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Assessment of immigrants' impact on the Slovak economy

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Abstract	Keywords
The migration process is becoming more and more intensive in the European region. Various opinions have been expressed about the effects of immigration on the country's economy. Most of these opinions reveal a positive impact via fulfilling deficits in the labour market and tax payments. On the other hand, a negative long-term effect on the social security system because of the poor integration of immigrants into the domestic population can be seen as a thread in this discussion. This paper analyses the impact of immigration, based on the United Nations National Transfer Accounts methodology developed by Lee and Mason. This methodology is employed to break down the System of National Accounts with respect to age groups and generations and, in addition, show the economic flows between them. The findings of this paper show that the earnings and consumption behaviour of immigrants and natives in Slovakia differ; immigrants tend to work after retirement age, earn more, and consume less, which results in positive effects on the aggregate life cycle deficit.	• national transfer accounts • immigration • Slovakia • income • consumption • life cycle deficit

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Introduction

Two problems in European countries are closely linked: ageing and migration. Ageing and migration outflows place a heavy burden on the social system, labour market, pension system, and state budget. Ageing and emigration both lead to a decrease in the number of effective taxpayers and effective earners in comparison to beneficiaries and consumers. While immigration can help to eliminate the negative effects of an ageing population and emigration by increasing the working-age population and boosting fertility, it also brings its own challenges.

The world is currently facing year-on-year growth in migration. The total number of migrants in 2020 was more than 280.5 million, or 3.9% of the total world's population. During that year, the total number of migrants to Europe has increased by 16% in comparison to 2015, from 75 million to 87 million people (International Organization for Migration, 2022). Since the outbreak of war in Ukraine, more than 8 million forced migrants have arrived in other European countries, and over 5 million have registered for the temporary protection schemes (UNHCR, 2023). The scientific literature rarely distinguishes between economic immigrants (voluntary) and forced immigrants. Nevertheless, these two types of immigrants are impacting the economy in different ways and vary in their behaviour (Cortes, 2004).

In this respect, Europe can perceive immigrants as an opportunity and improve immigration policies to eliminate the negative impacts of its ageing population and emigration. However, not all countries have an appropriate immigration policy regarding forced migrants (even highly skilled ones); e.g., in Slovakia, no changes in migration policy have been introduced since 2015 (Mara & Kovacevic, 2021). Lack of flexibility in the decision-making process leads to a decrease in the inflow of highly skilled workers and a drop in average economic productivity in comparison to neighbouring countries like Czechia, where where such flexibility exists.

Currently, in Slovakia, there are 102 thousand people registered for the temporary protection schemes, 57% of whom are in the 18–60 age group, and only 8% are over 60 (Ministry of Interior of the Slovak Republic, 2023). Frequently, forced migrants tend to occupy low-skilled positions; nonetheless, they register higher annual earnings growth as well as higher human capital investments compared to economic immigrants (Becker & Ferrara, 2019). In these terms, Slovakia is in a rather unique situation. It is heavily influenced by migration due to Russia's war against Ukraine, ageing, and emigration as its own endogenous factors.

Today, the phenomenon of immigration is more relevant than ever, and EU countries, including Slovakia, should clearly understand how it influences the economy, how immigrants integrate into the home economy, and how to maxi-

mize its positive effects. Increased migration flows are inducing researchers to assess the impacts of immigration. This paper aims to assess the effects of immigration in Slovakia by breaking down life cycle deficit (LCD) accounts for broad age groups, as well as examining the consumption structure of immigrants.

The reasoning behind looking into alternative ways to calculate national transfer accounts was impacted by the lack of data. The current study suggests compensating for missing survey data on immigrants by combining administrative data from different sources. An appropriate sample of administrative data enables the methodology to fill the gap created by missing immigrant data; it also includes the immigrants' data in per capita and aggregate accounts. Thanks to these administrative data, it is possible to calculate immigrants' consumption. The paper also proposes to use the same values of immigrants' private consumption as natives have in cases of similar incomes. In previous studies, data on immigrants were either used from surveys or ignored. Using administrative data gives the possibility of calculating national transfer accounts and following the changes every single year, which in fact expands the potential of this methodology.

This paper consists of the following sections: Section 1 provides a description of different scientific points of view on migration. Section 2 contains the methodological approach; data and limitations are discussed. Results after calculations are presented in Section 3, while in Section 4 and Section 5, the results are reviewed and summarized.

1. Literature review

The effects of immigration may be measured from different perspectives: fertility, education, the labour market, fiscal, social, income, and consumption. The topic of immigration is brought to the fore due to ageing populations. The current reality is characterized by a rapid shift towards an increase in average working age and a decrease in fertility rate. This trend is typical for the whole world. In Slovakia, the maximum fertility rate was 3.04 in 1960 and the minimum in 2002, which was 1.19. Nowadays, it stands at around 1.56 children per woman. There is a tendency to grow, but it is insufficient for the natural reproduction rate of population of 2.1, therefore the total population is slightly decreasing. In this regard, changes in population structure should be considered; a steady shift towards growth in average age occurs (OECD, 2023). Projections show that by the year 2100, the total population of Slovakia will have decreased by 20.3%, or by 1.1 million people, in comparison to 2019, while the dependency ratio will increase from the current 24.5% to 59.1%, with the same level of immigrants. In the absence of immigrants, the ratio is

projected to reach 66.6%, resulting in a doubling of individuals aged 65 and over. Failure to implement appropriate adjustments would exert a significant strain on the public finance system (EUROSTAT (c), n.d.). Population ageing as a primary problem generates side effects such as the necessity to compensate employees in the labour market and the fiscal burden on the state budget. Thus, scientific literature looks precisely at native-immigrant differences in the labour market and tries to understand the inequalities in the outcomes. De la Rica et al. (2015) studied six European countries and found that foreigners have a higher unemployment ratio than natives; e.g., in Sweden and Spain, the differences are 9.6 p.p. and 11.7 p.p., respectively. The lowest difference is in the UK, standing at only 1.5 p.p. Unlike the unemployment rate, the participation gap is on the side of foreigners. The participation gap is the difference between foreigners' and natives' participation ratios. Foreigners register a higher participation ratio, meaning they are better represented in the labour market than natives (de la Rica et al., 2015).

Moreover, immigrants do not significantly affect the un/employment ratio of the host country in the long-run, although they do have a negative influence on low-skilled natives (Okkerse, 2008). Depending on the type of immigration (economic or forced migration), long-term immigrants can be net beneficiaries of social insurance transfers. Often the second generation of immigrants are the reason for that the poor integration in the host country society. At the same time, integration and assimilation of immigrants in childhood (second generation) demonstrates better results in productivity in comparison to the first generation of immigrants (parents) and those who were not born in host country (Bratsberg et al., 2014).

As always, the roots of any differences are deeper than they seem. The unemployment/employment ratio, participation level and wage size positively correlate with the level of education. An analysis of 15 Western European countries demonstrates the immigrants' tendency as having a lower level of education than natives. Even if their level of education is adequate and suited to the job, they have lower income than natives, especially non-EU immigrants. Moreover, immigrants have lower chances of occupying higher positions in comparison to natives. The second generation of immigrants are affected by these issues as well (Dustmann & Frattini, 2011).

Besides human capital characteristics (education, working skills etc.), other variables affect the wage level or occupation likelihood of immigrants: country of origin, reasons for immigration and duration of stay in the host country. The wage level is mirrored in independence period of immigrants. This period is shorter for immigrants than for natives, due to lower level of immigrants' wages, which even lower consumption is not able to compensate (Apostolova et al., 2022).

The different socio-cultural dimensions of immigrants in labour market directly reflect on consumption, savings and remittances. Immigrants' consump-

tion is under-studied. Such datasets as European Union Statistics on Income and Living Conditions (EU-SILC) and Household Budget Survey (HBS) do not include immigrants' data, or they are presented in a statistically insignificant manner. Indirectly based on the literature related to saving behaviour, it can be assumed that immigrants tend to consume less than natives.

The saving behaviour of immigrants differs from that of the local population, e.g. for France, the average local savings for foreign employees in 1970 were 50% higher than those of French workers with the same income. Migrants save more in the host country if the price level is lower or if wages are higher compared to their home country. Furthermore, lower wages in the home country influence the amount and quality of effort that immigrants invest into their career in the host country (Dustmann, 1995).

Simultaneously, while saving, immigrants tend to use more conservative investment strategies. The reasons for this can be education level, gender and knowledge of language of the host country or local legislation (Hedesström et al., 2007).

Migrants not only earn and pay taxes in the host country but also send money to their home country, so outflows and inflows of remittances appear. Some of the money saved can be sent in the form of remittances. If immigrants are net senders, then they tend to consume less in the host country, and if they are net beneficiaries, then there are two possible options: 1) an increase in consumption, 2) an increase in savings with the same level of consumption. In 2020, the total remittances all over the world amounted to 702 billion dollars US (International Organisation for Migration, 2022).

There are several reasons why immigrants remit: altruism, exchange, a strategic motives, insurance and moral hazard, family loan arrangements, inheritance as an enforcement device, mixed motives (Rapoport & Docquier, 2005). In 2015, the total amount of remittance inflow was 2,134 million dollars US (2.4% of GDP). It is unlikely that the whole amount belongs to remits for immigrants, and it is more probable that the main proportion of this amount relates to Slovak emigrants abroad (World Bank, n.d.). At the same time, remittance outflows were 240 million dollars US. Unfortunately, there is no bilateral matrix for the year 2015, but there is one for 2021. Therefore, it can be assumed that the flows of remittance did not change dramatically between 2015 and 2021, where 93% of the whole remittance inflow belongs to EU countries, UK and Ireland. A very similar situation can be observed with remittance outflows, where 84% was sent to EU countries, with 47% of this being sent to the Czech Republic (KNOMAD/World Bank, a, b, c, n.d.). Based on that, immigrants from the third countries register a net remittance inflow—they received approximately 149 million dollars US from abroad and sent home a mere 38 million dollars US. In addition to income, immigrants receive remittances from their home countries, which can be treated as consumption, income and intra-/inter-transfers, respectively. For the purpose of

the current work, remittances are excluded, but it is clear that remittances have an impact on life cycle deficit. The only question concerning this is how they should be treated.

All the effects of immigration in various parts of economy have fiscal effects at the end. The fiscal impact of immigration was studied with the assistance of generational accounts methodology (GAs), which was adjusted with respect to immigrants. The authors discovered that reducing immigration might increase or reduce future fiscal burdens, with the outcome depending primarily on the amount and type of overall future burdens (Auerbach & Oreopoulos, 2000).

The overall fiscal impact of immigration is still unclear, whether it is a gain or loss. There are several factors influencing this: when government purchases depend on the total population, then the effect of immigration will worsen the fiscal imbalance, and if they are not affected by population size, then immigration will improve the imbalance, as total spending is shared among a larger number of people (Lee & Mason, 2010).

Difference in the behaviour of immigrants and natives have been studied with the help of life cycle surplus (LCS) gap and calculating independence period of immigrants (Apostolova et al., 2022). The authors of the previously mentioned studies confirmed that immigrants have lower incomes than natives and identified a lower level of economic independence among immigrants. It can be said that the labour gap and participation gap between immigrants and natives have been studied thoroughly in comparison to consumption, remittances and savings, which can be found in fewer scientific studies.

Unfortunately, many papers related to National Transfer Accounts (NTA) ignore immigrants, while others simplify and assume that immigration is offset by emigration (Kuhn & Prettner, 2018). As a result, there is a research gap and a misunderstanding of immigration's influence. The lack of data about immigrants' income and especially consumption results in challenges when calculating LCD accounts for them and identifying the impact of every age group. Therefore, the current paper suggests implementing changes in NTA methodology with the aim of filling this gap.

2. Methodology and data

For the purpose of this paper, UN National Transfer Accounts methodology is used. NTA shows the income value each age group earns in the labour market and through the ownership of assets, and how income is reallocated between age groups via public and private transfers, in addition to how each age group uses its disposable income for consumption and saving.

NTA consists of age profiles inclusive of age-specific averages such as labour income, consumption, asset income, public transfers, private transfers, and savings. Because NTA combines macro and micro levels, it is necessary to create the aggregate values using the System of National Accounts (SNA) and, following this, to use microdata like surveys and administrative datasets to distribute over age groups. Surveys and administrative datasets do not cover the entire population. For that reason, age profiles should be adjusted appropriately so that the sum of per-capita averages for each age group will tie to aggregate values from the macro level.

In other words, the sample weights that are used need to balance the sample with the population structure. Finally, the smoothing procedure serves to eliminate random variations and provide a clear presentation of the age shapes. In order to exclude the effects of country heterogeneity, normalization should take place: NTA age profiles are divided by a simple average labour income for natives aged between 30 and 49.

Basic NTA methodology consists of four steps. *The first step* is to derive macro controls for each economic activity from the SNA. In order to create NTA categories SNA macro controls need to be derived based on different entities in the economy: households and non-profit institutions serving households; government; financial corporations; non-financial corporations and the rest of the world (ROW). It is worth pointing out that the SNA includes data related to the whole economy, and consequently, immigrants' impact is included as well. As the SNA does not capture flows (transfers) between age groups and flows between households, distinguishing them is necessary.

The second step is to calculate the age-specific averages of different economic categories. Age profiles are in the age range from 0 to 80+. This step is divided into two sub-steps: calculating the age-specific averages for immigrants; aggregating the age-specific averages of natives and immigrants.

- Macro controls (macro level); ⟸ • System of National Accounts (SNA);
  - • Demography;

- Age-profiles (micro level); ⟹ • Synthetic cohort estimates
  - The Life Cycle Account (LCA)   - Support ratio (SR);
    - Consumption   - Fiscal support ratio (FSR)
    - Income
  - The Transfer Account (TA)
    - Public transfers
    - Private transfers
  - The Asset base reallocation Account (ABR)
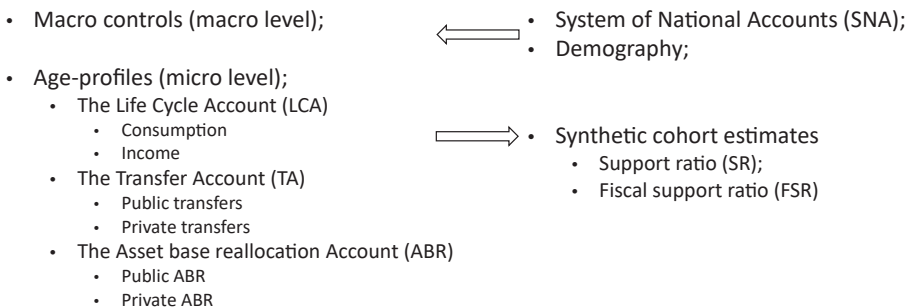   - Public ABR
    - Private ABR

Figure 1. Relationship between NTA elements

Source: author's own presentation.

For the native population, data from European Union statistics on income and living conditions is applied (EU-SILC, 2015) along with the Household Budget Survey (HBS, 2015). These data satisfy the conditions of NTA methodology, while for immigrants, administrative data should be used (Figure 1). Both results should be adjusted to macro controls in accordance with the SNA. Due to the fact samples in surveys differ from the SNA, it is necessary to prevent underestimation or overestimation of the actual values. The sum of products (age profiles multiplied by the number of persons by age group) should be equal to the aggregate value of each respective category.

Due to the random sampling employed in the survey, random variations can occur. To eliminate them, a smoothing procedure is implemented, and that is *the third step*. *The fourth step* is to make a proportional age profile adjustment to the macro controls.

There is a high risk of underestimating immigrants and overestimating the native population. Immigrants produce and consume within the host country, and if they are ignored, it means that the consumption and production belong in their entirety to the native population. For the sake of accuracy, the third and the fourth steps should be adjusted to the immigrants sample. For the full NTA methodology, see (Istenič et al., 2017; United Nations, 2013).

Like other accounting equations, NTA has equalization counterparts: inflows are matched with outflows. This budget identity is true for the household level, for individuals, every age group and for the whole economy:

$$C + S = YL + YA + \tau \tag{1}$$

where consumption (C) and saving (S) equal the disposable income consisting of labour income (YL), asset income (YA) and net transfer inflows (τ).

Equation (1) could be broken down in the following way:

$$C + I_K + I_M + T_g^- + T_p^- = YL + YK + YM + T_g^+ + T_p^+ \tag{2}$$

where the left side of the equation (2) (total expenditures) consists of private and public consumption (C), investment in capital (I_K), investment to credit and land (I_M), cash transfers to the government (T_g^-) and cash transfers to the private sector (T_p^-). The right-hand side, on the other hand, consists of labour income (YL), returns to capital (YK), returns to land and credit (YM), transfer income from the public and private sectors (T_g^+, T_p^+).

For the purpose of this paper only LCD accounts are calculated equation (3).

$$LCD_a = C_a - YL_a \tag{3}$$

where index a identifies age.

2.1. Datasets and methodology adjustments

In this paper, only LCD accounts are considered, thus transfer accounts, asset-based reallocation accounts and remittances are out of paper scope.

The reference year presented in this study is 2015, and this is done for the several reasons: there are full data of HBS, EU-SILC and administrative data from the Ministry of Interior and Ministry of Labour, Social Affairs and Family of the Slovak Republic (2015); year 2015 is not biased by any financial crisis or other exogenous and endogenous shocks like a pandemic or war; and the final reason is that as HBS is done every five years, the final version should be published in 2020 and integrated with EU-SILC. However, it is not yet available for Slovakia.

The weak point of the NTA methodology is its sensitivity to data quality. Standardized EU-SILC and HBS data give the possibility of accurate results, while the absence of the data brings a set of problems in the creation of NTA. Neither dataset includes immigrants, which makes it necessary for NTA adjustments with the assistance of administrative data. A combination of the above-mentioned administrative data assists in compensating for the lack of data in EU SILC and HBS. Administrative data provided by the Ministry of Interior and Ministry of Labour are not publicly available and have been requested and presented here in a processed form.

The Ministry of Labour data provides age-based immigrants' income and consists of regular job contracts, irregular job contracts, personal carers for the disabled, the self-employed and several more exotic and rare types of social insurance. Statistics and reality vary for self-employed entrepreneurs in Slovakia due to the common habit of showing less earnings, and paying lower taxes and social contributions in comparison to real earnings. Personal carers for the disabled are also not a significant indicator because of the small number of people in need of such a service. The dataset includes 52,677 observations, where 13,342 (25%) are females and 39,335 (75%) are males. Income is provided separately for females and males and combined by the author in the following way:

$$YL_a^T = \frac{(N_a^F \cdot YL_a^F) + (N_a^M \cdot YL_a^M)}{(N_a^F + N_a^M)} \tag{4}$$

where N_a^F – number of females of age a, YL_a^F – income of females at age a, N_a^M and YL_a^M represent number of males at age a and their income respectively.

The second administrative dataset provided by the Ministry of Interior shows current information of the number of immigrants in the country and the purpose of their stay. The dataset includes all immigrants in the country at the end of the year, their sex, age, citizenship, type of residence permission, pur-

pose of stay, and region of residence in Slovakia. The dataset includes 91,456 observations, where 32,975 (36%) are females and 58,481 (64%) are males.

In order to implement administrative data, statistical data (DATACube a, n.d.) of the average income split by age group should be applied. Statistical data provide information on the age groups in the following way: 0-19, 20–24, 25–29, 30–39, 40–44, 45–49, 50–54, 55–59, 60+ and the average gross salary for each of these. They represent the gross salary in the country for the current year. Statistical data are used because administrative datasets and EU--SILC have different collection methodologies, thus they need to be converted to a comparable form. In this regard, the following steps are suggested: firstly, data about the number of immigrants from Ministry of Labour and Ministry of Interior should be reconciled. This step is necessary due to the fact that the Ministry of Labour observes only 57.6% of the actual number of immigrants and only the age group from 15–80. There are few reasons for the differences between the two datasets: the Ministry of Labour does not provide data on persons within the 0–15 age group, and in some cases, employers do not supply information about the immigrants they employ, instead paying salaries in cash, etc. Then, the differences in natives' income between EU-SILC and administrative data should be clarified. After this, EU-SILC income can be formatted in an administrative format and the difference between immigrants' and natives' income can be calculated. Finally, the administrative income of immigrants can be adjusted to EU-SILC.

Data is kept for the 0–19 age group, as it is from EU-SILC and from an administrative source for immigrants, since values are insignificant. For the 60+ age group, the average difference of the previous age groups between administrative data and EU-SILC data is utilized (Table 1).

When combining every single age group from EU-SILC in respect to statistics, five years groups should be created and a simple average of natives' income should be calculated. Following this, the statistical data are divided by EU-SILC data, producing a coefficient which shows to what extent they differ. Finally, EU-SILC immigrants' income can be calculated by dividing immigrants' income by the coefficient.

Once income has been adjusted, private consumption can be calculated. Private consumption includes health, education, housing, other standard consumption like food, tobacco and alcohol. Private education and health are assumed to be zero, for the reason that education and the health system in Slovakia are financed by the state. Public health consumption is 8–12 times higher than private, and public education consumption is 30 times higher than private. Based on this, it can be assumed with high probability that the average immigrant accounts for insignificant private health and education consumption, thus they can be taken as nil. For the other types of consumption, it is assumed that immigrants with a certain level of income have the same level of consumption as natives with the same income. Since income

Table 1. Adjustment of administrative salary data to EU SILC format, Slovakia, 2015

a	b	c	d	e = c/f	f = b/d
Age group	Statistical salary, natives, euro	Admin. immigrants' salary, euro	EU SILC natives', euro	Immigrants' adj. salary to EU SILC. euro	Adj. coefficient to EU SILC, euro
Average	997.00	41.73	22.80	41.73	
0–19	582.00	397.01	459.40	265.49	1.50
20–24	687.00	656.99	875.40	649.14	1.01
25–29	886.00	840.64	1,068.80	849.99	0.99
30–34	1057.00	951.35	1,088.80	934.90	1.02
35–39	1108.00	978.13	1,070.00	971.82	1.01
40–44	1077.00	935.15	1,060.60	983.96	0.95
45–49	1008.00	916.27	997.80	938.70	0.98
50–54	974.00	851.75	788.80	711.69	1.20
55–59	944.00	667.64	927.78	618.18	1.20
60+	1002.00	41.73	22.80	41.73	1.08

Source: author's own calculation.

data are fully available, it can be treated as a proxy for private consumption. Suggested adjustments are based on the fact that an individual with the same income has the same consumption behaviour despite their country of origin. Remittances, saving and investment behaviour could obviously affect private consumption, nevertheless, for the sake of eliminating the potential bias due to data availability, the aforementioned factors are excluded.

Immigrants behave differently in terms of both private and public consumption. Following variables are excluded from public consumption: Social Protection-Unemployment, (due to local legislation, foreigners are not able to receive unemployment benefits during temporary residence permission), Social Protection-Housing (foreigners tend to rent accommodation rather than receive financial support from the state). The rest of the public consumption variables are included as for the native population.

The suggested methodological adjustment introduces several advantages. In countries with a relatively small proportion of immigrants and a high turnover, separate surveys are more costly and including a statistically correct number of immigrants in the survey sample is more challenging. The second advantage is the possibility of calculating tax effects from income and consumption provided by immigrants.

These limitations are not crucial and the results of this paper are significant enough for the purpose of research work. For the purpose of the current research, an immigrant is defined as a person whose country of birth and primary citizenship is different from the research country. Only legal immigrants are taken into consideration.

2.2. Decomposition of accounts between natives and immigrants

For the purpose of this paper, income accounts for immigrants and natives are calculated separately. Accounts for natives are calculated as per standard NTA methodology process using EU SILC while immigrants accounts are calculated as follows.

Administrative data of income should be distributed among the whole immigrant population.

Equation (5):

$$YL_{awg} = (AWG \cdot YL_a^T) - (AWG \cdot YL_a^T) \cdot \frac{\frac{N_a^{MVSR}}{N_a^{UPSVaR}} \cdot employment\ ratio}{N^{MVSR}} \qquad (5)$$

where AWG – is weighted average weighted by the number of immigrants from the Ministry of Labour dataset, YL_a^T – income Equation 4, N_a^{MVSR} – number of immigrants of age a from the Ministry of Interior dataset, $\hat{N}_a^{UPSVaR}$ – number of immigrants of age a from the Ministry of Labour dataset and N^{MVSR} – total number of immigrants from the Ministry of Interior.

When distribution is completed, administrative data can be transformed to the EU SILC with the help of the coefficients from Table 1.

Afterwards, natives' accounts and immigrants are combined and adjusted to the macro controls.

3. Results

3.1. Demographic state

In order to understand the immigration impact, it is first necessary to consider the demographic situation of the country. Slovakia has a unique position among other EU countries in that sense. On the one hand, the country

shows a low number of immigrants compared to other EU countries, while on the other, the employment ratio of immigrants in Slovakia is higher. The countries included here represent all parts of Europe. The 2010 employment ratio of immigrants in Slovakia revealed a higher number in comparison to other EU countries. There are two reasons for this: legislation, and the cultural similarity of immigrants and natives.

The proportion of immigrants in Slovakia is increasing over time. During the 5 years from 2010 to 2015, the number of immigrants increased by 0.6 p.p., while in 2020 it increased by 1 p.p. and the proportion of the working-age group increased by 1.3 p.p. What is more important is that the proportion of working-age immigrants is growing faster than the total share of immigrants. This tendency will continue in the future because of two factors: emigration of the Slovak population and the low fertility rate of native Slovaks. According to the available data, the growth rate of immigrants as a share of total population between 2020 and 2022 is 0.6 p.p., while the growth rate of the 15–64 age group is 1 p.p. The year-on-year growth of immigrants is even more significant: 22 p.p. of the total number of immigrants and 20 p.p. of the working-age group, respectively (Ministry of Interior of the Slovak Republic, 2000–2022). The combination of high participation ratio and the growth of the working-age group results in increasing positive effects from immigration.

The employment ratio of immigrants in Slovakia is very high—in 2015 it was 80.4 and in 2022 it stood at 81.1–85.2, depending on the data used for the calculations, while the average ratio in EU countries was 61.3 and 69.4, respectively (EUROSTAT, a, b, n.d.; Ministry of Interior of the Slovak Republic, 2000–2022). This means that almost all immigrants are active in the labour market in Slovakia, whereas other countries show worse results. The employment ratio is also impacted by the geographical composition of immigrants. For Slovakia, it includes culturally close regions: EU, Ukraine, Serbia, Russia, Belarus (Ministry of Interior of the Slovak Republic, 2000–2022), in contrast to other EU countries, especially West and North Europe, which have a higher proportion of immigrants from African and Asian regions. In Slovakia, more than half of immigrants come from EU countries, and they are usually highly qualified employees, which also impacts the employment ratio positively.

3.2. LCD accounts

Slovak immigration statistics vary markedly in comparison to other countries, therefore the effects should differ as well. To visualize those effects, the income age profile has been constructed (Figure 2). The income age profile of immigrants reflects the state of the labour market, where immigrants have an earlier working age and work longer. The blue solid line represents the labo-
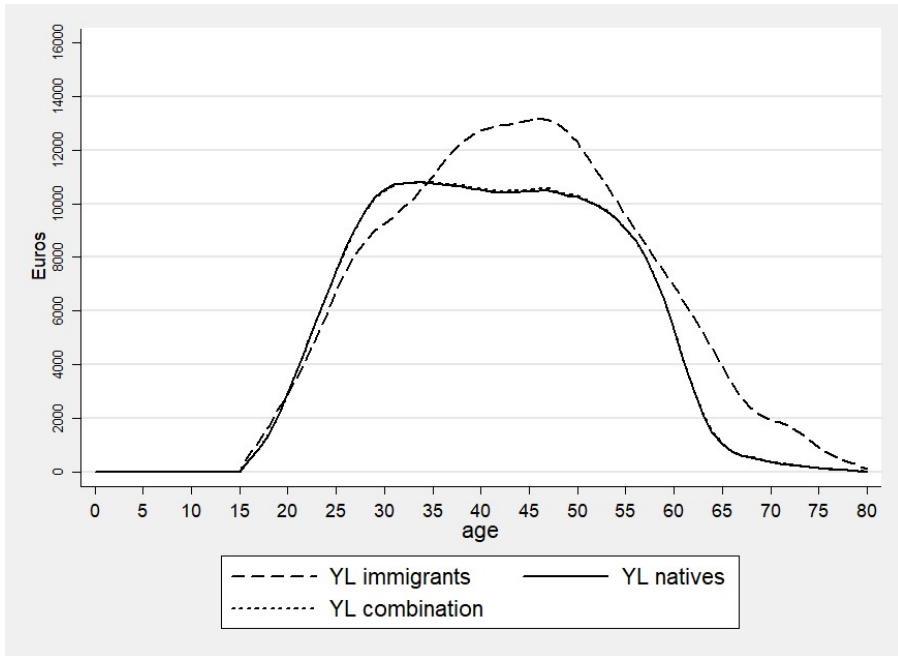
Figure 2. Income age profile of immigrants and natives per capita, Slovakia, 2015

Source: author's own calculation.

ur income per capita age profile of immigrants. Immigrants in Slovakia tend to stay in the labour market longer, thus the income decrease is less steep than among natives. The earnings of immigrants in the 35–55 age group are also higher. Before the age of 35, immigrants demonstrate a lower income than natives. This can be explained through the poor working experience of employees from Non-EU countries, while EU workforces in older age groups commonly occupy higher-paid positions. The total immigrants' impact on all age groups is positive (dot line) and generates approximately 1 p.p. growth. Higher immigrant incomes push up the incomes of the average person in the 35–79 age group living in the country. As mentioned previously, the 20–35 age group of immigrants pushes down the combined age profile slightly, and after this group immigrants have higher incomes (Figure 3).

Figure 3 shows the exact difference between combined income age profile and native income age profile. The first peak at age 40–45 can be explained by the higher income of immigrants from EU countries, who occupy higher positions; the second peak at age 60–70 demonstrates that immigrants tend to stay in the labour market longer than natives, which leads to a higher income age profile.

Income contrasts with consumption (public and private). By using an adjusted NTA methodology, levels of private consumption were split into: low,
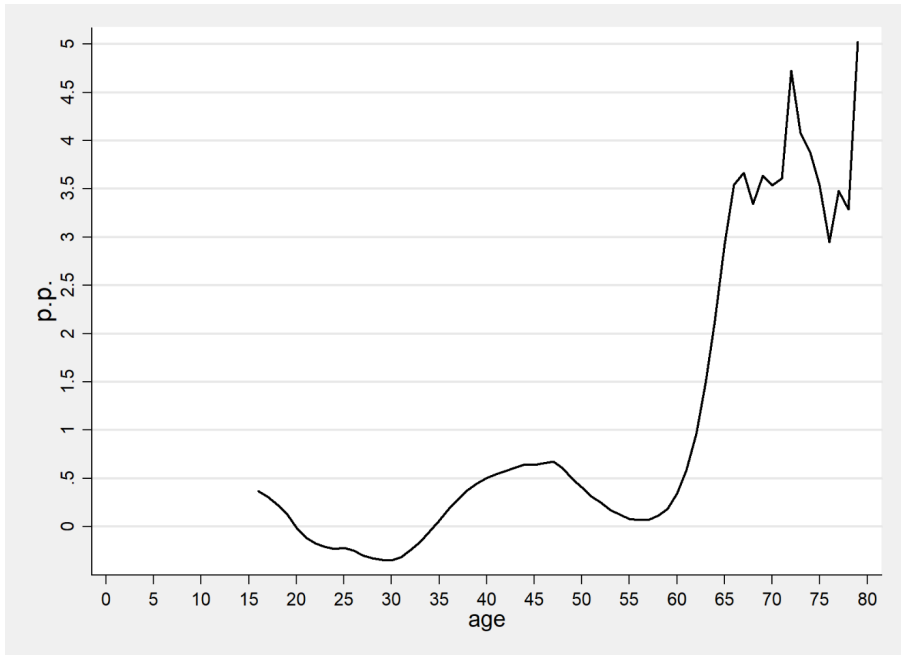
Figure 3. Impact of immigrants on combined income age profile, Slovakia, 2015

Source: author's own calculation.

mid, high and fixed (same). As per the standard NTA approach, people have consumption and either no or a small labour income at the beginning and the end of their lives, thus the orange line represents fixed private consumption. It is assumed that consumption during these periods is the same for immigrants and natives, and does not depend on income. Therefore, values are only for two groups: those who are not present in labour market and those who have left labour market. The remaining three solid lines correlate positively with income level: higher income—higher consumption. The dashed line is a combination of all four consumption levels (Figure 4). The highest consumption appears in the 30–35 age group, after which consumption declines slightly. The peak can be explained by a higher income gap because of differences in consumers' behaviour.

A detailed breakdown of private consumption shows that in Slovakia private consumption is presented mostly by other forms of consumption (food, fuel, tobacco and alcohol, etc.). Immigrants consume less than natives within the 0–30 and 55+ age groups. The first group's lower consumption can be explained by saving behaviour. Immigrants prefer consuming less and saving more, because of their uncertainty about returning to their home country. Moreover, the younger population in the workforce tend to send money home. Older
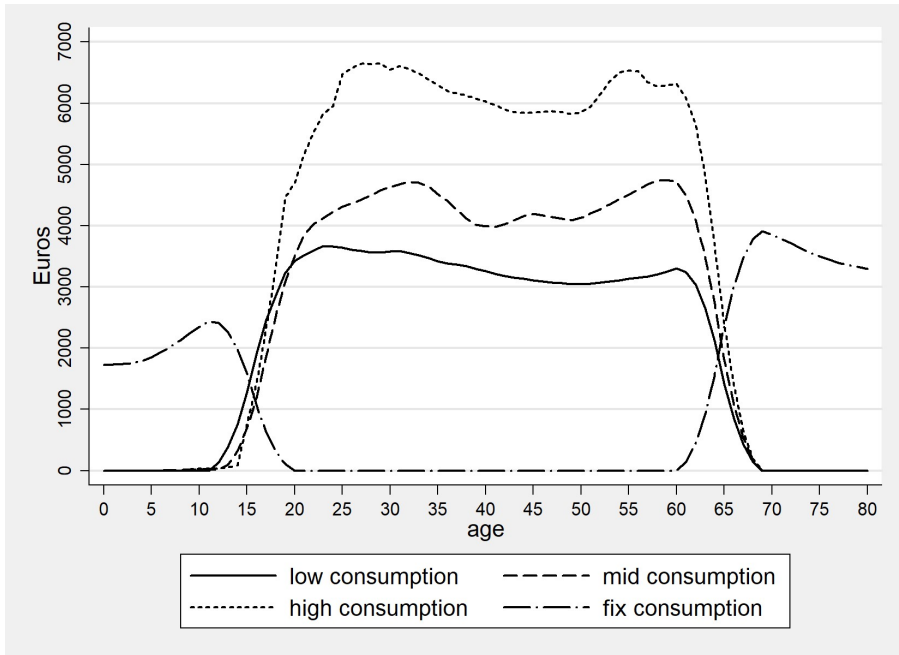
Figure 4. Private consumption age profiles derived by income level per capita, Slovakia, 2015

Source: author's own calculation.

immigrants have similar reasons and make inter- and intra-household transfers. The older generation helps younger generation of immigrants within the host country or outside. Axis *y* represents normalized values (see Section 2).

Meanwhile, a breakdown of public consumption is presented by education, health and other, and shows that the highest total input in total consumption is provided by public education. This is due to all levels of education system being financed by the state, while university studies are also free of charge for native students and foreigners alike. The private sector accounts for a very minor share in this field. Higher education consumption is explained in terms of the age structure of immigrants. They make up a bigger proportion of young age groups in their population. Health and other consumption represent transfers from the state in the forms of social security and healthcare. Because higher age groups of foreigners are rewarded better in terms of incomes, they tend to have higher future social benefits. This is a proxy from the previous salary size. On the other hand, immigrants do not have social security unemployment allowances and house allowances from the state because of Slovak legislation.

Countries with a high level of state participation in education, healthcare and social systems can see growth in government expenditures from very

young age groups of immigrants (0–15) and older age groups (65+). Overwise, countries with a high share of the private sector in the mentioned systems will see growth in direct and indirect taxes from consumption. Education consumption is calculated based on data from OECD education and training, where expenditure at every single education level is presented and then adjusted to macro controls. Health consumption is based on the administrative data of total expenditures and adjustments to macro controls.

A combination of the private and public consumption is presented in Figure 5. During the most productive period from 35–50 years old, immigrants consume slightly more than natives, and then after the age of 50, they consume less, with some of them also leaving the host country. As a result, the average life cycle consumption of immigrants is lower than that of natives.
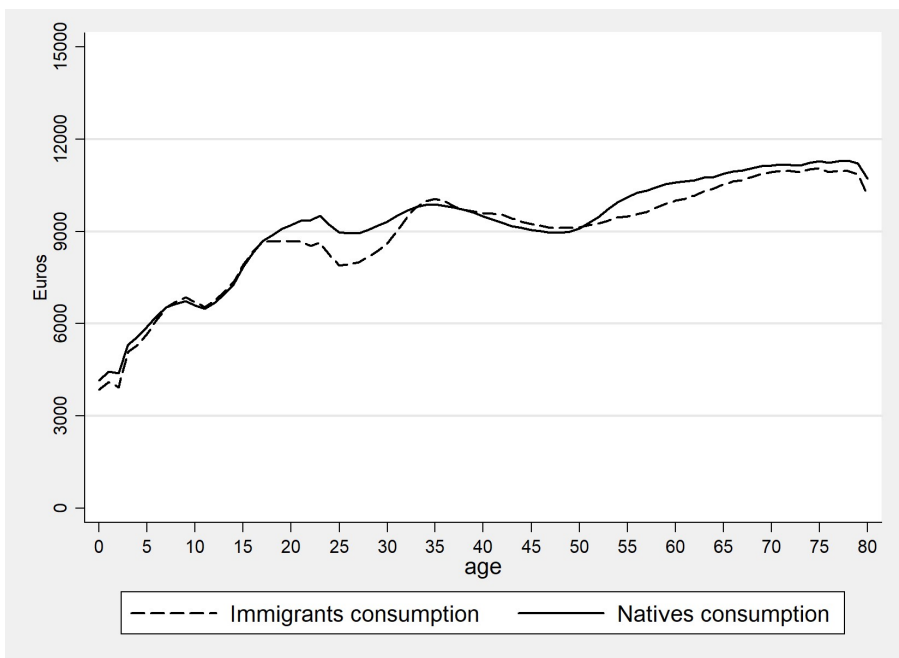

Figure 5. Natives' and immigrants' consumption age profiles per capita, Slovakia, 2015

Source: author's own calculation.

The age profiles of consumption and income give the possibility to calculate per capita and aggregate LCD age profiles. The difference in LCD per capita between natives and immigrants is shown in Figure 6. It shows that the average immigrant in the 45–50 age group earns more than the average native. The curve shows the difference between consumption and income. Negative values mean excess income over consumption and it is higher for immigrants;
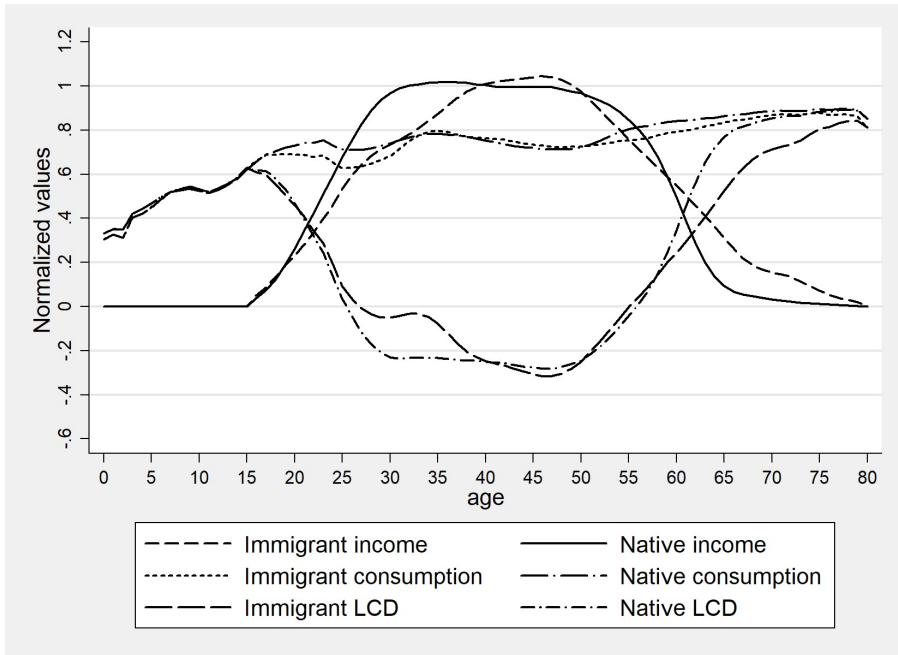
Figure 6. Comparison of immigrant and native LCD per capita, Slovakia, 2015

Source: author's own calculation.

in other words, the life cycle deficit curve is deeper. Its depth can be understood as a proxy for the two variables: productivity and independency. Greater LCD means effectiveness in the labour market as an employee, and the longevity of LCD shows for how long a person will fulfil his/her consumption needs without state support.

The total economic effect from immigration can be estimated by building aggregate LCD (Figure 7). Aggregation means that the whole immigrant population is included in the native population. The solid lines show immigrants' and natives' combinations of income, consumption and LCD, while bars represent only natives' variables. The gap between solid lines and bars demonstrates the effect of immigration. The highest effect is on aggregate income, while aggregate consumption is almost the same. This confirms the statement that highly skilled employees are better compensated and ensure the positive effect on the economy. Because of the small proportion of immigrants in the total population, their impact is eliminated by the native population.

The influence can be even more positive in the case of growth in the number of highly educated persons who occupy productive working positions. An encouraging impact is already being observed from only 2% of immigrants, thus higher immigrant numbers will contribute to the additional positive effect on aggregate values.
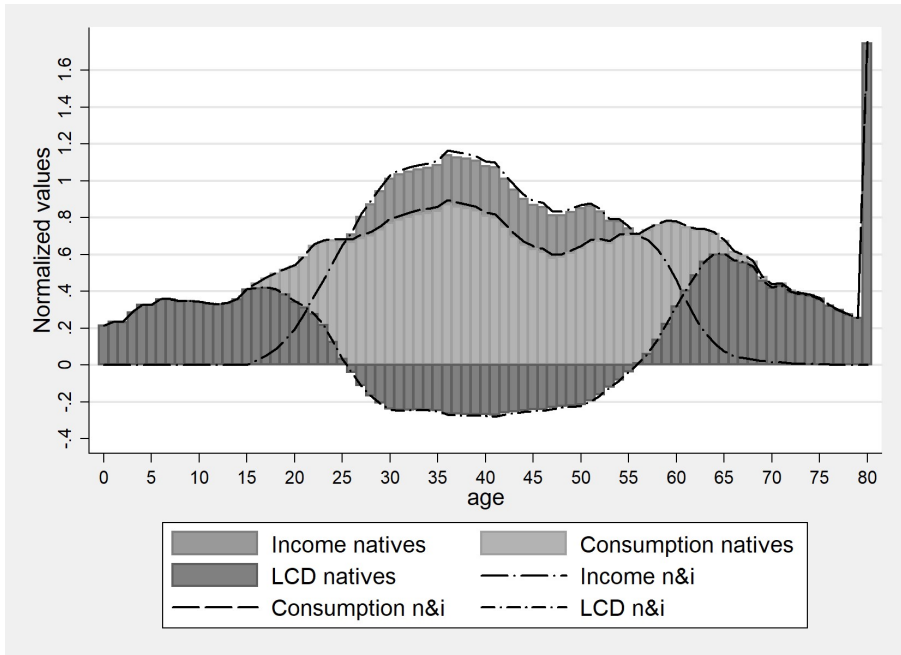
Figure 7. Aggregate LCD with and without immigrants, Slovakia, 2015

Note: The "tail" in the 80 age group appeared because NTA methodology only works with the 0–80+ age group, thus all people older than 80 years are included into this group.

Source: author's own calculation.

4. Discussion

The research results show that immigrants are heterogeneous. They have different education level, cultural patterns, gender structure and countries of origin. In the case of similar cultural environment and education level, immigrants are engaged more deeply in the integration process and generate greater positive effects for the host country's economy. Immigrants from countries with a vastly different cultural environment tend to be faced with a prolonged integration process and this can result in long-term negative impacts, e.g., on the social system through the childcare system. The results of this paper show that the second generation of immigrants receive more social allowances than they contribute to the system. Conversely, immigrants who occupy low-paid positions show higher wage growth in comparison to immigrants who occupy similar job positions to the native population.

Integration policy and migration policy are crucial factors for immigration effects. The results of this paper demonstrate that highly developed coun-

tries in Europe face challenges with regard to the participation level of immigrants in their labour markets, while less developed countries register better results. This happens because of stricter processes of legalization and lower social allowances in less developed countries.

Christl, Bélanger et al. (2022) confirmed the results that intra-EU and extra--EU immigrants have a different impact on the host country's economy. They found out that the average net fiscal impact of immigrants is lower than that of natives, while intra-EU immigrants have a favourable age and education structure, and thus their impact is enhanced. The authors also confirm the results of this paper, namely, that there is a high correlation between country of origin and integration in the labour market.

Integration in labour market can be impacted not only by country of origin but also by level of literacy. Christl, Köppl-Turyna et al. (2020) found out that people with an immigrant background and their children tend to have lower paid jobs, due to the poor language proficiency and literacy. Apostolova et al. (2022) supported this statement, adding that immigrants have a lower participation level in the labour market and a low independence ratio. However, the current paper does not confirm these statements. The majority of immigrants in Slovakia are originally from countries with similar language and culture, which plays a positive role in their labour market integration. On the contrary, immigrants in Slovakia have higher incomes, deeper LCD and longer labour market activity than natives. On the aggregate level, this is illustrated by visible effects from a small number of immigrants.

Negative or positive effects from immigration strongly correlate with the characteristics of immigrants. MaCurdy et al. (1998) built various models with different assumptions, which show that with regard to numerous immigrants, their saving and consumption patterns, education level and language knowledge, the influence on host country economy is different and vary from positive to negative effects in current and future periods. The current paper supports this statement and demonstrates that in comparison to other EU countries, Slovakia has different conditions, where immigrants are more favourable for the country and provide positive effects in the present-day economic reality. Compared to the aforementioned articles, this paper takes into consideration the lack of data about immigrants in EU-SILC and HBS, which can lead to decreased accuracy of the results. In addition, the author suggests a way to fill this gap. None of the studies presented above can be seen as the definite answer to the question "is immigration good or bad" but all of them clearly show that the characteristics of immigrants and the current state of politics define the results of immigration.

Conclusions

Slovakia experiences the same issues of ageing and low fertility ratio as other European countries. In addition, people in Slovakia are net consumers up to 25 years of age, and this age indicator is increasing. Slovaks extend their period of higher education and enter the labour market later, thus from year to year, the state has to face growing financial burdens. In Slovakia, today's critical expenditures in areas such as education and healthcare are covered to over 80% by the state budget. Thus, on the one hand, the average age of entering the Slovak labour market is rising, and on the other, longevity is increasing as well.

There are different opportunities of slowing down the negative processes, one of them is immigrants. The results in Slovakia show the positive impact that immigrants bring to the level of life cycle deficit accounts. Immigrants succeed in having both higher incomes than the native population and a higher participation rate in the labour market. Immigrants in Slovakia are younger and enter the labour market immediately after arriving there. The majority of immigrants come from culturally similar countries, which makes the integration process smoother and less costly. Moreover, Slovak scientists state that despite the high number of immigrants in Slovakia because of the war in Ukraine, they are still insufficiently numerous to satisfy the needs of the Slovak labour market (Morvay et al., 2023).

The aim of the present paper is to discover immigration's impact in Slovakia through LCD accounts and by examining the consumption structure of immigrants more precisely. To find answers for this hypothesis, the author employed a relatively new approach and adjusted existing NTA methodology to the immigrant population.

His findings show that in Slovakia, the number of immigrants grew by more than 120,500 people from 2010 to 2022. The share of working age group of immigrants increased from 2.0 in 2015 to 3.3% in 2020 and 4.3% of the population in 2022, respectively. Immigration in Slovakia is predominantly employment-related, with more than 80% of immigrants engaged in the workforce. This demographic dimension is reflected in the economy.

The income age profile for immigrants is superior to that of natives. This is the result of EU-country workforce occupying highly productive positions. At the same time, the proportion of immigrants in Slovakia's total population varied from 1.1% to 3.3% during the period between 2010–2022, which is a considerably low value in comparison to other EU countries. What is important, immigrants in Slovakia remain in the labour market for an additional 3 years, which also means a high independence ratio and the ability to fulfil their own needs and the needs of their families without additional income from the state budget.

At the same time, the life cycle consumption of immigrants is lower than that of natives. This is due to the fact that immigrants have smaller private consumption, while public consumption is higher. The higher public consumption of immigrants is explained by the younger population, which entails a higher educational cost for the Slovak state.

Private consumption in Slovakia stands at 80% of other consumption, in other words, everyday goods and services. In comparison to the native population, immigrants consume less in the period before 30 years of age and after the age of 55. This can be explained by remittances and intra-/inter-households transfers to members of the family within and outside the host country.

On the aggregate level, the low number of immigrants produces visible effects. LCD can be used as a proxy for estimating the productivity and independence of immigrants. For the countries like Slovakia, where the state participation in social system is relatively high, the most beneficial age group of immigrants is 30–55. Younger groups of immigrants have higher consumption of public goods and services like education, while older groups consume more social security system transfers. For countries with small state participation, the 0–15 and 55+ age groups are beneficial due to the growth of consumption and, as a result, tax outflows to the budget.

The full impact of every age group of immigrants will be visible after constructing a whole set of NTA accounts: LCD accounts, transfer accounts and asset-based reallocation accounts. The present paper provides a new point of view on immigration and also suggests filling the existing scientific gap by means of improvements in NTA methodology through the implementing administrative data of the immigrant population.

The case of Slovakia shows that the country has the potential to accept and integrate more immigrants than it currently has. Immigration is beneficial for the country, and increasing the number of immigrants will deliver positive effects for the whole economy and enable the state to implement a long-term policy for increasing the fertility rate and stabilizing the state budget. Despite all the benefits, immigration has its own limitations. The host country cannot substitute its own population with immigrants: it is impossible both from the technical side and political side. This study shows that the effects of immigration can be beneficial. The present research can prove valuable for different parties: a) for academic society via providing a new approach to thinking how the effects of immigration can be valued and how NTA methodology can be improved; b) for policymakers, by means of evaluating the effectiveness of policies aimed at regulating intergenerational transfers, identifying potential challenges and designing more targeted policies.

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