (0.274)	0.558 (0.276)
Final exports / exports	0.186 (0.173)	0.194 (0.175)	0.214 (0.194)	0.215 (0.187)	0.220 (0.191)	0.232 (0.209)	0.231 (0.199)	0.243 (0.205)	0.241 (0.206)	0.247 (0.207)	0.264 (0.219)	0.259 (0.206)	0.266 (0.212)	0.275 (0.216)	0.311 (0.249)
Intermediate exports / output	0.251 (0.151)	0.246 (0.149)	0.258 (0.149)	0.263 (0.154)	0.272 (0.166)	0.289 (0.166)	0.285 (0.167)	0.292 (0.160)	0.301 (0.157)	0.301 (0.163)	0.323 (0.167)	0.323 (0.168)	0.328 (0.165)	0.337 (0.172)	0.333 (0.166)

Standard deviations in parentheses.

Table 13: Summary statistics - manufacturing in Romania and Bulgaria

Variable	Romania			Bulgaria		
	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs
$\Delta \text{ } tfp$	-0.422	0.749	311	-0.216	0.942	339
tfp	-0.610	0.737	480	-1.284	0.905	509
$\Delta \text{ } lp$	-0.649	1.181	311	-0.291	1.474	339
lp	1.774	5.049	480	0.768	2.360	509
Upstreamness	0.695	0.350	541	0.737	0.333	577
Export share	0.258	0.272	541	0.325	0.275	577
Inward FDI	-1.144	1.681	164	-0.256	2.605	433
stock / output						
Intermediate	0.201	0.252	541	0.255	0.391	577
imports / output						
Intermediate	0.627	0.313	538	0.618	0.221	577
exports / exports						
Final exports	0.111	0.207	541	0.126	0.148	577
/ exports						
Intermediate	0.147	0.163	541	0.199	0.190	577
exports / output						

Table 14: Correlation table

	Δtfp	tfp	Δlp	lp	U	EXP	FDI	Int. IMP	Int. EXP	Fin. EXP
Δtfp	1.000									
tfp	0.450***	1.000								
Δlp	0.966***	0.431***	1.000							
lp	0.219***	0.429***	0.207***	1.000						
Upstreamness	0.123***	0.128***	0.102***	0.019	1.000					
Export share	0.129***	0.009	0.113***	-0.033**	0.219***	1.000				
Inward FDI stock / output	-0.031	-0.147***	-0.018	-0.026*	0.094***	0.158***	1.000			
Intermediate imports / output	-0.079***	-0.0633***	-0.042**	-0.018	0.047***	0.123***	0.177***	1.000		
Intermediate exports / exports	0.057***	0.116***	0.053***	0.071***	0.661***	-0.195***	0.043***	-0.003	1.000	
Final exports / exports	0.066***	-0.020	0.063***	-0.049***	-0.185***	0.795***	0.042***	0.093***	-0.623***	1.000
Intermediate exports / output	0.139***	0.033**	0.119***	-0.006	0.509***	0.825***	0.206***	0.106***	0.277***	0.313***

Note: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$



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