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# Life Cycle Surplus and Life Cycle Deficit of Immigrants Versus Natives

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## Abstract

Recently, immigration and its socio-economic aspects have been in the centre of the European Union leaders' agenda. In this paper, we apply the National Transfer Accounts (NTA) methodology to calculate the complete set of NTA results for immigrants and natives in five EU countries. We find that due to the lower labour income, which cannot be offset by the lower consumption, immigrants experience a shorter independence period and a much lower aggregate life cycle surplus than natives. The identified cross country differences between immigrants and natives could be used as a proxy of the achieved level of integration of immigrants.

*Keywords:* National transfer accounts, Immigrants, EU countries, Economic independence, Life cycle deficit financing

*JEL classification:* J15, J18, D64

## Introduction

In recent years, immigration and the socio-economic aspects of migration have become a central topic of the European Union (EU). Although lately the emphasis is placed on the possible new wave of refugees, immigration in EU has been a continuous process since World War II (de la Rica et al., 2015). The economic circumstances were changing during that period which caused alterations in the dynamics and substance of immigrants' flows. There are at least four different phases that can be identified here: (i) migration as a result of post-war adjustment and decolonisation, (ii) labour migration between 1960 and 1973, when the rapid economic growth created huge demand for workers, (iii) restrained migration due to deep recession following the oil shock, and (iv) migration due to dissolution of socialism and later on, in times of asylum seekers, refugees and illegal immigration. Further, two processes can be identified: the first process involves Eastern Europeans with more freedom to travel starting to enter Western Europe,

and the other process is the continuous flow of people from different places in the world affected by war conflicts (Stalker, 2002). This last phase still explains the migration processes in the last decade, in addition to the effect of the EU enlargement by 10 Central and Eastern European countries in 2004, and Romania, Bulgaria and Croatia in the later years. Since EU has been obliged to ensure free movement of people among the member countries, the flow from east to west remains important along with other free movements across EU countries.

In 2015, Europe as a continent counted for around 75 million migrants or 31 per cent of the total international migrant stock. There are some similarities across countries in terms of the economic, social and cultural effects of migrants on the domestic population, but there are also many differences and complexities which raise various questions and challenges for national policy makers (International Organization for Migration, 2017).

The EU countries might perceive immigration as an opportunity to mitigate the negative impact of the ageing population on the labour market and the

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sustainability of public finances. It is assumed that selective immigration of young, educated, skilled individuals, filling shortage occupations is beneficial for the economic “well-being” of the immigrant receiving countries (Zimmermann, 2005). However, is it possible to establish immigration policies for attracting the desired immigrants? More importantly, do immigrants with the desired characteristics achieve the expected market labour outcomes?

In the past, there have been numerous studies investigating the labour gap and the reasons for immigrants’ limited employment success and their wage differences compared to natives. The main goal of this paper is to use the novel data on immigrants from the National Transfer Accounts (NTA) in order to examine not only the labour gap but also differences in consumption and the economic behaviour of immigrants in general. Thus, our study aims to confirm the previous literature conclusions for lower labour income of immigrants than natives, and in addition to identify the lower level of the immigrants’ consumption which might be an adjustment mechanism for preserving their economic independence. Furthermore, NTA results provide data to analyse how immigrants and natives finance the gap between the consumption and labour income, i.e. to what extent they rely on public transfers which is an important aspect in terms of the ongoing population ageing process.

For assessing the economic impact of immigration, we analyse the production and consumption patterns over the life cycle. We use the concept of life cycle deficit as defined by the NTA methodology (Lee & Masson, 2011). By allocating all categories of income and consumption by age, we identify the age period of economic independence, i.e. a ‘life cycle surplus’ as well as the age periods of economic dependency for the young and the elderly in which labour income falls short of consumption for both immigrants and natives. The NTA shows how the excess consumption of individuals over their own labour income, also called a ‘life cycle deficit’, is financed through the public transfers (e.g. public education, health, long-term care), private transfers (e.g. parents financing food, clothing, housing etc. of their children) and interaction with the capital and financial markets (e.g. dividends received, loans taken).

In this paper, we examine the difference between the life cycle surplus of immigrants and natives by comparing their age span of the economic independence period and the size of their economic independence. Furthermore, we examine how the difference between age-specific consumption and age-specific labour income (i.e. life cycle deficit) is

financed for the immigrants versus natives in the old age.

The contribution of the paper is twofold. First, we analyse the differences between immigrants and natives in economic flows by age. Second, we provide a cross-country comparison. The cross-country differences between immigrants and natives could also be used as a proxy of the achieved level of integration of immigrants in the analysed countries. We provide the results for five European countries that have all the required data available: Belgium, Cyprus, Estonia, Ireland and Sweden. The diversity among these countries enables us to shed some light on the potential factors of the differences.

The paper is structured as follows. The next section provides a literature review on the differences in labour income and consumption over the life cycle, as well as the differences in financing the life cycle deficit between immigrants and natives. Section 2 presents the NTA methodology and how the economic flows of natives and immigrants are calculated. Section 3 presents the stylized facts for immigrants in the analysed countries and the NTA results by the immigration status across countries. The last section concludes the article.

## 1 Background

### 1.1 Immigrants’ versus natives’ labour income

Age is the central economic characteristic of individuals that determines their ability to produce and their consumption needs. The labour income estimated by the NTA approach shows the average market value of labour income in each age group. It reflects the variation in employment rates, hours worked and hourly wages across age. Thus, the difference in labour income between immigrants and natives reveals different labour force participation and unemployment rates (defining the employment rates as the difference between these two) and different labour income composed of gross wages, self-employment labour income, social contribution and fringe benefits at a specific age (Lee & Ogawa, 2011).

The differences in labour force participation rates of immigrants and natives are mainly driven by the difficulties in the labour market integration of immigrants. Employment rates of immigrants are lower than of natives, whereas the unemployment rates are higher (OECD, 2016). There is a vast body of literature trying to identify the determinants of the weak labour integration (Adsera & Chiswick, 2007; de la Rica et al., 2015; Kogan, 2004; Uhlendorff & Zimmermann, 2014), classifying them into the

micro and macroeconomic levels. At the micro level, the most important predictors of lower access to jobs and lower level of wages are individuals' characteristics, i.e. human capital. At the macro level, the strongest impact on the employability of immigrants are the immigrants' destination country and the country of origin (Fleischmann & Dronkers, 2010).

The main determinants related to human capital are education, experience, training, language proficiency and the immigrants' age. The level of education, type and years of experience as well as obtained training are important determinants but more in the context of how much they are valued in the destination country (Clark & Drinkwater, 2008; Zimmermann, 2005). Friedberg (2000) argues that human capital is imperfectly portable across countries. She finds that the education of immigrants coming from countries with a more similar educational system and economy is more valued. In such cases, the employment opportunities for immigrants and the return to education are more similar to natives. Likewise, the experience obtained abroad is often differently valued in both earnings and the employment probability (Blackaby et al., 2002; Kee, 1995). In line with these findings, over-qualification of immigrants coming from the EU10 countries, who have occupied low skill jobs in the UK, Ireland and other EU countries (Barrett et al., 2006; Drinkwater et al., 2009; OECD, 2007) is also observed. Nevertheless, Uhlenborff and Zimmermann (2014) find some evidence that high skilled immigrants have a higher probability of leaving unemployment than low skilled immigrants.

Immigrants' knowledge and proficiency of the destination country language is stated as the key determinant of the success of immigrants in the labour market. Clark and Drinkwater (2008) argue that this is reasonable as communication skills have become even more important in the modern service and knowledge-based economies. Peri and Sparber (2011) perceive the lack of language proficiency as different skill endowments of immigrants and natives, where natives are comparatively stronger in communication skills intensive jobs, while immigrants are superior in manual skills intensive jobs leading to lower wages. Consequently, immigrants tend to prevail in certain occupations and industries. This occupational segregation renders immigrant labour outcomes vulnerable to the industry performance and development (Ottaviano & Peri, 2012). The skill differences seem to point out the possible difference in productivity, which is a key economic factor for the differences in wages. However, the study conducted on a firm level and controlled for

productivity effects reveals that differences remain even after controlling for productivity. Hence, it suggests that there is a wage discrimination against immigrants (Kampelmann & Rycx, 2016).

The age at arrival is reported by Schaafsma and Sweetman (2001) as a factor that is negatively related to the immigrants' earnings. The explanations relate both to the human capital and language proficiency: the older the immigrants are at the time of entry, the less likely it is for them to obtain education in the destination country, and their ability to master the language diminishes.

Besides the human capital characteristics, we argue that there are three dominant factors that affect the immigrants' success in the labour market: (1) country of origin, (2) reasons for immigration and (3) duration of stay in the country.

First, both statistical data and studies (OECD, 2014; OECD, 2016) show that the country of origin is important for the employability of immigrants (Adsera & Chiswick, 2007). While high-skilled immigrants from developed countries experience similar (un)employment rates to natives, that is not the case for the rest of immigrants (Kogan, 2004). The difference in the level of development of the country of origin and the destination country is the main reason for the variation in the level of wages. When both countries are at the same level of development, immigrants face similar level of employment and wages compared to natives (Fleischmann & Dronkers, 2010; Kogan, 2004).

Second, Scarpa (2016) is one of those who has investigated how the reason for immigration affects the labour outcomes. His study reveals that the immigrants in Genoa (Italy) and Malmö (Sweden) originated from less developed countries, but differed in their type of entry and reasons for immigration. Immigrants in Genoa, often coming illegally but with clear work objective, turned out to be much more labour involved, as their skills corresponded to the skill shortage in this city. In contrast, immigrants in Malmö arrived legally on the basis of family reunification, humanitarian and other reasons, but could not respond to the labour market demand and achieved poor labour outcomes. The reason for immigration (the broadest classification being: economic, family integration or asylum reasons) refers to the type of entry, which is presumably available from residence permit registers. This information is easy for monitoring immigrants (in)flows, but not reliable nor useful for monitoring and analysing of immigrant stocks and as such hinders this kind of research. Another source that studies use in order to assess the importance of the entry category is the survey data

(the most important being the special module of the Eurostat employment Survey in 2008), but often these data differ from the data in residence permit registers (OECD, 2012b).

Third, the difference in the (un)employment rates and wages tends to decrease with the longer stay of immigrants in the country. Recent immigrants, defined as those who have arrived within the last 5 years, have lower employment rates and higher unemployment rates than settled immigrants and these differences are additionally higher when compared to natives (OECD, 2016). The study that compared immigrants' and natives' earnings in 15 European countries revealed that the immigrant-native earnings gap narrows with longer stay in the destination country and that it disappears after about 18 years (Adsera & Chiswick, 2007).

### 1.2 Immigrants' versus natives' consumption

In contrast to the vast literature on labour market outcomes, the consumption behaviour of immigrants seems to be under-researched. Ballester et al. (2015) identify lower consumption levels in Spain of the households whose household head is immigrant. The difference is more pronounced in times of crisis when those households' consumption reduces more than the consumption of households where the household head is a native. Two studies based on Italian data find a difference between the consumption levels of natives and immigrants, and of legal and illegal immigrants (Barigozzi & Speciale, 2011; Dustmann et al., 2017). They show that the consumption level of legal immigrants and natives is different, but tend to slowly converge with the immigrants' longer stay. On the other hand, illegal immigrants consume 40% less than legal immigrants, conditional on their background characteristics. Only one quarter of this consumption gap is explained by lower incomes of illegal immigrants compared to legal immigrants.

Finally, while labour gap has been widely investigated and the consumption behaviour of immigrants has been in the focus of few studies, it seems that no attention has been devoted to the difference between labour income and consumption, defining economic (in)dependency of immigrants versus natives. Here we see a theoretical and empirical gap and try to shed some light on this highly relevant topic.

### 1.3 Financing the life cycle deficit in the old age of immigrants versus natives

Changes in the demographic and economic life cycle pertinent for modern societies (as opposed to

hunter-gathers societies) have led to the phenomenon of old age dependency (Lee, 2000). The longevity of people and low fertility that resulted in population ageing further emphasized the importance of the way the old-age dependency (life cycle deficit) is financed. Immigrant population is also ageing in many European countries (Baykara-Krumme, 2008; Lanzieri, 2011; Van Mol & de Valk, 2016) and the number of old immigrants is expected to rise further (Schimany et al., 2013). Thus, it is important for the destination countries to be informed not only about the level of the immigrants' economic dependence during the working age period, but also about the extent to which old immigrants rely on (intergenerational) public and private transfers. Intergenerational transfers burden working age, young and future generations, as opposed to the reliance on their own previously accumulated assets.

Public transfers to and from immigrants have been extensively elaborated in the literature, aiming to assess the overall impact of immigrants on public finances (Auerbach & Oreopoulos, 2000; Lee & Miller, 2000; Böheim & Mayr, 2005; Chojnicki, 2013; Preston, 2014). Based on the most relevant studies for Europe and USA, it seems that there is no significant impact of immigrants on the public finances ranging to max  $\pm 1\%$  of GDP, and that the policies shall be based on other possible immigration implications (Rowthorn, 2008). With regard to private transfers, their level primarily depends on the generosity of the public systems and the welfare state provisions and to a lesser extent to family norms, so only limited differences in support between immigrants and natives have been identified (Bordone & de Volk, 2016). Private transfers are strongly downward (parent-child) in every economy out of 23 countries for which NTA results have been calculated in Lee and Masson (2011) and not an important source for financing old age dependency. However, upward private transfers are found in families with high poverty or where elderly have no access to adequate pension, which is sometimes the case of first-generation immigrants from developing countries (Attias-Donfut & Wolff, 2008; Baykara-Krumme, 2008). Saraceno (2010) found that more time for care and support is provided to individuals with low socio-economic status and by their children with low income. With regard to asset accumulation and transfers for old age, Escriva (2013) based on Peruvian and Moroccan immigrants in Spain concludes that middle-aged immigrants have limited possibilities to save and invest, due to the high unemployment rates and low wages, as well as due to spending a lot of resources on their old parents.



## 2 Data and methodology

### 2.1 NTA methodology

In our analysis, the immigrant is defined as a person whose country of birth is different from the country of usual residence (in which the respondent was surveyed). Given the nature of the surveys, only legal immigrants are expected to be included. This seemingly clear definition might be challenged, if country borders have changed in the past – for example, the Estonian-Russian national border. Namely, people born in a place which is at the time of the survey outside the national territory but feel that they are national citizens, their country of birth is entered according to this citizenship (Eurostat, 2011). We need to have this in mind when interpreting the results, since some country differences might be originating from this fact.

In order to examine the difference between the life cycle deficit of immigrants and natives, we use the relatively new NTA methodology and for the first time decomposed NTA results by immigration status. The main motivation for introducing the National Transfer Accounts was a better understanding of the generational economy and the economic flows across age groups. The NTA are consistent with the System of National Accounts (SNA) and complement them by introducing the age dimension. The NTA results have been already calculated for more than 70 countries across the globe and provide invaluable, consistent and comparable input for academic research but also for social and economic policies (<http://www.ntaccounts.org/>).

Age is a fundamental characteristic of individuals in defining their economic behaviour. In general, three phases in the course of life can be identified: 1) young age when individuals consume more than they produce and have to rely on the resources from others, 2) working-age when the production exceeds consumption and the resources are left for (co-) financing the consumption in the other two phases, and 3) old age when labour income again falls short of consumption (Lee, 2000). This pattern is general across all countries, but there are important differences in ages at which individuals are economically (in)dependent, in the size of economic (in)dependence and how the periods of dependence are financed. The NTA key concept – the life cycle deficit – is defined as the age-specific difference between consumption and labour income and enables us to measure the individuals' economic dependency.

The gap between consumption and labour income can be financed through private transfers (for

example parents financing their children's consumption), public transfers (publicly financed pensions, education, health etc.) or asset-based reallocations that result from participation on capital and financial markets. This relation is presented with the following flow identity (Lee & Masson, 2011):

$$\underbrace{C_x - YL_x}_{\text{Lifecycle deficit}} = \underbrace{\tau_x^+ - \tau_x^-}_{\text{Net transfers}} + \underbrace{YA_x - S_x}_{\text{Asset-based reallocations}}, \quad (1)$$

where  $C_x$  denotes consumption;  $YL_x$  labour income;  $\tau_x^+$  transfers received;  $\tau_x^-$  transfers given;  $YA_x$  asset income; and  $S_x$  savings. The general approach of the NTA is to combine survey data and various other data sources to create a relative position of the NTA categories for each age group and then by adjusting those relative 'age profiles' (using the population by age) to meet the aggregate controls from SNA or—in the case of the EU countries – the European System of Accounts (ESA). Next, the main categories of the flow identity shown in Equation (1) are elaborated. The NTA methodology is presented in the United Nations (2013) manual. For specifics of the European NTA see also Istenič et al. (2017).

#### 2.1.1 Labour income

Labour income as defined by the NTA represents the workers' compensation in its broadest sense, including gross wages, employer's contribution and fringe benefits. The labour income consists of earnings of employees and the labour income of self-employed. Earnings include wages and salaries and the employer's social contributions, domestic and those from the rest of the world. The main category of earnings are gross wages. Additionally, earnings include all the payments that a worker receives as the result of his/her labour input, like holiday leave payment, compensation for food and transportation or any other payment provided by the organisation in which he/she works, as well as non-cash employee income (e.g. private use of a company car). Earnings of employees represent the largest part of total labour income, while labour income of the self-employed is a much smaller component.

In our case, the data refer to 1-year age groups. The labour income age profile is calculated as a weighted average of income components from the EU Statistics on Income and Living Conditions (EU-SILC) survey. This survey also contains data on cash benefits or losses from self-employment on the individual level. The obtained relative age profile is adjusted to the ESA aggregates of mixed income. Because the ESA aggregates of mixed income include both return on labour (i.e. self-employment

income) and the return on capital of household enterprises, the NTA uses a simple assumption of allocating two-thirds of mixed income to labour income and one-third to the capital income (based on empirical evidence, e.g. [Gollin, 2002](#)).

### 2.1.2 Consumption

Consumption consists of private and public consumption. In the NTA framework, private and public consumption are both decomposed to education, health and other private or public consumption. This distinction is motivated by the strong age patterns of the education and health expenditures.

Data on private consumption are obtained from the Household Budget Survey (HBS) for 2010 that Eurostat made available in 2016 for most EU countries. Since private consumption is reported on the household level, various methods are used to allocate household expenditures to individual household members. For allocating the private expenditures on health by age, a linear regression model (without a constant term) is applied. By using the regression method, the total household expenditures are regressed on the number of household members in each age group. The relative size of regression coefficients (representing weights for individuals of different ages) is used to allocate household expenditures to individual members within each individual household. In the case of private education expenditures, we distribute household expenditures for a specific level of education equally among the household members enrolled in that particular level of education. Other consumption (excluding health and education) is allocated by applying the modified [Deaton's \(1997\)](#) equivalence scale. The NTA approach assumes the equivalence scale of 0.4 for children age four or younger, a linear increase from 0.4 to one between age four and age 20, and one for adults aged 20 or older.

Data for public consumption are mainly based on administrative data. To allocate public expenditures on education by age, we split final public consumption on education between different levels of education. Within each level of education, we use age- and level-specific enrolment rates to calculate relative per capita expenditures. We assume that within each level of education, the expenditures per enrolled student are the same regardless of the student's age.

Public health consumption allocated by age is taken from the [Ageing Working Group \(AWG\) \(2012\)](#). AWG uses the age distribution of health for the long-term projections of public expenditures.

The 'other public consumption' category consists of collective consumption such as government expenditures on defence, police, administration, building and repairing public roads, etc., and individual consumption such as in-kind social benefits for disability and sickness, old age, unemployment, family and children, etc. In the case of collective consumption, it is assumed that all individuals are beneficiaries; therefore, the uniform distribution of expenditures across age is used. For individual 'other' consumption, the public expenditures are allocated to the beneficiaries of particular public programmes, mainly by using the information on cash transfers reported in the EU-SILC.

### 2.1.3 Transfers

As presented in Equation (1), the age reallocations through which the gap between consumption and labour income is financed consist of two comprehensive, mutually exclusive flows – transfers and asset-based reallocations. In the NTA, transfers are defined as in-kind and in-cash transfers between the private sector and the public sector, as well as between different private institutions. While the public sector is defined as general government, the private sector consists of households, non-profit institutions serving households, and profit and non-profit corporations. Some of these flows can be directly estimated from the SNA/ESA. Some require modification and others (such as intra-household transfers) have no SNA/ESA counterpart.

Net public transfers are the difference between public transfer inflows and public transfer outflows. Public transfer inflows refer to the flows that are mediated by the government, including both in-kind and in-cash transfers received by individuals. Public transfers in-kind are public education, public health care and defence to name few, while public transfers in-cash are public pensions, unemployment benefits, family and child allowances, etc. Public inflows are assigned to the individuals who are their beneficiaries. While in-kind public transfer inflows are equal to the public consumption, public transfers in-cash are estimated using the EU-SILC data where individuals report how much money they have received in transfers. On the other hand, public outflows are economic flows from private to public sector, mainly consisting of different kinds of taxes and social contributions that individuals pay to the government or local authorities.

Private transfers include transfers between different households (inter-household transfers) and transfers within the same household (intra-household transfers). One of the main contributions of the NTA methodology is its comprehensive measuring

of intra-household transfers. This was not possible earlier, since transfers within households are not reported in SNA. Even though at the aggregate level intra-household transfers are equal to zero, they represent a very important category of the inter-generational transfers. While the inter-household transfers age profiles are estimated directly using EU-SILC, the intra-household transfers are indirectly estimated as a balancing item between private consumption and disposable income, where disposable income includes labour income, cash transfers less taxes paid and net inter-household transfers. Household members whose disposable income falls short of consumption are in deficit and therefore receive transfers from other household members with a surplus. If the total household deficit is larger than the total household surplus, the household head makes transfers out of asset income, i.e. he/she dis-saves (Lee & Masson, 2011).

#### 2.1.4 Asset-based reallocations

The asset-based reallocations consist of private and public reallocations, whereby private reallocations are more important. Asset-based reallocations consist of 1) asset income, including capital income and property income and 2) savings, whereas the asset income is an inflow and saving (if positive) is an outflow (Lee & Masson, 2011). Private capital income consists of capital income of corporations, income from owner occupied housing, and unincorporated enterprise income (i.e. capital share of mixed income). Private property income consists of flows generated by financial assets such as interests, dividends and rents. Assets (reported only at the household level) are assumed to be owned by the household head.

#### 2.2 NTA for immigrants and natives

Estimating age profiles from the survey data (e.g. labour and asset income, private consumption, in-cash public transfer inflows), separately for immigrants and natives, is straightforward, i.e. we calculate immigration status-specific averages, instead of the total age-specific averages. In both micro-level datasets, EU-SILC and HBS, we define immigrants as all those household members whose country of birth is different from the country of residence. Since in EU-SILC individuals report the year of immigration, all those with a missing value at the variable country of birth are also treated as immigrants if they have reported the year of immigration.

To estimate age profiles based on administrative data, some further procedures are used. For

example, in the case of public consumption on education, survey data is used to estimate enrolment rates by age for immigrants and natives separately. Even though we were expecting that the access of immigrants and their children to (particularly higher) education might be limited, our results show that enrolment rates of immigrants and natives are rather similar. In Estonia, Sweden and Belgium, the enrolment rates of immigrants at young adult ages are even higher than of natives. The individual public consumption (other than education and health) is mainly estimated using the EU-SILC data and the collective public consumption is uniformly distributed. The only component of public consumption which we cannot allocate to immigrants and natives separately is public consumption on health. Therefore, the potential differences in public health consumption between both groups are not captured. However, from survey we see that the educational levels of people aged 50+ are rather similar for both immigrants and natives. Since health condition strongly correlates with education, we expect similar health needs for both groups. Still, there could be potential differences regarding the access to those services.

The macroeconomic aggregates calculated from SNA are available only for the total economy. Therefore, the obtained age profiles for immigrants and natives are adjusted to match the total age profiles (for immigrants and natives combined). In this way, the sum of the products between immigration status-specific per capita age profiles and immigration status-specific population equals the value of per capita total age profile multiplied by the total population. Population data on immigrants and natives is estimated by using the Census Hub 2011 database (Eurostat, 2015). We take shares of immigrants and natives from the 2011 census data and apply them to the 2010 population from our analysis, taking into account that immigrants and natives were one year younger in 2010. For example, the share of immigrants and natives of age  $x$  in 2011 is used to estimate the share of immigrants and natives of age  $x-1$  in 2010.

#### 2.3 Measuring the gap in economic independence between immigrants and natives

The life cycle deficit as a central category in the NTA methodology can be used for various economic analyses and indicators. A positive life cycle deficit is pertinent in the age of childhood and in the old age. During these periods of life, the labour income falls short of consumption and the deficit (LCD) is financed by private or public transfers or



by asset income or debt/dissaving. On the contrary, in a large part of the working age period, an individual experiences negative life cycle deficit – i.e. positive lifecycle surplus (LCS). Following the NTA approach, we calculate the start and the end of the immigrants' and natives' independency period (indicating the age span of positive LCS) in the analysed countries, which represents our first indicator.

However, it is not only important to look at the length of the economic independence, but also the size of this independence. Therefore, our second indicator captures the gap between the immigrants' and natives' economic independence level by measuring the difference in the LCS of immigrants and natives, relative to the LCS of natives.

$$LCS \text{ immigration gap} = \frac{LCS^I - LCS^N}{LCS^N} = \frac{\sum_{x=l}^u (YL_x - C_x)^I - \sum_{x=l}^u (YL_x - C_x)^N}{\sum_{x=l}^u (YL_x - C_x)^N}, \quad (2)$$

where  $YL$  denotes labour income,  $C$  consumption; notation  $I$  refers to immigrants and  $N$  to natives;  $l$  is age at which independence period starts and  $u$  age at which independence period ends. In order to eliminate the effects of the different share of immigrants relative to natives across countries, we use the European standard population (Eurostat, 2013) for both immigrants and natives. The 'LCS immigration gap' indicator measures the relative difference between the LCS of immigrants and natives. It captures the lower capability of immigrants for transferring to other age groups and/or generating savings compared to natives.

### 3 Results

#### 3.1 Basic information on immigrants in the analysed countries

Among the EU countries, the required data for the NTA calculations were available only for the

following five countries: Belgium, Cyprus, Estonia, Ireland and Sweden. All except Cyprus are also members of the Organization for Economic Cooperation and Development (OECD). In 2010, their population varied from 0.8 million in Cyprus to 11.0 million in Belgium, and the unemployment rates ranged from 6.3% in Cyprus to 16.7% in Estonia (see Table 1). This indicates large differences among countries that have also been differently affected by the crisis. Estonia and Ireland had been more severely affected at the beginning of the economic crisis (up to 2010), which in turn had a great impact on the overall and on the immigrants' employment and unemployment rates (OECD, 2016).

The share of immigrants in the total population ranges from 13.9% in Sweden to 20.0% in Cyprus. The share of immigrants in the working-age population is higher than the share of immigrants in the total population. This is a result of the dominant age interval of immigrant flows being 15–24 years of age (OECD, 2016) and the size of immigration flows in the past. The only exception is Estonia, where immigrants are more represented in higher ages (Eurostat, 2017) and might be related with the changes in the country border between Estonia and Russia after World War II.

Since the country of origin is assessed to have an impact on the employment rates and income outcomes, Fig. 1 presents the composition of immigrants by the continent of origin, for the analysed countries in 2010. The national composition of immigrants varies considerably across countries and is mainly a result of former colonial links if any, former areas of labour recruitment, and ease of entry from neighbouring countries (Stalker, 2002). Belgium immigrant segments partly reflect the former colonial links with Africa, but also labour migrants and refugees from Eastern Europe and Asia. The latter also holds for Sweden, where immigration flows are additionally strengthened by immigrants received on family reunification and humanitarian basis. Cyprus immigrants' structure is

Table 1. Total population, immigrants and unemployment rates in 2010 by country.

Country	Total population	Immigrants	Immigrants as share of total pop. (%)	Population 15–64	Immigrants aged 15–64	Imm (15–64)/Pop (15–64) (%)	Unempl. rate (%)	Unempl. rate, immigrants (%)
Belgium	11,000,638	1,628,812	14.8	7,249,774	1,290,918	17.8	6.9	10.0
Cyprus	771,797	154,719	20.0	534,570	134,164	25.1	6.3	N/A
Estonia	1,294,455	197,364	15.2	864,961	116,782	13.5	16.4	22.8
Ireland	4,525,230	766,719	16.9	3,022,537	636,584	21.1	13.1	16.9
Sweden	9,331,080	1,299,285	13.9	6,045,650	1,023,125	16.9	7.1	16.3

Note: "N/A" stands for "Not Available".

Sources: Eurostat, 2017; OECD, 2012a; own calculations.

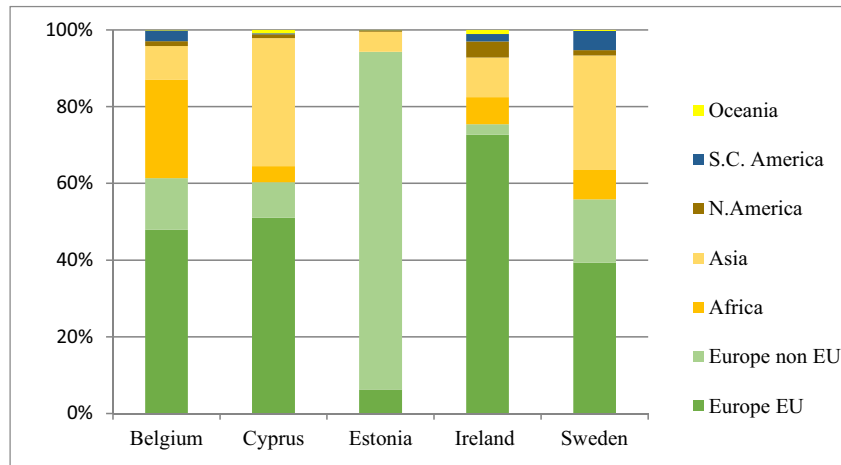


Fig. 1. Immigrants by continent of origin. Source: OECD (2010 data).

rather a combination of European and Asian immigrants, where the European part is due to colonial links, as it used to be a British colony, but also because of the ease of entry for Bulgarians and Romanians after their EU accession. The Asian part, however, is a result of the Soviet Union dissolution and due to the less developed countries nearby. Rather specific is Estonia, where the geopolitical changes led to border shift and now Russia accounts for 71% of all immigrants. Finally, the immigrants' structure in Ireland reflects the liberal work permit policy to attract economic migrants for compensation of skill shortage (Mahroum, 2001). The high economic growth in the period 2000–2007 and the decision to allow full access to the labour market for citizens of new member states in 2004 led to a surge in the number of immigrants in Ireland (Barrett & Kelly, 2012). A great share of immigrants refers to recent immigrants coming from high-income OECD countries and on average being more educated than across OECD countries.<sup>1</sup>

Next, there is a greater discrepancy in unemployment rates between natives and immigrants in Belgium and Sweden. This is in line with our discussion in Section 2 that greater differences are expected when the reason for immigration is not finding a job. Namely, in the European Union Labour Force Survey (2008 ad hoc module) only 17% (Belgium) and 10% (Sweden) of immigrants reported employment as reason for migration. In both countries, around 58% of immigrants reported family reunification as a motive for immigration and in Sweden 18% of immigrants reported

humanitarian reasons. On the contrary, in Ireland unemployment rates of immigrants are not much higher than of the natives. This is in line with the survey results where 40% of immigrants reported employment as a reason for immigration and only 38% family reunification (OECD, 2012b). Even though no data are available for the unemployment rates of immigrants in Cyprus, one could expect that they are not drastically different than those of the natives. That is due to the two main types of immigrants. First are the (British) Cypriots that once migrated to the UK and other developed countries in the 1950s and 1960s and have returned back to Cyprus in the early years of the 21st century (Teerling, 2011). They had no language proficiency and human capital valuation constraints – thus excellent prerequisites for employment. The second type of immigrants are the young workers from Romania and Bulgaria that entered the country (after Romania and Bulgaria became the EU members) and other third country nationals occupying mainly the low paid industries where skill shortage existed (Christofides et al., 2009).

### 3.2 NTA results: labour income, consumption and economic independency

#### 3.2.1 Labour income

The age profile of labour income has a typical inverted U-shaped curve. As explained in the methodology part, it reflects both 1) the earnings (gross wages including employers' social contributions) and self-employment labour income, as well as 2) the level

<sup>1</sup> As of 2012, Ireland has been in 7th place in the OECD in terms of the share of immigrants in its population, where 46% of them arrived in the last 5 years compared with 22% on average across OECD countries. Immigrants are on average more educated than across OECD countries, and count for 43% of highly educated compared with 31% across OECD countries, where 66% come from OECD high-income countries ([www.oecd.org/migration/integration-indicators-2012/](http://www.oecd.org/migration/integration-indicators-2012/)).

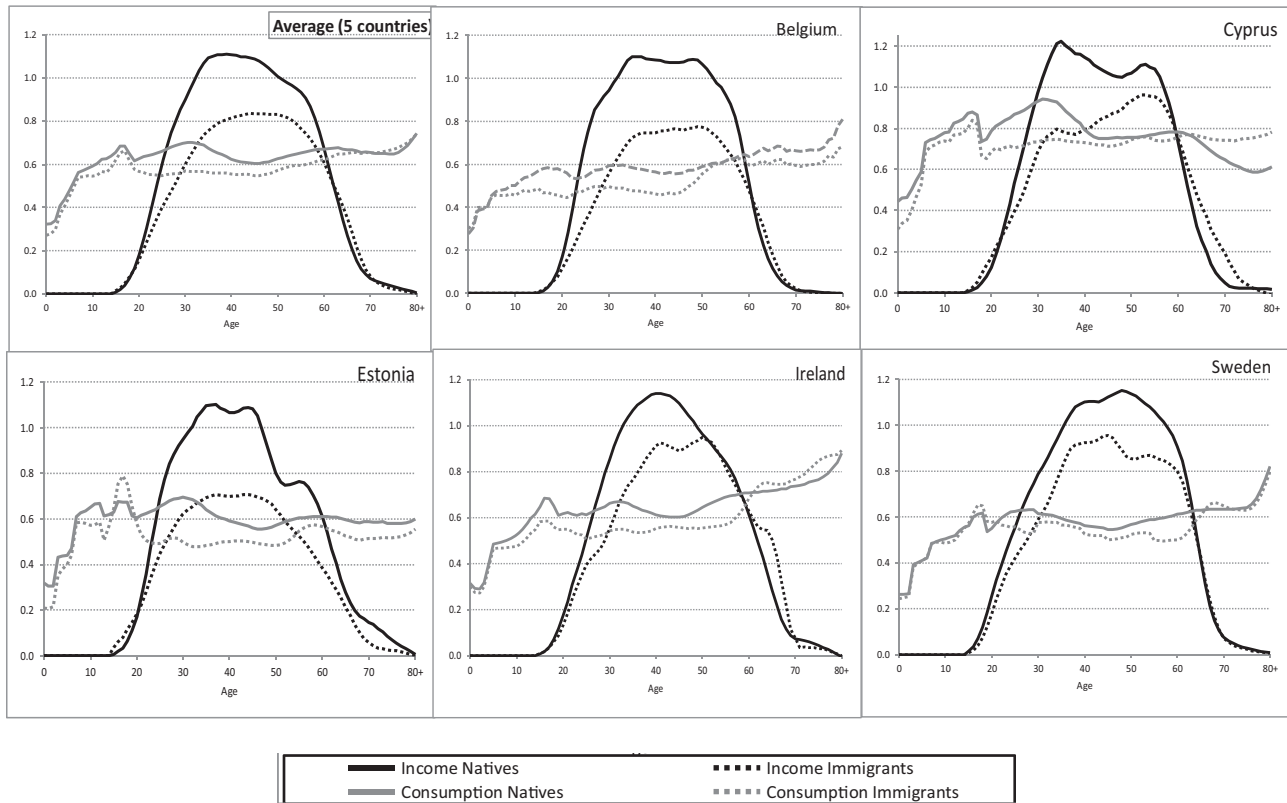


Fig. 2. Labour Income and Consumption age profiles for immigrants and natives in the EU countries, 2010. Sources: EU-SILC, 2011; HBS, 2010; Eurostat database; various other sources and authors' own calculations.

of employment at a certain age. Fig. 2 presents the labour income age profiles for natives and immigrants in each of the analysed EU countries and also the average of all five countries. To make per capita age profiles comparable between countries, we normalise them with the average labour income of individuals aged 30–49. This is a commonly used approach in the NTA framework to eliminate cross-country differences in the level of income, inflation rates, exchange rates, etc. (Lee & Masson, 2011). The age group 30–49 is perceived as a stable denominator, being only in a small extent affected by different labour market entries and exits across countries. The average labour income is a simple average of the per capita labour income for persons of age 30–49.

Fig. 2 shows that the labour income of immigrants is lower than of the natives at almost all ages in all countries. Both immigrants and natives start to enter the labour market at about age 15. Nevertheless, the labour income of immigrants on average increases at lower pace and is equal or slightly greater than that of natives only in certain old ages. That is mainly due to the difficulties entering the labour market (OECD, 2016), because of lacking country

specific skills, high number of low-skilled immigrants, wage discrimination of immigrants, lower negotiating power, accepting low-skill jobs, etc.

In Belgium, Estonia and Sweden, the difference in labour income between immigrants and natives is large throughout the entire working age period. The most striking differences are in Belgium at the age of 28 and in Estonia at age 26 when immigrants receive 46% and 40% less income than natives, respectively. The finding of lower labour income of immigrants is in line with the literature that we presented earlier and the statistical data. Namely, in Belgium and Sweden the immigrant structure by type of entry is not labour migration and there are no skill shortages driven policies in place. Furthermore, the country of origin of those immigrants is probably at a different level of economic development than the destination country. Also, the destination language knowledge of immigrants is low and requires long time to learn (except migrants from former colonies). With regard to Cyprus, there is also striking difference in the labour income of both groups, which tends to disappear in the late working age. Moreover, immigrant labour income

turns to be greater than of the natives at age 61 and over. The big difference between immigrants and natives in Cyprus can be explained by the striking increase in the immigration flows in the last 15–20 years. The immigrants coming from new EU member states and other third countries nationals are employed in the low pay industries or are engaged in domestic work (Gregoriou et al., 2010). In contrast, the reason for higher labour income of immigrants than natives in old age is not so clear. Notwithstanding the relatively loose minimum required working years, it seems that immigrants represented at these ages tend to work longer (European Commission, 2018). Finally, immigrants in Ireland achieve the same age-specific labour income as natives at the age of 51 and receive even higher labour income in some older ages. That corresponds to the structure of immigrants in Ireland, where high skilled immigrants from developed countries prevail. Nevertheless, some puzzles remain unsolved. The results can also be cohort driven, since Ireland only in 2000s turned to be an immigration instead of emigration country (OECD, 2012b).

### 3.2.2 Consumption

The consumption consists of public and private consumption, each of the categories disaggregated to 1) education, 2) health and 3) other consumption. There is a general pattern in all analysed countries for both immigrants and natives, that the consumption is greater in the young and old ages compared to the working age, due to the public education and health services. Private and public consumption of the working-age population is relatively stable for both groups of individuals.

However, the level of consumption age profile of the immigrants for all five countries strictly differs from the natives during the working age period. In that age period, the consumption of immigrants is lower than the consumption of natives, because of the lower private consumption other than health and education, which is expected, given the lower labour income and therefore fewer resources available. In most of the countries, the inequality between the immigrants' and natives' consumption is greater at the beginning of the working age period (which often corresponds with the first years of their arrival) when immigrants face difficulties entering the labour market (Barigozzi & Speciale, 2011; Dustmann et al., 2017).

In Belgium and Estonia, the consumption of immigrants is lower than of the natives also during the

old age, but this is not the case in other three countries. In Sweden, the consumption of immigrants and natives is almost the same,<sup>2</sup> resulting from considerably high public consumption. On the other hand, the private “other consumption” is the main reason for the higher consumption of immigrants than natives at old ages in Ireland and Cyprus. This seems to correspond with the higher asset income of immigrants in the old ages in these countries, as presented below.

### 3.2.3 Life cycle surplus and economic independency

By calculating the difference between the presented age profiles of labour income and consumption, we derive the age profile of life cycle surplus (LCS). Table 2 reveals that in all observed countries, immigrants are self-supported (through their labour income) for a shorter age span than natives. The age period of economic independence for these five countries combined (unweighted average) is 30 years for immigrants and 34 years for natives.

Immigrants in Belgium and Estonia face larger difference in labour income compared to natives, which is to a lesser extent offset by lower consumption. In these two countries, immigrants experience the shortest period of economic independence compared to natives; the labour income of immigrants becomes greater than their consumption 5 (Belgium) and 2 (Estonia) years later than that of natives, whereas at higher ages immigrants become dependent again 2 and 5 years sooner than natives, respectively. On the other hand, in Cyprus, Ireland and Sweden the economic independence period of immigrants is shorter by about 2 years compared to natives and is a result of the later start of their economic independence period. This corresponds with the statistical data on high unemployment rates among young who recently immigrated and their more volatile employment compared to the immigrants who have been longer in a country (OECD, 2016).

Furthermore, the ‘LCS immigration gap’ indicator reveals a considerably lower life cycle surplus of immigrants, expressed as a relative difference in the size of the economic independence between immigrants and natives. This difference in LCS between immigrants and natives relative to LCS of natives also provides meaningful comparison among the countries, eliminating country differences in the level of wages, prices, etc. We argue that this indicator can assess the level of

<sup>2</sup> Note that we were not able to distinguish between public health consumption of immigrants and natives.



Table 2. Immigrants' and natives' life cycle independency period and size.

Country	Life cycle independency period (age)				Aggregate life cycle surplus (LCS)			Integration ranking 1–5 (1-best, 5-worst)
	Immigrants		Natives		Immigrants (units)	Natives (units)	LCS imm. gap (%)	
	Start	End	Start	End				
Belgium	29	57	24	59	7985	19,238	–58	4
Cyprus	32	60	30	60	4655	11,523	–60	5
Estonia	27	55	25	60	6142	14,784	–58	3
Ireland	30	60	27	59	11,102	14,402	–23	1
Sweden	29	64	27	64	14,099	20,342	–31	2
Average	29	59	27	60			–46	

Note: Aggregate LCS of immigrants and natives is expressed in units that are result of multiplication of the number of immigrants/natives in LCS and their LCS (LCS values are standardly normalised with the average labour income of individuals aged 30–49).

Source: EU-SILC, 2011; HBS, 2010; Eurostat database; various other sources and authors' own calculations.

integration of immigrants in a country from the standpoint of the destination country. The more the immigrants are self-sustainable either by achieving reasonable (more similar to natives) labour outcomes and/or by adjusted consumption, the lower is the probability of the fiscal burden of immigrants for the destination country. The results show very high difference in the size of the economic independence between immigrants and natives in Belgium, Cyprus and Estonia where the LCS of immigrants is lower by more than 58% than the LCS of natives. The LCS immigration gaps for Belgium and Estonia confirm the results of the previous indicator that revealed the biggest difference in the length of the independence period between immigrants and natives in these two countries out of all analysed countries. Conversely, the LCS immigration gap for Cyprus is the largest, placing this country at the worst place in our ranking for integration, despite the relatively small difference in the independency span between immigrants and natives. Nevertheless, the given rank is in line with the Mipex<sup>3</sup> ranking scale and reflects the inexistence or the very limited integration policies and bad conditions for the majority of immigrants in Cyprus (Trimikliniotis & Demetriou, 2011). The relative difference in the size of the economic independence between immigrants and natives is the smallest in Ireland, followed by Sweden, where the LCS immigration gap is 23% and 31% (lower LCS of immigrants relative to LCS of natives), respectively. That seems to correspond to the rather narrow gap of the economic independency span of approximately two years.

### 3.3 Financing the LCD at older ages

The developed countries face a rapid population ageing that will be even more pronounced in the following decades. The researchers, international institutions and policy makers are concerned with the impact of population ageing on the sustainability of the public systems, especially pensions, health care and long-term care. However, the impact on the public sustainability depends on the manner how the LCD of the elderly is financed. For example, pay-as-you-go pensions systems will be heavily influenced by population ageing, whereas the impact on the funded systems (where each individual saves for his/her own pension) will be much lower.

Financing the old-age deficit varies strongly across the countries. Interesting regional differences have been identified worldwide reflecting the different arrangement of the support systems. Europe is characterized as a region where the most important role in old-age economic dependency financing play the public transfers (Mason & Lee, 2011). Following the approach of Mason and Lee (2011), Fig. 3 presents the 'triangle graph' with three channels through which elderly (65 years and older) finance their LCD: public transfers, private transfers and asset-based reallocations. In particular, each side of the triangle represents reliance on one of those three sources. By definition, for each spot in the triangle (or outside the triangle) the components sum up to 100%. We present the results separately for immigrants and natives.

All observed countries, both for immigrants and natives, are located near the right-hand side of the triangle, which means they are mainly relying on

<sup>3</sup> Migrant Integration Policy Index (MIPEX) uses a number of indicators, including labour market integration, long-term residence and family reunification rights, political rights, access to nationality, anti-discrimination policies and public opinion. Cyprus has the lowest score out of the analysed countries in this paper.

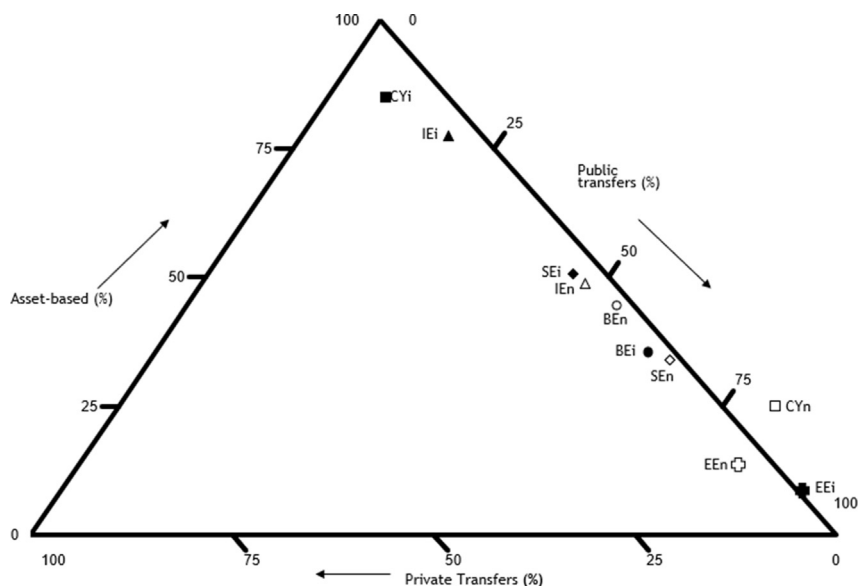


Fig. 3. Life cycle deficit financing in old age (65+) for immigrants and natives in 2010. Source: EU-SILC, 2011; HBS, 2010; Eurostat database; various other sources and authors' own calculations. Note: BE = Belgium, CY= Cyprus, EE = Estonia, IE= Ireland, SE= Sweden.

some combination of assets and public transfers and to a very limited extent on private family transfers. In Belgium and Estonia, public transfers are important for the natives, but they are even more important for the immigrants. In Cyprus, Ireland and Sweden, the asset-based reallocations are very important for immigrants. Despite the minor contribution of the private transfers in financing the LCD, in most of the countries, slightly greater reliance on these transfers by immigrants can be observed. This is in line with the findings that overall familial support is more exchanged in immigrant families (Kim et al., 2012), due to the stronger intergenerational bond in these families, as opposed to the majority of the population across Europe (Bordone & de Valk, 2016).

Considering the very low life cycle surplus of immigrants in Belgium and Estonia that cannot provide conditions for savings, it is expected that immigrants in the old age rely more on public transfers than natives. Immigrants' asset income in the old age is substantially greater than that of natives in Ireland, Cyprus and Sweden. A further analysis of the asset income components reveals that the difference originates from the greater value of capital income of immigrants. Consequently, the immigrants in these countries are less dependent on public transfers, and if we exclude Ireland and Cyprus (due to the previously mentioned rich cohorts), our data reveal that immigrants tend to save and invest more than natives in the period of life cycle surplus and rely more

on their own finances than natives in the period of old age (case of Sweden).

#### 4 Discussion and conclusions

By applying the National Transfer Accounts (NTA) methodology, we estimate average labour income and consumption by age for both natives and immigrants. We use the latest available and comparable data to identify how the production, consumption and economic flows across age differ for immigrants and natives.

The novelty of the NTA approach is in providing the age distribution of labour income and consumption, which enables new research possibilities. As a result, we can analyse at which age individuals face life cycle deficit and how long they are economically independent, i.e. earn more than they consume. Moreover, this methodology enables an analysis of how children and elderly finance the gap between consumption and labour income through public transfers, private transfers and asset-based reallocations. In this study, we present, for the first time, the NTA results separately for immigrants and natives. Due to heavy data requirements, this has been possible only for Belgium, Cyprus, Estonia, Ireland and Sweden.

The results show that in all countries and almost at all ages the labour income of immigrants is lower than of natives. Both immigrants and natives start to enter the labour market at the same age, but the labour income of immigrants increases at lower

pace and never reaches the maximum level of natives. This is in line with the previous studies on slow labour market integration in the first years of residence in the destination country and lower incomes of immigrants, especially in the first years of employment.

Regarding consumption, the results for immigrants primarily suggest that private consumption (other than health and education) is the main adjustment vehicle to compensate for the lower labour income in the working age. In general, the results for the age-specific consumption are an important contribution to the limited literature for the consumption of immigrants. Nevertheless, the same or higher consumption of immigrants in few of the countries in the old age (Sweden, Ireland and Cyprus) should be subject to further research. Using the NTA methodology, we were able to allocate to immigrants and natives all categories of public consumption except public consumption on health. Given the data limitation, we assumed the same per capita public consumption on health for both immigrants and natives. However, the needs and access to public health consumption might differ, which is left for the future research.

Due to the lower labour income which is not offset by lower consumption, immigrants experience shorter age span of LCS (economic independence period) and much lower aggregate LCS than natives. In Cyprus, Ireland and Sweden, the shorter economic independence period of immigrants of around 2 years is mainly a result of the later start of their economic independence period. In contrast, in Belgium and Estonia the shorter age span of LCS of immigrants compared to natives is a result of both later start and earlier end of their independence period, representing greater differences between these two types of residents. Also, we introduced an indicator that captures the relative difference between immigrants' and natives' economic independence level by measuring the ratio of the difference between LCS of immigrants and natives relative to LCS of natives. The so-called 'LCS immigration gap' reveals a very high difference in the size of the economic independence between immigrants and natives. The LCS of immigrants is lower than the LCS of natives by 58%–60% in Belgium, Cyprus and Estonia, 23% in Ireland and 31% in Sweden. We argue that this indicator along with the length of the immigrants' independency period can serve as a proxy for the level of integration of immigrants from the standpoint of the destination country and can offer a tool for comparison across countries. Furthermore, monitoring these two indicators in a country over time can signal policy makers how (un)successful the newly

implemented changes are in the measures and policies for the integration of immigrants.

Finally, based on the obtained results we focus on how the life cycle deficit in the older age is financed. Although the elderly in the analysed countries generally rely on public transfers, in Cyprus, Ireland and Sweden, immigrants tend to finance the deficit more extensively through the asset-based reallocations than natives who rely much more on the public transfers. While in Cyprus and Ireland this difference might refer to specific cohort characteristics, in Sweden it suggests that immigrants tend to save and invest more than natives.

The EU countries, especially those with a constant flow of immigrants, shall continue with measures for labour market integration along with the continuous assessment of their integration policies effectiveness. Our results show that higher labour income provides longer and greater life cycle surplus, and in turn provides higher level of consumption, which is an important determinant of the individual's well-being. Further research shall be focused on the saving and investing behaviour of immigrants, as this study suggest that this behaviour (apparent in the late working age and old age) might partly offset the negative implications of the labour income gap. Both higher labour income of immigrants and their greater reliance on asset-based reallocations would reduce the fiscal pressure of population ageing on young and future generations.

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