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Research Article

Economic support ratios and the demographic dividend in Europe

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Economic support ratios and the demographic dividend in Europe

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Abstract

BACKGROUND
Support ratios and dependency ratios are widely used as indicators for measuring the effects of population ageing on economic development. Both of these indicators use fixed age limits to distinguish between the working and the dependent populations.

OBJECTIVE
We apply age-specific profiles of consumption and labour income instead of using arbitrary age limits. Based on these age-specific characteristics, we study the impact of changes in the age structure on the economy. In addition to looking at the compositional effect of age structure changes, we also consider savings/wealth effects.

METHODS
The National Transfer Accounts (NTA) offer researchers a new method for comprehensively analysing economic flows across age groups. Because they combine micro (survey) data and macro controls, the NTA provide detailed profiles of consumption and labour income by age, as well as age profiles of transfers and assets, through which the differences between consumption and labour income are covered.

RESULTS
The development of the "NTA support ratio" for 2010–2050 indicates that the compositional effect of the changing population structure on economic development will range from –11% for the UK to –25% for Slovenia, which exceed the values of the conventional support ratio. The positive saving/wealth effect is almost negligible for the countries studied, except for the UK, Germany, and Spain.

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CONCLUSIONS
Given the current profiles of consumption and labour income in the European NTA countries, the rates of growth in the support ratio induced by the changing demographic structure will be negative in these countries. A positive effect of increased saving/wealth can counteract this decline in the support ratio, but depends on the institutional settings in which the elderly finance their consumption.

COMMENTS
We offer for the first time a European comparative study on the effect of changes in the age structure in the economy based on NTA data.

1. Introduction

Persistently low fertility levels and increasing rates of survival to older ages, in conjunction with the ageing of the baby boom generation, are the key determinants of the changing age structures in many European countries. As a consequence, natural population growth is negative, and the stability or growth in population in many of the European countries can only be sustained through positive net migration. Meanwhile, increasing shares of elderly people have to be supported by an ageing and shrinking working-age population. In light of the ageing of the population, welfare state systems (including the pension, health, and elderly care systems) have to be reformed. If economic productivity is to be sustained in the future, there is an urgent need to increase labour market participation at the intensive and the extensive margins.

To assess the consequences of the current and future demographic structure on the reallocation of resources across generations, demographic dependency ratios—or, alternatively, (economic) support ratios—are calculated. The former indicator relates the dependent age groups (young people and the elderly) to the working-age population, whereas the later relates working age population to the total population. Fixed age limits for the various age groups are imposed. The term “young dependent population” generally refers to people under age 20, while the term “old age dependent population” refers to people aged 65 or older. The remaining people, who are aged 20 to 65, are referred to as the “working-age population.” Unfortunately, the use of such inflexible age categories does not allow us to take into account the differing and changing age profiles of consumption and income across time and across countries, as they are shaped by the prevailing institutional settings. The concept of the support ratio, as introduced by Cutler et al. (1990), tries to make up for these shortcomings in part by relating a weighted share of the working-age population in the numerator to the weighted sum of all consumers in the denominator. Age-specific labour force participation and wages multiplied by the age structure of the population are applied in the numerator. For the denominator, consumption needs (usually referring to three broad groups: i.e., children, adults, and retired people) are multiplied by the age structure of the population to yield the potential dependent population.

An ideal indicator would take into account single years of age-specific consumption and labour market characteristics, and then combine these characteristics with the changing age structure of the population. The age profiles of the economic activities, in contrast to fixed age-specific limits, would then define the economic support ratio. The recent National Transfer Accounts (NTA) project (http://www.ntaccounts.org) provides the data needed to build such an indicator for several European countries. Based on a common methodology, the NTA project aims to describe the reallocation of resources across ages. Currently, there are 43 countries participating in the NTA project (including 13 European countries[3]). In combination with the recent demographic projections of Eurostat from 2011, the age profiles of consumption and income derived in the NTA project can be applied to yield a new set of economic support ratios. These indicators may be expected to provide the best possible estimates of the consequences of demographic change for the reallocation of resources across ages, assuming the current country-specific social security systems and economic activities continue to prevail in the future.

The data provided by the NTA project can also be used to estimate the demographic dividend that might materialize if the age structure of a population changes. A positive difference between the growth rates of the working-age population and the total population constitutes the accounting effect of the demographic dividend (which may be alternatively called the "first" demographic dividend, cf. Mason and Lee 2007). We introduce a modified accounting effect of the demographic dividend which takes into account single years of age-specific weights of income and consumption in the numerator and in the denominator, respectively. A positive accounting effect of the demographic dividend only refers to a temporary economic gain. In contrast, behavioural forces of the demographic dividend that relate to savings, and hence to capital accumulation, might affect the potential for long-term economic growth. However, whether the latter effect materialises will depend on the prevailing social security system. Only if old age retirement induces an increase in savings,[4] which implies the accumulation of productive capital, will these behavioural forces exist.

[3] Since the Italian, Polish, Russian, and Turkish NTA data were not yet finalised, we based our study only on nine of the European NTA countries.

[4] Strictly speaking, an increase in savings may also partly be the result of the accounting effect. This is because when a higher share of the population are of working age the share of savers will also be higher, since people tend to save more during their prime ages; i.e., during their working ages (cf. Bloom and Canning 2011).

These behavioural effects which operate through savings and capital deepening are called the “second demographic dividend” in Mason and Lee (2007). We apply the terminology as introduced by Bloom and Canning (2011), who argued that the accounting and behavioural effects operate simultaneously instead of sequentially.

In this paper, we build upon the NTA project by proposing an alternative set of (economic) support ratios, together with estimates of the demographic dividend for nine (or eight[5]) European countries. The paper is structured as follows. We start with a review of the data and methodology used in section 2. First, we present the recent demographic projections of Eurostat. Next, we offer a brief introduction to the NTA methodology and a summary of the key age profiles of consumption and labour. We then provide a definition of economic support ratios and an introduction to the demographic dividend. In section 3 we combine the age profiles of consumption and labour income with age-specific population projections to simulate the development of the economic support ratio and the demographic dividend over the coming decades. Our simulations are based on a cross-sectional pattern of age-specific consumption and labour income profiles, and do not take into account the changing behavioural effects caused by demographic and institutional changes. Nevertheless, such a shift-share analysis is helpful in highlighting the implications of demographic change, assuming the current life-cycle patterns and institutional arrangements remain the same. Section 4 concludes with a discussion.

Our results indicate that a support ratio that applies fixed age limits may underestimate the challenges of population ageing. In addition to the changing age structure, the variation in economic characteristics across the life cycle is important in determining the support ratio. Based on the refined measures of the support ratio, our results further indicate that the first demographic dividend will turn negative in the future, and that the likelihood that this development will be counteracted by a positive wealth effect through the second demographic dividend is negligible in most European countries.

2. Data and methodology

2.1 Population projections

To project the future economic support ratio and demographic dividends, we applied the most recent population projections generated by Eurostat EUROPOP2010. The

[5] For France not all of the data needed to calculate the savings/wealth effect are available.

projections are available for EU-27 member states and countries of the European Free Trade Association (EFTA), and cover the projection period 2010–2060. We chose to use the Eurostat projections instead of those produced by the United Nations or individual countries because the European context is accounted for in greater detail in the Eurostat projections, and because the assumptions and the technical procedures in the different countries were harmonised to a greater extent in the Eurostat projections than they were in the national projections. The projections EUROPOP2010 were based on the "convergence scenario," which assumed a convergence of fertility (to a value of 1.85) and mortality (assuming a life expectancy at age zero of 92.2 for males and 96.3 for females) across all of the countries considered by 2150. However, these projections were generated only for the period to 2060.[6]

In Figure 1, we have plotted the changing age structure as projected by Eurostat for the NTA countries considered in this paper. For the sake of clarity, we have chosen to present the results for two separate groups of countries: five countries with rather low fertility (Figure 1a: Austria, Germany, Hungary, Slovenia, and Spain) and four countries with relatively high fertility (Figure 1b: Finland, France, Sweden, and the United Kingdom).[7] In all of the countries, the share of young people declined, especially during the 1980s and 1990s. In the future, the share of young people is expected to stabilise at the current level of about 20% in the low-fertility group of countries (Figure 1a), and at slightly above 20% in the high-fertility group of countries (Figure 1b). The share of elderly people (aged 65+) in 2010 was around 17% in all of the countries except Germany, where it exceeded 20%. In all of the countries, the share of elderly people is projected to increase in the future: in the low-fertility group (Figure 1a), an increase to about 30% or more is projected; while in the high-fertility group (Figure 1b), an increase to about 25% is anticipated. Thus, the share of working-age people (aged 20–64 years) is expected to shrink.

For the projections of the economic support ratio and the accounting effect of the demographic dividend, we applied the demographic projections up to 2050. However, for calculating the behavioural forces of the demographic dividend (i.e., the savings/wealth effects) we needed to extend the population projections up to 2300. For this purpose, we assumed that after 2150 fertility, mortality, and migration remain constant at the level reached in 2150. The projection period was prolonged only because of a technical requirement of the calculations.

[6] In all of the subsequent analysis we only present projections until 2050, since most of the projected results stabilise thereafter.

[7] Table A1 in the appendix gives an overview of the change in the age structure.

Figure 1a: Age structure in European NTA countries 1960–2050 (actual data for 1960–2010 and projections for 2011–2050); in percentages

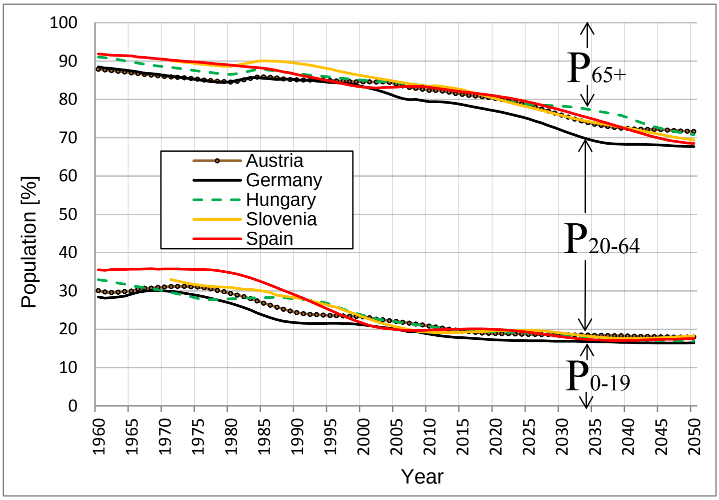
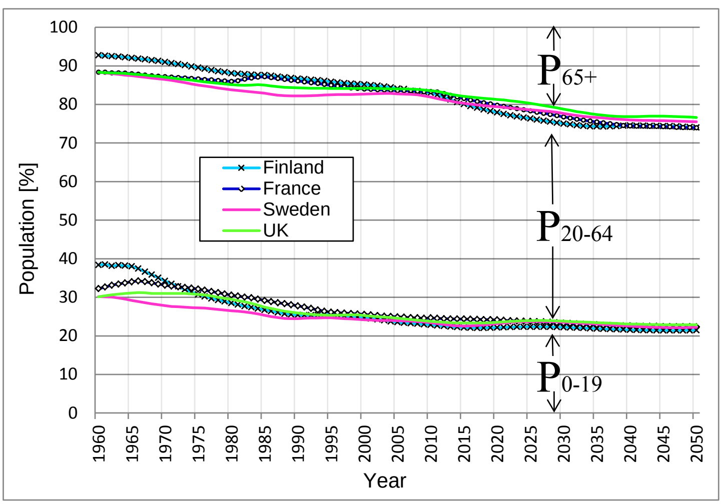


Figure 1b: Age structure in European NTA countries 1960–2050 (actual data for 1960–2010 and projections for 2011–2050); in percentages



Source: Human mortality database; Eurostat, EUROPOP2010; National statistical offices.

2.2 NTA methodology

Changes in the age structure of a population may be expected to have profound effects on both intra- and inter-generational transfers. However, the reallocation of resources according to age will depend on the underlying life-cycle profiles of consumption needs and earned income. A typical life-cycle pattern starts with childhood, a period of economic dependency during which consumption needs exceed labour income; followed by adulthood, a period of economic surplus during which labour income exceeds consumption needs, resulting in a negative life-cycle deficit; and then by retirement, a period of economic dependency during which consumption needs again exceed labour income, resulting in a positive life-cycle deficit. The length and the extent of periods of economic dependency and economic surplus over the life cycle will vary across countries and over time. These life-cycle profiles are profoundly shaped by a country's institutional settings, including the characteristics of its welfare system and its labour market setting, as well as by its overall economic performance. Individual characteristics, such as productivity and ageing, will also determine the life-cycle age profiles of consumption and production.

The National Transfer Account (NTA) project documents the means by which those age groups with life-cycle deficits (the young and the old) draw on the surplus resources of individuals of prime working age (Mason et al. 2009).[8] The inter-age economic flows through which the life-cycle deficit must be financed can have three different forms: 1) public transfers (e.g., publicly provided health care, unemployment benefits, or pensions), 2) private transfers (e.g., parents financing the consumption of their children), or 3) asset reallocation (e.g., savings, interest on bonds, or proceeds from the sale of a house). These flows are mediated by public or private institutions, with the family being the most important private institution (United Nations 2013).

The premise of the NTA project is to synchronise the age-specific profiles of consumption, income, and the reallocation of resources with the System of National Accounts (SNA), a well-established set of international standards. This synchronisation greatly improves data availability and the international comparability of results. Aggregate controls for the NTA categories are thus predominantly taken from the SNA.

The general approach of the NTA is to obtain relative age profiles from surveys, and to adjust these profiles by age-specific population numbers in order to match the aggregate controls taken from the SNA. The categories for which the aggregate controls are not available within the SNA can be estimated directly from survey data. However,

[8] The NTA methodology is being developed in an international project that includes 41 countries. It was initiated by Ronald Lee from Berkeley, UC, and Andrew Mason from East-West Center, Hawaii. For further information see also www.ntaccounts.org.

serious under- or overestimation can occur in such cases, as we have no information about the actual aggregate values.

Because the unit of analysis in the NTA is an individual, all of the inflows and the outflows are assigned to individuals. Data on the private consumption of households are available only at the household level. Various methods are used to allocate the total consumption of the household to individual household members, including regression and equivalence scale methods. In regression methods, the total household expenditures are regressed on the number of household members in each age group. The relative size of the regression coefficients (representing weights for individuals of different ages) is used for allocating household expenditures to individual members within the household. Equivalence scale methods, which follow Deaton (1997), assume an equivalence scale of 0.4 for children aged four or under, a linear increase from 0.4 to one between age four and age 20, and of one for adults aged 20 or older. Some categories of public consumption are allocated according to the observed age patterns of consumption (e.g., public education and health), while others are equally distributed over all ages (e.g., police and defence). Public and private consumption add up to the estimate of total consumption.

For labour earnings, we have data available by 1-year age groups. However, “mixed income” (production of unincorporated enterprises[9] owned by households) is not reported by individuals and it includes both returns to labour and returns to capital. Based on past research (Gollin 2002), the NTA assign two-thirds of the mixed income to labour and one-third to capital. From survey data, we also know which individuals are engaged in unpaid family labour. If we assume that the labour income of self-employed and unpaid workers is proportional to the labour income of employed workers of the same age, we can derive the age profile of the labour returns for the category of mixed income.

Public transfers can be in-kind (e.g., public education, health care, and defence) or in-cash (e.g., public pensions and child allowances). While some transfers are assigned to the individuals who are receiving them (e.g., pensions, public education, and public health), others are assigned to the household head (e.g., child allowances), based on the rationale that the household head is in the best position to decide how these transfers are spent. It is further assumed that the household head is the family member who gives and receives inter-household transfers: i.e., the private transfers the household gives to/receives from other households, such as gifts and various forms of support.

The private consumption of some household members exceeds their disposable income, which consists of an individual’s labour income plus inter-household transfers (in the case of household heads) and public cash transfer inflows, less taxes paid. The

[9] A privately owned business that is not legally registered as a company.

difference between consumption and disposable income, or the life-cycle deficit of these household members is covered through the intra-household transfers from household members who have surpluses of disposable income relative to their private consumption. It is assumed that all household members with a surplus, (i.e. negative life-cycle deficit), help to cover the positive deficit of the other household members proportionally to their surpluses. If the total disposable income of all of the household members is insufficient to finance total household consumption, the household head provides additional intra-household transfers out of asset income, and, if necessary, through dis-saving. If, however, disposable income exceeds household consumption, the excess is transferred to the household head and saved. It is therefore assumed that the household head owns all of the household assets, and that all of the income generated by the flow of assets is given to the head, and that he/she is also the one who dis-saves. Using this approach of covering the life-cycle deficit, we can indirectly obtain estimates of private transfers for which data usually do not exist. This approach also allows us to obtain the age profile of net asset-based reallocation.

Like in the SNA (or following the accounting practices of companies) the various categories in the NTA have equalisation counterparts. Inflows and outflows should match at the individual level, at the household level, and for the whole economy; as well as for each age group. The following balance equation summarises the basic flows considered in the NTA:

$$YL + YA + T_g^+ + T_f^+ = C + S + T_g^- + T_f^- \tag{1}$$

The left-hand side of equation (1) represents the inflow of labour income (*YL*), returns to assets (*YA*), transfer income from the public sector (T_g^+) and transfer income from the private sector (T_f^+). Total outflows on the right-hand side of equation (1) comprise the total (private and public) consumption (*C*), net savings (*S*), transfer payments to the government (T_g^-), and transfers to the private sector (T_f^-). Inflows from the left-hand side of equation (1) have to match the outflows from the right-hand side of equation (1).

Rearranging equation (1) shows the three sources through which the life-cycle deficit (excess of consumption over the labour income) can be financed (where *a* denotes the age group):

$$\underbrace{C(a)-YL(a)}_{\text{Lifecycle deficit}} = \underbrace{\underbrace{\underbrace{T_g^+(a)-T_g^-(a)}_{\text{Net public transfers}} + \underbrace{T_f^+(a)-T_f^-(a)}_{\text{Net private transfers}}}_{\text{Net transfers}} + \underbrace{YA(a)-S(a)}_{\text{Asset-based reallocations}}}_{\text{Age reallocations}} \qquad (2)$$

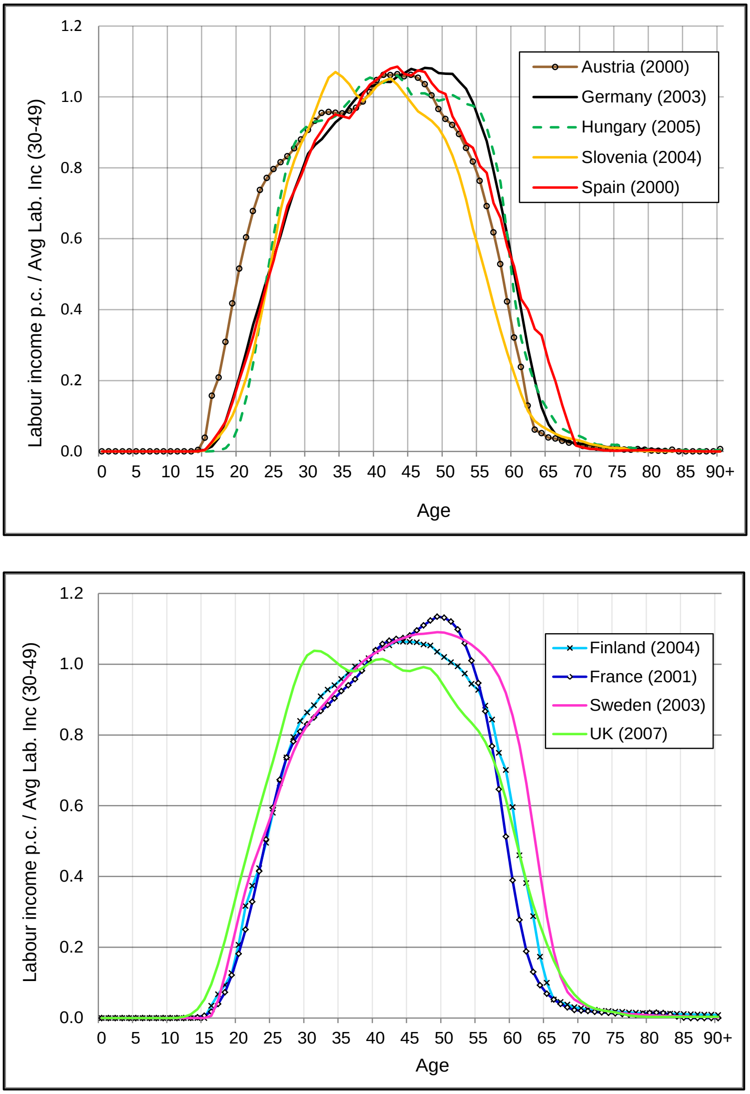
The last two elements on the right-hand side of equation (2) represent the asset-based reallocation. It is special in the sense that it can involve an inter-temporal “exchange.” An asset is accumulated by saving, generating asset outflows. Asset inflows are generated by assets yielding income and by selling assets (dis-saving). Asset-based reallocations thus consist of two flows: asset income, representing an inflow; and saving, representing an outflow. Thus, individuals can also shift resources from one age group to another by shifting resources through time. This shift can occur in both directions: “upwards,” by saving first and consuming later; or “downwards,” by taking out credits that are consumed first and paid off later.

2.3 NTA age profiles of labour income, consumption, and life-cycle deficit

In Figures 2 through 4 we present the age profiles of labour income, consumption, and the life-cycle deficit for all nine of the European countries that have been analysed in the NTA project so far. The results refer to different years for different countries, as indicated in the legends next to the country names. To ensure the comparability of the age profiles across countries, we have chosen to present the relative per capita age profiles using the average of labour income in the 30–49 age group as the reference category. As in Figure 1, the results are presented separately for two groups of countries that differ in their levels of fertility.

Figure 2 exhibits the characteristic hump-shaped age profile of labour income. Austria clearly stands out at the young end of the age profile: people in Austria tend to enter the labour market at young ages, as indicated by the steep increase in labour earnings at young ages. Slovenia stands out at the other end of the age profile: people in Slovenia tend to exit the labour market early, as indicated by the strong decrease in labour income at higher ages. Meanwhile, Sweden has a high labour income profile at higher ages, as workers there tend to exit the labour market at much later ages than they do in the other countries.

Figure 2: Labour income age profile for European NTA countries; presented as labour income per capita relative to the average labour income in the 30–49 age group



Source: NTA project.

Figure 3 presents the age profile of consumption, again in two panels for the same groups of countries as above. The lower levels of consumption among children are mainly driven by the applied equivalence scale, which linearly increases from 0.4 for four-year-olds to one for 20-year-olds. Thereafter, the consumption age profile is relatively stable. Finland and Sweden are exceptional, as they have rather high consumption levels among the highest age groups, particularly of public health care and of long-term care. In all of the countries, the consumption levels of people aged 20–30 and aged 50–60 is higher than it is for the age groups in between. This can be explained by the composition of the household: children are less likely to be living in the households of younger adults (aged 20–30) and of older adults (aged 50–60). Some relatively fixed categories of consumption (especially housing) can therefore be assigned to a smaller number of household members, which makes their per capita consumption higher.

Figure 3: Consumption age profile for European NTA countries; as consumption per capita relative to the average labour income in the 30–49 age group

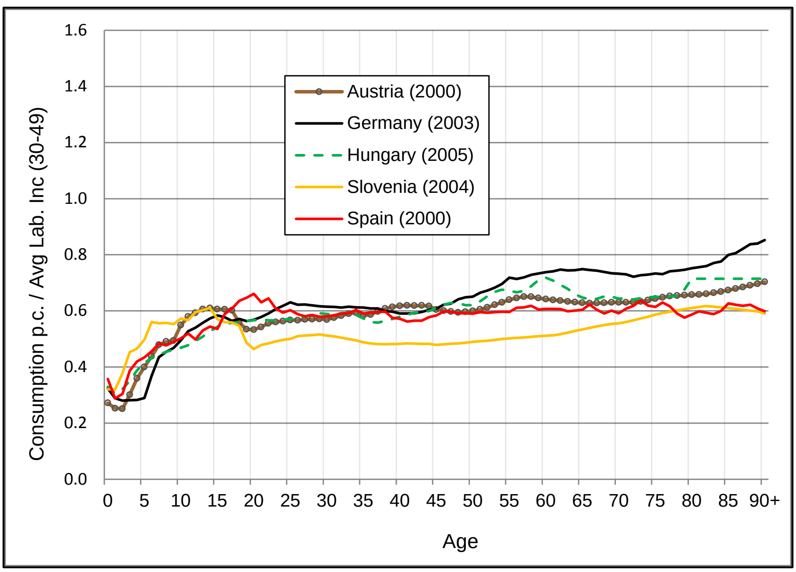
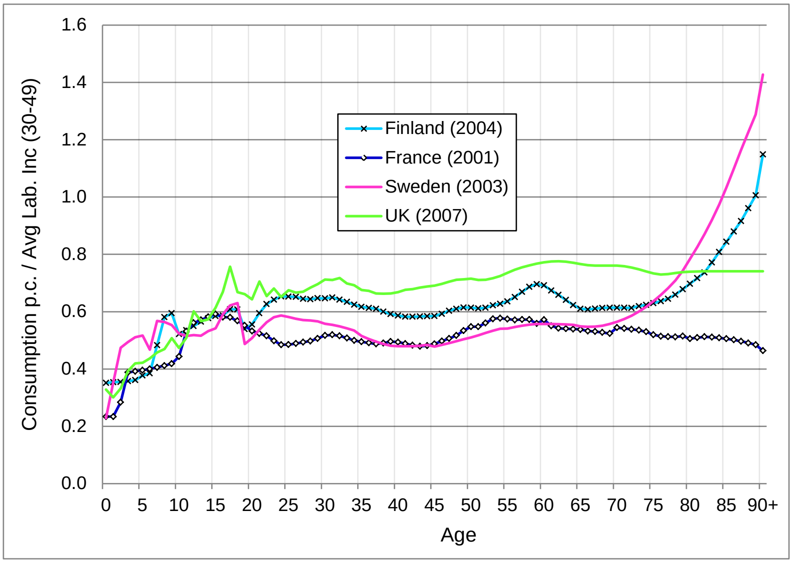


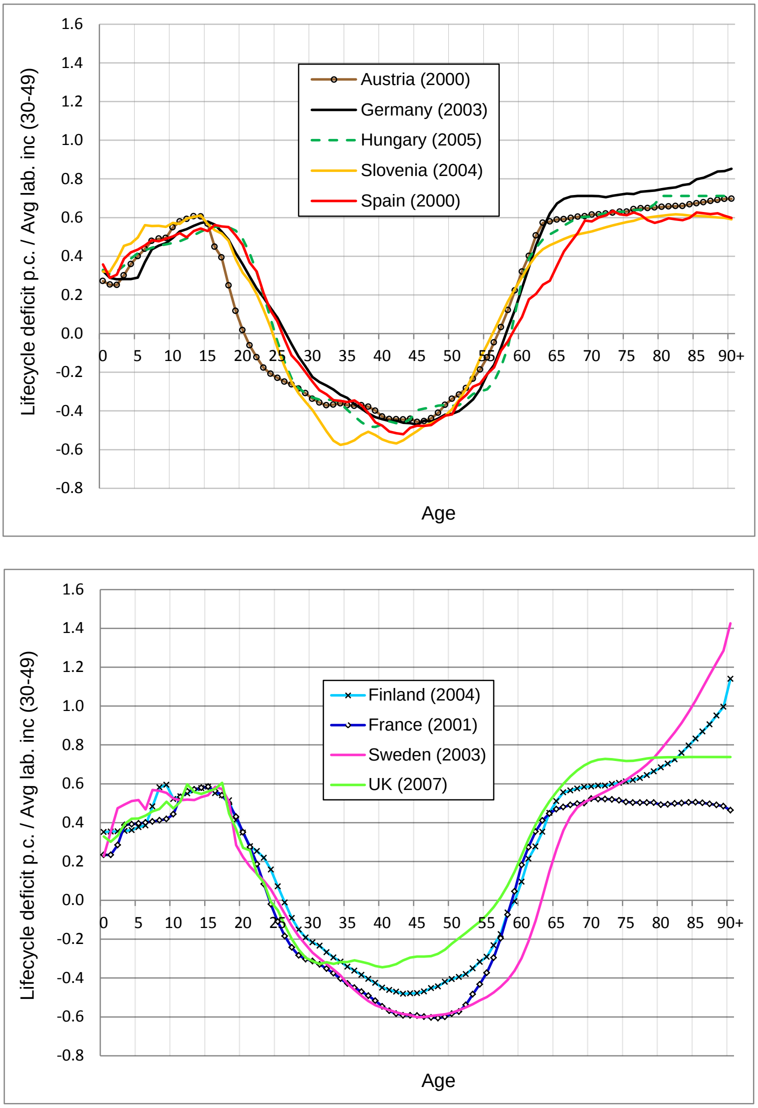
Figure 3: (Continued)



Source: NTA project.

The difference between labour income and consumption, or the life-cycle deficit, is plotted in Figure 4. It is predominantly the labour income age profile that determines the age span during which the life-cycle deficit is negative, as there is a surplus of labour income over consumption. The age span of the negative life-cycle deficit varies from 31 years in Germany (between ages 27 and 57) and Slovenia (between ages 25 and 55) to 38 years in Sweden (between ages 25 and 62). Obviously, the labour market entry and exit ages are key determinants of the economic surplus (negative life-cycle deficit) in a country.

Figure 4: Life-cycle deficit age profile for European NTA countries; as life-cycle deficit per capita relative to the average labour income in 30–49 age group



Source: NTA project.

2.4 Support ratio

To capture the reallocation of resources across generations in a single indicator, the ratio of the share of the working-age population to the overall population can be calculated. This indicator is often called the (economic) support ratio, as it describes the relationship between the people who are supporting the whole economy and the consumption needs of all of the people in the economy. A comprehensive analysis of the support ratio and its relationship to the changing age structure from 1960 to 2065 in the United States was presented by Cutler et al. (1990). They showed four alternative measures of the support ratio that differed with respect to the weights used in the numerator and the denominator of the ratio.

In a first version, they assigned the same weights to all consumers and all producers. The effective labour force (*L1*) was set equal to the number of people aged 20–64, assuming that all of the age groups are equally productive. Assuming that each age group has the same consumption needs, the effective number of consumers (*N1*) equals the total number of the population.

$$L1(t) = \sum_{a=20}^{64} N(a,t) \tag{3}$$

$$N1(t) = \sum_{a=0}^{\omega} N(a,t) \tag{4}$$

where $N(a,t)$ represents the number of people in age group a at time t, and ω denotes the maximum length of life. The change in the ratio of the effective number of the labour force (*L1*) to the effective number of consumers (*N1*) is therefore equal to the difference in the growth rate of the working-age population and the population growth rate. This is how the support ratio is conventionally defined.

In a second version, Cutler et al. (1990) proposed an alternative measure of the effective labour force (*L2*) and the effective number of consumers (*N2*). To obtain *L2*, individuals between ages 15 and 80 were weighted by the a) average age specific (in five-year age groups) earnings of people in the labour force, and b) forecasts of age-specific labour force participation rates. To build up *N2,* consumption weights for three broad age groups (0–19, 20–64, and 65+) using specific equivalence scales were applied.

Based on the alternative measures of effective consumers and effective labour force, Cutler et al. (1990) simulated four different versions of the support ratio—*L1*/*N1*, *L1*/*N2*, *L2*/*N1*, *L2*/*N2*—for the period 1960 to 2065. They concluded that the projected demographic change in the US would be beneficial (as evidenced by an increase in the support ratio) until about 2010. Thereafter, the changing age structure—fuelled by the departure of the baby boom generation from the labour force—would lead to a lower support ratio. For about 2030 to 2060, they predicted a moderate continued deterioration in the support ratio (Cutler et al. 1990:14). Measures of the support ratio based on *N2* showed a much more pronounced decline than an unweighted measure of effective consumers.

In our analysis, we applied NTA age profiles for labour income and consumption (normalised on the per capita labour income of people aged 30–49, as explained below) to obtain the effective labour force (*L2*) and the effective number of consumers (*N2*). Unlike Cutler et al. (1990), we could base our measures on single years of age profiles. Moreover, the NTA age profiles we chose to use were more comprehensive than the weights used in Cutler et al. (1990), and were based on a rich set of disaggregated sub-categories.

$$L2(t) = \sum_{a=0}^{\omega} \gamma(a) N(a,t) \tag{5}$$

$$N2(t) = \sum_{a=0}^{\omega} \alpha(a) N(a,t) \tag{6}$$

where $N(a,t)$ represents the number of people aged a in year t; $\gamma(a)$ represents an age-specific, time-invariant vector of productivity that is based on the NTA age profile of labour income scaled by the unweighted average of labour income between 30 to 49 years of age[10]. Similarly, $\alpha(a)$ represents an age-specific, time-invariant vector of consumption that is based on the NTA age profile of consumption, scaled again by the unweighted average of labour income between ages 30 and 49. ω denotes the maximum length of life. This provides us with an improved version of the support ratio that takes into account detailed consumption needs and the productive capacity at each age. We refer to this improved version of the support ratio as the “NTA support ratio.”

2.5 The demographic dividend

To measure the effect of changes in the population age structure on per capita income growth, the accounting and behavioural effect of the demographic dividend can be calculated. The accounting effect of the demographic dividend is related to the NTA

[10] Normalising on the per capita labour income of persons aged 30–49 is a standard approach in NTA analyses for comparing the results across countries. See, for example, Mason and Lee 2011.

support ratio, and is represented by the growth rate of the support ratio. This effect will be positive (negative) when the effective number of producers is growing faster (slower) than the effective number of consumers.

Typically, during the intermediate phase of the demographic transition when the fertility rate starts to fall, there are fewer dependent children who have to be supported. In that period, the number of working-age people grows faster than the number of children, and the share of elderly dependent people has not yet increased. During this phase, more resources for investment in economic development and family welfare are available. If all other factors are equal, per capita income will grow faster (Mason and Lee 2007). During this period the demographic dividend is positive.

The positive accounting effect of the demographic dividend is limited to a certain period. When the cohorts born during the fertility decline start to enter the labour market, the growth in the labour force slows, and the labour force may even start to shrink. Meanwhile, the presence of the more numerous pre-transitional cohorts, who also experience rising life expectancy over time, leads to an increase in the share of elderly people. If the labour force participation rates are not adjusted accordingly, per capita income growth will slow, and the demographic dividend will become negative.

There is, however, another impact of the changing population structure, which has until recently gone almost unnoticed by researchers focused on the accounting effect of the demographic dividend (Mason 2005): i.e., that during the ageing process the labour force increasingly concentrates in higher age groups. Rapidly increasing longevity can be a strong incentive for people to accumulate assets for their retirement. As Mason (2005) has argued, increasing life expectancy and the accompanying increase in retirement duration can lead to an upward shift in the age profile of wealth.

Whether savings increase depends on the prevailing institutional context. Only if the prospect of a longer retirement and a longer life leads to an increase in savings, and thus in capital accumulation, will these behavioural forces of the demographic dividend materialise. If the social security system in old age is inadequate or absent, people will save to support their consumption at old age, to finance bequests, and to be able to finance other uncertain events. The demographic dividend may then also be a consequence of investment in assets, such as personal savings, housing, and funded pensions. Hence, people of working age contribute to capital accumulation. However, in some countries the consumption of the elderly is predominantly financed through familial or public transfer programs. When this option exists, the incentive to build up asset wealth is reduced or even vanishes. Relying on transfer wealth for financing consumption at older ages does not yield corresponding benefits. Mason and Lee (2007:130) put these arguments together nicely: “The mechanism by which assets are shifted across age groups is important because it determines whether population aging leads to the accumulation of assets or to the expansion of public and private transfer programs."

The accounting and the behavioural forces of the demographic dividend can formally be derived starting from the following decomposition of consumption per capita (Mason and Lee 2007:133):

$$\frac{C(t)}{N(t)} = \frac{C(t)}{Y(t)} \cdot \frac{Y(t)}{L(t)} \cdot \frac{L(t)}{N(t)} \tag{7}$$

where $C(t)$ denotes total consumption, $Y(t)$ is total labour income. $L(t)$ and $N(t)$ are the effective number of producers and the effective number of consumers, respectively. Note that $L(t) = L2$ from Equation (5) and that $N(t) = N2$ from Equation (6). The term $C(t)/N(t)$ is denoted as consumption index $\bar{c}(t)$, while the term $Y(t)/L(t)$ (i.e. $\bar{y}(t)$) is denoted as the labour income index in Mason and Lee (2007).

The accounting effect of the demographic dividend is captured by the growth rate of the support ratio L/N; i.e., the last term in equation (7). If the first two product terms on the right-hand side of (7) were not affected by demographic change, a change in the support ratio would translate into a proportional change of consumption per capita. However, as was argued in Mason and Lee (2007), a change in the age structure of a population will also affect the consumption per output level (C/Y). If C/Y decreases when the support ratio increases, savings will increase.

We can write equation (7) in growth terms:

$$\hat{C}_N = \hat{C}_Y + \hat{Y}_L + \hat{L}_N \tag{8}$$

where a hat on top of a variable denotes the growth rate and the subscript denotes the numerator of the variable under consideration; e.g., C_N indicates consumption per capita. The rate of growth of consumption relative to income (called the second demographic dividend in Mason and Lee 2007) is given as follows:

$$\hat{C}_Y = (\hat{C}_N - \hat{Y}_L) - \hat{L}_N \tag{9}$$

The term in brackets on the right-hand side of equation (9) gives the "extent to which consumption per equivalent consumer C_N rises relative to productivity changes

Y_L induced by technological innovation" (Mason and Lee 2007:144). The growth rate of L_N constitutes the accounting effect of the demographic dividend. [11]

Estimating the savings increase as induced by the demographic dividend involves calculating the accumulation of wealth, which is intrinsically forward-looking. The life-cycle wealth of all adults in a specific year can be derived (Mason and Lee 2007:136ff) by summing up the current and all of the future consumption levels, minus the sum of the current and all of the future income levels of these adults. To build up these forward-looking levels of consumption and income, an exogenously fixed growth rate of consumption over age and an exogenously fixed growth rate of technology (in case of income) is applied, together with a time discount factor that reduces future levels of consumption and income. To obtain the life-cycle wealth, it is necessary to solve for the feasible consumption level, such that the results of the individual decisions are consistent with the aggregate asset flow $A(t+1)=(1+r)A(t)+Y(t)–C(t)$ in each time period[12]. According to Mason and Lee (2007:136), life cycle wealth $W(t)$ can be decomposed into assets $A(t)$ (e.g., private savings and funded pensions), transfer wealth to children $T_k(t)$ (the present value of the current and the future costs of child-rearing, which is negative), and pension transfer wealth $T_P(t)$ (the present value of public pension programs, such as the pay-as-you-go system and public health care):

$$W(t) = A(t) + T_k(t) + T_P(t) \tag{10}$$

The increase in savings depends on (a) the share of family transfers to children $\tau_k(t)=T_k(t)/W(t)$ and (b) on how much of the old age consumption is supported by transfers as opposed to assets $\tau(t)=T_P(t)/(A(t)+T_P(t))$ (where $A(t)+T_P(t)$ is denoted as pension wealth). The higher the share of family transfers to children (as opposed to public transfers), the more wealth is required from people for financing the consumption of their children. Analogously, if the elderly finance a large share of their consumption through asset-based reallocation, people need to accumulate more wealth during their working years to pay for retirement.

As was argued in Mason and Lee (2007:134), it is important for the macro-economy "whether that wealth is created by expanding transfer programs or accumulating assets." Only in the latter case will savings and capital deepening

[11] It should be noted that Mason and Lee (2007: 144) pointed out the difference between the growth rate of consumption per capita and output per worker as the growth rate of the consumption index. However, since the ratio of consumption to the total population was already denoted as index of consumption and the ratio of the output to the workers was denoted as labour income index, we did not choose to follow their notation.

[12] As described in Mason and Lee (2007:141), two methods can be used to solve for the time path of asset accumulation. The first method uses forward recursion to find a solution, whereas the second method uses backward recursion. In the analysis we chose to use the backward recursion.

increase. Like Mason and Lee (2007), we assumed that the shares of private asset accumulation among family members and of old age consumption are exogenously given. In Table 1, we have presented these two shares for the countries included in our study, together with the age span during which the life-cycle deficit is negative; i.e., when income exceeds consumption.

Table 1: Age span in which the LCD is negative; the share of private transfers in total transfers to children and the share of asset-based reallocation in financing the consumption of the elderly

Country	Age span in which LCD is negative	Children τ_k	Elderly τ
Austria (2000)	21–56	51	14
Finland (2004)	26–59	44	11
Germany (2003)	27–57	64	45
Hungary (2005)	25–58	48	0
Slovenia (2004)	25–55	64	15
Spain (2000)	26–58	69	51
Sweden (2003)	25–62	60	3
UK (2007)	24–56	71	69

Source: NTA project.

The age span during which the LCD is negative is quite heterogeneous across the European countries we studied, as is the reallocation of private resources across generations (Table 1). Private transfers to children as a percentage of total wealth transfers are lowest in Finland, at 44%; and are highest in the UK, at 71%. On the other end of the life cycle, it is again the UK that has the highest share of private transfers, with 69% of total pension wealth financed through private asset reallocation. In Hungary and Sweden, by contrast, only negligible shares of retirement financing come from private pension wealth transfers.

3. Results

Using the cross-sectional age profile of NTA consumption and income, together with the actual population data until 2010 and recent demographic projections by Eurostat from 2011 onwards, we present the results of the support ratio and the demographic dividend for nine (or eight) European countries.

3.1 Support ratio

Following Cutler et al. (1990), Figure 5 presents the four variants of the support ratio: *L1/N1, L2/N2, L1/N2,* and *L2/N1*. The NTA support ratio, *L2/N2,* which applies the actual NTA labour income and consumption profile by countries, was our preferred measure. However, we have also plotted *L1/N1* to show how this widely used indicator—which is the conventionally defined support ratio—differs from the NTA support ratio. By also presenting the support ratios in which only the numerator or denominator are weighted, *L1/N2* and *L2/N1,* we aimed to separate the contribution of each component. We chose 2000 as a reference year for calculating changes in support ratios through time. The improvement or reduction in the support ratio is therefore expressed relative to the situation in 2000.

Figure 5: Four alternative measures of the support ratio (relative to 2000); European NTA countries

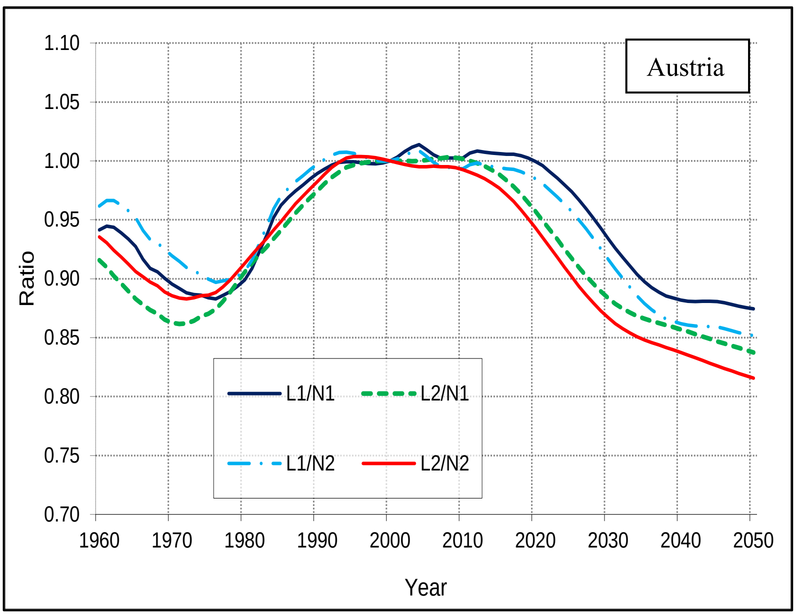
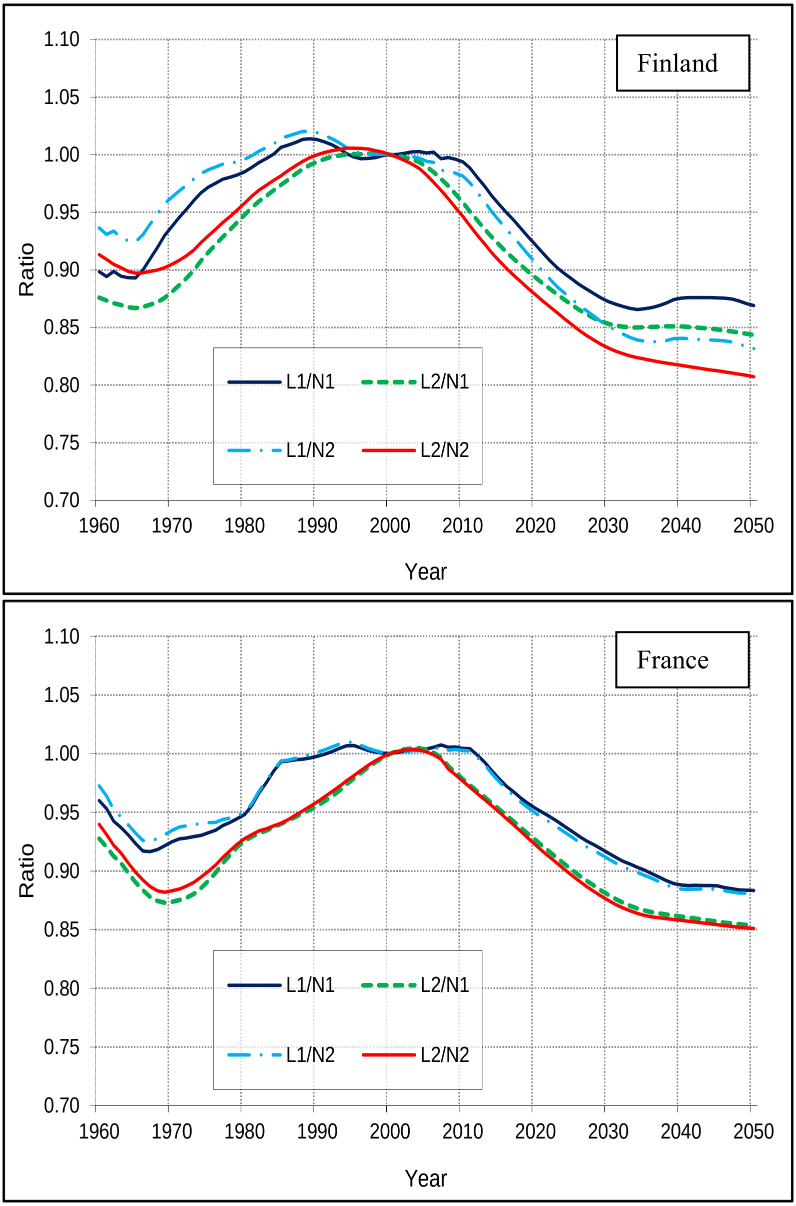


Figure 5: (Continued)



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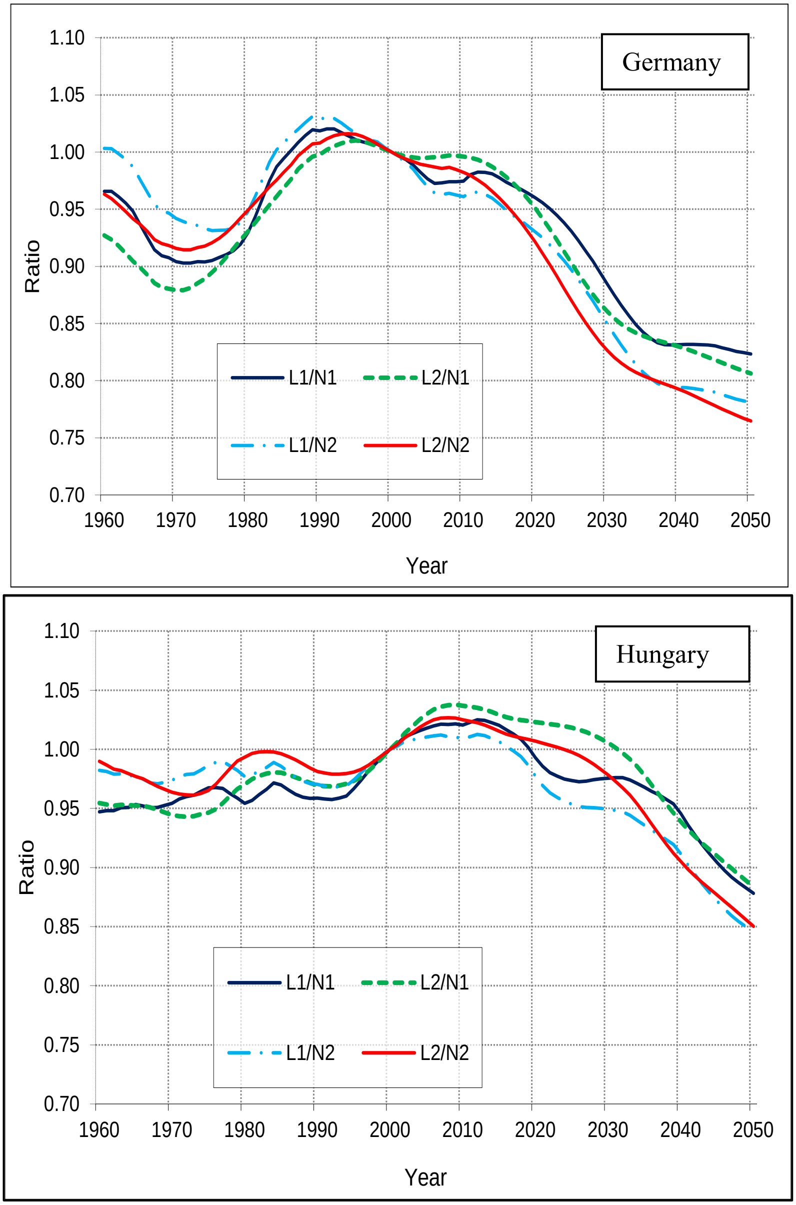

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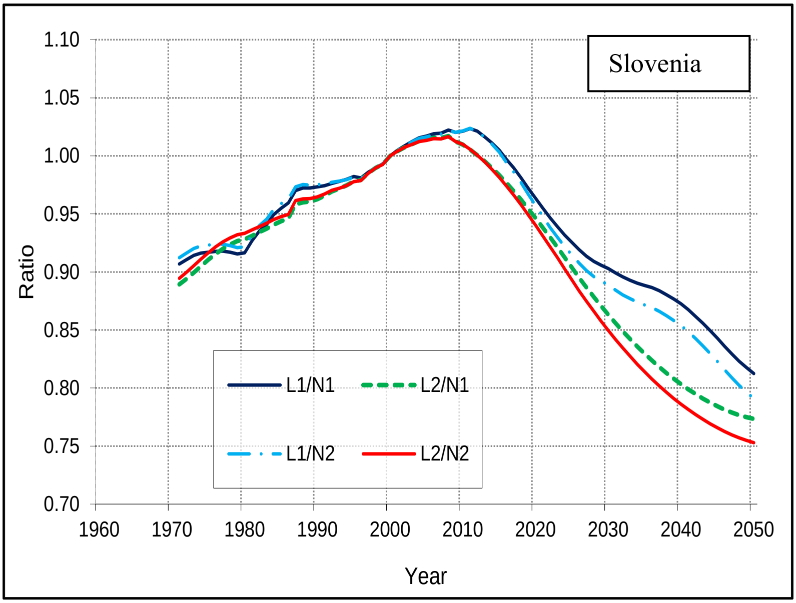

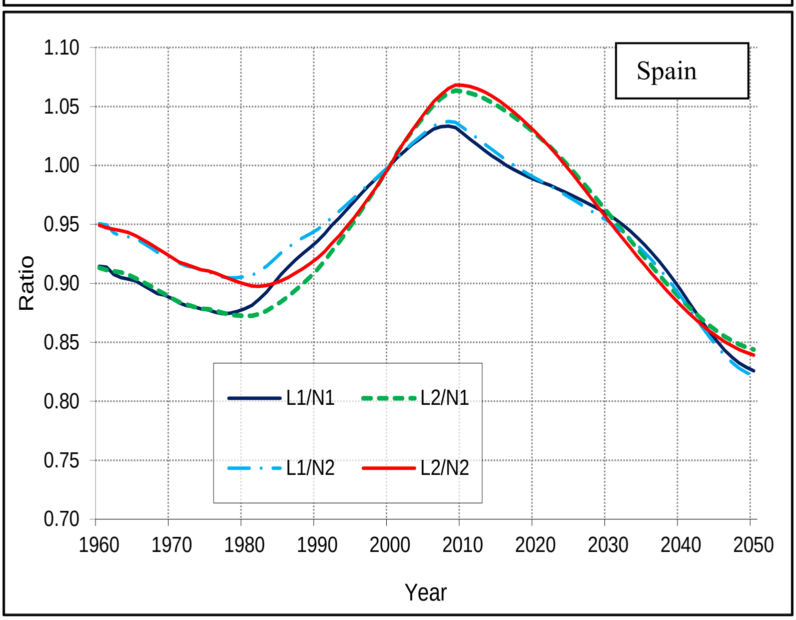

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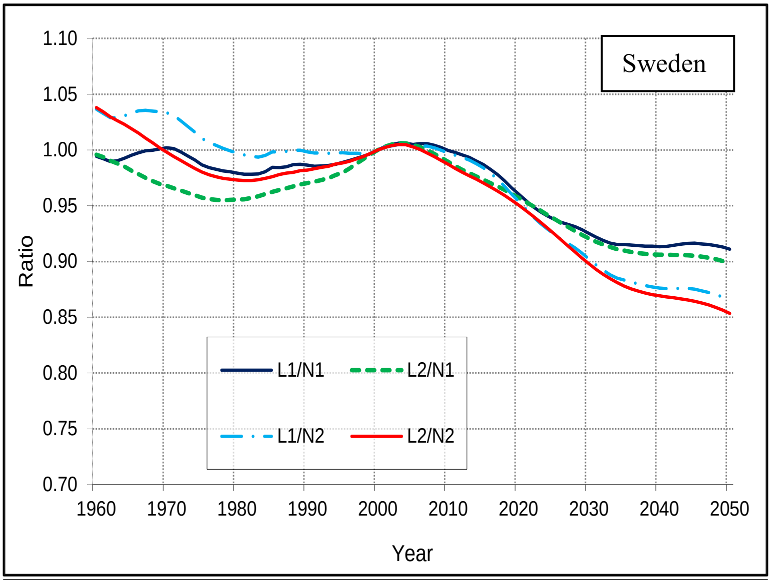
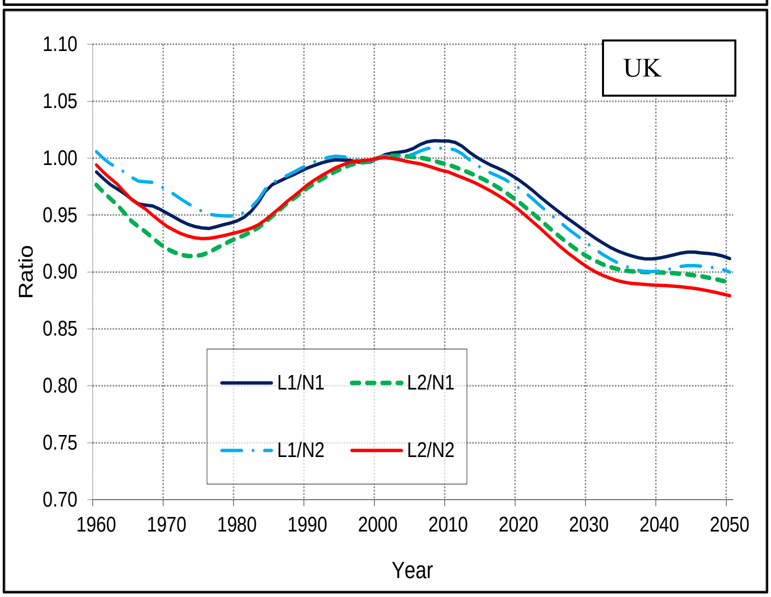




Source: EUROSTAT, EUROPOP2010; National statistical offices; NTA project

For all countries, except Hungary and Sweden (and partly the UK), the support ratio during the last decades indeed showed a decline, followed by an increase. Obviously, this was because the baby boom generation, who were born in the 1960s, increased the denominator of the support ratio through their higher consumption needs. After the baby boom generation entered the labour force and cohorts of lower fertility followed, the support ratio started to increase again. In Hungary, the baby boom in the 1950s was followed by a fertility decline during the 1960s, and a further baby boom (an echo from the 1950s) during the 1970s. Thus, in Hungary the support ratio did not decline during the 1960s, as there were no baby boomers putting pressure on the consumption needs (the denominator of the support ratio). As the baby boomers of the 1950s entered the labour force, a second baby boom in the 1970s put pressure on consumption needs. These two forces cancelled each other out, and explain why Hungary did not experience a pronounced increase in the support ratio, as was observed for the other countries. Consequently, the development of the support ratio between 1960 and 2000 was relatively smooth for Hungary. Late and repeated (echo) episodes of high fertility also smoothed out the support ratio in Sweden and partially in the UK. Projections up to 2050 indicate that the support ratio will decline in all of the countries during the coming decades as a consequence of the changing age structure, and given the current age profiles of effective consumption and labour income. The decrease in the support ratio will be strongest for Germany and Slovenia, where a decline of almost 25% up to 2050 is projected. France, Hungary, Sweden, and the UK are the countries that will experience the smallest decline in the support ratio by 2050; i.e., of about 15% compared to 2000. Austria, Finland, and Spain lie between these two groups. With the exception of Spain, the conventional measure of the support ratio that applies fixed age limits, ignoring age-specific consumption needs and labour input, would underestimate the decline in the support ratio. Moreover, the timing of the decline in the support ratio changes when the age profiles of consumption and income are taken into account. Hence, in addition to the projected demographic change, the country-specific age patterns of consumption and labour income will further depress the support ratio in the coming decades. A comparison of the support ratios *L1*/*N2* and *L2*/*N1* that alternatively apply weights for age-specific consumption or labour indicates the importance of those two profiles. In Finland, Germany, Hungary, Spain, and Sweden, it is mainly the consumption age profile that intensifies the demographic pressure. For Austria, France, Slovenia, and the UK, the current age-specific pattern of effective labour mainly amplifies the demographic burden.

In Figure 2 we have shown that in Sweden people tend to stay in the labour market much longer than in other countries. The support ratios in the other countries could improve by following the Swedish example. In Figure A1 (Appendix) we have presented simulations of support ratios for each country, in which we assumed a gradual adjustment (until 2050) of age-specific labour income profiles (from the base year given in Figure 2) towards the profile we observed in Sweden in 2003. In particular, we postulated for each age group a linear adjustment between the base year and 2050. For those age groups for which individual countries already had higher values of labour income than Sweden (these were mainly the lower age groups), we kept the values. As in Figure 5, we have presented the development of the support ratio relative to the base year 2000. The solid lines indicate these new support ratios, while the dashed lines refer to the support ratio in which we keep the country-specific patterns of labour income, as in Figure 5.

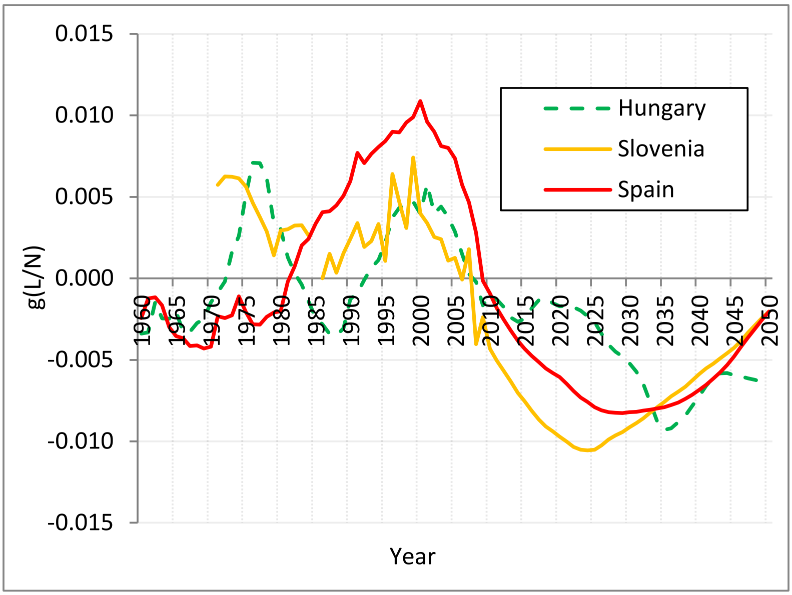
For all of the countries except Germany, the newly calculated support ratios did not show a decrease of much more than 5% between 2000 and 2050. In addition, the change in the labour income profile postponed the onset of the decline in the support ratios for countries like Slovenia, Spain, Hungary, and Austria by 10 to 20 (in the case of Austria) years. Hence, by increasing the labour income profile, the challenge of population ageing would be mitigated and countries would gain time to adjust their welfare policies accordingly. But for Finland, France, the UK, and Germany, the increase in the labour income profile would not be sufficient to counteract the on-going decline in the support ratio during the coming years.

3.2 Demographic dividend

3.2.1 The accounting effect

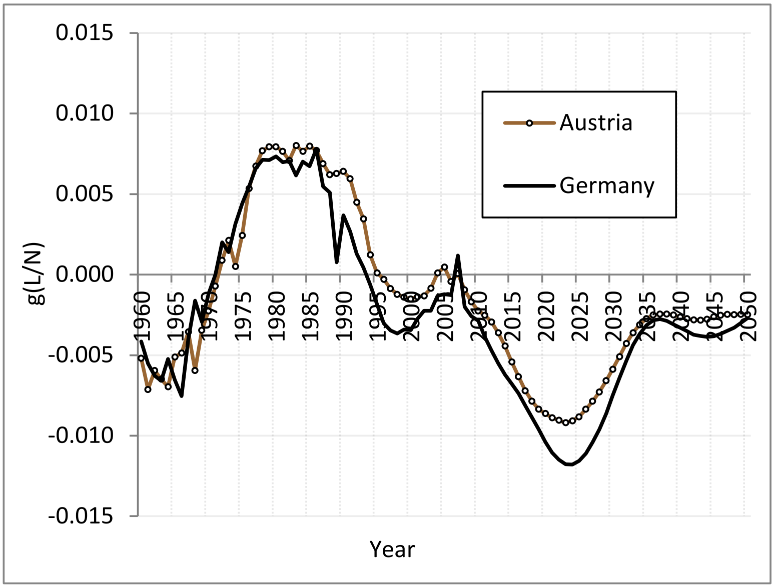
In Figure 6 we have plotted the annual rate of change of the effective number of workers, minus the effective number of consumers (the rate of change in the NTA support ratio, *L2*/*N2,* as given in Figure 5 above) for nine European NTA countries; i.e., we considered only the accounting effect of the demographic dividend. We have presented separately the results for high-fertility countries and for German-speaking countries. All of the countries show pronounced fluctuations in the growth rate in the NTA support ratio. The births of the baby boom cohorts in the 1950s and 1960s, together with the births of the small cohorts during and after the Second World War, induced a decline in the growth rate of the NTA support ratio. Starting in the early 1970s, when the baby boom generation entered the labour force and small cohorts of children followed, the growth rate of the NTA support ratio became positive for most countries; except for Sweden and Spain, where it did not turn positive until the early 1980s. For Hungary, the pattern was quite varied, with a short period of positive growth during the 1970s, followed by a decline in the early 1980s, and another period of positive growth in the early 1990s. The pattern in Slovenia was also unusual, showing a positive growth rate up to 2005.[13] By the end of the 1990s/beginning of the 2000s, the growth rate of the NTA support ratio turned negative for all of the countries. The higher consumption needs of the ageing baby boom generation, the entry of the small birth cohorts in the 1990s into the labour market, and the retirement of the baby boom generation in the near future will result in a negative growth rate during the coming decades. In quantitative terms, the growth rates are expected to be smallest in Sweden and largest in Spain.

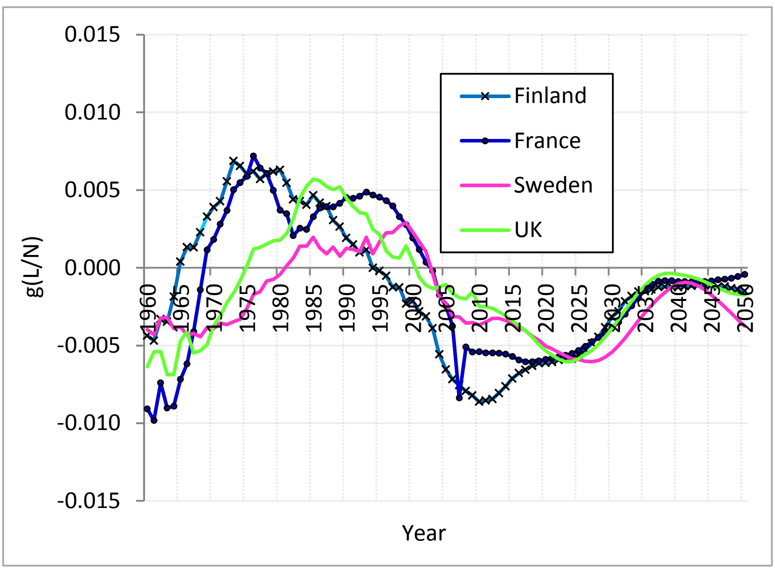
Figure 6: Growth rate of the NTA support ratio by European NTA countries



[13] In Slovenia, the high degree of variation of the growth rates of the NTA support ratio for the past period is partly due to data problems: specifically, a break in the data series caused by switching from the population estimates based on census data (combined with data on mortality, fertility, and migrations by age) to the Central Population Register as the population data source. We therefore removed the "spike" in 1985 from Figure 6.

Figure 6: (Continued)

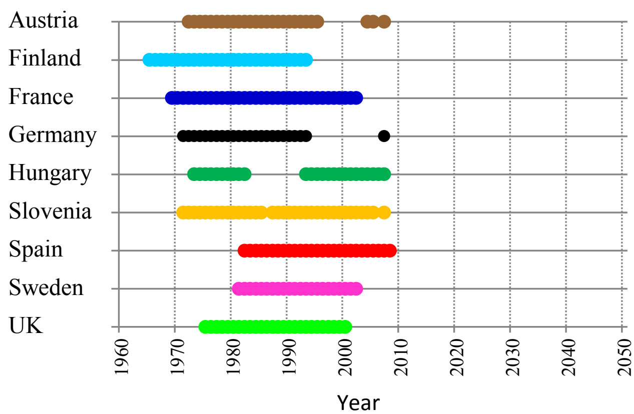




Source: EUROSTAT, EUROPOP2010; National statistical offices; NTA project.

In Figure 7, we have summarised the results, plotting the time window for which the growth rate of the NTA support ratio is positive. Although there is obvious variation in the beginning and the ending of the period of positive growth rates across Europe, as well as in the length and the quantitative extent of this period, Figure 7 also indicates that all of the countries will have to face a negative rate of growth in the NTA support ratio in the next four decades.

Figure 7: Years in which the growth rate of the NTA support ratio was positive; European NTA countries



Note: For Slovenia only the data from year 1971 on are available, the absence of the line in the period 1960–1970 does not imply a negative nor positive accounting effect.
Source: Figure 6.

3.2.2 The savings/wealth effect

For the subsequent simulations, we applied the procedure that was introduced in Mason and Lee (2007) and was implemented in their Matlab program, which they provided to us. Table 1 (section 2.5) summarises the parameter setting, while Table 2 presents the macroeconomic assumptions. Like Mason and Lee (2007), we assumed a discount rate of 3%, a depreciation rate of 3% (Mankiw, Romer, and Weil 1992:414), an international real rate of return on assets of 6% (Barro and Sala-i-Martin 1995:124) declining linearly to a steady-state level of 4.42% in 2300 (Mason and Lee 2007:143), and productivity growth of 1.5% (a long-term productivity growth rate of 1.5% is used, for example, by European Commission 2012:24 and 2000:24) (all measured as annual growth rates). All of the simulations were based on the time horizon from 2010 to 2300. In Figure 8, we have presented only the results for the time period 2010 to 2050.[14]

Table 2: Parameters used in the simulation

Parameter	Value of the parameter
Discount rate	3%
Depreciation rate	3%
Real rate of return	6%, gradually declining to 4.4% in 2300[15]
Technological growth	1.5%

For each country, we have presented two panels. In the first panel (a), we plotted the time series of the level of the consumption index in relation to the index of labour income, as given by the ratio $(C/N)/(Y/L)$, together with the support ratio L/N and the share of consumption in total income C/Y. We always based the calculation of C and Y on the effective number of consumers and effective number of producers, respectively. In the second panel (b), we plotted the underlying asset accumulation that generates the time series of wealth. These include the share of pension wealth to total labour income (Wp/Y), the share of assets in total labour income (A/Y), and family transfers to children as a share of total labour income (T_k/Y).

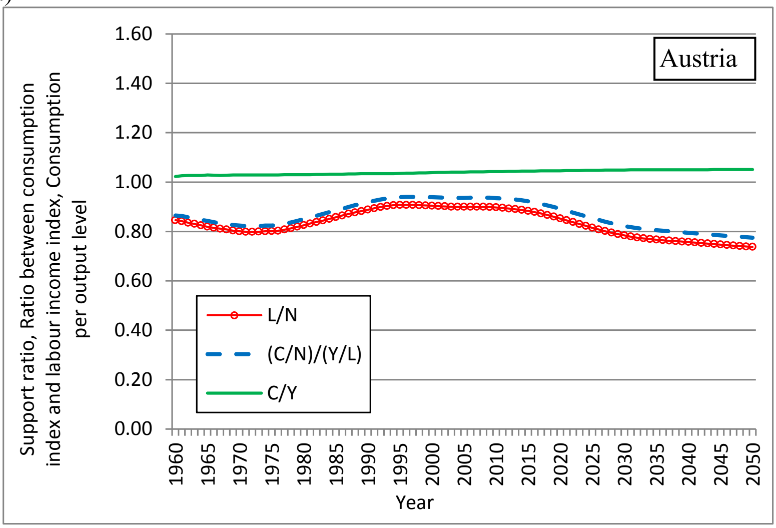
For most of the countries, the level of the consumption index was shown to be close to the level of the support ratio (panel (a)), which implied a negligible increase in the level of consumption to income (C/Y). The consumption index was found to exceed the support ratio, which suggests the potential for a positive wealth effect for Germany, Spain, and the UK only. For Germany, the accounting effect of the demographic dividend turned negative around the beginning of the 1990s, and this was also the point in time when the wealth effect of the demographic dividend became positive. For Spain, the wealth effect set in during the late 1980s, when the accounting effect of the demographic dividend in Spain was still positive. While the accounting effect of the demographic dividend had turned negative by the end of the first decade of the 21st century, the wealth effect of the demographic dividend is expected to stay positive going forward, albeit at a lower value compared to the time when both dividends were positive. The UK was found to have the largest wealth effect (starting from around 2008) among all of the countries studied. Especially during the coming decade (2012–

[14] For France, the required data about the private and public transfers are not available; therefore we could not calculate the wealth effect.
[15] For details see Mason and Lee 2007.

2022), when the accounting effect is expected to be negative, the wealth effect will be highest in the UK.

Figure 8: Components of consumption per capita and wealth flows; European NTA countries

Panel (a)



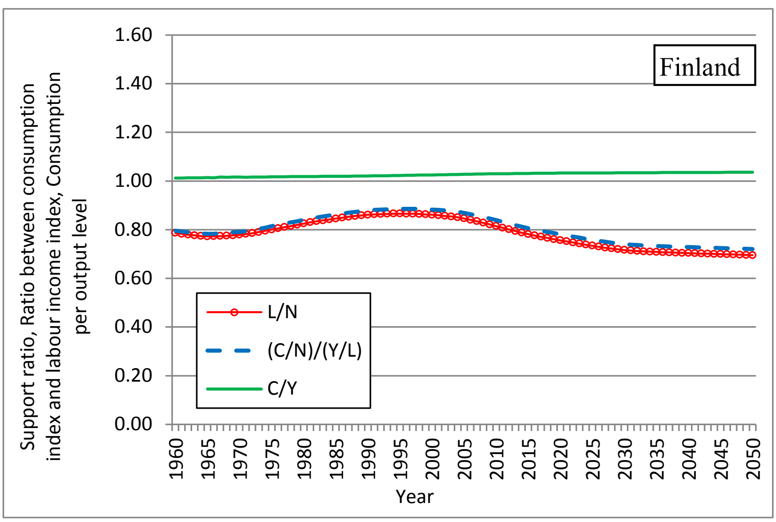
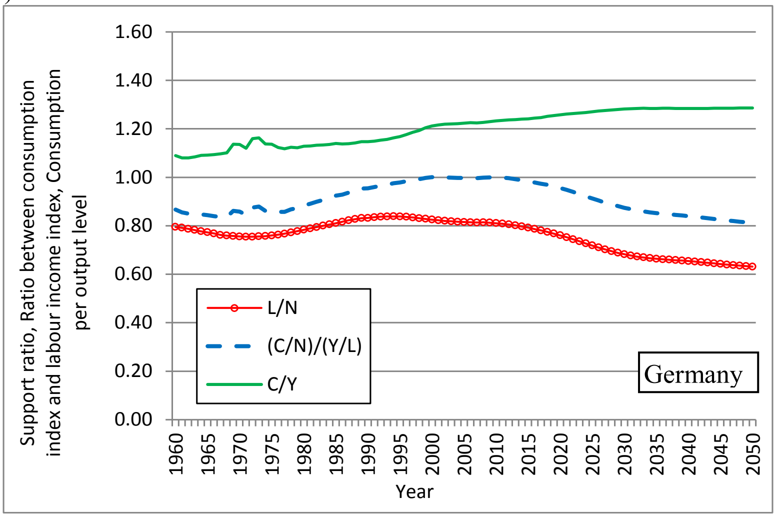


Figure 8: (Continued)

Panel (a)



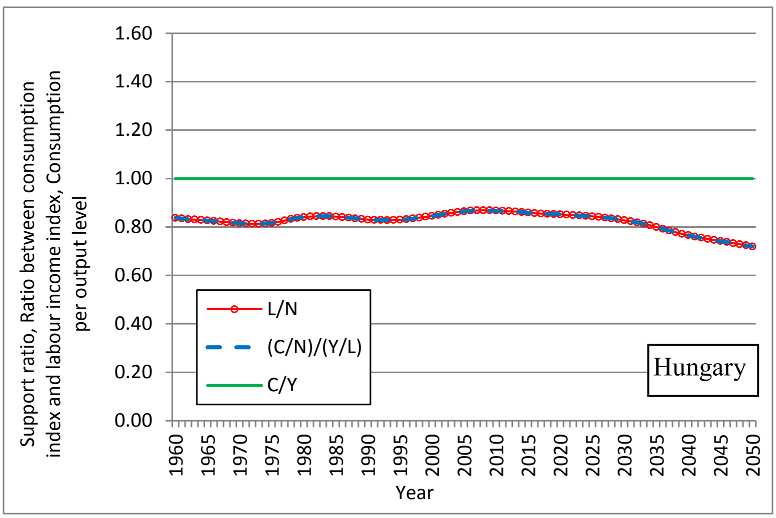
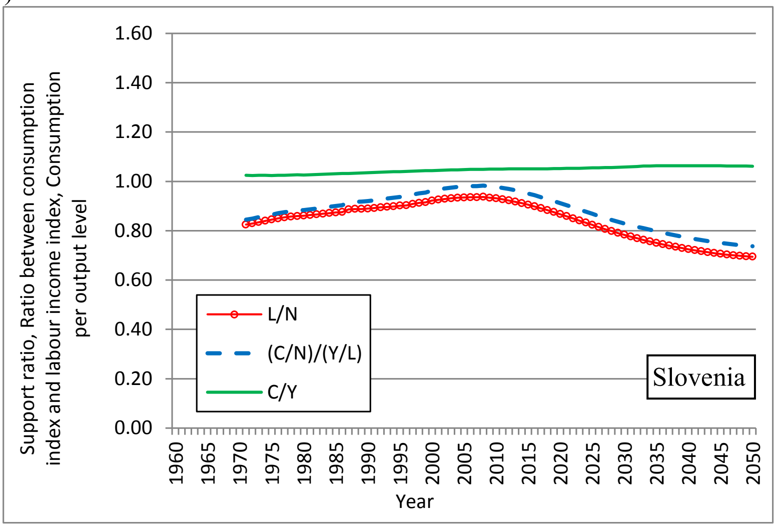


Figure 8: (Continued)

Panel (a)



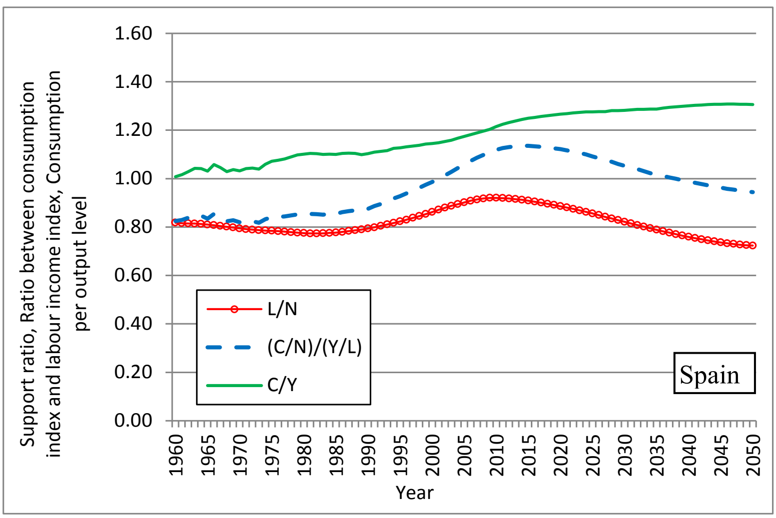
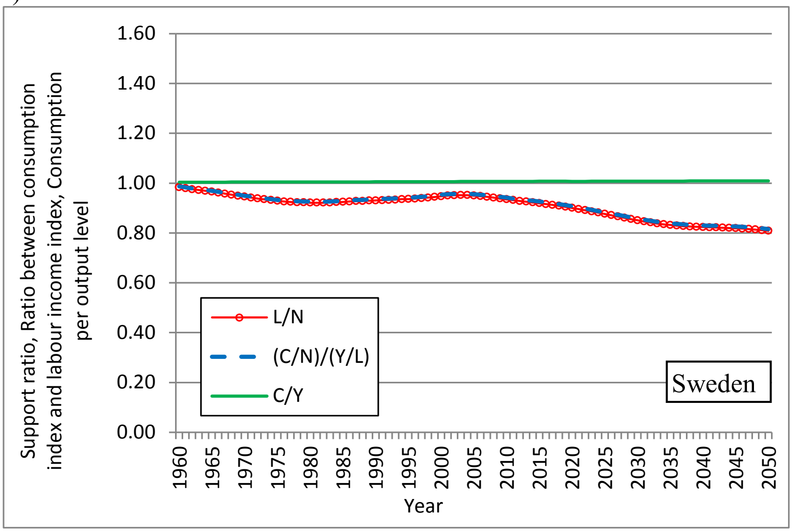


Figure 8: (Continued)

Panel (a)



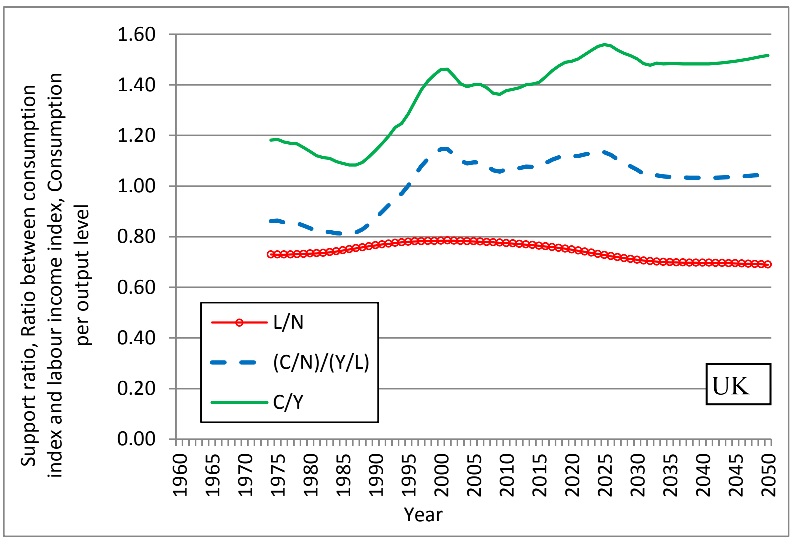
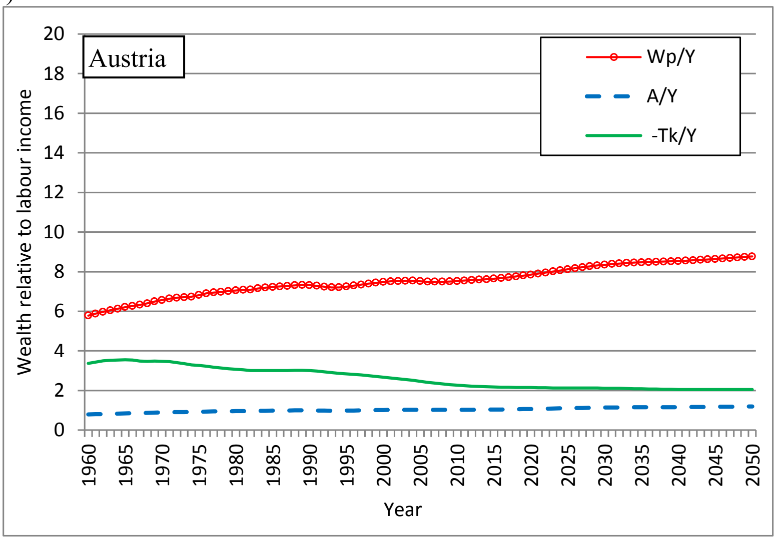


Figure 8: (Continued)

Panel (b)



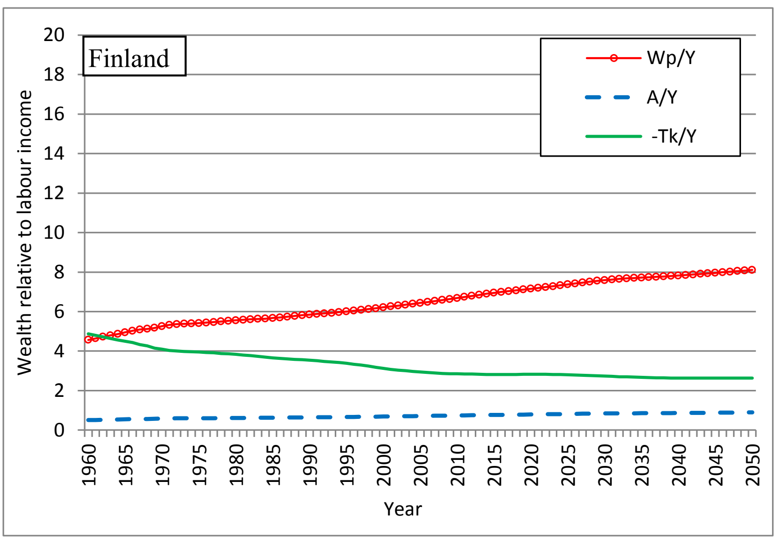
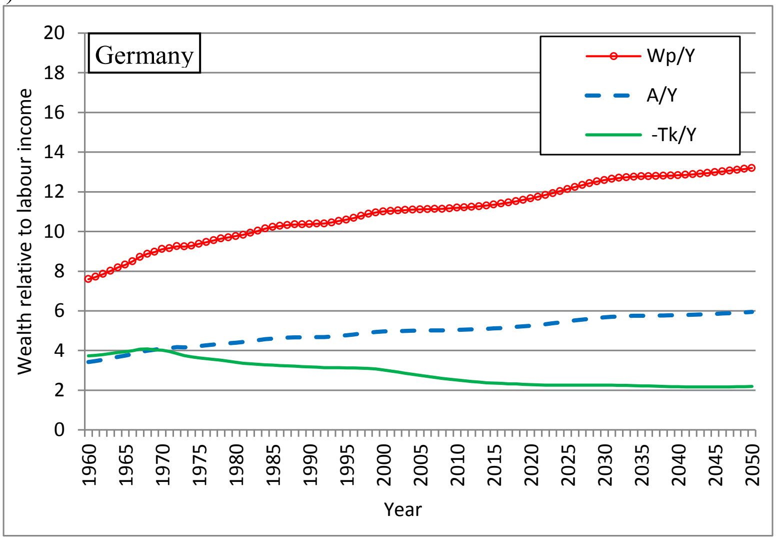


Figure 8: (Continued)

Panel (b)



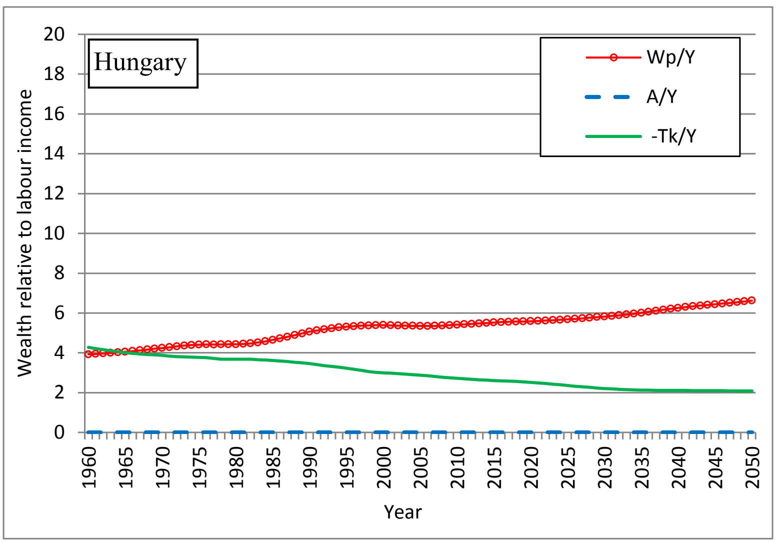
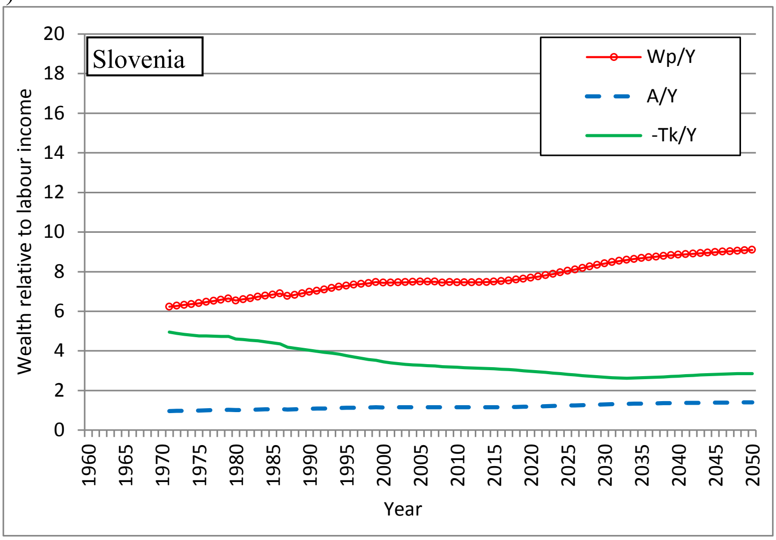


Figure 8: (Continued)

Panel (b)



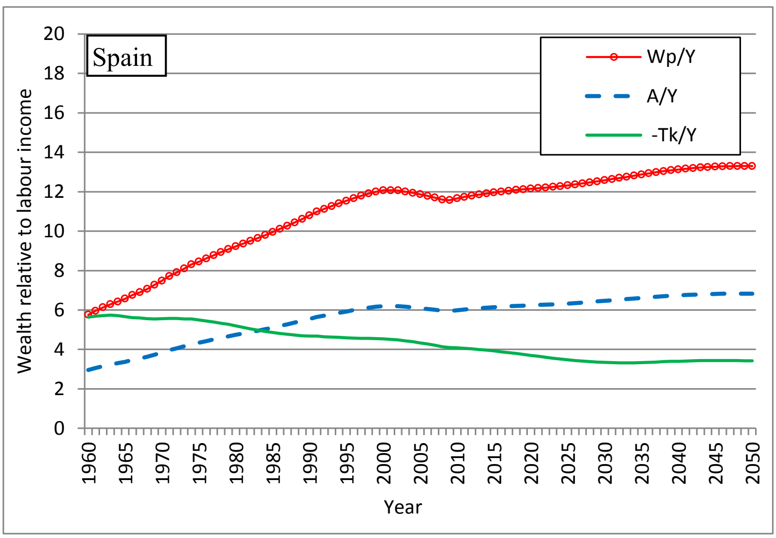
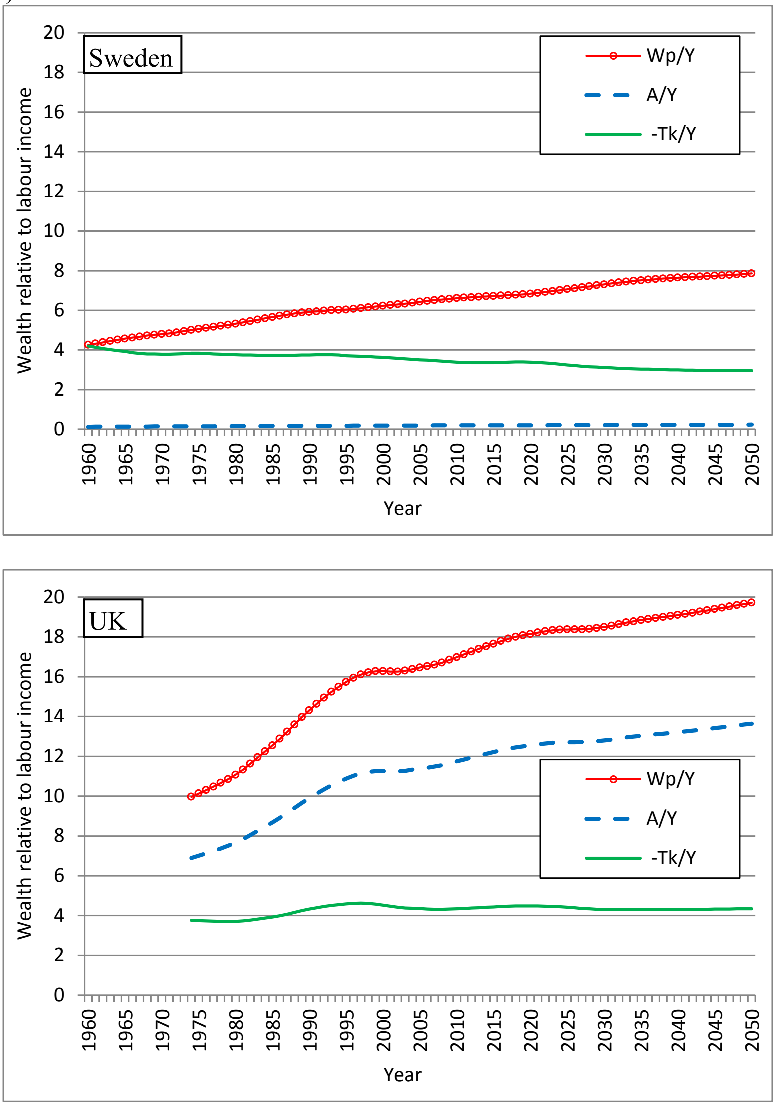


Figure 8: (Continued)

Panel (b)



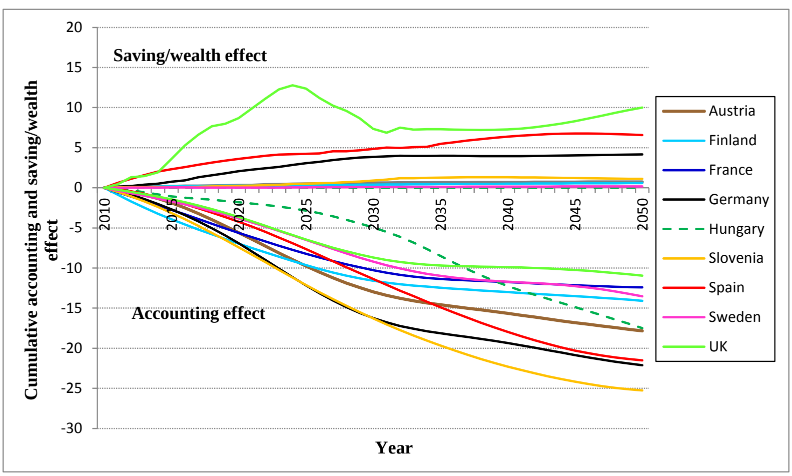
Note: For the UK the data on births by age of mother (that are required to calculate the presented results) are available only from year 1974 onwards.

Source: EUROSTAT, EUROPOP2010; National statistical offices; NTA project.

The transfer of wealth to children has decreased in all of the countries (Panel b in Figure 8), and will continue to decrease. At the same time, the transfer of pension wealth will continuously increase over time. However, the increase in pension transfer wealth has not resulted in a corresponding increase in asset accumulation in most of the countries, except for Germany, Spain, and the UK.

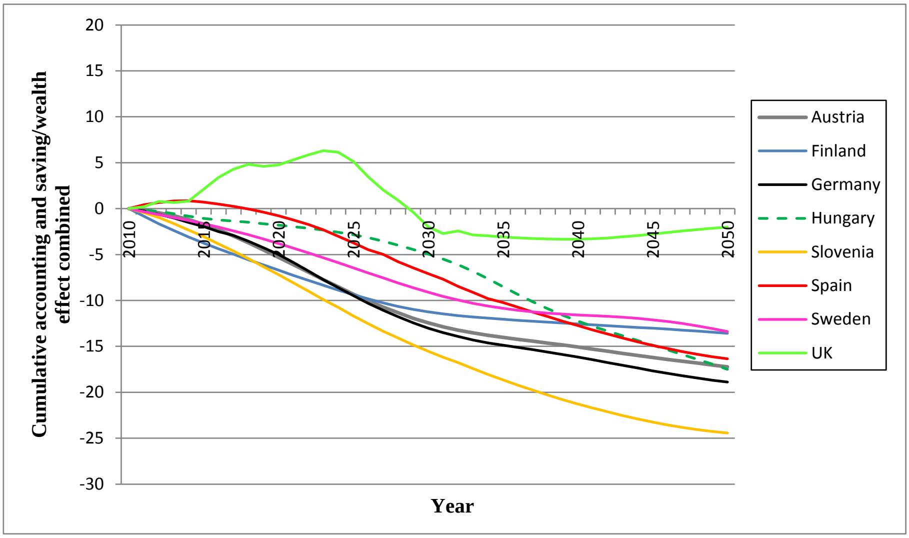
In Figure 9a we have presented the cumulative effect of the accounting and wealth effect of the demographic dividend on per capita consumption from 2010 onwards. The net effect of both effects is given in Figure 9b. For all of the countries, the accounting effect has turned negative and will continue to decline. In the medium term (until around 2020), the difference across countries will be around five percentage points, but is expected to rise to 15 percentage points by the year 2050. For countries like Slovenia, Germany, and Spain, it will become increasingly difficult to counteract the negative accounting effect, given their current age profiles of consumption and labour. Indeed, as Figure 9b shows, although Spain and Germany will experience a positive wealth effect in the coming decades, it will not be sufficient to counteract the decline in the accounting effect. The situation is most severe in Slovenia, where the wealth effect is also almost negligible. Only in the UK will the wealth effect allow for growth in consumption per output in the short run. In all of the other countries, including the UK in the long run, the wealth effect will only dampen the negative accounting effect.

Figure 9a: Cumulative effect of the accounting effect (negative values) and the savings/wealth effect (positive values or zero) on economic development in 2011–2050 for European NTA countries



Source: EUROSTAT, EUROPOP2010; National statistical offices; NTA project.

Figure 9b: Cumulative effect of both accounting and savings/wealth effect combined on economic development in 2011–2050 period by European NTA countries



Source: EUROSTAT, EUROPOP2010; National statistical offices; NTA project.

4. Conclusions and discussion

In this paper, we applied recent age profiles of economic activity (consumption and income) as estimated in the National Transfer Accounts (NTA) project to forecast the role of a changing age structure on the allocation of resources across ages. Instead of using fixed age-specific limits for consumption and labour income, we applied single years of age-specific economic activities in order to take into account the variation of economic life cycles across countries. Hence, the dependent and the active populations were defined by the observed data, and not by fixed age limits, as is usually done in demographic dependency ratios.

First, we applied age profiles of labour income and consumption for European NTA countries to improve the widely used indicator of the support ratio. Instead of using arbitrarily defined weights and age groups, we applied detailed, one-year specific age profiles of actual production and consumption. The difference between this "NTA support ratio" and the conventional support ratio turned out to be substantial for the European countries we analysed. In general, the NTA support ratio is projected to decline more than the conventional support ratio in the coming decades. Germany and Slovenia are the countries with the largest decreases in the support ratio. Low labour force participation levels, together with population aging, explain these results.

The growth rate of the support ratio, the accounting effect of the demographic dividend, is shown to be negative for the next five decades in all of the countries we considered. The cumulative effect is projected to range from –11% for the UK to –25% for Slovenia. While population ageing could induce a positive wealth effect, this is unlikely to occur except in the UK, Germany, and Spain. A positive wealth effect is not anticipated in most parts of Europe because the consumption of the elderly is predominantly financed through public transfers. Thus, there is little incentive to accumulate assets to finance the consumption of the elderly.

When interpreting the results, it is important to bear in mind that the NTA age profiles rest on the data from one year only. The results can be distorted due to specific situations or events in that particular year. It should also be noted that the base year to which the cross-sectional profiles of consumption and income refer differ among the countries studied. This may be a problem if, for example, countries are in different phases of the business cycle during the years selected.

It should also be emphasised that our simulations are based on constant age profiles of consumption and labour income. Constructing actual age profiles for individual years in the past and projecting changes into the future would improve the realism of our simulations. In particular, increasing labour force participation by women, greater educational investment by more recent cohorts, and the lengthening of working lives may lead to an increase in the effective number of producers, thereby alleviating the burden of population ageing. While historical NTA have already been constructed for some countries, investigating these possible trends remains a challenging task for future research.

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Corrections:

On April 24, 2014 two typing mistakes were corrected on pages 977 and 978.

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Appendix

Table A1: Age structure of the population in European NTA countries in selected years (actual data for 1960–2010 and projections for 2020–2050); in percentages

	Age group	1960	1970	1980	1990	2000	2010	2020	2030	2040	2050
Austria	0–19	30.1	31.0	29.3	24.4	23.2	20.8	18.9	18.6	18.2	18.0
	20–64	57.8	55.0	55.2	60.7	61.4	61.5	61.4	57.3	54.1	53.7
	65+	12.1	14.0	15.5	14.9	15.4	17.6	19.8	24.1	27.6	28.4
Finland	0–19	38.4	34.3	28.5	25.4	24.7	22.9	22.2	22.2	21.6	21.4
	20–64	54.4	56.7	59.6	61.3	60.5	60.1	55.8	52.8	53.0	52.6
	65+	7.2	9.0	11.9	13.3	14.8	17.0	22.1	25.0	25.5	26.0
France	0–19	32.3	33.2	30.6	27.8	25.6	24.7	24.1	23.3	22.5	22.3
	20–64	56.1	54.1	55.4	58.3	58.4	58.7	55.7	53.5	51.9	51.6
	65+	11.6	12.8	14.0	13.9	16.0	16.6	20.2	23.2	25.6	26.0
Germany	0–19	28.4	30.0	26.8	21.7	21.1	18.8	17.2	16.9	16.6	16.5
	20–64	60.1	56.3	57.8	63.4	62.2	60.6	59.7	55.0	51.7	51.2
	65+	11.5	13.7	15.4	14.9	16.6	20.6	23.0	28.1	31.7	32.3
Hungary	0–19	33.0	30.0	27.9	27.9	23.6	20.8	19.4	18.4	17.2	16.9
	20–64	58.1	58.6	58.5	58.8	61.4	62.6	60.9	59.9	58.0	53.9
	65+	8.9	11.5	13.5	13.3	15.0	16.6	19.7	21.8	24.8	29.2
Slovenia	0–19	…	*33.0	30.9	28.2	23.2	19.2	19.6	19.0	17.6	18.3
	20–64	…	*57.1	57.7	61.3	62.9	64.3	60.6	56.8	54.9	51.1
	65+	…	*9.9	11.4	10.6	13.9	16.5	19.8	24.2	27.5	30.6
Spain	0–19	35.5	35.7	34.8	28.8	21.5	19.8	20.0	18.0	17.1	17.6
	20–64	56.4	54.7	54.2	57.7	61.7	63.3	60.9	59.1	55.1	50.9
	65+	8.1	9.6	11.1	13.5	16.8	16.8	19.1	22.8	27.8	31.5
Sweden	0–19	30.2	27.8	26.5	24.5	24.2	23.4	23.2	23.5	22.5	22.2
	20–64	58.2	58.6	57.3	57.7	58.5	58.5	56.2	54.1	53.4	53.3
	65+	11.7	13.5	16.2	17.8	17.3	18.1	20.6	22.3	24.0	24.5
UK	0–19	30.1	31.0	29.5	25.9	25.3	23.8	23.5	23.8	23.1	22.9
	20–64	58.2	56.1	55.7	58.4	58.9	59.8	57.8	55.0	53.7	53.7
	65+	11.7	12.9	14.9	15.7	15.8	16.4	18.7	21.2	23.2	23.4

Note: * The data are for 1971.
Source: Human mortality database; Eurostat, EUROPOP2010; National statistical offices.

Figure A1: Support ratios by countries assuming a gradual adjustment (up to 2050) of age-specific labour income profiles towards the profile we observe in Sweden in 2003

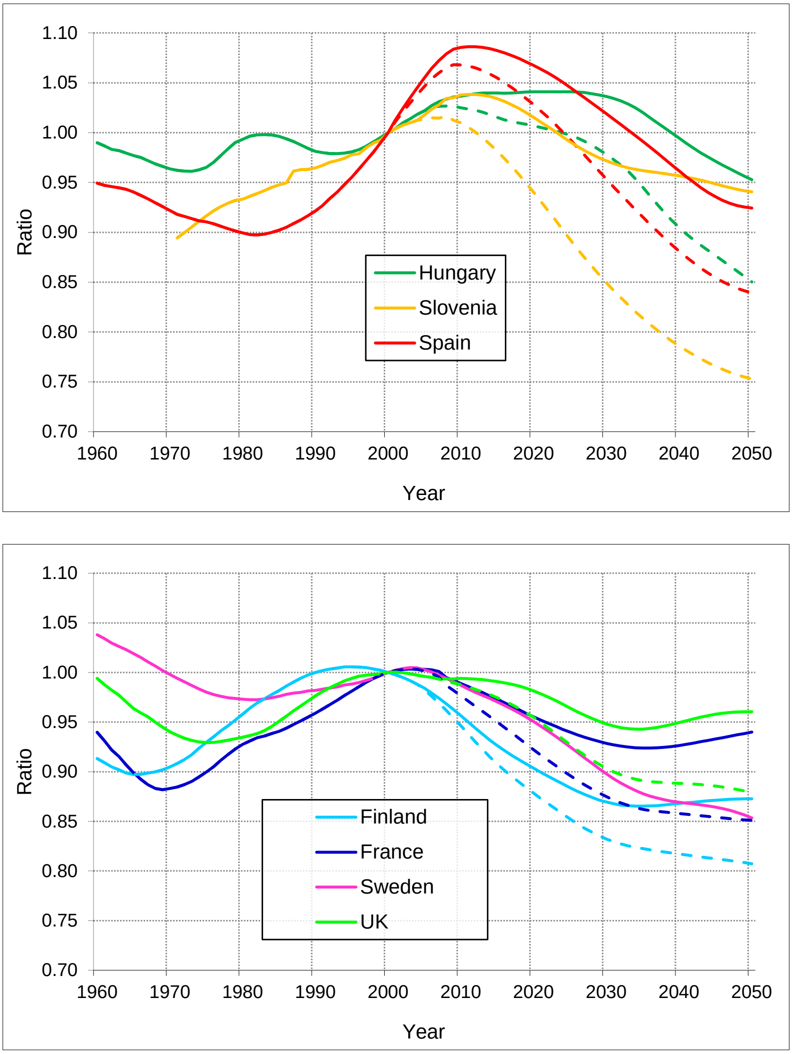
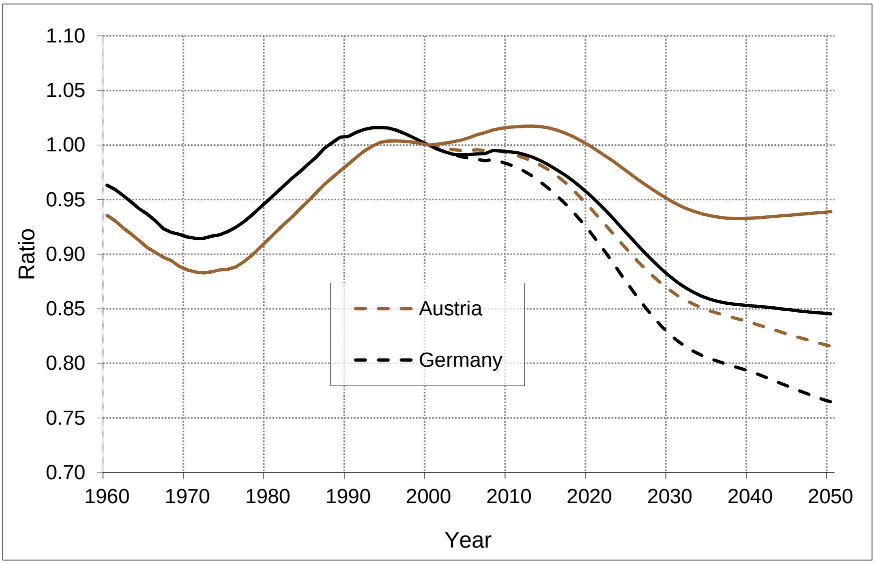


Figure A1: (Continued)



Note: The solid lines indicate new support ratios (in which a gradual adjustment towards the Swedish labour income profile is assumed), while the dashed lines refer to the support ratio in which we keep the country-specific patterns of labour income as in Figure 5.

Source: EUROSTAT, EUROPOP2010; National statistical offices; NTA project.