Measuring Dependency Ratios using National Transfer Accounts

Mikkel Barslund and Marten von Werder

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Abstract

It is now widely recognised that the socio-economic changes that ageing societies will bring about are poorly captured by the traditional demographic dependency ratios (DDRs), such as the old-age dependency ratio that relates the number of people aged 65+ to the working-age population. Future older generations will have increasingly better health and are likely to work longer. By combining population projections and National Transfer Accounts (NTA) data for seven European countries, we project the quantitative impact of ageing on public finances until 2040 and compare it to projected DDRs. We then simulate the public finance impact of changes in three key indicators related to the policy responses to population ageing: net immigration, healthy ageing and longer working lives. We do this by linking age-specific public health transfers and labour market participation rates to changes in mortality. Four main findings emerge: first, the simple old-age dependency ratio overestimates the future public finance challenges faced by the countries studied – significantly so for some countries, e.g. Austria, Finland and Hungary. Second, healthy ageing has a modest effect (on public finances) except in the case of Sweden, where it is substantial. Third, the long-run effect of immigration is well captured by the simple DDR measure if immigrants are similar to the native population. Finally, increasing the length of working lives is central to addressing the public finance challenge of ageing. Extending the length of working lives by three to four years over the next 25 years – equivalent to the increase in life expectancy – severely limits the impact of ageing on public transfers.

Keywords: Public finances, national transfer account, population projection, longer working lives

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1. Introduction

European societies are ageing. According to Eurostat population projections, the median age of the population in the EU will increase from 41 years in 2010 to 46.4 in 2040. At that time 26.9% of the population will be 65 years or older. The well-known causes are increasing longevity and low fertility in European populations. The challenges to public finances, pensions and health care expenditure posed by this development are often framed in terms of the demographic dependency ratio, old-age burden or support ratio – essentially the ratio of older people to the working age population (World Bank, 1994; Cutler et al., 1990).

The old-age demographic dependency burden, often defined as the number of people aged 65+ over the number of people in the 20 to 64 years age group has sometimes been supplemented with the share of very old (defined as the number of 85+ over the working age population) to illustrate that public transfers in the form of health care are particularly large for this age group. Thus, the fact that we tend to live longer is often, at least implicitly, perceived as spelling decline, lower pensions and generally lower welfare.

However, a growing number of authors have recently pointed to the fact that a measure based on chronological age alone is misleading in societies where longevity is increasing substantially with each generation (Sanderson and Scherbov, 2007, 2010 and 2013; Lutz, 2009; Shoven, 2010; Barslund and Werder, 2016). Sanderson and Scherbov (2013) argue that it is more appropriate to use a measure such as prospective age, i.e. remaining life expectancy. Using prospective age, the ratio of old to young can more usefully be calculated by relating the number of people with less than 15 years of remaining life expectancy to the number of people (or some subset thereof) with more than 15 years of remaining life expectancy. Other measures exist that similarly account for changes in longevity (Sanderson and Scherbov, 2013).

Building on this literature, Spijker and MacInnes (2013) have recently gone so far as to call ageing a 'non-problem', at least for the UK. They propose a more dynamic measure – what they call a 'real old-age dependency ratio'. Instead of using chronological age, they relate the number of people with a prospective age of less than 15 years to the number of people in employment, arguing that the development in this ratio better reflects the 'old-age burden' and associated challenges. This can be seen as a dynamic version of the simple headcount demographic dependency ratio where age cut-off points are moved along with improvements in life expectancy. Measured this way, they emphasise that the real old-age dependency ratio has been falling since the 1980s for major European countries. In favour of measuring the old-age burden by a prospective measure of age, such as the real old-age dependency ratio, rather

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than one building on chronological age is the finding that some public transfers depend less on chronological age and more on prospective age. The cost of individual health care is closely related to proximity to death as opposed to years from birth (Felder et al., 2000; Bjørner and Arnberg, 2012).

While acknowledging the broader point, Barslund and Werder (2014) have confronted this measure and, in particular, the value of `backcasting' the real old-age dependency measure. They emphasise that National Transfer Accounts (NTAs) (Mason et al., 2006) show that for many countries pension transfers form the largest part of public old-age transfers until rather late in life. Until recently pension ages in many countries remained unchanged for decades with a downward trend in the average age of retirement (OECD, 2013). The real old-age dependency ratio may be *too* dynamic with respect to implicitly assumed behavioural changes regarding retirement and length of working life, whereas the traditional static old-age DDR is useful in measuring the economic challenges faced by an ageing society without behavioural changes. Moreover, relying only on a dynamic measure risks masking the policy challenge in changing individual behaviour, in particular related to retirement.

Given this background, the contribution of this paper is modest. In essence our goal is to shed light on how NTAs can qualify the discussion surrounding ageing and the old-age burden along three important dimensions related to: health care spending and the concept of healthy ageing, measuring the impact of migration and longer working lives. These are three central building blocks when it comes to meeting the public finance challenges of ageing. In this context we emphasise the usefulness of NTAs to study relative magnitudes of impacts on public finances of different scenarios over a range of EU countries, as opposed to more detailed budgetary impacts provided by single country inter-temporal models (Storesletten, 2000; Schou, 2006; Hansen et al., 2015).

In the course of this exercise we rely on NTAs to provide age-specific government (net) transfers, which allow for a more precise assessment of dependency ratios.[1] It enables us to take account not only of changes in the composition of the population over 65, but also the composition of the working age population, and changes in the number and composition of dependent young individuals. When looking at the effect of healthy ageing and longer working lives, we link transfers to mortality rates via the given age-transfer link provided by the NTAs. In doing so we connect to the literature on prospective ageing and more dynamic dependency ratios (see Mason et al., 2015 for a similar approach). Working at an aggregate multi-country level and with a static framework, we acknowledge upfront the uncertainties surrounding the results. However, with NTAs becoming available for a growing number of countries, and the prospect of country NTAs with different base years and more detailed breakdown of transfers, which allow us to better validate assumptions, the present approach should yield additional insight into the policy challenges of ageing.

As a preview to our results, we find that the simple old-age DDR overestimates the future public finance challenges faced by the countries studied. In some cases, for example Austria, Finland and Hungary, this is significant. Second, healthy ageing – keeping health transfers constant for a given mortality rate – has a modest effect except in the case of Sweden where it is significant. Third, the long-run effect of immigration is well captured by the simple old-age

[1] Public net transfers for a given age group are calculated as the sum of monetary transfers (e.g. public pension) and the value of publicly provided services (e.g. part of health care costs covered by the government as well as e.g. defence spending and spending on the police forces) less taxes and fees paid for the use of public services.

DDR measure if the common assumption of immigrants being similar to natives is maintained. The immediate to short-term impact of immigration tends to be overstated by the simple old-age DDR measure. Finally, increasing the length of working lives is central to addressing the public finance challenge of ageing. By linking government transfers to mortality, we project that extending the average length of working lives by around 3-4 years over the next 25 years – roughly equivalent to the gain in life expectancy – severely limits the impact of ageing on public transfers.

The remainder of this paper is structured as follows: in the next section we briefly describe the concept of National Transfer Accounts and note important caveats that are relevant for our application. This is followed by an outline of the methodology employed. The main results are in section 4. Section 5 concludes.

2. National Transfer Accounts and population data

The population statistics used in this article are the EUROPOP2013 projections produced by Eurostat,[2] covering all 28 EU countries. We use the base scenario, but detailed assumptions on age-specific fertility, mortality and net migration are available to facilitate alternative projections. The projection horizon goes from the base year of 2013 to 2080, although results are presented only up to 2040. They are based on a convergence scenario where the key demographic contributors – fertility and mortality – are assumed to converge towards the same value in the very long run (Barslund and Werder, 2016). Core features are an increase in fertility for most countries (exceptions are Ireland, Sweden and France) and a further increase in life expectancy for all countries with convergence towards the value of low mortality countries. Migration projections are country-specific.

The population projections are paired with NTAs for the seven countries for which they are available from the National Transfer Accounts project (Table 1).[3]

Table 1. Countries covered and reference year

Country	Reference year
Austria	2000
Germany	2003
Finland	2004
Hungary	2005
Slovenia	2004
Spain	2000
Sweden	2003

Source: National Transfer Accounts project.

The concept of NTAs is described concisely and in depth elsewhere (Mason et al., 2006; Prskawetz and Sambt, 2014; UN, 2013). Below we provide only the essential components for our application of them, together with a few caveats.

[2] A detailed description of the EUROPOP2013 projections is forthcoming. A short description is available from Eurostat (2015) and European Commission (2014).

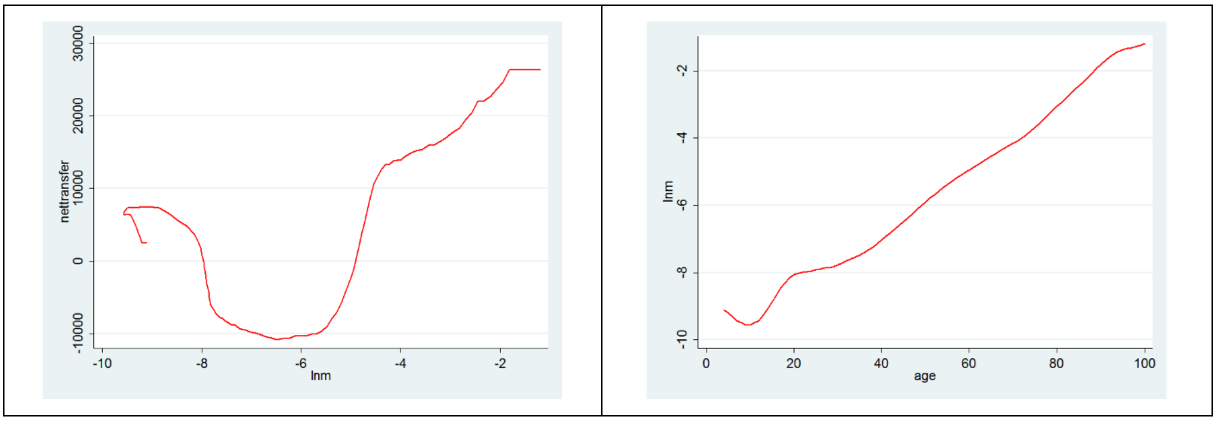
[3] See www.ntaccounts.org and Lee and Mason (2011).

In short, an NTA breaks down the most important aggregate flows on one-year population age groups for a given year. The flows include public and private consumption, income and transfers. The latter flow, transfers, which is the important component from the point of view of our analysis, is further broken down into transfers related to education, health care, pensions and other public and private transfers. This breakdown is done via information from micro surveys. Aggregates are calibrated by reference to related quantities in the system of national accounts.

Using the information embedded in the age profile of public transfers in an NTA, it is possible to give a much more detailed description of the impact of changes in the population composition on the public budget. In particular, compared to the traditionally computed DDR,[4] it is possible to assess the effect of changes in the composition of populations aged 20-64 and 65+. Furthermore, as emphasised in Hammer et al. (2014), the age limits on when an individual is, on average, a net contributor can be endogenously determined from the transfer profiles.

In this study we utilise one additional advantage of NTAs: the one-year age specific transfer profiles allow for a correspondence from mortality (or, almost equivalently, remaining life expectancy) via age to the net transfers in the base year. This allows us to link net transfers (and implicitly health status, retirement behaviour and related labour market participation) to mortality rates in the projection. As an example, Figure 1 shows net public transfers for Germany as a function of (the logarithm of) mortality rates in the base year for the German NTA, together with a mortality age plot. Unfortunately, age-specific transfers are not available beyond the age of 90.[5] We take transfers to be constant beyond that age.

Figure 1. DE net public transfers as a function of mortality (2013)



Note: The RHS shows logarithmic mortality for each age in 2013. The LHS plots net transfers against logarithmic mortality based on the NTA for Germany in 2003 and the RHS plot.

Sources: NTAs and Eurostat.

[4] Throughout this paper, we refer to the DDR – the number of people aged 65+ over the number of people in the age interval 20 to 64 – as the simple DDR, the headcount DDR or the traditional DDR interchangeably.

[5] For Hungary, not beyond the age of 80.

Caveats and limitations

There are important caveats to the use of NTAs. First, because NTAs build on the system of national accounts, they are only available with a time lag. This means that behavioural changes from recent reforms are not reflected in the data. As an example: the NTA from Germany is from 2003 (Table 1) and therefore predates the Hartz reforms and later reforms to the retirement age. Secondly, it is important to understand that they are strictly static in nature. Thus, the underlying assumption behind using an NTA for a given year to assess transfers in the future is that the world will 'stand still'. In addition, our approach does not account for second-order effects from potential changes in equilibrium conditions; the return to capital and labour will change in response to changes in labour supply and capital accumulation. This is, of course, hard to justify for any scenario where the total population changes, but particularly so when measuring the effect of immigration. Thirdly, at present, NTAs are only available for a single year whereas, as is the case for national accounts, flows are subject to business cycle effects and therefore measured transfers are not necessarily structural. There is clearly a need for country NTAs for different years and at different points in the business cycle to assess the sensitivity of projection exercises to the base year. While these are clear limitations, some of them, like dependence of a base year, are not fundamentally different from the challenges posed by the calibration of overlapping generation models.

3. Methodology

The primary objective of this study is to investigate how far NTAs enhance our understanding of the challenges to public finances from population ageing. To this end our approach to measuring demographic and economic dependency is for the most part rather standard. The innovation lies in coupling transfers to mortality rates, as explained below.

Demographic dependency ratios and healthy ageing

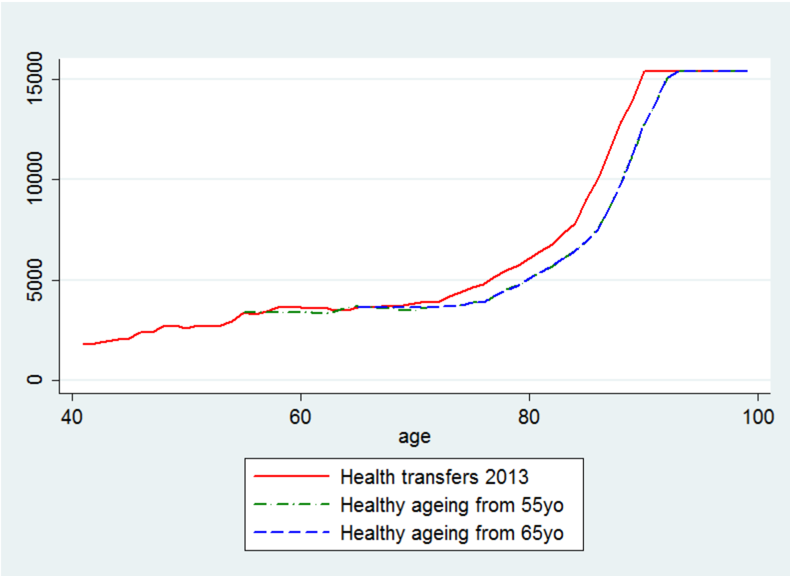
Our baseline DDR measure (SC1) is the traditional count of people above the age of 64 divided by the size of the population between the ages of 20 and 64, i.e. what is normally considered the working age population (Table 2). To compare first with a transfer adjusted measure based on NTAs and second a transfer based measure where health transfers are adjusted for mortality (healthy ageing), we add two additional measures. The first (SC2) takes into account the fact that not only is the size of the older population increasing but its composition will also change towards a larger share of people over 85. This is partly a consequence of increasing longevity and partly because the baby boomers are moving into this 85+ category with time. However, it also accounts for the fact that the age at which net government transfers turn negative lies some years before the age of 65. In addition, the age at which contributions (in public finance terms) turn positive for young people is also endogenously determined by the NTAs. Finally, the NTA-adjusted DDR includes transfers to the young. Thus, if the size of young cohorts is falling, this increases the capacity to sustain a large number of older people from a public finance view.

Table 2. Main scenario definitions

Name	Description	Definition
SC1	Simple head count old-age DDR	$\frac{\text{Population aged 65 and above}}{\text{Population aged } 20-64}$
SC2	NTA transfer weighted DDR	$\frac{\sum_{i=1,..,100} \#pop_i \times net\ transfers_i \times I\{net\ transfers_i > 0\}}{\sum_{i=1,..,100} \#pop_i \times net\ transfers_i \times -I\{net\ transfers_i \leq 0\}}$ Where $\#pop_i$ indicates population at age i, $net\ transfers_i$ are net public transfer at age i, and $I\{.\}$ is and indicator function taking the value 1 if *true* and zero otherwise.
SC3	NTA transfer weighted DDR with health transfers adjusted for mortality	As SC2 but with the health transfer part of *net transfers* fixed for given mortality after the age of 55 or 65. This allows for a projection of health transfers given changes in age-specific mortality rates.

The healthy ageing scenario (SC3) is a variant of the NTA-adjusted DDR. Here healthy ageing takes the form of keeping public net health transfers fixed for a given mortality rate from the age of 55 and over.[6,7] This shifts the government health transfer curve outwards (Figure 2). One important implicit assumption is that there is no age-related component in (publicly financed) health care costs. This is likely to be a best-case scenario (Bjørner and Arnberg, 2012).

Figure 2. Government health transfers for healthy ageing scenarios, Germany



Note: Government health transfers in 2000 and in 2040 for healthy ageing scenarios from respectively 55 and 65 year of age. Health transfers shifted by mortality from the age of 55 are difficult to see in the figure due to the overlap with the 65+ transfer shift line. Line is flat from the age of 90 in 2000 by construction (see main text above).

Sources: NTAs and Eurostat.

[6] Results from a healthy ageing from the 65 years scenario are also presented (see Appendix A), but they are not materially different. For most countries, the age 55-65 is on the relatively flat slope of the transfer curve (see Figure 2).

[7] Shifting along a curve of remaining life expectancies yields qualitatively the same results as with mortality.

Effect of immigration

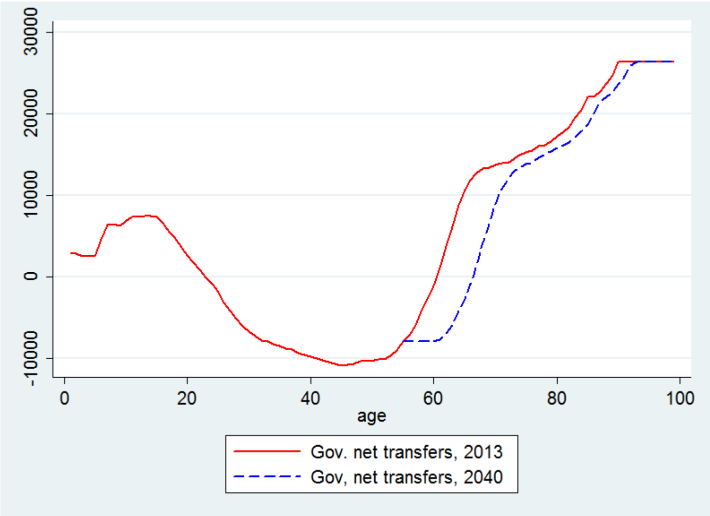
Immigrants tend to be younger than natives and therefore boost the working age population relative to the economically dependent population.[8] This improves the economic dependency ratio, in particular if measured only as the number of older people over the working age population (Pianese et al., 2014). However, this simpler measure omits two important issues: first, immigrants, like natives, have children, which dampens the effect on the overall dependency ratio. Second, the profile of net public transfers is not constant over the working life. Young individuals below age 30 contribute less than 45 year olds because they earn less on average (see Appendix B). Thus, the net contribution by a young immigrant tends to be below the average contribution by the working age population. By using NTAs to capture the net transfers at each age, we are able to address how these two issues affect the impact of immigration on the dependency ratio.

We supplement the simple demographic dependency ratio for the scenarios with and without projected migration with the NTA transfer adjusted DDR (SC2, above) and calculate this for both the migration and non-migration projections.

Longer working lives

In contrast to much of the literature on ageing and economic sustainability, the focus here is not implicitly on the retirement age. Instead, we seek to simulate a shift in retirement behaviour that follows projected developments in mortality. In practice this is achieved by linking total net government transfers to mortality for those aged 55 and over (Figure 3). The procedure is similar to the healthy ageing scenario described above.

Figure 3. Net government transfers by age, Germany



Note: Government net transfers in 2013 and 2040.

While it is a somewhat arbitrary choice, the age of 55 is the age after which labour market participation started to drop off markedly at the time of the reference year (Table 3).[9] Furthermore, one way to interpret the proposed shift is to think of reforms which increase the

[8] Under the standard assumption that immigrants are similar to natives in educational composition, labour market participation, health, etc.

[9] Labour market participation and employment rates are presently generally higher.

effective retirement age in line with the projected increase in mortality (life expectancy) without further pension compensation at retirement. We emphasise that this should not be interpreted as a projection since there has been no historical movement in labour supply response following decreasing mortality (Milligan and Wise, 2015). Rather, it is an estimate of the policy challenge.

Table 3. Labour market participation at ages 50-54 and 55-59 in reference year for the NTA

		Labour market participation rates		**Employment rate**	
	Year	50-54	55-59	50-54	55-59
Germany	2003	81.4	65.9	74.3	56.4
Spain	2000	66.5	52.7	61.8	48.9
Hungary	2005	71.1	47.4	68.3	46.0
Austria	2000	77.7	49.4	74.3	47.4
Slovenia	2004	75.3	45.4	71.2	43.9
Finland	2004	86.2	65.4	80.1	58.5
Sweden	2003	87.5	81.6	84.9	78.4

Sources: Eurostat.

4. Results

DDRs and healthy ageing

The first thing to observe is that the simple headcount old-age DDR measure overestimates the public finance impact of ageing for all countries in the long run (2040), see Table 4. For some countries, namely Austria, Finland and Hungary, the difference is significant. The reasons are: the NTA transfer adjusted measure (SC2) takes the young into account and the young dependent population either declines (in some cases substantially) or increases much more slowly than the older dependent population. This slows down overall growth in the population requiring net government transfers. Second, for the countries considered in this study, government net transfers turn positive between the ages of 56 to 63 years. This age group is included in the NTA measure but not in the simple old-age DDR, which reduces the growth in transfers even if the share of 85+ year olds is growing (Table 5). This effect would diminish by setting the age limit for the simple DDR to 60 instead of 65. The difference in the denominator plays a smaller role, except for Spain, where negative net transfers from the working age population declines much faster than the headcount measure of 20 to 64 year olds (i.e. the denominator in the old-age DDR measure).

The second thing we note is that there can be substantial differences in the short term. For Austria, the simple DDR considerably underestimates the population-driven changes in government transfers, whereas for Spain, Hungary and Finland the opposite is the case.

Table 4. DDRs and the impact of healthy ageing

		2013	2020	2030	2040
Austria	Simple DDR	1	1.09	1.39	1.69
	NTA based DDR	1	1.13	1.40	1.53
	Healthy ageing (NTA-based)	1	1.12	1.38	1.51
Germany	Simple DDR	1	1.13	1.48	1.82
	NTA based DDR	1	1.15	1.51	1.71
	Healthy ageing (NTA-based)	1	1.14	1.46	1.63
Finland	Simple DDR	1	1.26	1.48	1.48
	NTA based DDR	1	1.12	1.23	1.27
	Healthy ageing (NTA-based)	1	1.11	1.21	1.24
Hungary	Simple DDR	1	1.20	1.39	1.59
	NTA based DDR	1	1.05	1.15	1.40
	Healthy ageing (NTA-based)	1	1.04	1.14	1.37
Slovenia	Simple DDR	1	1.26	1.68	1.96
	NTA based DDR	1	1.21	1.54	1.77
	Healthy ageing (NTA-based)	1	1.19	1.49	1.68
Spain	Simple DDR	1	1.17	1.52	2.05
	NTA based DDR	1	1.12	1.46	1.94
	Healthy ageing (NTA-based)	1	1.10	1.42	1.84
Sweden	Simple DDR	1	1.11	1.21	1.29
	NTA based DDR	1	1.07	1.22	1.28
	Healthy ageing (NTA-based)	1	1.05	1.15	1.17

Note: Healthy ageing is based on constant health-related transfers for given mortality after the age of 55.
Sources: Own calculations based on EUROPOP2013 and National Transfer Accounts.

Turning to the healthy ageing scenario, what stands out is that there is a lot of country heterogeneity among the countries studied (Tables 4 and 5). The effect of scenario 2 (transfer-weighted DDR) relative to scenario 3 (healthy ageing) depends on the change in the composition of the population aged over 65 and how much health care accounts for total transfers to the old. Since the latter is not constant across ages, the two effects also interact. How much the healthy ageing scenario will reduce the impact of ageing also depends on the steepness of the mortality (age)-specific health transfer curve. A steeper curve implies a larger impact from healthy ageing on the dependency ratio.

Table 5. Health care transfers (% of total transfers)

	Average share of healthcare in transfers	Share of 85+ in % of 65+			
	2013	2013	2020	2030	2040
Austria	0.14	0.14	0.14	0.16	0.16
Germany	0.25	0.13	0.14	0.18	0.18
Finland	0.16	0.13	0.13	0.14	0.22
Hungary	0.19	0.11	0.11	0.13	0.18
Slovenia	0.34	0.12	0.14	0.14	0.18
Spain	0.20	0.15	0.18	0.16	0.17
Sweden	0.36	0.15	0.13	0.16	0.19

Source: Own calculations based on National Transfer Accounts.

In Slovenia and Sweden, more than one-third of transfers to those aged 65 and over are health care transfers. In Germany, the corresponding number is one-fourth, whereas for Hungary and Spain it is close to one-fifth. Health-related transfers to older people in Austria and Finland constitute only around 15% of total public transfers. The countries are equally different when it comes to the change in the age distribution of the population above age 65 until 2040. Finland and Hungary will see an increase of close to 70% in the share aged 85 and over. For Slovenia the figure is 50%, and in Germany and Sweden it is increasing by one-third. Austria and Spain face a relative constant age distribution with the number of 85+ year olds increasing marginally faster than the overall number of 65+ year olds.

For Austria, Finland and Hungary healthy ageing is projected to have little impact until 2040. These are the three countries with the lowest health share in overall transfers. The largest impact is for Sweden, where healthy ageing reduces the projected increase in the DDR by more than one-third. Minor effects are found in Germany, Slovenia and Spain.

In sum, the simple headcount-based DDR tends to overestimate the effect of ageing on government transfers. The main reason is that transfers to the young are not accounted for. Healthy ageing is important for Sweden, but less so in other countries. Appendix A illustrates this and shows additionally a healthy ageing scenario from the age of 65.

The effect of immigration

Our starting point is the projected net migration from the baseline EUROPOP2013. All countries have projected positive net migration in the full period until 2040 (in fact until 2080), except Spain where net migration turns positive around 2025. However, the magnitude of projected migration relative to population varies among countries (Table 6). Sweden and Austria have projected annual net migration rates of around 0.5% of the population until 2040. Germany and Finland have somewhat lower numbers, while Hungary and Slovenia are projected to see net immigration of approximately 0.2%. Spain faces first emigration at a rate of 0.2% until 2025, with somewhat higher average rates of immigration until 2040. The assumed rates are above historical immigration rates for Austria, Finland, Hungary, Slovenia and Sweden. The age distribution of migrants is very similar across countries, with the bulk in the age bracket between 20 and 30 years old (Appendix B).

Table 6. Annual net migration assumptions in EUROPOP2013

	Avg. immigration rate 1990-2013 (% of population)	Immigration (% of population)			
		2015	2020	2030	2040
Austria	0.39	0.5	0.6	0.6	0.4
Germany	0.35	0.3	0.3	0.3	0.2
Finland	0.18	0.4	0.4	0.4	0.3
Hungary	0.15	0.2	0.2	0.2	0.3
Slovenia	0.13	0.2	0.2	0.2	0.3
Spain	0.62	-0.2	-0.2	0.2	0.5
Sweden	0.37	0.5	0.5	0.5	0.4

Sources: Eurostat and EUROPOP2013.

As a result of these assumptions of the EUROPOP2013 projection, all countries will show an improvement in the demographic dependency ratio relative to a situation without migration. Appendix B shows the age distribution of migrants relative to natives for all countries.

Our main purpose is to explore the extent to which the use of NTAs and associated government transfers affects the changes in DDR from immigration. The underlying assumption relevant for the use of NTAs is that immigrants behave as the average national citizen (regarding fertility, mortality and labour market participation) and have the same average endowment with respect to human capital (i.e. same average wage) and savings.[10]

The total impact on the DDR of the different countries will depend on the size of immigration. Table 7 shows the reduction in the change of the DDR relative to a zero-migration scenario. Thus, the 35% for the simple DDR for Austria in 2020 indicates that the growth in the DDR will be reduced by 35% relative to a situation with zero-migration. A 100% reduction would mean no future growth in the DDR. These are reported in order to illustrate the projected impact of immigration. The main results are the differences in impact from the simple old-age DDR measure and the transfer-adjusted measure of DDR, respectively. In a long-term perspective to 2040, there is little difference, depending on how the DDR is measured. The simple DDR headcount is a good proxy for the public finance impact when it comes to net migration.

In the short term, focusing on 2020, the simple DDR tends to overstate the impact of immigration. Immigrants are young and thus their net transfer contribution is still low, but at the same time they are in the age range where fertility is relatively high, giving rise to negative net transfers from children (see Appendix B). For Hungary the results differ in the short term due to the age structure of immigrants, who are primarily (even) younger than working age.

[10] This is not, of course, an innocent assumption (Sébastien, 2011). However, exploring the extent to which relaxing this assumption would change the outcome is beyond this study (see Schou, 2006; Hansen et al., 2013 and Ruist, 2014).

Table 7. Improvement in the simple DDR and government transfer-weighted DDR (%) from immigration relative to a zero-migration scenario

		2013	2020	2030	2040
Austria	Simple DDR	0	0.35	0.31	0.36
	DDR with NTA	0	0.22	0.30	0.40
Germany	Simple DDR	0	0.17	0.17	0.22
	DDR with NTA	0	0.08	0.14	0.21
Finland	Simple DDR	0	0.14	0.22	0.32
	DDR with NTA	0	0.17	0.27	0.36
Hungary	Simple DDR	0	0.09	0.14	0.19
	DDR with NTA	0	0.18	0.20	0.20
Slovenia	Simple DDR	0	0.07	0.11	0.18
	DDR with NTA	0	0.04	0.12	0.21
Spain	Simple DDR	0	-0.06	0.01	0.11
	DDR with NTA	0	-0.16	-0.07	0.06
Sweden	Simple DDR	0	0.31	0.42	0.49
	DDR with NTA	0	0.25	0.30	0.41

Sources: Own calculations based on EUROPOP2013 and National Transfer Accounts.

Longer working lives

Securing the future sustainability of public finances will have to rely on longer average working lives. This means that the statutory pension age will have to increase in many countries. However, the statutory pension age is not a good metric for assessing length of working life because the average retirement age in many countries is well below the statutory retirement age. In a richer model environment focusing on country-specific features, assumptions can be made or behaviour modelled on how increases in the statutory retirement age will impact the average length of working life. From this, one could estimate the increase in the number of people working and relate this to the number of pensioners (e.g. Martín, 2010; Fehr et al., 2012; Staubli and Zweimüller, 2013; Lassila et al., 2014). There are numerous policy challenges related to extending working lives. Our approach is different and we do not consider the policy challenge. Instead the focus is on the potential. We relate the net public transfers, excluding health transfers, of people older than 55 to their mortality rate in 2013. Future behaviour with respect to retirement and labour market participation, but also the pension system as such, is then projected from the mortality rate. This is somewhat in the spirit of Shoven and Goda (2010), who suggest age limits related to retirement linked to mortality developments.

For the seven countries considered here, the shift in the transfer curve is equivalent to a shift in behaviour of around five years. Thus, in 2040, a 60 year old is assumed to have the same behaviour – in particular with respect to the labour market – as a 55 year old had in 2013.[11]

[11] Informally, we think of this as the average individual maintaining his or her labour market participation behaviour from 55 to 60, but without any compensation in the form of higher pensions.

Based on Eurostat labour force statistics, we make assumptions about labour force participation for the reference year of the country's NTA (see. Table 3) and assume that the difference between labour force participation and employment is structural in the reference year. To arrive at the implied increase in average working life for each country, the labour market participation rate is multiplied by the implicit number of years, close to 5 for all countries, the transfer schedule is shifted (Table 8).

Table 8. Increases in length of working life

	Reference Year	Labour market participation rate	Extension of working life, years	Duration of working life, base year
Germany	2003	73.7	3.7	34.3
Spain	2000	59.6	3.0	31.6
Hungary	2005	59.3	3.0	28.0
Austria	2000	63.6	3.2	34.6
Slovenia	2004	60.4	3.0	33.2
Finland	2004	75.8	3.8	36.4
Sweden	2003	84.6	4.2	38.5

Source: Eurostat.

The impact on demographic dependency ratios from an increase in working lives is substantial. In Germany, Spain and Austria the expansion of the demographic dependency ratio is diminished by around two-thirds. In the case of Finland the DDR will be no bigger in 2040 than it is today. The same is almost the case with Sweden, where the DDR will only grow 10% towards 2040 in this scenario. For Slovenia the impact is somewhat less significant.

Table 9. Improvement in the transfer-adjusted DDR (%) in the longer working life scenario

	2013	2020	2030	2040
Austria	0	0.63	0.58	0.64
Germany	0	0.78	0.71	0.68
Finland	0	0.73	0.83	1.06
Hungary	0	2.55	2.01	1.50
Slovenia	0	0.32	0.34	0.40
Spain	0	0.71	0.63	0.62
Sweden	0	0.91	0.80	0.91

Note: Effect of a longer working life scenario measured by the reduction in the growth of DDR towards 2040.

The reported scenario for longer working lives builds upon the scenario with immigration, as outlined above. If the healthy ageing scenario is added, some additional percentage points' reduction in the increase in the DDR is obtained (see Appendix C for full results).

Extending working lives is of central importance to meeting the fiscal challenge of ageing. For most countries the effect of working longer dwarfs the potential available in increasing immigration or healthy ageing. Appendix D shows the effect of each instrument against the baseline of zero net migration.

5. Conclusion

This study shows that one has to be careful when assessing the impact of population ageing by the simple headcount measure of the demographic dependency ratio. Using National Transfer Accounts, we find that it can significantly distort the challenges faced – in a negative direction. While it obviously has to be present in the policy mix, and being something we all wish for, healthy ageing is unlikely to make much of dent in the increase in net public transfers.

Considering only the impact of immigration, the simple DDR goes a long way towards accurately portraying the impact. However, the assumption normally used for assessing the impact of immigration, i.e. that immigrants have the same characteristics as nationals, is of course much contested in the literature.

Furthermore, we have taken the literature on prospective ageing as a starting point for defining a scenario of longer working lives. This is done by keeping behaviour constant for a given mortality over the projection period for the population aged 55 and over. The result is an increase in the average length of a working life by 3 to 4 years. For most of the countries studied, this makes a decisive reduction in the increase of projected net public transfers.

Finally, we stress the uncertainties involved in such multi-country macro projections, but believe that the methods used here can be useful when comparing countries and in assessing the broad impact of policy initiatives. As National Transfer Accounts become available for more and more countries and for more years, there is further scope for cross-validation of the results and assumptions made in this study.

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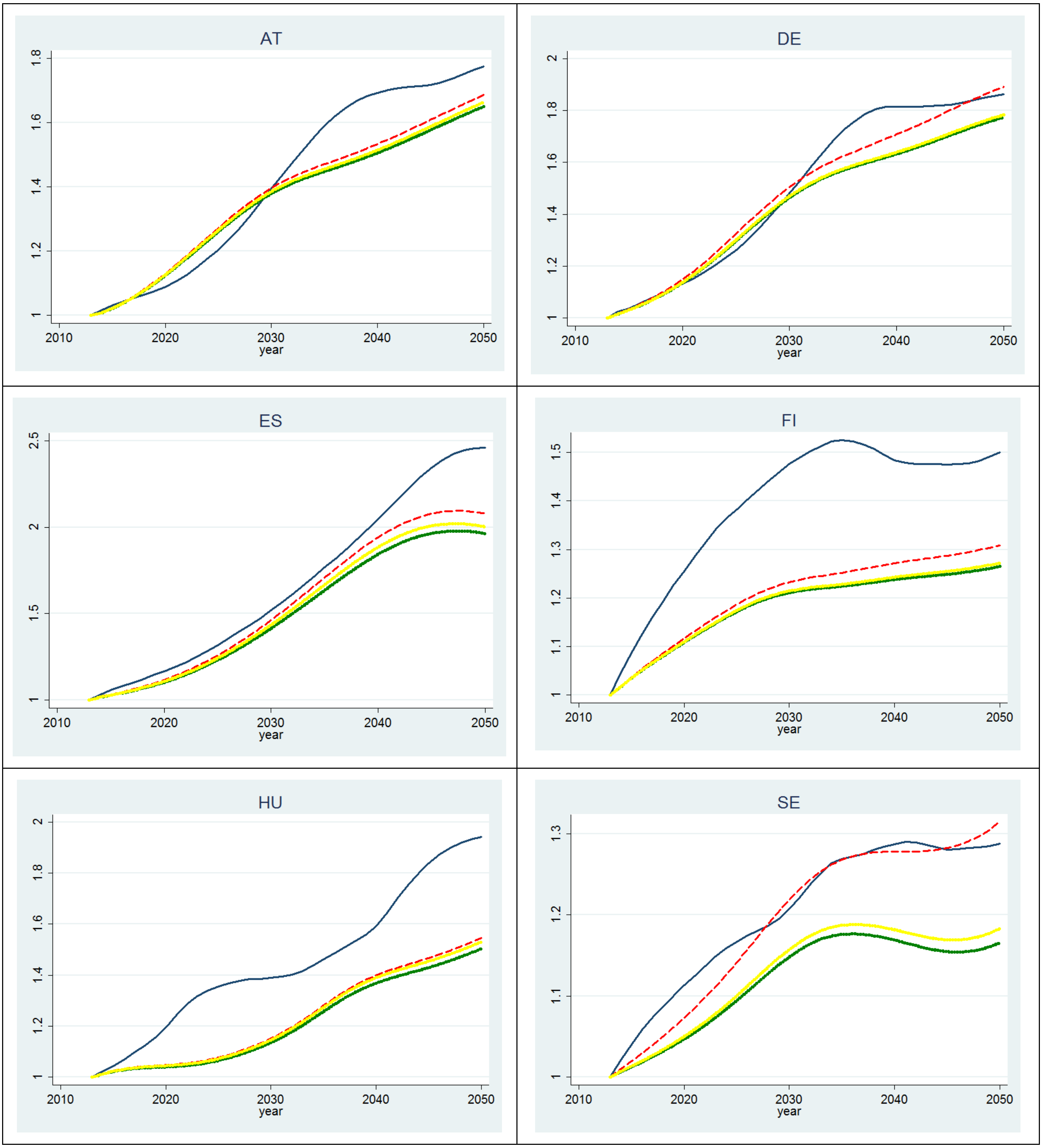
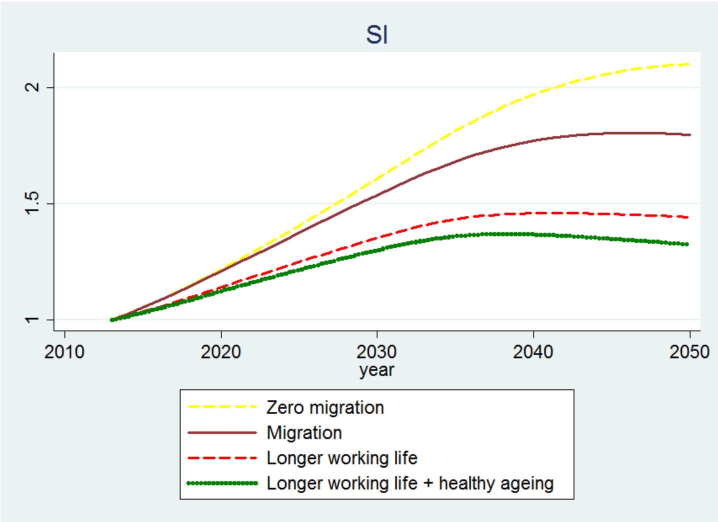
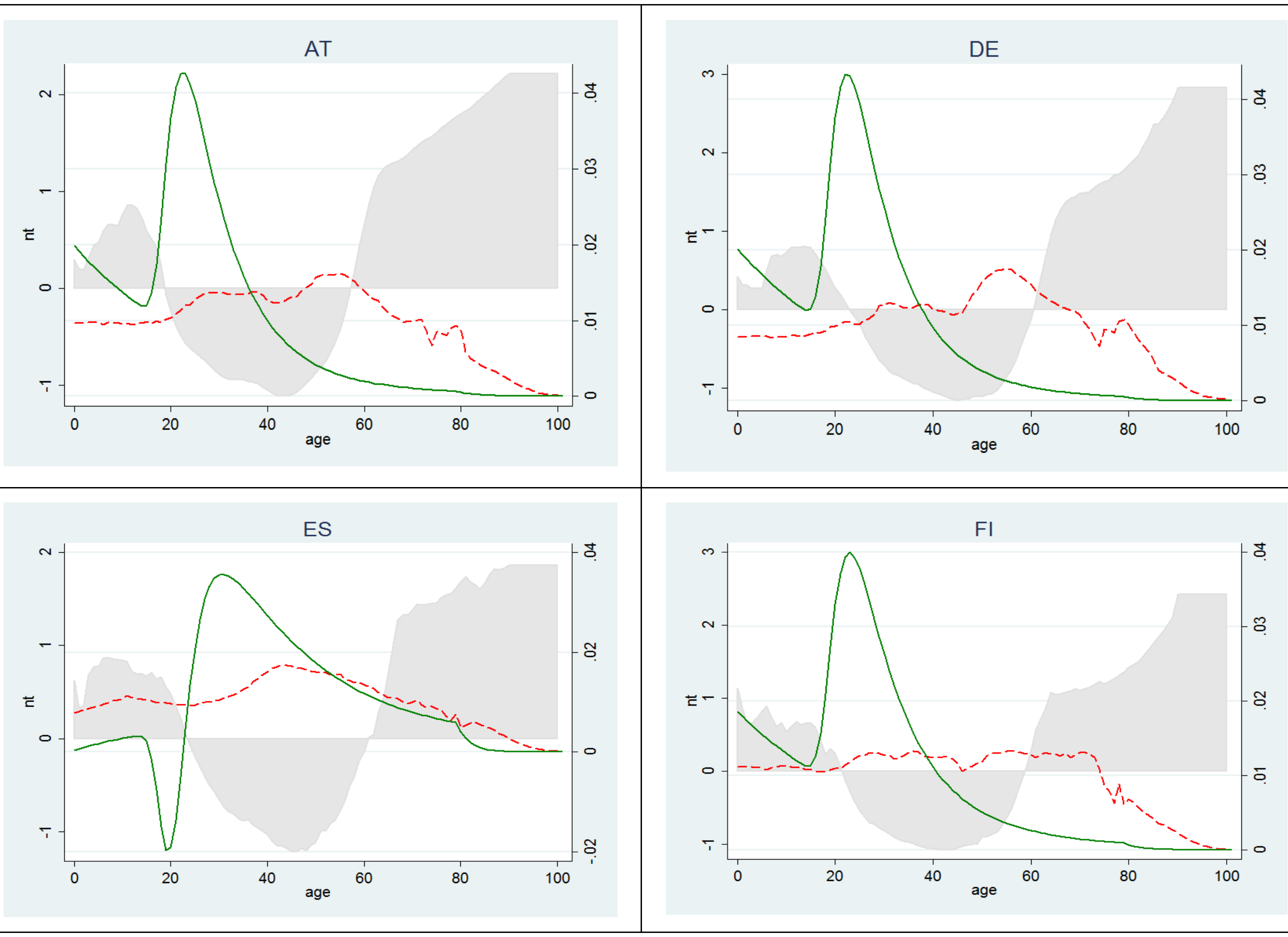
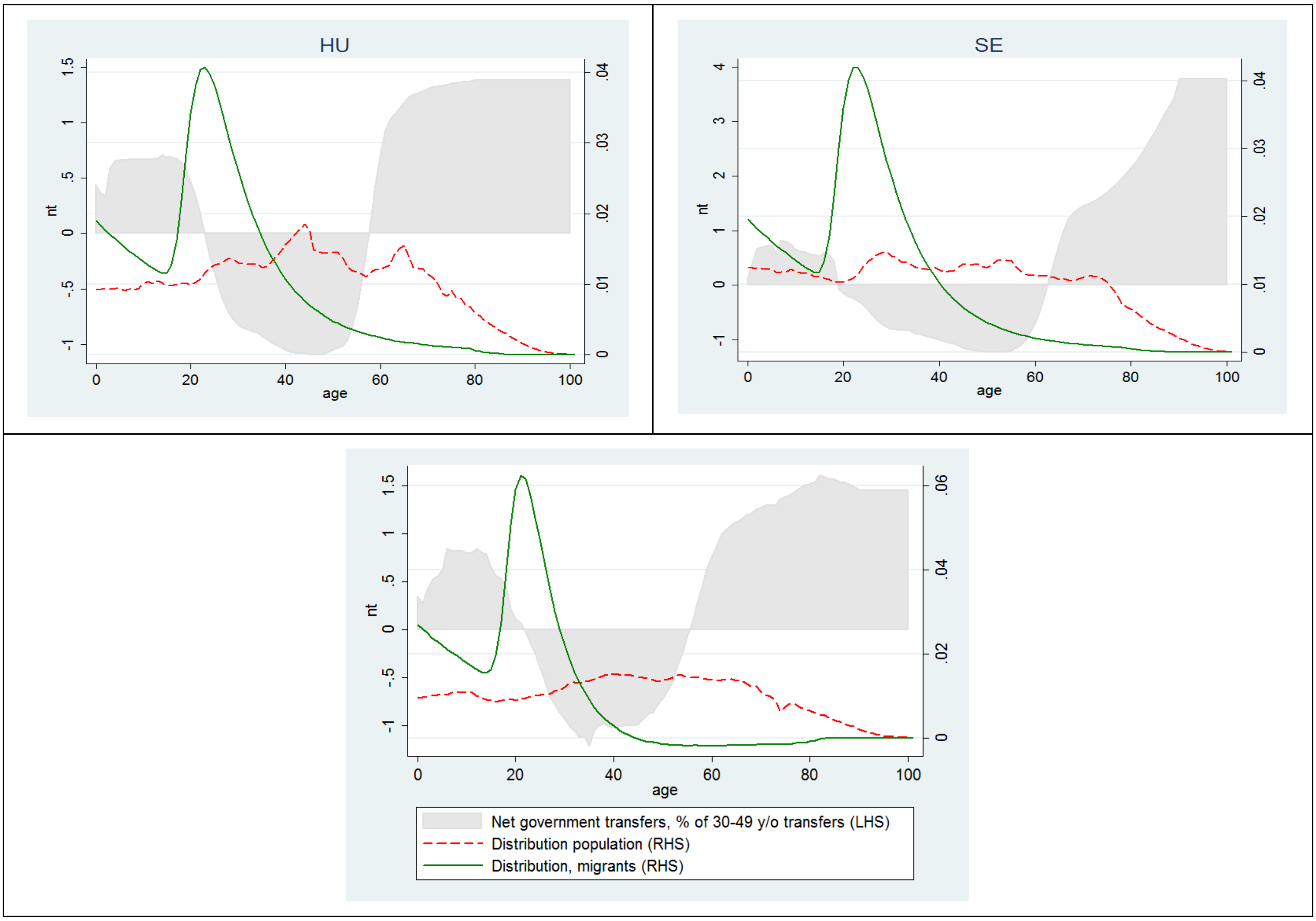
Appendix A. National transfer accounts and demographic dependency ratios



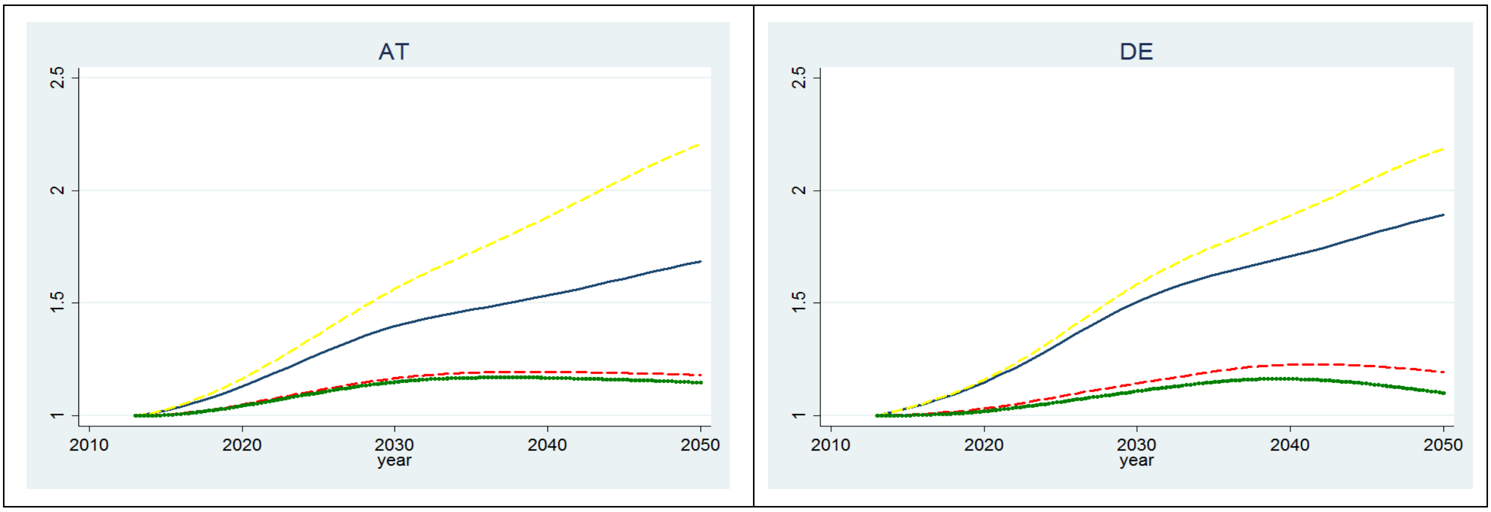


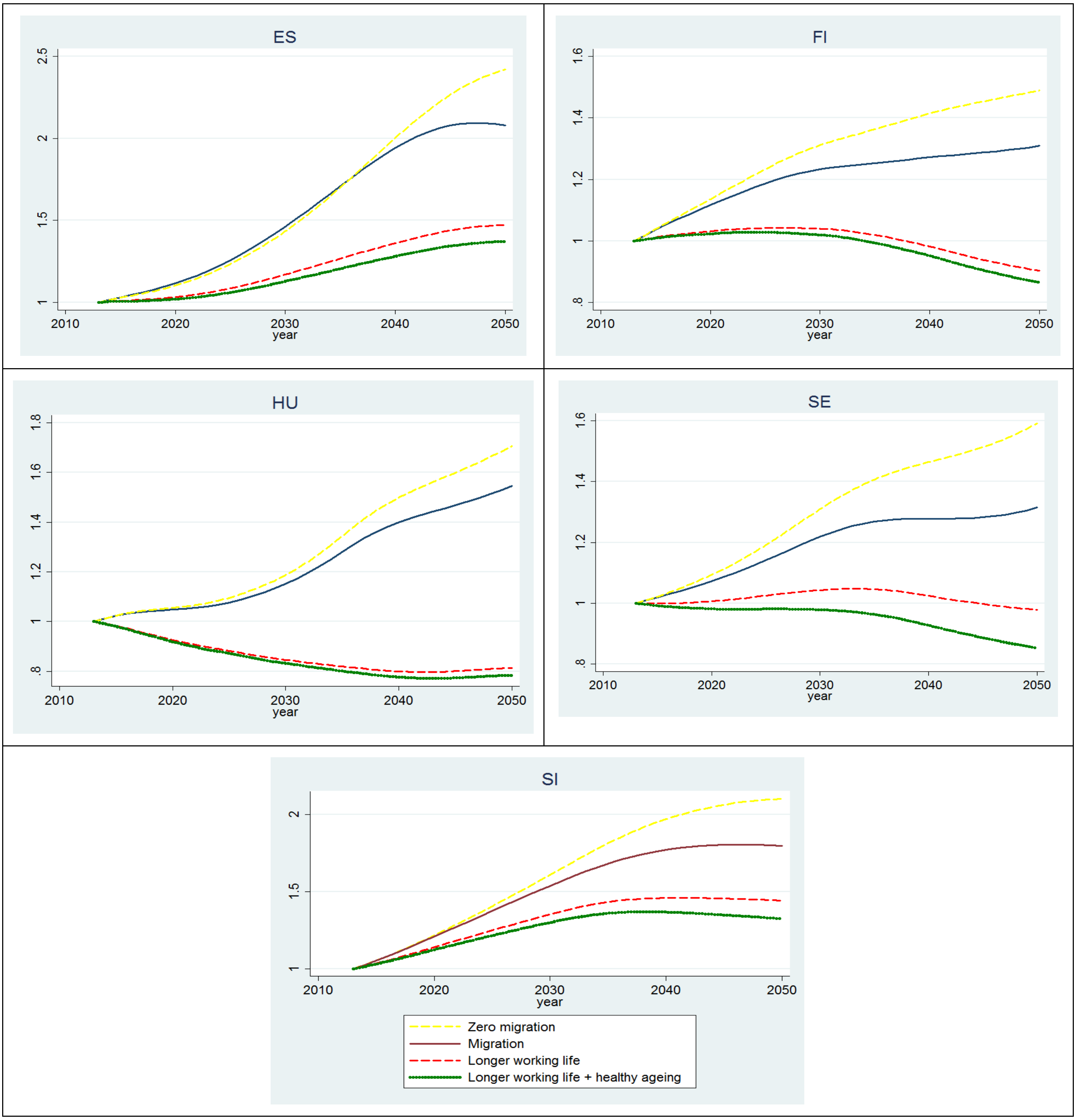
Appendix B. Age structure of migrants and natives together with government net transfers





Appendix C. Combined effect of migration, working longer and healthy ageing




ES
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1.5
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2020
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2040
2050
year
FI
1.6
1.4
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HU
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1.6
1.4
1.2
1
.8
SE
1.6
1.4
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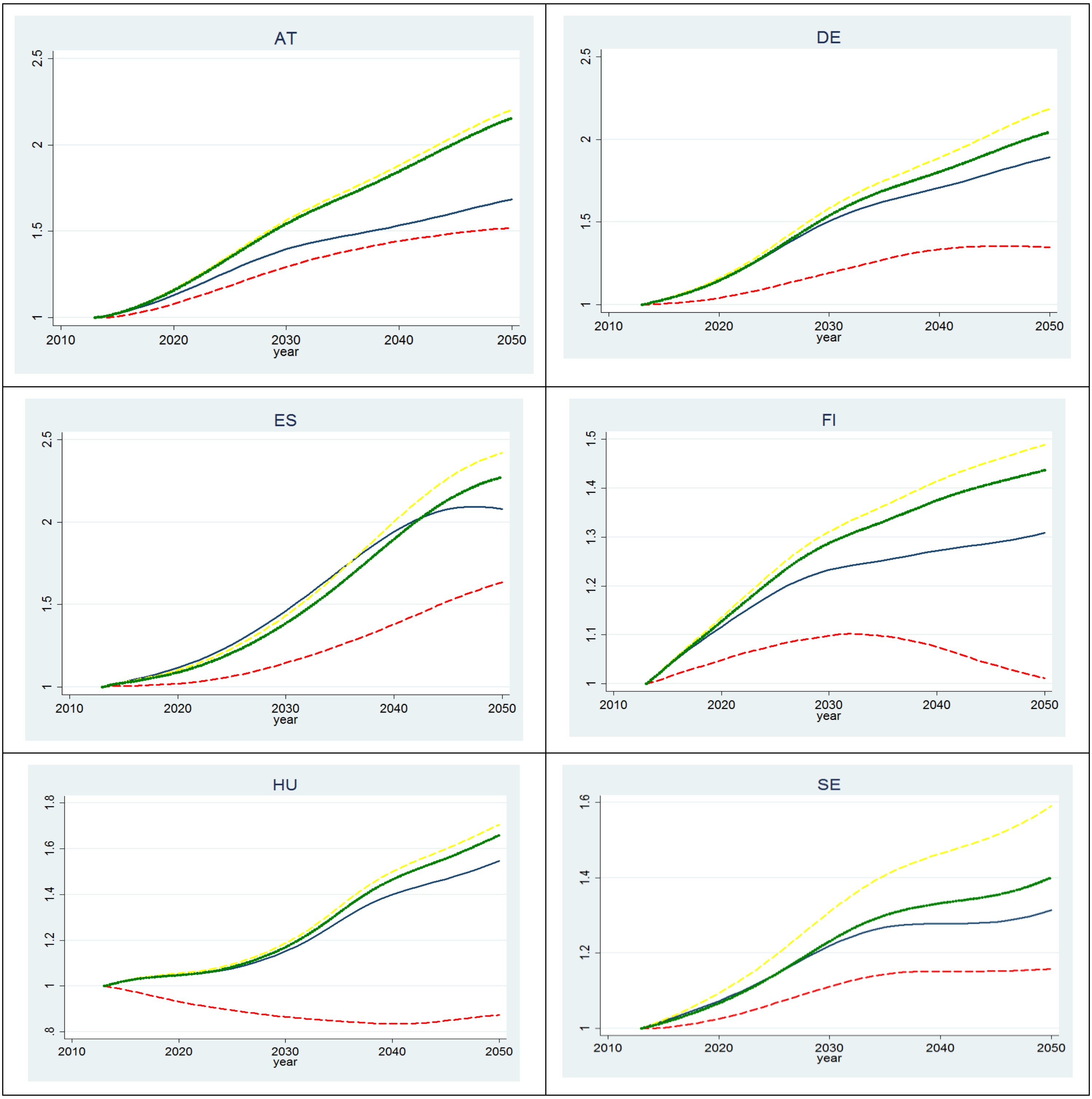
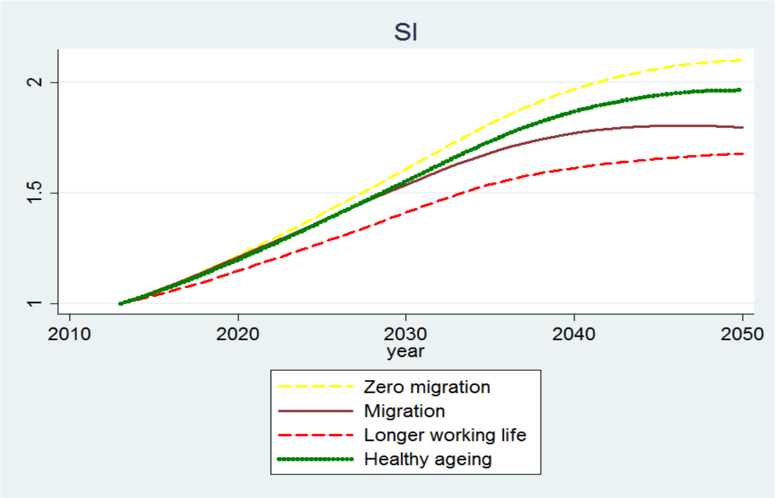
1
.8
SI
2
1.5
1
Zero migration
Migration
Longer working life
Longer working life + healthy ageing

Appendix D. Effect on dependency ratios of different instruments




SI
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year
Zero migration
Migration
Longer working life
Healthy ageing