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The Transformation of the Catchment Area of the University of Pécs from 2013 to 2023^{4, 5}

ABSTRACT

Higher education institutions are in constant competition for students, and educational catchment areas, along with their spatial dimensions, play a crucial role—especially in relatively small yet densely populated countries like Hungary, where the accessibility and appeal of institutions can be paramount. This study aims to examine the evolution of the University of Pécs' (UP) catchment area from 2013 to 2023, with a particular focus on the impact of demographic factors and student mobility. The analysis highlights the primary student recruitment areas, with special attention to South Transdanubia and the city of Pécs. It was found that the medical and health sciences programs at UP are the most popular, particularly among students from the Transdanubia and Central Hungary regions. In the field of economics, a significant portion of students also come from South Transdanubia and Central Hungary. A similar regional distribution is observed in the humanities and teacher education programs, mirroring that of the medical sciences. The study provides recommendations for strengthening regional presence and attracting students from other major cities in Hungary, with a particular focus on internationalization and scholarship opportunities. The findings suggest that changes in UP's catchment area present both opportunities and challenges for the university within the domestic higher education landscape.

Keywords: University of Pécs, spatial distribution, students, higher education, recruitment, mobility

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⁴ The study was supported by the Kriszbacher Ildikó Talent Support Programme of the University of Pécs for the academic year 2023/2024 and the Faculty of Sciences of the University of Pécs [A tanulmány a Pécsi Tudományegyetem Kriszbacher Ildikó Tehetséggondozó programjának 2023/2024. tanévi támogatásával és a PTE Természettudományi Kar Kari Tudományos Diákköri Tanács támogatásával készült].

⁵ This document has been prepared using the tabular data set compiled by the Hungarian Central Statistical Office (www.ksh.hu) upon specific request. The calculations and conclusions drawn from them are the sole intellectual property of the authors.

INTRODUCTION

The study of the spatial dimensions of higher education, including educational catchment areas, remains highly relevant to the geography and landscape of higher education, as institutions are engaged in fierce competition for students. This is evident in 2023, when students in Hungary could apply to 62 higher education institutions. The intensity of this competition is intensified by the country's relatively small size, moderate concentration, and medium population density by European standards. The shift toward a market-oriented approach is a two-sided phenomenon: universities receive state support as a matter of course, gaining financial backing by ensuring an adequate student population, while students seek the best institution for their needs (Kovács et al., 2012; Vámos, 2024). Given this competitive landscape, cooperation is paramount for institutions, particularly regarding research collaboration and social inclusion. The development of the knowledge economy and the information society is a global socio-economic process in which higher education institutions play a crucial role. Increasing both domestic and international enrollment is essential for the long-term success and competitiveness of these institutions (Kuráth, 2007; M. Császár et al., 2021).

Polónyi (2023) notes that in Hungary, post-millennium enrollments in higher education reached low points in 2007–2008, 2013, and 2020, with declines of up to 40,000 to 50,000 students. After 2009, enrollments began to rise again. This trend can be attributed to demographic changes, as well as various educational policy decisions, including the introduction of tuition fees, the concept of self-sustaining universities, changes in the higher education framework, the introduction of student loans, and the implementation or removal of language exams and advanced school-leaving certificates as requirements (Polónyi, 2020, 2023).

An effective way to analyze the spatial dimensions of higher education is by observing developments and trends within the catchment area. The concept of catchment areas is derived from the definition of hinterland, which refers to regions closely linked economically to a city or municipality. Chisholm (1889) initially used the term “Hinderland,” but “Hinterland” later became the standard term. The hinterlands of ports are categorized into export and import hinterlands. Andre Allix applied the term “Umland” to describe the economic environment of inner-city areas and “Hinterland” to denote the hinterland of ports (The Editors of Encyclopaedia, 1998). Today, “Hinterland” is commonly used to refer to the rural areas associated with an urban catchment area (Merriam-Webster, n.d.; OED, 2023). However, the concepts of “Umland,” “Hinterland,” and catchment area are increasingly blurred (Baltazar & Silva, 2019).

Since the 1970s, qualitative elements have been introduced in attraction studies to explore the causal relationships behind various phenomena (Kincses, 2017). In Hungary, the study of qualitative factors gained prominence in the 1990s, coinciding with significant economic changes during the regime change (M. Császár & Németh, 2006).

In Hungary, three major centers of higher education stand out in terms of student numbers, following the capital: Debrecen, Szeged, and Pécs (Wusching, 2016). The universities in these cities are not

only important in terms of educational geography but also have a significant economic impact and influence on internal migration. In the case of the University of Pécs (UP), this impact is particularly pronounced in its region, specifically the South Transdanubian region, with Pécs as its headquarters and Baranya County as its locality (Hardi, 2007; M. Császár et al., 2019).

UP's catchment area is extensive, featuring a well-defined regional scope (Hegedűs, 2015; M. Császár & Wusching, 2014). However, in recent years, the university has experienced an internal shift in its student population, characterized by a decreasing proportion of Hungarian students—primarily due to demographic factors—compared to the growing share of foreign students (Erdős et al., 2021).

This study pays special attention to the University of Pécs regarding students enrolled in Hungarian language programs in Hungary, examining how the university's attractiveness has evolved over the past decade and how this affects UP's long-term competitiveness in its study locations (Pécs, Kaposvár, Zalaegerszeg, Szombathely). Kuráth and Sipos (2019) highlight that the competitiveness of higher education institutions is directly reflected in the size and composition of student enrollment. Accordingly, our study aims to analyze the changes in UP's catchment area between 2013 and 2023, focusing on which regions are most affected by these changes and identifying potential areas for an increase in student numbers. Our research explores the spatial patterns and trends in student recruitment, with particular emphasis on the role of regionality and its impact on the catchment area of the University of Pécs.

METHODS

This research is based on two primary datasets, each containing data related to UP over a 10-year period. For national-level analyses, the data source is the Hungarian Central Statistical Office (HCSO). For the University of Pécs, the direct data source is the Directorate of Education (UP DE). All data analyzed in the subsequent sections of the research are derived from the NEPTUN Unified Hungarian Higher Education Academic System, which is recorded in the Higher Education Information System (HEIS). NEPTUN is utilized by all higher education institutions in Hungary for managing and administering student data, academic progress, and finances. The system was implemented at UP on November 17, 2015, making data available from the subsequent admission cycle, specifically the 2016 general admission procedure. Additionally, data from the University of Pécs University Telecommunications Information System for the years 2013–2015 has been exported to the UP DE database.

Regarding the research databases, the tabular dataset from the Hungarian Central Statistical Office titled *Number of students participating in higher education by district of residence, by institution*, compiled upon request, contains data on students with a legal relationship to a Hungarian higher education institution from the academic years 2013/14 to 2022/23, broken down by year. The UP DE database shows a total of 57,389 students with home addresses during the period from 2013/14 to 2022/23, with each student assigned an individual anonymized code per admission cycle. It is important to note that students may not reside in the same area where they completed their secondary education,

resulting in potential discrepancies in catchment area classification. In this study, aggregating data by districts aims to mitigate this issue, as fewer secondary school students are likely to pursue further education far from home.

EXCEL (Microsoft Corporation, 2023), SPSS (IBM Corporation, 2023), and RStudio (RStudio Team, 2023) were utilized for data management, while ArcGIS PRO (Esri Inc., 2023) was employed for data visualization. Jenks natural breaks clustering was used for mapping the data, as this classification system is commonly applied in spatial research. The Jenks formula identifies natural clusters within a data series, determining significant breakpoints where the most similar values are grouped in each category, thereby maximizing the differences between categories (Tóth, 2014). For the long time series analysis (2013–2023), we rounded the threshold value defined as a significant enrollment number to the nearest hundred for UP, considering the Jenks natural breaks. For the national study, this threshold is set at 280 for the lower bound, which we rounded to 300.

In our data analysis, we first assessed homogeneity of variance using Levene's test, which indicated that the variances were not equal. Consequently, we employed Welch's ANOVA test, which is robust to violations of homogeneity of variance. We then conducted an F-test to determine the statistical significance of the differences between groups.

The maps presented illustrate the research findings at the district level, based on the publicly available district polygon database from the Lechner Knowledge Centre. Budapest was treated as a single map unit for both district and municipal analyses, as a district-by-district resolution was not available in either database. Thus, a total of 175 polygons are included in the district maps (174 districts plus Budapest). For simplicity, Budapest is referred to simply as “Budapest” when analyzing districts in subsequent sections. To ensure comparability over time, all spatial databases have been created according to the 2022 settlement structure (Annex C).

The changes analyzed in the context of districts offer valuable insights from an educational geography perspective. While districts are administrative units with fixed, linear boundaries (Tóth, 2004), they effectively describe urban and peri-urban settlement structures. However, studies at the settlement level are also crucial for understanding educational geography, as the secondary schools from which enrollments are drawn are located in cities and must be considered when designing university enrollment strategies.

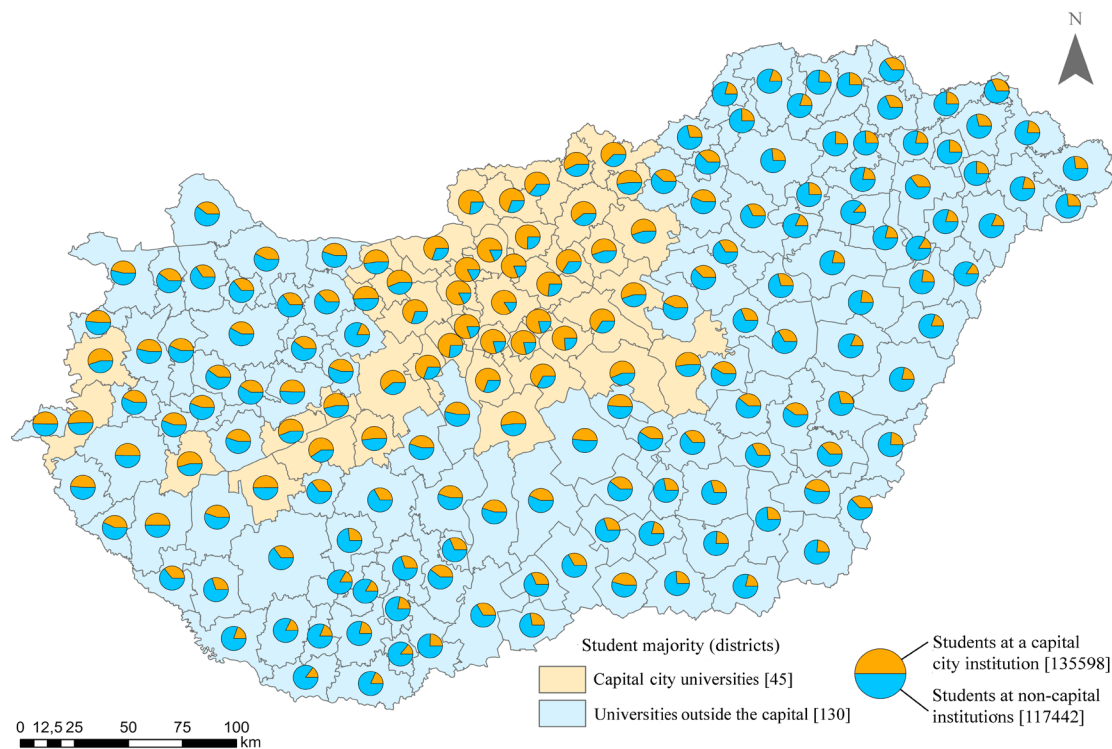
In several cases, we examined admission procedures, summarizing general, cross-year, and make-up admission procedures by year of admission. The highest number of enrollments typically occurs during the general admission procedure, with the latter two categories contributing to the data of the first.

RESULTS

National and regional share

When examining the data for trends, significant differences emerge in the attractiveness characteristics based on students' place of residence and the number of students per institution⁶. For rural higher education institutions, the primary recruitment base typically extends to a radius of about 50–60 km (Kozma et al., 2002). Beyond this area, the enrollment effect diminishes. An exception to this trend is the capital, where Budapest has a significant national coverage (Hegedűs, 2014; Jancsó & Szalkai, 2017; Jávorffy-Lázok & Tésits, 2020) (Figure 1), while rural institutions primarily exert a regional impact (Wusching, 2016).

Figure 1. Percentage of students in urban and rural higher education institutions by district of residence for the 2022/2023 academic year



Source of data: Hungarian Central Statistical Office (2023a) (edited by: A. Béres)

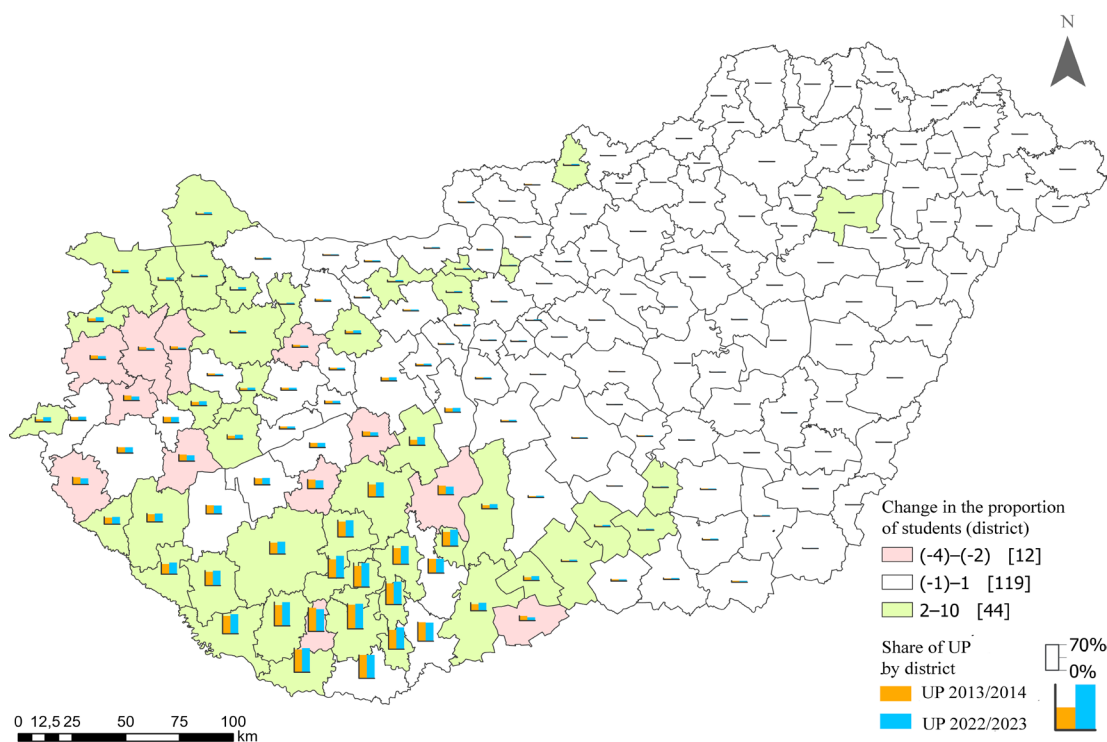
It is important to note that presenting national data not only contextualizes UP's situation within the region but also allows for an exploration of the differing recruitment patterns between rural institutions and those in Budapest. From the map (Figure 1), it is evident that rural university towns retain at least half of their local students during their postgraduate years. An exception to this trend is observed in the Lake Balaton region. The reason for the higher **continuation** rates that appear to be “capital city-oriented” in the Szombathely district and its surroundings stems from the current principles of

⁶ In the Levene test, the degrees of freedom is 174, the F value is 14.758, and the p-value is $< .2e-16$. The F value for the Welch ANOVA test is 345.42, with degrees of freedom of 174.00 in the numerator and 530.96 in the denominator, and the p-value is $< 2.2e-16$. The W statistic for the Shapiro-Wilk test is 0.23692, and the p-value is $< 2.2e-16$.

map design, as the data set is somewhat distorted by the presence of the ELTE campus operating there. In general, changes in the attractiveness of training centres depend on many factors, such as economic, social and educational trends. If there is an increase or decrease over a period of time, it may be due to changes in the availability of jobs, the economic situation, demographic characteristics, or changes in educational policy. By comparing the 2013 and 2023 datasets (Figure 2), some changes can be observed when examining West and Central Hungary.

In the South Transdanubian region, UP successfully increased the share of students enrolled in the majority of districts between 2013 and 2023 (Annex A). Budapest's share in this region did not change, but in the case of West Transdanubia and Central Transdanubia, the share of students continuing their studies in the capital increased, but in some districts, e.g. Szentlőrinc and Paks (Annex A), UP's share decreased.

Figure 2. Change in the percentage of UP students by districts of residence between the 2013/2014 and 2022/2023 academic years



Source of data: Hungarian Central Statistical Office (2023a) (edited by: A. Béres)

Trends in the number of students at UP

The number of students at the University of Pécs increased steadily until 2006, after which it experienced a consistent decline until 2013 (M. Császár & Wusching, 2014). At the end of the 2013/2014 academic year, the University of Pécs had 21,819 students (Figure 3). This decline continued until the 2016/2017 academic year. In the 2017/2018 academic year, the decrease halted, with the student population

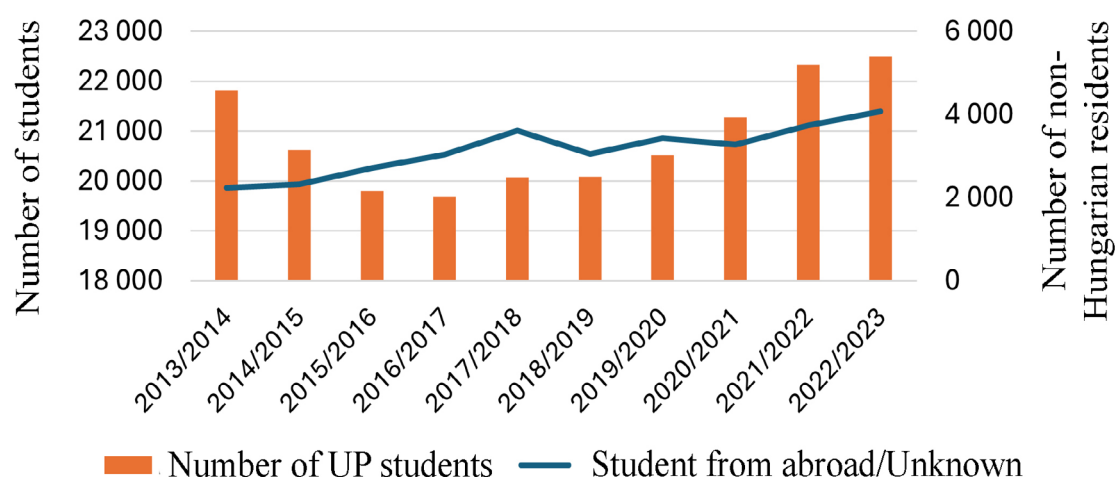
increasing by 400 compared to the previous year. This number stagnated in the following year but began to rise again starting in the 2019/2020 academic year. However, the rate of increase appeared to slow until the 2022/2023 academic year, when the number of students reached 22,490. This figure still falls significantly short of the nearly 35,000 students enrolled in the 2006/2007 academic year.

Figure 4 illustrates the number of students enrolled at UP, University of Szeged (USz), and University of Debrecen (UD) in various years between 2013 and 2023. M. Császár and Wusching (2014) noted that, when comparing the number of UP students to the national total of higher education students, it becomes evident that UP's national share has been declining since 2006, alongside a decrease in the specific number of students. This trend indicates a gradual loss of the university's presence within the national higher education landscape, continuing until 2014. In 2013, UP accounted for 6% of the national student population, but this figure dropped to 5% in 2014, marking the lowest percentage since the turn of the millennium; however, it subsequently began to increase again.

Throughout the study period from 2013 to 2023, the University of Pécs' share of the national student population fluctuated between 5% and 7%. During this period, UP had a total of 57,389 students, of which 32,208, or 56%, hailed from the South Transdanubian region. In contrast, the enrollment numbers at the other two rural universities—USz and UD—exhibited a more stable trajectory, with their share consistently higher than that of UP.

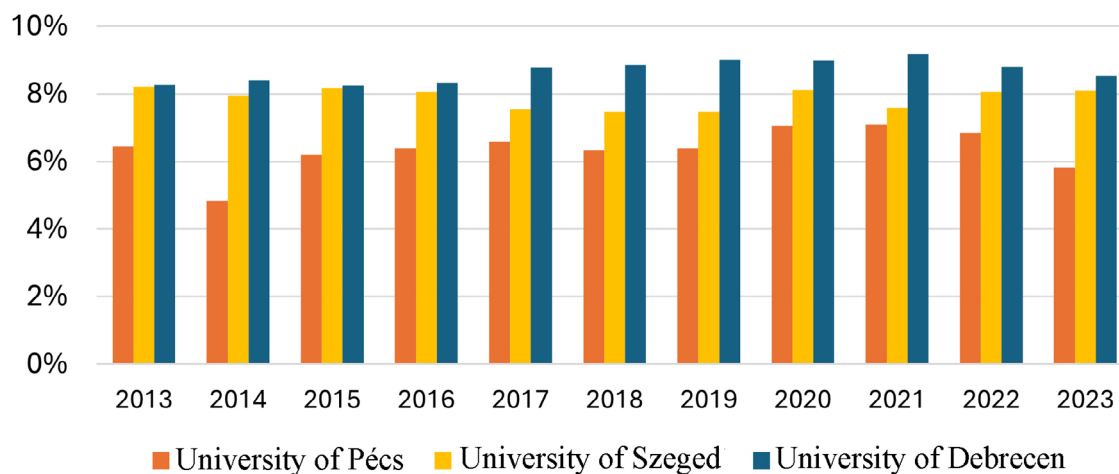
Beyond the South Transdanubian region, eighteen districts have a total university student population exceeding 300 students (Figure 5). The largest of these is Budapest, with 3,669 students, followed by districts of larger settlements, cities with county status, and county seats in Transdanubia: Székesfehérvár (1,262 students), Zalaegerszeg (1,170 students), Nagykanizsa (1,120 students), and Baja (1,048 students). The median number of students at the national level is 88, which serves as the basis for the coloring in Figure 5.

Figure 3. The number of Hungarian students at the University of Pécs (UP) per academic years from 2013/2014 to 2022/2023



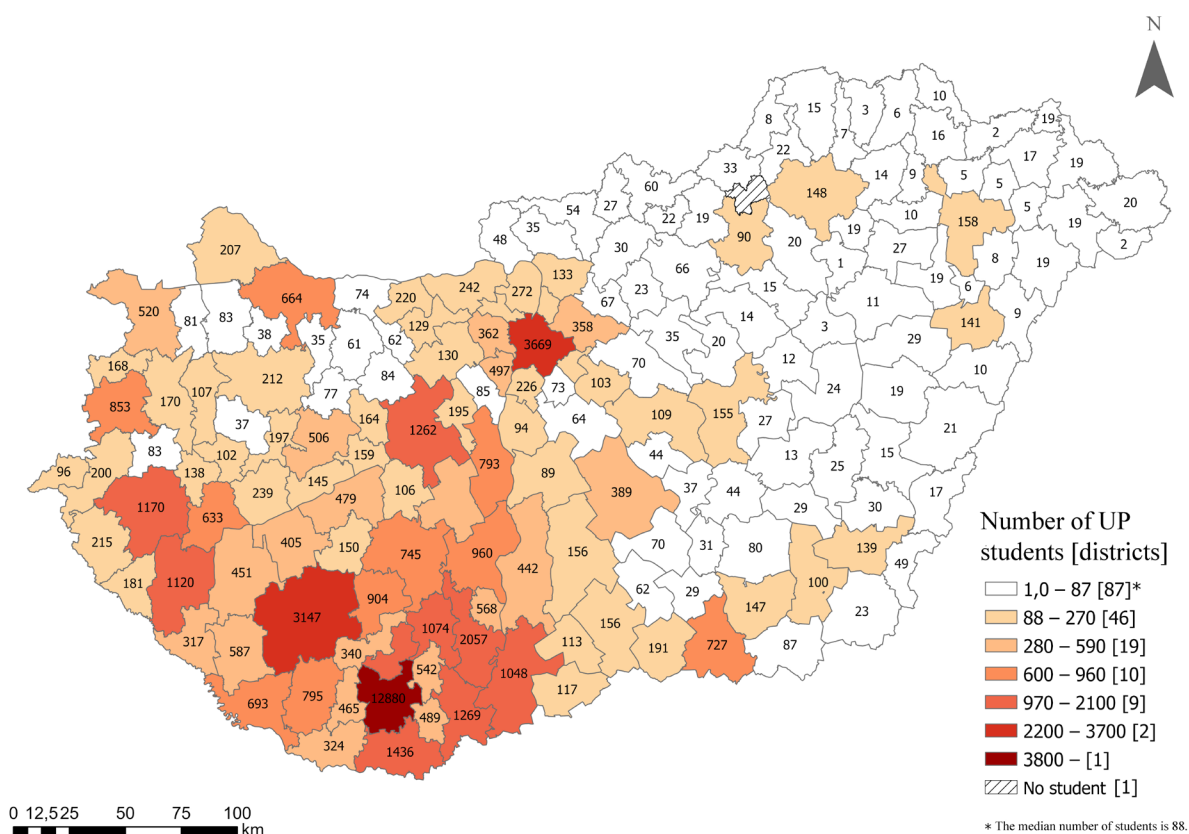
Source of data: UP DE (edited by: A. Béres)

Figure 4. Proportion of students enrolled at the University of Pécs (UP), University of Szeged (USz), University of Debrecen (UD), and other higher education institutions in Hungary annually from 2013 to 2023



Source of data: Educational Authority (2024) (edited by: A. Béres)

Figure 5. Number of students at the University of Pécs aggregated by district of residence from 2013 to 2023



Source of data: UP DE (edited by: A. Béres)

Regional supply: central part of the UP catchment area

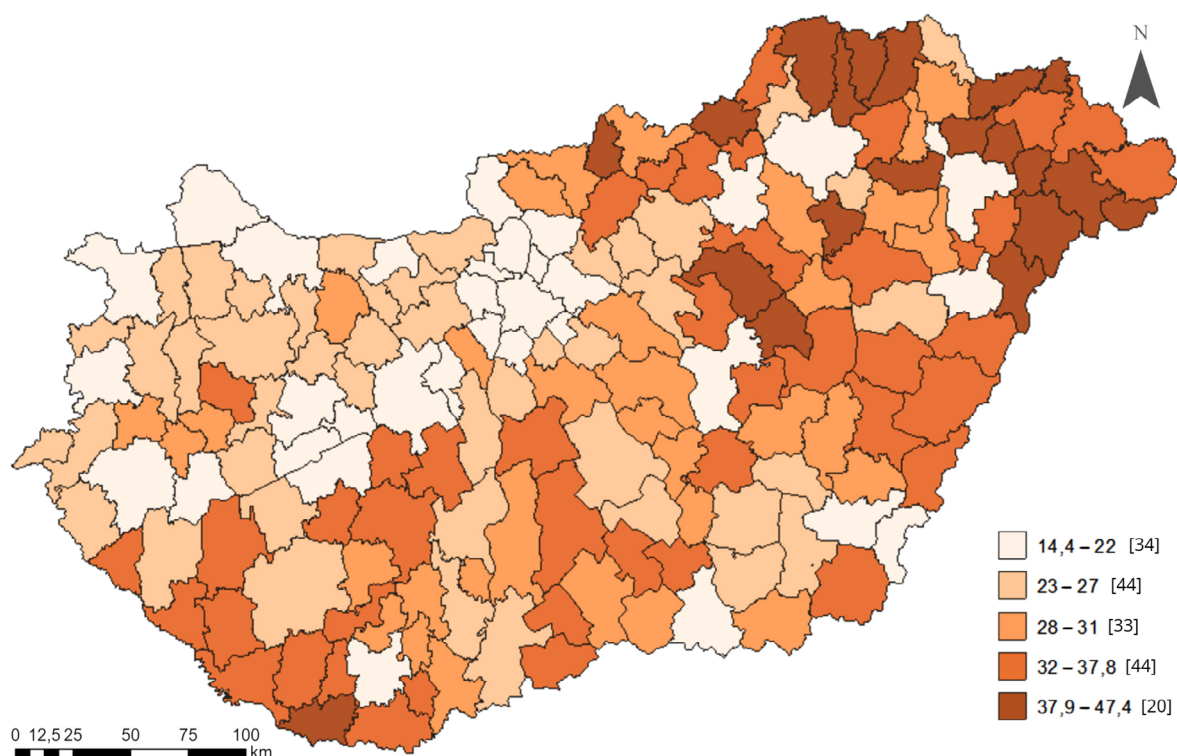
The South Transdanubian region holds significant importance for the University of Pécs (UP), yet it also faces numerous challenges. From a socio-geographical perspective, the region is characterized by various crises affecting the age composition of the population, levels of education, and income levels. These factors contribute to a specific pattern of social deprivation, profoundly impacting the functioning and strategy of the university.

One of the most pressing issues is the demographic shift towards an aging population. According to demographic projections, by 2050, for every 100 working-age individuals in Hungary, there will be 47 elderly people, an increase from the current 32. In South Transdanubia, the most aging region, this figure could rise to 60 by 2050 (Obádovics & Tóth, 2023). The region's negative natural reproduction rate is evident in the data series and is accompanied by a negative permanent inward migration margin (Hungarian Central Statistical Office, 2022, 2023b).

Examining the districts with the largest populations in the region reveals a concerning trend: the number of young people aged 15–17 has decreased by more than 1,000 in the districts of Pécs and Kaposvár over the last 20 years, and by 900 in Szekszárd. These individuals would typically transition to higher education at UP within a year or two after completing their secondary education, making this a significant demographic concern for the university.

Data from the Hungarian Central Statistical Office (2023d) indicate that the future challenges for UP enrollment are further exacerbated by a decline in the number of districts in the northern parts of the South Transdanubian region where the highest level of education attained is eight grades. The drop-out rate in public education remains high in the region's catchment area, including Ormánság (Figure 6). Since the proportion of low-educated individuals is closely tied to economic and social development opportunities, this high percentage necessitates special attention when formulating and implementing territorial education policies aimed at supporting the region's development and preparing it for future labor market challenges. This issue is particularly noteworthy, as children of low-educated parents are significantly less likely to complete secondary or tertiary education compared to those whose parents possess higher educational qualifications (Gayle et al., 2018; Oloomi, 2020; Torche, 2018). The analysis of the share of graduates in South Transdanubia reveals significant heterogeneity across the region. While Pécs stands out as the educational hub, surrounding districts exhibit graduate shares below 30%. Previous research underscores that this disparity may have long-term implications for both society and the economy, as educational attainment is closely linked to labor market success and individual quality of life. These regional disparities highlight the necessity for education systems and support measures aimed at bridging these gaps, thereby promoting social mobility and regional development.

Figure 6. The percentage of 15–X-year-olds with only primary school education in the population, 2022, aggregated by districts



Source of data: Hungarian Central Statistical Office (2023c) (edited by: A. Béres)

Spatial characteristics of the UP catchment area

Analysis of the districts shows that the number of areas from which at least 300 students are enrolled at the University of Pécs (UP) in any given academic year ranges from eight to fifteen, based on the aggregated data of students' places of residence (Annex B). In terms of Budapest and its districts, the primary student base for UP comprises Kaposvár, Mohács, Pécs, Siklós, Székesfehérvár, Szekszárd, and Zalaegerszeg. While the number of students from Baja has increased since 2020, enrollment from Paks and Szombathely has been declining. Conversely, the Dombóvár district has shown a positive trend in student numbers over the past four years; if this trend continues, the district may again surpass 300 students.

Examining faculty enrollment, the district representation shown in Table 1 varies slightly, primarily due to the presence of specific academic sites. For instance, the Faculty of Health Sciences (FHS) is located in Szombathely, Kaposvár, and Zalaegerszeg, leading to higher enrollment potential in these areas. Table 1 lists the ten districts with the highest number of students per faculty, ranked in descending order based on enrollment.

Among other faculties, the districts of Győr and Sopron are notable for the Medical School. For the Faculty of Cultural Sciences, Education and Regional Development (FCSERD), the top districts

are exclusively from the South Transdanubian region, with Baja also making the list. The Faculty of Music and Visual Arts (FMVA) draws students from several lowland districts, including Szeged and Kecskemét. Three notable trends emerge regarding faculty enrollment and the university's training portfolio: (1) a strong regional structure focusing on the local higher education market, exemplified by FCSERD and FMVA; (2) a broader base that includes the capital and western regional centres, represented by Medical School, Faculty of Health Sciences and Faculty of Pharmacy; (3) a diverse base covering both local and distant districts, with Faculty of Engineering and Information Technology serving as a prime example.

Table 1. The ten districts with the highest number of students per faculty from the academic years 2013 to 2023

Faculties of UP									
Law	Medical School	Humanities and Social Sciences	Health Sciences	Pharmacy	Cultural Sciences, Education and Regional Development	Business and Economics	Engineering and Information Technology	Music and Visual Arts	Sciences
Pécs	Pécs	Pécs	Pécs	Pécs	Pécs	Pécs	Pécs	Pécs	Pécs
Kaposvár	Budapest	Budapest	Budapest	Kaposvár	Székszárd	Kaposvár	Budapest	Budapest	Kaposvár
Budapest	Szombathelyi	Kaposvár	Kaposvár	Budapest	Paksi	Székszárd	Kaposvár	Szegedi	Budapest
Székszárd	Győr	Székszárd	Szombathelyi	Nagykanizsa	Bonyhád	Siklós	Székszárd	Kaposvár	Székszárd
Székesfehérvár	Kaposvár	Siklós	Zalaegerszeg	Szombathelyi	Dunaújváros	Mohács	Szeged	Kecskemét	Siklós
Siklós	Székesfehérvár	Székesfehérvár	Nagykanizsa	Bonyhád	Tolna	Komló	Siklós	Székesfehérvár	Komló
Mohács	Zalaegerszeg	Zalaegerszeg	Székesfehérvár	Székszárd	Tamási	Bonyhád	Székesfehérvár	Veszprém	Székesfehérvár
Zalaegerszeg	Sopron	Nagykanizsa	Sopron	Győr	Siklós	Budapest	Mohács	Székszárd	Nagykanizsa
Nagykanizsa	Nagykanizsa	Mohács	Győr	Zalaegerszeg	Mohács	Szigetvár	Bonyhád	Mohács	Mohács
Komló	Székszárd	Komló	Székszárd	Székesfehérvár	Baja	Baja	Baja	Szombathely	Dombóvár

Source of data: UP DE (edited by: A. Béres)

Of the 3,155 settlements in the country, 348 are cities (including one capital and 25 cities with county status), 126 are large villages, and 2,681 are villages. Of these, UP has enrolled students from 2,153 municipalities over the last ten years. On average, 334 students came from the capital, 1,982 from a city or county seat, 1,489 from a town, and 1,414 from villages. This shows that the majority of UP students come from urban areas. For municipalities with an aggregate student population of 500 students, the predominance of Transdanubia stands out. The analysis of the above data within the South Transdanubian region is also important in the context of spatial development. It can be seen that out of the 1,713 municipalities in the South Transdanubian region, only 283 have zero students. All of these 283 municipalities have a population of fewer than 500 inhabitants, and in several cases, they have a population of 30–50 inhabitants.

In the context of recruitment, recruitment campaigns, and strategy formulation, it is also worth observing the list of districts and its evolution. Table 2 shows the twenty districts that sent the highest number of students to UP in absolute terms in 2013. The last column in Table 2 shows how the number of students in the districts with the most students in 2013 changed by 2023. The bottom right row shows the summed change in these, which is negative: -1,173 students. The national change between the two years is +671. This reflects the fact that, in contrast, other districts have seen an increase in the number of students. Thus, it can be seen that the spatial structure of the university, as previously outlined by M. Császár & Wusching (2014), is in transition. The first four areas remain unchanged:

the districts of Pécs, Kaposvár, Szekszárd, and Budapest, but thereafter the student population has changed somewhat, as shown in Table 2. The districts of Zalaegerszeg, Székesfehérvár, Siklós, Komló, Dombóvár, and their surroundings continue to have a significant share, although their position changes somewhat—for example, they move up or down from fourth—while the districts of Paks, Szombathely, and Keszthely show a decline.

Table 2. The rate of change in student enrollment from UP's top twenty districts from 2013 to 2023⁷

No.	District	UP students (2013)	UP students (2023)	Change (people)
1.	Pécs	4 394	4 323	-71
2.	Budapest	1 203	1 414	+ 211
3.	Kaposvár	1 094	925	169
4.	Szekszárd	784	531	-253
5.	Zalaegerszeg	499	407	-92
6.	Nagykanizsa	477	376	-101
7.	Székesfehérvár	474	409	-65
8.	Siklós	445	394	-51
9.	Mohács	418	339	-79
10.	Komló	392	348	-44
11.	Paks	383	258	-125
12.	Szombathely	373	272	-101
13.	Baja	361	330	-31
14.	Bonyhád	345	292	-71
15.	Dombóvár	344	287	+ 211
16.	Dunaújváros	298	233	-169
17.	Keszthely	274	194	-253
18.	Tamási	267	230	-92
19.	Szigetvár	246	235	-101
20.	Barcs	213	212	-65
	TOP 20 TOTAL	13 284	12 009	-1 173
	Total number of students	21 819	22 490	+ 671

Source of data: Hungarian Central Statistical Office (2023a) (edited by: A. Béres)

Figure 7 shows the number of UP students grouped by field of study according to their year of admission. It indicates that the university has a smaller proportion of students (less than 1%) in the fields of agriculture and art education. For the other areas, student numbers are close to the average, except for natural sciences, which stands out with a higher proportion of students (7%) in the 2014 admission period.

Beyond the two aforementioned fields, during the years under review, the enrollment rate for the humanities is between 11–13% (average 12%); for economics, 14–19% (average 17%); for computer science, 3–6% (average 5%); for law, 6–9% (average 7%); for engineering, 7–10% (average 9%); for arts, 3–4% (average 3%); for medicine and health, 20–24% (average 22%); for teacher education, 9–15% (average 12%); for sports, 3–6% (average 4%); and for social sciences, 3–6% (average 5%). There are observable variations in some admission years, but they remain minor (1–2% of the average).

The most popular field of study at UP is medical and health sciences (Figure 8), which is offered by three faculties: the Medical School, the Faculty of Pharmacy, and the Faculty of Health Sciences. The primary recruitment areas for this field are Transdanubia, the Central Hungarian region, and the

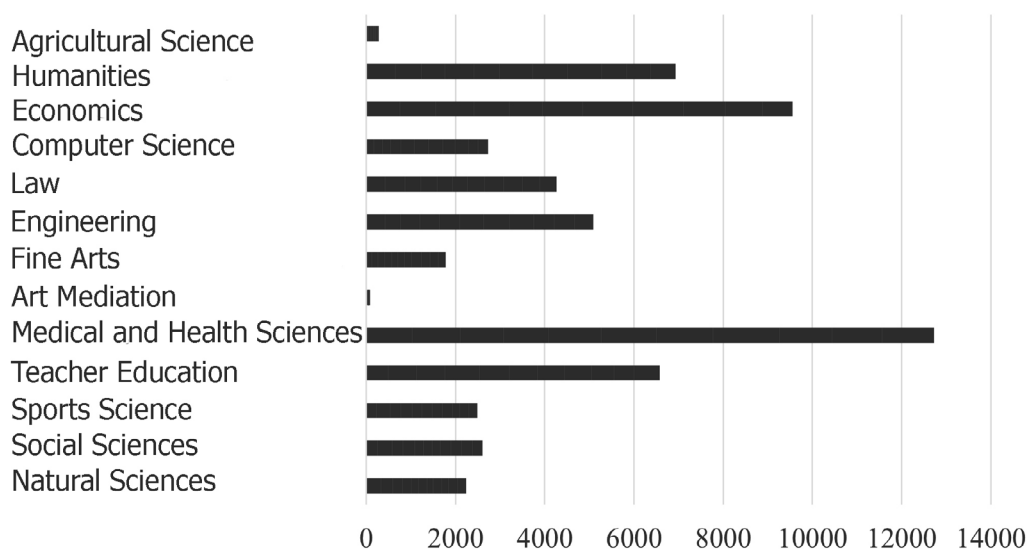
⁷ The value of the Spearman rank correlation coefficient is 0.958, significance: 0.000.

Szeged district. Half of the students originate from districts of county seats and cities with county status.

The most concentrated field of study is economics (Figure 9), where a significant proportion of students come from the South Transdanubian and Central Hungarian regions. Half of these students are from the districts of Pécs, Kaposvár, Szekszárd, and Siklós.

The third most popular field of study is the humanities (Figure 10). Regarding the 50% threshold, the larger districts in southern Transdanubia stand out, along with a visible axis from the Danube districts to Budapest. With a similar number of students as in the humanities, the fourth most popular field at the University of Pécs is teacher education, as also shown in Figure 10. Both in terms of the top 50% of students' residences and its overall spatial pattern, this field resembles that of the humanities, following a Pécs–Budapest axis.

Figure 7. The number of students at UP, aggregated by field of study and admission procedure between 2013 and 2023

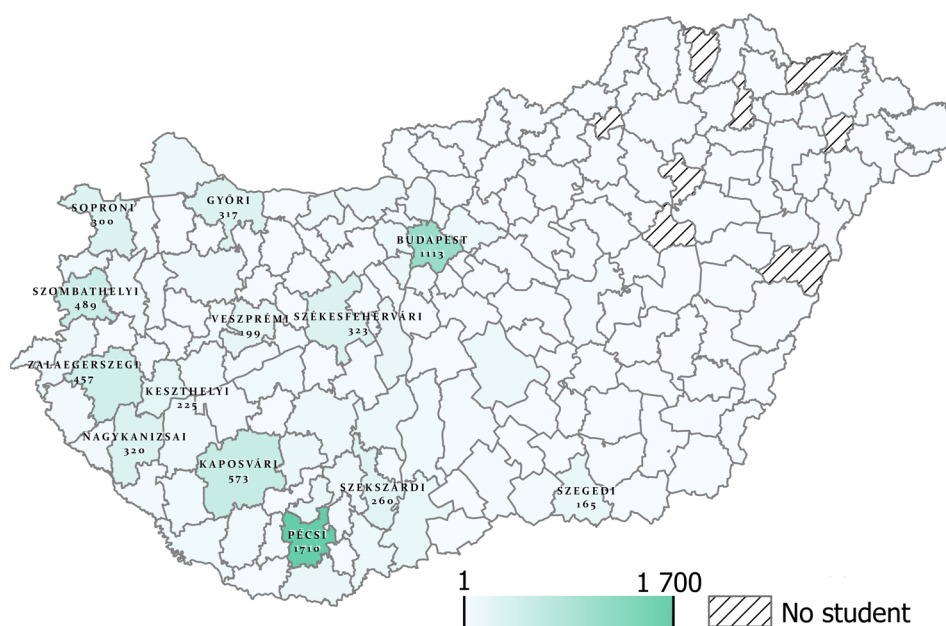


Source: UP DE (edited by A. Béres)

When broken down by fields of study, the tendency of some fields to attract students from municipalities becomes evident. At the undergraduate level, the humanities, arts, and arts mediation fields have a relatively higher share, ranging between 11–14%. Additionally, art education particularly stands out in cities with county status, indicating that specializations in this field attract more urban students at the UP undergraduate level.

For Master's programmes, the proportion of students from municipalities slightly decreases, with the most notable decline observed in the law field. In the case of standalone, non-university courses, the technical and teacher training fields exhibit a lower share of metropolitan students and a higher share of students from municipalities. Meanwhile, the medical and health sciences field shows the opposite trend, with a higher proportion of metropolitan and urban students and a lower share from municipalities.

Figure 8. The number of UP students in medical and health sciences by district between 2013 and 2023⁸



Source: UP DE (edited by A. Béres)

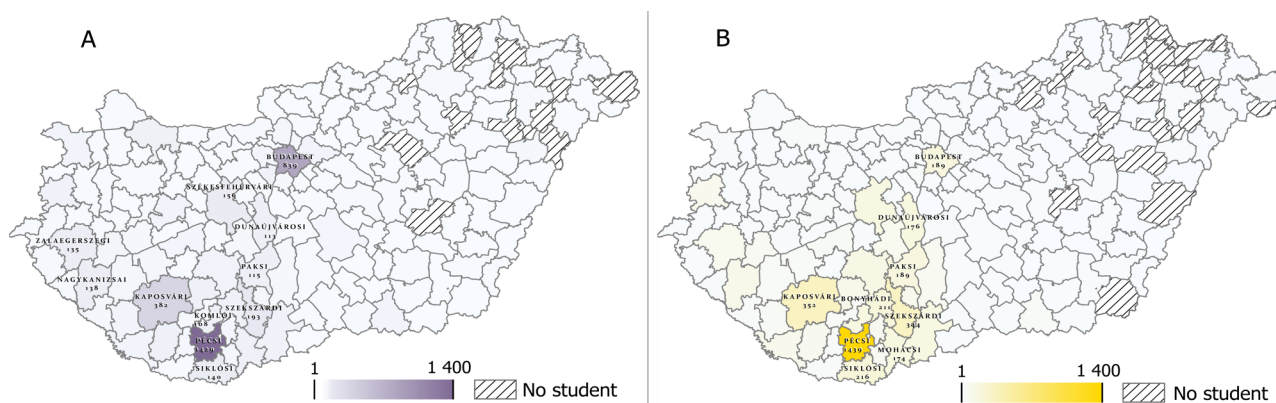
Figure 9. The number of UP students in economics by district between 2013 and 2023⁸



Source: UP DE (edited by A. Béres)

⁸ For all training areas, we indicated the name of the district—according to the aggregated number of students for the years of the examination period—from which the number of students arriving for the training area constitutes the upper 50%.

Figure 10. The number of UP students in humanities (A) and teacher training (B) by district from 2013 to 2023⁹



Source: UP DE (edited by A. Béres)

In higher education vocational programmes, the distribution shifts slightly. At this level, the proportion of metropolitan students at UP is generally low, with the exception of the medical and health sciences field. In contrast, the number of urban students is notably high in art education. For other fields, the student population is evenly divided, with approximately 30% coming from municipalities, 30% from county capitals or cities with county status, and 30% from other cities.

As shown in Figures 8–10, these four fields attract relatively fewer students from North-Eastern Hungary. However, during the period under study, the only district from which no students were admitted was Bélapátfalva. In other districts, students applied to and were admitted into technical and artistic fields of study.

RESULTS

Based on the analysis of the University of Pécs' (UP) catchment area, it can be concluded that the institution's primary recruitment base is the South Transdanubian region, with a particular focus on the city of Pécs and its surroundings. The ten-year decline in student numbers described by M. Császár and Wusching (2014) has halted and entered a growth phase since 2017. It is evident that UP's catchment area has expanded in depth, now encompassing other parts of the country, with an increasing number of students arriving from Budapest and other large cities. This trend highlights that internal mobility within Hungary is becoming more prominent in terms of student enrollment at UP. The main driver of this expansion is the rising number of students from Budapest and other major cities across the country. Compared to the period examined by M. Császár and Wusching (2014), UP has increased the number of enrolled students from its key catchment areas relative to universities in Budapest.

Several factors have influenced the changes in UP's catchment area. Demographic shifts, such as the national decline in population and the decreasing number of young people—particularly

⁹ For all training areas, we indicated the name of the district—according to the aggregated number of students for the years of the examination period—from which the number of students arriving for the training area constitutes the upper 50%.

affecting the South Transdanubian region (Obádovics & Tóth, 2023)—have negatively impacted the potential student base. Additionally, the research points out that the presence of disadvantaged and underdeveloped areas within the catchment region could pose long-term challenges.

The study provides a detailed analysis of the spatial distribution and regional preferences of UP students, with a particular focus on specific fields of study and campuses, underscoring the university's important role in regional education and development. The most popular field of study at UP is medicine and health sciences, attracting students from various county seats and cities in the Transdanubian and Central Hungarian regions. In economics, there is a significant concentration of students primarily from South Transdanubia and Central Hungary. The spatial patterns of humanities and teacher education resemble those of medical and health sciences, whereas technical and arts mediation programmes tend to attract urban students. Data indicate that most students in these fields come from larger settlements, such as the capital city and county seats. A similar distribution is observed across undergraduate, Master's, and unified, undivided programmes.

It is also evident that fewer students from North-Eastern Hungary apply to the examined fields, with technical and arts programmes being the only notable exceptions. While economic programmes are highly localized, medical and health science fields exhibit greater mobility in terms of student enrollment.

In the future, it may be important for UP to monitor changes in its catchment area based on these results. A higher education institution in a similar situation could adopt several strategies. One approach is to strengthen the dominance of nationwide programmes, such as medical and health sciences education. If these areas of study become more attractive (e.g., through innovative teaching materials, scholarships, or excellent research opportunities), the university's market share can increase. Strengthening such programmes not only attracts students but also communicates the values of the University of Pécs, enhancing its image at both national and international levels.

Another strategy could focus on reinforcing the regional orientation of its programmes by following three pathways: strengthening domestic resources, expanding from local hubs, and focusing on new areas. For regionally focused programmes (e.g., pedagogy, humanities, economics), it may be beneficial to develop local resources. This could involve increasing recruitment efforts in secondary schools, aligning programmes with local labour market needs, and fostering closer collaboration with local businesses and institutions.

If there is growth in a specific field of study in a particular city, such as Debrecen (Figure 2), UP could leverage this to establish a stronger presence there. This might include targeted marketing campaigns, local recruitment events, or joint programmes with regional partners. In this way, UP can extend its influence to other regions through local hubs.

Finally, in areas where UP currently lacks a strong presence or has lost ground (e.g., Dombóvár, Bonyhád, Paks), it would be important to analyse the reasons for this decline. If specific regions see low application numbers, targeted campaigns could be launched to highlight the benefits of studying at UP, which may be particularly important for expanding the university's reach beyond its traditional catchment area.

A limitation of this research lies in the use of district-level data, as district boundaries are rigid and may not fully capture the natural spatial flexibility of student mobility or the dynamics of attraction within the catchment area. However, using district-level data remains practical, as district structures generally reflect the cohesion between cities and their surrounding municipalities.

Future research should explore the spatial distribution of the university's international student base, particularly to assess whether the decline in local student numbers can be offset by foreign students. It would be worthwhile to investigate the regions from which international students are coming and identify trends in their recruitment. Additionally, future studies could examine the extent to which an increase in international students compensates for demographic challenges and how it impacts UP's regional competitiveness.

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ANNEX

Annex A. The percentage of UP and the capital's universities' students by district of residence in 2013/2014 and 2022/2023, and the extent of change

District	UP %		Budapest %		UP %-os változás	Budapest %-os változás
	2013/14	2022/23	2013/14	2022/23		
Baranya County						
Bóly	53.2%	60.4%	22.6%	14.5%	7.2%	-8.2%
Hegyhát	50.9%	60.7%	23.5%	16.7%	9.8%	-6.8%
Komló járás	58.3%	66.2%	22.6%	16.6%	7.8%	-6.0%
Mohács járás	52.1%	50.8%	24.0%	24.4%	-1.3%	0.5%
Pécs	65.9%	69.1%	24.1%	21.3%	3.2%	-2.7%
Pécsvárad	58.0%	63.0%	23.7%	22.1%	4.9%	-1.6%
Sellye	61.7%	66.0%	18.7%	15.0%	4.3%	-3.7%
Siklós	63.7%	64.4%	22.0%	18.6%	0.7%	-3.4%
Szentlőrinc	64.9%	60.6%	17.7%	19.0%	-4.3%	1.3%
Szigetvár	56.7%	64.8%	22.9%	17.8%	8.1%	-5.1%
Somogy County						
Barcs	48.9%	54.2%	25.5%	19.8%	5.4%	-5.7%
Csurgó	28.0%	31.6%	37.2%	35.7%	3.6%	-1.5%
Fonyód	18.0%	18.9%	50.6%	50.2%	0.9%	-0.4%
Kaposvár	30.8%	33.7%	33.2%	34.9%	2.9%	1.7%
Marcal	23.7%	23.0%	38.1%	44.6%	-0.7%	6.5%
Nagyatád	37.7%	41.3%	32.8%	30.3%	3.6%	-2.5%
Siófok	12.9%	12.6%	53.1%	59.7%	-0.3%	6.6%
Tab	25.2%	23.0%	38.7%	35.5%	-2.3%	-3.1%
Tolna County						
Bonyhád	43.8%	50.2%	32.2%	30.3%	6.4%	-1.9%
Dombóvár	42.4%	46.1%	29.6%	26.5%	3.7%	-3.1%
Paks	25.3%	22.2%	40.4%	45.0%	-3.1%	4.6%
Szekszárd	38.8%	39.3%	38.4%	39.4%	0.5%	1.0%
Tamási	34.5%	40.1%	33.6%	33.0%	5.6%	-0.5%

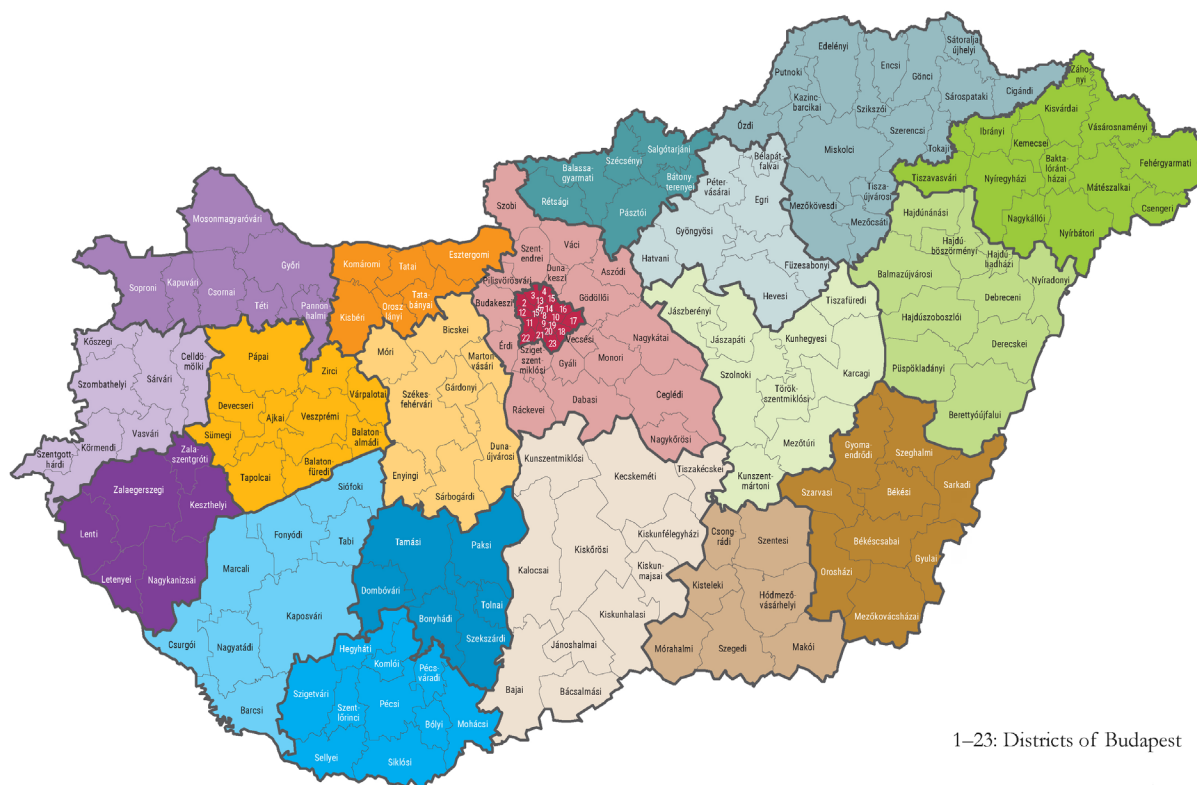
Source of data: Hungarian Central Statistical Office (2023a) (edited by: A. Béres)

Annex B. List of districts with student enrollments of 300 or more in the academic years between 2013 and 2023

District	Academic years									
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23
Baja	—	—	—	x	—	—	—	x	x	x
Bonyhád	—	x	x	x	x	—	—	—	—	—
Budapest	x	x	x	x	x	x	x	x	x	x
Dombóvár	x	—	—	—	—	—	—	—	—	—
Kaposvár	x	x	x	x	x	x	x	x	x	x
Komló	x	x	x	x	—	—	—	x	x	x
Mohács	x	x	x	x	x	x	x	x	x	x
Nagykanizsa	x	x	x	x	x	—	x	x	x	x
Paks	x	x	x	x	x	—	—	—	—	—
Pécs	x	x	x	x	x	x	x	x	x	x
Siklós	x	x	x	x	x	x	x	x	x	x
Székesfehérvár	x	x	x	x	x	x	x	x	x	x
Szekszárd	x	x	x	x	x	x	x	x	x	x
Szombathely	x	x	x	x	—	—	—	—	—	—
Zalaegerszeg	x	x	x	x	x	x	x	x	x	x

Source of data: Hungarian Central Statistical Office (2023a) (edited by: A. Béres)

Annex C. Districts of Hungary



1–23: Districts of Budapest

Source: Hungarian Central Statistical Office. (n.d.).

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