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SPATIAL ASPECTS OF THE RESTRUCTURING OF THE HUNGARIAN ECONOMY BETWEEN 2000 AND 2019

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Abstract

In the years following the regime change of 1989-90, Hungary faced numerous economic and political challenges. Apart from the dominance of privatisation, the '90s can definitely be described as a decade of transition. The performance of the Hungarian economy had reached the pre-transition level by the turn of the millennium, while the labour market and the structure of economic sectors had undergone substantial changes. In the present paper, we investigate how stable the developed sectoral structure proved to be in the two decades that followed and what territorial specificities the changes were characterised by. Our main question is how further structural changes – besides the sectors' performance (productivity) growth – contributed to the changing economic performance of territorial units in the period of 2000-2019.
In our study, we divide productivity change into a "between-sector" and a "within-sector" element. We regard the analysis as a relevant research question in general as well. However, the global financial crisis occurring at the "mid-term" of the studied period (2008) represents a special rupture. The analysis framework is provided by the counties (NUTS3 regions), we conduct our analysis in this context. It can be established that the primary factor of productivity growth is the increase of performance within sector groups and not the change in the economic structure of counties. The impact of structural changes is smaller in magnitude and may even have a negative value in several cases, i.e., the economic structure of counties has shifted from higher-productivity sectors towards those with lower productivity.

Keywords: productivity, restructuring, Hungary, NUTS3 regions

INTRODUCTION

The slowdown and stagnation of productivity growth were noted as early as the 1980s in developed economies. According to the Productivity Paradox coined by Robert Solow, the expansion of IT sector advances was not accompanied by productivity growth. Several research

papers have attempted to prove or reject this statement (Oliner & Sichel, 1994; Triplett, 1999; Lee & Perry, 2002; Thatcher et al., 2006; Brown, 2014).

Rapid changes are inevitable in the structure of production. Each sector has different innovation performance, the income elasticity of demand for different goods varies, comparative advantages change in external trade, etc. (Kuznets, 1973). These changes may emerge on corporate or industrial level, even independently of the macroeconomy in the short term, but they will definitely have an impact on aggregates in the long term. If there is a larger growth in an industry or sector in the long term, their share of total output will also increase, and the regional or national structure of the economy will transform (Streissler, 1982; Krüger, 2008a). According to Krüger (2008b), the effect of structural changes is manifested in industries with increasing productivity, and it explains a more significant part of productivity growth if total factor productivity is considered rather than only labour productivity. In this paper, we examine how structural changes have influenced productivity in the regions of Hungary in the past twenty years.

Industrialisation, the expansion of industry (employment, GVA share), began about two centuries ago in the countries referred to as developed today (in Hungary, it started at the end of the 19th century). Over the last half-century, we can observe a reverse process (deindustrialisation) in the same countries (in Hungary from the 90s), which is a complex phenomenon (Nagy & Lengyel, 2016). Productivity growth, automation, and robotisation, even with unchanged performance share in the national economy, still decrease the employment share of industry. The mass outsourcing of certain activities (ICT, logistics, servicing, etc.) to the service sector recognises performances that were earlier registered in the industry officially in the tertiary sector. The spectacular expansion of the third sector itself decreases the relative weight of industry. The phenomenon of delocalisation also appears to trigger a process of deindustrialisation in developed countries, when certain activities – a typical example is assembling – are outsourced to countries with a more favourable wage offer (Lux, 2015, 2017; Lengyel et al., 2017; Molnár, 2016; Nagy et al., 2021).

The concept of reindustrialisation also emerged in the ‘80s as a term denoting a desirable phenomenon. Reindustrialisation is, of course, not identical to a mechanical reversal of deindustrialisation processes of the past decades. New industries emerge (software industry, health industry, etc.), and substantial restructuring is taking place within the industry for the benefit of subsections promising greater value added (motor vehicle industry, pharmaceuticals,

etc.). The basis and essence of reindustrialisation is growing productivity (Cristopherson et al., 2014; Tregenna, 2013).

Following the crisis of 2008 (and the decline of all indicators – GVA, foreign and domestic sales, productivity and number of employed workers), manufacturing industry started to grow in Hungary (Lengyel et al., 2017). The number of employed workers increased by 2.5% between 2009 and 2014 (from 649 thousand to 665 thousand). The number of workers employed in manufacturing overall increased by about 9% from 2014 to 2020. Considering the approximately 9% increase in total employment numbers over the same period, we cannot establish the expansion of manufacturing. At the same time, it is also noteworthy that in the past five years, each subsection of manufacturing has experienced "better times". Therefore, employment – after an initial increase in the transition period – decreases. In 2020, compared to 2019, it decreased in every county. The same is true – with a few exceptions – regarding GVA data: GVA at current price (!) decreased in most cases in each section in 2020 compared to 2019.

The government aimed to achieve a 30% GDP share for industry. In 2019 – considering only manufacturing industry – this value was 24.1%, which meant the seventh place in the then EU28 (as opposed to the fourth place in 2014), practically sharing the same position with Slovakia, Germany, Romania, and Austria, relative to the EU average of 18.7%. At the same time, besides country shares, it is also worth noting that three-quarters of manufacturing performance in the EU was provided by five countries (Germany, Italy, UK, France, and Spain) over this period.

In the following section, we review the relevant literature, continuously narrowing space and timewise as we approach the time horizon of the current research. Then, following a methodological description, we present our results. We intend to describe the changes in the past period without value judgement and do not aim to formulate recommendations for economic policy.

THEORETICAL BACKGROUND AND LITERATURE REVIEW

Structural changes have been examined through various types of models. In the general equilibrium model (Mas-Colell et al., 1995), with the multi-sector endogenous growth model (Deaton, 1986; Blundell, 1988), in connection with industry life cycles (Agarwal, 1998; Agarwal & Audretsch, 2001; Klepper, 1997, 2002), based on development economics (Rostow, 1971; Syrquin, 1988) and evolutionary economics (Harberger, 1998; Pasinetti, 1993).

Furthermore, as demonstrated by the current paper, through the analysis of differences in reallocation and the development of productivity (Baily et al., 1996; Disney, et al., 2003; Foster et al., 2001; Fagerberg, 2000; Peneder, 2003; Krüger, 2008b).

Based on 17 years of data in 24 manufacturing industries of 39 countries, Fagerberg (2000) found that in most countries, within-sector effects defined the average increase of labour productivity in the industry, the between-sector effect was not strong, while the covariance effect was negative, i.e., the structural effects between industries did not really contribute to total productivity growth, only where the growth of the electronics industry was the basis of economic growth.

Studying manufacturing in the countries of the European Union (3-digit), Peneder (2003) found that structural changes have a weak effect on the average increase of labour productivity. There is no systematic connection between labour market restructuring and the growth of industries with higher productivity.

Ezcurra and Pascual (2007) studied the evolution of the spatial disparities of productivity in thirty-nine Central and Eastern European regions between 1992 and 2001. Their findings indicate that while regional disparities decreased, convergence between countries and divergence within countries could also be detected. The spatial differences of output per person[1] can be explained by the internal differences (for example, work morale, habits, social differences, location of industries, infrastructure and development potential in the region, etc.) between regions. The key factors playing a role in determining the size of regional disparities of productivity have the same effect on output per worker values. The composition of industry contributed to a relatively small extent to the average regional distribution of productivity. Thus, the relatively marginal effect of the structural component confirms the relevance of one-sector growth models in investigating regional disparities of income per capita. They emphasise that the national component and the connection between the economic behaviour of neighbouring regions have a significant role in explaining differences observed in the sectoral productivity levels of the Central and Eastern European region, even though these factors showed a decreasing effect over the 10-year sampling period. Geographical distance from the EU core countries and agglomeration economies are less important; however, these two

[1] Szakálné Kanó and Lengyel (2021) found that in the case of Central and Eastern European member states, there are severe disparities; the difference can even be threefold between the richest and the poorest regions (Szakálné Kanó & Lengyel, 2021).

variables became increasingly important during the 1990s, indicating a strengthening economic relationship between the Central and Eastern European region and Western Europe.

Martin et al. (2018) studied different productivity growth paths not at the level of industries but at the level of (85 British) cities between 1971 and 2014. They concluded that there was significant structural convergence between the cities, and the data indicated a general decrease in the level of specialisation. According to the decomposition analysis, structural changes had a negative effect on the increase of productivity, which was outweighed by the positive impact of within-sector changes, although it decreased in the examined 45 years and its extent differed from city to city.

Kiss (2007) notes that the Hungarian economy became firmly integrated into the global economy following the regime change. This had a dual consequence in terms of regional differences. On the one hand, it contributed to growth in labour productivity and employment in the affected regions, which could increase their manufacturing weight. On the other hand, it entailed a growing exposure to global economic processes (no substantial decrease was observed in the field of electricity, gas, steam, and water supply, where both demand and supply sides are domestic). Transformation was also observed in territorial restructuring; the centre of industrial production shifted to the northern parts of Transdanubia. 76% of foreign companies, 64% of foreign capital, and the majority of industrial export were concentrated in Central Hungary, Central Transdanubia, and West Transdanubia (one-third of the country's territory) in 2007. The most important sector was machinery, manufacturing transport equipment and electronics, in particular (Kiss, 2002, 2008a, 2008b).

Kiss (2012) also found that the crisis had the most unfavourable impact in the new central region of industrial production, primarily due to the substantially decreasing, but otherwise significant, share of exports in the region. Although the non-regional differences in industrial employment did not change as a result of the crisis, long-term unfavourable effects prevailed in disadvantaged parts of the country. The new spatial structure of the industry is very vulnerable. Rácz (2019) also points out that in the past decade, the role of working capital has been revalued, not only in the context of Hungary but the Central and Eastern European region as a whole that was unable to reduce the lag behind Western Europe. Moreover, the crisis has aggravated systematic vulnerability.

Lengyel et al. (2017) suggest that over the study period, in some counties, the increase of manufacturing employment and GVA can also be interpreted as reindustrialisation, although, based on the data, deindustrialisation can be seen in Baranya, Hajdú-Bihar, and Csongrád.

Interestingly, the latter phenomenon is linked to the outstandingly higher educational capacity of the relevant counties. Addressing the topic of reindustrialisation, Nick et al. (2019) also establish that in the case of Hungary, export-oriented production based on a labour market with high value added (especially automotive industry and related industries) contributes to the fact that industry has one of the largest GDP-proportionate share in the EU. Zsibók (2018) examined various scenarios with a GDP decomposition method, which outlines that, in most cases, regional differences are expected to increase by 2050 and can be significantly affected by the development of demographical changes.

DATA AND METHODS

In our work, we use one of the – perhaps most popular – measures of analyses related to spatial concentrations, the location quotient (LQ). It refers to the under- or overrepresentation of an economic activity in a particular territorial unit (NUTS3 regions) compared to the national economy (Lengyel et al., 2017). The location quotient is:

$$LQ_i = \frac{e_{is}/E_s}{e_i/E} = \frac{s_i}{x_i}, \quad (1)$$

where:

e_{is} – number of employed workers in territorial unit i, in a particular sector group,

e_i – number of employed workers in territorial unit i,

E_s – number of employed workers in a particular sector group at national level,

E – total number of employed workers at national level.

Its interpretation is the following: territorial units with a value above 1 for a particular sector group can be characterised with more significant specialisation, and the sector group in these territorial units is present in increased concentration compared to the average. We can find opposing views in the literature (e.g., EC 2009), however, we accept that strong concentration is shown by sector groups having an LQ value above 1.5.

We are aware of the limitations of LQ. Due to its simplicity, however, it can be relatively easily interpreted to consider it appropriate to exploit this advantage of the measure, applying it in the investigation of labour productivity representing the subject matter of our work.

In our study, we divide the analysis of productivity change into the sum of a "between sector groups" and a "within-sector" element. As defined by Martin et al. (2018, 554) based on Krüger (2008b):

$$\frac{\Delta Y_{jt+k}}{Y_{jt}} = \frac{\sum_{i=1}^{n} s_{ijt}\Delta y_{ijt+k}}{Y_{jt}} + \frac{\sum_{i=1}^{n} \Delta s_{ijt+k}(y_{ijt} - Y_{jt})}{Y_{jt}} + \frac{\sum_{i=1}^{n} \Delta s_{ijt+k}\Delta y_{ijt+k}}{Y_{jt}} \quad (2)$$

where:

Y_{jt} is the real GVA per employee in territorial unit j at time t,

ΔY_{jt+k} is the change of real GVA per employee between t and t + k,

s_{ijt} is the proportion of employed workers in sector i within the total employment of territorial unit j,

y_{ijt} is GVA per capita in territorial unit j in sector i at time t,

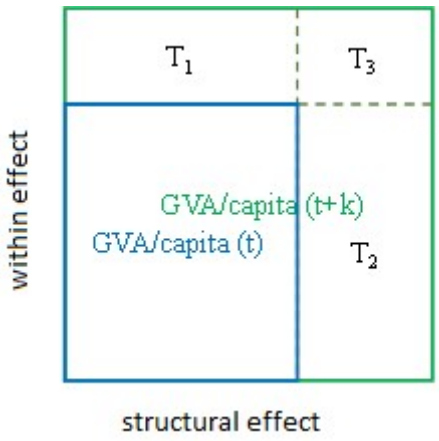
Δs_{ijt+k} is the change of the proportion of employed workers in sector i in territorial unit j between t and t + k,

Δy_{ijt} is the change of GVA per capita in territorial unit j in sector i between t and t + k,

$Y_{jt} = \sum_{i=1}^{n} s_{ijt} y_{ijt}$.

The first term of the right side of the equation (T1) can be interpreted as "within-sector effect", which is the average of the productivity growth of the sector groups, weighted by the (assumed as given) employment share of the sector groups within the economy of territorial unit j. The second term (T2) quantifies how the economic structural change of territorial unit j contributed to the performance change of the territorial unit. Here we consider the initial differences in the productivity of the sector groups as given. This term of the equation takes a positive value if in region j: (1) sector groups initially performing above average show increasing employment shares between t and t+k, and/or (2) the employment share of sector groups with initially below average productivity decreases. It is negative if in region j: (1) employment shares of sector groups initially performing above average decrease, and/or (2) sector groups with initially below average productivity show increasing employment shares between t and t+k. The third term (T3) quantifies the combined effect of structural change and sectoral productivity growth over a particular period. It is certainly positive in region j if employment shares of those sector groups increase, for which the productivity changes favourably. The second and third terms collectively express the extent of the structural effect, or, in other words, the between-sector change within a particular territorial unit, in terms of productivity growth (Fig.1).

Figure 1 Structure of the model



Source: own compilation

All the data used in the analysis were obtained from the Eurostat database, where the data on Hungarian counties (NUTS3) between 2000 and 20192 are available, broken down by sectors (Tab. 1).

Table 1 Highest-level sector aggregates (hereafter referred to as sector groups)

Code	Name of the sector group
A	Agriculture, forestry and fishing
B-E	Industry (except manufacturing and construction)
C	Manufacturing
F	Construction
G-J	Wholesale and retail trade, transport, accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M-N	Professional, scientific and technical activities; administrative and support service activities
O-Q	Public administration, defence, education, human health and social work activities
R-U	Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies

Source: Eurostat database

RESULTS AND DISCUSSION

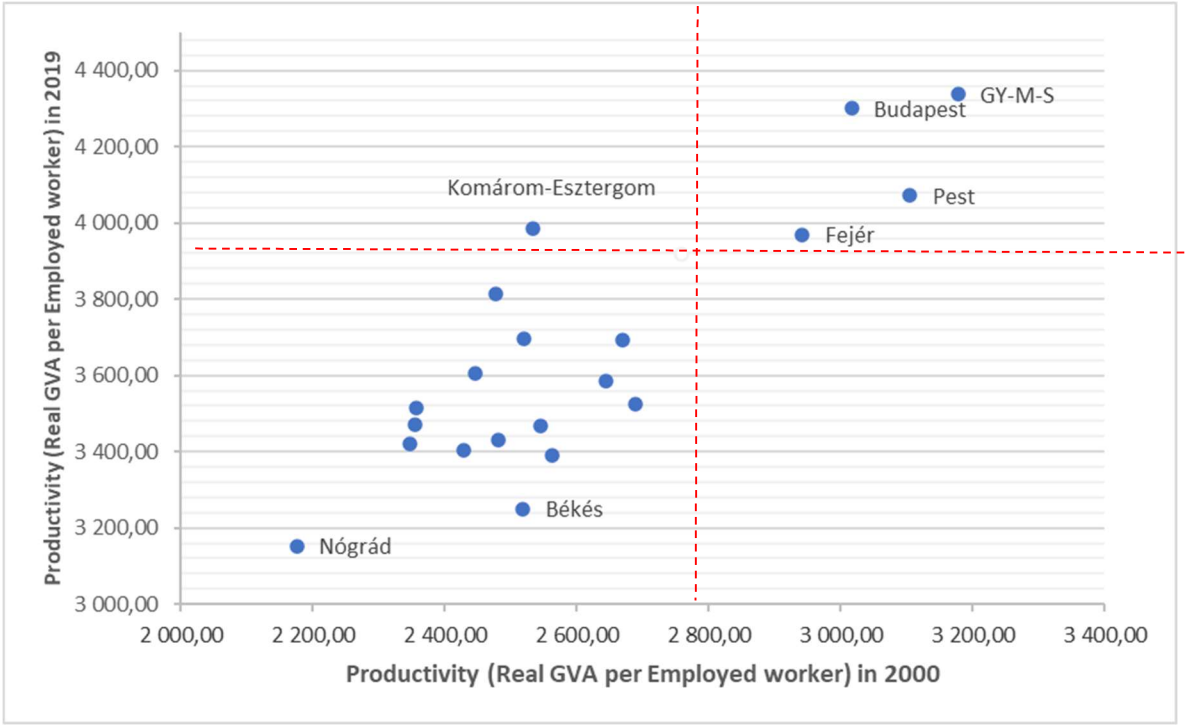
We considered it worthwhile to examine the 20 NUTS3 regions first. These regions represent the focus of our work in terms of labour productivity and its change (Fig. 2). The positive relationship indicates that there has not been drastic restructuring in the past twenty years, but smaller changes can be found.

[2] The most recent data at the time of the completion of the manuscript.

The mutually perpendicular lines located in the middle of the figure (Fig. 2) symbolise the average of 2000 and 2019. The counties located in the top right quarter are those which had a productivity value above average two decades ago and are still above average in this respect. Currently, Győr-Moson-Sopron (GY-M-S) is in the lead, with Budapest slightly behind, followed by Pest and Fejér. It can be seen that the capital was in the second place, and the surrounding county switched positions in the meantime.

The top left area includes only Komárom-Esztergom. This is the only county which was able to move forward since, based on the data of 2000, it did not reach the national average, while in 2019 it surpassed that. Komárom-Esztergom slightly precedes Fejér.

Figure 2 Change of labour productivity (Real GVA/Employed worker) between 2000 and 2019 among Hungarian NUTS3 regions, at prices of 2000



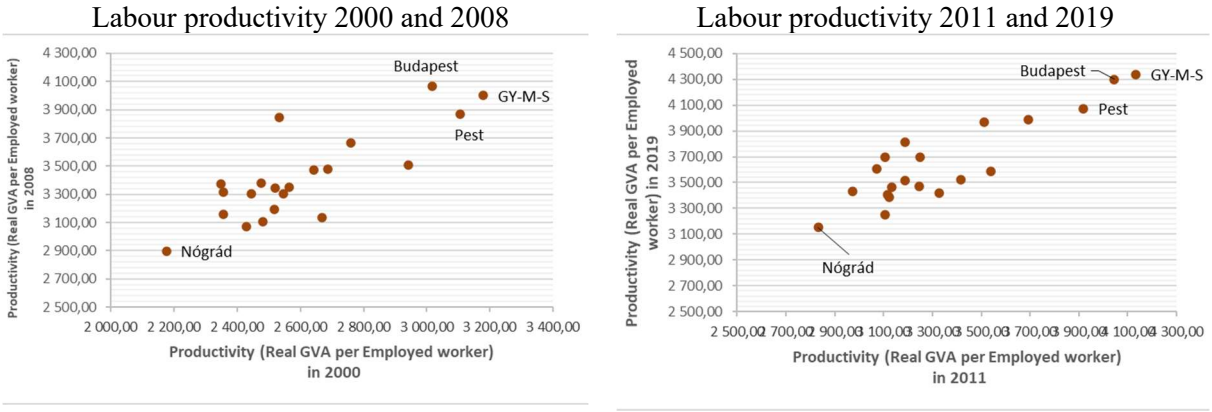
Source: own construction based on Eurostat database

There is not a single county in the "fourth quadrant", i.e., there was no substantial relative decline. Fifteen territorial units are found in the bottom left quarter. These counties had a value below the national average in 2000, and their position has not changed since. The national average is the most closely approximated by Bács-Kiskun. Based on the data of 2019, Békés is the second last, which showed a relatively (albeit slightly) better performance two decades ago. Nógrád was positioned at the end of the list in both studied periods, whose handicap is conspicuous. The data description analysis corroborates the fact that regional differences exist

between regions (see Ezcurra & Pascual, 2007; Zsibók, 2018). Moreover, these differences are conserved over time.

The financial crisis of 2008 took place over the studied period, the effect of which is worthwhile to examine separately as well. We consider the years 2009 and 2010 – when the effects of the crisis were most visible in macroeconomic indicators – a sort of rupture; therefore, we provide a brief presentation of the period before and after within the entire studied period (Fig. 3).

Figure 3 Development of labour productivity (Real GVA/Employed worker) before and after the financial crisis



Source: own construction based on Eurostat database

At the beginning of the pre-crisis period, Győr-Moson-Sopron had the highest value in terms of labour productivity, followed by Pest, while Budapest ranked only third. The national average was also exceeded by Fejér. The handicap of Nógrád was already evident. Interestingly, at that time, Bács-Kiskun showed a relatively weak performance, and it was lagging behind Csongrád-Csanád and slightly behind Békés.

The order of the three South Great Plain counties (Bács-Kiskun, Békés and Csongrád-Csanád) was established by the end of this period, 2008, which is still prevalent, i.e., Bács-Kiskun took the lead, followed by Csongrád-Csanád, and Békés is the last in this respect. Prior to the crisis, Budapest had the highest value, slightly ahead of Győr-Moson-Sopron. At that time, Pest ranked third based on the examined indicator. Interestingly, only four NUTS3 territorial units surpassed the national average then, the difference being Komárom-Esztergom and not Fejér ranking in the fourth place.

At the beginning of the second period of analysis, in 2011, the values of 3 counties and the capital were above the national average, and their order did not change. 2019 is the first year

when already five territorial units are found above the national average. It is due to Fejér "clawing its way back".

In line with the time horizon of our analysis, we also examined the location quotient at two points of time, in 2000 and 2019. As already mentioned, we considered the values over 1.5 as an indicator of a strong concentration of a particular sector group. Regarding the year 2000, it is found that, not surprisingly, most sector groups were already concentrated in Budapest. The LQ value of eight sector groups was above the national average, four of which showed exceptionally high concentration (Tab. 2).

Table 2 Location quotients of Hungarian NUTS3 regions by industries in 2000

GEO/TIME	A	B-E	C	F	G-J	J	K	L	M-N	O-Q	R-U
Hungary	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Budapest	0.17	0.63	0.67	1.02	1.17	1.98	2.04	1.50	1.72	1.04	1.36
Pest	0.93	0.85	1.09	1.38	1.15	0.78	0.43	0.99	0.76	0.80	0.93
Fejér	1.18	1.53	1.55	0.92	0.65	0.53	0.45	1.61	1.22	0.71	0.69
Komárom-Eszt.	1.11	1.93	1.38	0.89	0.81	0.41	0.47	0.64	0.74	0.89	0.73
Veszprém	1.06	1.73	1.23	0.94	0.90	0.43	0.50	0.92	0.78	0.93	0.77
Gyor-M-S.	1.03	0.76	1.49	1.04	0.88	0.58	0.54	0.87	0.72	0.77	0.77
Vas	1.08	0.54	1.66	0.90	0.80	0.35	0.45	0.64	0.69	0.77	0.89
Zala	1.31	1.19	1.23	1.08	0.94	0.37	0.48	0.67	0.52	0.87	1.17
Baranya	1.57	1.43	0.83	0.99	0.91	0.72	0.66	1.05	0.63	1.19	1.03
Somogy	1.84	0.94	0.82	0.95	1.04	0.45	0.57	0.72	0.69	1.10	0.96
Tolna	2.00	2.53	0.96	1.13	0.78	0.36	0.51	0.59	0.76	0.94	0.75
Borsod-Abaúj-Z.	0.90	2.18	0.99	0.94	0.93	0.69	0.56	0.73	0.51	1.22	0.82
Heves	1.21	1.94	1.18	0.96	0.88	0.38	0.63	0.63	0.51	1.01	0.74
Nógrád	0.75	1.05	1.27	1.12	0.80	0.47	0.58	0.62	0.61	1.23	0.64
Hajdú-Bihar	1.88	0.91	0.91	0.87	0.94	0.64	0.53	0.58	0.63	1.16	0.88
Jász-Nagykun-Sz.	1.75	0.97	1.13	0.83	0.85	0.39	0.52	0.51	0.62	1.11	0.69
Szabolcs-Szatmár-B.	1.33	0.52	0.97	0.88	1.12	0.40	0.53	0.41	0.53	1.20	0.75
Bács-Kiskun	1.89	0.66	1.12	0.89	0.98	0.60	0.54	0.59	0.44	0.92	0.91
Békés	2.13	0.75	1.04	0.75	0.89	0.63	0.63	0.38	0.48	1.10	0.72
Csongrád	1.93	0.70	0.94	0.99	0.90	0.69	0.59	0.73	0.75	1.09	0.87

* Uppercase letters refer to the name of sector groups. See Tab. 1.
** Values over 1.5, representing extremely high concentration, highlighted by red
*** Values below .5, representing extremely low concentration, highlighted by orange
Source: own construction based on Eurostat database

These four sector groups included info-communication, financial, real estate, and professional, scientific and technical. It may even be logical that these sectors were concentrated in the capital at that time and still are. On the other hand, it is less fortunate that agriculture has significant concentration in eight counties. All three counties of the Southern Great Plain and South Transdanubia (Baranya, Somogy and Tolna) as NUTS2 regions can be listed here at the time

of observation. On the contrary, industry played a similarly important role in Central Transdanubia (Fejér, Komárom-Esztergom and Veszprém) already in 2000, i.e., this sector had substantial concentration in all three counties of the region. Interestingly, at that time, Fejér was the only one where three sectors were overrepresented.

Moving on to 2019, based on the location quotient (Tab. 3), there are no significant structural changes and structural effects; nevertheless, smaller, less noticeable changes appeared. In the capital, the same four sector groups we have previously mentioned are concentrated to a substantial extent. In Pest, the concentration of wholesale and construction can be regarded as excessive, while concentration in industry and real estate became less pronounced in the case of Fejér.

Table 3 Location quotient of Hungarian NUTS3 regions by industry in 2019

GEO/TIME	A	B-E	C	F	G-J	J	K	L	M-N	O-Q	R-U
Hungary	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Budapest	0.06	0.73	0.45	0.81	1.10	2.37	2.11	1.76	1.80	1.18	1.23
Pest	0.92	1.20	1.42	1.78	1.85	0.83	0.61	1.09	1.23	0.78	1.14
Fejér	1.05	0.90	1.62	0.98	0.76	0.26	0.37	0.82	0.79	0.69	0.81
Komárom-Eszt.	1.03	1.45	2.21	1.12	0.89	0.23	0.41	0.52	0.69	0.80	0.78
Veszprém	1.24	0.91	1.27	0.91	0.91	0.31	0.45	0.79	0.65	0.78	0.86
Gyor-M-S.	0.95	0.91	1.78	0.97	0.94	0.32	0.58	0.67	0.68	0.69	0.99
Vas	1.03	0.59	1.44	0.92	0.68	0.18	0.33	0.58	0.45	0.65	0.93
Zala	1.17	0.93	0.83	0.92	0.96	0.26	0.47	0.72	0.41	0.74	0.78
Baranya	1.58	1.20	0.71	0.91	0.76	0.49	0.56	0.59	0.58	1.20	1.04
Somogy	1.83	1.14	0.74	0.89	0.83	0.17	0.40	0.46	0.40	1.04	0.87
Tolna	1.72	3.32	0.84	1.75	0.70	0.36	0.49	0.37	0.61	0.86	0.70
Borsod-Abaúj-Z.	1.04	1.29	1.16	1.00	0.78	0.30	0.49	0.42	0.73	1.13	0.89
Heves	1.04	1.88	1.72	1.02	0.85	0.22	0.39	0.64	0.35	0.95	0.79
Nógrád	0.86	0.72	0.91	0.68	0.67	0.16	0.34	0.48	0.28	1.07	0.67
Hajdú-Bihar	2.11	1.03	0.77	1.13	0.98	0.68	0.65	0.67	0.70	1.12	0.96
Jász-Nagykun-Sz.	1.62	1.12	1.39	0.80	0.73	0.21	0.39	0.46	0.48	0.92	0.71
Szabolcs-Szatmár-B.	2.24	0.74	1.22	0.95	0.87	0.24	0.53	0.60	0.36	1.22	1.11
Bács-Kiskun	2.11	0.86	1.40	1.29	1.00	0.25	0.49	0.63	0.45	0.91	0.78
Békés	2.55	0.75	0.92	0.74	0.74	0.19	0.55	0.33	0.32	1.05	0.77
Csongrád	1.53	1.23	0.80	0.98	0.89	0.68	0.59	0.77	0.65	1.07	0.82

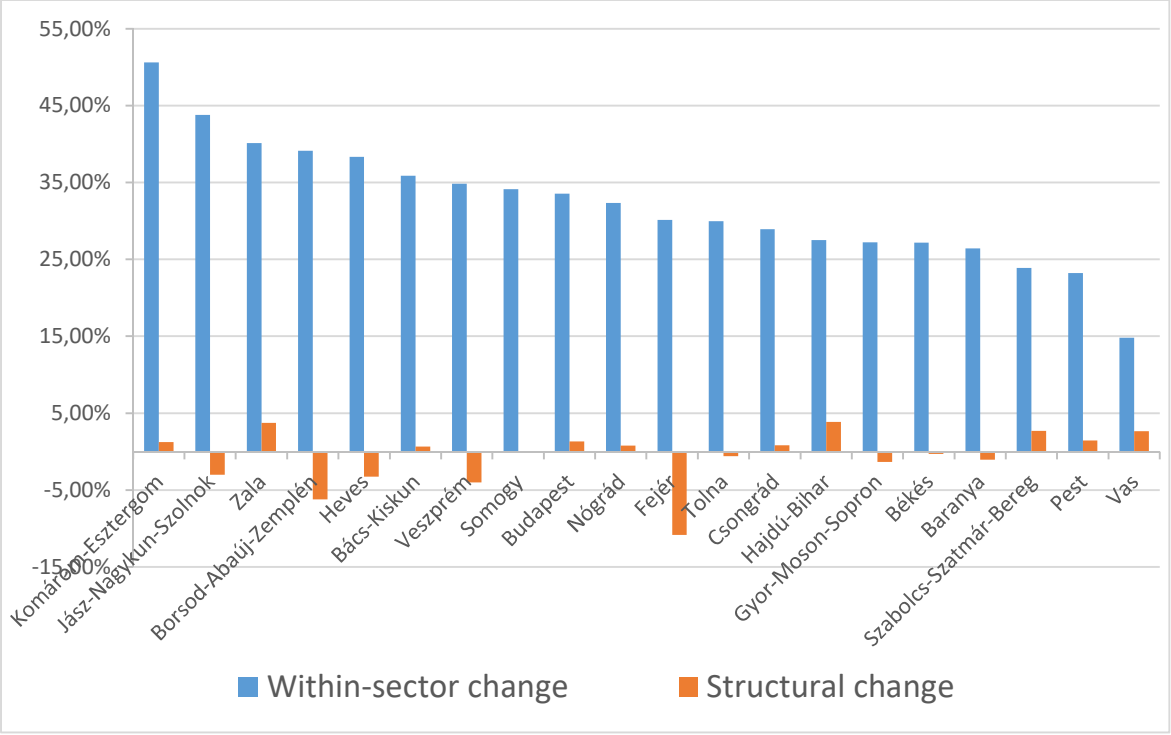
* Uppercase letters refer to the name of sector groups. See Tab. 1.
** Values over 1.5, representing extremely high concentration, highlighted by red
*** Values below .5, representing extremely low concentration, highlighted by orange
Source: own construction based on Eurostat database

In 2019 one county was also found to show a high concentration in three sectors. Agriculture had an outstanding concentration (above 1.5) in nine counties in 2019. In Tolna, besides agriculture and construction, industry also had a prominent position (due to the location of the only nuclear power plant in the country here). The latter value (3.32) is the highest regarding the two studied points of time and all counties.

Comparing Tab. 2 and Tab. 3, we can see that the number of counties with low LQ values increases in the Information and communication, Financial and insurance activities, Real estate activities and Professional, scientific and technical activities, administrative and support service activities sectors. This suggests that the counties are even more isolated from Budapest, and the dual structure has survived (see Kiss, 2007).

In our study, we divided productivity change into a "between-sector" and "within-sector" element. The sum of these two effects represents the total change in labour productivity (the change by counties between 2000 and 2019 is presented in Fig. 2). It can be found that over the studied period, in both shorter periods, the changes within sector groups were dominant, while the effect of structural changes is much smaller (Fig. 4 and Tab. 4).

Figure 4 Contribution to total change, 2000-2008



Source: own construction based on Eurostat database

Table 4 Breakdown of productivity growth of Hungarian NUTS3 regions, 2000-2008

	Within-sector change 2000-2008	Structural change 2000-2008	Total change (sectoral + structural) 2000-2008
Komárom-Esztergom	50.63%	1.25%	51.89%
Zala	40.11%	3.72%	43.83%
Jász-Nagykun-Szolnok	43.79%	-3.02%	40.78%
Bács-Kiskun	35.86%	0.65%	36.51%
Heves	38.33%	-3.27%	35.05%
Budapest	33.55%	1.33%	34.88%
Somogy	34.12%	0.04%	34.16%
Nógrád	32.35%	0.79%	33.14%
Borsod-Abaúj-Zemplén	39.11%	-6.24%	32.88%
Hajdú-Bihar	27.50%	3.86%	31.36%
Veszprém	34.82%	-4.02%	30.80%
Csongrád	28.94%	0.83%	29.76%
Tolna	29.97%	-0.58%	29.39%
Békés	27.16%	-0.31%	26.85%
Szabolcs-Szatmár-Bereg	23.87%	2.71%	26.57%
Győr-Moson-Sopron	27.21%	-1.33%	25.87%
Baranya	26.41%	-1.06%	25.35%
Pest	23.20%	1.46%	24.66%
Fejér	30.14%	-10.84%	19.30%
Vas	14.80%	2.65%	17.45%

Source: own construction based on Eurostat database

As it can be seen, the primary factor of productivity growth in the examined NUTS3 regions is the performance growth within the sector groups rather than the change of the economic structure of counties.

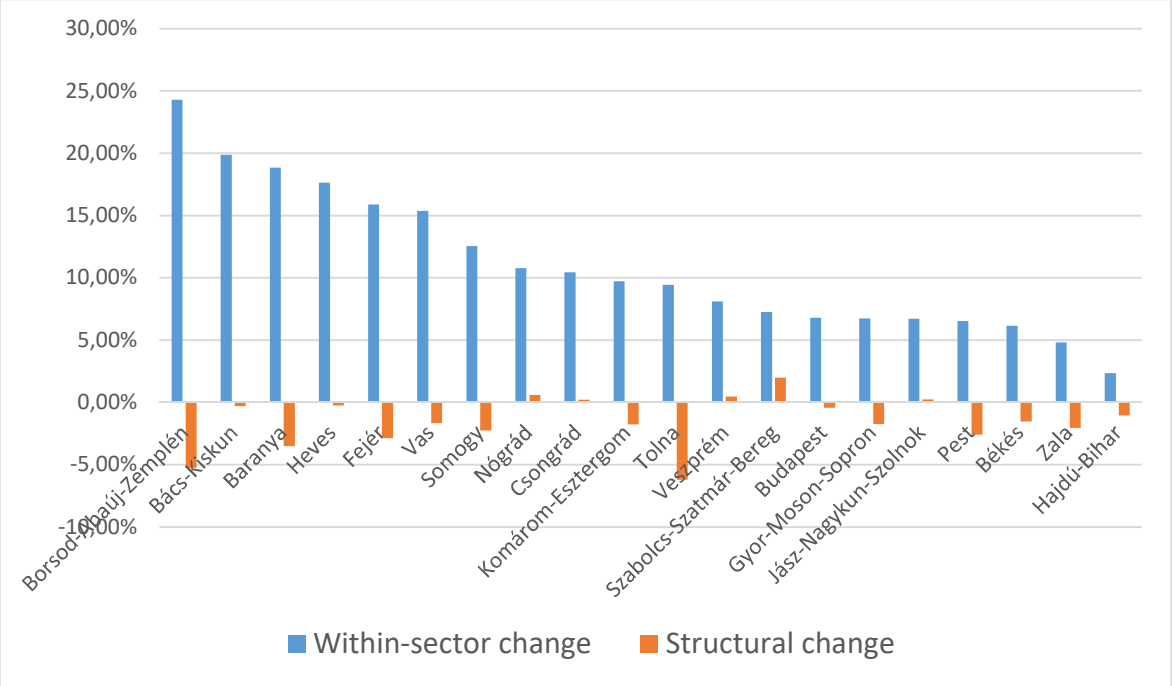
The effect of structural changes on performance growth is smaller than the sectoral effect in many cases; sometimes, it even takes a negative value. I.e., the economic structure of counties has shifted from sector groups with higher productivity to those with lower productivity. Although they studied other periods and focused on cities, Martin et al. (2018) obtained similar results for England.

The winner of the pre-crisis period is Komárom-Esztergom, for which the extent of within-sector change exceeds fifty per cent (Tab. 4). It is seven per cent higher compared to the second

Jász-Nagykun-Szolnok in this respect. In the case of the former, structural change shows a positive albeit minimal effect. The positive effect of structural change could be demonstrated in a total of eleven cases among the studied territorial units. This value was the highest in the case of Hajdú-Bihar (3.86%), closely followed by Zala (3.72%). It can be stated that the structural shifts increased the productivity of the counties to a lesser extent in the studied period compared to the change within sector groups.

Regarding total productivity change throughout 2000-2008, two Transdanubian counties (Fejér and Vas) are positioned at the end of the list. The weak performance of Fejér is particularly surprising in this respect. The effect of the changes within sector groups (+30.14%) is understandable; nevertheless, the negative value of the effect of structural changes (-10.84%) is surprising. The present paper does not focus on the in-depth analysis of the situation of each county, but several papers have found that it was the period when the North Transdanubian contiguous regions grew faster than the national average. However, after the turn of the millennium, many of these counties ranked last in terms of growth due to the exhaustion of earlier industrial dynamics. The still painful effect of the departure of IBM can also be mentioned in the case of Fejér and Székesfehérvár.

Figure 5 Contribution to total change, 2011-2019



Source: own construction based on Eurostat database

Moving on to the second period, it is striking that the period of 2011-2019 showed much more moderate growth rates (Fig. 5 and Tab. 5). Over this period, the labour productivity of Bács-Kiskun increased strongly, even though its extent did not reach twenty per cent (19.57%).

Considering total change, no substantial growth could be detected in the case of the territorial units positioned at the end of the list. For Győr-Moson-Sopron, the growth was only five per cent, and even lower for five counties, 1.3% in Hajdú-Bihar.

During this decade, structural change was less significant in terms of productivity change. It had a positive effect on labour productivity in four counties, but – except for Szabolcs-Szatmár-Bereg – all of them had values below 1%, which is, in fact, only a quantifiable value. The negative effect is occasionally stronger, especially in the case of Tolna and Borsod.

Table 5 Breakdown of productivity growth of Hungarian NUTS3 regions, 2011-2019

	Within-sector change 2011-2019	Structural change 2011-2019	Total change (sectoral + structural) 2011-2019
Bács-Kiskun	19.87%	-0.30%	19.57%
Borsod-Abaúj-Zemplén	24.30%	-5.25%	19.05%
Heves	17.64%	-0.24%	17.40%
Baranya	18.84%	-3.50%	15.34%
Vas	15.37%	-1.65%	13.72%
Fejér	15.88%	-2.88%	13.00%
Nógrád	10.77%	0.60%	11.37%
Csongrád	10.44%	0.21%	10.66%
Somogy	12.55%	-2.26%	10.29%
Szabolcs-Szatmár-Bereg	7.25%	2.00%	9.25%
Veszprém	8.09%	0.49%	8.58%
Komárom-Esztergom	9.73%	-1.75%	7.98%
Jász-Nagykun-Szolnok	6.72%	0.24%	6.96%
Budapest	6.79%	-0.43%	6.36%
Győr-Moson-Sopron	6.74%	-1.74%	5.00%
Békés	6.16%	-1.53%	4.62%
Pest	6.55%	-2.59%	3.96%
Tolna	9.44%	-6.20%	3.24%
Zala	4.83%	-2.04%	2.78%
Hajdú-Bihar	2.34%	-1.04%	1.30%

Source: own construction based on Eurostat database

Nevertheless, regarding within-sector changes, productivity growth in the above-mentioned Borsod-Abaúj-Zemplén was the most substantial (24.3%), ahead of Bács-Kiskun (19.87%), Baranya (18.84%), and Heves (17.64%). Over this time interval, productivity growth exceeded 10 per cent in only nine counties. Even the capital city of Budapest is positioned in the second half of the ranking.

Evaluating the overall picture of the two decades studied in our work, it can be established that the previously emerging differences – sectoral structures – have been preserved. In the first decade, some effects of economic restructuring were detected in terms of the development of counties, but these were obliterated with the financial crisis. There were territorial units showing more and less dynamic growth in the context of existing structures.

CONCLUSION

In our paper, we sought to explore the changes in the structure of the Hungarian economy in the past two decades (2000-2019) through the indicator of labour productivity. Within the studied period, over both shorter periods, within-sector changes were dominant, while the effect of structural changes was much smaller.

The primary factor of the productivity growth of NUTS3 regions (counties) was performance growth within each sector group. The significance of economic structural change is marginal in comparison, even negative in some cases (the economic structure of counties shifted from sector groups with higher productivity to sectors with lower productivity).

Based on our findings, we recommend that regional policy designers be more attentive to the enormous investments that can transform each region's economic structures. Moreover, they should encourage those development projects which contribute to higher productivity.

Since our findings focus only on Hungary, we cannot establish general results about structural changes. Therefore, we are planning to extend our research in two different directions. One of them is broadening the country list by adding Central-Eastern European countries to examine whether other regions show a similar pattern. Another is complementing the research with new variables that can represent particular driving factors of structural change in Hungary.

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