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The role of exports and global value chains

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Unraveling the economic performance of the CEEC countries The role of exports and global value chains *

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Abstract

In this study we assess the importance of exports and global value chains (GVC) participation for economic growth. Using novel methods and an extensive dataset, we decompose GDP growth in the Central and Eastern European (CEEC) countries to show that in a large part of the period of transition and integration with the EU, exports have played a predominant role in shaping economic growth. We also show that exports have been the major factor driving the convergence of the CEEC countries with their advanced counterparts. We employ panel methods to analyze the determinants of growth of exported value added and show that the major growth drivers in the analyzed period of 1995-2014 are GVC participation, imports of technology and capital deepening.

Keywords: economic growth, international trade, GVC, heterogeneous panels, common correlated effects estimation, CEEC.

JEL: C23, F21, O33.

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1 Introduction

The globalization processes that intensified over the last two decades have changed the pattern of division of labor and trade around the world. Production of goods has become increasingly fragmented and countries have become vertically specialized in tasks/stages of production rather than particular products and services in the framework of global value chains (GVC). As the supply chains have become difficult to track, the role of trade in driving the economic growth has also become more complicated, ie. exports require intermediate imports and at the same time may rely on imported technology, in particular in developing countries. In this paper we answer the following questions questions: 1) what is the direct contribution of exports to economic growth?, 2) what is the role of exports in driving the convergence among countries?, and 3) what are the main drivers of export performance?

We analyze the case of the countries of Central and Eastern Europe (CEEC)[1] who have undergone a great deal of structural change over the past two decades. Their economic transition have involved a gradual removal of trading barriers and barriers to the international flows of capital. Moreover, they have become the manufacturing backbone of the European economy, by tight integration with the largely regional global value chains, a high degree of vertical specialization on production of intermediate goods as well as reliance on intermediate imports and FDI. At the beginning of the processes of transition and reintegration with the rest of Europe, the gap in the income levels between the CEEC and the EU-15 have been substantial and economic convergence has been an major goal of EU accession. Our objective is to assess the contribution of exports expansion to the economic growth of CEE countries over the extended period of time covering a large part of the transition period (1995-2014), the EU accession and finally the great trade collapse and the global financial crisis. Moreover, we inquire into the role of exports in the process of economic convergence of the new EU member states. Lastly, we identify the supply-side determinants of export performance.

From theoretical stand-point, international trade may affect the incomes per capita through factor-price equalization, a feature of the classical Heckscher-Ohlin model (see Jones, 1956). International trade has, however, been in general absent from growth and convergence theoretical literature (see eg. Solow, 1956). Notable exceptions include Grossman and Helpman (1991) endogeneous growth framework where trade-promoting policies can induce innovation and accelerate growth as well as Ben-David and Loewy (1998) where trade leads to knowledge spillovers that result in income convergence and heightened growth rates during transition and over the long run. The modern micro-founded trade literature sees trade and openness as a productivity booster. In the Melitz (2003) model opening to trade relocates resources to more productive exporting firms forcing least productive firms to exit hence improving aggregate productivity through self-selection. While the concept of learning-by-exporting is absent in the theoretical literature, Melitz and Costantini (2007) show that firms expecting trade liberalization may decide to innovate and improve productivity.

Our paper takes a novel approach to growth accounting. We decompose the supply-side

[1]The group of CEEC countries includes Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

aggregate of GDP into the domestically absorbed and exported components. Traditional national accounts measures of net exports do not allow for an accurate assessment of the direct exports contribution to growth, in particular in countries undergoing a significant structural change. While due to increased GVC involvement exports of goods are increasingly dependent on imports of intermediate goods, transition countries have also been characterized by a sustained upward trade in the import intensity of final demand components. This is particularly true for growing investment demand that was closely related to catching-up processes and FDI-driven export expansion. However, due to increased specialization consumption demand in countries tightly integrated in GVC has also increased. These differences both in levels and in changes of import intensity of different National Accounts components may lead to a wrong assessment of the contribution of exports to GDP growth with the use of net exports. In order to circumvent this problem eg. Kranendonk and Verbruggen (2008) as well as Cardoso et al. (2013) use national input-output tables to identify the import content of exports as well as other GDP components. We follow a different approach, based on Johnson and Noguera (2012) who propose a method of identifying of sectoral value added generated in a country to a domestically absorbed component and exports. By the use of annual global input-output tables we analyze changes in volumes of those components. Additionally, we use the method proposed by Wang et al. (2013) to decompose the gross exports into the domestic and foreign component and to assess the role of vertical specialization in the relative exports growth of analyzed countries.

We contribute to the literature on openness and income convergence. The micro data evidence on trade-related productivity gains is ample. Many of the studies base on the seminal paper by Bernard and Jensen (1999) who investigate the productivity-based selection into exporting as well as export-led productivity improvements (learning-by-exporting). While the former process is confirmed by the data, the evidence for the latter is rather scarce. Wagner (2007) surveys more recent evidence and reaches similar conclusions, ie. the evidence of learning by exporting is restricted to selected countries. However, given the fact that exporters are more productive and tend to grow larger and attract more resources, this reallocation alone is enough to see trade-induced productivity growth. The macro-level trade-convergence link was popular in the economic literature in the 1990s and earlier. A comprehensive survey of this early literature is given in Edwards (1993). While most of the studies surveyed show large effects of trade liberalization on income of the developing countries, estimation strategies are simple and subject to the endogeneity of the measure of trade openness. In a newer study Frankel and Romer (1999) proposes an instrumental variable approach and shows that trade effects on income are indeed robust. On the other hand, Rodriguez and Rodrik (1999) find no evidence of a positive relationship between more liberal trade policy and economic growth.

Since our decomposition of GDP allows us to identify its part directly related to exports, we are able to perform the convergence analysis on the exported and domestically absorbed components of GDP. This removes the need to look for exogenous openness measures and/or appropriate instruments, a problem present in many earlier studies. In order to estimate the convergence equations, we apply dynamic panel methods that account for endogeneity. We subsequently turn to the supply-side determinants of exported value added, ie. the growth rates of capital and labor. We augment our specifications with measures of GVC participation, price-cost competitiveness, FDI inflow as well as import content of investment demand. We apply standard panel methods and, due to significant substantial cross-sectional dependence and possible heterogeneity, the Common Correlated Effects estimator (Pesaran, 2006).

We find that exports have been a predominant component of the GDP growth rate of the CEEC in the analyzed period, in particular after the EU accession. Export performance of the CEEC have been better than the one in most of the comparator EU-15 countries and remained to be important growth factor even after the global economic crisis. We show that the rate of convergence within the CEEC due to exports was twice as large as the one due to supply to the domestic market. In the process of the CEEC catching up with the rest of the EU-15, exports played an even larger role. We also show that the growth rate of exports was mainly driven by the capital deepening (including imports of investment goods) as well as increased participation in GVC and to a smaller extent FDI.

The structure of the paper is as follows. In section 2 we provide a synthetic outlook of the input-output framework and describe its usefulness in growth accounting. Section 3 documents the most important patterns about the role of exports in economic growth in European countries. In section 4 we investigate the most important (short-run) linkages between export-led growth and supply-side factors as well as differences in these relationships. Given this preliminary evidence, section 5 documents also long-run effects of the supply-side factors. Finally, section 6 concludes.

2 Methodology

To assess importance of foreign sales in the value added growth we use the standard input-output analysis. The main reason behind this choice is the ambiguity of international trade flows. Unlike the final demand aggregate, (e.g. household consumption), the gross exports and imports consist of both final and intermediate goods. Therefore, appropriate measurement of value added in exports is required.

Let us explain the economic role of (gross) imports in an open economy. Uncontroversially, imported final goods are unambiguously absorbed in domestic final demand (table 1). However, the role of intermediates is less clear. On one hand, imported intermediate goods can be combined to produce final goods for domestic sales. On the other hand, the imported intermediates can be further processed to produce goods for exports. This refers to both final and intermediate goods destined to foreign markets. The importance of the latter aggregate will be higher if a given economy is more engaged in the multi-stage (as well as multinational) process of production.

The aforementioned heterogeneity of imports has important implications for measuring the role of foreign sales in value added (figure A.5). Namely, given a fact that some intermediates can be imported to produce some goods for exports it leads to some non-negligible content of imported value added in exports.

The essential issue is to separate the import content from exports as well as domestic final demand. This can be done with the Leontief model. Assume that the matrix $\mathbf{X}$ captures intermediate consumption between sectors. Then, ignoring the time dimension,

Table 1: Ambiguity of imports

Imports' component	Macroeconomic variables		
	Final Demand	Final production	Exports
Final goods	X		
Intermediate goods used in final production for domestic sale	X	X	
Intermediate goods used in final production for foreign sale (i.e. exports of final goods)		X	X
Intermediate goods used to produce intermediate goods for foreign sales (i.e., exports of intermediate goods)			X

the input-output matrix can be expressed as:

$$\mathbf{A} = [a_{ij}] = \frac{x_{ij}}{\sum_j x_{ij}}, \tag{1}$$

where x_{ij} denotes the intermediate consumption of goods produced in the i-th sector that are used in production of sector j. The element a_{ij} describes how many units from the ith sector are required to produce one unit of good in the jth sector. If the sectors i and j are located in different economies then a_{ij} refers to import content.

Under the assumption of stability (over time) of input-output structure the above formulation leads to the familiar relationship between the output ($\mathbf{x}$) and the final demand ($\mathbf{y}$):

$$\mathbf{x}\underbrace{(I - \mathbf{A})}_{\mathbf{L}} = \mathbf{y}, \tag{2}$$

where $\mathbf{L}$ is the so-called Leontief matrix.

Viewed from a perspective of a particular economy it is helpful to group all sectors into domestic (denoted as $\mathcal{D}$) and foreign ($\mathcal{F}$). Then, denoting $\mathbf{y}_i$ as the ith sector final production, the global value added can be decomposed into four component:

$$\mathbf{y} = \underbrace{\sum_{i\in\mathcal{D}} \left[\mathbf{L}^{-1}\mathbf{y}^{\mathcal{D}}\right]_i}_{\mathbf{y}^{\mathcal{D}\to\mathcal{D}}} + \underbrace{\sum_{i\in\mathcal{D}} \left[\mathbf{L}^{-1}\mathbf{y}^{\mathcal{F}}\right]_i}_{\mathbf{y}^{\mathcal{D}\to\mathcal{F}}} + \underbrace{\sum_{i\notin\mathcal{D}} \left[\mathbf{L}^{-1}\mathbf{y}^{\mathcal{D}}\right]_i}_{\mathbf{y}^{\mathcal{F}\to\mathcal{D}}} + \underbrace{\sum_{i\notin\mathcal{D}} \left[\mathbf{L}^{-1}\mathbf{y}^{\mathcal{F}}\right]_i}_{\mathbf{y}^{\mathcal{F}\to\mathcal{F}}} \tag{3}$$

where $\mathbf{y}^{\mathcal{D}}$ ($\mathbf{y}^{\mathcal{F}}$) is the vector of domestic (foreign) absorption, i.e.,

$$\mathbf{y}^{\mathcal{D}} = \begin{cases} \mathbf{y}_i & \text{if } i \in \mathcal{D} \\ 0 & \text{if } i \notin \mathcal{D} \end{cases} \quad \text{and} \quad \mathbf{y}^{\mathcal{F}} = \begin{cases} 0 & \text{if } i \in \mathcal{D} \\ \mathbf{y}_i & \text{if } i \notin \mathcal{D} \end{cases}$$

The first term ($\mathbf{y}^{\mathcal{D}\to\mathcal{D}}$) in (3) denotes the domestic value added that is absorbed in the domestic final demand. The second component ($\mathbf{y}^{\mathcal{D}\to\mathcal{F}}$) of (3) refers the domestic value added embodied in the foreign final demand. It contains the domestic value added in exports of final goods as well as intermediates.

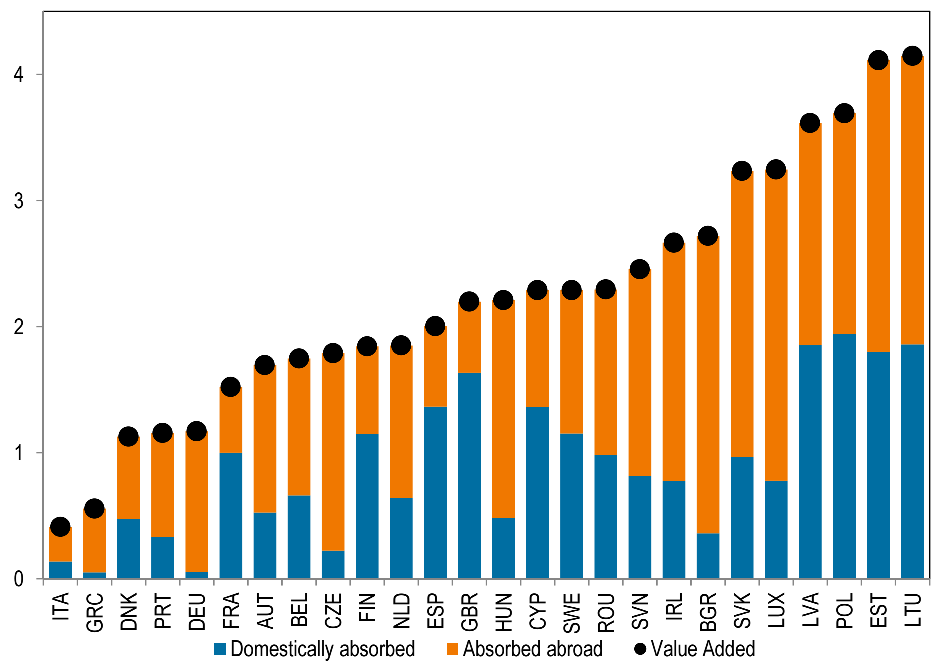
Our principal source of data is the World Input Output Database (WIOD) database (Timmer et al., 2015). We use two editions of WIOD database, for the periods of 1995-2009 and 2000-2014. Since all flows of intermediate consumption are expressed in the current USD, we use the WIOD-provided deflators and exchange rates for the first edition of the WIOD Socio Economic Accounts and the Eurostat deflators for the second edition.

Based on the above data source it is possible to divide the (real) gross value added into two components: (i) (real) exported value added, and (ii) (real) domestically absorbed value added. Given complex and time-varying nature of international economic linkages this decomposition allows us to provide broad range of stylized facts about the role of exports and vertical specialization in economic growth.

3 Growth Accounting & Export-led Convergence

In this section we provide a first set of stylized facts about the role of exports in economic growth. Figure 1 shows the decomposition of annualized value added growth for the period under consideration. Differences in the overall GDP growth aside, there are large differences in the contribution of exports to the overall GDP growth both across the CEEC countries as well as in the EU-15. One can, however, say that over the analyzed period exports have contributed to at least half of the value added growth in the CEEC countries. There are, however, exceptions from that rule and they include the Czech Republic, Slovakia, Hungary and Bulgaria, where due to specialization most of GDP growth was driven by exports. On the other hand the dependence on exports in the EU-15 has been diversified. In Germany exports were responsible for almost all value added growth while in France, Spain, UK and Finland domestic demand was the main driver of GDP.

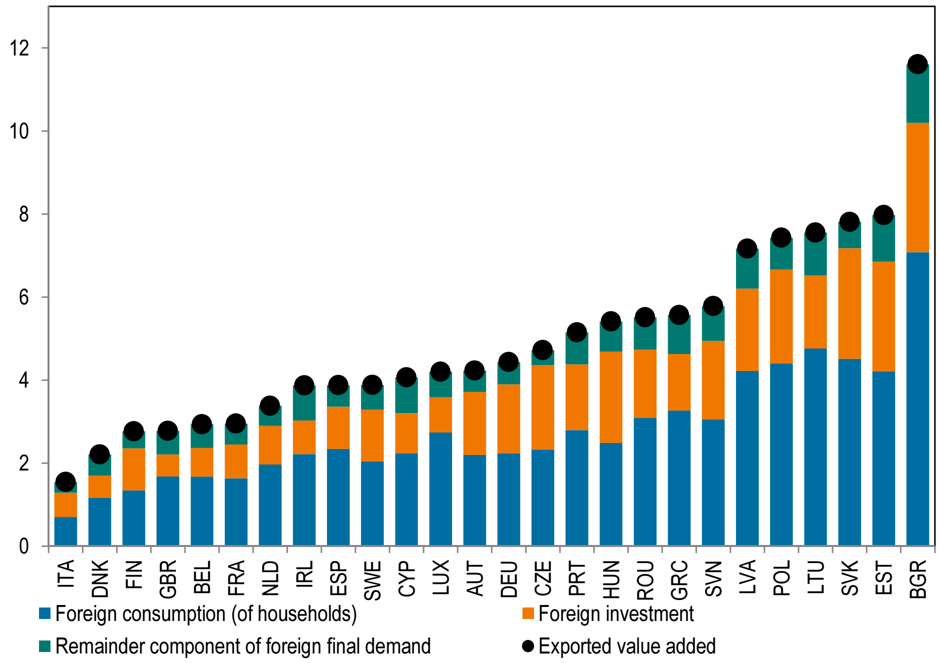
Figure 1: Value added growth and its components (average between 1995 and 2014, in %)



The above pattern has been changing over time. Looking at the three subperiods, one can identify major differences in the response to the global economic crisis and the great trade collapse (Figure A.1). While in the selected EU-15 countries, the exports component of GDP has lost its importance, in some CEEC, including Poland, the Czech Republic and Slovakia it remained the dominant growth driver.

Turning to the role of foreign absorption components (consumption of households, investment, etc.) the structure of exported value added growth seems to be similar between UE-15 counties and CEEC (figure 2). However, one might observe a substantial heterogeneity in the structure of exports among the CEEC economies. On one hand, a high degree of specialization in export-oriented capital goods production has led to a relatively large magnitude of these products in the Czech Republic and Hungary. Average relative contribution of foreign investment demand in exported value added growth exceeded 40% while in other countries it was below 30%.

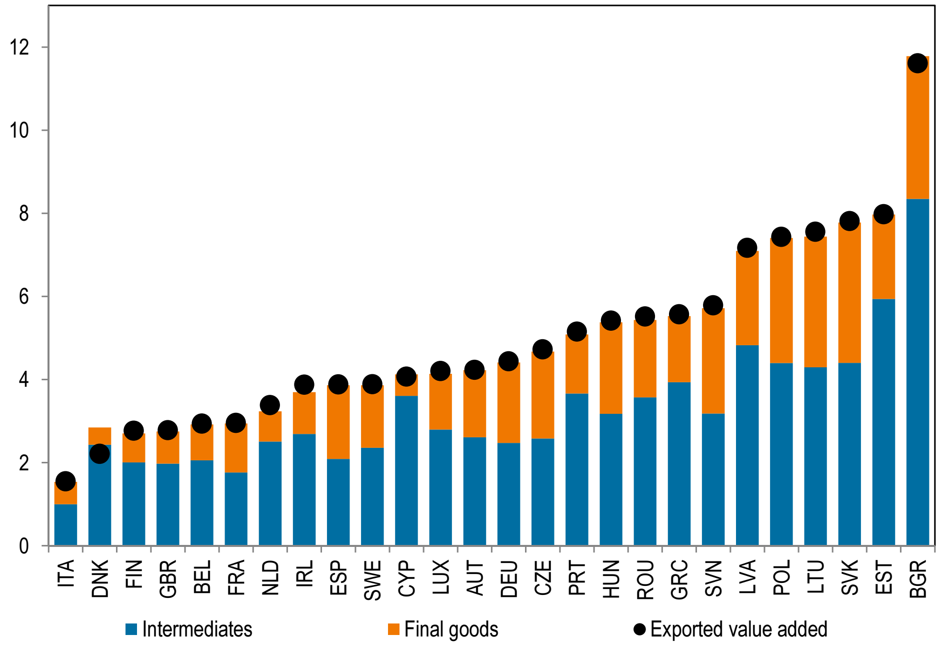
Figure 2: Exported value added growth and its components (annualized, in %, 2003-2014)



Another important dimension of exported value added that is the division into intermediates and final goods. It should be noted that such decomposition can be done within the standard (international) input-output analysis. High importance of intermediate goods suggests that the international vertical specialization of production is one of the most important economic processes that drive the growth in exported value added.

Figure 3 shows that intermediates' contribution to the exported value added growth was larger than that of final goods. In absolute terms, foreign sales of intermediates are more important for CEEC economies. However, the relative contribution of intermediates in these two groups was almost the same and range from 54% in Spain and the the Czech Republic to 74% in Estonia and the Netherlands. This suggests that despite some structural differences in the GVC participation among the EU countries the observed development of GVC has led to increasing role of exports in economic growth for all EU members.

Figure 3: Exported value added growth and its components (annualized, in %, 2003-2014)



Interestingly, the role of intermediates in the exported value added growth has not diminished after the Great Trade Collapse. Of course, there has been a substantial decline in exports dynamics but, overall, this pattern has not been driven by a decline in the importance of trade in intermediates (figure A.3). More importantly, the above empirical regularity does not point to reversal of GVC development but rather suggests a substantial slowdown in international vertical specialization process. However, the stable role of intermediates in exported value added growth is somehow coherent with so-called bullwhip effect (Alessandria et al., 2010). According to this hypothesis, any unexpected and substantially large demand shocks would be amplified along the international value chains in which production of complex goods is organized. As a result, it leads to a disproportionate reaction of international trade. Although this mechanism is widely employed to understand the Great Trade Collapse it can also explain recovery of international trade after this period.

To scrutinize the importance of vertical specialization in economic growth we extend the growth decomposition by identifying the structural change component. Denoting t as time index, the intertemporal change in aggregate value added of given economy ($\Delta \mathbf{y}_t^{\mathcal{D}\rightarrow\cdot}$) can be expressed as follows:

$$\Delta \mathbf{y}_t^{\mathcal{D}\rightarrow\cdot} = \sum_{j\in\{\mathcal{D},\mathcal{F}\}} \sum_{i\in\mathcal{D}} \left[\mathbf{L}_{t-1}^{-1} \Delta \mathbf{y}_t^j\right]_i + \sum_{j\in\{\mathcal{D},\mathcal{F}\}} \sum_{i\in\mathcal{D}} \left[\left(\Delta \mathbf{L}_t^{-1}\right) \mathbf{y}_{t-1}^j\right]_i, \tag{4}$$

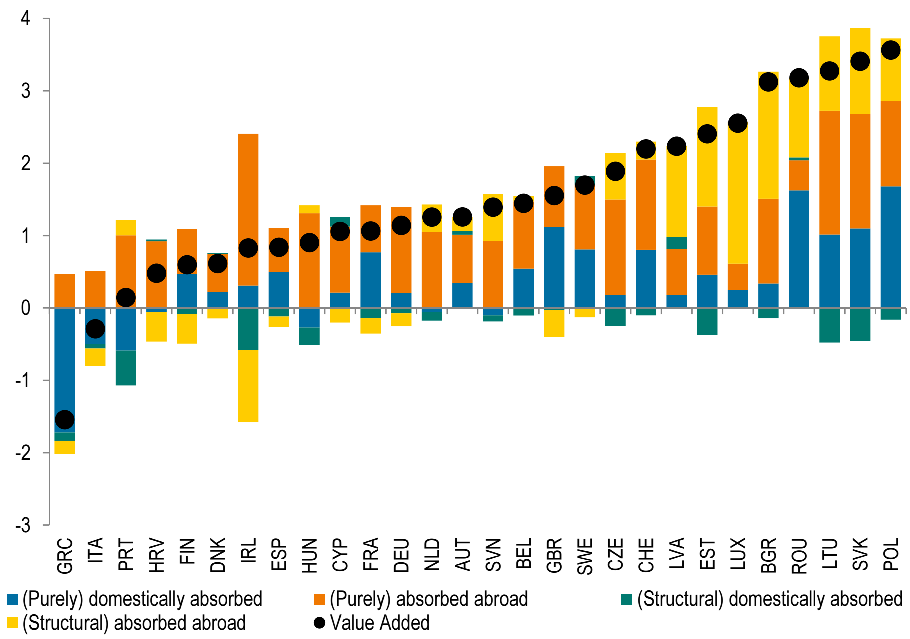
where the first component measures the aggregate change in value added that abstracts from shifts in production structure while the latter one captures structural effects which refer to changes in output-input structure (intersectoral linkages) of global economy.[2]

[2]It should be noted that in the (4) there is a covariance term. However, viewed from the perspective of the current study, its role is negligible because only two sectors are considered.

Both components can be divided into subcomponents of domestically and foreign-absorbed value added. Intuitively, substantial contribution of the second component highlights the role of gains or losses from vertical specialization for economic growth.

The role of structural shift in intermediate production in shaping the economic growth was uneven among the European countries (Figure 4). On one hand, the CEEC have benefited substantially from the international fragmentation of production. This pattern is highlighted by a positive contribution of the component related to structural shift in exported value added. The relative contribution to overall economic growth ranges from 24% for Poland to almost 35% for Slovakia from 2003 to 2014.[3] For the Baltic countries this effects was even stronger. At the same time, the structural shift in intersectoral linkages has led to a slight decrease in domestically absorbed value added in these countries. However, its magnitude has been limited. On the other hand, the old EU members have not experienced substantial gains from intersectoral reallocation.

Figure 4: GDP growth and its components (annualized, in %, 2003-2014)



Intuitively, the systematic differences in economic performance between CEEC and non-CEEC countries fueled the catching-up process. At the same, the above documented empirical regularities suggest that the exported value added played a crucial role in overall economic growth of European countries. To assess the rising role of exports in the catching-up process we use the standard (unconditional) convergence equation (Durlauf et al., 2005):

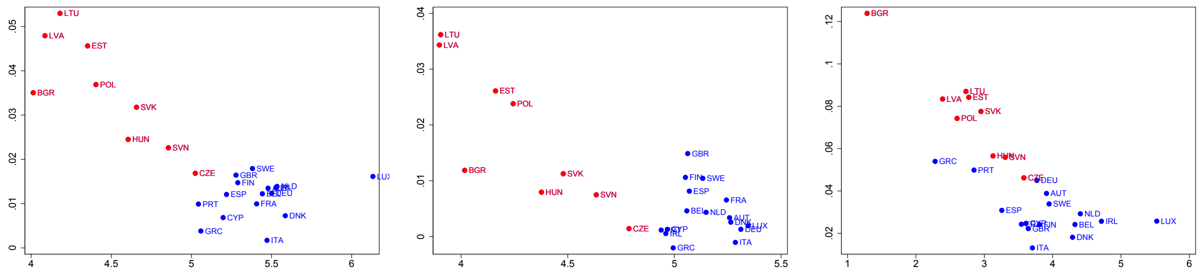
$$\Delta y_{it}^{j} = \beta_0 - \beta^{C} y_{it-1}^{j} + \varepsilon_{it}, \tag{5}$$

where Δy_{it}^{j} and y_{it-1}^{j} represent the dynamics and the logged lagged level of the value added PPP per capita or its specific part $y_{it}^{j} \in \{va_{it}^{PPP}, dva_{it}^{PPP}, eva_{it}^{PPP})$. In the above formula-

[3]The sample in this exercise is shortened due to two reasons. Firstly, this exercise requires the same (sectoral) structure of economy. The data for recent WIOD version starts in 2000. Secondly, the industry deflators for NACE rev. 2 are not widely available for some countries.

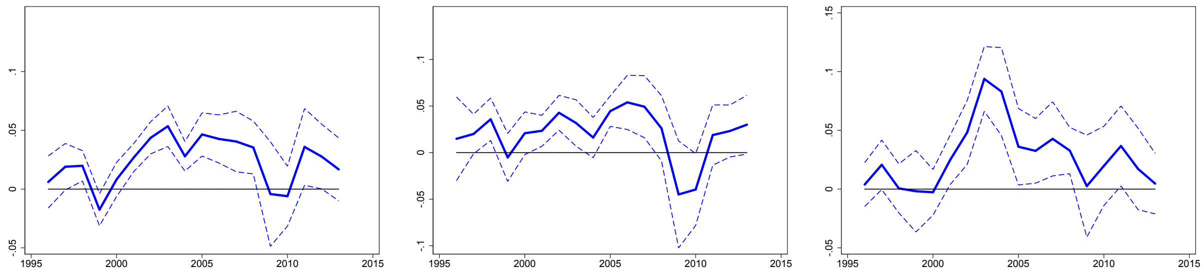
tion, the parameter $\beta^{\mathcal{C}}$ is the convergence rate and it measures the speed of (unconditional) catching-up process. If the convergence equation (5) is applied to the cross-sectional data then Δy^j_{it} denotes the average growth rate over period and y^j_{it-1} is the initial level.

Figure 5: The growth rate of value added (vertical axis) and the logged value added PPP per capita (horizontal axis)



Note: Left: total value added, center: domestically absorbed value added, right: exported value added. Red and blue color refers to CEEC and non-CEEC countries, respectively.

Figure 6: The rolling estimates of the pace of convergence $\hat{\beta}^{\mathcal{C}}$



Note: Left: total value added, center: domestically absorbed value added, right: exported value added. The solid and dashed lines represent the point estimates and the standard 95% confidence intervals based on the heteroscedasticity-consistent standard errors, respectively.

We subsequently look into the patterns of convergence across our sample. Figure 5 shows the 1995 log levels of value added and its two components per capita in PPP[4] versus the average real growth rate of those components over the analyzed period. This preliminary analysis shows a somewhat clear pattern of convergence (negative slope) across the analyzed countries both in terms of total value added as well as exported value added. The domestically absorbed value added convergence seems to be a phenomenon present only in the CEEC group.

Figure 6 shows the estimates of cross-section regressions of value added component growth rates on the lagged log-levels. The levels of the estimated convergence coefficient (in absolute terms) are visibly higher in the case of exported value added than in the case of the domestically absorbed value added and naturally in the case of total value added suggesting a higher contribution of exports rather than domestic absorbtion to overall convergence. This export-led convergence has not been, however, uniform over time. While the late 1990s have seen the Asian and, more importantly, the Russian crisis that have negatively affected exports in the CEE, the pace of export-led convergence picked-up

[4]The series on data on purchasing power parity are taken from Eurostat while series on population comes from the Penn World Table 9.0.

in the pre-accession period after 2000 (when most of trade barriers in the CEE-EU trade had already been eliminated[5]), and intensified after the EU enlargements in 2004 and 2007 with an eventual slowdown during the global financial crisis of 2009 and sluggish recovery thereafter.

Given the well known problem of endogeneity of OLS estimates of convergence in a panel setting, we employ a System-GMM approach along the lines of Arellano and Bover (1995) and Blundell and Bond (1998). The estimations are performed on four-year averages to take care of short run variability of value added growth rates.[6] The results shown in Table 2 confirm our previous findings. For the overall sample the estimated pace of convergence of total value added is 5% per year while in the case of export-led convergence, this estimate is twice as high. Convergence among the CEEC countries is faster (10% per year), mainly due to export-led convergence and a slightly higher importance of domestic absorption. On the other hand, convergence processes are not found to be significant for the non-CEE countries. These results suggest that convergence in the analysed sample is mainly due to CEE countries catching up with the non-CEE countries and that exports play a dominant role in this process.

Table 2: GMM estimates of the (unconditional) convergence parameter $\hat{\beta}^{\mathcal{C}}$

	All countries			CEEC countries			non-CEEC countries		
	tva_{it}^{PPP}	dva_{it}^{PPP}	eva_{it}^{PPP}	tva_{it}^{PPP}	dva_{it}^{PPP}	eva_{it}^{PPP}	tva_{it}^{PPP}	dva_{it}^{PPP}	eva_{it}^{PPP}
$\hat{\beta}^{\mathcal{C}}$	0.05***	0.023**	0.111***	0.112*	0.043*	0.113***	-0.002	-0.085	0.017
AR(2)	[0.413]	[0.096]	[0.712]	[0.698]	[0.372]	[0.880]	[0.251]	[0.514]	[0.307]
Sargan	[0.040]	[0.013]	[0.193]	[0.184]	[0.149]	[0.582]	[0.000]	[0.001]	[0.000]
Hansen	[0.478]	[0.200]	[0.129]	[0.557]	[0.643]	[0.589]	[0.132]	[0.190]	[0.132]

Note: the superscripts ***, ** and * denote the rejection of null about parameters' insignificance at 1%, 5% and 10% significance level, respectively. The expressions in round and squared brackets stand for robust standard errors and probabilities values corresponding to respective hypothesis, respectively. AR(2) it the test for serial correlation developed by Arellano and Bond (1991) and the null hypothesis in this case is about the error term time independence (of order two). The Sargan and Hansen statistics are used to test over-identifying restrictions and in both cases the null postulates validity of instruments.

4 Determinants of export-led growth

In this section we turn to the analysis of the determinants of export-led growth.

We combined the data on neoclassical factors of production, measures of vertical specialization and price-cost competitiveness and FDI stocks. The detailed description of variables is delegated to table A.1. The dataset consists of series for 26 countries over 19 years. Table A.2 reports the measures of cross-sectional dependence and the results of panel unit root tests. The formal test statistics proposed by (Pesaran, 2015) are extremely high for all variables and interests their first differences. The null is about cross sectional

[5]except the agricultural and food sector.

[6]We cross-checked our results by experimenting with various length of subperiods, i.e. 3 and 5 years. But these results are very close estimates based on four-year averages.

independence and it is easily rejected at any reasonable significance level. The identified cross-sectional dependence is crucial for testing a unit root. Therefore, we use a broad range of panel unit root test including the standard IPS test (Im et al., 2003) and statistical procedures that account for cross-sectional dependence proposed by Pesaran (2007) and Chang (2002). Nevertheless, the results of all tests do not allow to reject the null about a unit root for our variables (or their logs). First-differencing renders all variables stationary.

Given above features of the data and our focus on supply-side factors our starting point is the (logged) production function for the differenced variables:

$$\Delta y_{it}^{j} = \alpha_0 + \alpha_1 \Delta k_{it} + \alpha_2 \Delta l_{it} + \alpha_3 \Delta x_{it} + \varepsilon_{it}, \tag{6}$$

where $\Delta y_{it}^{j} \in \{\Delta va_{it}, \Delta dva_{it}, \Delta eva_{it}\}$, k_{it} and l_{it} stands up for the logged capital and labor input, respectively, x_{it} denotes the additional independent variable and ε_{it} is the error term.

We begin by running panel regressions of the total growth rate of value added, growth rate of domestically absorbed value added and exported value added on the supply side variables, namely the growth rates of capital and labor.

The results of those preliminary regressions are shown in Table 3 and they point out to the importance of both the economic cycle as well as the unobserved heterogeneity in growth rates of value added components. In particular, inclusion of time dummies has a visible downward bearing on the estimates of labor of the pooled regressions. The estimates of the capital elasticity are visibly higher for the exported value added while the estimates of labor elasticity tend to be higher for the domestically absorbed value added.

Table 3: The estimates of labor and capital elasticities for value added and its components

	Δva_{it}	Δdva_{it} pooled	Δeva_{it}	Δva_{it}	Δdva_{it} pooled	Δeva_{it}	Δva_{it}	Δdva_{it} FE	Δeva_{it}
Δk_{it}	0.515***	0.541***	0.696***	0.490***	0.463***	0.780***	0.723***	1.106***	0.078
	(0.092)	(0.132)	(0.233)	(0.077)	(0.130)	(0.249)	(0.190)	(0.208)	(0.303)
Δl_{it}	0.619***	0.521***	0.766***	0.381***	0.396***	0.232**	0.447***	0.382***	0.580***
	(0.098)	(0.107)	(0.140)	(0.086)	(0.111)	(0.116)	(0.092)	(0.109)	(0.139)
μ	0.007***	-0.004	0.029***	0.010***	0.004	0.023***	0.006*	-0.005	0.030***
	(0.002)	(0.003)	(0.006)	(0.003)	(0.004)	(0.006)	(0.004)	(0.005)	(0.008)
Year Dummies	NO	NO	NO	YES	YES	YES	YES	YES	YES

Note: the superscripts ***, ** and * denote the rejection of null about parameters' insignificance at 1%, 5% and 10% significance level, respectively. The expressions in round brackets stands for robust standard errors.

Cross sectional heterogeneity is large. Inclusion of country fixed effects inflates almost all the estimated elasticities except the elasticity of capital on exported value added. This warrants further inquiry into the nature of such heterogeneity. Table 4 shows the results of similar regressions where we allow for different capital and labor slopes for CEEC countries and remaining analyzed countries. The results point out to a significant premium in the capital elasticity in the CEEC countries in the pooled regressions. However, when

Table 4: The estimates of labor and capital elasticities for value added and its components

	Δva_{it}	Δdva_{it} pooled	Δeva_{it}	Δva_{it}	Δdva_{it} pooled	Δeva_{it}	Δva_{it}	Δdva_{it} FE	Δeva_{it}
Δk_{it}	0.096	0.211	-0.307	0.134	0.091	-0.016	0.201	0.498**	-0.500
	(0.119)	(0.133)	(0.243)	(0.135)	(0.146)	(0.281)	(0.180)	(0.236)	(0.459)
Δl_{it}	0.902***	0.738***	1.175***	0.538***	0.555***	0.364*	0.535***	0.518***	0.574***
	(0.077)	(0.077)	(0.205)	(0.083)	(0.087)	(0.192)	(0.082)	(0.107)	(0.208)
$CEEC_i$	0.011*	-0.002	0.021*	0.009*	-0.005	0.019*			
	(0.006)	(0.007)	(0.011)	(0.005)	(0.007)	(0.010)			
$CEEC_i \times \Delta k_{it}$	0.342*	0.359	0.917**	0.284*	0.430**	0.670*	0.671***	0.771***	0.774
	(0.173)	(0.229)	(0.391)	(0.161)	(0.216)	(0.394)	(0.189)	(0.248)	(0.483)
$CEEC_i \times \Delta l_{it}$	-0.262	-0.254	-0.199	-0.061	-0.141	0.206	-0.066	-0.126	0.077
	(0.170)	(0.182)	(0.277)	(0.132)	(0.164)	(0.219)	(0.089)	(0.117)	(0.227)
μ	0.009***	0.000	0.036***	0.009***	0.007*	0.020***	0.009**	-0.003	0.032***
	(0.003)	(0.003)	(0.006)	(0.003)	(0.004)	(0.006)	(0.004)	(0.005)	(0.011)
Year Dummies	NO	NO	NO	YES	YES	YES	YES	YES	YES

Note: the superscripts ***, ** and * denote the rejection of null about parameters' insignificance at 1%, 5% and 10% significance level, respectively. The expressions in round brackets stands for robust standard errors.

country fixed effects are taken into account, the differences between CEEC and non-CEEC countries cease to be significant for the value added component.

In order to explore the within variation slightly further, we introduce additional control variables into our exported value added regressions. We control for such export-related structural factors as the participation in global value chains (foreign value added content of exports), the level of competitiveness measured by real effective exchange rate based on ULC (unit labor costss), the stock of inward FDI as well as the import intensity of investment to account for possible technological spillovers from these two sources.

All of the additional controls (Table A.3) turn out to be important drivers of exported value added growth. Moreover, for most of the analyzed variables, the effect for the CEEC countries is significantly higher than for remaining countries. This is in particular true for foreign value added content of exports where the elasticity of exported value added growth in CEEC is almost double the one of the non-CEEC countries. While FDI is only weakly affecting export capacity of the CEEC countries, the effect of the import-intensity of investment is positive and significant. These factors work toward increasing of the CEEC countries export potential and speed up the convergence process to the non-CEEC countries. It is also important to note, that introducing additional controls into the equation renders the capital elasticity of exports significantly higher than for the remaining countries, showing the importance of the capital accumulation in building of export potential in the CEEC.

Given the systematic difference between CEEC and non-CEEC countries we turn to more thorough exploration of panel heterogeneity.

5 Heterogeneous panel data estimates

Our preliminary evidence exploits mostly the short-run variation of data. However, the the long-run effect might differ from the short-run reaction reported in the previous section. Therefore, we turn to the analysis of the long-run effects through the lens of an error correction model.

To estimate the long-run elasticities we use a panel error correction model (ECM):

$$\Delta y_{it}^{j} = \alpha_{0,i} + \alpha_{1,i}\Delta k_{it} + \alpha_{2,i}\Delta l_{it} + \alpha_{3,i}\Delta x_{it} + \phi_{0,i}y_{it-1}^{j} + \phi_{1,i}k_{it-1} + \phi_{2,i}l_{it-1} + \phi_{3,i}x_{it} + \varepsilon_{it}, \quad (7)$$

where $y_{it}^{j} \in \{va_{it}, dva_{it}, eva_{it}\}$, k_{it} and l_{it} stands for the nonstationary (logged) capital and labor input, x_{it} is the additional independent variable and ε_{it} is the error term. In the above formulation we relax the assumption that all parameters are homogeneous among considered countries. The parameters $\alpha_{1,i}$, $\alpha_{2,i}$ and $\alpha_{3,i}$ measure the contemporaneous reaction of outcome variable to a change in factors of production. If the coefficient $\phi_{1,i}$ (on the y_{it-1}^{j}) lies between -1 and 0 then it is a central value in the ECM model because it captures the pace of adjustment toward a (long-run) equilibrium. The long-run multiplier can be obtained directly from the estimates of the equation (7) and are equal to $-\phi_{1,i}/\phi_{0,i}$, $-\phi_{2,i}/\phi_{0,i}$ and $-\phi_{2,i}/\phi_{0,i}$ for capital, labor and additional independent variable, respectively. Finally, it should be mentioned that the above formulation of the ECM model nests the specification considered in the previous section. Namely, if the error correction mechanism is absent ($\phi_{i,0} = \phi_{i,1} = \phi_{i,2} = \phi_{i,3} = 0$ for all countries) and the assumption of short-run coefficients homogeneity is satisfied then (7) simplifies to (6).

We use the Common Correlated Effect (CCE) estimator proposed by Pesaran (2006). A natural way to account for potential slope heterogeneity is to perform mean group estimation which is a simple arithmetic average of coefficients estimated at the individual (country) level. However, in the presence of cross-sectional dependence this strategy does not produce reliable estimates due to a presence of multi-factor structure of the error term. Pesaran (2006) postulates to augment the individual-specific regression by cross-sectional averages of dependent and independent variables to account for the error multi-factor structure. More recently, Chudik and Pesaran (2015) show that taking into account the lagged dependent and explanatory variable is plausible strategy for controlling the effects of the unknown error multi-factor structure in the dynamic models. We follow this approach, but due to small time dimension, the individual-specific regression are extended additionally by the cross section averages of lagged dependent variables (Δy_{it}^{j} and y_{it-1}^{j}). Given relatively small time dimension we also pool the adjustment coefficient ($\phi_{0,i} = \phi_0$). This choice stems out from the fact that we are interested in (possible) heterogeneity of long-run estimates and an assumption on homogeneity of the long-run multipliers would be therefore pointless.[7] To check validity of this restriction we run the standard Hausman test.

In the baseline specification, we include only neoclassical factors of production, i.e., labor and capital. Table 5 summarizes the estimates of the ECM model for the value added and its components. For the value added (va_{it}) the estimates of the long-run

[7] In addition, we have also experimented with pooling other coefficients, i.e., various combination of $\phi_{0,i}$, $\alpha_{1,i}$, $\alpha_{2,i}$, $\alpha_{3,i}$ and $\phi_{3,i}$. Although the qualitative implications remained almost unchanged the Hausman statistics suggested that pooled estimates differ significantly from their mean group counterparts in some cases.

elasticities of capital and labor are positive and below unity. In addition, their sum does not exceed unity and when we take into consideration the variation of those estimates then the null hypothesis of constant returns to scale is strongly rejected in favor of decreasing return to scale. However, the statistical properties are rather problematic. Namely, the residuals exhibit moderate cross-sectional dependence and the error correction term is not stationary. To overcome this problem and account for a possible trend in total factor productivity in the ECM model for the va_{it} is extended by a linear (time) trend. These estimates (the second column in table 5) suggest the higher role of capital deepening and the estimated long-run elasticity on capital is above 0.7.

Table 5: The Error Correction Model estimates for the value added and its components

	Value added (va_{it})		Domestically abs.(dva_{it})		Exported (eva_{it})	
SHORT RUN						
Δk_{it}	1.808***	1.949***	2.005***	2.767***	1.821**	2.076***
	(0.408)	(0.407)	(0.544)	(0.657)	(0.744)	(0.722)
Δl_{it}	0.254***	0.285***	0.511***	0.712***	0.727***	0.520**
	(0.058)	(0.064)	(0.091)	(0.090)	(0.185)	(0.213)
LONG RUN						
y^j_{it-1}	-0.490***	-0.551***	-0.483***	-0.644***	-0.350***	-0.442***
	(0.045)	(0.049)	(0.040)	(0.059)	(0.038)	(0.044)
k_{it}	0.452**	0.712**	0.257**	0.897**	1.846***	0.312
	(0.196)	(0.338)	(0.122)	(0.452)	(0.288)	(0.502)
l_{it}	0.313**	0.411**	0.017	-0.019	0.263	0.953**
	(0.137)	(0.159)	(0.177)	(0.190)	(0.527)	(0.443)
t		-0.002		-0.014*		0.049***
		(0.006)		(0.008)		(0.013)
RESIDUALS AND ERROR CORRECTION DIAGNOSTICS						
Hausman	[0.000]	[0.053]	[0.070]	[0.317]	[0.671]	[0.544]
CD	[0.032]	[0.281]	[0.006]	[0.925]	[0.662]	[0.696]
IPS	[0.333]	[0.086]	[0.042]	[0.013]	[0.000]	[0.002]
CADF	[0.007]	[0.000]	[0.470]	[0.033]	[0.050]	[0.036]
Chang	[1.000]	[1.000]	[0.997]	[0.997]	[0.000]	[0.002]

Note: the superscripts ***, ** and * denote the rejection of null about parameters' insignificance at 1%, 5% and 10% significance level, respectively. The expressions in round and squared brackets stand for standard errors and probability values corresponding to respective hypothesis, respectively. The Hausman statistics is employed to compare the above results with the mean group estimates and the null states that there is no systematic differences. The CD refers to the test for the presence of (weak) cross-sectional dependence and the null hypothesis postulates cross-sectional independence (Pesaran, 2015). In the panel stationarity test for the error correction term, i.e., IPS (2003), CADF (2007) and Chang (2002), the null hypothesis is about unit root tests.

The results for the ECM model for domestically absorbed value added are strikingly different. In the baseline model (without trend, third column in table 5) the estimated long-run elasticities of interest are relatively small (on capital) or insignificant (on labor). Akin to the previous case, the statistical inference is not plausible here due to possible unit root in the error correction and cross-sectional dependence of the residuals. In the extended model (with a linear trend) the statistical properties are more trustworthy and the long-run elasticity of capital is slightly higher. However, the estimated coefficient on time trend is negative at 10% significance level. This puzzling estimate can be explained with our previous investigation on economic convergence (see section 3), i.e., substantially lower convergence rate (or divergence for non-CEEC countries) of domestically absorbed value added.

The estimates of the baseline ECM model for the exported value added (without trend, fifth column in table 5) highlight the role of capital deepening in export-led growth. Moreover, the implied long-run elasticity to capital exceeds unity while the respective coefficient for labor is insignificant. Importantly, in this case the residuals are not cross-sectionally correlated while the null hypothesis concerning the unit root is rejected at 5% in all tests. These numbers point to capital-intensity of export-led growth. However, in our supply-side focus the extraordinarily high long-run elasticity to capital can be explained by the absence of technological factors. Therefore, as in previous cases, the ECM model for the eva_{it} is extended by a linear trend. It turns out that this modification completely changes our results. Namely, it reduces the long-run elasticity of capital to zero, producing average growth rate of technology progress exceeding 4.9% per annum and relatively high coefficient on labor. Based on these estimates, the implied explanation of export-led growth is purely technological.

To rationalize our set of estimates for exported value added the ECM model is extended by supply-side factors that can possibly have a long-run effect on export-led growth. Table 6 presents a broad set of estimates based on a replacement of time trend by such factors. Let us start with the foreign content of exports (FAX_{it}) which measures degree of international fragmentation of production. By including import content of gross exports in the ECM model the capital elasticity substantially decreased. More importantly, the implied effect of change in FAX_{it} on the eva_{it} is positive both in the short and long run. This highlights the importance of vertical specialization for export-led growth.

In addition, we also consider the ECM with FDI, real effective exchange rate and import content of investment. In all cases we find a slight reduction in long-run effect of capital intensity, however, less pronounced than in the ECM model with the FAX_{it}. The estimated long-run estimates are in line with the economic intuition.

According to the estimates for all alternative specifications labor is a crucial supply-side driver of exported value added only in the short-run. In all cases the estimated long-run elasticities are insignificant. This suggests that the export-led growth is not labor-intensive.

Eyeballing long-run estimates at the country level (figure A.6–A.7) several patterns can be identified. Firstly, export-led growth is more sensitive to changes in capital in CEEC. Secondly, the role of labor input in the creation of the exported value added is larger in the non-CEEC countries. Thirdly, the long-run effects of globalization and technical change are almost the same in the CEEC and non-CEEC countries.

Summing up, our empirical evidence suggests systematic differences in the importance of factors of production between exported and domestically absorbed value added. In particular, the long-run export-led growth can be explained mostly by capital deepening enhanced by international fragmentation of production.

Table 6: The Error Correction Model estimates for the exported value added

	(1)	(2)	(3)	(4)	(5)	(6)
SHORT RUN						
Δk_{it}	1.821**	1.019	1.719**	2.080***	0.972	1.143
	(0.747)	(0.828)	(0.800)	(0.788)	(1.087)	(1.056)
Δl_{it}	0.511***	0.712***	0.413**	0.598***	0.727***	0.520**
	(0.511)	(0.169)	(0.167)	(0.162)	(0.185)	(0.213)
ΔFAX_{it}			0.771***			
			(0.222)			
Δfdi_{it}				0.142**		
				(0.056)		
$\Delta reer\_ulc_{it}$					-0.297***	
					(0.081)	
$\Delta GFCF^{F}_{it}$						0.905***
						(0.195)
LONG RUN						
eva_{it-1}	-0.350***	-0.448***	-0.331***	-0.426***	-0.353***	-0.409***
	(0.038)	(0.051)	(0.046)	(0.046)	(0.045)	(0.046)
k_{it}	1.846***	0.312	1.125***	1.788***	1.772***	1.462***
	(0.287)	(0.521)	(0.389)	(0.316)	(0.351)	(0.329)
l_{it}	0.262	0.953**	0.173	0.356	0.783	0.412
	(0.527)	(0.413)	(0.647)	(0.429)	(0.562)	(0.485)
t		0.049***				
		(0.015)				
FAX_{it}			3.008***			
			(0.819)			
fdi_{it}				0.346		
				(0.230)		
$reer\_ulc_{it}$					-0.458***	
					(0.176)	
$GFCF^{F}_{it}$						2.268***
						(0.469)
RESIDUALS AND ERROR CORRECTION DIAGNOSTICS						
Hausman	[0.671]	[0.544]	[0.993]	[0.918]	[0.000]	[0.093]
CD	[0.662]	[0.696]	[0.951]	[0.480]	[0.191]	[0.270]
IPS	[0.000]	[0.002]	[0.003]	[0.000]	[0.000]	[0.070]
CADF	[0.050]	[0.036]	[0.000]	[0.003]	[0.486]	[0.081]
Chang	[0.000]	[0.002]	[0.000]	[0.003]	[0.486]	[0.081]

Note: as in the table 5.

6 Concluding remarks

The link between trade and growth has been somewhat ambiguous in the economic literature, for at least two reasons. One is the problem of complexity of production chains that leads to an increasing import intensity of exports and renders the standard national accounts-based GDP decompositions inaccurate. Second is a problem of endogeneity, ie. exports are a component of GDP and measures of openness used in the past empirical literature are not completely exogenous.

We have taken a different approach to that of the past literature. Instead of looking at aggregate growth rates, we have been able to split GDP growth into parts that are directly related to domestic absorption and exports, by cleaning exports from the foreign value added content. This way, we have been able to revisit the standard convergence equations using different GDP components and look at the contributions of domestic absorption and exports to convergence processes.

Our decompositions show that exports have been a predominant component of the GDP growth rate of the CEEC in the analyzed period, in particular after the EU accession. Export performance of the CEEC have been better than most of the comparator EU-15 countries and remained to be important even after the global economic crisis. We show that the rate of convergence within the CEEC that was due to exports was twice as large as the one due to supply to the domestic market. In the case of the CEEC countries catching up with the rest of the EU-15, exports played an even larger role.

We have analyzed the sources of growth of domestic value added by using modern panel methods. We show that the growth rate of exports was mainly driven by the capital deepening (including imports of investment goods) as well as increased participation in GVC and to a smaller extent FDI and that growth of the labor input did not play a significant role. This finding is in contrast to the "'traditional"' view of the division of labor in Europe, ie. the advanced countries specializing in capital-intensive goods and the less developed countries having comparative advantage in labor intensive goods. Setting up modern export-oriented production facilities in Eastern Europe has clearly involved the growth of capital stock, imports of technology as well as inflow of FDI, and the export structures in Europe are rather vertically than horizontally differentiated.

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A Additional tables and figures

Table A.1: Data sources and description of variables

Variable	Description
va_{it}	the logged real value added
dva_{it}	the logged real domestically absorbed value added
eva_{it}	the logged real exported (absorbed abroad) value added
k_{it}	the logged real capital stock, the series taken from the Penn World Table (PWT) 9.0 (Feenstra et al., 2015)
l_{it}	the logged labor input approximated by the aggregate hours, the series taken from the PWT 9.0
FAX_{it}	the share of foreign content (value added) in the the gross exports. The FAX_{it} series are calculated with the WIOD database.
$GFCF_{it}^{F}$	the share of foreign content (value added) in investment (the gross fixed capital formation). The $GFCF_{it}^{F}$ series are calculated with the WIOD database.
fdi_{it}	the fdi stock, as % of GDP; series taken from OECD
$reer\_ulc_{it}$	the logged real effective exchange rate deflated by unit labor costs in total economy; the series taken from the Eurostat
$CEEC_i$	dummy variable for the 10 CEEC countries, i.e., Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

Table A.2: Panel Unit Roots and Cross Sectional Dependence Tests for the economic variable of interest

Variable	Panel Unit Roots			Cross-Sectional Dependence	
	IPS	CADF	Chang	$ave\|\rho\|$	CD
LEVELS (OR LOGGED LEVELS)					
va_{it}	[0.725]	[0.967]	[1.000]	[0.907]	73.11***
dva_{it}	[0.169]	[0.539]	[1.000]	[0.726]	53.55***
eva_{it}	[0.999]	[0.208]	[1.000]	[0.937]	75.54***
k_{it}	[0.764]	[0.954]	[0.644]	[0.980]	119.29***
l_{it}	[0.811]	[1.000]	[1.000]	[0.546]	26.77***
FAX_{it}	[0.637]	[0.248]	[1.000]	[0.684]	65.08***
$GFCF^F_{it}$	[0.258]	[0.546]	[0.453]	[0.434]	36.48***
fdi_{it}	[1.000]	[0.000]	[1.000]	[0.720]	75.28***
$reer\_ulc_{it}$	[0.000]	[0.001]	[1.000]	[0.522]	23.14***
FIRST DIFFERENCES					
Δva_{it}	[0.000]	[0.000]	[0.000]	[0.600]	46.83***
Δdva_{it}	[0.000]	[0.000]	[0.000]	[0.356]	26.19***
Δeva_{it}	[0.000]	[0.000]	[0.000]	[0.534]	41.49***
Δk_{it}	[0.003]	[0.001]	[0.085]	[0.505]	36.75***
Δl_{it}	[0.000]	[0.000]	[0.000]	[0.307]	31.37***
ΔFAX_{it}	[0.000]	[0.000]	[0.000]	[0.435]	46.87***
$\Delta GFCF^F_{it}$	[0.000]	[0.000]	[0.000]	[0.343]	34.94***
Δfdi_{it}	[0.000]	[0.000]	[0.000]	[0.421]	41.66***
$\Delta reer\_ulc_{it}$	[0.000]	[0.000]	[0.000]	[0.294]	8.85***

Note: The expressions in squared brackets stands for probabilities values corresponding to respective hypothesis. In the panel stationarity test, i.e., IPS (2003), CADF (2007) and Chang (2002), the null hypothesis is about unit root tests. The ave $|\rho|$ stands for the averaged absolute correlation coefficient . The CD refers to the test for the presence of (weak) cross-sectional dependence and the null hypothesis postulates cross-sectional independence (Pesaran, 2015).

Table A.3: The estimates of labor and capital elasticities for exported value added (FE)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10	(11)	(12)
Δk_{it}	0.078	-0.500	0.186	-0.524	0.166	-0.581	0.066	-0.429	0.279	-0.770*	0.233	-0.575
	(0.243)	(0.459)	(0.238)	(0.447)	(0.229)	(0.433)	(0.245)	(0.474)	(0.231)	(0.432)	(0.227)	(0.426)
Δl_{it}	0.580***	0.574***	0.596***	0.709***	0.532***	0.519***	0.580***	0.531**	0.545***	0.793***	0.548***	0.622***
	(0.108)	(0.208)	(0.106)	(0.205)	(0.102)	(0.196)	(0.109)	(0.213)	(0.103)	(0.197)	(0.101)	(0.194)
$CEEC_i \times \Delta k_{it}$		0.774		0.932**		1.005**		0.669		1.417***		1.085**
		(0.483)		(0.472)		(0.459)		(0.500)		(0.461)		(0.451)
$CEEC_i \times \Delta l_{it}$		0.077		-0.110		0.099		0.172		-0.277		-0.059
		(0.227)		(0.224)		(0.213)		(0.238)		(0.218)		(0.213)
ΔFAX_{it}			0.889***	0.597**							0.629***	0.189
			(0.183)	(0.249)							(0.179)	(0.251)
$CEEC_i \times \Delta FAX_{it}$				0.468*								0.661**
				(0.269)								(0.269)
$\Delta reer\_cpi_{it}$					-0.401***	-0.360***					-0.361***	-0.382***
					(0.053)	(0.101)					(0.053)	(0.106)
$CEEC_i \times \Delta reer\_cpi_{it}$						-0.072						-0.007
						(0.120)						(0.124)
Δfdi_{it}							0.004	0.004				
							(0.007)	(0.008)				
$CEEC_i \times \Delta fdi_{it}$								0.128*				
								(0.073)				
$\Delta GFCF^F_{it}$									0.871***	0.711***		
									(0.119)	(0.159)		
$CEEC_i \times \Delta GFCF^F_{it}$										0.416**		
										(0.209)		
μ	0.030***	0.032***	0.030***	0.033***	0.031***	0.033***	0.031***	0.036***	0.024**	0.028***	0.030***	0.034***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)

Note: the superscripts ***, ** and * denote the rejection of null about parameters' insignificance at 1%, 5% and 10% significance level, respectively. The expressions in round brackets stands for robust standard errors.

Figure A.1: Value and its components (average in the selected periods, in %)

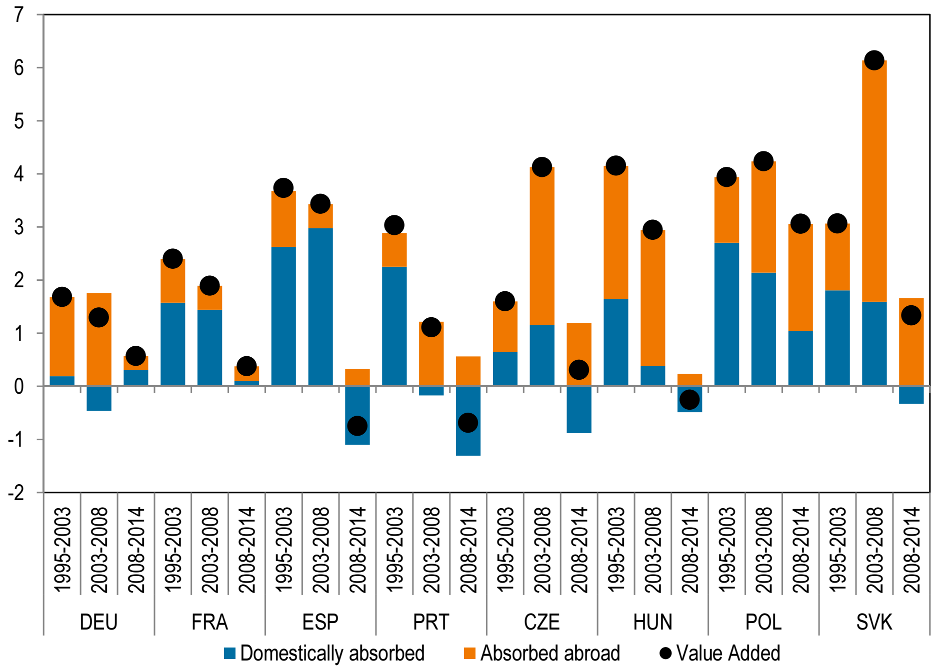

Figure A.2: Exported value added growth and its components (average in the selected periods, in %)

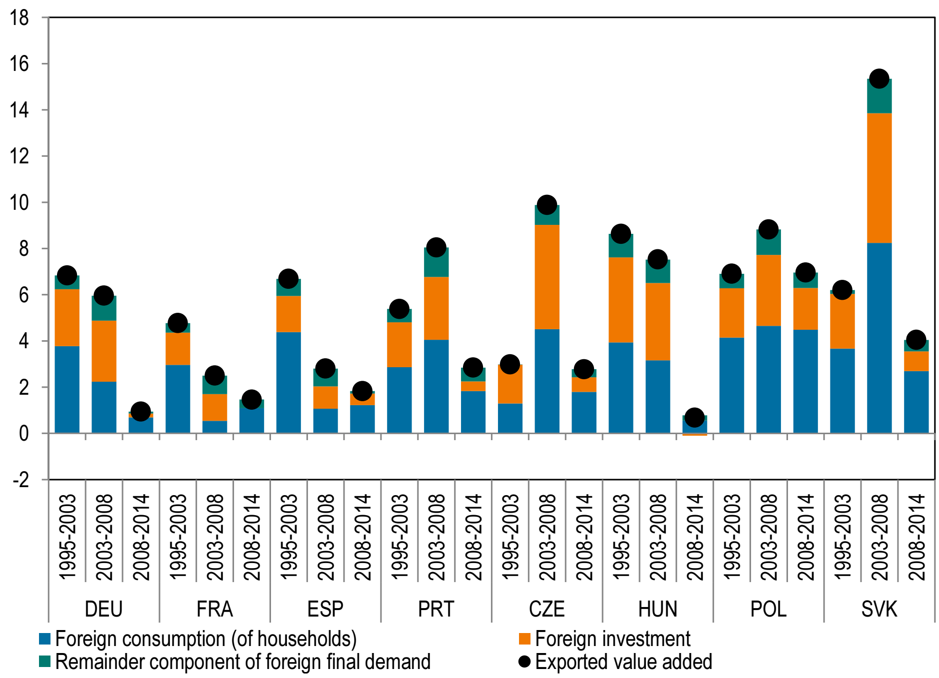

Figure A.3: Exported value added growth and its components(average in the selected periods, in %)

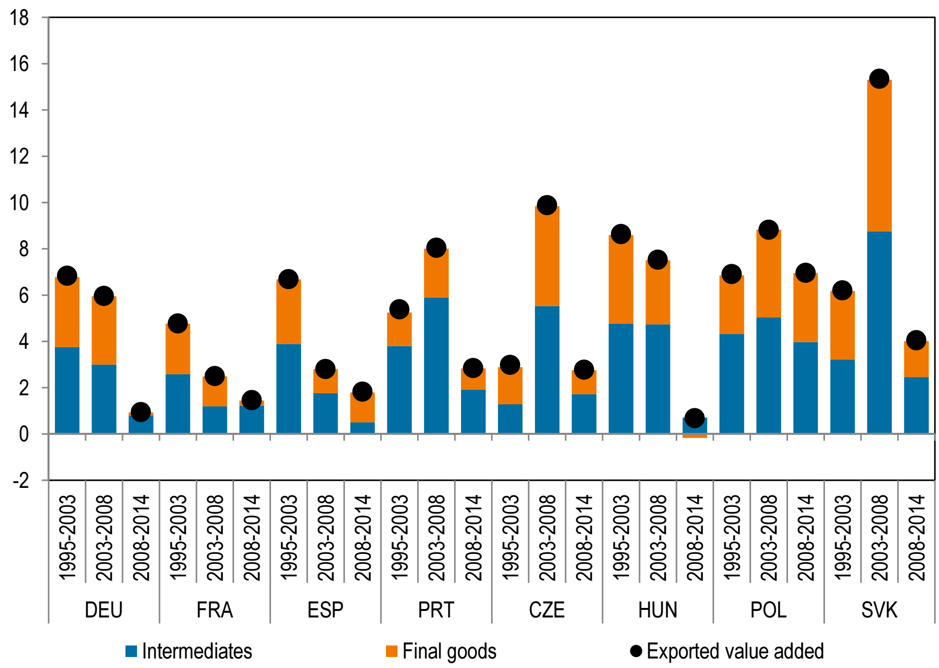

Figure A.4: GDP growth and its components (annualized in the selected periods, in %, 2003-2014)

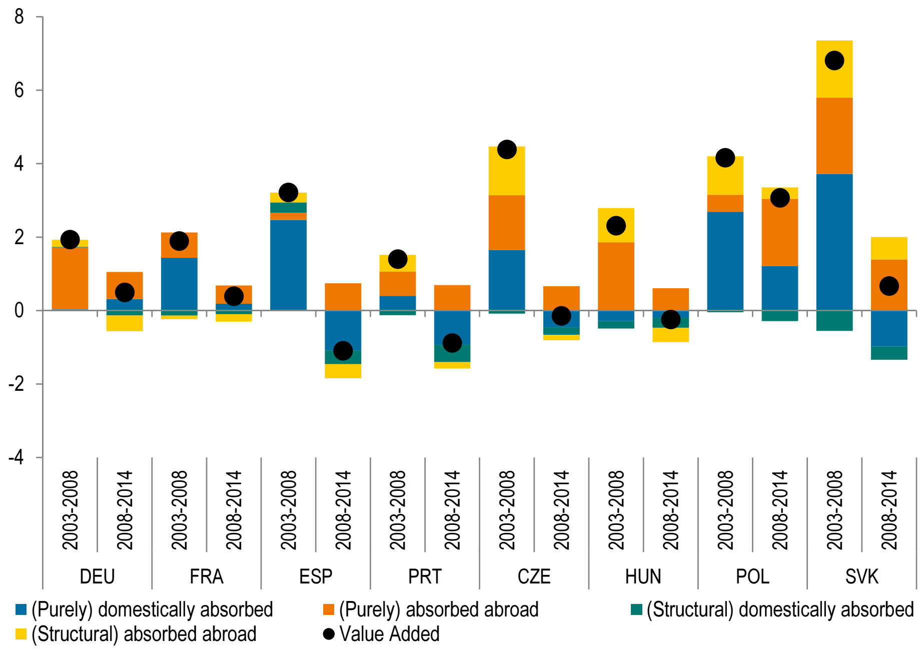

Figure A.5: Creation of Value added and the role of Imports

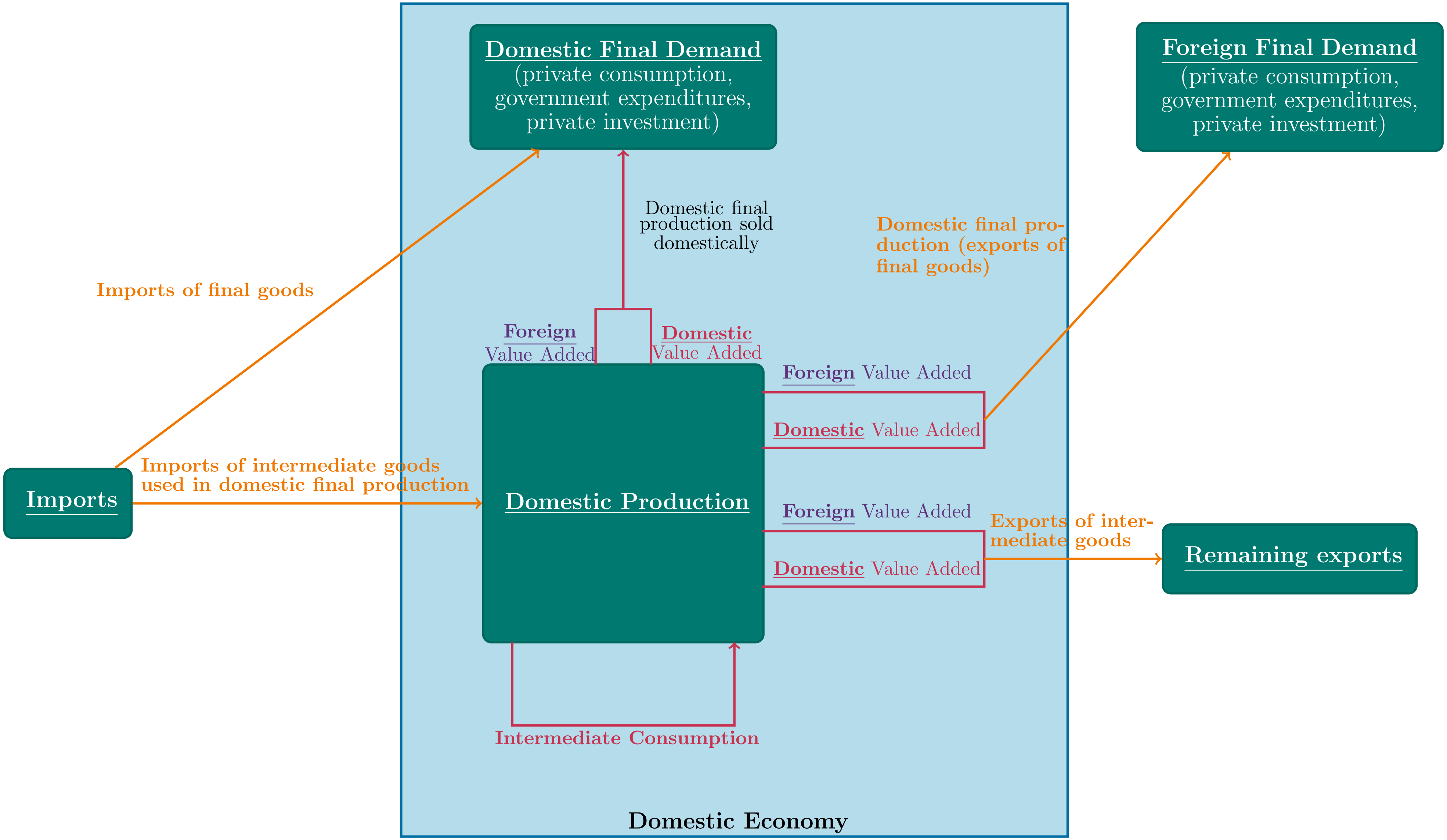

Figure A.6: The long-run elasticities at the country level – the baseline ECM model (without a linear trend)

value added (va_{it})	domestically absorbed value added (dva_{it})	exported value added (eva_{it})

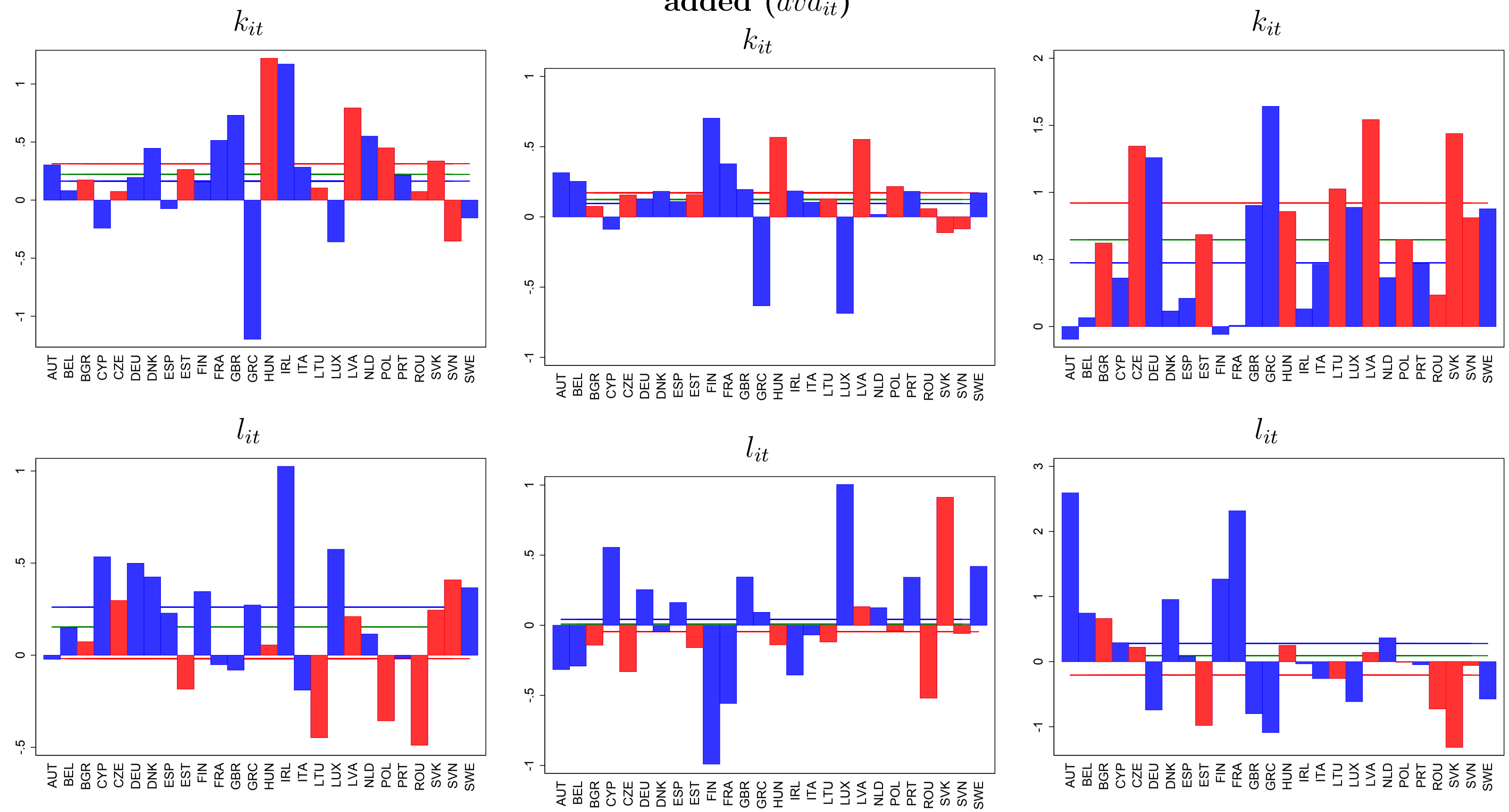

Figure A.7: The long-run elasticities at the country level – the ECM model with a linear trend

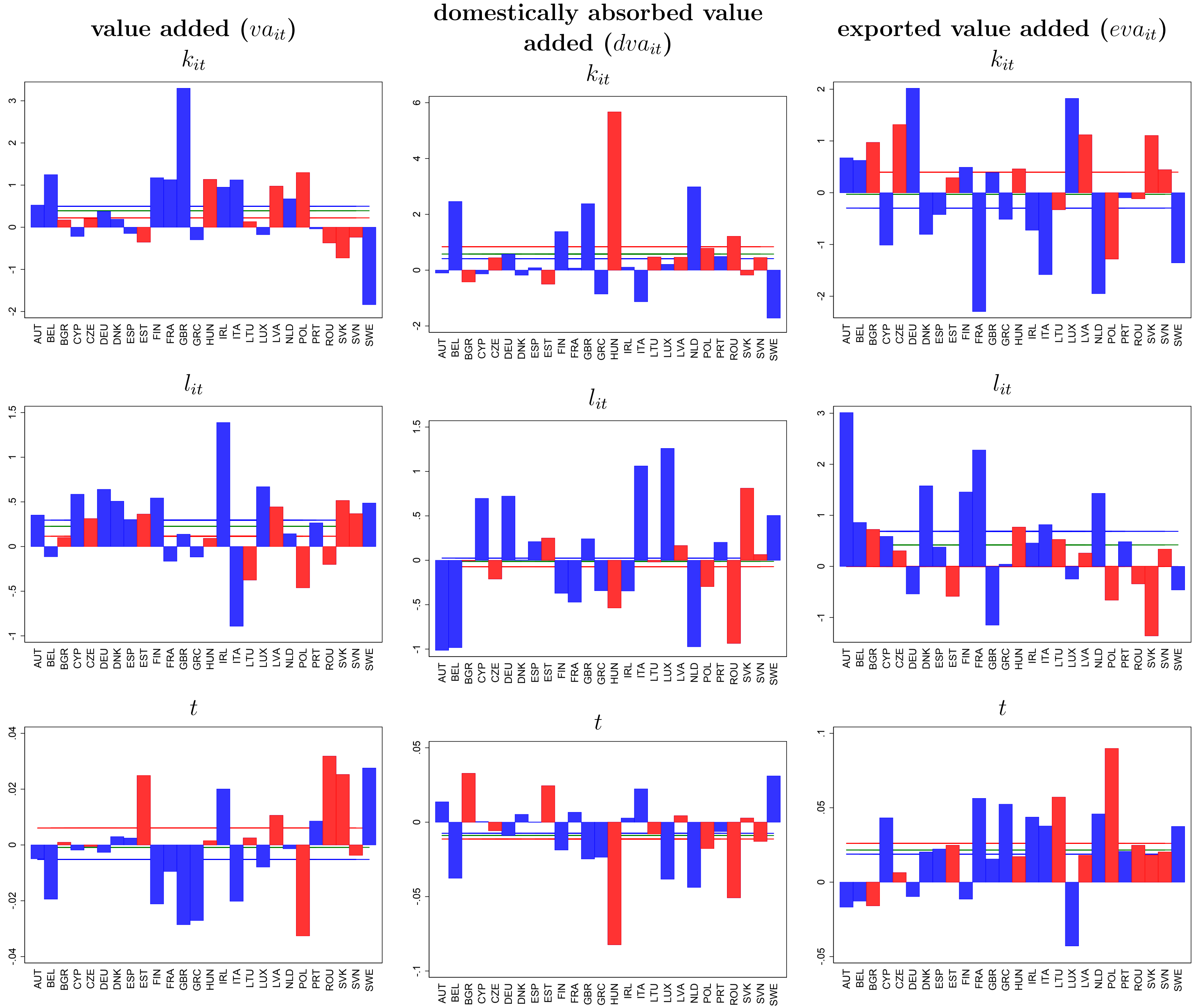

Figure A.8: The long-run elasticities at the country level – the ECM for the exported value added (1/2)

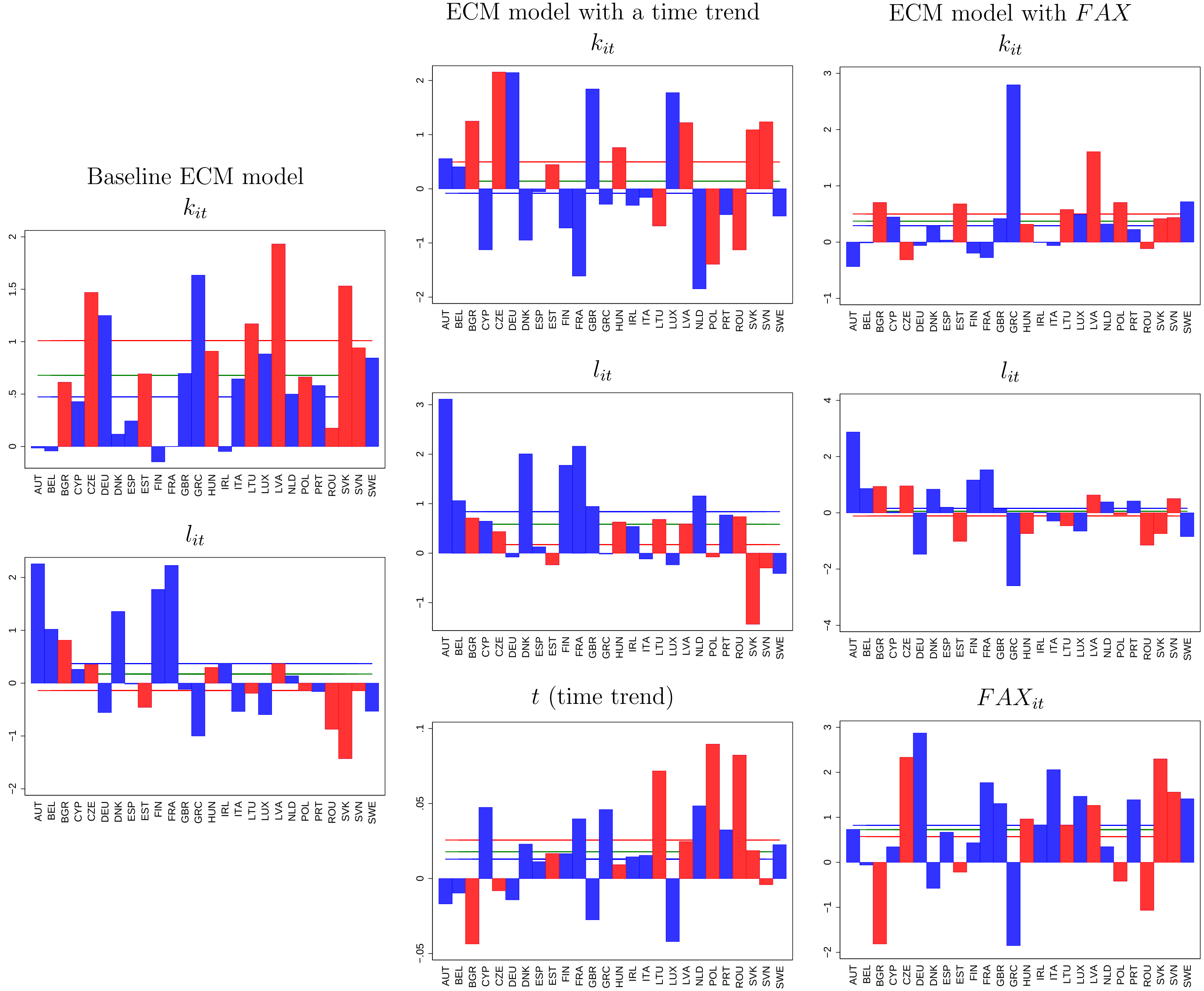

Figure A.9: The long-run elasticities at the country level – the ECM for the exported value added (2/2)

ECM model with fdi | ECM model with $reer\_ulc$ | ECM model with $GFCF^F$

k_{it} | k_{it} | k_{it}

l_{it} | l_{it} | l_{it}

fdi_{it} | $reer_ulc_{it}$ | $GFCF^F_{it}$