



# Labour Productivity in a Central and Eastern European Secondary City – Evidence from Regional and Firm-Level Data

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**Abstract.** Our article examines the changes in the economic position of a Hungarian secondary city, Pécs, and its region in the post-crisis period from a labour productivity perspective. Our aim is to contrast results based on data of the city's largest local firms from the Orbis Europe enterprise database with the results based on the EuroStat regional database. We assess local trends in a sectoral disaggregation and focus on the period between the two crises. Our results suggest that Pécs and its region face a persistent difficulty in attracting external resources and in retaining and generating endogenous resources.

**Keywords:** labour productivity, regional growth, firm-level analysis, Central and Eastern Europe, lagging regions

## Introduction

Economic development in post-transition countries is heavily dominated by the performance of the capital cities, although second-tier cities, such as growth poles, are also important drivers of development. They can lift the economic performance of their regions and reduce interregional inequalities, promoting territorial and social cohesion (ESPON 2013). An important feature of the Hungarian urban structure is the quasi-absence of the second level of the urban pyramid, i.e. the category of large towns with a population of 300,000 to 500,000 in the settlement network. Pécs is one of the Hungarian growth poles, a medium-sized city according to EU standards, with a population between 100,000 and 200,000, it is lacking scale, critical mass,

and international visibility (Somlyódiné 2014, Molnár et al. 2018). An important feature of Pécs is its remoteness from the capital; nevertheless, its direct cross-border activities are not significant due to the economic weakness of its wider region. Pécs is a deindustrialized rural university city, and its region, Baranya County, is located in a weak economic environment, showing signs of stagnation rather than expansion. In this research, we intend to gain insight into the development potential of a second-tier city, which is itself developed, but its regional hinterland is underdeveloped. Our preliminary assumption is that behind the development challenges of Pécs and its region there lies a multi-level governance problem (Pálné Kovács 2020, 2021) stemming from the low quality of institutions (see Rodriguez-Pose 2020). The novelty of our research is that the Orbis database has been in use for a relatively short time in the Hungarian academic community (see e.g. Muraközy et al. 2018), especially in the field of regional studies, although it has a longer history in the international literature (Gal 2013), and it allows us to dig deeper into productivity analysis than the standard regional-level data.

The global financial crisis has brought about a lasting, hysteretic change in economic development worldwide, a major symptom of which being a global slowdown in productivity, called the ‘productivity puzzle’ (Haldane 2018). An important change occurred during the 2010s, namely that the unemployment problem in the Central and Eastern European countries, prevalent after the transition and the global financial and economic crisis, has turned into the reverse, with labour shortage becoming an increasing hindrance to growth. In addition to intensive job-creating investments (especially in the lower value-added segments), there has been an overall improvement in labour market indicators across the regions, triggering remarkable interregional convergence in this respect. The economy is, in effect, in full employment, but, despite the improvement, significant spatial inequalities persist. In those regions where labour shortages and unemployment coexist, the employability problem of the workforce is assumable. As a result, this situation leaves little room for further economic development and territorial rebalancing driven by labour market expansion. An important observation is that regional differences in labour market indicators account for a vanishing fraction of the total spatial economic (per capita GDP) inequalities (not more than 3 or 5 percent), and the remaining part is attributable to interregional labour productivity differences (well above 95 percent), as indicated by Monfort (2020) in several European countries. All this points to a need for a heightened focus on efficiency-oriented territorial development policies and planned urban development. (Evidently, urban dynamics play a pivotal role in the economic performance of regions, whereas second-tier or smaller cities could attempt to attain agglomeration advantages by mitigating their disadvantages through a different spatial structure in which their efforts and sizes are bundled (Ouweland et al. 2022, Rechnitzer–Berkes 2021).)

Whereas productivity challenges (Askenazy et al. 2016) have a clear regional dimension (Tsvetkova et al. 2020), the corporate sector has an ultimate role in determining regional productivity. Altomonte and Békés (2016) highlight that the economic fortune of regions and nations is increasingly driven by a handful of large firms. The privatization or dissolution of potential national champions after the regime change and the weakness of domestic mid-sized firms (Lux 2020) provide scant alternatives to the FDI-driven model of so-called dependent market economies (Bohle–Greskovits 2006). Nölke and Vliegenthart (2009) note that the institutional frameworks and innovation systems are so different from the Western context that they engendered a distinct variety of capitalism whereby CE economies are highly exposed to the decisions and activities of MNEs, and the hierarchical control of subsidiaries provides the main coordination mechanism. In such export-oriented branch plant economies, foreign MNEs are at the forefront of market-driven reindustrialization, the pattern of which is highly heterogeneous across the regions (Lengyel et al. 2016). Our present research examines the changes in the economic position of the city of Pécs and its surrounding region in the period following the financial and economic crisis. The aim of our research is to identify the main development opportunities available for the city and its region in the medium and long term. We intend to analyse this question at the meso (regional) and the micro (firm) level.

In this article, we intend to study the above-described processes through explorative statistics at the regional level and contrast them with insights from firm-level data. The second section of our study summarizes the results of previous literature in this context. Then we introduce our database and the methodology applied, and the results will be presented in the following section. The last section concludes and establishes the proposed directions of further research.

## **Literature Context**

Regional economic disparities are commonly large in CEE countries (Szilágyi-Debrenti 2020), but in Hungary they are even higher compared to other countries of the Visegrád group (Kuttor 2018). The growth performance of the Hungarian regions was uneven and variable in time during the post-crisis period, especially at the top of the distribution, while growth at the bottom remains persistently low. The most remarkable change was that in the first half of the 2010s the FDI-manufacturing type regions, as defined by Lengyel and Varga (2018), were areas of high growth, whereas the capital city experienced an economic slowdown; however, this trend turned to the reverse during the second half of the decade (Zsibók 2021). Lengyel and Varga (2018) classify Baranya County as a knowledge centre region where considerable human capital creation is accompanied by low

manufacturing output and funding from the rural development programme can improve the population retention capacity of the lagging depopulated region (Szabó 2021). This is in line with the view of Iammarino et al. (2020) that human capital accumulation alone is insufficient to spur dynamism in low-income regions and to mitigate the risk of falling into a development trap: to benefit from more human capital in the region, there must also be an overall economic environment that allows this resource to be productively employed.

In the post-2008 period, the main challenge for Hungary was to generate growth driven by investment and productivity against the backdrop of declining labour productivity and a slowdown of growth rates for the EU as a whole. However, a marked specialization in value chain function production undermines efforts in regions serving mostly as assembly platforms of TNCs to attract higher value-added, headquarter activities and to overcome the middle-income trap (Gál-Schmidt 2017). Headquarter companies tend to keep strategic activities close to home and the decision autonomy of local subsidiaries, the role of R&D, business support, distribution, and sales remain limited even in the presence of functional upgrading (i.e. by acquiring more service tasks). The weaknesses of the FDI-driven model (relying on low labour costs, skilled labour, tax advantages, and proximity to the West) manifest in the absence of domestic innovation-leading companies and headquarters and are compounded by a shrinking working-age population (see e.g. Galgóczi et al. 2015, Lux 2017, Egyed-Rácz 2020). In terms of labour costs, Hungarian workers were the third worst paid in the EU in 2020, with an average hourly earnings of € 9.9 compared to the EU average of € 28.5, which explains the growing number of western branch plants in Hungary. In fact, the contribution of foreign affiliates to value added was around 40 percent in Hungary in 2018 (Grieveson et al. 2021). Despite a slight decrease in the productivity gap, a recent OECD economic survey documents persistently large differences between export-oriented, capital-rich, foreign-owned, investment-intensive companies and low-productivity firms serving domestic demand and with few connections to global supply chains. The specialization of foreign subsidiaries and their suppliers in fabrication-type activities (assembly) in GVCs is associated with low domestic value-added content in their export, which places industrial diversification at the top of the agenda of industrial policy. Accordingly, the Hungarian Government's Irinyi Plan aims to achieve a 5% growth in domestic value added in total export performance whilst increasing the participation of domestic SMEs in the supplier chains of large MNEs with high innovation potential. The dominance of manufacturing production by the automotive industry (NACE sector C29) reflects the strategic position of Hungary in the EU automotive value chain. Thus, the economic fate of the country – and of the V4 as a whole – is inextricably linked to the automotive sector, accounting for 13 percent of all manufacturing jobs in Hungary compared to 8.5% at the level of the EU.

Molnár et al. (2018) identify spatial and hierarchical effects in the Hungarian municipalities' competitive differentiation: the proportion of competitive municipalities is higher in the more successful central and north-western regions of the country and at higher levels of the urban hierarchy. In other parts of the country, better competitiveness indicators are limited to large cities and suburban municipalities, whereas underdeveloped regions are characterized by the combination of a competitive centre and disadvantaged hinterland (see also Tóth-Nagy 2013). The authors state that the economic success of Hungarian second-tier cities is primarily attributable to their integration into global production networks led by big foreign companies as well as the reindustrialization process. Pécs and its region, as a victim of economic geography (forces of clustering and density) and political neglect, are lagging in these terms. Displaying the traits of left-behind places, defined by Storper et al. (2020) as deindustrialized shrinking cities and struggling rural areas, they confirm the thesis of Florida (2017) according to which talent, youth, and wealth tend to flow to a limited set of mostly metropolitan areas, the so-called 'cities of elites'. Meanwhile, regions left behind by economic transformation and which do not possess any unique special assets face brain drain, migration, and decline. This echoes the main findings of the literature that stress the importance of extra-regional linkages for economic growth and diversification in the CE space at the expense of the factors of regional competitiveness, i.e. the presence of clusters and regional innovation systems that are relevant for highly developed Western regions. Strategic documents and policy efforts emphasize the need for high-tech clusters but disregard whether the necessary conditions for their development are available and whether the local business environment has the capacity to utilize the innovation potential of cutting-edge science outside the metropolitan regions. As Zenka et al. (2014) succinctly observe, the scarcity and high level of spatial concentration of lead firms, headquarters and strategic functions such as R&D design or marketing, and the limited prospects of functional upgrading are likely to reinforce spatially imbalanced growth at the expense of non-metropolitan regions in the branch plant economies. According to Molnár et al. (2018), the economic duality of Hungary is well reflected in the performance differences of second-tier cities, showing the advantageous position of centres located closer to the capital, benefiting from both localization economies and borrowed size.

Harris (2021) suggests that there are three main possible causes of low aggregate productivity. First, frontier firms are not among the global leaders in their industry; second, there is a lack of diffusion of technology from (national) 'best-practice' frontier to non-frontier firms; third, there is an insufficient reallocation of resources from less to more efficient firms through 'creative destruction'.<sup>1</sup> The low rate of firm entries and exits indicates a weakness of competition, allowing low-productivity firms to maintain

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1 Harris (2021) explains that 'creative destruction' as per Schumpeter (1943) can take place via two mechanisms. First, 'churn' means the opening of more efficient and/or the closure of less

their presence on the market. Due to the dual structure of the Hungarian economy, we believe that the most significant mechanism may be the lack of technology diffusion; however, the mechanisms of creative destruction are also at play due to the specificities of the state's economic role in Hungary (on the sub-optimal mechanism of resource allocation among firms and actors, see e.g. Mátyás 2022).

Muraközy et al. (2018) warn that not only the large productivity gap between the frontier firms (defined as the top 5% firms in terms of productivity performance) and the rest (i.e. the long tail of laggard firms) is a problem for the aggregate economic performance in Hungary but also the generally weak productivity of the frontiers themselves. A well-developed diffusion infrastructure (such as the Fraunhofer Institutes in Germany) to help non-frontiers adopt innovation could prevent this gap from growing wider.

As mentioned in the introduction, Monfort (2020) shows that in most European countries the contribution of labour productivity disparities to per capita GDP dispersion is above 90 percent because regional disparities in terms of labour productivity have increased, while disparities in regional labour markets have decreased. Central and Eastern European countries are among the top countries in this respect (with well above 95 percent contribution of labour productivity to total per capita GDP disparities). From this, it follows that in a labour-scarce environment labour market policies play a marginal role in further reducing regional disparities, while rebalancing labour productivity is of key importance. A large part of labour productivity disparities can be explained by structural effects, namely that companies of larger size and foreign ownership have a significant productivity advantage over smaller, local companies (Muraközy et al. 2018). The low level of immaterial investments by European standards, especially in manufacturing and ICT, undermines domestic firms' ability to access knowledge and skills vital for increasing productivity. Furthermore, local productivity spillovers are weak due to the low local capacity for technology adoption (Éltető–Alguacil 2020). Foreign-controlled companies accounted for 47.4% of gross value added in Hungary in 2018, and foreign-owned firms have a productivity advantage of twofold over domestic firms regarding the value added per employee (HCSO 2020). The distribution of foreign-owned, larger companies is highly concentrated in space: the capital city, Budapest, accounted for 44.8 percent of the total Hungarian FDI stock (net liabilities) in 2020 (HCSO 2022). In line with the literature, we assume that within-sector productivity differentials have a larger role than between-sector disparities (Harris 2021). Andrews et al. (2019) state that aggregate productivity and differences thereof across countries are increasingly being linked to the widespread heterogeneity in firm performance within countries and sectors.

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efficient firms, and, second, an external reallocation means the reallocation of existing market shares from low- to higher-productivity firms.

## Data and Methods

Our empirical research covers data from the largest local firms (in terms of operating revenue and employment) in the city of Pécs, analysed from a labour productivity perspective. We take into account the 200 largest enterprises according to two indicators: the employment-based and the revenue-based firm size. The source of our data is the Bureau van Dijk's Orbis Europe enterprise database,<sup>2</sup> supplemented by Eurostat data at the regional (NUTS 3) level. We intend to study the regional and local economic dynamics over time; hence we analyse data for the period between the two crises. Firm-level data are available for the period of 2013–2020. The extracted information includes the company name, the 4-digit NACE Rev. 2 core code, the operating revenue in US dollars, and the number of employees. Unfortunately, there are numerous missing data in our database, therefore we opted to consider companies that had available revenue and employment data for the year 2020. On average, 77 percent of the data are available, with the latest years having 80 to 90 percent coverage (and full coverage in 2020).

The regional analysis is based on Eurostat data. The statistical office of the European Union publishes gross value added (GVA) data and employment data at the NUTS 3 level in a sectoral decomposition between 2000 and 2020.<sup>3</sup> When calculating temporal dynamics, it is useful to evaluate GVA and revenue data at constant prices. For this purpose, we use the GDP deflator published in the AMECO database,<sup>4</sup> which is available at the national level. It is common in the literature that regional price levels are approximated by their national-level counterparts due to data limitations (see e.g. Rokicki–Hewings 2019). With the deflator, we convert the values so that the price level in the year 2015 represents 100.

The Orbis Europe database listed a total of 41,574 companies in Pécs. The largest companies (N = 200) included in our analysis account for a total of 34,654 employees (according to the employment-based top list) and 2,841 million dollars of operating revenue (according to the revenue-based top list), based on the data from the year 2020. Of course, there is a sizeable overlap between the two sets of companies, but it is far from complete, with 116 out of the 200 companies appearing in both rankings, but 84 companies missing from one or the other top list.

Labour productivity at the regional level is measured as the ratio of regional GDP (or GVA) to the number of persons employed. Unfortunately, we do not have data for the hours worked and cannot distinguish between full-time and part-time employment. In parallel, as an approximation for labour productivity at the firm level, we use the ratio of revenues to the number of employees. Gal (2013) uses turnover-based labour productivity for international firm-level comparisons among

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2 We are thankful to Tamás Szabó (CERS-IRS) for his help in data collection.

3 Databases named *nama\_10r\_3gva* and *nama\_10r\_3empers*.

4 <https://db.nomics.world/AMECO/PVGD?tab=table> (retrieved on: 12.09.2022).

other alternative measures (such as total factor productivity – TFP). Gal (2013) considers total revenue-based labour productivity as the most widely available measure, whose major weakness is that it does not control for intermediate input usage. A company with substantial reselling activity (especially in the trading sectors) will probably rank very high in this measure. The use of value-added-based labour productivity resolves this issue, as value added in itself is the difference between output (sales or revenue) and intermediate inputs (including resold goods, typical in retail trade). Still, labour productivity does not control for differences in capital intensity across firms; therefore, in order to control for capital intensity, total factor productivity (TFP) should be calculated. To reach the highest possible coverage of the data, we opt for the use of revenue-based labour productivity at the firm level.

## Development and Productivity in Baranya County

After the global financial and economic crisis, Central and Eastern European economies underwent a slow recovery process, and in the second half of the 2010s, the high-pressure economy took off and allowed the economies to converge towards the average European level of development (in terms of per capita GDP in PPS). Hungary reached 75.7 percent in 2021, starting from 66.1 percent in 2010,<sup>5</sup> which is close to the development level of Poland (77.1 percent), Portugal (74.0 percent), and Romania (72.7 percent). The capital regions have been the uncontested winners of this process, but non-capital regions have also been able to gain strength, albeit to a lesser extent. Territorial disparities peaked right after the global financial and economic crisis, but their decline came to a halt after 2015. Spatial inequalities are high in Hungary: Budapest is among the 20 most developed NUTS 2 regions in the EU (ranked 19<sup>th</sup> in 2020 at 153 percent of the average per capita GDP), while three Hungarian regions, including South Transdanubia (reaching 51 percent in 2020), are permanently among the 20 least developed ones.

The regional-level analysis indicates that in terms of labour productivity Baranya is well below the Hungarian average level. The distribution of production and employment is highly concentrated in the capital city in Hungary, with the exception of the manufacturing industry (*Table 1*). Although we have available data for 2020, we compare the data up to 2019 because of the distorting impact of the coronavirus crisis.

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5 Based on Eurostat's *nama\_10\_pc database* ([https://ec.europa.eu/eurostat/web/products-datasets/-/nama\\_10\\_pc](https://ec.europa.eu/eurostat/web/products-datasets/-/nama_10_pc)).

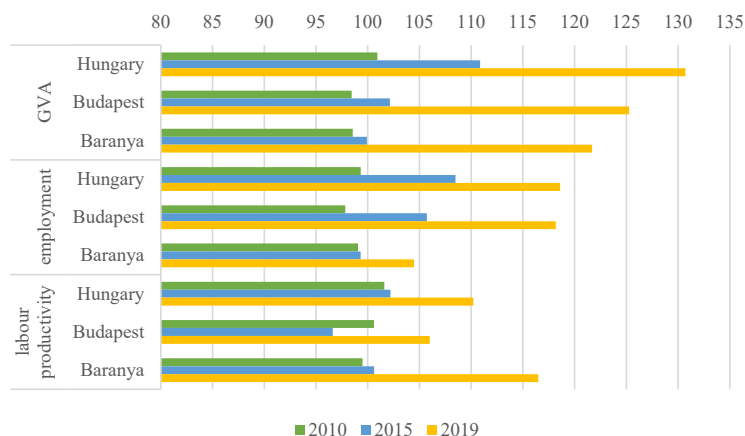


**Table 1.** Selected relative economic indicators at the NUTS 3 level in Hungary (2010–2019, Hungary = 100)

Indicator	NUTS 3 region	2010	2015	2019
Relative labour productivity	Budapest	112.2	107.1	109.0
	Baranya	82.1	82.6	88.6
Share in national gross value added	Budapest	37.9	35.8	37.2
	Baranya	2.6	2.4	2.5
Share in national employment	Budapest	33.7	33.4	34.1
	Baranya	3.2	2.9	2.8

Source: authors' elaboration based on Eurostat data

The economic dynamics of Hungary and Baranya heavily relied on employment growth (*Figure 1*); however, it has not been coupled with remarkable productivity improvements, therefore labour productivity was sluggish, especially during the first half of the previous decade.



Source: authors' elaboration based on Eurostat data

**Figure 1.** The change of gross value added (at constant prices), employment, and labour productivity (at constant prices) relative for 2009 (= 100) in Budapest, Baranya County, and at the national level (2009–2019)

Baranya has a specific sectoral structure (*Table 2*). Classified as a knowledge centre region (see Lengyel–Varga 2018), the public sector (O to Q) is overrepresented in terms of both employment and GVA in Baranya. In addition, the primary sector (A), as well as the construction (F) and arts, entertainment and recreation (R to U) sectors have a strong representation in terms of both GVA and employment relative to the national average.

**Table 2.** *Distribution of GVA and employment between the different sectors at various spatial levels in Hungary in 2019 – percentages (total economy = 100)*

	A	B-E	F	G-I	J	K-N	O-Q	R-U
	gross value added							
Hungary	3.9	23.6	5.7	18.3	4.9	23.8	16.7	3.0
Budapest	0.2	11.6	3.7	20.6	9.5	35.0	15.7	3.6
Baranya	8.2	19.1	6.6	15.4	3.0	19.2	24.9	3.6
	employment							
Hungary	4.0	20.8	7.6	24.0	3.3	14.7	21.0	4.6
Budapest	0.2	9.0	5.7	25.2	7.2	24.5	22.7	5.5
Baranya	7.2	18.5	8.0	20.5	1.9	10.0	28.6	5.2

*Source: authors' elaboration based on Eurostat data*

As a result of the uneven sectoral distribution of employment and gross value added, labour productivity also differs across sectors and regions. *Tables 3 and 4* indicate the relative sectoral labour productivity values in two different comparisons: first, vis-à-vis the national average and, second, relative to the total economy's average. Our calculations (*Table 3*) show that Baranya has a slight relative advantage over national-level productivity in the financial, real estate, professional, scientific, and administrative activities (sectors K to N). Labour productivity is similar to the national level in the primary sector (A), but it lags far behind in the industrial sector (B to E) and in terms of the total economy, as well.

**Table 3.** *Labour productivity in a sectoral breakdown in Baranya and Budapest vis-à-vis the national average (= 100) – 2019*

	Total	A	B-E	F	G-I	J	K-N	O-Q	R-U
Hungary	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Budapest	109.0	88.5	124.8	94.3	116.4	97.1	96.1	94.5	114.2
Baranya	88.6	100.6	81.2	98.0	86.6	92.7	104.4	97.1	94.6

*Source: authors' elaboration based on Eurostat data*

**Table 4.** *Labour productivity in a sectoral breakdown in Baranya and Budapest vis-à-vis the total economy (= 100) – 2019*

	Total	A	B-E	F	G-I	J	K-N	O-Q	R-U
Hungary	100.0	99.8	113.0	75.2	76.6	148.5	162.3	79.6	63.8
Budapest	100.0	81.1	129.4	65.1	81.8	132.4	143.1	69.0	66.9
Baranya	100.0	113.3	103.6	83.1	74.8	155.3	191.1	87.2	68.1

*Source: authors' elaboration based on Eurostat data*

*Table 4* shows the relative labour productivity values obtained from a comparison of sectoral performances within the different spatial units. Within Baranya, a significant relative advantage of the financial, real estate, professional, scientific, and administrative activities (sectors K to N) and the info-communication sector (J) can be detected, and there is some advantage in the primary sector (A) and the industry (sectors B to E).

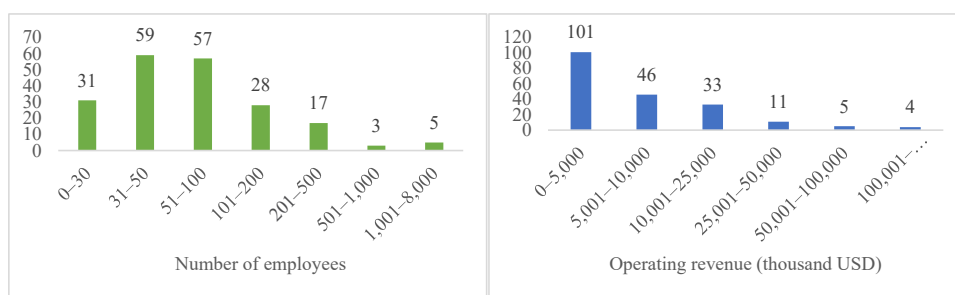
The above calculations provide the general impression that Baranya County has a relative productivity advantage in those sectors whose relative importance is below the national average, with the exception of agriculture. In those sectors that are overrepresented in Baranya (agriculture, construction, and the public sector), labour productivity is close to the national level, but it does not exceed it.

## **Labour Productivity and Challenges at the Firm Level in the City of Pécs**

Based on the Orbis Europe database, we have calculated the share of the economic performance of Pécs within the county's economy, restricted to the 100 leading enterprises (in terms of employment and revenue) in 2019. From the 100 largest employers of Baranya County, only 51 are headquartered in Pécs, representing 70% of their employees, while 48 out of the 100 largest companies in Baranya in terms of revenue are located in Pécs, generating 60% of their revenues.

When inspecting a larger bundle of the sample, almost four quarters (73.5 percent) of the 200 largest companies have less than 100 employees, and around half of them have not more than 5,000 thousand dollars operating revenue (data from 2020 – see *Figure 2*). The employment ranged between 26 and 7,950 persons, while the operating revenue ranged between 2,595 and 368,758 thousand dollars in the 200 largest companies located in Pécs (according to the two different measures of firm size). The sectoral distribution shows that the three dominant sectors in terms of operating revenue are industry (B to E), trade, transport, accommodation and food services (G to I), and the public sector (O to Q), but in terms of employment, the public sector has a clear dominance, employing around half of the workforce. Within the industrial sector, the manufacturing sector (C) takes around two-thirds of the employment, while electricity, gas, steam and air conditioning supply (sector D) take around a fifth of the industrial employment. Water supply (sector E) employs ten percent of the workforce, while mining and quarrying (sector B) has a negligible role. The distribution of the revenues within the industry is more uneven compared to that of employment: in addition to manufacturing (sector C), the electricity, gas, steam and air conditioning supply (sector D) also accounts for a significant share of industrial revenues (38 percent in terms of the employment-

based ranking and 46 percent in terms of the revenue-based ranking, which is higher than that of manufacturing, with 44 percent of total industrial revenues). Within sectors G to I, trade (sector G) is dominant, employing three-quarters of the workforce within the 200 largest companies, but in the revenue-based ranking list, there is no firm operating in sector I (accommodation and food service activities) at all. Within the public sector, education (sector P) is the most represented with almost 60 percent of the employment and revenues, public administration, defence, and compulsory social service activities (sector O) are represented with up to one third of the employment, and 10 percent of the employment and revenues of the public sector appears in the health sector (sector Q).



Source: authors' elaboration based on Orbis Europe data

**Figure 2.** The distribution of the 200 largest firms in Pécs according to employment and revenues, 2020

**Table 5.** The sectoral distribution of the largest firms in Pécs in 2019

Sector	Employment-Based Top List			Revenue-Based Top List		
	No. of Firms	Revenue	Employees	No. of Firms	Revenue	Employees
A	1	1.1%	1.0%	2	0.9%	1.1%
B-E	58	38.6%	20.9%	52	39.4%	20.9%
F	18	3.3%	2.1%	24	3.5%	2.6%
G-I	43	25.9%	12.7%	64	26.1%	13.7%
J	4	0.3%	0.5%	6	0.4%	0.4%
K-N	35	5.0%	9.1%	24	4.4%	6.8%
O-Q	30	24.4%	50.9%	24	24.7%	53.0%
R-U	11	1.4%	2.8%	4	0.7%	1.7%
Total	200	100.0%	100.0%	200	100.0%	100.0%

Source: authors' elaboration based on Orbis Europe data

We calculated the average performance of the companies in a sectoral breakdown and found a somewhat different picture according to the two kinds of firm size measures (*Table 5*). In terms of the employment-based ranking list, the public sector ranks high according to employment and revenues, but labour productivity is poor relative to the average of the 200 firms. Keeping in mind the specificities of the trading sector, the highest relative labour productivity was measured here, although employment is below the average. If we consider the revenue-based ranking list of the examined Pécs-headquartered companies, the industrial sector (B to E) and the public sector (O to Q) excel in labour productivity and revenues as well relative to the average. In all cases, the art (R to U) and the info-communication (J) sectors performed relatively poorly. This latter finding is in stark contrast to what was stated in the analysis at the county-level aggregation for Baranya above. We suspect that this issue is due to differences in company size, because the companies in the info-communication sector might be generally smaller, that is, they appear at the NUTS 3-level aggregation but not in our sample consisting of the largest companies.

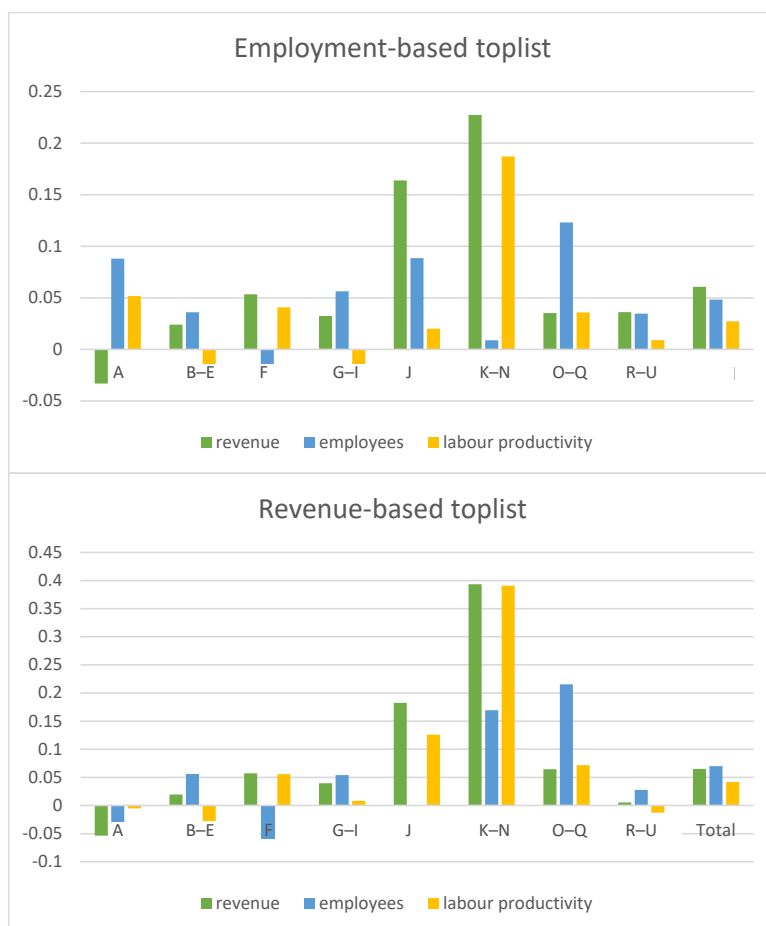
**Table 6.** Average firm-level employment, revenue and productivity data in a sectoral breakdown relative to the total economy (= 100%) in Pécs, 2020

Employment-Based Top List					Revenue-Based Top List				
Sector	No. of firms	Revenue	Employees	Labour productivity	Sector	No. of firms	Revenue	Employees	Labour productivity
A	1	192%	181%	82%	A	2	85%	101%	27%
B-E	58	125%	74%	98%	B-E	52	141%	84%	132%
F	18	36%	26%	109%	F	24	29%	21%	48%
G-I	43	121%	61%	199%	G-I	64	82%	43%	98%
J	4	17%	35%	39%	J	6	28%	18%	46%
K-N	35	29%	51%	56%	K-N	24	44%	53%	90%
O-Q	30	179%	332%	39%	O-Q	24	216%	490%	140%
R-U	11	23%	48%	40%	R-U	4	34%	78%	11%
<b>Total</b>	<b>200</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>Total</b>	<b>200</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
<b>Total volumes</b>	<b>200</b>	<b>11,149</b>	<b>173</b>	<b>83</b>	<b>Total volumes</b>	<b>200</b>	<b>14,203</b>	<b>163</b>	<b>462</b>

Source: authors' elaboration based on Orbis Europe data

Revenue and productivity changes are measured at constant prices, so near-zero percent values represent stagnation in real terms. We have found no remarkable drop in employment connected to the coronavirus crisis in 2020 despite finding

evidence of a decline (albeit not dramatic) in revenues in most sectors. A few outlier values have a strong impact on the averages, as there are only a few larger companies in addition to the many smaller ones in Pécs; therefore, we have chosen to exclude the data of Harman in 2018 because this company significantly widened its production in that year.



Note: outlier values are excluded.

Source: authors' elaboration based on Orbis Europe data

**Figure 3.** Average growth rates in a sectoral breakdown, 2013–2020

Our firm-level calculations show that the dynamics of average firm-level labour productivity growth reflects better the evolution of revenue growth than employment growth (*Figure 3*). As expected, employment growth paths have been smoother than revenue growth. In line with the literature (Askenazy et al. 2016), in the course of the post-crisis adjustment, the flexibility of the labour

market was quite low at the expense of the productivity of labour, and we have observed similar trends with respect to the COVID-19 crisis. However, this was not considered problematic since job security is a priority from a social aspect, while the main problem was the persistence of productivity slowdown even in the post-recovery period.

Our results demonstrate that the 200 largest companies were not severely affected by the negative impacts of the COVID-19 crisis. These findings recall the long-standing debates on the role of the public sector in peripheral regions (James et al. 2012). As pointed out by Venables (2020), localization economies (i.e. knowledge spillovers, labour market pooling and specialized suppliers) in the production of internationally tradable goods generate two types of cities, those producing tradables (e.g. manufacturing) and cities specialized in non-tradable sectors (e.g. public sector or restaurants) that serve social needs. We do not believe that the public sector has a crowding-out effect with regard to private sector economic performance; indeed, a well-functioning public sector, or in a broader sense a ‘foundational economy’ (see Bentham et al. 2013, Russell et al. 2022) is necessary for the whole regional and local economy to work efficiently (Birch–Cumbers 2007). Moreover, increasing productivity in the foundational economy would result in more regionally balanced growth than an exclusive focus on frontier firms that are highly concentrated spatially. Our firm-level analysis shows that a strong public sector provides a degree of stability for the local economy in Pécs but is unable to contribute adequately to long-term growth.

Rechnitzer and Berkes (2021) classify Pécs as a ‘wayfinding’ city where, despite its favourable conditions in several aspects of territorial capital, the directions of future development are unclear. A typology by Lengyel et al. (2016) characterizes Pécs as an efficiency-driven, follower-type potential knowledge region where engineering is supplanted by the role of research-intensive industries (e.g. pharmaceuticals). An enduring challenge arises from the persistence of labour market tightness, leaving limited scope to exploit additional labour reserves. As a result, the key issue for future regional economic growth is productivity improvement fuelled by the improved efficiency of local SMEs.

The inflow of EU funds is a critical issue, but mainly for overall national economic growth because their interregional rebalancing effects are not evident due to the highly centralized management of these financial sources in Hungary.

The regional development trap (Diemer et al. 2022) remains a serious challenge for Pécs and its wider region. A further increase in the role of the public sector is contested by the unsustainable finances of the municipal government, but the university still remains an important development factor. Nevertheless, reindustrialization efforts are necessary to hold Pécs on a development path based on the utilization of its endogenous resources (Rechnitzer–Berkes 2021, Lux 2021).

## Conclusions

Our article examined the changes in the economic position of a peripheral regional centre, the city of Pécs and its region, in the period following the financial and economic crisis. Our results suggest that productivity challenges are a long-term issue both at the firm and the regional level and that their resolution cannot be postponed, as in a labour-scarce environment in the 2020s extensive employment expansion in itself can no longer fuel economic growth. The main challenge for Pécs is to attract external resources and retain and generate endogenous resources.

The main limitation of our research is its relatively short time coverage with respect to the firm-level data. The cross-sectional coverage of the Orbis database is not complete either. Future research directions include the extension of our database with additional variables in the firm-level analysis, e.g. to estimate total factor productivity and foreign direct investments, as well as using additional data sources such as that of the National Tax and Customs Administration.

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