

Impacts of the international students' consumption expenditures on the national economy in Hungary, 2020

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International students have a significant impact on the national economy in numerous fields, which is first and foremost realised in the sectors directly affected by their expenditures. Further, these economic impacts have spillover effects through intersectoral relations. Their patterns are in correlation, inter alia, with the system of supplier networks, the characteristics of products and product groups, and the contributions realised in the fields required to produce goods and services. Accordingly, the effect of one consumption unit is multiplied as it 'passes through' through these relations systems, and thus, many other sectors of the economy may also benefit from it beyond the producers and service providers directly involved. To measure these spillover effects, the present study relied on the findings of a questionnaire survey conducted among students in the academic year of 2019/2020 (n=6296 students), the input-output analysis (IOA) published by the Hungarian Central Statistical Office (HCSO), and the multipliers calculated based on that as well as other data items of the HCSO. The results showed that in 2020, as a result of international students' consumption, 213 billion HUF worth of total output and approximately 124 billion worth of gross value-added were generated in the national economy as a whole. Moreover, student consumption also generated imports, amounting to approximately 25 billion HUF. In

addition to the above dimensions, the consumption of students generated employment, and thus, income. As a consequence of the spending by the respective groups of international students, approximately 20,000 new jobs were created in the national economy as a whole, and the generated income exceeded 67 billion HUF, of which 53 billion were spent on wages and salaries. The results of the study are beneficial for all those who are affected by the presence of international students, the higher education institutions hosting them, and businesses building on their demands, and in a broad sense, the entire population of the host cities. They can also be useful for decision makers at the national, regional, and local levels.

Keywords:

international students,
ERASMUS+,
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fee-paying students,
multiplier,
input-output analysis

Introduction

Trends in student mobility imply a dynamic increase in the number of international students studying in different countries all over the world. The total number of international students may soon reach 7 million; the OECD projects the number of international students to reach 8 million in 2025 (Institute of International Education 2015). In Hungary, there were 38,422 international students in the academic year 2019/2020, which means an increase of 26,000 international students over almost twenty years. Although COVID-19 may have a multidimensional and complex effect on the above trends, besides a further increase in the number of students or a change in the trend may be expected, examining the economic impacts of such a significant trend may have a socio-economic importance from the aspect of assessing the decline in their weight in the Hungarian national economy.

Universities have a wide range of impacts on society and the economy (Drucker–Goldstein 2007, Drucker 2016, Florax 1994, Lengyel–Szakálné Kanó 2012, Sebestyén et al. 2021, Szakálné Kanó et al. 2017), of which the economic impact of foreign students is a decisive factor (Münch–Hoch 2013). The presence of international students and the changes in their number may affect the economy in many dimensions and may impose considerable tasks on the institutional system they use (serving their needs), while the demand generated by the students opens further market opportunities for various economic actors. Furthermore, mapping these dimensions can have strategic importance for the socioeconomic actors

involved. The ‘Shifting of Gears in Higher Education’ action plan published by the Hungarian government in 2016 has drawn attention to the importance of the topic in its objective of targeting 40,000 international students in Hungarian universities by 2023. This number is almost half a percent of the total population of Hungary; nevertheless, the territorial distribution of students is much more centralised than that of the population. On the one hand, this implies that the economic impacts of international students are more concentrated in several respects; and on the other hand, it also draws attention to the need to study the extent to which the spillover effects of the impacts, and the multiplier nature of these effects along the intersectoral relations, have an impact on the economy as a whole.

It is, therefore, not unanticipated that the academic literature on the economic and social impacts of international students, as well as the diversity of these impacts, is remarkably extensive. An increasing number of authors are conducting investigations of this kind, including the study of the role and weight of international students as a consumer group, the mapping of direct payments to the economy, and other economic recovery effects (Árva–Várhelyi 2020). Analysing the Hungarian and international academic literature of the topic in a broader sense, it can be concluded that the majority of studies have attempted to demonstrate the economic impacts of international students in countries through quantification and in numerical terms (Montanari–Staniscia 2014, Bergerhoff et al. 2013, Yao–Bai 2008, Ortiz et al. 2015, Baumgartner 2018, Butcher 2002, Infometrics 2016, Oxford Economics 2007, Münch–Hoch 2013, Grasset 2017, London & Partners 2018, London Economics 2018, Australian Government 2016). Caffrey–Isaacs (1971) investigated the impact of universities on local economies using the method they developed (ACE Model). One step in their study was to assess the economic impacts of students. In the following decades, several modified theories were developed based on the work of these authors, such as the ‘shortcut’ model (Ryan G.–Malgieri 1992) or the framework system elaborated by D’Allegro and Paff (Mary-Lou–Lolita 2010). Brooks–Waters (2011) pointed out in their study that economic benefits for the higher education institution, the city in which it is located, and broadly speaking the target country, are directly realised in tuition fees and the amounts spent on living expenses, and this effect can be very significant. The results of a study focusing on London concluded that international students contributed to the economy at an average of 81,500 GBP per capita per academic year (London Economics 2018). However, the socioeconomic impacts generated by the presence of international students are not only direct impacts, but also indirect and induced impacts (Kenton 2018) which may include direct expenditures of the students, additional expenditures of the university due to the increased number of students (indirect impact), and additional expenditures of other economic actors as a consequence of increasing demand from the students and the university (induced impacts). In their study, Lee–Yiping (2008), in addition to the economic impacts

(impacts of direct expenditures), also investigated the cultural impacts and reasons for the choice of institutions associated with them. Butcher (2002) analysed the impacts of the demographic, social, and economic aspects of international students in New Zealand. This study used an approach similar to the present research in that it aggregated economic impacts based on the main areas of spending and then demonstrated the direct economic impact based on total student expenditures. Grasset (2017) investigated students' consumption habits in Spain, including calculations with multipliers. The latter research, in addition to the theoretical approaches on which the current analysis is also built, focussed on a national economy or one of its components.

For investigating the economic impacts of students, Rechnitzer–Hardi (2003) studied the impact of universities on the local economy in their work, and they also analysed domestic students' consumption. Using a theoretical approach, Berács (2008) discussed the economic importance of student mobility in the context of knowledge transfer in higher education. The related case study literature includes works by Füzesi–Tistyán (2013) and M. Császár and her colleagues (M. Császár–Wusching 2016, 2018, M. Császár–Alpek 2018, M. Császár et al. 2019). M Császár et al. (2016–2018) focused on three large Hungarian university towns and pointed out that the economic recovery and employment impacts of international students on Hungarian higher education can be observed at the institutional, regional, and national levels as well.

In many cases, the investigation of the target group's economic impacts focused on the multiplier effects which are mostly approached in research through the application of the Keynesian multiplier and/or with the help of various income-expenditure models (also known as input-output or IO models) (Borrallho et al. 2014, Hermannsson et al. 2009, Katircioğlu–Bıcak 1996, Kotosz 2013, Tavoletti 2007, Zhang et al. 2016, 2017). These are reinforced by Regional Economic Models, Inc. (REMI) and Regional Input-Output Modelling System (RIMS II) models. REMI is a dynamic IO model that creates equilibrium models based on time-series analysis, while RIMS II estimates direct and indirect impacts on a regional basis. The most important aspect of these models is that they analyse the local economic situation with and without including a university (Kotosz et al. 2016). An analysis of the economic impact of the University of Pécs, based on the input-output model, was also presented in the analysis by Sebestyén et al. (2021). The study revealed that, considering the spatial impacts of the University of Pécs, foreign students played a significant role in the absolute per capita impacts (Erdős et al. 2021).

The methodological basis for the present study primarily involves models based on the Leontief IOA, which are not unknown in regional investigations. Besides, the method has been applied for several countries, such as Canada, by a study (Roslyn Kunin and Associates Inc. 2017), which investigated the local direct and indirect impacts, their effects on the gross domestic product (GDP), and the labour

market based on the income and expenditure structure of students. The Leontief model has also been used in investigations in the USA (Ortiz et al. 2015), focusing on the direct, indirect, and induced impacts of international students on economic production and the labour market. Studies with similar profiles have been conducted in New Zealand (Ministry of Education 2006) and Spain (López et al. 2016). The modelling of direct, indirect, induced, and catalytic impacts was presented by Kotosz et al. (2015). This study highlighted several important areas of the complex socio-economic impacts of universities (Kotosz et al. 2015).

Building on the above theoretical framework, the authors of the present study investigate the economic impacts of international students in Hungary's target group, specifically addressing the characteristics and involvement of the different sectors of the national economy, and the perceptions of students indicating the differences in the student mobility programs with respect to six main dimensions: output, gross value-added, use of imported goods and services, compensation of employees, wages and salaries (of the compensation of employees), and employment (number of people). The aim of this research is to investigate the economic impacts of students by mapping intersectoral relations structures and spending habits at the national level.

Research methods

Both primary and secondary sources were used in this study. The primary source was a questionnaire administered among international students between 27 January and 10 March 2020 mostly online. The total number of respondents was 6,296. The ratio of responding students was 18.84%, representing a diverse distribution by target groups (Table 1).

Regarding gender composition of the sample, 3,442 male (54.7%) and 2,815 female (44.7%) students completed the questionnaire, while 39 did not indicate their gender (0.6%).

The respondents named 123 countries as the country of their origin. Using a geographical approach, the countries were grouped by regions relying on the UN methodology¹, thus creating groups of countries and simplifying the processing of the results. Compared to the whole sample, students from West Asia (1,506 students, 23.9%), East Asia (736 students, 11.7%), and South Asia (719 students, 11.4%) were more dominant, while students from North Africa (521 students, 8.3%), Southeast Asia (423 students, 6.7%), and Western Europe (348 students, 5.5%) were more moderate in their numbers.

¹ <https://unstats.un.org/unsd/methodology/m49/>.

Table 1

Figures related to the population and the sample target groups*

Target group	Population, 1 st half of 2019/2020		Sample, 2020		Sample/ population, %
	number	%	number	%	
Students participating in Stipendium Hungaricum Programme ^{a)}	9,035	27.0	4,713	74.9	52.16
Fee-paying students ^{b)}	19,939	59.7	1,185	18.8	5.94
Students participating in Erasmus+ Programme ^{c)}	4,448	13.3	398	6.3	8.95
Total	33,422	100.0	6,296	100.0	18.84

* The total number of international students (33,422) is not the same as the total number of international students studying in Hungary because the students studying in Hungarian (but having no Hungarian citizenship) from the areas across the border are not included in the research.

a) Statistical number of Stipendium Hungaricum grant beneficiary international students, autumn semester 2019/20, as of 17 October 2019. Source of data: FIR.

b) Due to lack of other sources, the number of fee-paying students was calculated based on the autumn 2019 FIR OSAP database. During the calculation, the number of Stipendium Hungaricum students registered in the FIR OSAP database was subtracted from the total number of fee-paying students, and what was left after the subtraction was considered as the number of fee-paying students.

c) Data from autumn 2019, source: TPF database.

The sample consisted of respondents from 41 higher education institutions. Overall, more than half of the respondents in the sample studied at the University of Debrecen (1,243 students, 19.7%), Budapest University of Technology and Economics (790 students, 12.5%), Eötvös Loránd University (737 students, 11.7%), and University of Pécs (681 students, 10.8%). The sample included a significant number of students from Szent István University (451 students, 7.2%), University of Szeged (429 students, 6.8%), and Corvinus University of Budapest (327 students, 5.2%), accounting for 19.2% of the total sample. The sample consisted of 23 institutions from Budapest and 18 from the countryside. At the time of sampling, 3,395 students (54%) were enrolled in provincial universities and 2,900 (46%) were enrolled in universities in Budapest.

If the respondents in the sample are considered as a whole, then the students in bachelor's programs have a predominant role (2,732 students, 43.4%), while those in master's programs have a lower but still dominant share (2,118 students, 33.6%), and PhD students have a significant share as well (1,020 students, 16.2%).

In the context of training fields, the largest share was of students studying technical sciences (1,644 students, 26.1%), followed by a share of over 10% of students in medical and health sciences (1101 students, 17.5%), and a sizeable share of students in economic sciences (986 students, 15.7%).

International students have an impact on the economy in many areas, which can be directly observed in the sectors affected by their spending. However, these economic impacts spill over by means of intersectoral relations, whose pattern, inter

alia, includes links to the supply chain networks, the characteristics of products and product groups, and the contributions realised in certain areas to provide products and services. Accordingly, the effect of one unit of consumption is multiplied as it ‘passes through’ these networks, so many other areas of the economy can benefit from it in addition to the group of producers and service providers primarily affected. When assessing the spillover effects of the expenditures of students, as already described in the academic literature (Koppány 2017), Type 1 multipliers were calculated by means of IOA using the Leontief inverse.

The most recent 2015 symmetric industry-by-industry input-output table for domestic output (Type ‘B’) accessed from the HCSO website was used in the analysis. Type ‘B’ was chosen because an estimate of the import value was also aimed at in relation to the objectives of the research, and for that, as well as for the determination of the related import multipliers, it was necessary to present a table that indicates the import in a separate row and includes its volumes in sectoral breakdown. The choice of the symmetric input-output table (industry-by-industry) was justified by the objectives of the research, and several examples can be found in the academic literature for the demand effects to be explored and the related final demand multipliers to be determined (Kozák 2014, Heindl 2014, Koppány 2017). Owing to the accuracy of the input data, it was reasonable to combine some sectors in the original table, which was completed by adding the cell values by rows and columns. Accordingly, several sectors were combined as follows (NACE, Rev. 2 in brackets):

- Manufacture of paper and paper products (17); manufacture of chemicals and chemical products (20); manufacture of basic pharmaceutical products and pharmaceutical preparations (21).
- Manufacture of computer, electronic, and optical products (26); manufacture of electrical equipment (27).
- Manufacture of motor vehicles, trailers, and semi-trailers (29); manufacture of other transport equipment (30).
- Electricity, gas, steam, and air conditioning supply (35); water collection, treatment and supply (36); sewerage collection and treatment, waste collection and management, remediation activities, and other waste management services (37–39).
- Real-estate activities and owner-occupied rental activities (68A and B).
- Creative, arts and entertainment activities; libraries, archives, museums, and other cultural activities; gambling and betting activities (90–92); and sports, amusement, and recreational activities (93).

The data table used for the analysis consisted of 55 rows and 55 columns. In addition to the above-mentioned import value, the analysis also examined the impacts on the output, compensation of employees, gross value-added, and employment. From among the required basic data, the impacts on the output, compensation of employees (wages and salaries separately), and gross value-added were automatically

available in the input-out table, while the number of employees by sector was obtained from another data source, the 2015 use table available in the HCSO databases. The number of employees in the aggregated sectors was calculated as the sum of the number of employees in the sectors concerned.

The above data table constituted the basis for determining the multipliers using the method below. First, the matrix of technical coefficients (\mathbf{A}) was calculated as follows:

$$\mathbf{A} = \mathbf{Z}\langle\mathbf{x}\rangle^{-1}$$

where \mathbf{Z} – the elements of the square matrix of the input-output table; $\langle\mathbf{x}\rangle^{-1}$ – inverse of the sectoral output diagonal matrix.

Similarly, employee compensation, gross value-added, import ratios, and employment intensity were determined for the following rows: compensation of employees (wages and salaries), gross value-added, number of employees, and the use of imported goods and services. The coefficients were calculated by dividing the values of the rows per column by the output per sector.

Next, the Leontief inverse (\mathbf{L}) was calculated using the following formula:

$$\mathbf{L} = (\mathbf{I} - \mathbf{A})^{-1}$$

where \mathbf{I} – the unit matrix; \mathbf{A} – the matrix of technical coefficients.

To obtain Type 1 multipliers, the Leontief inverse was multiplied from the left by the vectors composed of proportions of imports, gross value-added, labour income, and employment data relative to sectoral output. In addition, the output multipliers were determined as the column sums of the Leontief inverse (by multiplying the \mathbf{L} matrix by a unit vector from the left).

The first element of the study on the multiplier effects of the excess demand generated by international students was the resulting demand multipliers (in other words, Type 1 demand multipliers). The second element was constituted by the estimated expenditure amounts revealed on the basis of the primary investigation, first assigned to each sector and then converted from market purchase price to basis price. The national economic impact was calculated as the product of these two factors.

Given that the students estimated their expenditure on products at market prices, it was necessary to convert the values obtained into basic prices to quantify the multiplier effects. Determining the trade and transport margins and reallocating these items within the expenditures by the corresponding retail and wholesale trade was another task to complete.

In the first step, the trade margin was isolated using the data of the trade and transport margin matrix and the use table published by the HCSO, and the final consumption expenditure of households was used as a basis for the estimation of trade margin ratios in both tables. The trade margin was divided between wholesale and retail trade in compliance with their contribution to the final consumption expenditure of households in the trade and transport matrix.

The expenditure values obtained by sectors were removed from the taxes and subsidies on products and from the value of imports. In the case of the former, the

matrix of taxes less subsidies on products was used to identify the proportions of taxes and subsidies on products by sector, while in the latter case, the data of the symmetric import matrix provided the basis for the calculations. Both data tables were downloaded from the HCSO databases for 2015 and synchronised with the time dimension of the input-output table used for the research. Thus, when defining the basic prices, the amount of the trade margin was calculated from the given expenditure, followed by the determination of the amount of taxes and subsidies on the products as well as of the import. The basic price-based values used in the model were determined by reallocating the first to trade sectors and further reducing the market purchase price by sectors with the latter two.

In the analysis of multiplier effects, the academic literature distinguishes between direct, indirect, and induced effects. The aim of the model was to demonstrate the growth in demand that can be approached through three factors. First, the growth in demand may affect the output directly (direct effect) if the demand increases by one unit and the sector can satisfy that need, and no other factors limit it; then, the direct impact can be identified as one-unit growth in demand. However, in addition to quantifying direct demand growth, excess production generates indirect effects through the satisfaction of the input demand and as a result of the intersectoral relations, which may result in further increases in addition to the above-described one-unit direct effect depending on the intersectoral relations and input use (Kovács 2010). The induced effects go one step further, assuming that as demand increases, households get access to additional income, which is also partly or fully spent, thus generating multiplier effects in the economy (Hara 2012). The aim of this study was to estimate the impacts of direct and indirect effects on the national economy.

Moreover, the information provided by the students also had to be organised along several dimensions and had to be adjusted to the IOA and its multipliers, which were based on the main product and service groups used by the students involved in the research. When linking each product and service category to the relevant sectors, the sectors that primarily produce the given product and/or service were considered. The calculations were performed, and the results were summarised using the MS Excel 2019 program.

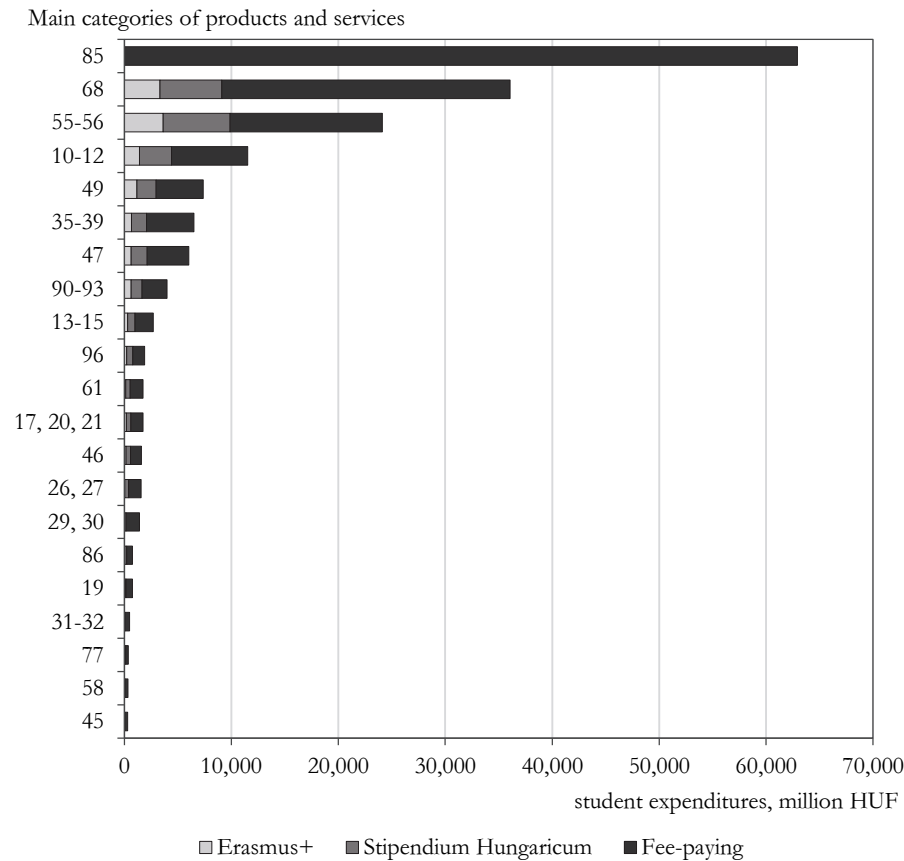
Results

Student expenditures by the most affected product and service categories

The total expenditure of 174,148 million HUF made by the student groups participating in the research, including regular monthly expenditure, tourism expenditure, and occasional expenses, shows a great variety in the dimensions of products and services (Figure 1).

Figure 1

Distribution of student expenditure by main categories of products and services* at market price (based on the aggregate volume of monthly regular expenditure, tourism and occasional expenses, in million HUF), 2020**



* 45 – Motor vehicles and motorcycles trade and maintenance; 58 – Publishing activities; 77 – Rental and leasing activities; 31-32 – Furniture, other manufacturing products; 19 – Coke and refined petroleum products; 86 – Human health activities; 29, 30 – Motor vehicles; 26, 27 – Computer, electronic and optical products; 46 – Wholesale trade (except for: motor vehicles, motorcycles); 17, 20, 21 – Paper and paper products, chemicals and medical supplies; 61 – Telecommunication services; 96 – Other personal services; 13-15 – Textiles, clothing, leather products; 90-93 – Creative arts and entertainment activities, libraries, archives, museums and other cultural activities, gambling activities, sport activities, amusement and recreation activities; 47 – Retail trade (except for: motor vehicles, motorcycles); 35-39 – Electricity, gas, steam, air conditioning, water production/treatment/supply, wastewater collection and treatment, waste management, sanitation, and other waste treatment services; 49 – Land transport and transport via pipelines; 10-12 – Food, beverages, and tobacco; 55-56 – Accommodation and food and beverage service activities; 68 – Real estate activities; 85 – Education.

** The values present aggregated expenditure amounts at market price for the total population (and in the case of certain groups for the total number of students by groups studying in different forms), and uniformly for a period of ten months.

The largest amount of expenditure in terms of aggregate values and per area was represented by expenditure on educational services through tuition fees. This item was special in that it was relevant exclusively in the case of fee-paying students among the groups involved in the research and had an estimated expenditure of 62,925 million HUF.

Among the categories containing the expenditures of all target groups, the largest proportion of the amount spent in terms of the total group, and in accordance with the former experiences of the research, was found in the areas of real-estate services and owner-occupied rental property, representing approximately 36,065 million HUF of the estimated total spending. The second largest amount of expenditures (24,135 million HUF) in the services category was found in the case of hotels and restaurants, including dormitory services, expenditure on accommodation at tourist locations, and catering to both local service providing units and those used during travel. However, the involvement of these service groups had a diverse internal distribution: on the target group level, 51% (12,345 million HUF) was spent on consumption in local catering units, while 20% and 18% were spent on tourists' accommodations (4,775 million HUF) and dormitory services (4,367 million HUF), respectively. The lowest ratio (11%) was on account of the amount spent in the catering units during travel, but even in this case, this amount was nearly 3 billion HUF (2,648 million HUF). With regards to the target group involved in the current study, this group of services reflected similar ratios, while in the case of the students participating in the ERASMUS+ programme, the centre of gravity shifted somewhat towards tourism-related expenditures, and in the case of the Stipendium Hungaricum students, the ratio of dormitory services was higher. Fee-paying students differed from the above two target groups in terms of their higher expenditures related to local catering units.

The above categories were followed by 'Food, beverages, and tobacco' sector (11,528 million HUF), 'Land transport and transport via pipelines' sector due to the travel of the students (7,367 million HUF), and sectors 35-39 related to overhead costs (6,487 million HUF), and retail services (6,032 million HUF). In the case of 'Land transport and transport via pipeline services', the picture became clearer when three areas of expenditure were considered: travel expenses related to tourism, occasional expenditure items spent when travelling to home countries, and the amount spent on local municipal transport. In this context, it was true for the whole sample and for each target group that tourism expenses formed at least 50% of the related consumption and approximately 52% for the basic population. As for the target groups, the highest ratios were estimated for the Erasmus+ students; travel-related tourism expenditures were close to 60% (58%). The ratio spent on local transport was 19% in the case of the Erasmus+ students, while the Stipendium Hungaricum students spent 32%, and the fee-paying students spent 30% in that category. The remaining amounts (28%, 16%, and 20% in the order of the above target groups) included expenditures related to travelling to home countries.

For the above product and service groups, the higher ratios of accommodation costs, overhead costs, and the amounts spent on food may be due to the fact that these consist of essential items, which are purchased regularly and in large quantities.

The role of trade was particular in this model, with its high ratio, which was primarily due to the fact that in many product groups, students' consumption was realised in combination with this sector. The majority of products purchased by the students, predominantly in retail, were food, beverages, and tobacco (representing 56.1% of the consumption realised combined with trade services), while the following sectors had a share of over 5% in the expenditures of the target groups: textiles, clothing, leather products (14.4%); paper and paper products, chemicals and chemical products, medical supplies (8.7%); computer, electronic and optical products, electrical equipment (7.4%); and retail and motor vehicles purchased through motor vehicles and motorcycles trade, other vehicles (6.2%). The distribution by target group showed a similar picture; however, there was a significant difference: the ratio of durable goods also increased in parallel to the length of the expected training period. In the case of expenditure on electronic equipment being typical of Erasmus+ students, 6.83 times higher average monthly expenditure per capita was observed in the target group of Stipendium Hungaricum students, and 9.61 times higher average monthly expenditure was observed in the group of fee-paying students. These differences were also observed in the case of the means of transport (multipliers being 5.42 and 19.62, respectively) and the purchase of furniture and other furnishing items (1.95 and 6.2, respectively).

Analysis of the economic impacts of students with respect to intersectoral relations

The expenditures on the above discussed product and service categories generate different impacts on the economy depending on the channels and patterns through which value creation in the related sectors is linked to other sectors. The various indicators calculated from the IO Table, adjusted to the structure of the students' expenditures, showed great variations in the individual sectors, whose differences remained perceivable in all 21 sectors most intensively affected by students' expenditures (Table 2).

The weight of the impacts of international students on output was strengthened by the fact that, among the sectors most intensively affected by them, the production of food, beverages, and tobacco had the highest multiplier in the country². At the same time, accommodation service and catering (amounting to a great proportion of

² Determining the position of the sectors in the ranking happened in all cases in relation to 55 sectors treating the combined categories together and with excluding/neglecting the following sectors: 97–98: Activities of households as employers of domestic personnel; Undifferentiated goods- and services-producing activities of private households for own use, 99: Services provided by extraterritorial organisations and bodies.

students' spending) and sectors 35-39³ related to the overhead costs of students also had outstanding positions (fifth and ninth, respectively) in the ranking, including all sectors. Higher values (11th-15th highest output indicators in the ranking containing all sectors) were also observed in the following sectors: publishing activities (sector 58), wholesale trade (sector 46), creative, arts and entertainment activities; libraries, archives, museums and other cultural services; gambling activities, sport activities, amusement and recreational activities (sectors 90–93), retail trade (sector 47), and land transport and transport via pipelines (sector 49), of which (as formerly discussed), several sectors generated significant revenue in the context of the consumption of international students based on the relative ratios of students' expenditures.

The impact on imports of sectors affected by students' expenditures was significantly different. Although three sectors were listed on the first three places in the ranking of import multipliers at the national level (in descending order: manufacture of motor vehicles and other vehicles; manufacture of computer, electronic and optical products, manufacture of electronic equipment, and coke and refined petroleum products), these areas were only moderately affected by the students' expenditures (approximately 2.1% of the total expenditure). This could be due to one of these factors: (i) a high number of students typically spent a lower amount occasionally (e.g., buying lecture notes), (ii) a low number of students with low spending (e.g., fuels), or (iii) a higher amount of purchases, typical of a small proportion of students (purchasing cars, motorbikes, etc.) were related to these sectors. These were followed by sectors with an import multiplier over 0.5: textiles, clothing, and leather products (sectors: 13–15; ranking: 8), and paper and paper products, chemicals, and medical supplies (sectors: 17, 20, 21; ranking: 10) which together represented 4.7% of the total expenditures of the students. This shows that the international students' expenditures only moderately affected the sectors with specific higher import multipliers. In contrast, the three sectors that accounted for a significant share (70.7%) of the students' expenditures (education, real-estate activities, owner-occupied rental property services, and accommodation and food and beverage service activities) were significantly lagging behind in the ranking by import multiplier values; out of 55 sectors, these were ranked 54th, 51st, and 26th, respectively. The picture becomes further nuanced by the fact that food, beverages, and tobacco products, which accounted for the largest share (6.6%) of the total students' expenditure following the three sectors named above, was ranked 19th in the same ranking.

³ Electricity, gas, steam, air-conditioning; water production, treatment and supply; wastewater collection and treatment; waste management; sanitation and other waste treatment services.

Table 2

The value of multipliers by sectors, 2020

Sector	Compensation of employees	Of compensation of employees: Wages and salaries	Gross value-added at basic prices	Use of imported goods and services	Output at basic prices	Number of employees (persons/billion HUF)
10–12 – Food, beverages, and tobacco	0.268	0.217	0.579	0.411	1.882	90
13–15 – Textiles, clothing, leather products	0.294	0.241	0.427	0.557	1.202	142
17, 20, 21 – Paper and paper products, chemicals and medical supplies	0.174	0.136	0.481	0.503	1.389	37
19 – Coke and refined petroleum products	0.093	0.073	0.279	0.711	1.224	16
26, 27 – Computer, electronic and optical products	0.128	0.101	0.267	0.724	1.152	37
29, 30 – Motor vehicles	0.102	0.080	0.255	0.737	1.190	23
31–32 – Furniture, other manufacturing products	0.299	0.241	0.530	0.453	1.349	111
58 – Publishing activities	0.410	0.334	0.738	0.242	1.494	112
35–39 – Electricity, gas, steam, air conditioning, water production/treatment/supply, wastewater collection and treatment, waste management, sanitation, and other waste treatment services	0.310	0.237	0.660	0.311	1.499	71
49 – Land transport and transport via pipelines	0.364	0.298	0.655	0.312	1.450	99
55–56 – Accommodation and food and beverage service activities	0.404	0.331	0.663	0.277	1.731	168
61 – Telecommunication services	0.298	0.233	0.769	0.206	1.374	60
68B, A – Real estate activities (without owner-occupied rental property); owner-occupied rental property	0.141	0.115	0.872	0.094	1.341	43
77 – Rental and leasing activities	0.149	0.122	0.709	0.268	1.277	42
86 – Human health activities	0.519	0.420	0.716	0.221	1.284	131
90–93 – Creative, arts and entertainment activities, libraries, archives, museums and other cultural activities, gambling activities, sport activities, amusement and recreational activities	0.420	0.337	0.732	0.192	1.487	136
96 – Other personal services	0.208	0.173	0.809	0.150	1.266	178
45 – Motor vehicles and motorcycles trade and maintenance	0.377	0.306	0.656	0.313	1.391	150
46 – Wholesale trade (except for: motor vehicles, motorcycles)	0.351	0.281	0.698	0.274	1.488	90
47 – Retail trade (except for: motor vehicles, motorcycles)	0.461	0.376	0.786	0.184	1.475	191

The position of the sectors affected by students' expenditures regarding the employment multiplier also showed a characteristic pattern, which was reflected in the fact that several sectors with a significant share of the students' expenditures had multiplier values which placed them among the top ten in the national ranking. Retail trade was fifth, other personal services – generating a lower spending volume – was sixth, education was seventh, while accommodation and food and beverage service activities – generating one of the highest volumes in student expenditure – was eighth in the ranking by employment multiplier values. These data indicate that, as detailed below, by analysing the above multipliers together with the students' expenditures related to each sector, a significant employment effect can be observed.

The compensation of employees also increased in connection with the expenditures because a part of the students' expenditures was channelled into the economic circulation in this way, of which education (second place) and human health activities (seventh place) had the highest values. In the latter sector, although it only gave a boost to a smaller proportion of the students' expenditures, the assessment of the impact's magnitude of the target groups on wages and salaries was overshadowed by the fact that the retail sector was also ranked highly, generating the eleventh highest multiplier regarding employee compensation, which was the most intensively affected sector in all target groups.

The multipliers calculated based on wages and salaries within the compensation of employees were similar to the income multiplier, with the ranking of most sectors intensively affected by students' expenditures having the same or similar position as in the case of the relevant income multiplier. The most significant deviation was found in the combined sectors 35–39, where the income multiplier ranked 30th out of the analysed 55 sectors, while the wages and salaries multiplier was ranked 37th. There was also a larger deviation in the case of the textile, clothing, and leather products sector, being three places ahead of the position of its multiplier for wages and salaries in comparison with the position in terms of the income multiplier.

Finally, the current analysis included gross value-added multipliers. In this area, it also anticipated a significant student contribution as education – being the recipient of one of the largest shares of students' expenditures – is second in the ranking, while real-estate activities and owner-occupied rental activities, characterised by significant spending in all target groups, resulted in the fourth largest gross value-added multiplier at the national level. From the perspective of the present analysis, the retail sector also had a high gross value-added multiplier (13th in the national ranking – only three places behind other personal services) among the sectors receiving the majority of expenditures.

Analysing all sectors together in all dimensions and projecting the relative position to the 21 sectors most intensively affected by students' expenditures, the study found that the retail sector had a prominent position. Besides estimating the highest employment multiplier in this sector from among the sectors most intensively

affected by students' expenditures, the retail sector had the third highest income multiplier and the fourth highest gross value-added multiplier as well. At the same time, the fourth lowest value was estimated for the import multiplier in this sector. In many areas, accommodation and food and beverage service activities also had higher multipliers, with the second highest output multiplier, fourth highest employment multiplier, and sixth highest income multiplier. The positions of education were also outstanding in this respect; of the sectors most intensively affected by students' expenditures, the income multiplier and gross value-added multiplier were the highest in this sector (generating the second highest multiplier in both respects at the national level). Furthermore, the value of the employment multiplier was the third highest in this sector among the 21 sectors.

The contradictory nature of the sectoral impact came from the fact that while the higher values were diverse within various sectors with respect to the compensation of employees, gross value-added, output and employment, three sectors of the 21 with the highest import ratio were positioned in the lower half of the ranking with respect to the multipliers observed. Overall, among the sectors most intensively affected by students' expenditures, in addition to the above, the highest output multipliers were estimated in the case of the food, beverage, and tobacco sector; the highest import multiplier was generated in the motor vehicle sector; the highest gross value-added multiplier was estimated for education and for areas including indexed expenditures in all target groups, real-estate activities, owner-occupied rental activities, and the income multiplier was again the highest for education, and the second highest for human health activities.

Estimated impact of students' expenditures on output, gross value-added, imports, employment, income, wages, and salaries⁴

The estimated consumption of the group of students studying in the Erasmus+ programme, including intersectoral relations, resulted in approximately 16,726 million HUF output, 8,000 million HUF gross value-added, and 2,550 million HUF use of imported goods and services in the total economy. The aggregated employment impact resulting from the current groups of students exceeded 1,000 persons (1,175.28 people) which was approximately 3.2 times more than the results of the former model, neglecting the spillover effects. In addition, meeting the demands of the students contributed to the compensation of employees, with 3,308 million HUF and 2,689 million HUF for wages and salaries, based on estimates.

In the case of the Stipendium Hungaricum students, even though the amount of individual spending was below the spending of the Erasmus+ students, the estimated impacts of the total spending on the national economy were around 1.83 times more

⁴ To estimate the impacts of international students on these factors, the students' expenditures had to be adjusted to the multipliers in many respects where use tables, matrices of trade and transport margin, matrices of symmetric import, and matrices of taxes less subsidies on products were used (www.ksh.hu).

than the spending of the Erasmus+ students, the full impact reaching over 30 billion HUF (30,613 million HUF). Moreover, the expenditures of Stipendium Hungaricum students, projected to the total national economy, generated a gross value-added of 14,608 million HUF. When it came to the employment effect, the increase was even higher in comparison with previous models, with the total number exceeding 2,000 people (2,178.42 people) which was approximately 3.3 times more than the estimated direct value, ignoring the spillover effects. The larger increase is explained by the fact that the weight of the expenditures of Stipendium Hungaricum students shifted towards the retail sector most explicitly in their case compared to other target groups, as shown in former analyses, and the employment multiplier of this sector proved to be the highest among the sectors most intensively affected by students' expenditures. The estimated value of the sum of the compensation of employees generated by the spending of international students participating in the Stipendium Hungaricum programme was 6,075 million HUF, approximately 81.2% (4,934 million HUF) of which was present in the economy in the form of wages and salaries. In addition, meeting the consumption demands of the students had a further impact on generating imports, whose total sum was close to 5 billion HUF (4,758 million HUF) for the total target group estimated on the basis of the spending dimensions named by the students.

At the same time, the fee-paying students had the highest spending per capita and the highest number of students, which, in fact, anticipated that the weight of this group proved to be the highest regarding its impact on the national economy as a whole. Another element that added to the specific nature of this target group was that a significant part of their spending was realised in tuition fees, through which the education sector had, in terms of its impacts on output, gross value-added, employment, and compensation of employees (within it, wages and salaries) – the highest weight in the whole economy among the sectors above, due to its economic impact and the high volume of spending, as already discussed above. Based on the estimated values, merely as a result of the tuition fees, an output of 73,345 million HUF, a gross value-added of 54,753 million HUF, a compensation of employees of 41,188 million HUF (of which 32,192 million HUF in the form of wages and salaries), employment of 10,731.29 people, and an import of 4,097 million HUF were generated in the economy as a whole.

Taking into account the whole group, the volume of impacts generated by the spending of fee-paying students in the dimension of outputs exceeded 92 billion HUF (92,389 million HUF) without tuition fees and 165 billion HUF (165,734 million HUF), including tuition fees. The total impact on the gross value-added without tuition fees was 47,012 million HUF and 101,765 million HUF with tuition fees. The estimated value of employment (excluding tuition fees) was 5,839.26; however, its volume exceeded the volume previously estimated for this group. Compared to the version ignoring the spillover effects, the increase was 'only' double (2.09) which was due to the fact that a significant part of the consumption by fee-paying students

belonged to the real-estate activities and owner-occupied rental activities sectors, which had a lower employment multiplier. The overall total employment effect in this group was 16,570.55 people. This significant change was partly due to the outstanding expenditure amounts and partly due to the fact that tuition fees generated income in a sector whose employment multiplier was seventh in the national ranking, while it was the third highest among the sectors most intensively affected by student spending.

In addition to the employment effect, the consumption by fee-paying students (excluding the tuition fees) generated a compensation of 16,811 million HUF for employees, 81.1% of which (13,635 million HUF) was paid in the form of wages and salaries. If the impact generated by the tuition fees were also added to this value, then the aggregate employee income would have reached 57,999 million HUF, with the ratio of wages and salaries becoming 79% (45,827 million HUF). Moreover, surplus production and service capacity built on the demands of the students also affected the import value, which in this group was estimated to be approximately 13,198 million HUF without tuition fees and 17,294 million HUF, including the impact generated by tuition fees.

Analysing the economic effects which take into account the intersectoral relations generated by the aggregated spending of the three target groups of international students, the following values were estimated based on the model above: output – 213,073 million HUF (139,728 million HUF without tuition fees); gross value-added – 124,372 million HUF (69,619 million HUF without tuition fees), employment – 19,924.25 people (9,192.96 people without tuition fees). In addition, the estimated employee income of approximately 67,382 million HUF (26,194 million HUF without tuition fees) was realised from the income generated by students' expenditures, including 53,451 million HUF (21,259 million HUF without tuition fees) for wages and salaries. Moreover, student consumption also had an impact on the volume of imports, the total value of which was 24,603 million HUF (20,506 million HUF without tuition fees) for the aggregated value of the total target group. The distribution of the above amounts by target group of this analysis had a specific pattern (Table 3).

The fee-paying students had the greatest weight in all dimensions. This means that 64–68% of the expenditures of fee-paying students (not including tuition fees) had an overall economic effect with respect to only the spending categories in which expenditure was indexed for all target groups. The fee-paying students were followed by the Stipendium Hungaricum students, with a share of 21–24% and the Erasmus+ students with a share of 11–13%. When tuition fees were added to the model, the weights changed radically, even more towards the fee-paying students. The contribution of the latter target group to the total impact reached 70.3–86.07%, while the share of Stipendium Hungaricum students dropped to 9.02–19.34%, and the share of Erasmus+ students dropped to 4.91–10.37%.

Table 3

Impact of the target groups and total number of international students on output, gross value-added, imports, compensation of employees (wages and salaries) and employment, 2020

(million HUF)

Factor	ERASMUS+	Stipendium Hungaricum programme	Fee-paying students	Total
Output	16,726	30,613	165,734 (92,389)	213,073
Gross value-added	8,000	14,608	101,765 (47,012)	124,372
Use of imported goods and services	2,550	4,758	17,294 (13,198)	24,603
Compensation of employees	3,308	6,075	57,999 (16,811)	67,382
Wages and salaries (of the compensation of employees)	2,689	4,934	45,827 (13,635)	53,451
Employment (number of people)	1,175.28	2,178.42	16,570.55 (5,839.26)	19,924.25

Note: The values shown in parentheses in 'Fee-paying students' column were calculated without tuition fees and presented for comparison.

Analysing the sectoral shares in all dimensions together and summing up the above experiences, it may be concluded that the economic impacts generated by students' expenditures on the sectors, taking into account the intersectoral relations and quantifying the impacts realised along these interactions, showed an extreme distribution in terms of sectoral involvement. Although there were different patterns, consumption in the fields of education, real-estate activities, owner-occupied rental activities, accommodation and food and beverage service activities, and land transport and transport via pipelines, and the impact on a wide range of economic sectors through the supplier relationship systems of these sectors played a decisive role. Wages and salaries (included in the compensation of employees) were an exception, where although the impact of consumption in the education sector remained stable, the sectoral structure was radically transformed in the rest of its elements. The role of the trade sector increased, within which the impact of retail services was the largest, while the weights of the real-estate activities and owner-occupied rental activities radically decreased.

Conclusion

The focus group of the present study included international students studying in Hungarian higher education institutions within the framework of the Erasmus+ and Stipendium Hungaricum programs or as fee-paying students. The research was based

on a complex questionnaire survey, which witnessed participation from 6,296 international students. The economic impacts were explored using the Leontief inverse and by determining and using Type 1 multipliers.

The results of the research showed that international students' consumption amounted to almost 174,148 million HUF in Hungary. This expenditure had a multiplier effect due to various economic sectors involved in the production of related goods and services and their integration and connections. Thus, international students' contribution to the total output of Hungary increased to more than 213,073 million HUF. In addition, the presence of international students also had an impact on many other macroeconomic indicators; the present study showed that the spending realised by the target groups increased the gross value-added by approximately 124,372 million HUF, use of imported goods and services by 24,603 million HUF, compensation of employees by 67,382 million HUF, and employment by an estimated value of 19,924.25 people in the national economy.

In addition to exploring the aggregate economic impact, the present study also examined the share of the national economic sectors in the context of total student expenditure. In this respect, education occupied the first place (62,925 million HUF), followed by real-estate activities and owner-occupied rental activities (36,065 million HUF); accommodation and food and beverage service activities (24,135 million HUF); food, beverages, and tobacco (11,528 million HUF); and land transport (7,367 million HUF).

Based on the above results, it can be concluded that student mobility can have a significant impact on different national economies. A wide range of sectors benefit directly or indirectly from student consumption, and this effect gets further multiplied due to inter-sectoral relations. This study provides a cross-sectional analysis of this phenomenon at a given point in time which can serve as a useful theoretical background for future comparative studies and can be of practical importance for all those affected by the economic impacts of international students, including decision-makers, economic actors involved in the production of related products and services, and more broadly, the society at large.

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