Indicators of economic dependency using the NTA results for EU countries

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Abstract

In the coming decades, the ageing of European population will continue at a rapid pace. The National Transfer Accounts (NTA) methodology breaks down the income and consumption by age to analyse impact of population ageing on economic sustainability and economy in general. This chapter uses fully comparable results of National Transfers Accounts (NTA) for 25 EU countries in 2010 to indicate the potential increase in dependency in the future given the current institutional setting. Next to the conventionally defined demographic dependency ratio we add 1) the NTA dependency ratio using the age patterns of production and consumption in the market and 2) the dependency ratio using age patterns of production and consumption originating from unpaid household work. We show that imbalances will originate from the impact of population ageing on market part of the economy. Further, imbalances will be coming from unpaid household work but of much lesser extent.

Key words: National Transfer Accounts, economic life cycle, sustainability, unpaid household work, European Union

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1 Introduction

Age is one of the key determinants of people's economic behaviour. Therefore, change in the population age structure has numerous economic consequences that bring challenges for both private and public institutions. All European countries face rapid population ageing. According to the latest Eurostat's population projections EUROPOP2018 the proportion of the European Union's (EU) population aged 20–64 is projected to decrease from 59.4% in 2018 to 52.1% in 2050. In the same period, the proportion of the population aged 65+ is projected to increase from 19.7% to 28.5%. The proportion of the population aged 0–19 is projected to remain stable at about 20% over the projection period (Eurostat, 2019).

Those demographic changes will have to be followed by the changes in the institutional settings and economic behaviour. The extent of the imbalances coming from the population ageing needs to be monitored to prepare and act timely. This is especially important for policy makers for making economic decisions and introduce institutional changes including adjustments in retirement conditions.

A simple indicator often used for analysing the impact of demography on sustainability and economy is the demographic dependency ratio. It is defined as dependent population (0-19 and 65+ years of age) divided by the people in working age (20-64 years). However, this is a very crude indicator, assuming fixed age limits. It also assumes that all dependent individuals are equally dependant and that all individuals in working age contribute to the production equally. In this paper we first present the development of the conventional dependency ratio using the EUROPOP2018 population projections.

Next, we calculate the NTA dependency ratio (*NtaDR*) that was introduced by Loichinger et al. (2017). To calculate the *NtaDR* we use fully comparable results of National Transfers Accounts (NTA) for 25 EU countries in 2010. The NTA methodology introduces age dimension into the System of National Accounts (NTA). The categories of consumption and income are broken down by age using various data sources including aggregate data sources combined with micro data from surveys. In this paper we take advantage of two main categories in the NTA: the age profile of consumption and the age profile of labour income.

Average labour income by age depends on the enrolment and length of schooling, employment rates, unemployment rates, share of persons not entering the labour market because they focus on work in the households, retirement age etc. In the Ageing Report 2018 the European Union provides comparative set of assumptions and labour market projections in form of employment rates (European Commission, 2018). The assumption of fixed age limits used in the demographic support ratio are now dropped and more realistic assumptions are used. However, in those assumptions and projections the same productivity is assumed for all employees, whereas to all other individuals the value of zero is assigned.

A step forward in defining the dependent population and the productive part of the population was made by Cutler et al. (1990). In their work they weight working age population by age-specific labour income and they compare the obtained total to the total population weighted by the age-specific consumption. That was a big step compared to the conventionally defined demographic dependency ratio. But it was Ronald Lee and Andrew Mason who comprehensively and into details analysed the production and consumption and the difference between those two (e.g. R. D. Lee & Mason, 2011; eg. R. Lee, Lee, & Mason, 2008; Mason & Lee, 2006; United Nations, 2013).

In *NtaDR*, we focus on difference between consumption and labour income that people face at young and old age. In the NTA framework this difference is named "life cycle deficit" (LCD) and has to be financed through private transfers (for example, parents financing the food, clothing, housing etc. of their children), public transfers (like publicly financed education, health, public pensions), or interaction with assets (using received dividends for financing part of the consumption, taking a loan etc.). We calculate the LCD of all individuals in the country by multiplying per capita age pattern of LCD with population age distribution. Then we express the obtained total LCD relative to the total labour income in the country that is calculated by multiplying per capita age pattern of labour income with the population by age. This indicator shows the excess of consumption over the labour income among young and old relative to the total labour income in the country.

In the final step we supplement the analysis with the new indicator that includes the value of work provided in form of the unpaid household work. We take into account both the production of unpaid household work but also the consumption of those services provided in form of the unpaid household work. There might be additional pressure hidden in combination of population ageing with the current patterns of production and consumption of unpaid work. Alternatively, population ageing might free up required hours of work in the household for sustaining the current patterns of consumption by age. This would then enable people to enjoy more leisure time or enter the labour market. The analysis of the unpaid work follows the NTA methodology applied to the unpaid household work based on the time use surveys. Therefore, the name National Time Transfer Accounts (NTTA) was given to this approach. For details on the methodology used see for example Donehower (2014) and Vargha et al. (2017). In our analysis we use the dataset provided in the European AGENTA project ("AGENTA Data Explorer," 2019) whereas the methodology is described in the accompanying manual (Vargha, Šeme, Gál, Hammer, & Sambt, 2016). In the next section we briefly describe the data on labour income and consumption in the market part of the economy and the unpaid household work that will be used in the analysis. In section 3 we explain three indicators of the dependency. In section 4 we present the results of our analysis and in section 5 we conclude.

2 Methodological framework

The economic consequences of population ageing depend on how rapid the changes in age structure are and on the age patterns of individuals' economic activities. For the demographic projections we apply the latest Eruostat's projections EUROPOP2018 (Eurostat, 2019) and for the age profiles of consumption and production (market and unpaid work) we use the results of the AGENTA project ("AGENTA Data Explorer," 2018).

2.1 Market part of the economy

The economic life cycle exists due to differences in the patterns of consuming and producing over the life cycle. Figure 1 shows the age patterns of consumption and labour income as an average for all 25 EU countries. To achieve comparability among countries, the values are presented relative to the average labour income for ages 30–49.

The age profile of labour income starts to increase after the age of 15, when individuals start entering the labour market. After the peak during prime ages, labour income starts to decrease primarily due to lower labour market participation rates for the elderly. Whereas the labour income age profile has a typical bell-shaped distribution, the total consumption is rather stable across all ages, with exception of two peaks: the first one at young ages due to high public education expenditures and the second one for the elderly due to high public health care and long-term care expenditures.

Due to higher consumption as compared to labour income, individuals at young and old ages face an LCD because their consumption is greater than their labour income. On the other hand, during working ages, individuals produce more than they consume and therefore face a life cycle surplus (LCS).
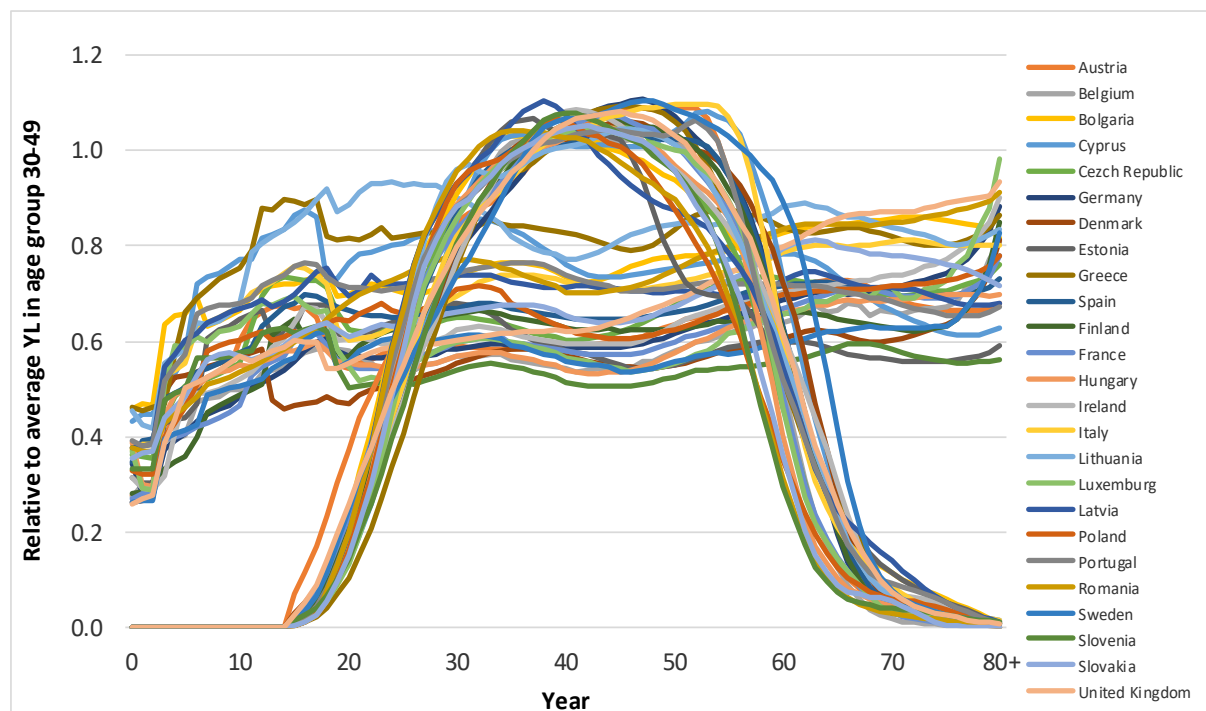

Figure 1: Age profiles of labour income for 25 EU countries, 2010
Sources: AGENTA, 2018.

Figure 1 reveals that in all EU countries the labour income exceeds consumption in an age range that is shorter than 45 years as conventionally assumed (from 20 to 64 years of age). Therefore, taking into account the actual age patterns of consumption and production will result in different size and trajectory of economic dependency over time.

Even though the pattern of the economic life cycle is in general similar across countries, there are still large cross-country differences (1) in the age span at which individuals are net supporters and (2) in the size of the positive LCD.

In Belgium and Austria, the young already start to be economically independent at the ages of 24 and 25, the youngest among all EU countries. In contrast, in Greece, the economic independence of the young starts only at the age of 32. Relatively low employment rates in Greece in 2010 as compared to the other EU countries (Eurostat, 2019), as well as the high consumption relative to the average labour income, results in the shortest age span of LCS in Greece, accounting for only 23 years (between ages 32 and 54). A relatively short age span of LCS is also characteristic of Romania, mainly resulting from relatively low ages at which the elderly become dependent. Relatively early retirement is also characteristic of post-socialist EU countries, such as Poland and Slovakia. In contrast, individuals stay economically dependent up to higher ages in Cyprus, Denmark, and Sweden. Denmark and Sweden are also those countries in which the age span of LCS is the longest among the EU countries, accounting for 36 and 37 years, respectively.

2.2 Unpaid work

In this paper we apply Eurostat's latest demographic projections EUROPOP2018 and the NTA data from the AGENTA project. In particular, from the NTA data we apply the age patterns of labour income and consumption that refer to the market part of the economy. We have described the NTA approach and the data set already in our other chapter in this book, therefore we will not repeat it again. On top of that, we apply also the production and consumption of unpaid household work contained in NTTA dataset that was provided in the AGENTA project as well.

The NTTA age profiles are estimated from the time use surveys. The Harmonized European Time Use Survey (HETUS) contains data on 14 EU countries. We added also one additional country (Austria) from the MTUS data source. The age patterns of household production are available for general housework, childcare, and inter-household labour. General housework includes all household production activities other than childcare. Inter-household labour includes unpaid household work provided to individuals in other households. For allocating produced goods and services to individual household members, the imputation method has been used. The age profiles based on time use surveys have been imputed into the EU-SILC dataset. For the imputation, the information on the age and gender of the household members is used, but also the information about the household composition.

To make the NTA and the NTTA data comparable, we translate the NTTA results from minutes to monetary values by using country-specific gross hourly wages paid to elementary occupations in 2010 (Eurostat, 2017).

Market part of the economy captured in the National transfer accounts does not include the entire economic activity in the country. There is a lot of production and consumption going on in form of unpaid household work. In our last indicator we therefore include also unpaid household work that has strong age ingredient (see Figure 2). The age patterns of production and consumption of services in a form of unpaid household work are very different. Therefore, with changing demographic structure due to population ageing, the unpaid household work could worsen or improve long-term economic sustainability as well. However, the biggest differences in age profiles of consumption compared to production are at lower ages, where we do not expect impact on sustainability since we already showed that the share of 0–19 is expected to remain stable during the projection period.
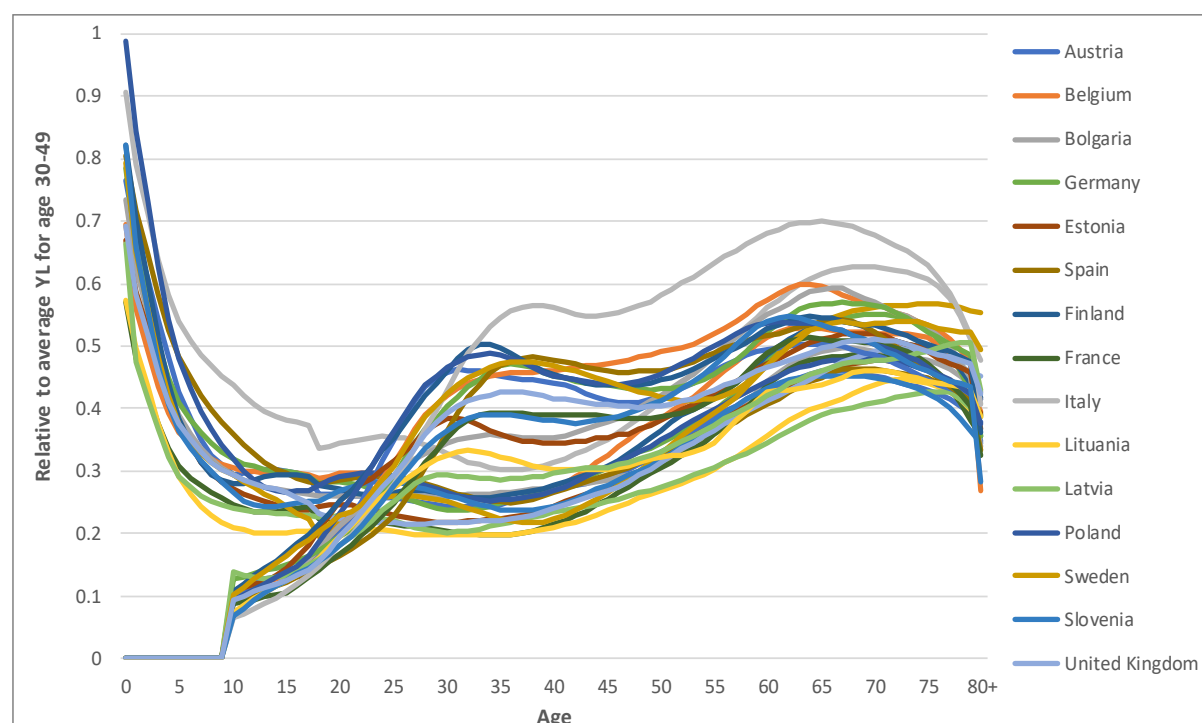

Figure 2: Value of unpaid household work by age (relative to average labour income between 30 and 49 years of age) in 15 EU countries, 2010
Sources: (Vargha et al., 2016).

2.3 Dependency indicators

In this section we build up the indicators of dependency. We start with the conventional demographic dependency ratio and then we add two indicators based on the NTA and NTTA results. We first introduce the actual economic patterns of consumption and its financing through the labour income earned on the market. Finally, we take into account the value of

unpaid (household) work to complete the picture of the gap between consumption and production during the projection period.

3.1 Demographic dependency

Our first indicator is the conventional dependency ratio defined in demographic terms that shows the ratio between dependent individuals (conventionally defined as 0-19 and 65+ years of age) and working age individuals (20-64 years of age).

$$Demographic\ dependency\ ratio = \frac{P_{0-19} + P_{65+}}{P_{20-64}} \tag{1}$$

This gives us the information on how severe the population ageing is from the demographic point of view. It also provides the comparability with the results from the past since this is a widely used demographic-economic indicator.

3.2 NTA dependency ratio

The impact of the changing demographic age structure depends on the institutional settings in the economy whereby the crucial roles play the age patterns of labour income and consumption. Population ageing is less of a problem in countries where people enter the labour market early and they withdraw late. On the other hand, a high consumption over the entire life cycle and especially high health and long-term care expenditure at higher age will have negative impact on sustainability. In the NTA dependency ratio (*NtaDR*) we again have the dependent individuals in the numerator and the supporters in the denominator. However, this time they are expressed in the equivalent number of dependents and equivalent number of supporters, since we take into account the actual extent of consumption and production at different ages. Technically, we calculate total consumption (C_i) and total labour income (YL_i) at each age by multiplying per capita age profiles with the population and then we sum up positive deficits for all ages. As denominator we use the total market labour income in the country, since the labour income is a standard denominator in NTA analyses.

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

In Equation 2 *C* denotes consumption and *YL* stands for labour income – both in the market part of the economy. Also, both categories are expressed as totals, already multiplied with the number of people in corresponding age groups. The *NtaDR* represents an exercise in which we assume that per capita age profiles of consumption and labour income stay fixed over time –

meaning that cross-sectional and longitudinal age profiles are the same. Thus, the results are driven exclusively by changing demographic age structure.

3.4 NTTA dependency ratio

Finally, we introduce also the NTTA dependency originating from the production and consumption of services provided in a form of an unpaid work. In defining this indicator we use 1) the difference between consumption and total labour in the numerator and 2) total labour production (again, market labour income) in the denominator.

$$NttaDR = \frac{\sum_{i=0}^{80+}(UWC_i - UWP_i)}{\sum_{i=0}^{80+}(YL_i)},$$

where *UWC* represents consumption of unpaid work, *UWP* denotes production of unpaid work and *YL* is, just like before, labour income in the market part of the economy. We again assume the age patterns of consumption and production to stay the same over time.

4 Results

4.1 Demographic dependency

Figure 3 shows the demographic dependency ratio defined as a number of people aged 0–19 and 65+ relative to the number of people aged 20–64. The conventional demographic indicator is interesting both in its initial value and the relative change over the projection period.
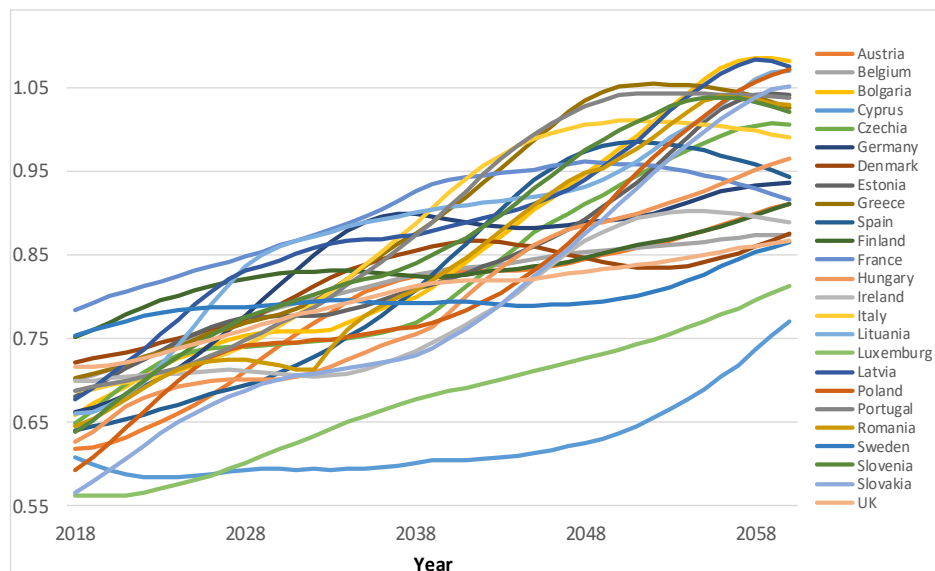

Figure 3: Conventional demographic dependency ratio in 25 EU countries, 2010

Sources:(Eurostat, 2019).

The dependency ratio in 2018 ranges from 0.56 in Luxembourg and Slovakia to 0.78 in France and 0.75 in Sweden and Finland. Low dependency ratios are driven by the pronounced share of people in working age or/and low fertility, whereas the high levels are driven by relatively high fertility and high longevity. In the future the dependency ratio is projected to increase in all countries because of increasing share of people aged 65+ and decreasing share of working age people. In all countries the share of young (aged 0–19) does not change much during the projection period and therefore has only small impact on the changes in dependency ratio. In Luxembourg the dependency ratio remains among the lowest, whereas in Slovakia it strongly increases, so Slovakia ends up as a country with the highest value of dependency ratio according to these population projections. This increase is explained with rapidly increasing longevity and very pronounced generations of baby-boomers entering the age group 65+. The same explanation holds for increasing dependency ratio in most other countries.

4.2 NTA dependency ratio

Once we introduce actual age patterns of labour income and consumption by age, the results change considerably. According to the NTA support ratio indicator, countries with the highest NTA dependency ratio in 2018 are Greece, Lithuania and Romania. These are also the three counties that face the highest increase in NTA dependency ratio during the projection period up to 2060. Romania is characterized with an early retirement and high level of consumption, especially at higher ages (see Figure 1). In Lithuania a high consumption is even more pronounced, with a distinctively high consumption of young adults. In Greece the consumption is very high in all age groups and among all 25 EU countries they enter the labour market the latest.
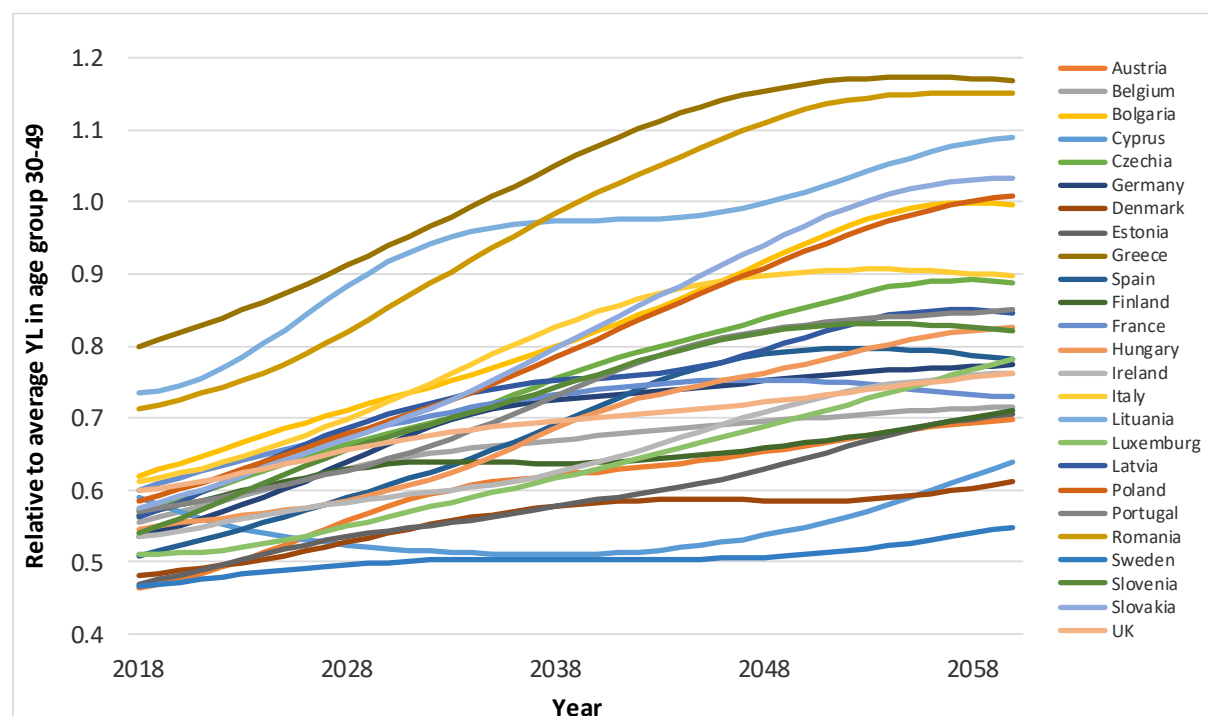
On the other side of the spectrum is Sweden because individuals stay in the labour market distinctively longer than in all other EU countries. Working longer is not only the most logical measure when longevity in increasing and population is ageing but also the most efficient one in the long run. In Sweden the NTA dependency ratio remains the lowest during the entire projection period with almost no increase at all. Similar holds for Denmark, also ranking high in how long people stay in the labour market, but unlike Sweden, Denmark faces some increase over the projection period. In the base year Austria has a similarly low NTA dependency ratio as Sweden because entering the labour market very early due to the specific system of apprenticeship in their educational system (Sambt & Prskawetz, 2011). However, acting on the lower end of the labour income age profile is less effective than acting on the higher end, because in the long run increasing share of elderly is still pushing the NTA dependency ratio up. Therefore, over time the NTA dependency ratio in Austria increases more than in Sweden. However, in Austria the *NtaDR* in 2060 is still lower than in most other countries. In Estonia the initial level of *NtaDR* is among the lowest due to the low consumption relative to labour income (Figure 1), but it increases substantially during the projection period because also the lower consumption is less effective in coping with the population ageing than it is the late withdraw from the labour market (the case of Sweden).

4.3 NTTA dependency ratio (*NttaDR*)

Finally, we focus on unpaid household work to identify the impact of future demographic changes on sustainability of consumption compared to production. This time production is in a form of services of unpaid household work, whereas the consumption is represented by the consumption of those services. In denominator we again use the total labour income generated on the market. By using the same denominator, we will be able to sum up the results of this and the previous indicator.
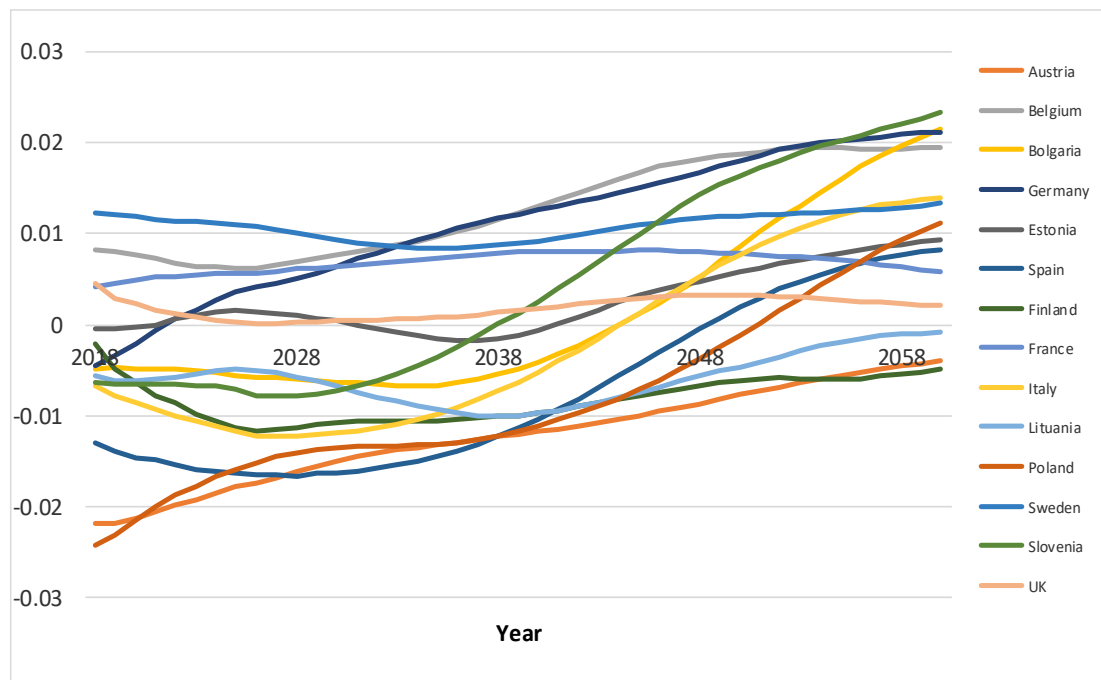
Figure 5: The difference between consumption and production of total unpaid household work relative to the total labour income in 15 EU countries, estimated to 2010.

Sources: Vargha et al., 2017; author's own calculations.

The data on time use survey from which we calculate age profiles of unpaid household work are available only for selected countries. The data were collected in different years for different countries. We estimate the value of production and consumption in year 2010 for all of them, using the wage rate from that year. In the base year we would expect the aggregate inflows match aggregate outflows by definition. However, this is not the case, since distribution of population was different in 2010 than in the year in which the data were actually collected. In Figure 5 we should therefore not focus on the absolute value of *NttaDR* indicator but its change during the projection period. The values are higher in 2060 than in 2018 in all countries except Finland and the UK. This means there will some additional pressure on the sustainability due to the changing population's age structure.

The consumption is very high in the first years of life and therefore very sensitive to the number of little children, but during the projection period there will not be much changes in the share of these age groups in total population. The production side is high among working-age individuals but also people retire. Short after the retirement it even reaches maximum and people provide substantial amount of unpaid work until they physically can. Therefore, individuals produce more than they consume for the entire adult life except close to their death. Those highest age groups have only limited impact on total production and consumption because not many people are still alive at that age. The negative change in the difference between total consumption and total production of unpaid work is the biggest in Poland (-3.5 percentage points of the total market labour income) and Slovenia (-3.0 p.p.). In Finland (0.3 p.p.) and the UK (0.2 p.p.) the impact is slightly positive.

We therefore conclude that there will be some additional pressure on sustainability in most countries coming from unpaid work (average is -0.8 p.p of the market labour income in the projection period 2018–2060), but in a negligible amount compared to the market part of the economy.

5 Discussion and conclusions

In the Europe we are facing rapid population aging that will continue at rapid pace also in three to four future decades. The National Transfer Accounts (NTA) methodology is a comprehensive attempt to analyse the impact on demographic changes on economic sustainability and economy in general. In short, the NTA introduce the age dimension into the System of National Accounts (NTA) including the labour income and consumption as two central NTA categories. In this paper we use fully comparable results of National Transfers Accounts (NTA) for 25 EU countries in 2010 to show potential imbalances between consumption and production in the future given the current institutional setting.

The conventionally defined demographic dependency ratio shows the number of people aged 0–19 and 65+ relative to the number of people aged 20–64. In 2018 the demographic dependency ratio was the highest in France (0.78), Sweden (0.75) and Finland (0.75). The high levels are driven by relatively high fertility and high longevity. Using the latest Eurostat projections EUROPOP2018 we find that in future the dependency ratio is projected to increase in all countries because of increasing share of people aged 65+ and decreasing share of working age people.

However, a high demographic dependency ratio does not necessary translate into high pressure on economic sustainability because it depends on the institutional settings in the country, especially on the age pattern and levels of consumption and labour income. First we add the NTA dependency ratio (*NtaDR*) using the age patterns of production and consumption in 25 EU countries in 2010. It turns out that according to this indicator Sweden is the country with the lowest *NtaDR* in 2018 and during the projection period there is almost no increase in *NtaDR*. Also, Finland and France are now around the average of all countries. With this indicator Greece, Lithuania and Romania become the countries with distinctively higher *NtaDR* than other countries and they have the highest *NtaDR* also during the entire projection period. These results depend on 1) the level of consumption relative to the labour income, 2) age when people enter the employment, but most of all 3) the age when people withdraw from employment. Namely, the economic dependency in the future will be driven by the old-age dependency, whereas the young-age dependency will remain about unchanged.

Finally, there is a lot of production and consumption going on in the households in the form of unpaid work which is not covered in the System of National Accounts. Age patterns of production and consumption of unpaid household work are analysed with the National Time

Transfer Accounts (NTTA). The NTTA dependency ratio (*NttaDR*) shows that population ageing will pose some sustainability challenges on unpaid household economy as well, but they will be relatively negligible compared to the market part of the economy.

Our results show that countries can score very differently at different indicators of dependency. The results based on N(T)TA data, in which the individuals' characteristics related to economic activity are considered, are better suited as for helping policy makers in adapting public policies and individual strategies to cope with population ageing. We emphasize that our simulations are based on changes in the population structure, whereas holding the age-specific profiles of economic activities unchanged. Therefore, a caveat with this approach is that we interpret cross-sectional data as longitudinal – i.e. patterns which individuals will follow during their lifetimes. The presented results should not be considered as realistic forecasts of what will happen in the future but more as indicators of (un)sustainability and the information on what is the nature of unsustainability when comparing the results over time and with other countries.

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