GENERATIONAL DISTRIBUTION OF CONSUMPTION AND INCOME IN POLAND IN THE CONTEXT OF POPULATION AGEING

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ABSTRACT
Population ageing in Poland will lead to pronounced changes in the age structures, which will have significant macroeconomic consequences and impact the levels of consumption and labour income of future generations. Using the National Transfer Accounts for Poland we quantify the impact of population ageing on lifecycle deficit. Changes in the size and age structure of population, if the current consumption and labour income profiles are not changed, will lead to a fast decline of total labour income and slower decline of consumption. As a result, the lifecycle deficit will be increasing. Furthermore, the share of lifecycle deficit attributed to older population, whose consumption is financed mainly from public pension transfers. Our results indicate the need to introduce policy changes that would increase the aggregate income, through extending working lives and increasing labour market participation, as well as adjust consumption levels to sustain the generational balance.

Keywords: population ageing, generational balance, National Transfer Accounts

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Introduction

The aim of this paper is to discuss the potential macroeconomic consequences of the population ageing in Poland. Low fertility levels combined with lower mortality lead to the accelerating population ageing in Poland. Furthermore, ageing of the baby boom generation born in the 1980s will contribute to the quickly increasing share of population in the older age group after 2030. These developments will lead to a significant challenge related to financing the consumption of generations, who are not generating labour income: the young and the old. In the paper, we quantify the potential changes in the aggregate lifecycle deficit using the National Transfer Accounts approach. We show that the patterns of consumption and labour income in Poland lead to the narrow range of effective productive age in Poland. We also discuss the estimates of the aggregate lifecycle deficit applying the demographic projections to current age profiles of consumption and labour income. Finally, we compare economic and demographic dependency in Poland and in selected EU countries.

1. National Transfer Accounts as an approach to measure consequences of population ageing

One of the analytical approaches that allows the economic consequences of population ageing to be identified is the assessment and analysis of the National Transfer Accounts (NTA). This method was developed by Lee and Mason (see Lee and Mason, 2011) and is currently applied in over 60 countries worldwide, including 26 EU member states[1]. The National Transfer Accounts are designed to provide a systematic and comprehensive approach to measuring and analysing economic flows from a generational perspective. It is based on the concept of generational economy, as defined by Lee and Mason (2011).

At each stage in their life, generations have different patterns of consumption and labour income that result in the lifecycle deficit. This can be denoted as:

$$C(x) - Y^l(x) = \tau^+(x) - \tau^-(x) + Y^A(x) - S(x), \text{ where:} \qquad (1)$$

$C(x)$ – consumption
$Y^l(x)$ – labour income
$\tau^+(x)$ – transfers received
$\tau^-(x)$ – transfers paid
$Y^A(x)$ – income from assets
$S(x)$ – savings

The left-hand side of the equation (1) denotes the lifecycle deficit, while the right-hand side is comprised of net transfers $(\tau^+(x) - \tau^-(x))$ and the reallocation of resources $(Y^A(x) - S(x))$. The NTA method is designed to assess these flows, divided into public and private parts, taking into account cross-sectional age profiles for each of the parts in the equation (1). The assessment is based on existing administrative, demographic and survey data, including income and household budget surveys. Age profiles are estimated in nominal currency values as well as in relative terms, as a percentage of the labour income of cohorts in the age groups 30-49. Consequently, we can see whether particular cohort's consumption is financed from

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[1] The harmonised NTA dataset for EU countries was developed in the AGENTA project, financed from the 7th Framework Programme (www.agenta-project.eu).

labour income or whether it requires additional transfers (public or private) or financing from savings or other asset reallocations[2].

The NTA profiles for Poland are estimated for 2012. They show that Poles have one of the earliest ages at which labour income is insufficient to cover consumption. The economic dependency level, measuring the aggregate life-cycle deficit of those outside the productive age group, relative to the total labour income in Poland, is relatively high given the current demographic structure of the Polish population. If the current consumption and labour income patterns are maintained, population ageing will lead to a faster decline in labour income, compared to consumption, which would increase the aggregate life cycle deficit, particularly related to the older population.

1. Patterns of income and consumption in Poland: what can we learn from the NTA estimates?

The estimated age profiles of consumption and labour income are the starting point for the analysis. Figure 1 depicts the age profiles of public and private consumption. Public consumption is targeted towards young and old generations. In the case of young generation, the bulk of public consumption is related to the public education, while for the older population we see rising role of public health consumption. Public consumption is dominated by other consumption.

Figure 1. Per capita age profiles of public (left) and private (right) consumption, 2012 in PLN
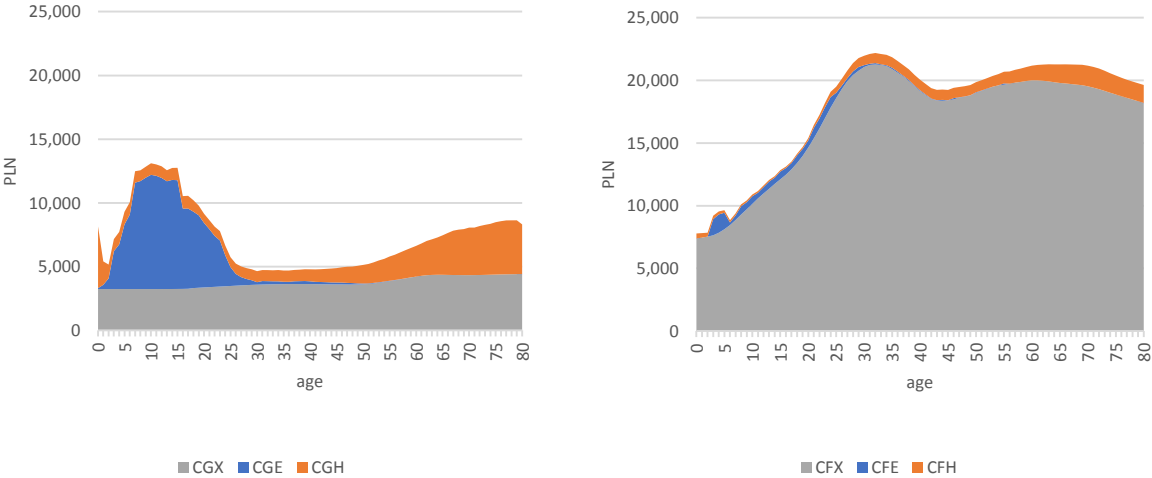
Note: CGH – public consumption on health, CGE – public consumption on education, CGX – other public consumption, CFH – private consumption on health, CFE – private consumption on education, CFX – other private consumption

Source: POLNTA project, SGH

In the case of private consumption, the highest consumption is noted for people in age group between 27 and 38 years of age. The private consumption does not decline much for the older cohorts, which also reflects relatively high level of public transfers related to pensions (as shown later in the paper). This is also confirmed by other indicators. According to the EU-SILC data, the median income of population 65 and over in Poland is close (or in the case of

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[2] A short methodological note on the NTA is presented in the annex.

men even above) the median income of those in age group 0-64 (European Commission 2012). Private consumption on education is highest in the case of children in the pre-school age. This is related to the cost of pre-school education, both in public and private facilities, which are incurred by the Polish households. The health expenditure is increasing for older cohorts, similarly to the public consumption.

Labour income

The per-capita labour income in Poland profile shows a typical shape of the life-course labour income pattern. After the initial rise to reach its peak in prime age, the labour income starts to decline relatively steeply for those in age groups 40 and over. As a result, the income for those around age 60 is around half of those in age 40. This phenomenon can be partially attributed to different skill structure of generations in Poland, with older generation having lower skill level, compared to the younger ones. Another explanation is the availability of early retirement transfers (until 2008), that allowed for earlier retirement of older cohorts.

At older age groups, the income from self-employment represents a larger share of total labour income, which indicates that self-employed tend to retire later, compared to salaried workers.

Figure 2. Per capita age profile of labour income, 2012 in PLN
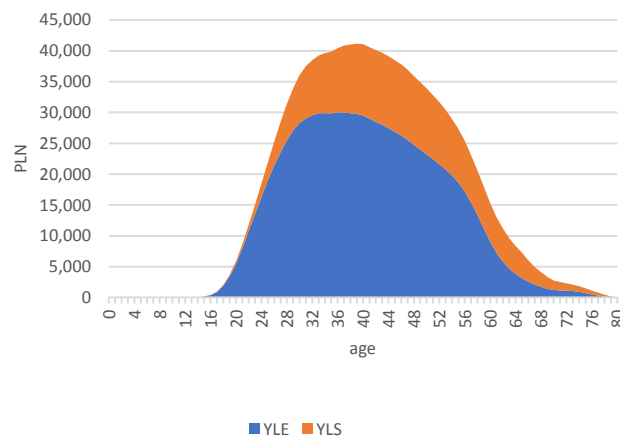

Note: YLS – income from self-employment, YLE – income from salaries

Source: POLNTA project, SGH

The NTA-based consumption and labour income profiles estimated for Poland and presented in Figure 3 indicate that the borders of productive age in Poland are between 26 and 56. These borders are set as the age levels when labour income exceeds consumption. For younger cohorts (up to 26) and older ones (above 56) the deficit between consumption and labour income requires additional financing from public or private transfers or from savings.

*Figure 3. Per capita age profiles of labour income and consumption, 2012*
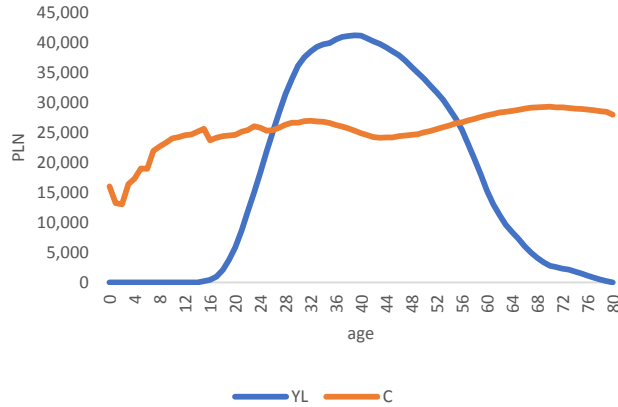
The resulting per capita lifecyle deficit requires financing, which is coming either from private of public transfers as well as (public or private) asset-based reallocations. For example, the consumption of children is financed by their parents, in the form of private transfers. The consumption of pensioners is financed mainly through public pension payments. It can be also financed by consumption of earlier savings (that is private asset-based reallocations). Figure 4 depicts the resulting lifecycle deficit (i.e. difference between consumption and labour income). Figure 5 depicts the sources of its financing. The consumption of children and youth is financed to a large extent from private transfers, while the consumption of the older generations is financed mainly from public transfers, to a lesser extent from asset-based reallocations. Therefore, changes in the age structure of the population will have an impact not only on the aggregate levels of the lifecycle deficit, but also on the share of the deficit that is expected to be financed from public transfers.

Figure 4. Per capita age profiles of lifecycle deficit, 2012 | *Figure 5. Per capita transfers and asset-based reallocations, 2012*
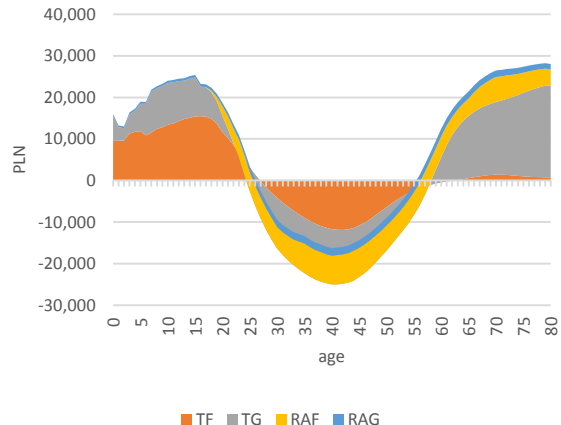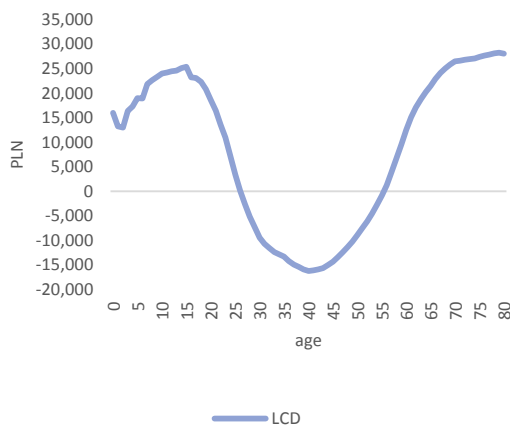
2. Projected changes in the size and age structure of the Polish population and its impact on aggregate consumption and labour income.

The 2013 Eurostat population projection for Poland shows significant shifts in the age structure of the Polish population. In 2012 the total size of the population in Poland was 38.063 million people. By 2030 it is projected to decline to 37.526 million people and by 2050 to 34.842 million people. This sharp decrease will be accompanied with the changes in the age structure, which are related to the ageing of the two baby boom generations born in the post-war period and in the 1980s (Figure 6).

Figure 6. Population by age

a. Population 2012	b. Population 2030	c. Population 2050
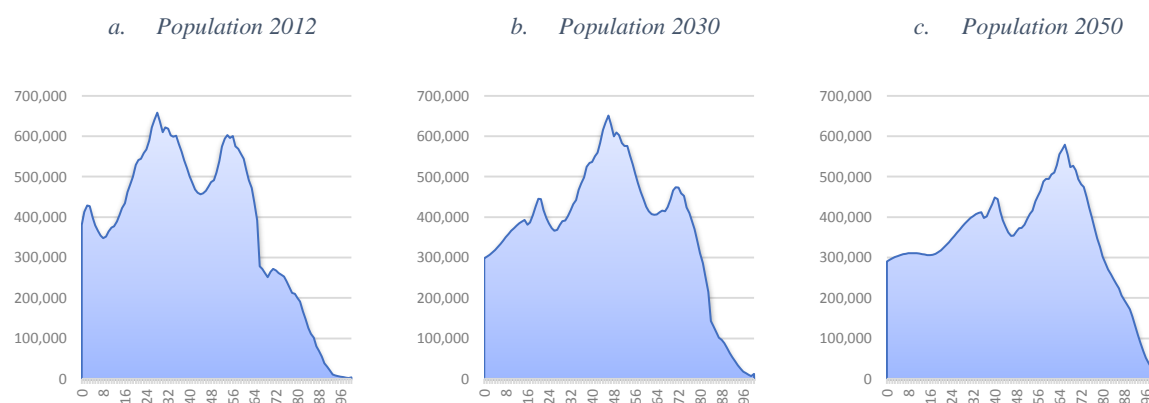
Source: Author's calculations based on the initial estimates in the POLNTA project, SGH, GUS demographic data (2012) and Eurostat population projection (data for 2030 and 2050).

The potential impact of changing age structures on consumption and labour income in Poland

The NTA labour income and consumption profiles allow the aggregate level of consumption and labour income to be estimated, as shown in Figure 6 (panel a). In 2012, the aggregate life cycle deficit for the population below 26 (PLN 207 bn.) was higher than for the population above 56 (PLN 193 bn.).

If we apply constant per capita age profiles to demographic projection, we can estimate the impact of the changing age structure of the population on the level of potential aggregate life cycle deficit in the future, when the ageing process becomes more pronounced. With this assumption, the amount of the aggregate life cycle deficit would drop to 91 per cent of the base 2012 level by 2030, and then increase to 120 per cent in 2050. The share of the lifecyle deficit in the total lifecyle deficit, attributed to the population above economic activity age would increase from 48% in 2012 to 50% in 2030 and 68 in 2050.

While the assumption of constant age profiles is, of course, unrealistic, it allows assessing the impact of changing age structures on aggregate income, consumption and the resulting life cycle deficit. The results of the simulation are shown in Figure 7 (panels b and c). If the current consumption and labour income per capital profiles remain constant, this means that both the aggregate labour income and aggregate consumption will shrinks due to the declining size of the total and working age populations. In 2030, the aggregate labour income would be below 91 per cent of the 2012 level, and in 2050 it would drop further to less than 74 per cent, i.e. by more than a quarter. Aggregate consumption would drop moderately to 98.4 per cent in

2030 (compared to 2012) and 92.4 per cent in 2050. Additionally, the level of the aggregate life cycle deficit for the population over 56 would exceed the aggregate life cycle deficit for the population under 27.

The rising lifecycle deficit means that the current levels of consumption would be impossible to maintain with the current level of labour income. Reducing the aggregate life cycle deficit would require either an increase in labour income or a decrease in consumption levels (or both). One of the potential directions is to shift the per capita labour income by extending working lives and increasing the age limit from which the life cycle deficit becomes positive. Another potential direction is to increase labour productivity and, as a result, per capita and aggregate labour income.

*Figure 7. Aggregate labour income and consumption based on 2012 NTA profiles*
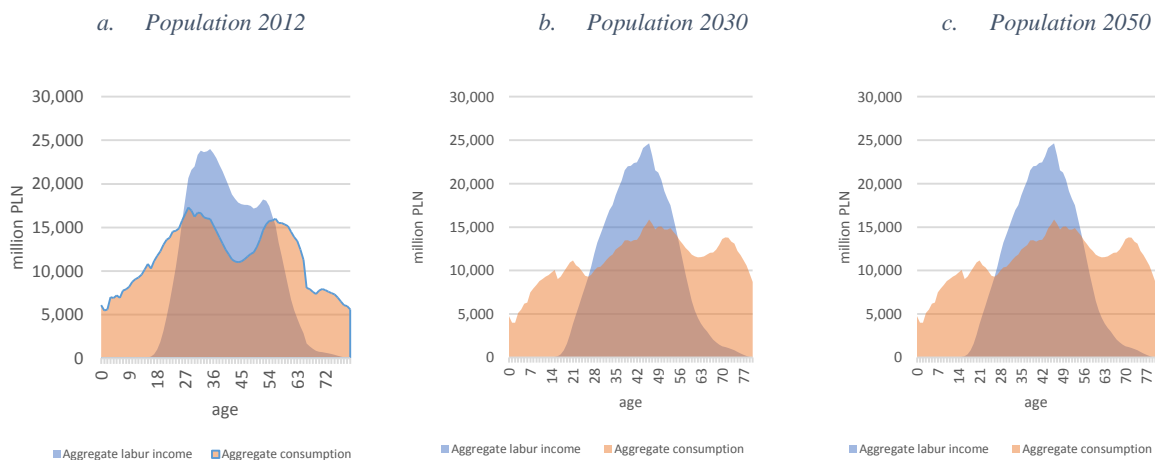
Source: Author's calculations based on the results of the POLNTA project, SGH, GUS demographic data (2012) and Eurostat population projection (data for 2030 and 2050).

The contribution of the population above 56 to the aggregate life cycle deficit will increase with time (Figure 7). This has important implications from the policy perspective as the public transfers needed to cover this deficit are expected to increase. This is because the life cycle deficit of the older population is financed almost fully from public transfers, which include pension cash transfers as well as public consumption, such as health benefits. Furthermore, as the labour income of the population over 60 is declining with each age cohort, the financing of private consumption at older ages comes mainly from public transfers, predominantly pensions, as discussed earlier. On the other hand, the life cycle deficit of the younger population is, to a large extent, financed from private transfers (namely parents financing the consumption of their children). In the future, because less children are being born, the level of the aggregate transfers needed from parents to children will be lower.

Figure 8 presents the estimates of the public transfers per capita by age. The level of per-capita public transfers received by people in the age group of over 60 rises very quickly, as people retire and claim old-age benefits. Again, with the ageing population this would increase the risk of rising public expenditure. However, this risk is mitigated by the pension reform introduced in 1999. The pension reform affects the age profiles of pension transfers received, reducing the amount of transfers received by consecutive generations, which can already be observed (see for example Chłoń-Domińczak, Strzelecki, and Łątkowski 2016).

Figure 8. Per capita age profile of public transfers (cash transfers and public consumption), 2012
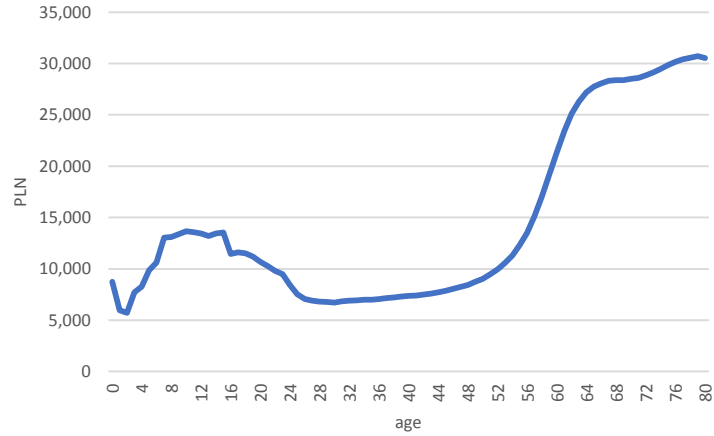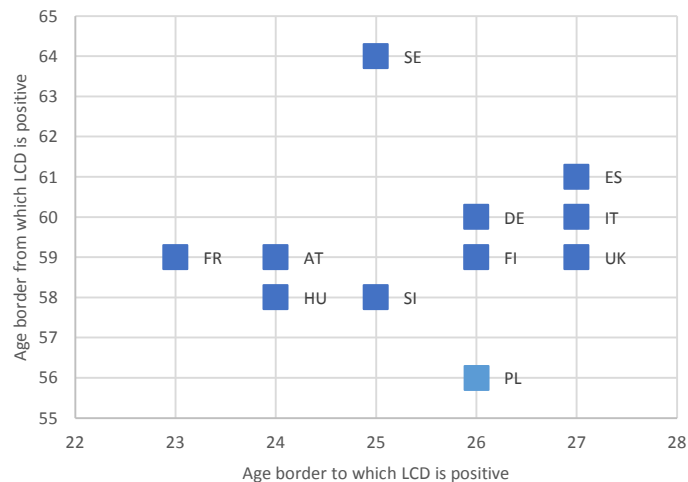
Source: POLNTA project, SGH

3. Economic and demographic dependency in Poland compared to other EU countries

In comparison to other EU countries, the range of productive age groups which exhibit a negative lifecycle deficit is narrow in Poland (i.e. age groups where labour income exceeds consumption) and covers only 29 cohorts and is the narrowest among the EU countries that have estimated NTA profiles. In other countries, this ranges from 31 cohorts (in the UK) to 38 cohorts in Sweden (see Figure 9). Compared to other countries, Poland is characterised by having a relatively late age until which the life cycle deficit is positive, and the earliest age from which it becomes positive again, even comparing to other CEE countries, that is Slovenia or Hungary.

Figure 9. Age borders until and from which the life cycle deficit is positive, selected EU countries (2010/2011) and Poland (2012)

Source: Loichinger et al. (2017) and POLNTA project for Poland

Given the differences in the productive age limits as well as differences in the level of consumption and labour income between countries, the traditional demographic dependency does not reflect the actual level of transfers needed to finance the aggregate life cycle deficit.

The NTA profiles can be used to assess economic dependency that takes into account flexible productive age borders and the level of consumption and labour income age profiles.

The NTA-based measure of economic dependency is proposed by Loichinger et al. 2017. To obtain a measure for the dependency across individual ages in childhood and old age respectively, they calculate the average measure of economic dependency at each age, multiply it by the corresponding population size and then add them up over the age groups where the difference between consumption and labour income is positive (also referred to as positive life cycle deficit).

Based on these values, they calculate two dependency ratios $NtaDR_{young}$ and $NtaDR_{old}$ by relating the total dependency of young and old, i.e. the part of consumption that is not financed from the labour income, to total labour income. This measure reflects both the population structure (as the traditional demographic dependency rate) and the design of the economic life course.

$$NtaDR_{young} = \frac{\sum_{i=0}^{L}(C_i - YL_i)}{\sum_{i=0}^{80+}(YL_i)} \tag{2}$$

$$NtaDR_{old} = \frac{\sum_{i=O}^{80+}(C_i - YL_i)}{\sum_{i=0}^{80+}(YL_i)} \tag{3}$$

where the index L stands for the age when the life cycle deficit at young age is still positive and where index O stands for the lowest old age at which the life cycle deficit turns positive again. By adding up these two values, the total NTA-based dependency is calculated, relating the total positive lifecycle deficit of the two generations to total labour income.

A comparison of the two dependency ratios: demographic[3] and NTA-based economic dependency proposed by (Loichinger et al. 2017) for selected EU countries and for Poland is shown in the Table 1. Poland has an economic dependency level comparable to the level noted in Finland or the UK, which have higher demographic dependency ratios, particularly due to larger relative size of the older part of the population. At the same time, in Sweden a high level of demographic dependency is combined with lower level of economic dependency[4]. Such differences are due to the narrow productive age range that means that the level of economic dependency of younger and older cohorts in Poland is high.

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[3] Relating the ratio of populations in age groups 0-19 and 65 and over to the population at working age, i.e. 20-64.

[4] The NTA method also allows other measures of economic dependency to be assessed, based on the relationship between labour income and asset-based reallocations and consumption, or fiscal dependency that takes into account public transfers that are paid or received (see for example Chłoń-Domińczak, Abramowska-Kmon, et al. 2016; Chłoń-Domińczak, Kotowska, et al. 2016; Lee and Edwards 2002; Loichinger et al. 2017; Prskawetz and Sambt 2014).

Table 1. Demographic dependency ratio (DDR) and NTA dependency ratio (NtaDR) for young age, old age and total population (2012 for Poland and 2010 for all other countries)

Country	Demographic Dependency Ratio			NTA Dependency Ratio		
	Young	Old	Total	Young	Old	Total
Austria	0.33	0.28	0.61	0.20	0.26	0.46
Finland	0.38	0.29	0.67	0.26	0.26	0.52
France	0.42	0.29	0.71	0.26	0.29	0.55
Germany	0.31	0.34	0.65	0.19	0.31	0.50
Hungary	0.33	0.27	0.60	0.24	0.26	0.50
Italy	0.31	0.34	0.65	0.26	0.34	0.60
Slovenia	0.30	0.26	0.56	0.24	0.24	0.48
Spain	0.31	0.27	0.58	0.25	0.21	0.46
Sweden	0.40	0.32	0.72	0.26	0.22	0.48
UK	0.40	0.28	0.68	0.27	0.26	0.53
Poland	0.32	0.22	0.54	0.28	0.26	0.54

Source: Loichinger et al. (2017) and initial estimates in the POLNTA project for Poland

4. Conclusions

The generational economy provides more insight into the economic consequences of population ageing. The changing age structure of the Polish population leads to numerous challenges that can be identified and, more importantly, quantified using the National Transfer Accounts method. Based on the projected demographic change, the potential level of aggregate life cycle deficit, i.e. the gap between aggregate consumption and aggregate labour income, may increase. This is due to the faster decline of the potential aggregate labour income compared to aggregate consumption.

This means that one of the most important policy recommendations for Poland is to introduce policies to increase the aggregate labour income. There are several ways to achieve this goal. Firstly, by prolonging the working life and shifting the per capita age profile to the right. As a result, the age border when the life cycle deficit becomes positive would increase. A comparison with other European countries indicates that there is room for such change. However, the recent decision on the reduction of the retirement age in Poland will have the opposite effect (Chłoń-Domińczak 2016). The second possibility is speeding up transition to the productive age. As already stated, young Poles start their productive lives relatively late. School should start at the age of 6, although unfortunately the age was recently increased again to 7 by the government. Speeding up the school-to-work transition is also important. The third potential policy direction is to increase the level of productivity that would increase the labour income per capita profile. This would require a national skills development strategy, including the promotion of lifelong learning. While in recent years the share of young people with tertiary education in Poland has increased significantly to 43.4% (2015), exceeding the EU average, at the same time, however, the share of the adult population participating in education and training remains, at 3.5% (2015), one of the lowest in the EU. Some improvements could be also sought by reducing the skills mismatch on the labour market. However, according to the assessment of Mcgowan and Andrews 2015, this could contribute to an increase of around 2% in productivity gains. Productivity increases can be also achieved by introducing technological changes.

Population ageing also represents a challenge when it comes to financing the increasing life cycle deficit of the population in the post-productive age group. This deficit in Poland is currently financed almost exclusively from public transfers, as the level of pension savings remains at a very low level. As discussed earlier, the implementation of the pension reform will lead to gradual improvements in the balance in the old-age pension system. It is important to monitor the level of other public transfers to the elderly, including public health care consumption, which is rising quickly in this age group. In particular, greater focus on health prevention to support longer and healthier lives, can be seen as an important contribution to maintaining this expenditure at a sustainable level in the context of population ageing.

In more general terms, it is important to monitor the generational dependency, focusing not only on the demographic age structure, but also economic flows. Using these measures to assess the implications of population ageing across the EU could complement the existing practices included in the Ageing Reports (European Commission DG ECFIN 2015 and earlier). This would provide an opportunity for the policy makers to gain more insight into policy challenges in the context of the national developments that shape the labour income, consumption and public transfers.

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