Evolution of the generational distribution of income, consumption, and the lifecycle deficit in Poland between 2004 and 2016: facing the EU convergence and demographic challenges ❖

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Abstract

The National Transfer Accounts approach is used to assess the lifecycle deficit in Poland between the EU accession in 2004 and 2016. In this period, overall consumption remained relatively stable relative to wages, while labour income increased, mainly due to increased economic activity at higher ages. There is a shift in the generational distribution of consumption and public transfers towards the older age groups. While the per capita age profiles in Poland converge to the average levels observed in Europe, a gap remains, particularly in public transfers, including in public consumption of health. As the population continues to age, it may be expected that this gap will close as the expectations of the senior generations rise.

Key words
National accounts, national transfer accounts, population ageing, generational accounting

JEL codes:
J11, J14, J18

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Introduction

Population ageing in developed countries has led to concerns being raised about whether intergenerational stability can be maintained. These concerns are primarily related to the need to finance the increasing aggregate consumption of the more numerous senior generations who mainly rely on public transfers, such as pensions or public health care. Economists have focused on the importance of measuring and projecting the balance of intergenerational transfers, and have developed various conceptual and analytical proposals for assessing the generational economy. One of the first approaches used to measure the net wealth of current and future generations was presented by (Auerbach, Gokhale, & Kotlikoff, 1991), who proposed a methodology for measuring the net present value of payments of existing and future generations to governments. They concluded that unless policies are altered, future generations will face a net tax burden that will be one-fifth larger than that faced by the generation born in 1990. (Diamond, 1996, p. 597) argued that the development of generational accounts has three strands: (i) normative considerations of government activity, (ii) the use of generational accounting in a positive theory of human behaviour, and (iii) the presentation of a generational balance as a both normative criterion and a useful target for a political economy. In addition to these three strands of deliberation defined by Diamond, another important contribution to the generational economy is the National Transfer Accounts (NTA) approach (Lee & Mason, 2011), which provide a comprehensive accounting not only for public, but for private resource reallocation. The NTA paint a more complex picture of government activities that is extended by activities at the household level, and that includes the role of intra-household transfers in financing the consumption of the younger and the older generations. This area of research is developing dynamically, both because the number of countries covered worldwide and the scope of the analytical approach are expanding; and because it takes into account not just generational differences, but other factors as well, including the gender and the socioeconomic status of households (Lee & Mason, 2019).

The application of the NTA approach in the historical context provides a better understanding of the development of government activities, as measured by public transfer flows addressed to different generations, as well as interactions between public policies and cross-generational transfers at the household level. In the European context, such studies have been performed for France and Sweden (d'Albis et al., 2015; Lindh, Oeberg, & Sanchez-Romero, 2011). Moreover, the NTA quantify the lifecycle deficit; i.e., the part of consumption of two population groups (young and old) that is not financed by labour income. Thus, the approach makes it possible to compare the allocation of public and private resources to finance the lifecycle deficit over the life course at the beginning and at the end of the life course.

This article contributes to the generational economy by providing an assessment of the development of the lifecycle deficit in Poland, a country that is undergoing very dynamic social, economic and demographic changes. Using the historical NTA age profiles, we focus on the period from 2004 to 2016; i.e., from after the country's accession to the European Union until recent years. During this period, Poland experienced rapid economic growth and social progress: the real GDP increased by 56.1%, the employment rate for people aged 20-64 increased from 57% to 69.3%, the unemployment rate declined from 19% to 6.1%, and the real average wage increased by 53.9%. Between 2005 and 2016, the at-risk of poverty rate in Poland declined from 20.5% to 17.3% (compared to an increase over this period from 16% to 17.3% in the EU). Even during the 2008 crisis, the economy in Poland performed quite well, as unlike in other EU member states, the economic growth rate remained positive. However, over the same period, the age composition of the population changed: i.e., the labour force shrank and

the population continued to age. Thus, it appears that in the future, maintaining a generational balance in Poland will become increasingly difficult.

These economic, social, and demographic changes also have an impact on the generational distribution of income and consumption, and as well as on the intergenerational balance. In this article, we will reflect on the following four research questions using the NTA estimates for Poland:

- How did the economic, social, and demographic changes that occurred between 2004 and 2016 affect the aggregate labour income and consumption, and the resulting lifecycle deficit? Which components of consumption increased more quickly than others? Are these changes affected by the ageing of the population?
- How was the generational distribution of the lifecycle deficit and consumption affected by economic, social, and demographic changes?
- Are the evolving NTA age profiles in Poland becoming more similar to those observed in Europe and in selected European countries in 2010[1]?
- Do the observed changes in consumption, labour income, and the lifecycle deficit indicate that economic dependency will be sustainable in the future as the population continues to age?

The article is structured as follows. First, we describe the methodology and the data used for the estimation of the NTA age profiles in Poland. We then provide a brief description of major demographic trends. In the following section, we analyse the changes in the main NTA aggregates between 2004 and 2016, including the impact of demographic and per capita age profile changes on the overall changes in these aggregates. Next, we present the demographic developments over this period. In the following section, we focus on the evolution of aggregate and per capita age profiles of consumption and labour income, and the resulting lifecycle deficit. This analysis also takes into account the changes in the distribution of resources between generations. We compare the results for Poland with those for selected countries in Europe that represent different welfare regimes, as well as with the EU average, using the harmonised NTA profiles for European countries for 2010 that were assessed and calculated in the EU-funded AGENTA project (Istenič, Hammer, Šeme, Lotrič Dolinar, & Sambt, 2016). The selected countries represent both different welfare regimes based on the typology proposed by (Esping-Andersen, 1990) and two different country groups that have been classified according to the generational focus of public policies by (Chłoń-Domińczak, Abramowska-Kmon, Kotowska, Łątkowski, & Strzelecki, 2019). In the latter classification, three groups of countries were identified. (i) *European* is a cluster of 14 countries in which the age profiles of public transfers are close to the EU average. This cluster is comprised of both liberal and continental welfare regimes that seem to exhibit similar age patterns for public transfers, including for levels of public consumption (including Poland, Germany, and Spain). (ii) The *underdeveloped cluster* is a cluster of countries characterised by below-average transfers by age that includes five new member states.[2] (iii) *Scandinavian* is a cluster of countries characterised by above-average public transfer and consumption levels by age (including Sweden). Drawing on this classification, we have selected the following countries for comparisons: Germany (continental regime and European cluster), Spain (Mediterranean regime and European cluster), and Sweden (social democratic Scandinavian regime and Scandinavian cluster). The outcomes of the analysis are summarised in the conclusions.

[1] For comparison, we use NTA profiles estimated in the FP 7-funded AGENTA project estimated for 2010.
[2] Bulgaria, Estonia, Latvia, Romania, and Slovenia

Estimates of the NTA profiles in Poland

The NTA profiles in Poland were estimated following the common methodology, which is presented in the NTA manual (United Nations Department of Economic and Social Affairs Population Division, 2013). We used three main types of data sources:

- survey data (EU-SILC and Household Budget Survey – HBS) were used to estimate age profiles of private consumption and labour income;
- public sources, including data from the National Health Fund, were used to estimate public consumption of health and education, and public statistics were used to assess public consumption of education; and, finally,
- the national accounts were used to calculate aggregates aimed at adjusting the survey data-derived age profiles to match the total flows in the economy.

The main source of data on private consumption was the Household Budget Survey (HBS). The HBS in Poland is conducted annually on a sample of 37,500 households. From 1992 onwards, the survey is based on a monthly rotation; i.e., each month, the survey covers over 3100 households. The methodology of the HBS is comparable annually, which ensures the comparability of the obtained estimates (Statistics Poland, 2018). The age profiles of the private consumption components have been estimated using different analytical methods.

The private education consumption profile has been obtained using the regression method, following the recommendations from the NTA manual (UN 2013, p. 98). It is calculated from age zero until age 54 (we also include expenditures on lifelong learning). The education expenditures for each household member is allocated according to the obtained regression coefficients. The private health consumption for all ages is assessed using an iterative approach, which is an alternative to using a regression method (UN 2013, p. 100). Other private consumption by age is calculated according to a piecewise linear profile, with weights for private consumption ranging from 0.4 for children aged four and younger and increasing linearly to one for adults aged 20 and older.

Public education consumption profiles are calculated for each year. They are based on the data on education expenditures for each level of education drawn from the state and local government budget reports, which are combined with information on enrolment at different stages of education by age from Eurostat. Public health consumption is assessed based on data from the National Health Fund. Data on other forms of public consumption (i.e., defence, police, justice) are obtained from national accounts, and are distributed equally over the population according to the NTA methodology.

Finally, the EU-SILC data on individual income are used to estimate the age profiles of labour income, including the income of self-employed individuals.

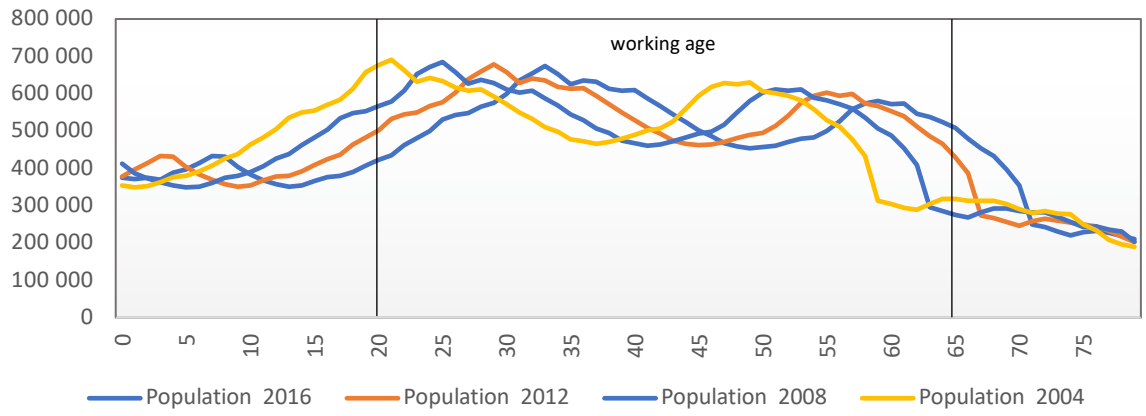
The obtained profiles are smoothed across ages using the Friedman (1984) method, in line with the approach proposed in the NTA manual. However, public consumption of education remains unsmoothed to allow us to capture differences resulting from different levels of expenditure at different educational stages. At the end of the estimation procedure, all age profiles are adjusted using the relevant aggregate from the national accounts.

Demographic developments

Before we analyse how the National Transfer Account aggregates and age profiles are changing over time, it may prove helpful to discuss the demographic developments in Poland between 2004 and 2016. The Polish population is characterised by two large baby boom generations: one composed of cohorts born after the Second World War, and the second composed of cohorts born at the end of 1970s and the beginning of the 1980s. Since 1989, fertility has been below replacement level, reaching its lowest point in 1998 (TFR below 1.5). As a result of these fertility trends, the youngest generations (below age 20) are gradually declining in size, while the two baby boom generations are growing older. Thus, the age structure of the population has been changing over time. Between 2004 and 2016, the population under age 20 declined by 1.7 million, while the population above age 65 increased by 1.3 million. The working-age population (aged 20-64) was increasing until 2011, and then started to decline (Figure 1, Table 1). Consequently, the young-age dependency ratio declined from 39 to 31 people under age 20 per 100 people aged 20-64 years, while the old-age dependency ratio increased from 21 to 26 people aged 65+ per 100 people aged 20-64 years.

These baby boom cohorts shaped the age composition of the population, and affected the aggregate age profiles of labour income, consumption, and the lifecycle deficit; as we discuss in the following sections.

Figure 1. Age profile of the population in Poland, 2004-2016



Note: People aged 80+ are not shown for the sake of the clarity of the picture.
Source: EUROSTAT [extracted on 15.12.2019]

Table 1. The size of the broad age groups and demographic dependency ratios

	2004	2008	2012	2016
Number of people				
0-19	9 357 711	8 449 733	8 015 276	7 693 130
20-64	23 797 851	24 539 856	25 030 310	24 436 457
65+	5 018 273	5 146 287	5 487 713	6 303 405
Per 100 people aged 20-64				
Young DR (0-19)	39	↓34	↓32	↓31
Old-Age DR (65+)	21	21	↑22	↑26
Total DR	60	↓55	↓54	↑57

Source: EUROSTAT [extracted on 15.12.2019]

The evolution of aggregate consumption, labour income, and the lifecycle deficit in Poland between 2004 and 2016

In the following, we analyse the development of the aggregate and the per capita age profiles. We begin by assessing the changes in the main NTA aggregates: the lifecycle deficit, consumption, and labour income and transfers (most importantly public transfers). Next, we assess to what extent these aggregates changed due to shifts in the population age structure, and to the per capita age profiles measured in real terms.

Change in the main NTA aggregates

The main focus of the NTA approach is to identify the lifecycle deficit (LCD) and the sources of its financing. This is done using the basic equation that relates to the main national accounts' aggregates. Specifically, we assume that at each stage of the lifecycle, generations display different patterns of consumption and labour income that result in a lifecycle deficit. This can be denoted as:

$LCD(x) = C(x) - Y^l(x) = \tau^+(x) - \tau^-(x) + Y^A(x) - S(x)$, where: (1)

$LCD(x)$ – lifecycle deficit
$C(x)$ – 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 a 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, while taking into account cross-sectional age profiles for each of the variables in the equation (1).

As we highlighted in the introduction, Poland experienced very strong economic growth after its EU accession in 2004. This growth also translated into growth in real aggregate consumption (by 44.9%) and in real aggregate labour income (by 52.38%). Because labour income grew more quickly than consumption, the real aggregate lifecycle deficit increase was much smaller, and amounted to 21.14%. At the same time, the aggregate data show that the overall growth in consumption is an outcome of the different dynamics that characterise its components. Specifically, it is clear that public consumption grew faster than private consumption due to large increases in public consumption of health (by 75.43%), while aggregate public consumption of education grew at a much slower pace. Moreover, private consumption of health increased more than public consumption of health; in 2016, it was 88.5% higher than it was in 2004. As a result, the ratio of private to public consumption increased from 0.58 to 0.62. Last but not least, private consumption of education increased slightly between 2008 and 2012, and then declined to the 2004 level in real terms (Table 2).

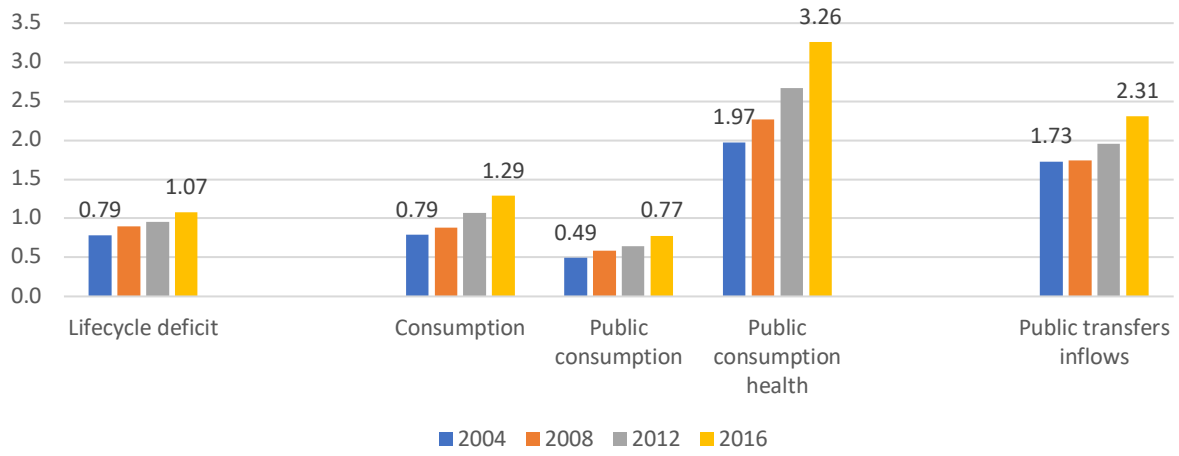
Table 2. Real value of the main NTA aggregates between 2004 and 2016, measured according to real PLN of 2016

	million PLN real value from 2016				2004=100		
	2004	2008	2012	2016	2008	2012	2016
Lifecycle Deficit	**49 682**	**51 393**	**65 157**	**60 186**	**103.4**	**131.1**	**121.1**
Consumption	**208 240**	**249 064**	**269 316**	**301 798**	**119.6**	**129.3**	**144.9**
Public Consumption	53 683	68 370	70 755	83 068	127.4	131.8	154.7
Public Consumption, Education	13 159	15 720	18 132	19 275	119.5	137.8	146.5
Public Consumption, Health	11 150	14 904	16 347	19 560	133.7	146.6	175.4
Public Consumption, Other	29 374	37 746	36 276	44 233	128.5	123.5	150.6
Private Consumption	154 557	180 693	198 561	218 730	116.9	128.5	141.5
Private Consumption, Education	2 112	2 122	2 295	2 140	100.4	108.6	101.3
Private Consumption, Health	6 476	7 105	9 116	12 208	109.7	140.8	188.5
Private Consumption, Other	145 968	171 467	187 150	204 381	117.5	128.2	140.0
Public Transfers, Inflows	100 499	122 599	133 460	155 169	122.0	132.8	154.4
Public Transfers, Outflows	101 787	125 380	136 344	158 648	123.2	134.0	155.9
Labour Income	**158 559**	**197 671**	**204 159**	**241 612**	**124.7**	**128.8**	**152.4**

Source: Own calculations

The increases in consumption and in the lifecycle deficit are not equally distributed across the three generations (aged 0-26, 27–57, 57+), defined according to the NTA limits of economically active ages; i.e., the ages at which the LCD turns negative (27 years and 57 years). To demonstrate these changes, the ratios of the main NTA aggregates for people aged 57 and older (senior generations) to people under age 27 (younger generations) are derived (Figure 2).

Figure 2. Ratios of the aggregate consumption and the aggregate lifecycle deficit of the senior generations (aged 57 and older) compared to those of the younger generations (under age 27)



Source: Own calculations

A comparison of the ratios of the lifecycle deficit (LCD), consumption, and public transfers attributed to the younger generations and the senior generations shows a clear change in the generational pattern. There was a steady shift towards higher consumption and a lifecycle deficit for the senior generations in relation to the younger generations. At the same time, the share of public transfers received by senior generations also increased.

In 2016, the aggregate LCD of the senior generations was higher than that of the younger generations (by seven points); while in earlier years, the younger generations had a higher aggregate lifecycle deficit than the senior generations (by 21 points). The generational change in aggregate consumption was even more pronounced. In 2016, the aggregate consumption of the senior generations was 30 points higher than that of the younger generations; while in 2004, the aggregate consumption of the younger generations was 21 points higher than that of the senior generations. There was also a significant generational shift in public consumption and in public transfers. The public consumption of health among the senior generations increased from almost two times to more than three times that among the younger generations between 2004 and 2016. The senior generations received 2.3 times more public transfers than the younger generations in 2016, up from 1.73 times more in 2004.

These results clearly confirm that as the population ages, the aggregate consumption and the lifecycle deficit of the senior generations are increasing relative to those of the younger generations, and that this trend is accompanied by increases in public transfers that are mainly used to finance the consumption of this population group.

For comparative purposes, normalised age profiles are used. According to the NTA manual (Population Division. Department of Economic and Social Affairs. United Nations, 2013), the normalisation factor is the labour income of the prime age group (30-49-year-olds). As Table 3 shows, between 2004 and 2016, the real income used for normalisation increased by 38.4% in per capita terms and by 49.7% in aggregate terms. Both of these increases were below the level of real GDP growth between 2004 and 2016 (56.1%).

Table 3. Average labour income (ages 30-49) in real value for 2016

	2004	2008	2012	2016	*Index 2016/2004*
per capita (in PLN)	35 726	43 426	42 433	49 458	*138.4*
aggregate (in million PLN)	4 769	5 700	5 827	7 140	*149.7*

Source: Own calculations

The normalised data also allows for international comparisons. However, when comparing national normalised data, it is important to take into account the nominal differences between countries. The average labour incomes of individuals aged 30-49 differ significantly between countries, as shown in Table 4.

Table 4. Average labour income (ages 30-49) in EUR in Poland and selected countries

Country	**Average nominal income in EUR**
Poland (2016)	11 337
Germany (2010)	32 979
Spain (2010)	24 255
Sweden (2010)	40 525

Source: Own calculations for Poland, (Istenič et al., 2016)

As we can see, the ratio of labour income used for the normalisation between the country with the highest nominal income (Sweden) and the lowest nominal income (Poland) exceeds 3.5. This finding also has implications for comparisons. For example, the share of labour income

required to finance consumption needs is much lower in Sweden than in Poland. This also means that the Swedish population can devote higher shares of their income to savings, which, in turn, affects the ability of the Swedish population to finance the consumption of the senior generations from asset-based reallocations.

Impacts of the age structure and the per capita age profiles on the NTA aggregates

In order to identify the impact of changes in the age structure and the per capita age profiles on the dynamics of the NTA aggregates, the observed growth in the NTA aggregates is decomposed into: (i) the change in the population age structure; (ii) the impact of the per capita age profile; and (iii) the impact of the per capita normalised age profile, that is, deducting the impact of the wage growth of people aged 30-49 (Table 5).[3]

If only the age composition changed, the lifecycle deficit would increase by 5.2%, while the total aggregate consumption and labour income would decline by 1.7% and 3.5%, respectively. Interestingly, only education consumption would increase, following the increase in the number of school-age children resulting from the temporary increase in births in 2004-2009. The public transfers (both inflows and outflows) would also decline.

Table 5. Indices of changes in the NTA aggregates between 2004 and 2016 and their decomposition into demography and per capita age profile impacts (according to real PLN of 2016)

	Total change (2004=100)	The isolated effect of change in		
		population age structure	per capita age profile	per capita age profile normalised
		(i)	(ii)	(iii)
Lifecycle Deficit	**121.1**	**105.2**	**115.2**	**76.9**
Consumption	**144.9**	**98.3**	**147.5**	**98.5**
Public Consumption	154.7	102.9	150.5	100.5
Public Consumption, Education	*146.5*	*128.4*	*114.1*	*76.2*
Public Consumption, Health	*175.4*	*89.4*	*196.2*	*131.1*
Public Consumption, Other	*150.6*	*97.7*	*154.2*	*102.9*
Private Consumption	141.5	96.5	146.6	97.9
Private Consumption, Education	*101.3*	*124.4*	*81.4*	*54.4*
Private Consumption, Health	*188.5*	*89.9*	*209.7*	*140.1*
Private Consumption, Other	*140.0*	*96.6*	*144.9*	*96.8*
Public Transfers, Inflows	154.4	92.9	166.3	111.0
Public Transfers, Outflows	155.9	94.9	164.2	109.7
Labour Income	**152.4**	**96.6**	**157.8**	**105.4**

Note: The multiplication of (i) and (ii) provides with the total change.
Source: Own calculations

The decomposition shows that the per capita age profiles in real terms (column (ii) in Table 5) had a larger impact than the age structure changes on the growth in the analysed aggregate values. In particular, the development of per capita age profiles led to marked increases in consumption and labour income, but to a smaller increase in the lifecycle deficit. The largest increases caused by the evolution of the per capita age profiles were due to the changes in both public and private health consumption, which doubled. At the same time, the public

[3] According to the NTA manual (UN 2013), the normalisation used for the age profiles is the labour income of people in the 30-49 age group.

consumption of education grew to a lesser extent, which indicates that the overall growth in the economy and wages did not translate into public investments in human capital development. The private consumption of education declined, which may reflect policy changes. For example, under a new policy, children in primary and lower secondary schools were provided textbooks by schools, which meant that parents no longer needed to buy them. It is also worth noting that the growth in public transfers (both inflows and outflows) was greater than the growth in labour income. This indicates that a fiscal expansion occurred, which would have led to larger public transfers. These issues are discussed later in the article.

The impact of the per capita age profiles is even more visible when we investigate changes in the NTA aggregates using normalised values (the column (iii) in Table 5). The normalised age profiles allow us to estimate the effect of the change in the age profile, rather than its shape combined with the growth in wages. Using normalised age profiles, we find that the lifecycle deficit declined, following a slight decrease in aggregate consumption and an increase in labour income. Even when we exclude the impact of the wage growth, we see that the consumption of both public and private health increased, by 31 and 40 p.p., respectively; and that the consumption of both public and private education decreased, by 24 and 46 p.p., respectively. The public transfer inflows and outflows increased faster than wages.

The evolution of the normalised NTA age profiles in Poland compared to those in selected EU countries

In this section, our focus is on the evolution of the per capita and the aggregate age profiles of consumption, public transfers, labour income, and the lifecycle deficit in Poland. First, we analyse the evolution of the age profiles for Poland between 2004 and 2016, referring to normalised values per capita and aggregate age profiles. The age profiles evolve due to changes in both the per capita profiles and the numbers of people in different age cohorts. Second, we compare the 2016 per capita age profiles in Poland to those in selected EU countries representing different welfare regimes (Germany, Spain, Sweden). The age profiles are designed for three broad age groups: 0-19 years (younger generations), 20-64 years (working-age generations), 65 years and older (senior generations). Unlike in the previous section, here we use the traditional borders of the economically active age range to derive some age-specific and cross-country comparable indicators. For comparison purposes, we use the normalised NTA age profiles developed within the AGENTA project (Istenič et al., 2016). As the reference year for the EU estimates is 2010, the 2016 age profiles in Poland are compared to the age profiles observed six years previously in other EU countries. However, as we use normalised age profiles, our approach still allows us to identify relative differences stemming from different socio-economic developments and welfare regime characteristics.

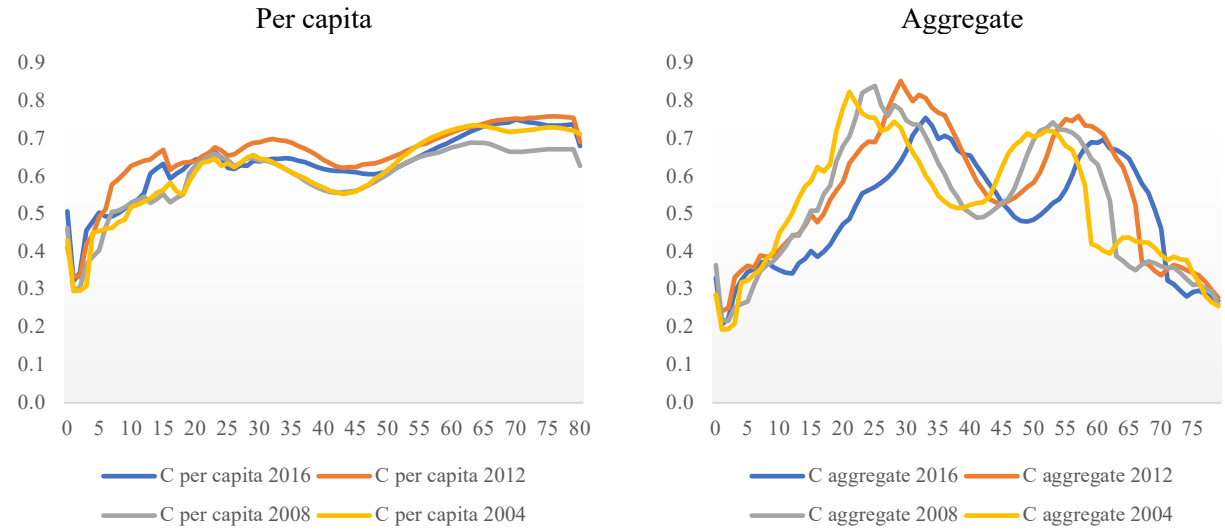
Consumption

Like most other developed countries, Poland has a per capita consumption age profile that shows some consumption increases for older age groups. There are, however, some changes in the per capita consumption over time. While the 2004 and 2008 profiles were similar for most of the age groups, the consumption for people aged 50 and older was a little lower relative to the labour income of 30-49 year-olds. In 2012, the normalised age profile shifted upwards, which means that relative consumption increased in the wake of the recovery from the slowdown of 2008. In 2016, there was a decline in consumption for the younger generations (particularly those aged 0-15) and for the working-age generations (aged 30-40, but also aged 50-64). Among the younger generations, the consumption decline was related to the slower

growth in public consumption of education, which was discussed in the previous section (Figure 3, the left panel).

When we look at the aggregate consumption, we see a visible shift in consumption peaks related to the two baby boom generations (Figure 3, the right panel). Between 2012 and 2016, aggregate consumption declined for ages 10 and 35, as well as for ages 44 and 60. People aged 60-73 in 2016 consumed a larger share of total consumption than the cohorts aged 60-73 in 2012, despite having similar per capita consumption levels. Between 2012 and 2016, aggregate consumption declined visibly for people aged 10-35, even though their per capita consumption was similar to that of people aged 15-25. Thus, it is clear that the size of the age group matters.

Figure 3. Normalised age profiles of consumption in Poland, 2004-2016



Source: Own calculations

The evolution of the per capita age profiles between 2004 and 2016 shows that the age profiles in 2004 and 2008 differed considerably from the age profiles in 2012 and 2016. In 2004 and 2008, per capita consumption across all ages in Poland was below the EU average in 2010; but in 2012, it was above this level, except among the younger generations; and in 2016, it was again lower, except among the senior generations. The increases were unequally distributed across generations. The highest normalised per capita consumption growth is observed for the younger generations. Consumption among the senior generations also increased, exceeding the EU average in 2012 and 2016. The smallest increase is noted for the working-age generations.

The normalised per capita consumption by the three generations in Poland differed slightly from the patterns found in the other EU countries (Table 6). Consumption among the younger generations was below the average EU level but was higher than the normalised levels in Germany or Sweden. This difference is explained by the higher nominal labour income of people aged 30-49 used for normalisation. Consumption among the senior generations (aged 65 and older) in Poland in 2012 and 2016 was higher than the EU average but was similar to the levels observed in Germany.

Table 6. Normalised per capita consumption by broad age groups, Poland vs. selected EU countries

Age group	Poland				EU 25	DE	ES	SE	Poland (EU 25 average 2010 = 100)			
	2004	2008	2012	2016	2010	2010	2010	2010	2004	2008	2012	2016
Consumption (C) per capita												
all	49.87	48.51	53.36	51.32	52.66	48.74	52.87	46.16	94.7	92.1	101.3	97.4
0-19	9.65	9.70	11.13	10.56	11.17	9.35	11.34	9.51	86.4	86.8	99.7	94.6
20-64	28.63	28.10	30.23	28.98	29.89	27.46	30.22	26.14	95.8	94.0	101.1	96.9
65+	11.59	10.72	11.99	11.78	11.61	11.93	11.31	10.51	99.9	92.3	103.3	101.5
0-19/65+	*0.83*	*↑0.90*	*↑0.93*	*↓0.90*	*0.96*	*0.78*	*1.00*	*0.90*	*86.5*	*94.0*	*96.5*	*93.2*

Source: Own calculations

Overall, we see that the ratio of per capita consumption between the younger and the older generations in Poland in 2016 was lower than the EU average, which means that the younger people were consuming (relatively) less. However, there were differences in these patterns between Poland and the countries representing other welfare regimes. While the generational ratio in Poland was similar to that in Sweden, it was higher than that in Germany (which was related to the lower consumption among the younger generations in Germany). On the other hand, in Spain, the generational ratio was higher, as the younger generations were consuming more in relative terms than they were in other countries.

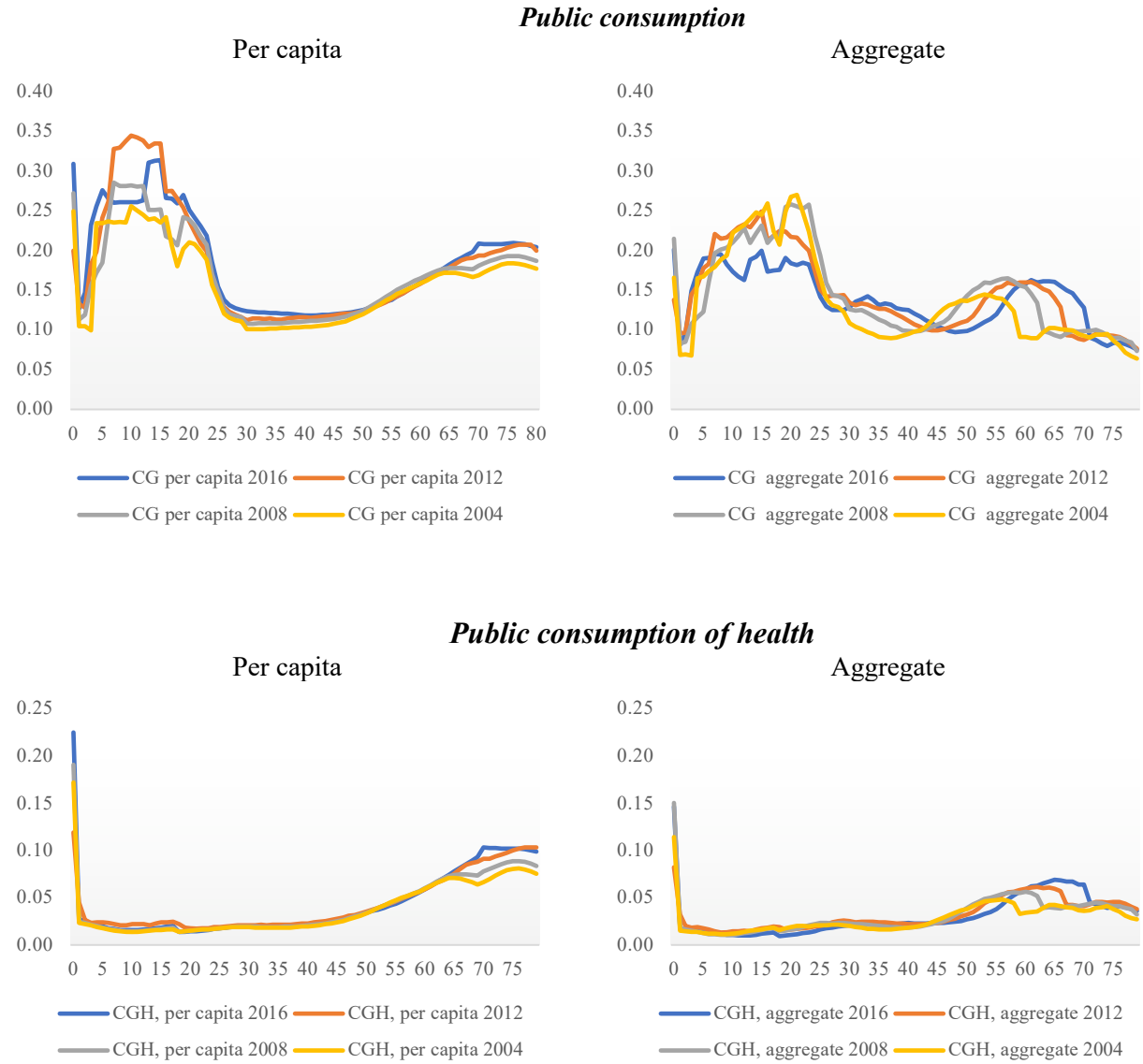
Public consumption

As we discussed above, public consumption increased more than total consumption. Additionally, public consumption was more likely to change due to intergenerational shifts. Therefore, we take a closer look at this component of the overall consumption. As Figure 4 (the upper panel) shows, the public consumption per capita age profiles in Poland changed for both the younger and the senior generations. There was some volatility in public consumption between ages six and 19, which reflects developments related to public education consumption. Between 2004 and 2012, per capita spending on education increased.

The highest levels of growth were between 2008 and 2012, mainly for the 6-15 age group; i.e., for children enrolled in education at the primary and lower secondary levels. In 2016, public consumption fell for this age group, and it declined more for those aged 6-12 than for others. This shows a shift towards lower relative per capita spending on primary education. This may be because the population of children of primary school ages was increasing, while levels of public education spending remained relatively steady.

Another visible development is the increase in per capita public consumption for people aged 65 and older in subsequent estimates, which is likely related to the increased consumption of public health (Figure 4, the lower panel).

Figure 4. Normalised age profiles of public consumption in Poland, 2004-2016



Source: Own calculations

The evolution of the per capita profiles for selected age groups is presented in Table 7. Between 2004 and 2016, total public consumption increased for all age groups. The growth in public consumption was higher among the younger generations in 2008 and 2012 (compared to in 2004) than it was among the senior generations. As a result, the ratio of public consumption among the younger generations relative to that among the senior generations increased.

However, when we compare these values to the EU average, we clearly see that despite these increases, public consumption was below the average for all age groups in Poland. The largest gap was among the senior generations, while public consumption among the younger generations was the closest to the EU average. Total per capita normalised public consumption in Poland was similar to the level observed in Germany but was lower than the levels found in Spain and in Sweden. It is also worth noting that the generational ratio of public consumption was more favourable for the younger generations in Poland that it was in the EU 25 and in all of the selected countries.

The gap in public consumption between Poland and the EU average was larger for health consumption. For the working-age generations, the public consumption of health was only slightly higher than two-thirds of the EU average, and was even lower than it was in Sweden or in Germany. The comparison is more favourable for the younger and the older generations, as between 2004 and 2016, the ratio of the values for Poland to the EU average in 2010 increased by 15.2 p.p. for the younger generations, and by 19.8 p.p. for the senior generations. As a result, the generational ratio of the public consumption of health, like that of the total public consumption, was more favourable for the younger generations in Poland compared to the European average and to Germany and Spain, but was smaller than it was in Sweden. Between 2004 and 2016, following the increase in the public consumption of health among the senior generations, the generational ratio in per capita consumption shifted towards the older generations.

Table 7. Normalised per capita public consumption by the broad age groups, Poland vs. selected EU countries

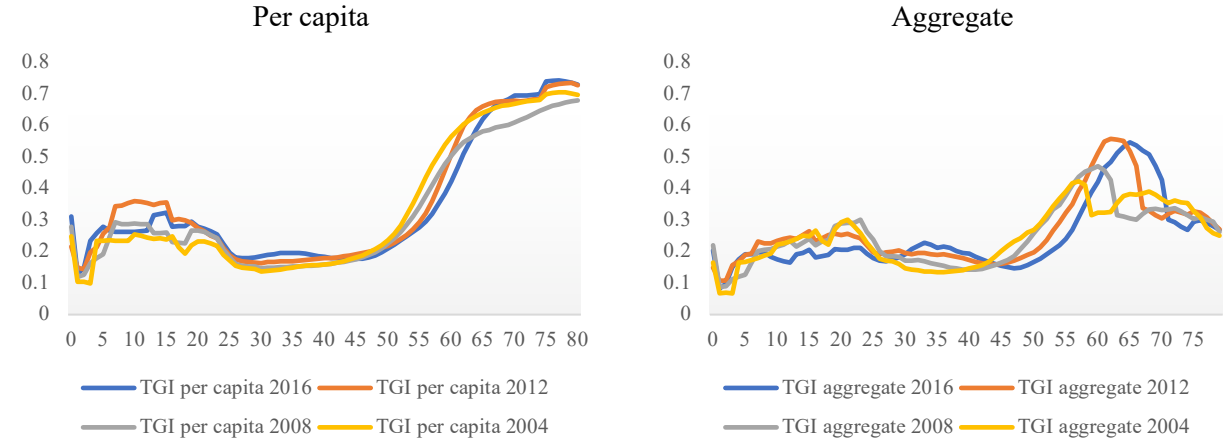
Age group	Poland				EU 25	DE	ES	SE	Poland (EU 25 average 2010 = 100)			
	2004	2008	2012	2016	2010	2010	2010	2010	2004	2008	2012	2016
Public consumption (CG) per capita												
all	12.96	13.77	14.78	14.86	16.84	14.65	16.71	19.44	77.0	81.8	87.7	88.2
0-19	4.27	4.58	5.43	5.18	5.67	4.56	5.59	5.55	75.3	80.9	95.8	91.3
20-64	5.87	6.22	6.20	6.45	7.40	6.47	7.39	9.13	79.4	84.1	83.8	87.1
65+	2.82	2.97	3.14	3.24	3.77	3.61	3.73	4.76	74.7	78.6	83.3	85.8
0-19/65+	*1.51*	*↑1.54*	*↑1.73*	*↓1.60*	*1.50*	*1.26*	*1.50*	*1.17*	*100.7*	*102.9*	*115.0*	*106.4*
Public consumption of health (CGH) per capita												
all	3.0	3.2	3.5	3.5	4.5	4.8	4.8	5.0	67.3	71.5	77.9	78.0
0-19	3.05	3.24	3.53	3.54	4.53	4.79	4.81	4.96	81.1	87.1	95.6	96.3
20-64	0.49	0.52	0.57	0.58	0.60	0.66	0.61	0.77	66.9	68.3	70.7	68.3
65+	1.39	1.42	1.46	1.41	2.07	2.25	2.19	2.28	63.2	70.2	80.3	83.0
0-19/65+	*0.41*	*↓0.40*	*↓0.38*	*↓0.37*	*0.32*	*0.35*	*0.30*	*0.40*	*128.4*	*124.1*	*119.1*	*115.9*

Source: Own calculations

Public transfers inflows

In addition to engaging in public consumption, individuals receive public cash transfers, mainly in the form of pensions as well as other cash benefits that finance consumption, particularly among the senior generations. When we account for all public transfers, we see that there was a significant shift towards the senior generations, which indicates that the generational ratio shifted towards senior generations in the public transfer inflows. While the evolution of the public transfers for the young generations is mainly explained by the development of public consumption, the changes observed among the working-age and the senior generations were also driven by public policy regulations related to cash transfers. Increased public transfer inflows towards the working-age generations in 2016 (namely, for people between ages 26 and 45) is explained by the introduction of the new universal family 500+ benefit for families with at least two children under age 18 in April 2016. Among the senior generations, there was an observable shift of public transfer inflows between ages 50 and 69 to the right, which indicates the delayed take-up of pension benefits. This trend can be attributed to the increases in the legal and the effective retirement age (Chłoń-Domińczak, 2019).

Figure 5. Normalised age profiles of public transfer inflows in Poland, 2004-2016



Source: Own calculations

When we look at the changes in the aggregate age profiles of public transfer inflows in the subsequent years, we see that as the post-war baby boom generations grew older, the peak of these inflows shifted from age 57 (born in 1947) in 2004 to age 65 (born in 1951).

The summarised per capita public transfer inflows for all age groups in Poland range between 26.3 and 28.7 of the income of those groups at ages 30-49 (Table 8). The per capita public transfers received by the younger generations were around half of those received by the senior generations. In 2016, this ratio in Poland (0.47) was below the EU average (0.52) but was similar to the ratio in Germany and in Sweden. The total public transfer inflows for all age groups were below the EU average, with the gap being smallest for the senior generations and largest for the working-age generations. The distribution of public transfer inflows by generations in Poland was similar to that observed in Germany.

Table 8. Normalised per capita public transfer inflows by the broad age groups, Poland vs. selected EU countries

Age group	Poland				EU 25	DE	ES	SE	Poland (EU 25 average 2010 = 100)			
	2004	2008	2012	2016	2010	2010	2010	2010	2004	2008	2012	2016
all	27.12	26.28	28.66	27.78	31.18	27.53	29.65	32.18	87.0	84.3	91.9	89.1
0-19	4.31	4.76	5.82	5.30	6.01	4.86	5.77	5.89	71.7	79.2	96.7	88.2
20-64	11.95	11.41	11.71	11.28	13.55	11.80	12.95	14.04	88.2	84.2	86.4	83.3
65+	10.86	10.11	11.14	11.19	11.62	10.87	10.94	12.25	93.5	87.0	95.8	96.3
0-19/65+	*0.40*	*↑0.47*	*↑0.52*	*↓0.47*	*0.52*	*0.45*	*0.53*	*0.48*	76.7	91.1	100.9	91.6

Source: Own calculations

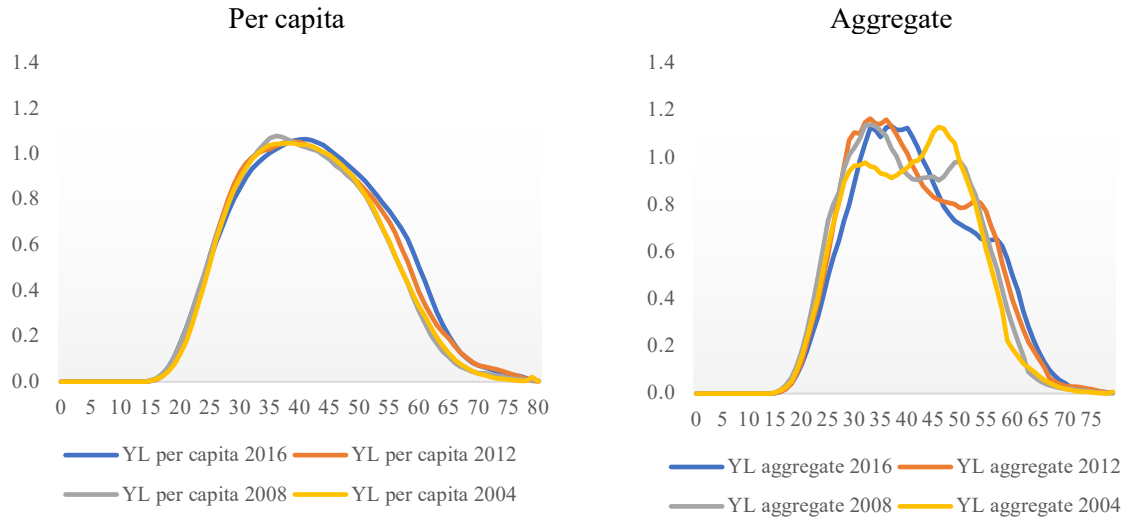
Concluding this consumption assessment, we can state that the analysis of the NTA age profiles clearly shows that while total consumption in Poland was gradually converging to the European average (relative to the labour income of those aged 30 to 49), the public consumption and public transfers remained below the EU average. These findings indicate that the welfare state is still less developed in Poland that it is other European countries, including in Germany, Spain, and Sweden; and that it is very different from the most generous Scandinavian model. Our findings on the evolution of the per capita age profiles indicate that there was a shift towards a higher share of consumption among the senior generations, particularly between 2004 and

2012, but that this trend reversed slightly in 2016. Furthermore, we found that the consumption gap between Poland and the EU average declined in terms of both the total and the public consumption.

Labour income

The normalised per capita age profiles of labour income show that between 2008 and 2016, there was a shift of the profile to the right, which corresponds to a trend towards people working longer and retiring later in response to policy reforms that increased the retirement age and limited early retirement routes in Poland (Figure 6, the left panel). As a result, there was a visible increase in the earnings of working-age people, but also of people aged 65 and older. Moreover, we see changes in the age profiles of the aggregate labour income: the bimodal shape with two humps is lower for people around age 30 and is higher for people in their mid-forties; and the curve reaches its maximum level for generations in their mid-thirties. This pattern illustrates the impact of the changing age structure, in particular as the post-war baby boom cohorts transitioned from working generation ages to senior generation ages (Figure 6, right).

Figure 6. Normalised age profiles of labour income in Poland, 2004-1016



Source: Own calculations

The observed shifts in the per capita profiles made them more similar to the EU average of 2010, which is our reference point (Table 9). However, the labour income of people of working ages in Poland in 2016 still remained below the EU average, and far below the values observed in Sweden in 2010. It is also worth noting that the labour income of the youngest group (0-19) in Poland also remained below the EU average, which can be explained by the organisation of the educational system in Poland; i.e., the share of young people participating in the dual education system is relatively low in Poland, particularly compared to the share in Germany or in Sweden. Thus, most young people in Poland do not enter the labour market until they complete their education, usually after they turn age 18. The most important change in the age profile was in the labour income of people aged 65 and older. While their income was far below the EU average of 2010 in 2004 and 2008; in 2012 and 2016, it exceeded it. While there was also a convergence of the labour income of people aged 20-64 in Poland towards the EU average, it remained below the values observed in Sweden, Spain, and Germany.

Table 9. Normalised per capita labour income by the broad age groups, Poland vs. selected EU countries

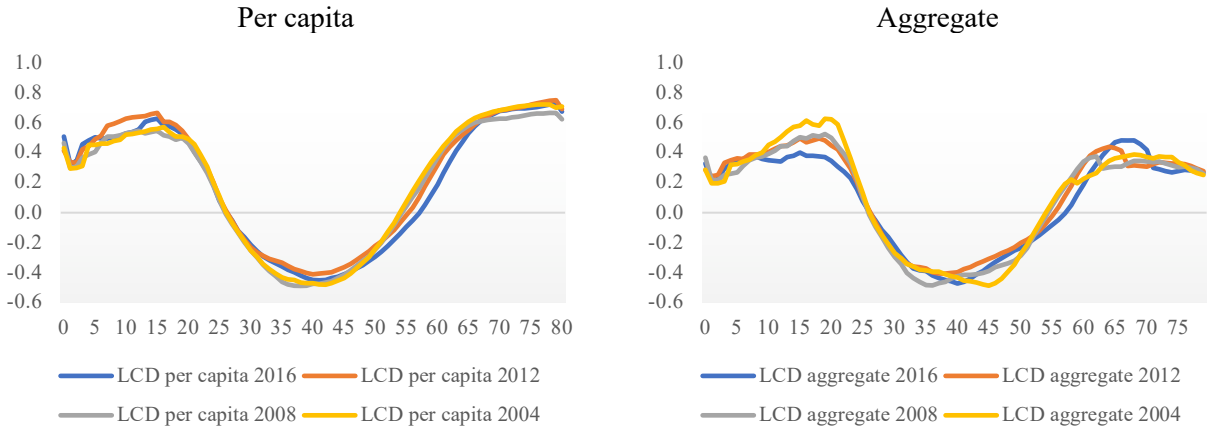
Age group	Poland				EU 25	DE	ES	SE	Poland (EU 25 average 2010 = 100)			
	2004	2008	2012	2016	2010	2010	2010	2010	2004	2008	2012	2016
Total	33.1	33.3	34.9	35.7	37.0	37.3	37.8	40.8	89.6	90.1	94.4	96.6
0-19	0.2	0.2	0.2	0.2	0.3	0.4	0.2	0.4	54.8	78.0	62.1	75.4
20-64	32.4	32.5	33.6	34.4	35.7	36.2	36.7	38.9	90.7	91.1	94.2	96.5
65+	0.6	0.6	1.1	1.1	1.0	0.8	0.9	1.5	58.1	57.8	108.9	108.1

Source: Own calculations

Lifecycle deficit

Between 2004 and 2016, the normalised per capita age profile of the lifecycle deficit (LCD) changed relatively little (Figure 7). However, there were two developments that should be pointed out. First, between 2012 and 2016, the lifecycle deficit of the younger generations declined, mainly due to the decline in per capita public education consumption. This decline followed an increase that occurred between 2008 and 2012. Second, the economic activity age was extended in Poland due to the later transition to retirement. This, in turn, led to an increase in the lifecycle surplus for the working-age generations. An increase in the total number of years with a LCD surplus in 2016 from 26 years (from age 24 to 57) to 30 years (from age 27 to 57) is also observed. The evolution of the aggregate profiles indicates that the declining number of people aged 0-19 led to a smaller aggregate LCD for the younger generations, and to a larger aggregate LCD for the senior generations, as their numbers had increased.

Figure 7. Normalised age profiles of lifecycle deficit in Poland, 2004-1016



Source: Own calculations

Table 10 shows the normalised per capita lifecycle deficit (LCD) in Poland for the broad age groups relative to that for the EU average, and in Germany, Spain, and Sweden. The 2016 values for Poland were similar to those for the EU average, after the increase in the lifecycle surplus for the generations 20-64 observed in 2016. The LCD of the younger generations relative to wages was smaller in Sweden and Germany; while the lifecycle surplus of the working-age generations was larger than it was in these two countries. Furthermore, the normalised LCD of the senior generations was lower in Sweden. The boundaries of the LDC for the economically active ages in Poland were becoming similar to those of the EU average due the increase of the upper limit in 2016. However, the upper limit was still below that observed in Germany, Spain, or Sweden.

Table 10. Normalised per capita lifecycle deficit by the broad age groups, Poland vs. selected EU countries

Age group	Poland				EU 25	DE	ES	SE	Poland (EU 25 average = 100)			
	2004	2008	2012	2016	2010	2010	2010	2010	2004	2008	2012	2016
Lifecycle deficit												
all	16.77	15.21	18.49	15.61	15.71	11.41	15.04	5.35	106.8	96.8	117.7	99.3
0-19	9.49	9.46	10.95	10.34	10.87	9.00	11.11	9.10	87.3	87.1	100.8	95.1
20-64	-3.74	-4.40	-3.38	-5.44	-5.78	-8.70	-6.43	-12.72	64.6	76.1	58.4	94.2
65+	11.02	10.15	10.92	10.71	10.62	11.11	10.37	8.96	103.8	95.5	102.8	100.9
Economic active age (boundaries of the negative LCD)												
low	27	26	27	27	27	27	27	27				
high	53	54	55	57	57	59	59	63				
Economic dependency rate												
young	0.35	0.34	0.37	0.34	0.34	0.28	0.34	0.25	102.7	99.8	109.4	100.8
old-age	0.44	0.40	0.39	0.35	0.34	0.33	0.31	0.22	130.8	119.6	116.6	105.0
total	0.78	0.74	0.76	0.69	0.67	0.61	0.65	0.47	116.7	109.7	113.0	102.9

Source: Own calculations

Changes in the aggregate lifecycle deficit also implied that there were some shifts in the economic dependency rate, which is defined as a ratio of the aggregate lifecycle deficit of the generations below and above the economically active age to the aggregate labour income (as proposed by Loichinger, Hammer, Prskawetz, Freiberger, & Sambt, 2017). The total economic dependency rate in Poland was lower in 2016 than it was in earlier years, which is due to the decline in economic dependency at both younger and older ages. The decline in the economic old-age dependency rate is attributable to both the increase in the economic activity age range and the increase in the labour income of people aged 50 and older. Despite these improvements, the economic dependency rate in Poland is still higher than the 2010 level in Spain, Germany, and, in particular, Sweden; and is close to (but above) EU the average.

Conclusions

The application of the NTA approach to analyse changes in the generational distribution of labour income, consumption, and the lifecycle deficit (LCD) over time provides a useful framework for assessing the shifts in the generational balance that have occurred in Poland since 2004 due to marked economic and social changes, as well as to shifts in the population age structure. The estimated per capita age profiles of the NTA components and their aggregates – which are also considered for the broad age groups reflecting the younger, working-age, and senior generations, respectively – allow us to gain in-depth insights into evolving generational distributions, and provide responses to the research questions that were formulated in the introduction.

The analysis of the evolution of the NTA age profiles in Poland shows that the dynamic economic growth that occurred over this period led to increases in the major aggregates of national accounts, most notably, in consumption and labour income. The decomposition of the NTA aggregates revealed that the total changes in the aggregate consumption, labour income, and the LCD between 2004 and 2016 were affected mainly by the growth in wages and the shifts in the per capita age profiles; and, albeit to a smaller extent, by the shifts in the age structure. If only the age structure had changed, both consumption and labour income would

have declined in real terms; the former more than the latter. The changing age structure would have also led to an increase in the LCD. This impact was reversed by growing wages and evolving age profiles. Due to the change in the per capita age profiles in nominal terms (in real values), consumption and labour income increased sharply. As labour income grew faster than consumption, the increase in the LCD was smaller (in real terms). It is also worth noting the impact of the evolution of the normalised per capital age profiles, which reflect changes in the public policies, and in the societal preferences and behaviours that shape private consumption and intra-household transfers. Finally, we also see that changes in the per capita normalised age profiles of public transfer inflows, which are comprised of public consumption and cash transfers (such as pensions) contributed to an 11-p.p increase in aggregate public transfers. This means that the growth in public cash transfer inflows was faster than the growth in public consumption.

Shifts in the normalised age profiles caused the aggregate labour income to increase faster than the growth in wages. Aggregate consumption declined relative to wages. As a result, if only the normalised age profiles had changed, the LCD would have declined by almost a quarter. This suggests that the growth in the aggregate LCD caused by the ageing of the population in Poland was significantly mitigated by the evolution of the per capita age profiles, which led to higher labour income and lower consumption levels. If the direction of these developments is maintained in the future, the growth in the aggregate lifecycle deficit can be slowed in Poland, even as the population continues to age. This "opportunity window" is conditioned on labour income growth being faster than consumption increases. The policy regulations implemented prior to 2016, particularly those related to increasing the effective retirement age, were conducive to such developments. Unfortunately, the 2017 regulation that weakened the higher retirement age could lead to slower growth in labour income, which could, in turn, affect the pace of the increase in the LCD in the future. Therefore, it is important to continue monitoring the development of the NTA age profiles in Poland.

We also show that the effects of changes in the population age structure and the per capita age profiles differ for public and private consumption. If we take into account only the age structure, the aggregate public consumption would have increased in total by 2.9 p.p, while the aggregate private consumption would have declined by 3.5 p.p. In both cases, this is the joint outcome of higher education consumption combined with lower health and other forms of consumption.

Changes in the normalised age profiles also led to increased aggregate public consumption (by 0.5 p.p.) and lower aggregate private consumption (by 2.1 p.p.). However, we see important differences when we look at different sub-components of consumption. The effect of changes in normalised per capita public education consumption led to a reduction in this share of consumption by almost a quarter, while the private consumption of education declined by almost half. At the same time, aggregate health consumption grew the most due to the change in the age profile (by 30 p.p. in the case of public consumption and 40 p.p. in the case of private consumption). These developments are similar to those observed in other counties, such as the US or Sweden. As technical progress and population ageing have progressed, the per capita public consumption of health has also increased, mainly for pre-natal and post-natal health services, as well as for the care of people aged 65 and older. Given the ageing of the population, this trend is likely to continue. The changes in the other forms of consumption have been similar to the overall changes. Thus, the evolving age profiles that reflect economic and social developments affect public and private consumption, and explain to a large extent the observed overall changes in aggregate consumption and its structure. One of the important conclusions we can draw is that as the consumption of health increases, expenditures on public (and private)

education will decline, which may have an impact on the development of human capital in the future.

There have also been changes in the generational distribution of the consumption, labour income, and the lifecycle deficit. The smaller per capita normalised consumption that we observed for people in the 55-65 age group, combined with the shift in the per capita labour income, also reflect the extension of the boundaries of economically active ages. While the lower age limit remained similar at age 27 – and is the same as the level in the European countries compared here – the upper age limit increased from 55 years in 2004 to 57 years in 2016. Despite this increase, 57 years was still below the EU average, as well as the ages observed in Spain and Germany (59 years), and, in particular, Sweden (63 years). When the latest observed boundaries of the economically active ages in Poland were used to assess changes in the generational distribution of the lifecycle deficit, consumption, and public transfers, the relative share of the aggregate consumption, public transfer inflows, and the LCD of the senior generations increased. Overall, the aggregate consumption of the senior generations in 2016 was greater than that of the younger generations; while in 2004, the younger generations consumed more. The generational distribution of consumption changed most in the case of public health consumption, following the observed shift in the per capita normalised age profiles for people 65+, and combined with changes in the population age structure. The evolving generational distribution of public transfer inflows was also affected by both shifts in the per capita age profiles (particularly between 2004 and 2008) and the age structure of the population. Finally, the changes in the generational distribution of the lifecycle deficit were affected by shifts in the population age structure, as the per capita LCD of the younger generations increased slightly, while it declined for the senior generations. This means that the demographic developments mainly affected the age structure of the LCD and not its size, which was mitigated by the changes in the per capita age profiles.

Finally, when we compared the developments in Poland to the average 2010 NTA age profiles for the EU-25 and selected countries representing different types of welfare regimes, a slow reduction in differences was observed. In the case of consumption, the age profiles in Poland became similar to the EU-25 average, but also quite similar to those in Spain. The total normalised per capita consumption, particularly of the younger generations, also became similar to the EU average and to the values observed in Spain. Moreover, there was a gradual reduction in the gap in public consumption between the EU average and Poland for all generations. The total public consumption, particularly of the younger and the senior generations, became closer to the EU average, and similar to the levels observed in Spain, but lower than the levels found in Sweden. The gap in the public consumption of health also declined, particularly for the younger and the senior generations, but this consumption was still below the EU average and the values observed in all countries. These findings indicate that in the future, there might be further pressure to increase the per capita public health consumption of the senior generations. Regarding public transfer inflows, the changes in the per capita profiles led to increased similarities with the EU average as well as with Spain and Germany. While the per capita labour income in Poland also increased for people of working ages (20-64 years), it remained below the values observed in the EU-25, as well as in all analysed countries. The largest gap was found for the Swedish per capita labour income. The comparison of the per capita lifecycle deficit indicated that for all age groups, the LCD became similar to the EU average and to that in Spain, but was lower than that in Germany and in Sweden. The NTA-based economic dependency of the senior generation declined, and is currently similar to the EU average and to that in Germany and Spain, but is higher than that in Sweden. These developments mean that the social and economic changes that have affected the development

of the age profiles in Poland made the generational distribution of consumption, labour income, and the lifecycle deficit more similar to the European average and to those in Spain, and, to some extent, to those in Germany – but not to those in Sweden. These results confirm the conclusions of (Chłoń-Domińczak et al., 2019), who found that public transfers in the Scandinavian countries (including in Sweden) differed from those in the largest group of countries, which includes Germany, Spain, and Poland.

Our analysis of the evolution of the NTA age profiles in Poland between 2004 and 2016 shows that social and economic developments can modify considerably the impact of the ageing of the population on the lifecycle deficit, particularly through increases in the economic activity levels of people at all ages, including those close to the upper limit of the economically active age range. At the same time, we observe rising pressure on increasing consumption, particularly consumption related to health. In the future, we can expect to observe a further evolution of the age distribution of the lifecycle deficit, with a rising share of the LCD for the senior generations. Policies aimed at raising labour income at all ages, particularly among people aged 50 and older, can help to sustain the generational balance in the future, despite advances in population ageing.

References

Auerbach, A. J., Gokhale, J., & Kotlikoff, L. J. (1991). Generational Accounts : Meaningful Alternative Accounting. *Tax Policy and the Economy*, *5*(1991), 55–110.

Chłoń-Domińczak, A. (2019). Impact of retirement age changes on the old-age pension take up in Poland after 1990. *Ubezpieczenia Społeczne. Teoria i Praktyka*, (4), 1–25.

Chłoń-Domińczak, A., Abramowska-Kmon, A., Kotowska, I. E., Łątkowski, W., & Strzelecki, P. (2019). Welfare state and the age distribution of public consumption and public transfers in the EU countries. *Vienna Yearbook of Population Research*, *17*, 71–97. https://doi.org/10.1553/populationyearbook2019s071

d'Albis, H., Bonnet, C., Navaux, J., Pelletan, J., Toubon, H., & Wolff, F. C. (2015). The lifecycle deficit in France, 1979-2005. *Journal of the Economics of Ageing*, *5*, 79–85. https://doi.org/10.1016/j.jeoa.2014.09.005

Diamond, P. (1996). Generational Accounts and Generational Balance: an Assessment. *National Tax Journal*, *49*(4), 597–607.

Esping-Andersen, G. (1990). *The Three Worlds of Welfare Capitalism*. Princeton University Press.

Istenič, T., Hammer, B., Šeme, A., Lotrič Dolinar, A., & Sambt, J. (2016). European National Transfer Accounts. Retrieved from http://www.wittgensteincentre.org/ntadata

Lee, R., & Mason, A. (2011). *Population Aging and the Generational Economy. A Global Perspective*. Edward Elgar Publishing Limited.

Lee, R., & Mason, A. (2019). Analyzing population ageing and intergenerational redistribution: NTA and AGENTA. *Vienna Yearbook of Population Research*, *17*, 1–5. https://doi.org/10.1553/populationyearbook2019s001

Lindh, T., Oeberg, G., & Sanchez-Romero, M. (2011). Backcasting National Transfer Accounts in Sweden from 1800 to 2009, 1–5. Retrieved from https://www.ntaccounts.org/doc/repository/Thomas, Gustav and Miguel.pdf

Loichinger, E., Hammer, B., Prskawetz, A., Freiberger, M., & Sambt, J. (2017). Quantifying Economic Dependency. *European Journal of Population*, *33*(3), 351–380. https://doi.org/10.1007/s10680-016-9405-1

Population Division. Department of Economic and Social Affairs. United Nations. (2013). *National Transfer Accounts Manual: Measuring and Analysing the Generational Economy*. Retrieved from http://www.ntaccounts.org/doc/repository/NTA manual 2013.pdf

Statistics Poland. (2018). *Methodological report. Household budget survey*. Warsaw.

United Nations Department of Economic and Social Affairs Population Division. (2013). *National Transfer Accounts Manual: Measuring and Analysing the Generational Economy*.