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New patterns in the position of CEE countries in global value chains: functional specialisation approach

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Abstract

Research background: High servitisation of manufacturing makes it impossible to separate services from manufactured goods properly, which implies difficulties in the assessment of the position of the country on the smile curve, i.e. in the proper assignment of products or services to one of the industrial process steps: pre-production, pure fabrication or post-production services. Therefore, we propose to use the business functions of industries identified with the aid of labour market data rather than the industrial classification of products in order to create a more appropriate measure of the position of countries in GVCs.
Purpose of the article: We aim to identify and analyse the patterns of functional specialisation for eight Central and Eastern European Countries (CEECs) — the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia — both at the country and industry level. In addition, we analyse functional specialisation patterns for Germany, which serves as a reference country.
Methods: To assess functional specialisation patterns, we employ the methodology proposed by Timmer *et al.* (2019a). It allows us to obtain functional specialisation indices for four different business functions — management, R&D, marketing, and fabrication. To compute them, we

combine two sources of data — domestic value added from decomposed sectoral input-output tables (the World Input Output Database) and the Occupations Database built up by Timmer *et al.* (2019a).

Findings & value added: Our research shows a very heterogeneous pattern in CEEC countries' position in GVCs by taking into account their functional specialisation at the countries and industries levels. Poland and Slovakia focus primarily on low value-added fabrication processes, the Baltic countries and Slovenia specialise in management services, Hungary and Latvia gain in marketing services, and the Czech Republic and Slovenia win in R&D activities. We indicate that some CEE countries (Poland, Slovakia) could be stuck in a functional trap, and our approach could be a valuable tool for assessing the process of coming out of it.

Introduction

Most international trade takes place within global value chains (GVCs). Seventy percent of international trade is the exchange of intermediates, services, and capital goods used by firms for production and to serve their customers (OECD 2020, pp. 1–11). What is more, multinational enterprises are responsible for one-third of the world's production and half of the global trade (OECD, 2018, pp. 1–9). On the other hand, the coronavirus (COVID-19) pandemic has a considerable impact on global value chains, and some economists forecast that future changes in the framework of GVCs will lead to a decline (Javorcik 2020, pp. 111–116). Regardless of these findings, in the literature we can still see new attempts to improve the measurement of GVC activities at the country or sector level.

Previous analyses of country/industry positions in GVCs concentrate on the distance from final demand, which indicates how far countries are situated from the final downstream industry in the production process that deals with the final demand of the supply chain (Antràs *et al.* 2012, pp. 412–416; Chen 2017, pp. 66–74; Wang *et al.* 2017, pp. 1–71). The most popular measure of GVC position is the upstreamness index proposed by Fally (2011, pp. 2–12) and Antràs *et al.* (2012, pp. 412–416), which measures the industry's distance from the final use in terms of the number of production stages.

These indicators have one significant weakness. For their calculation, data based on industrial classification must be used, which is unreliable *per se*. Trade and industrial data are organised through classifying firms by their primary activity, which could be misleading. Firms which design the goods that they sell and coordinate production networks are often classified as manufacturers, but they do not participate in the fabrication process (Fontagné & Harrison 2017, pp. 1–34). When using industrial data, it is also difficult to distinguish between service and manufacturing items due to the high servitisation of manufacturing. It means that manufacturing firms

increasingly use and produce services that they combine with the goods they sell. In international trade, most of the value added by service sectors is through the delivery of intermediates to manufacturing sector whose output is exported.

So, in literature there is a gap and a demand for new approaches to identify a countries position in GVCs by used methods devoid of the abovementioned weaknesses. We try to fill this gap to use a new approach named functional specialisation, proposed by Timmer *et al*. (2019a, pp. 1–30). The methodology combines detailed occupation data with input-output tables to trace value added trade flows across countries and concentrate on preparing a new index of revealed comparative advantage based on the different types of GVC activities. Our paper aims to analyse the pattern of GVC activities for eight CEE countries (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia) and Germany, which is a benchmark country. To the best of our knowledge it is the first analysis focused on the functional specialisation pattern for CEEs countries. Our research allows us to discover and track if any CEE countries fall into a functional trap.

The paper is organized as follows. Section 2 includes a literature review on the specialisation in trade, especially on its evolution and measures. Section 3 describes the methodology of the research. We present the new approach to measure the functional specialisation proposed by Timmer *et al.* (2019a, pp. 1–30). Section 4 presents and analyses the results. We focus on showing the identified pattern of GVC specialisation in CEECs. Section 5 is a discussion on existing studies, and, finally, Section 6 includes conclusions.

Literature review

Specialisation is a central idea in international trade theories. In the absence of the exchange of international goods, a country consumes all that it produces. As a result of foreign trade, a country does not have to manufacture all products, but it may specialise in producing some goods. Specialisation may occur in the range and volume of goods. Foreign trade theories provide numerous explanations for how countries specialise in the amount of sales of goods. They focus on different determinants of specialisation, i.e. the Ricardo's model on labour productivity differentials (Ricardo, 1817, pp. 256–272), the Heckscher–Ohlin model on relative factor endowments (Ohlin, 1967, pp. 281–324), a new trade theory on demand characteristics and market structure (Krugman, 1980, pp. 950–959) and, additionally, new

economic geography models on transport cost (Krugman, 1991, pp. 483–499). The specialisation concept was popularised by Balassa (1965, pp. 99–123), who proposed a standard tool to analyse specialisation patterns, i.e. the revealed comparative advantage index (RCA).

However, the approach to the specialisation changes significantly due to the changes that have occurred in international trade over the last two decades. Nowadays, it is about developing GVCs, by which we understand the full range of activities (design, production, marketing, distribution and support for the final consumer, etc.) that are divided among multiple firms and workers across geographic spaces to bring a product from its conception to its end use and beyond (de Backer & Miroudot, 2014, pp. 1–42). The development of GVCs has affected global trade primarily by significantly increasing trade in intermediate goods. Two-thirds of world trade occurs via global value chains, in which products cross at least one border before the final assembly (Degain *et al*., 2017, pp. 37–68). In recent years, GVCs represent a significant source of economic upgrading opportunities and a new direction for growth. They also change the specialisation approach, which should concentrate on more intensive participation in the global value chain (Cattaneo *et al.*, 2013, pp. 1–52).

The idea of the smile curve explains how the benefits of GVCs are distributed among countries. The concept of the smile curve was proposed by Shih (1996, pp. 1–126), the founder of Acer, who observed that both ends of the value chain (pre- and post-production service activities) generate higher values added to the product than the middle of the value chain (fabrication activities). The smile curve logic has been widely used in the context of GVCs (Meng & Wei, 2020, pp. 988–1016). It reveals that countries should specialise in pre-production activities (such as product design, research, development, market research or software development) and post-production activities (marketing and sale) in order to generate more value added. Countries may be involved in the pure production activity (instead of outsourcing it) if the production process is based on new Industry 4.0 technologies, advanced robotics and high skill availability. The smile curve concept also indicates that a high specialisation in the low-value chain function may hamper economic growth because of the comparatively lower value added generated (Stöllinger, 2018, pp. 1–25).

The previous approach to measuring "specialisation patterns" via GVC functions did not refer to specific specialisation measures like the RCA index. GVC position measures proposed by Fally (2011, pp. 2–12), Antràs *et al.* (2012, pp. 412–416), Chen (2017, pp. 66–74), Wang *et al.* (2017, pp. 1–71), which focus on the industry's distance to the final demand, are considerably more popular. Only Stöllinger (2019, pp. 1–45) and Timmer *et al.*

(2019a, pp. 1–30) propose a new measure of country's specialisation in global value chains, which is referred to as functional specialisation. The general idea is to combine the classic formula of specialisation, i.e. RCA index, with the functions played by countries in GVCs.

The approach proposed by Stöllinger (2019, pp. 1–45) is based on project-level data on FDI greenfield investment. The measurement of functional specialisation is linked to the role of foreign-owned subsidiaries located in GVCs. To measure functional specialisation, Stöllinger (2019, pp. 1–45) suggests using the share of inward greenfield FDI projects in a country serving a particular function in the total number of inward projects in that country, relative to the corresponding share at the world level.

For our analysis, we apply the second approach proposed by Timmer *et al.* (2014 pp. 1–32; 2019a, pp. 1–30). It is associated with the worker's occupation. The authors map occupations to activities and combine them with information on inter-industry and inter-country trade flows from the World Input-Output Database. In this approach, the occupation of workers provides information on the nature of the activity performed.

Given that functional specialisation is a novel concept, papers on this topic are scarce. Chen *et al*. (2018, pp. 1–41) apply it to reveal a negative relationship between specialisation in fabrication activities and GDP per capita of Chinese provinces. Timmer *et al*. (2019a, pp. 1–30) find considerable heterogeneity in specialisation patterns across selected OECD countries and a positive correlation between GDP per capita and specialisation in R&D. They find specialisation in management and marketing functions unrelated to the income. On the other hand, de Vries *et al.* (2020, pp. 1–29) use data at the level of Dutch firms to discover that firms specialised in R&D and marketing are significantly more productive than those specialised in fabrication. Buckley *et al.* (2020, pp. 79–106) reveal that developing economies forge ahead with revenue generated from manufacturing activities compared to advanced economies, while income convergence resulting from knowledge-intensive activities carried out in pre- and post-manufacturing phases are much slower.

This paper focuses on the analysis of functional specialisation patterns in CEECs trade. In addition, we wish to identify what these countries do in the value chain by analysing the their functional specialisation indexes at industrial level.

Research methodology

For the identification and analysis of functional specialisation patterns in trade across selected CEE countries, we apply the novel methodology proposed by Timmer *et al*. (2019a). This approach allows to illustrate the specialisation of a country in different business activities located along GVCs by adopting Balassa's (1965) revealed comparative advantages index. As Timmer *et al.* (2019a, p. 3), we consider *k* functions linked to four types of activities of firms in the production process: research and development services with technology development (RD), pure production (FAB), management services (MGT) and marketing services consisting in sales and distribution activities (MAR).

The identification of particular business functions — followed by their contribution to country exports — are based on information obtained from the labour market. A key factor is labour income of domestic workers who carry out such functions. Workers are assigned to particular business activities according to their occupations.

To calculate functional specialisation (FS) indices for function *k* in country *i*, we use to following formula:

$$FS_i^k = \frac{f_i^k / \sum_k f_i^k}{\sum_i f_i^k / \sum_i \sum_k f_i^k}, \tag{1}$$

which reflects the relation between the share of function *k* in overall income in country exports and the income share of function *k* for all countries in their total exports.

To calculate f_i^k — domestic value added by function *k* in country *i*'s exports — two steps and two sources of data are needed. The first step involves the identification of domestic value added in exports on the basis of input-output tables.

Taking into consideration such tables for G industries in country *i*, the G×1 gross output vector *y* is as follows:

$$\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_G \end{bmatrix} = \begin{bmatrix} 1 - a_{11}^d & -a_{12}^d & \dots & -a_{1G}^d \\ -a_{21}^d & 1 - a_{22}^d & \dots & -a_{2G}^d \\ \vdots & \vdots & \ddots & \vdots \\ -a_{G1}^d & -a_{G2}^d & \dots & 1 - a_{GG}^d \end{bmatrix}^{-1} \begin{bmatrix} e_1 \\ e_2 \\ \vdots \\ e_G \end{bmatrix} \tag{2}$$

and it can be written in a matrix notation as:

$$y = (I - A^D)^{-1}e, \tag{3}$$

where I is a G×G identity matrix, A^D is a G×G matrix of domestic coefficients, and e refers to a G×1 vector of gross exports. Next, the G×1 vector of domestic value added in exports (d) takes the following form:

$$d = Vy, \tag{4}$$

where V gives a G×G matrix of value-added shares of gross output on diagonal and zeros elsewhere:

$$V = \begin{bmatrix} v_1 & 0 & \dots & 0 \\ 0 & v_2 & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & v_G \end{bmatrix}. \tag{5}$$

The second step of the FS concept proposed by Timmer *et al.* (2019a, p. 10) focuses on workers and their occupations. It is assumed that in each industry of country i, groups of workers serve four different business functions as mentioned above. Individual occupations are assigned to business functions as shown in Table 1. The majority of main 1-digit occupations groups (1, 4, 5, 6, 7, 8) according to the International Standard Classification of Occupations (ISCO-88) are strictly linked to particular functions. Professionals, technicians and associate professionals (groups 2 and 3) serve two functions — R&D and marketing services, whereas workers with elementary occupations carry out the pure production function or marketing activity.

Finally, by combining both sources — the input-output tables and the database of occupations — the G×1 vector f of value added by function k in the exports of country i is as follows:

$$f = Bd, \tag{6}$$

where B is a K×G matrix containing the share of domestic workers' income in value added from industry j.

In our article, the identification and analysis of FS patterns is provided at the country level as well as at the industry level, with particular reference to manufacturing versus services. We investigate fourteen manufacturing industries and seven service sectors (Table 2). In our analysis, we consider

only these service sectors which are treated as tradable, i.e. transport services, post and telecommunications, financial intermediation and business services.

Results

The decomposition of gross exports is conducted with the use of the World Input-Output Database (WIOD, Timmer *et al.*, 2015) and the Occupations Database created by Timmer *et. al.* (2019a).[1] The detailed analysis of functional specialisation is provided for eight CEE countries — the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia and for Germany, being a reference country, and for the period 1995–2011.

At the end of the period analysed, the structure of domestic value added in exports for particular business functions (Figure 1) indicates that two functions are of considerable importance — fabrication (from 30% for Germany to 48% for Poland) and marketing (from 26% for Poland to 38% for Latvia). The remaining functions account for 13–26% for the Czech Republic and Estonia respectively (marketing services) and 9–23% for Lithuania and Germany (in R&D activities).

In comparison to the beginning of the period (1999), the dominant position of the fabrication function saw a decline in the structure in all countries including Germany. The majority of CEECs — Estonia, Hungary, Lithuania, Latvia and Poland — noted an important growth in marketing. Value added in exports linked to this activity as a share of total value added in exports increased by 10 and 9 percentage points in Lithuania and Latvia, respectively. The most visible growth of the importance of management services is in Slovenia and Slovakia (9 and 6 percentage points). Finally, the most noticeable increase in terms of R&D activities is reported for Poland and the Czech Republic (about 3 percentage points for each country).

The next step involves the presentation of FS indices over time for eight CEECs and for Germany (Figure 2). Among the countries analysed, the pattern which is revealed by the German economy is the most desired. We observe a dominant role of R&D activities whereas other functions including fabrication do not provide advantages. The opposite pattern is observed for Poland. A strong specialisation in the fabrication function describes the Polish economy as a pure factory economy. This conclusion is similar to the results presented by Stöllinger (2021). A FS pattern similar to the Polish

[1] To obtain the FS indices, we use 'Online appendix with replication files' and the Matlab codes provided by Timmer *et al*. (2019b).

one is also demonstrated by the Slovak economy, but not to such a visible extent.

Considering other economies, fabrication still plays a significant role, but these countries also reveal advantages in the remaining business functions. Estonia — along with Latvia and Lithuania – exhibits specialisation in management, with such specialisation also being demonstrated by Slovenia at the end of the period. Comparative advantages linked to R&D activities in CEECs are mainly displayed by the Czech Republic and Slovenia. The last group of countries which specialise in marketing services includes Hungary and Latvia; however, advantages are visible from the year 2005 and 2008 respectively.

To answer the question on which sectors account for countries' specialisation in particular business activities, first we divide the industries into two groups — manufacturing and tradable service industries (Figure 3).

At the end of the period analysed, Germany, being our reference country, focuses all pre- and post-fabrication activities (especially R&D) only on manufacturing sectors, with sectors of German services not revealing comparative advantages whatsoever. The Czech Republic, Slovakia and Slovenia specialise in pure fabrication, marketing and R&D activities in manufacturing sectors only, with Slovakia and Slovenia also specialising in management. For Hungary and the Baltic states, that pattern is opposite; these countries reveal advantages in different business functions in service sectors only. Latvia is a country with a highly noticeable specialisation in all business functions in services, Lithuania displays advantages in fabrication and management, while Estonia does so in fabrication, marketing and R&D. Hungary has a slight advantage in fabrication and R&D and a slightly stronger position in marketing.

The next part of our analysis takes a closer look at particular industries (Table 3). When analysing the top 5 sectors with the highest FS indices (FS>1 only), the importance of transport activities (sectors 60-63) is observed, regardless of the country and business activity. The comparative advantage in any other service industries — financial intermediation or business services — does not exist (except for marketing in Hungary). This is unfavourable for CEECs. Advantage in business services may support the position of a country in global markets. Business services are suppliers of innovation, assist growth, productivity and high quality of employment (EC, 2014, pp. 12–13). On the other hand, it should be remembered that in our analysis, CEECs are considered against the background of all the WIOD countries.

From the perspective of the countries, Hungary, Latvia and Lithuania reveal a strong specialisation in transport services no matter which kind of

business function we analyse. This pattern is also visible for Estonia, but to a lower extent.

When it comes to manufacturing sectors in CEECs, we would like to underline the importance of four of them — manufacture of wood and of products of wood and cork (20), other non-metallic mineral products (26), manufacturing n.e.c. (36t37) and manufacture of rubber and plastic products (25). This specialisation is particularly visible in Slovakia, the Czech Republic and Slovenia. In case of Germany the most specialised sectors are manufacture of machinery (29) and manufacture of transport equipment (34t35).

Discussion

Our analysis allows us to reveal a new pattern of GVC specialisation for CEECs based on occupation data. The revealed specialisation patterns among CEECs are very similar to those discovered by Stöllinger (2021, pp. 93–116). In his analysis, which was based on FDI data, the same CEE countries possess revealed comparative advantage in the value chain function production, with the pre- and post-production functions being underrepresented. In addition, we find that CEECs at similar levels of development can vary widely in their FS pattern (Baltic vs. Visegrád Group countries), which is also confirmed by Timmer *et al.* (2019a, pp. 1–30). It goes without saying that further research based on more detailed data, i.e. regional data, is needed, and further analysis is highly recommended to discover a clear pattern of specialisation within CEE countries.

The identification of these patterns is crucial for national policy-making, because according to Cieślik *et al.* (2019, pp. 481–502), companies participating in GVCs produce a smaller range of products, which means that they focus on their core competencies. Our analysis confirms unfavourable positions of some CEE countries in GVCs (e.g. Poland and Slovakia), which still do not focus on R&D activities. Our results are consistent with the analysis conducted by Krūminas *et al.* (2019, pp. 1–17), which reveals that there are no links between GVC activities and R&D tasks in CEE countries. On the other hand, these results are in contrast to the known positive effects of GVC activities on innovation and productivity in the production process among advanced economies (Taglioni & Winkler, 2016, pp. 179–194)

We also discover that CEECs are highly specialised in sectors that are not very innovative or knowledge-intensive. These findings are in line with the study by Gereffi (2019, pp. 240–254), which reveals that a better posi-

tion in the value chain does not necessarily correspond to the upgrade of products or processes. On the other hand, Blažek (2016, pp. 849–869) distinguishes several forms of functional downgrading: passive downgrading (involuntary step of an enterprise towards the assembly of an easier good, triggered by the choice of a higher-ranking buyer); adaptive downgrading (an enterprise cannot withstand competitive pressure and is forced to specialise in a market segment with lower value); and strategic downgrading (which may result from a change in business strategy). Our study may suggest that CEE countries may be subject to adaptive downgrading in GVCs, but additional research is necessary to confirm this hypothesis.

Conclusions

Our paper aims to analyse the pattern of GVC activities for eight CEE countries (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia) and for Germany — as a reference country — using a novel approach referred to as functional specialisation. We discover a very different pattern of GVC specialisation in CEECs. Poland and Slovakia specialise in the fabrication function, the Baltic countries and Slovenia in management, Hungary and Latvia in marketing, and the Czech Republic and Slovenia both in fabrication and research and development. These patterns differ greatly from the German specialisation, where R&D activities play a dominant role. CEECs have revealed comparative advantages mostly in low knowledge-intensive services (transport) and manufacturing sectors (wood or plastic production), which serves as a confirmation of their unfavourable position in GVCs compared to Germany.

Our analysis has some policy recommendations. The findings suggest that some CEE countries (Poland, Slovakia) could be stuck in a functional trap. This could be for two reasons. First, as Stöllinger's (2021) analysis suggests, it may be connected with too strong participation of CEE counties in regional value chains, build around a hub — Germany. We recommend implementing economic policy instruments supporting CEE firms to greater involvement in extra-regional value chains. Second, it could result from insufficient functional upgrading of CEE industries and CEE countries' inability to shift their functional specialisation patterns toward more knowledge-intensive value chain functions, particularly in pre and post-production activities. It requires a transformation of the underlying capabilities in CEE countries or even the creation of a new Innovation System among CEE countries.

We are aware of our research limitations. They are mostly related to the data. Our database does not allow us to conduct a global analysis, because the WIOD database is limited to 40 countries, mostly from the European Union.

The results of this paper should be treated as preliminary. It is dedicated to the patterns of functional specialisation of selected CEE countries. In the future, research may be extended for the analysis of functional specialisation determinants. We would also like to consider what decides on the CEE countries' functional specialties. It would also be inspiring to discover the factors that determine the upgrading of this specialisation, i.e., a transition from low-value-added specialisation (e.g., fabrication) to high-value-added specialisation (e.g., R&D).

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Annex

Table 1. Occupations and business functions

Occupations	1-digit ISCO88	3-digit ISCO88	Business functions
Legislators, Senior Officials and Managers	1		management
Professionals	2	200-235 240-247	R&D marketing
Technicians and Associate Professionals	3	300-334 340-348	R&D marketing
Clerks	4		marketing
Service Workers and Shop and Market Sales Workers	5		marketing
Skilled Agricultural and Fishery Workers	6		fabrication
Craft and Related Trades Workers	7		fabrication
Plant and Machine Operators and Assemblers	8		fabrication
Elementary Occupations	9	900, 920-933 910-916	fabrication marketing

Source: authors' own elaboration based on Timmer *et al.* (2019b).

Table 2. NACE 1.1 sectors used in the analysis

Sector	Sector description
15t16	Food , beverages and tobacco
17t18	Textiles and textile products
19	Leather and leather products
20	Wood and wood products
21t22	Pulp, paper and paper products; publishing and printing
23	Coke, refined petroleum and nuclear fuel
24	Chemicals and chemical products
25	Rubber and plastics products
26	Other non-metallic mineral products
27t28	Basic metals and fabricated metal products
29	Machinery, nec
30t33	Electrical and optical equipment
34t35	Transport equipment

Table 2. Continued

Sector	Sector description
36t37	Manufacturing nec; recycling
60	Other inland transport
61	Other water transport
62	Other air transport
63	Other supporting and auxiliary transport activities; activities of travel agencies
64	Post and telecommunications
71t74	Renting of M&Eq and other business activities
J	Financial intermediation

Table 3. Top-5 industries with the highest FS indices in 2011

	RCA FAB	RCA MGT	RCA MAR	RCA RD		RCA FAB	RCA MGT	RCA MAR	RCA RD
	26	20	26	26		63	20	20	63
	20	26	20	60		20	63	63	20
CZE	36t37	25	60	20	LVA	60	60	60	60
	60	60	36t37	36t37		36t37	64	62	64
	27t28	29	25	21t22		15t16	61	15t16	15t16
	29	29	34t35	29		20	20	20	20
	34t35	34t35	21t22	34t35		15t16	25	25	36t37
DEU	25	27t28	29	21t22	POL	36t37	26	60	15t16
	61	61	24	26		60	60	36t37	26
	26	25	26	25		25	63	63	63
	20	20	20	20		20	19	20	26
	63	63	63	63		26	20	26	27t28
EST	36t37	61	61	64	SVK	36t37	26	19	25
	26	36t37	36t37	26		27t28	21t22	60	60
	17t18	26	26	17t18		21t22	25	27t28	36t37
	60	63	63	63		20	60	20	20
	29	60	60	64		60	20	60	60
HUN	25	25	25	62	SVN	26	26	25	19
	63	26	71t74	60		25	21t22	21t22	26
	26	-	62	25		29	25	63	25

Table 3. Continued

	RCA FAB	RCA MGT	RCA MAR	RCA RD		RCA FAB	RCA MGT	RCA MAR	RCA RD
	60	60	60	63					
	20	63	63	60					
LTU	63	20	20	20					
	36t37	36t37	23	61					
	23	64	36t37	36t37					

Notes: sectoral abbreviations are described in Appendix 1; grey fields – service sectors; '-' for MGT in Hungary – only four sectors in this business function in HUN reveal comparative advantages

Figure 1. Structure of domestic value added in exports by business functions

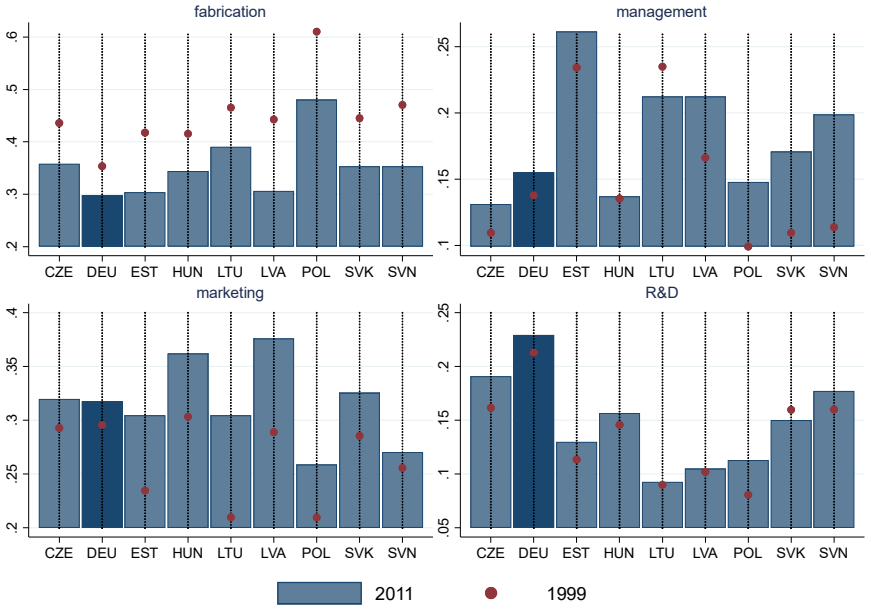

Figure 2. Functional specialisation in CEE countries

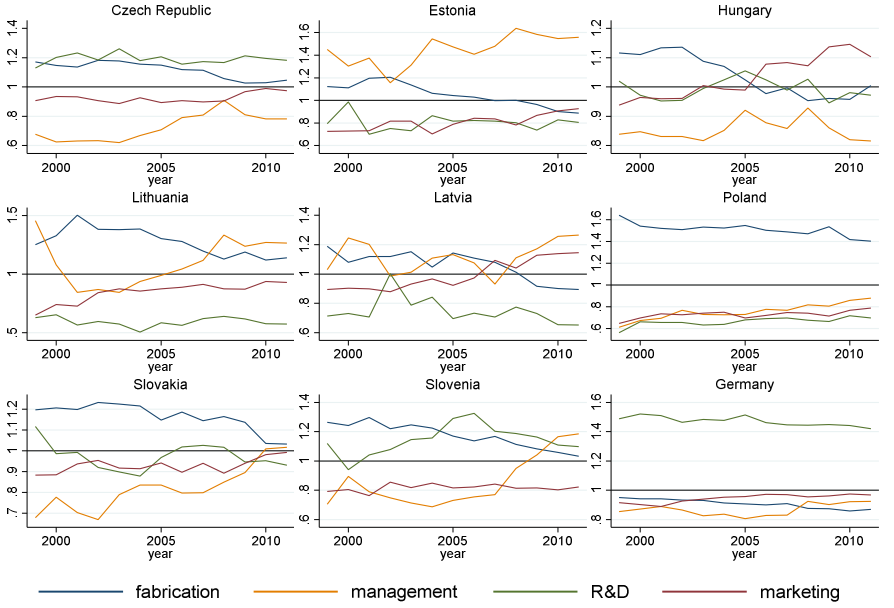

Figure 3. Functional specialisation in manufacturing and service sectors in 2011