NBS Working paper
7/2019

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NATIONAL BANK OF SLOVAKIA
EUROSYSTEM

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ISSN 2585-9269 (online)

The limits of foreign-led growth: Demand for digital skills by foreign and domestic firms in Slovakia

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Abstract: This paper addresses demand for skilled labour in Slovakia, a country that is characterized by a high degree of economic integration through inward foreign investment and through international backward linkages within global value chains. Developing existing approaches to political economy and global production networks (GPNs), our framework distinguishes between demand for digital skills on two levels: occupational structure; and skill content within occupational types. In this way, we can assess not only what kind of workers are hired by companies, but also what kind of specific skills are required from these workers. Using a large dataset on vacancies from a leading job portal, combined with administrative data on company size and ownership, we show that foreign and mixed-ownership companies generally advertise for higher skilled occupations than domestic firms, but their skill requirements for these jobs are lower than in similar jobs in domestic companies. Foreign companies have higher skill requirements only in some blue-collar jobs linked to assembly and component manufacturing. For white collar occupations, domestic companies are more likely to require digital skills. The findings confirm our expectations about the position of Slovakia as a country in an integrated periphery, where multinational companies are heavily present but rarely bring complex activities. Our key policy implication is that foreign direct investment in the integrated periphery brings only a limited potential for technology transfers.

Keywords: skills, foreign direct investment, FDI, digitalization, global production networks, job vacancies
JEL Classification: J24 O33

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Introduction

Having experienced an impressive catch-up growth relative to the EU average in 2003-2008, the process of economic convergence in Slovakia slowed down, if not stalled, after the crisis of 2008. The gross national income per person remained relatively stable since 2013, at around 76 % of the EU average. A more intensive use of skilled workers is a key requirement for increasing productivity to underpin a sustained process of convergence. Digital skills have become particularly relevant in the context of the technological change that characterized last decades.

The economic catch up in the 2000s was supported by the inflows of foreign direct investment (Havlat et al., 2018). Slovakia, as other countries in the region, reintegrated into the world economy after the breakdown of the Comecon through production networks organized by MNCs (Myant and Drahokoupil, 2011). MNCs modernized the industrial base through acquisitions and reorganizing supplier relations. Greenfield investment then brought new activities, notably in metal and electronics manufacturing, complementing existing industries. Foreign investors also took control of a major part of non-tradeable services such as telecoms and banking. In the 'dependent' (Nölke and Vliegenthart, 2009) or 'FDI-based' (Myant and Drahokoupil, 2011) economies, the MNCs, rather than domestic institutions and actors, have a major role in generating innovation and skills that underpin their comparative advantage. Importantly, dual economic structures characterize the dependent economies in CEECs, with large gaps between domestic and foreign sectors. Foreign-controlled companies generate much higher value added than domestic companies. Furthermore, foreign-controlled companies are technology leaders with most of the innovation, and research and development (R&D), concentrated in foreign-controlled sectors (e.g. Radosevic and Ciampi Stancova, 2018; Knell, 2017).

Innovation and productivity gaps between foreign and domestic sectors are widely seen as a challenge for the region in sustaining upgrading and convergence with the rest of the EU. At the same time, economic integration through global production networks (GPNs) offers opportunities for economic upgrading and development (Henderson et al., 2002; Mahutga, 2014; World Bank, 2017). Establishing links between foreign-controlled innovation leaders, domestic companies and institutions can bring industries in the region closer to innovation frontiers (Kravtsova and Radosevic, 2012). Participation in GPNs can lead to higher output and productivity as MNCs increase demand for skilled workers and their training and as trained workers move to local firms (Engel and Taglioni, 2017).

However, despite their theoretical importance, there is little research on the differences in skill use between foreign and domestic companies in Slovakia and other FDI-based economies. We address such differences in this paper. More specifically, we develop a framework on skill use in FDI-based economies and analyse micro-level data on the demand for skills in Slovakia. Characterized by one of the highest degrees of dependence on foreign investment, the country corresponds closely to the ideal typical model of a dependent market economy.

Our paper contributes to the literature on global production networks and comparative political economy by drawing on an analytical approach developed in empirical labour economics. The latter provides an empirical understanding of labour demand by companies that is missing in political economy approaches to GPNs. In turn, we enhance the understanding offered in empirical labour economics by incorporating global production networks and comparative political economy perspectives. The latter frameworks provide a conceptualization of the structure and organization of value-adding activities that is typically not considered in empirical labour economics.

We begin by deriving expectations of the differences in skill demand, concerning both occupational structure and skill use within occupational types, between foreign and domestic sectors. While the foreign sector can be expected to demand higher-skilled occupations, we expect MNCs to have higher skilled requirements than domestic companies only in a limited segment of professions. Our analytical strategy relies on information from job vacancies obtained from a job-search portal that we match with information on companies from the Slovak organizations register.[3] Our data set contains detailed information that allows us to distinguish skill demand on the two levels. We can also take into account the structure of the economy, comparing between different types of companies. We focus on digital skills that are associated with the use of new technology and with an execution of complex tasks. These indicate a potential for innovation and productivity spillovers from FDI.

The empirical findings broadly support our expectations. Accordingly, foreign-owned companies generate more jobs in higher-skilled occupations, but the specific skill requirements for these jobs are lower than in similar jobs in domestic companies. The exception represents a narrow set of occupations related to comparative advantage in assembly and component manufacturing. While our expectations and findings on the differences within occupations may seem counter-intuitive, they correspond to the research on the structure of production networks in manufacturing that we discuss in detail in the following section. The expectations also correspond to the more stylized observations in the service sector. For instance, in the IT sector, large foreign players include multinationals that outsource relatively simple activities such as remote network support. In contrast, major domestic IT companies include leading antivirus companies that rely on own research and development. Yet, these very different activities fall under the same occupation categories and would be ignored by an occupational analysis. The differences can be only identified through the more detailed data on skill demand.

Global production networks and dependent development in Central and Eastern Europe

The distinction between foreign-owned and domestic companies plays a key role in the research on GPNs and global value chains. While foreign ownership indicates the control of strategic resources (firm-specific advantages), domestic companies in less-developed countries are likely to integrate into GPNs in a subordinate role as suppliers of simpler components or services that rely on low-skilled labour (e.g. Humphrey and Memedovic, 2003). Integration into GPNs controlled by multinationals is then seen as an opportunity for less-developed regions to upgrade (Henderson et al., 2002; Coe et al., 2004; World Bank, 2017). Economic development is thus conceptualized as the outcome of the strategic coupling between regional assets and the needs of global production networks.

Transfers of knowledge, such as superior process and product technology and marketing skills, between multinational corporations and domestic firms thus represents a key mechanism of development (Blomstrom and Kokko, 2001; Dunning and Lundan, 2008; Ponte and Sturgeon, 2014). The presence of spillovers along the value chain, and the nature of the links between actors in GPNs, has dominated the research agenda of the GVC/GPN approaches.[4] However, such approaches have been criticised for treating the firm as a black box, with little attention paid to the processes of learning and skill development and upgrading within the firm (Ramirez and Rainbird, 2010).

[3] The registry is an administrative data source maintained by the Statistical Office of Slovakia.

[4] Empirical findings on the developmental consequences of integration through GPNs remain somewhat inconclusive, if not contradictory.

GPNs played a major role in the reintegration of transition economies in Eastern Europe in the late 1990s and early 2000s (Drahokoupil, 2008; Myant and Drahokoupil, 2011). Foreign investors control the production networks through which tradeable sectors in CEECs are organized. The FDI inflows have allowed the region to reconstitute itself as the industrial heartland of Europe, specializing in the low value-added stages of global value chains (e.g. Leitner and Stehrer, 2014). Given their dependence on the transfer of capital, technologies and operational skills through GPNs, CEECs have developed the features of an 'integrated periphery' (Pavlínek, 2018). A large part of non-tradeable services, such as banking or telecommunications, is also foreign-owned. The extent of the dependence on FDI is illustrated in

Table 1. The table also includes the most recent data on the import content of exports, a measure of integration into global value chains through international backward linkages.

Table 1 Foreign control and integration into value chains

	Import content of exports, %, 2014	FDI stock, % of GDP, 2017		Foreign control of enterprises, %, 2016	
		Inward	Outward	Value added	Employment
Slovakia	48.19	54.9	3.3	48.1	28.5
Czechia	46.61	65.1	11.6	43.3	27.6
Hungary	47.31	61.2*	20.0*	51.4	25.7
Poland	32.98	42.9	5.4	36.8	29.3
Germany	25.35	24.2	40.9	24.8	11.2
UK	21.87	57.5	58.1	28.0	19.0
France	26.27	31.8	52.8	16.4	11.0
EU19 (EMU)	26.57				
EU28				24.6	15.3

Notes: The import content of exports is defined as foreign value-added in gross exports divided by total gross exports. *Sources:* OECD (2019), Import content of exports (indicator). doi: 10.1787/5834f58a-en, Eurostat [tec00105, fats_g1a_08], * data from the Hungarian National Bank were used as the comparative datasets do not take into account the effects of special purpose entities and transfer capital that distorts Hungarian FDI data (Antalóczy and Sass, 2015)

CEECs have thus been conceptualized as 'dependent' or 'FDI-based, second-rank' market economies in the political economy literature (Nölke and Vliegenthart, 2009; Myant and Drahokoupil, 2011 respectively). In the dependent market economy model, multinational corporations, rather than domestic institutions and actors, play a key role in generating the innovation and skills that underpin comparative advantage. FDI-based economies are characterized by dual economic structures that conform to the expectation of GPN theories: foreign-controlled companies exhibit higher productivity and innovation intensity than domestic companies. The latter are integrated into global production networks as lower-tier suppliers of multinational corporations. Foreign-owned companies also pay consistently higher wages than domestic companies (Gottvald et al., 2013, controlling for relevant characteristics).

The dual nature also characterizes innovation systems in the region, with foreign-owned companies accounting for most R&D spending and innovation (Knell, 2017; Radosevic and Ciampi Stancova, 2018). In fact, innovation in FDI-based economies tends to be restricted to upgrading of the production process rather than R&D. More precisely, two parallel innovation systems can be identified in the region (Radosevic et al., 2010). There is the large FDI-centred system, targeted towards downstream activities in production such as the development of production processes. In contrast, the domestic system, however weak, is R&D based: it

consists of a handful of new technology companies specializing in upstream knowledge-intensive services.

The nature of dual economies in CEECs has been established through empirical research that compares the complexity of activities in foreign and domestic companies and the nature of the links between them. For instance, studies of the automotive sector, which dominates industrial structures in Slovakia (see Table 2), have shown gaps between domestic and foreign companies. At the same time, however, higher value-added functions in foreign subsidiaries have been found also to be weakly developed, with most R&D-related activities concentrated outside of the country (Pavlínek, 2016). Econometric evidence has pointed to both positive and negative spillover effects of FDI on productivity (Jacobs et al., 2017). More detailed sectoral studies of spillovers and linkages in the automotive industry show only tenuous and dependent linkages between foreign subsidiaries and domestic firms, with unconnected foreign subsidiaries that operate as assembly platforms being vertically integrated into externally-organized GPNs that are weakly embedded in the Slovak economy (Ferenčíková and Fifeková, 2006; Pavlínek, 2018). In the service sector, inward investments have targeted not only non-tradeable services, but have also created a substantial segment of business services providers geared towards clients abroad. The segment generates considerable demand in professional occupations, but the skill intensity of these activities tends to be relatively low (Capik and Drahokoupil, 2011; Mezihorak, 2018).

Table 2 Sectoral structure, 2016

	Manufacturing, %		Motor vehicles, %	
	Value added	Employment	Value added	Employment
Slovakia	36.6	31.4	8.2	4.6
Czechia	39.9	35.3	8.5	4.6
Hungary	38.5	27.7	7.9	3.5
Poland	33.1	28.7	3.3	2.1
Germany	34.3	25.3	6.4	2.9
UK	15.5	13.1	1.6	0.8
France	22.7	18.6	1.9	1.4
EU28	26.6	21.4	2.9	1.8

Sources: Eurostat [sbs_na_sca_r2]

However, despite their importance in the theoretical frameworks linking GPNs with development, empirical evidence on differences in skill use in companies remains weak. [5] Research on GPNs in integrated peripheries tends to focus on (the lack of) the transfer of skills and know-how and the linkages between firms, but there is little evidence on what can be transferred as far as the skills used in companies are concerned (i.e. the skill gap).

Demand for skills and occupations in dual economies

The nature of the demand for skills has been analysed by empirical approaches in labour economics. The field has undergone a shift from canonical models assuming two distinct groups of workers (skilled and unskilled) performing different and imperfectly substitutable tasks towards frameworks considering interactions among worker skills, job tasks, evolving technologies and shifting trading opportunities (Acemoglu and Autor, 2011; Frey and Osborne, 2017). Some of the best empirical strategies have analysed task content in jobs derived from

[5] Pavlínek and Žížalová (2016) offer some small sample evidence on skill use in automotive suppliers in Czechia.

the occupational classification – for European countries, typically 3-digit ISCO in EU-LFS (e.g. Arntz et al., 2016; Keister and Lewandowski, 2017). Keister and Lewandowski (2017) identified a comparatively high and growing share of routine cognitive tasks in CEECs, including Slovakia. This might be linked to a comparatively low investment in ICT in the region (Arntz et al., 2016) and also to the growth in the business services outsourcing sector identified above.

A more granular understanding of the demand for skills in the labour market can be obtained from data on job vacancies. Job vacancy research has a long tradition in economics (Holt and David, 1966), but it has grown as more data has become available with the shift towards online job advertising (Askitas and Zimmermann, 2015). Such research has focused on the changing demand for individual skills on the labour market and on the nature of skill requirements (Modestino et al., 2016; Wade and Parent, 2002). A similar focus can be found in job vacancy research on the Slovak labour market: this includes an analysis of the skill requirements for individual groups of workers (Štefánik, 2012; Mytna Kurekova and Žilinčíková, 2015) as well as the wage premium associated with foreign language skills (Fabo et al., 2017). In this paper, we extend such analysis by comparing the demand for skills between firms, hence addressing the key structural property of dual economies in the integrated periphery.

Statistically verifiable expectations on the differences in the demand for skills between domestic and foreign-owned sectors can be derived from GPN and political economy frameworks. At the level of occupational structure, foreign companies are likely to employ more workers in higher-skilled occupations as they specialize in more complex activities in the value chains than domestic companies. In the dependent market economy model, MNCs have relatively low skill requirements; they are attracted to the region by the combination of relatively low labour costs and a skilled population with substantial knowledge of the medium level of technology that is used in component manufacturing and the assembly of industrial goods (Nölke and Vliegenthart, 2009). However, we expect them to demand more complex occupations than domestic firms as the latter typically represent second or third-tier suppliers in manufacturing, specializing in simpler activities. In the service sector, demand for more skilled professional occupations is likely to be associated with the business services outsourcing providers that tend to employ graduates.

However, the pattern may not be reproduced once we compare the demand for specific skills within the occupational groups. Higher skill requirements can be expected from foreign firms only in occupations related to assembly and component manufacturing (i.e. ISCO 6 – ISCO 8). Activities of foreign-owned firms that import technologies and operational skills tend to be limited to assembly operations and the production of generic and labour-intensive components, or the labour-intensive production of low-volume special models (e.g. Pavlínek, 2018). In this segment, innovations travels from foreign companies to domestic ones and MNCs thus can be assumed to be the first to increase demand for skills relevant to new technologies.

In other occupational groups, we actually expect domestic companies to have higher skilled requirements. First, domestic companies, while typically specializing in less complex activities, need to cover also strategic functions that MNCs are likely to service from their headquarters. Domestic companies are thus likely to have higher skill requirements in managerial and professional occupations (ISCO 1 and ISCO 2). Second, professionals employed by business services outsourcing providers, typically foreign-owned, are likely to have relatively low skill requirements (hence an expectation of a relatively lower level of demand from foreign companies for digital skills in ISCO 2). Finally, the domestic R&D segment is also likely to be associated with higher skill demand from domestic companies in more complex occupations (ISCO 1, ISCO 2 and also ISCO 3 Technicians and associate professionals). However, the overall effects should be small given the weakness of the domestic R&D segment.

In sum, we distinguish between skill demand on two levels: occupational structure; and skill content within individual occupations. At the level of occupational structure, foreign companies are likely to employ more workers in highly skilled occupations, as they tend to specialize in more complex activities in the value chains than domestic companies. However, at the level of specific skill demand within occupations, foreign firms can be expected to have higher skill requirements only in occupational categories related to assembly and component manufacturing.

Analytical strategy

We analyze the use of skills in dual economies through a case study of Slovakia, a country that is characterized by a high degree of dependent integration through inward foreign investment and international backward linkages into global value chains, relative even to other CEECs. As shown in

Table 1, the high degree of dependence on global value chains in Slovakia is not unique in the region. In any case, Slovakia approximates closely the FDI-based, dependent market economy model.[6] We focus on digital skills as these are likely to be associated with the use of new technology and with the execution of complex tasks. As discussed above, higher technology and skill intensity should indicate a potential for productivity spillovers from FDI to domestic firms.

We derive information on skill demand from job vacancies posted on a leading job search portal during 2011-2017. Vacancy data refer to job openings (flows) rather than the jobs in companies (stocks). However, the long-term perspective may well weaken the importance of such a distinction. Demand for skills expressed through hiring is also likely to reflect demands related to the introduction of new technology. Job vacancies data provide more detailed information on the skills required for the job than available surveys and cover a long time period. Moreover, the data include a company identifier, in connection with which we have been able to link to administrative data (via a firm registry) to obtain information on ownership of the company and its size.

An analysis of job vacancies posted by different types of companies represents a novelty of our approach to job vacancy research. These variables are typically not included in analysis as a result of the lack of available data, despite the assumed theoretical importance of ownership and company size (for foreign ownership, see, e.g., Fabo et al., 2017). In contrast, empirical comparison of domestic and foreign companies is common in the GPN analyses. However, these tend to rely on small-N samples and case studies of individual firms or firm networks before extrapolating conclusions to the level of national industries (see Dicken et al., 2001, p. 89). We analyse the nature of dual economies using national-level data that we can break down also to the industry level. Our level of analysis thus corresponds to the levels at which the implications of integration into GPNs for development need to be theorized (Bair, 2005; Mahutga, 2014).

More specifically, we examine a large sample of job vacancies posted on the leading Slovak job portal, Profesia.[7] We first analyse the differences in demand for individual occupations and then compare demand for digital skills within occupations. In this context, we differentiate between basic, intermediate and advanced digital skills. Our classification follows a methodology established by the testing of an exhaustive list of digital skills on a wide scale

[6] Nölke and Vliegenthart (2009) thus gave Slovakia as an example of a coherent dependent market economy.

[7] Profesia has an exceptionally high market share, with about 80 per cent of online job vacancies advertised there (Štefánik, 2012).

of online vacancies from the US (Beblavý et al., 2016a). The complete list of tested skills is listed in Table 11 in the Appendix.

Technically, we compute marginal odds at the mean through logistic regression with a binary variable denoting the presence of a digital skill requirement in a vacancy as the response variable. As the explanatory variables, we have dummies for company characteristics – size; ownership (domestic, mixed and foreign); location in the capital region of Bratislava[8]; and sector[9] – as well as the minimum required educational attainment listed in the vacancy[10] and the yearly fixed effect. We predict models separately for each ISCO occupational group to alleviate biases arising from an implicit assumption of the employer that a job candidate will have a required skill on the basis of having another, explicitly listed, requirement (Carnevale et al., 2014).[11] This way, we can limit comparisons to jobs with similar overall skill requirements and hiring cultures.

We derive information on skill requirement from 'tags' associated with individual vacancies (as in Fabo et al., 2017). The skill tags used by the portal broadly cover knowledge of foreign languages, a large set of different digital skills and some job-specific skills such as accounting.[12] The advantage of our approach is that our analysis is based on what employers themselves specify as the skill requirements for advertised jobs. Our approach thus allows avoiding errors in extracting skill requirements from the text of the advertisements, as common in other studies (e.g. Beblavý et al., 2016b; Kureková-Mýtna et al., 2016; Maurer-Fazio, 2012). Such parsing is error-prone as the skills demanded are typically not presented in a standardized manner. On the other hand, the texts of advertisements rather reflect the linguistic and stylistic approaches applied by different employers (Boselli et al., 2018; Carnevale et al., 2014). In the case of Profesia, professional positions in the fields of ICT or finance are often advertised in English, while Slovak is common in other professions and sectors. Many advertisements are structured, but idiosyncratic styles are also often used. For instance, some advertisements aiming to recruit young workers tend to use very colloquial language and opt to skip traditional lists of skill requirements.

Finally, in order to test for the validity of measuring the demand for digital skills through job vacancies, we estimate regression models also with the demand for foreign language skills as a response variable (Table 13 in the Appendix). We assume that a positive effect of foreign ownership can be expected with a high degree of confidence for this type of skill. In line with our expectations, we find a higher demand for foreign languages from foreign companies for all occupational categories, except for professional jobs, for which the propensity of mixed ownership companies to require foreign language proficiency was found to be narrowly lower than among domestic companies.

Data

We base our analysis on a complete dataset obtained from the Profesia job portal covering the period 2011-2017.[13] A comparison between the intake of vacancies on Profesia with the inflow of vacancies reported by the Public Employment Agency (UPSVAR) is shown in Figure 1. The number of vacancies posted on the online portal is higher than that found in the public

[8] Which appears to be the only relevant consideration for regional skill bias in Slovakia (Štefánik, 2012)

[9] Size and ownership information is obtained by matching each individual employer ID with company registry administrative data. Location and sector are self-reported by the employer.

[10] Employers signal vacancy requirements using similar tags to those used to signal skill requirements.

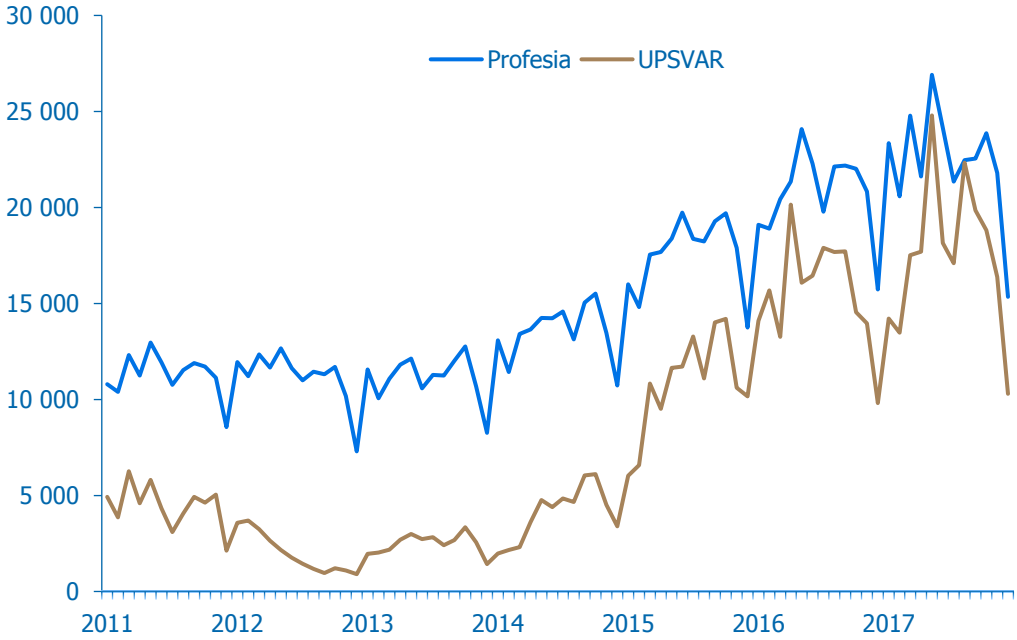
[11] For instance, a worker with a degree is unlikely to lack the basic ability to interact with the internet.

[12] The tags are assigned to a vacancy at the time of its posting by the prospective employer who chooses from a list of 220 checkboxes representing individual skills.

[13] At the time of analysis, the complete data for 2018 were not available and thus we decided not to include the incomplete year in order to avoid introducing potential bias caused by seasonal effects.

registry.[14] The two indicators covary to a large extent (r= 0.95), indicating that they respond to the same set of macroeconomic variables. Nonetheless, neither of the two figures is likely to cover the entire universe of vacancies, in particular because the obligation of employers to report vacancies to UPSVAR was discontinued in 2003[15]. In fact, the structure of vacancies published online differs from that of the employment agency: jobs advertised on Profesia[16] tend to be more commonly found in white collar occupational groups (ISCO 2-4), while the employment agency is more likely to register blue collar jobs (ISCO 7-8).

Figure 1 Inflow of vacancies posted on the Profesia job portal and registered by the Public Employment Agency



Sources: Profesia, UPSVaR.

However, as shown in Table 3, the differences between the two datasets have diminished over time. There has been a decrease in the relative share of professional jobs in the Profesia dataset, while the share of plant and machine operators and assemblers has grown with all other categories remaining largely stable. While the historical bias of high-skilled, white collar positions being more likely to be advertised online is in line with the existing literature (Carnevale et al., 2014), a shift towards more blue collar vacancies might be interpreted as a shift towards a relatively more comprehensive coverage of the actual population of vacancies in the economy.

A comparison of the shares of individual sectors is reported in Table 4. As expected, the relative share of information and communications technologies (ICT) is higher in the online database, while the relative share of transportation, and manufacturing and industry, is higher in the database maintained by the employment agency.

[14] For the purposes of the comparison, we exclude armed forces occupations. The latter tend to be completely absent in the Profesia dataset but are well represented in the UPSVAR data.

[15] Furthermore, sometimes in 2015 there is a clear break in the series in UPSVAR data caused by the adoption of policy of active solicitation of job vacancies from companies.

[16] Profesia uses its own occupational qualification which is, however, heavily based on Slovak national occupational classification KZAM which, in turn, is transferable to the 2008 update in the ISCO classification.

Table 3 Share of civilian occupational groups in vacancies published on the Profesia portal compared with the Public Employment Agency register

ISCO	2011	2012	2013	2014	2015
Managers (ISCO 1)	5% (1%)	4% (-1%)	4% (-1%)	3% (-3%)	3% (0%)
Professionals (ISCO 2)	29% (15%)	28% (14%)	27% (13%)	25% (8%)	23% (11%)
Technicians and associates (ISCO 3)	15% (-5%)	15% (-1%)	15% (-2%)	15% (0%)	14% (-1%)
Administrative (ISCO 4)	14% (3%)	14% (4%)	14% (3%)	13% (1%)	13% (2%)
Service and sales (ISCO 5)	22% (9%)	22% (-4%)	22% (1%)	21% (0%)	21% (-1%)
Skilled agricultural, forestry and fishery workers (ISCO 6)	0% (-1%)	0% (-1%)	0% (-1%)	0% (-1%)	0% (-1%)
Crafts and trades (ISCO 7)	6% (-8%)	7% (-4%)	7% (-4%)	7% (-5%)	7% (-8%)
Operators in production (ISCO 8)	7% (-10%)	7% (-6%)	7% (-5%)	9% (-3%)	12% (-3%)
Elementary occupations (ISCO 9)	3% (-4%)	4% (0%)	4% (-2%)	5% (0%)	6% (-2%)

Note: Figures given in brackets represent the difference in the share of individual occupational groups in the vacancies registered by UPSVR

Table 4 Share of sectors in vacancies published on the Profesia portal compared with the Public Employment Agency register

Sector	2011	2012	2013	2014	2015	2016	2017
Manufacturing and industry	21% (-6%)	21% (-6%)	21% (-7%)	21% (-12%)	21% (-12%)	22% (-6%)	24% (-9%)
Construction	3% (-4%)	3% (-5%)	3% (-3%)	3% (-3%)	3% (-1%)	4% (-4%)	4% (-3%)
Wholesale and retail	19% (3%)	21% (6%)	21% (6%)	22% (9%)	22% (10%)	23% (10%)	23% (7%)
Transportation	3% (-9%)	4% (-9%)	3% (-9%)	4% (-8%)	4% (-9%)	4% (-10%)	5% (-10%)
Accommodation and restaurants	5% (1%)	6% (4%)	6% (0%)	6% (1%)	7% (2%)	7% (2%)	7% (1%)
ICT	21% (17%)	19% (15%)	19% (15%)	17% (14%)	18% (15%)	16% (13%)	15% (12%)
Finance and insurance	10% (4%)	10% (2%)	9% (2%)	8% (-1%)	8% (-2%)	9% (0%)	8% (3%)
Business and consultancy	4% (-1%)	5% (1%)	5% (1%)	5% (-4%)	5% (-1%)	4% (-2%)	5% (2%)
Administration	9% (7%)	9% (7%)	9% (4%)	9% (7%)	8% (5%)	7% (3%)	6% (3%)
Education, healthcare culture	3% (-14%)	4% (-13%)	4% (-8%)	4% (-4%)	3% (-7%)	3% (-6%)	3% (-6%)

Note: Figures given in brackets represent the difference in the share of individual occupational groups in the vacancies registered by UPSVR

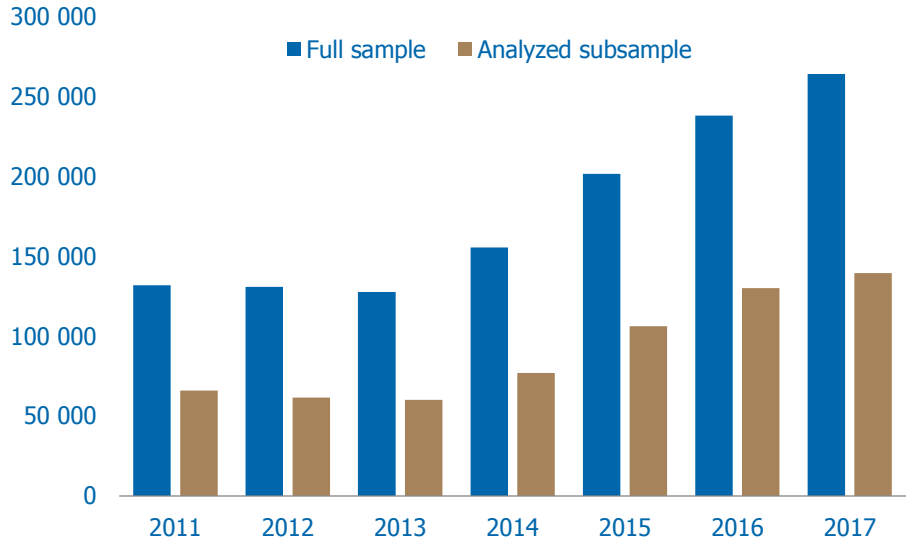
The full Profesia dataset contained approximately 1,250,000 unique vacancies[17] although we have removed a large part from the analysis. Our analysis was then performed on approximately 640,000 private sector, non-military, non-agricultural job vacancies posted on Profesia between 2011 and 2017 (Figure 2). The biggest loss of observations was associated with the removal of advertisements posted by personnel agencies. These vacancies were submitted by companies that, in the vast majority of cases, were not looking to hire workers themselves but were rather recruiting candidates for other companies[18]. These vacancies could, therefore, not be linked to a specific employer in most cases. The second most frequent

[17] Publication of these vacancies is paid for, so employers have an incentive not to post duplicates. Nonetheless, it is not possible to rule out the possibility that some vacancies were not fulfilled and then repeatedly (re-)posted. Profesia does not remove such duplicate postings from the dataset because it is not straightforward to see whether a vacancy is actually a position that is repeatedly offered or, rather, a new offer for a very similar, standardized position.

[18] Not much is known about the role of agencies on the labor market. Recent qualitative research shows it is widespread predominantly in smaller supplier firms rather than major companies and tend to cover mainly unskilled work (Kahancová et al., 2017).

reason for removal was the exclusion of vacancies not posted by a private sector company but by public institutions, collectives, churches and other non-private organizations or, in very rare cases, those that could not be matched with a specific employer. Additional reasons for exclusion, affecting a much smaller share of observations, were for vacancies advertised abroad[19] or for skilled agricultural workers and military occupations. Finally, a small number of observations were removed where there were unlikely combinations of occupation and education, such as those for professional jobs requiring only elementary education or machine operator jobs available only to holders of a degree.[20]

Figure 2 The full sample size before and after data selection (effective sample)



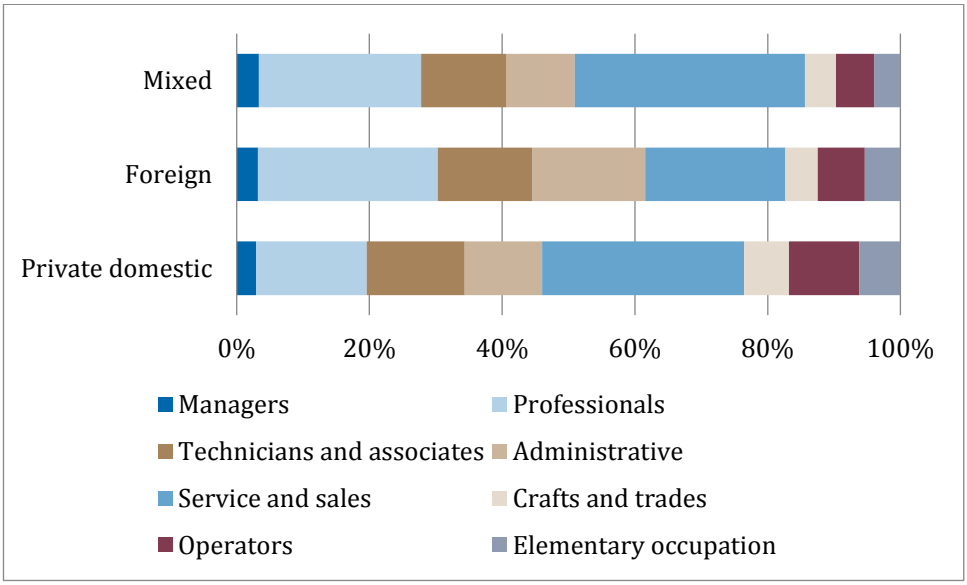
Results

We first test our expectations on the level of occupational structure. The differences in demand between domestic, mixed and foreign companies for individual occupations are presented in Figure 3. In line with our expectations, internationally-owned companies demand more skilled occupational categories than domestic firms. Firms with mixed ownership rank in between.

[19] Austrian and Czech companies, in particular, advertise skilled jobs on Profesia due to shortages of skilled workers in these countries.

[20] These unlikely combinations constituted cells with a low number of observations that would introduce biases into the regression results. We removed them by cross-tabulating the categories for occupation and educational requirements and keeping only those vacancies located in cells with at least 5,000 observations. This approach removes all apparently unlikely combinations without influencing any seemingly meaningful ones.

Figure 3 Occupational structure per company ownership



However, these differences may be related to other structural differences, such as company size (foreign companies are predominantly larger: see Figure 5). We thus control for the effects of company characteristics, including location in the capital city of Bratislava, ownership structure, size and economic sector, through a simple logistic regression that estimates demand for blue collar positions (ISCO 5, 7, 8 and 9). The formal specification of the regression is presented in Equation 1.

$$P(ISCO_i > 4) = f(capital\ city, ownership, company\ size, sector, year) \quad (1)$$

As shown in Table 5, foreign-owned companies are, indeed, 6.5 per cent less likely to offer blue collar positions. Interestingly, companies with mixed ownership structures are slightly more likely to offer blue collar positions than are domestic ones once individual characteristics have been accounted for. This stands in contrast with the picture obtained from the descriptive data in Figure 3.

Table 5 Regression estimates for the determinant of the advertised position being 'blue collar'

	Coef.	Std. Err.	Z	P>z	[95% Conf.	Interval]
Capital	-.1842046	.0015912	-115.77	0.000	-.1873232	-.1810859
Mixed ownership	.0135704	.0026148	5.19	0.000	.0084456	.0186953
Foreign ownership	-.0652037	.0018891	-34.52	0.000	-.0689064	-.0615011
10 - 99 empl.	-.0348587	.0022663	-15.38	0.000	-.0393005	-.0304168
100 - 999 empl.	-.0610685	.0024231	-25.20	0.000	-.0658177	-.0563193
1,000+ empl.	-.0831817	.0028461	-29.23	0.000	-.0887599	-.0776035

Note: Blue collar occupation is understood as one belonging to ISCO 5, 7, 8 and 9. Controlled for year and sector fixed effects. Education requirements excluded due to endogeneity. N = 513,046

As far as the demand for digital skills within individual occupations is concerned, we expected foreign firms to have higher demand for digital skills only in ISCO 6-8 occupational categories. The descriptive analysis, presented in Table 6, confirms this expectation, but only as far as the intermediate skills are concerned. In fact, the intermediate level of digital skills seems most

relevant to more complex activities in the blue-collar professions. There does not appear to be any difference between the requirements for basic and advanced digital skills for 'blue collar' workers; and no difference between the demand for any category of digital skills for service and sales, and elementary occupation workers.

The patterns in white collar occupations are consistent with our expectations in all levels of digital skills. Domestic firms exhibit higher demand for basic and intermediate digital skills in all white collar occupations (ISCO 1-4), not just in ISCO 1-3 as we hypothesized. For advanced digital skills, this dynamic is preserved only for professionals, with other white-collar occupations being equally likely to demand advanced digital skills regardless of form of company ownership. Such a pattern corresponds to expectations related to the effect of the presence of the business services outsourcing sector.

Table 6 Digital skill requirements breakdown per ISCO occupation group

	Basic digital skills			Intermediate digital skills			Advanced digital skills		
	Dom	For	Mix	Dom	For	Mix	Dom	For	Mix
Managers (ISCO 1)	**24%**	15%	19%	**77%**	51%	50%	4%	5%	4%
Professionals (ISCO 2)	**12%**	7%	5%	**37%**	27%	28%	**31%**	16%	15%
Technicians and associates (ISCO 3)	**21%**	10%	11%	**66%**	48%	45%	9%	11%	8%
Administrative (ISCO 4)	**23%**	11%	13%	**73%**	*46%*	60%	4%	4%	6%
Service and sales (ISCO 5)	15%	15%	11%	38%	36%	40%	1%	1%	1%
Crafts and trades (ISCO 6)	9%	10%	8%	18%	**34%**	23%	2%	3%	2%
Operators in production (ISCO 7)	4%	4%	5%	10%	**18%**	11%	1%	1%	1%
Elementary occupations (ISCO 8)	4%	2%	1%	9%	8%	4%	0%	1%	0%

Note: Bold denotes the largest value within each particular occupational and skill group as long as they are at least five percentage points higher than the second highest value. Italics denote the smallest value within each particular occupational and skill group as long as they are at least five percentage points lower than the second lowest value.

In the final step, we test if the differences in demand hold when we control for other factors that might determine the likelihood of the demand for digital skills. The formal logit model is presented in equation 2. We run the model separately three times with basic, office and advanced computer skills (s) as the dependant variable (y).

$$P(y_{si}) = f(capital\ city, ownership, company\ size,\ education, sector, year) \quad (2)$$

The models confirm the patterns that were apparent in the descriptive statistics (see Table 7). Our theoretical expectations on the effects of foreign-owned firms are thus broadly confirmed. The effects of mixed ownership go in the same direction as that for foreign-owned ones but tend to be weaker.

For managers (ISCO 1), we see that the demand for digital skills is much higher in domestically-owned companies. The difference is particularly pronounced for intermediate digital skills, which are 17 per cent less likely to be in demand in the case of mixed ownership and 20 per cent less likely to be demanded in foreign-owned companies; while the demand for advanced skills is marginally higher for mixed and foreign-owned companies. This relationship holds also for the categories of technician and associate professionals (ISCO 3) and administrative workers (ISCO 4), although the effect is not nearly as high as for intermediate skills. Professional jobs (ISCO 2) advertised by domestic companies likewise exhibit a higher probability of requiring intermediate digital skills. This effect is stronger for advanced digital skills (by 3 per cent in the case of mixed ownership and 9 per cent in the case of foreign ownership).

As far as 'blue collar' occupations are concerned, domestically-owned companies are less likely to demand digital skills in ISCO 5 and 7 occupations, confirming our expectation of higher skill levels being demanded by foreign companies in these areas. The difference is greatest in the intermediate skills category, in which specifically craft and trades workers are 11 per cent more likely to be required to have mastered intermediate digital skills if they seek work in a foreign-owned company (4 per cent in the case of mixed ownership) compared to their peers applying for a job in a domestic company. The effects for service and sales workers, as well as holders of elementary occupations, are mixed and inconclusive.

Finally, looking at the control variables, we make several observations. The digital skills requirements are generally lower for positions advertised in the capital city of Bratislava, probably as a result of the tight labor market. Interestingly, when a college degree is required, the digital skills requirements tend to be lower than for positions requiring only high school degree with final examination. A possible cause behind this apparent contradiction is that the degree requirement to a large extent suffices to signal the implicit demand for skills, which in turns makes it less important for employers to explicitly specify it. The evidence for the effect of company size is mixed.

Table 7 Regression results for digital skills, by occupation, full sample

ISCO	1	2	3	4	5	7	8	9
Basic Skills								
Capital	-0.0527***	-0.0323***	-0.0434***	-0.0312***	-0.00786***	-0.000948	0.0124***	0.000178
Mixed ownership	-0.0509***	-0.0216***	-0.0518***	-0.0430***	-0.00807***	0.0128***	0.0107***	-0.00842***
Foreign ownership	-0.0798***	-0.00834***	-0.0454***	-0.0473***	-0.0107***	0.0132***	0.00389***	-0.00718***
10 - 99 empl.	0.0211***	0.0191***	-0.0420***	0.00239	0.00329*	0.0142***	0.00931***	-0.00187***
100 - 999 empl.	0.0455***	-0.0154***	-0.0708***	-0.0189***	0.0175***	-0.0180***	-0.00713***	-0.000119
> 1,000 empl.	-0.0812***	-0.0595***	-0.128***	-0.124***	-0.118***	-0.0546***	-0.0378***	-0.0183***
Primary					-0.0611***		-0.0522***	-0.0112***
Without exam				-0.0609***	-0.0683***	-0.0459***	-0.0135***	-0.00704***
College	-0.0387***	-0.0221***	-0.0466***	-0.0362***	-0.0256***			
Office Skills								
Capital	-0.0700***	-0.0706***	-0.0593***	-0.0290***	-0.0192***	0.0325***	0.0344***	-0.00635***
Mixed ownership	-0.173***	-0.0678***	-0.154***	-0.0678***	0.0554***	0.0371***	0.00142	-0.0131***
Foreign ownership	-0.200***	-0.0330***	-0.112***	-0.135***	-0.0422***	0.113***	0.0605***	0.0116***
10 - 99 empl.	0.0543***	0.0890***	0.0153***	-0.0338***	0.00738**	0.0230***	0.00633*	-0.00516**
100 - 999 empl.	-0.0207	0.0462***	-0.0517***	-0.144***	-0.0381***	0.0172**	-0.00352	-0.0100***
> 1,000 empl.	-0.223***	-0.0197***	-0.162***	-0.354***	-0.286***	-0.0294***	-0.0138***	-0.0624***
Primary					-0.381***		-0.225***	-0.0978***
Without exam				-0.364***	-0.249***	-0.277***	-0.0943***	-0.0526***
College	-0.0306***	-0.0132***	-0.0599***	-0.0418***	0.0282***			
Advanced Skills								
Capital	0.00223	-0.0259***	-0.00796***	-0.00509***	0.000666***	0.00109	0.00267***	-0.000310***
Mixed ownership	0.00936**	-0.0330***	0.00657**	0.0124***	0.00207***	0.00330**	0.00366***	0.000510**
Foreign ownership	0.0164***	-0.0909***	0.00968***	0.00929***	0.00230***	0.00271***	0.00228***	0.000730***
10 - 99 empl.	-0.00659*	0.0447***	0.00230	-0.00783***	9.23e-05	-0.00537***	-0.00196***	0.000100
100 - 999 empl.	0.000670	-0.0803***	-0.0233***	-0.0107***	-0.000238	-0.00326***	-0.00162***	-0.000388**
> 1,000 empl.	-0.0266***	-0.146***	-0.0434***	-0.0130***	-0.00371***	-0.00372**	-0.00467***	-0.000833***
Primary					-0.00805***		-0.00814***	-0.00153***
Without exam				-0.0527***	-0.00436***	-0.0237***	-0.00523***	-0.00150***
College	0.00562**	-0.0746***	-0.00857***	0.0117***	5.56e-05			
Observations	21,213	151,51	97,897	93,745	170,379	41,757	52,879	35,176

Note: All regressions are controlled for year and sector fixed effects

As our expectations on the differences between white-collar and blue-collar occupations are based on to the stylized facts from manufacturing and service-sector outsourcing, we compare also sector-specific models that include only advertisements by employers operating in manufacturing and IT respectively. The pattern of occupational breakdown in domestic and foreign owned companies in these two sectors indeed looks completely different (see Table 79). In manufacturing, domestic companies employ more craft and trades workers, while foreign owned companies offer more professional and associate professional positions. The situation is reversed in the IT sector, where the domestic companies tend to advertise professional position, while foreign owned ones offer relatively more positions in service and sales domain.

Table 8 Regression results for digital skills, by occupation

ISCO	1	2	3	4	5	7	8	9
Manufacturing								
Domestic	4%	15%	19%	9%	12%	19%	19%	3%
Foreign	3%	21%	23%	11%	7%	14%	19%	1%
Mixed	3%	21%	21%	12%	6%	15%	19%	2%
IT								
Domestic	1%	70%	12%	8%	6%	2%	0%	0%
Foreign	1%	62%	12%	17%	6%	0%	0%	0%
Mixed	3%	67%	11%	6%	13%	0%	0%	0%

As shown in **Error! Reference source not found.**, the results correspond to our expectations and also to the aggregate models presented above. More specifically, foreign manufacturing companies have higher requirements for intermediate digital skills in blue collar positions (ISCO 6-8) and lower requirements for the white collar occupations. In contrast, foreign companies in IT have lower requirements across the occupational categories, with significant differences in white collar occupations. Domestic IT companies have particularly higher skill requirements in ISCO 2 and ISCO 3, indicating a much higher level of sophistication in domestic IT companies. The effect is most pronounced in the advanced skill category.

Table 9 Regression-based average marginal coefficients for demand for digital skills in foreign owned companies compared to domestic owned ones, by occupation for IT and manufacturing sectors

ISCO	1	2	3	4	5	7	8	9
Manufacturing								
Basc	**-8.41%**	**-5.05%**	**-4.62%**	**-2.62%**	**-9.75%**	**3.16%**	**0.67%**	**1.21%**
Office	**-7.49%**	**-4.46%**	**-6.16%**	-1.14%	**-2.68%**	**11.30%**	**3.92%**	**3.05%**
Advanced	**4.81%**	**2.18%**	**3.17%**	**6.18%**	**0.77%**	**-0.30%**	**0.63%**	0.00%
IT								
Basic	**-6.48%**	**-0.39%**	**-2.32%**	**-1.81%**	**-3.58%**			
Office	**-3.15%**	**-3.51%**	**-4.28%**	**-14.30%**	**-11.70%**			
Advanced	0.28%	**-24.00%**	**-13.40%**	**-0.53%**	**-0.31%**			

Note: controlled for being located in Bratislava, size of the company, education requirements and year fixed effect. Coefficients in bold significant at 5% threshold.

Finally, to test the stability of the estimates, we ran the model separately for each analyzed year, controlling for occupational categories (see Table 10). We find the effects of a company being foreign-owned retain the same direction as well as approximately the same magnitude over time, although there appears to have been a narrowing of the difference in the last two years, in particular for intermediate digital skills. This might be a sign of a narrowing of the differences between foreign and domestic sectors, but change over a longer period would need to be observed to support such a conclusion.

Table 10 Development of the difference in demand for digital skills between foreign and domestic firms over time

	2011	2012	2013	2014	2015	2016	2017
Basic skills	-0.0635***	-0.0357***	-0.00829***	-0.0109***	-0.0206***	-0.0125***	-0.0167***
Office skills	-0.0580***	-0.0747***	-0.0572***	-0.0570***	-0.0443***	-0.0294***	-0.0134***
Advanced skills	-0.0142***	0.00218*	-0.00959***	-0.00829***	-0.0102***	-0.00375***	-0.00136**

Effects of foreign ownership relative to domestic

Conclusion

Foreign-owned firms generate more jobs in higher skilled occupations, confirming that they add higher value added than the domestic firms. At the same time, however, we found that, for comparable jobs, domestic firms are the ones more likely to seek digitally-skilled workers. The situation is different in blue-collar jobs where foreign-owned companies are the ones that are more prone to require digital skills. Foreign companies are thus technology leaders in a narrow segment of manufacturing activities related to assembly and component production, with a potential for technology transfer from foreign to local firms. Overall, the range of activities performed in local branches of MNCs thus appears limited, with relatively low skill content. As our robustness check shows, workers are rather required to be able to communicate in foreign languages and thus be smoothly integrated in the international division of labour. The pattern remains largely stable over time, confirming the stability of Slovakia's position in the integrated periphery.

The policy implications of our findings are threefold. Firstly, the considerable public resources invested in attracting FDI to Slovakia might lead to some modern manufacturing jobs, but they are unlikely to contribute to a broader modernization and digitalization of the Slovak economy. It might be prudent to consider shifting some resources to supporting the domestic R&D sector. Secondly, the co-existence of higher wages (normally associated with higher human capital) paid by foreign-owned companies, with the digital skill acquisition being concentrated in domestic firms, might result in a misallocation of human capital. Thirdly, the concentration of the most gifted white-collar workers in MNCs, where their engagement with digital technologies might be limited, means that these workers might not be accessible for digitally more advanced domestic companies. Moreover, those talented workers might encounter a "glass ceiling" within the Slovak branches of MNCs, under which they are unable to access the high value opportunities associated with the intensive use of digital skills, and this might drive them to seek those opportunities abroad in the headquarters of their company. This might negatively affect the convergence of the Slovak economy and living standards in Slovakia.

Appendix

Table 11 Dependent variable definitions

Basic skills	Intermediate skills	Advanced skills
Mac OS	Microsoft Access	ASP
Internet	Microsoft Excel	C++
Microsoft Windows	Microsoft Word	Perl
MS-DOS	Microsoft PowerPoint	Server administration
	SAP	HTML
	AutoCAD	IBM Informix
	CorelDRAW	Java
	Corel PHOTO-PAINT	JavaScript
	Adobe Photoshop	Oracle Database
	MicroStation	Sybase
	IBM Lotus Notes	Administration UNIX/Linux
	T602	UNIX/Linux
	Microsoft FrontPage	Visual Basic
	Microsoft Outlook	Administration Windows
	Adobe Illustrator	Delphi
	Adobe PageMaker	Microsoft SQL Server
	QuarkXPress	Microsoft Visual FoxPro
	Magic	Administration Novell NetWare
	Autodesk 3ds Max	Pascal
	Pro/ENGINEER	InterBase
	SAP	PHP
	Microsoft Project	Pervasive SQL
	OpenOffice	Tango 2000
	Oracle Forms	XML
	CATIA	IBM i
	SolidWorks	Administration OpenVMS
	CAD	COBOL
	Adobe InDesign	Fortran
	602Office	Ada
	NX	PL/1
	I-DEAS	PowerBuilder
	ACAD	Smalltalk
	Solid Edge	Adobe Dreamweaver
	Autodesk Inventor	SAS
	Allplan - Nemetschek	Adobe Flash
	CENKROS	MySQL
	Jeeves	WAP
	SIMATIC STEP 7	OpenGL
	Omron	DirectX
	Movex	SAS
	Microsoft Dynamics NAV	ASP.NET
	ArchiCAD	C#
	Autodesk Revit Architecture	Administration Lotus Notes
	Allplan	SQL
	ArCon	LotusScript
	Galileo	Java EE
	Amadeus	RPG
	ARIS	PL/SQL
	Human	Progress
	POHODA	4GL

Autodesk Maya
SketchUp
Microsoft Visio
Adobe Premiere Pro
Adobe After Effects
OMEGA
ALFA
OpenOffice.org Writer
OpenOffice.org Calc
OpenOffice.org Impress
OpenOffice.org Base
OpenOffice.org Draw
SDL Trados
Wordfast
Bloomberg
Microsoft SharePoint
ABRA
TIA Portal
WinCC OA
EPLAN
Money S3
Money S4
GIS

Administration LAN/WAN
.NET
Visual Basic .NET
UML
Python
Erwin
Visio Studio
Microsoft Visual Studio
ABAP
MFC
Assembler
win32 API
C Shell
ActionScript
AJAX
IBM DB2
XHTML
Administration MySQL
Administration Oracle Database
Administration Microsoft SQL Server
VMware ESX
Microsoft Hyper-V
Ruby
C
CSS
Objective-C
PostgreSQL
Google Analytics
Google AdWords
Google AdSense
Administration IBM DB2
Administration SAP
Object Pascal
WordPress
Swift
R
NODE.JS
Angular
ReactJS
Bash
Haskell
VHDL
Matlab
Drupal
OpenCart
PrestaShop
Magento

Table 12 Independent variable definitions

Company location		
	Capital	Is the job located in the Bratislava region? (dummy)
Company ownership		
	Domestic	(reference category)
	Mixed	(dummy)
	Foreign	(dummy)
Company size		
	Small	<10 workers (dummy)
	Medium	10 – 99 workers (reference category)
	Intermediate	100 – 999 workers (dummy)
	Large	1,000+ workers (dummy)
Education groups		
	Low	Primary education only (dummy)
	Med_1	Secondary without leaving examination (reference category)
	Med_2	Secondary education with leaving examination (dummy)
	High	Tertiary education (dummy)
Year dummies		

Industry (Profesia qualification)

- Hotels and hospitality
- Transportation, logistics
- Banking and finance
- Information technology
- Communications
- Retail
- Wholesale
- Business advisory and consulting
- Administration
- Health care, education and culture
- Restaurants, bars and similar
- Construction
- Manufacturing
- Automotive
    - Electronics
    - Machinery
    - Other

Figure 4 Distribution of educational requirements per ISCO occupational group

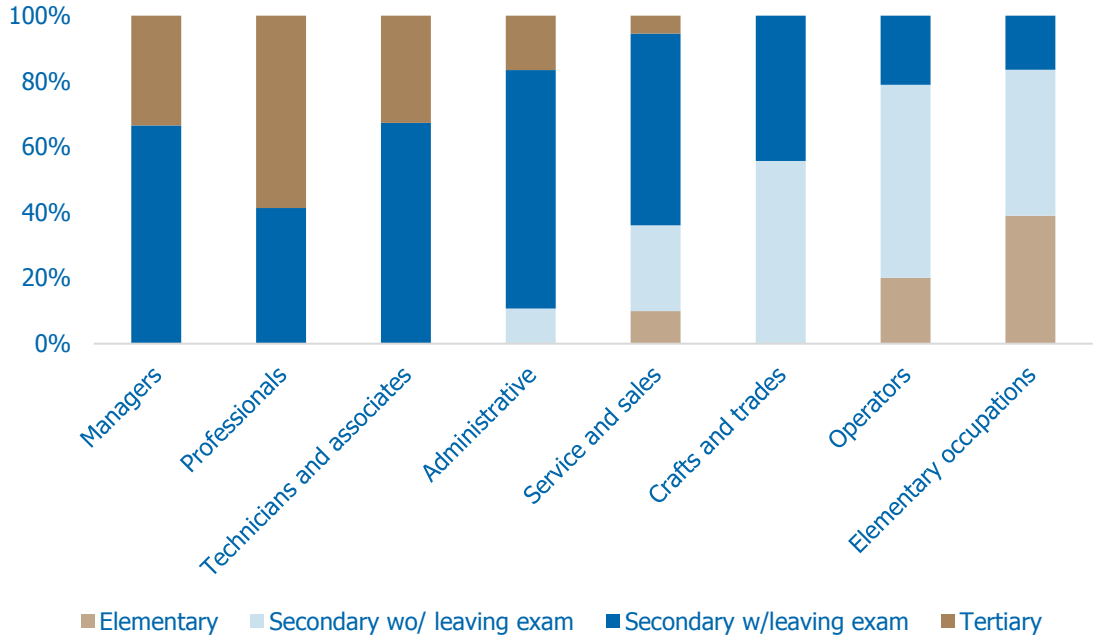


Figure 5 Distribution of companies according to number of employees per ownership structure

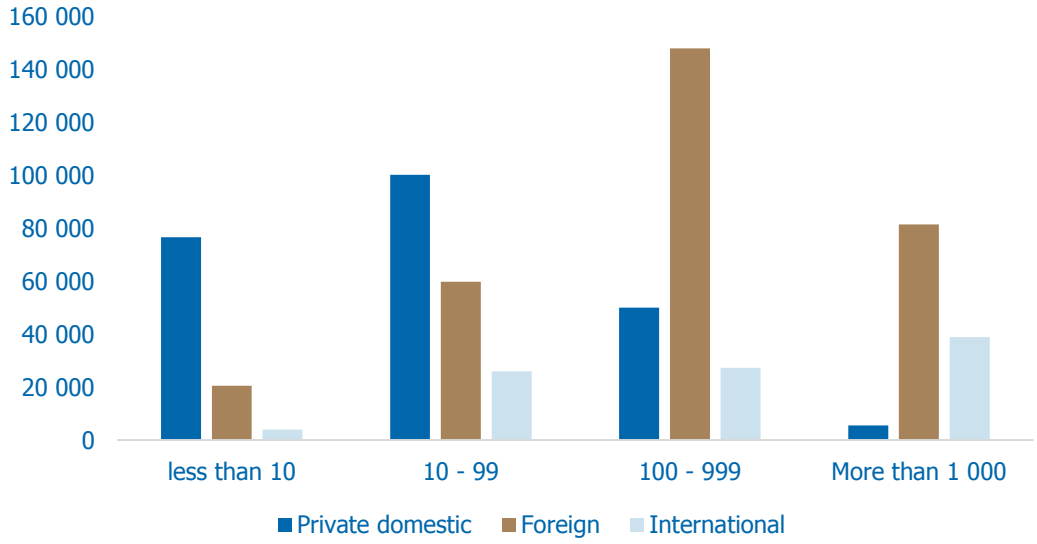


Table 13 Regression results foreign language skills

ISCO	1	2	3	4	5	7	8	9
Capital	0.0865***	0.0625***	0.0583***	0.0988***	0.141***	0.0247***	0.00822**	0.0668***
Mixed ownership	0.0491***	-0.0286***	0.115***	0.0932***	0.0472***	0.0659***	0.0254***	0.0921***
Foreign ownership	0.0752***	0.0236***	0.147***	0.109***	0.0674***	0.197***	0.0650***	0.0426***
10 - 99 empl.	-0.0533***	0.0244***	0.0175***	-0.0734***	-0.0418***	-0.0858***	-0.0591***	-0.0364***
100 - 999 empl.	-0.123***	-0.0797***	-0.0368***	-0.111***	-0.0831***	-0.156***	-0.143***	-0.0402***
> 1,000 empl.	-0.225***	-0.0229***	-0.0729***	-0.110***	-0.284***	-0.231***	-0.203***	-0.196***
Priamary					-0.230***		-0.186***	-0.209***
Without exam				-0.358***	-0.225***	-0.362***	-0.143***	-0.163***
Collage	0.334***	-0.00146	0.231***	0.113***	0.377***			
Sector dummies	YES	YES	YES	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES
Observations	21,213	151,51	97,897	93,745	170,379	41,757	52,879	35,176

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