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The Savings Gap in Hungary

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Abstract

In a simple cohort model we project current per capita age-profiles of labour income and consumption to the future and combine them with the expected future age composition of society. We use Hungarian data of 2012. Due to a shrinking and ageing population this exercise predicts a growing gap between labour income and consumption, which have to be covered by asset-based revenues. We apply two balancing items, a windfall capital endowment in the base year and a gradual capital accumulation through higher savings. We also quantify how much can the household economy, an integral but unregistered part of modern economies, absorb of the effects of ageing. In addition, we also feed the model with 1995 demography. The two decades between the mid-1990s and the mid-2010s offered a special demographic opportunity for Hungary. This period coincided with the botched pre-funding experiment in the public pension system. We demonstrate the potential of this missed opportunity.

1. Motivation

Ageing, the changing age composition of society due to decreasing fertility and increasing longevity, is known to put public transfer programmes under pressure.[1] The age-profiles of taxpayers and beneficiaries and the age-profiles of future populations spell conflict between revenues and expenditures. This applies with a particular force to programmes financed by labour related contributions and consumed mostly by the old, such as public health care and pensions. These systems must adjust either through higher taxes or longer working careers or replacing labour-related taxes with taxes levied on consumption and assets or lower benefits in old age.

However, it is less known how ageing will affect consumption and labour income. Consumption is, after all, the most important component affecting the material wellbeing of people. It is financed by labour income and to a lesser extent by accumulated assets. Since age composition is involved here again it is somewhat surprising that the question of sustainability of the current patterns of consumption and labour income invokes less attention. In order to make our point we present three pairs of age-profiles in Figure 1. On the left hand panel we show per capita taxes paid and transfers received.[2] Transfers include all public programmes in cash or in kind; both taxes and transfers are consistent with National Accounts.[3] Per capita figures are related to entire cohorts and not only taxpayers and beneficiaries. Thus the age-profile of labour related taxes for example reflects age specific employment as well as wages and tax rules. Taxes are mostly paid by people in working age; beneficiaries are typically the older cohorts and people with young children.[4] Public programmes in Hungary are generous for parents. An alternative assumption on transfer incidence assigning family benefits to children instead of parents would even find children receiving more resources from society than from their parents (excluding unpaid household labour). Either way the dashed line of net transfers (transfers received less taxes) shows that net payers are the active aged whereas net beneficiaries are those in their inactive period of their lifecycle, children and the elderly.

Public programmes are worth of roughly half of national income.[5] In the central panel of Figure 1 we repeat the calculation including all items of national income. Here the equivalent of outflows is labour income, which covers consumption, and the netting factor, that is the equivalent of net transfers, is the difference between consumption and labour income. This is called lifecycle deficit (when negative) or lifecycle surplus (when positive), LCD/LCS in

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[2] Data are obtained from the Hungarian National Transfer Accounts project, which is part of the similar international (www.ntaccounts.org) and European (http://europe.ntaccounts.org/web/nta/show/ and http://www.agenta-project.eu/en/index.htm) projects.

[3] More specifically with the categories of D.2-D.3 (indirect taxes less subsidies), D.5 (taxes on income and wealth), D.61 social contributions, D.62+D.63 (social benefits in cash and in kind) and D.7 (other current transfers).

[4] Values in Figure 1 and related figures throughout the paper are normalised on the per capita labour income of persons aged 30-49. This is standard practice in National Transfer Accounts (see below). Proving the most stable basis for normalisation it facilitates cross-country as well as over-time comparisons.

[5] We use as reference national rather than domestic macroeconomic categories since the former is more relevant for financing the lifecycle. Age-profiles of exchanges with the rest of the World are usually unknown and to a large extent irrelevant in the analysis of inter-age resource flows. The only exception is intra-familial cross-border transfers (remittances), which were marginal in the Hungarian case in the years discussed here (but which are rapidly gaining momentum since then).

short, by the National Transfer Accounts (NTA) terminology.[6] LCS in the inactive sections of the lifecycle is financed from the LCD of the active aged. Channels of the flows of resources are various including households, government and the corporate sector. Transfers can take the form of pay-as-you-go pensions, mortgages, student loans, public health care or consumption goods bought by parents just to name some. Aggregate LCD/LCS across all cohorts is usually negative since labour income is not the only source of financing consumption. Asset-based revenues are also involved. In the reference period of Figure 1 asset-based revenues made up to 8 percent of national income; in 2012, the base year of our main projections it was 9 percent.[7]

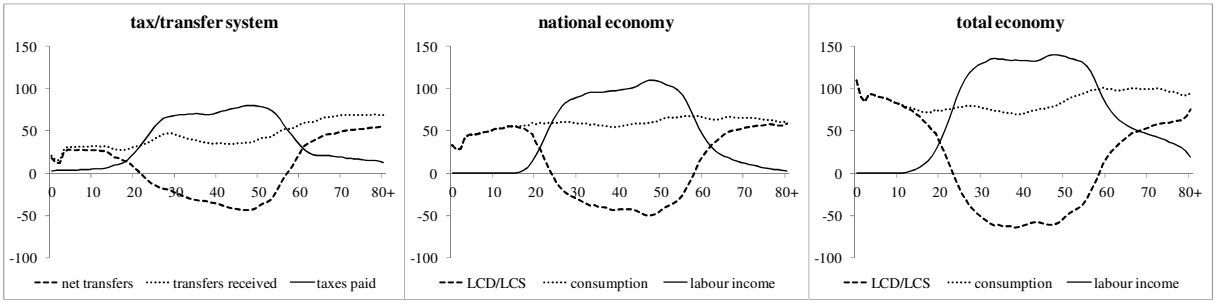

Figure 1: Per capita age-profiles in the Hungarian tax/transfer system, national economy and total economy

Notes: Values are normalised on the per capita labour income of persons aged 30-49 and given as percents. Horizontal axis: age of cohort in 2000. Total economy: national economy and household economy (components of national accounts and the household satellite account) combined.
Sources: Gál, Szabó and Vargha (2015); Hungarian National Transfer Accounts project.

The central panel of Figure 1 depicts a consumption age-profile smoother and more uniform than the age-profile of public transfers. This reveals the importance of private intra-household transfers, mostly parents financing the consumption of their children. The resulting lifecycle deficits are also more balanced between the two inactive generations than they were in the case of net public transfers. Public programmes are more elderly biased than the national economy. In other words, public channels are relatively more important in financing old age than childhood.

Finally, we extend NTA to the household satellite account. The same way as NTA introduces age into national accounts we draw age-profiles of the production and consumption of unpaid household labour and add it up with the NTA age-profiles of labour income and consumption.[8] In the right hand panel of Figure 1 we present the combined value of labour and consumption in the total economy including both the national and the household

[6] The method of National Transfer Accounts was established by Lee (1994a,b). An NTA Manual was published by Mason et al (2009) and the Population Division of the United Nations has published a revised manual (United Nations 2013). A comprehensive introduction to the method, including theoretical foundations, comparative results and a wide range of country-studies can be found in Lee and Mason (2011) and the NTA Special Issue of the Journal of the Economics of Ageing (Patxot, Lee and Mason 2015).

[7] The paper is based on projections of data from 2012; however calculations involving unpaid household labour are based on data from 2000. Figures on value of unpaid household labour produced and consumed come from the household satellite account, which is a product of the time use survey updated once in every decade in Hungary. At the time of preparing this report the 2010 household satellite account was not yet available.

[8] This is called National Time Transfer Accounts (NTTA). NTTA methodology was created by Donehower (2014; earlier version from 2011); for a recent survey see Vargha, Gál and Crosby-Nagy (forthcoming); for details on the Hungarian NTTA see Gál, Szabó and Vargha (2015).

economy. There are some important changes compared to the central panel of the figure such as a value of labour profile well in the positive in old age revealing an important labour contribution to the total economy by people in retirement, which remains unaccounted for in the standard national accounts; as well as a lifecycle surplus for children far exceeding that of the elderly telling a story quite different from that of the over-consuming old.

In short, the age-profiles of the three panels are quite different. Most of the literature concentrates on one of them, age-profiles of taxes and public transfers. Here we shift the focus and extend usual sustainability tests to the national economy and the total economy.[9] Below we will apply simple projection techniques frequently used in the analysis of future public budgets to labour income and consumption. Other than demonstrating the obvious unsustainability we measure the extent to which consumption has to be reduced and resources saved in order to counterbalance the effect of demography. The effect of higher savings is twofold. First, it decreases aggregate lifecycle deficit. Second, it increases growth in form of higher investments. This additional growth diminishes the need for consumption reduction.

In Section 2 we present an empirical background for Hungary. We show the peculiarities of the ageing process; we give an empirically driven definition of old age other than the frequently used but ad hoc 65 years; we will show the current share of asset-based revenues in financing old age; and we will briefly summarize the experiences of Hungary's experiment with pre-funding in the mandatory pension system between 1998 and 2011. In Section 3, we will describe our method of projection and show the results. Conclusions will be drawn in Section 4.

2. Background

The ageing process in Hungary

The population of Hungary, currently 9.9 million, reached 10 million in 1960, peaked in 1980 at 10.7 million and fell below 10 million once again in 2010. It is expected to further decrease to 7.3 million by 2100. Shrinking is accompanied by a changing age composition. The average age of the population, 41.0 years in 2012, was 33.3 years in 1960, 38.7 years in 2000 and by the medium projection scenario of the Hungarian Demographic Research Institute it would increase to 52.1 years by 2100.

In short, Hungary was among the first nations facing a shrinking population. This makes it comparable to countries in its close proximity such as Austria and Germany, but the speed of this process is not as fast as it is expected further in the east e.g. in Russia or the Ukraine. Similarly, the ageing of the Hungarian population has started long ago but it is slower and less dramatic than in Mediterranean countries, such as Italy or Spain, and in East Asian nations, such as Korea or Japan.

In Figure 2, we present recent and projected population pyramids with the two genders combined. The figure reveals further details on the aging process relevant for a projection exercise. The age composition in 2000 includes two large generations in active age, the baby boomers, born in the mid-1950s, and their echo born in the mid-1970s. In colloquial language the older generation is called the Ratko-children named after the then-minister of social

[9] There are notable precedents of such projections. Khoman and Weale (2006) create synthetic cohorts from projected cross-sectional age-profiles in order to measure sustainability of current consumption patterns and estimate the savings gap in the UK; Khoman and Weale (2008) extend the calculation to France, Italy and Spain. Patxot et al (2013) combine Spanish NTA age-profiles with the generational accounting methodology. Lee, Mason et al (2014) use fertility as the balancing item and calculate fertility rates necessary to maintain the current public transfer system as well as consumption patterns.

affairs, who enforced a strict no-abortion policy between 1953 and 1956 pushing up fertility for a short while. Accordingly, the echo are the Ratko-grandchildren. Two such relatively large cohorts among net taxpayers and none among net beneficiaries reveal a window of opportunity for economic growth and capital accumulation. This window opened in the second half of the 1990s with the entrance of the Ratko-grandchildren to the labour market and closes in the first half of the 2010s with the retirement of the parents' generation. This period corresponds with the country's experiment with an extension of its universal, national pay-as-you-go pension scheme with a pre-funded pillar. Below we will return to this question.

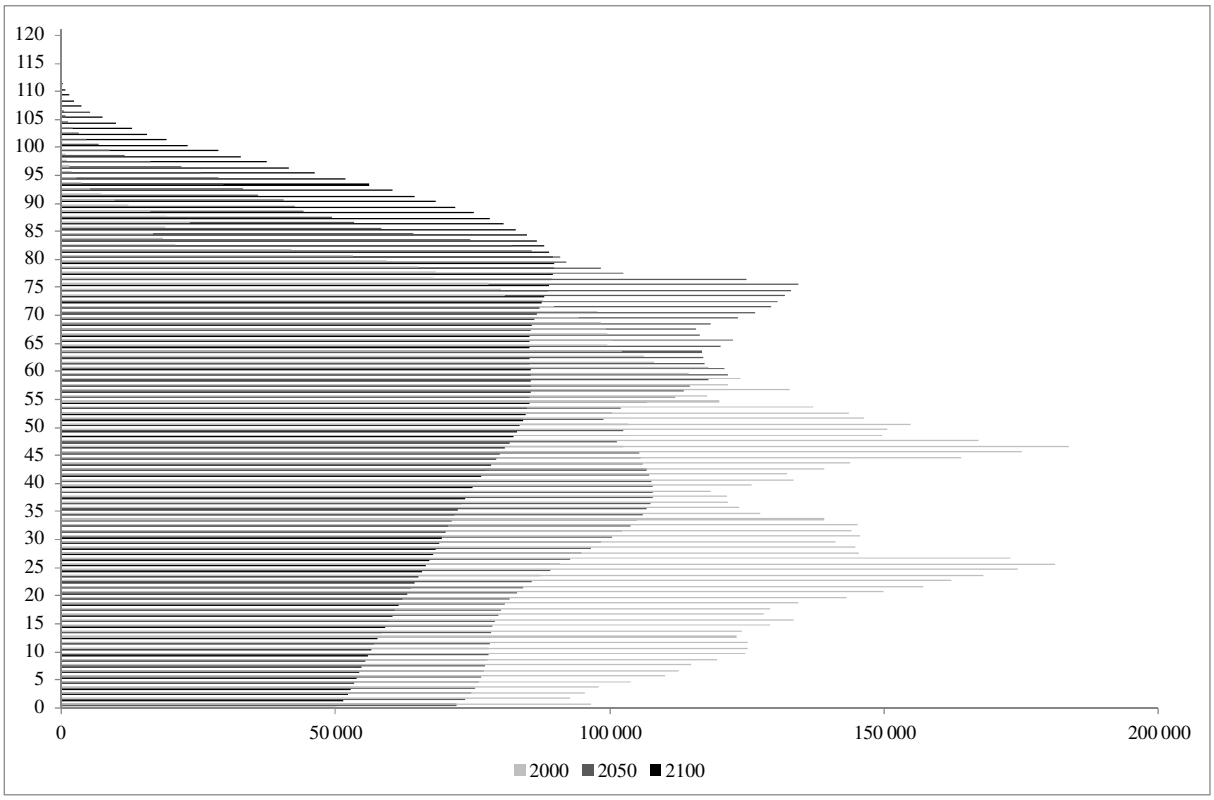

Figure 2: Current and projected age-composition in 2000, 2050 and 2100

Source: Hungarian Demographic Research Institute.

A further striking feature of the population pyramids is not what is there in the figure but what is not: there is no further echo in the 1990s and neither there is one later. The pyramid of 2050 sees the echo generation as septuagenarians; their children form a much smaller wave. This predicts a wave of ageing in the early 2040s even stronger than the current one in the mid-2010s.

Finally, a further attribute of projected demographic developments relevant in the context of projecting current age-profiles of labour income and consumption is the improvement in mortality, which is practically translated as the ageing of the old. The average age of the population 60 years old or older is expected to grow by 7.2 years over this century. If we raise the age limit we still find significant improvements: 5.7 years among the 70 years old or older, 4.5 years among the 80 years old or older and 2.5 years in the 90 years old or older cohorts. This is particularly relevant if the projected age patterns are high in old age such as the profiles of pensions and public health care.

Table 1: Current and projected average age of older cohorts

	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100
60+	71.1	71.4	72.8	72.9	74.1	75.7	76.9	77.0	77.5	78.3
70+	77.7	78.1	78.5	79.8	79.6	80.8	82.3	82.8	82.7	83.4
80+	84.4	85.3	85.4	86.0	86.8	86.6	87.9	88.7	88.8	88.9
90+	92.8	92.8	93.2	93.3	93.9	94.0	94.1	95.0	95.3	95.3

Source: Authors' calculation based on projections by the Hungarian Demographic Research Institute.

What is old age?

The borderline between active age and old age is typically given exogenously both in cross-country comparisons and in projections. The usual age limit currently applied is 65 years. Distortions to both types of analysis are obvious. In cross-section, labour market activity seems low whereas pension systems seem generous if not actual age limits are applied. In particular, if a lower actual age limit corresponds with lower life expectancies, as in Hungary, a cross-country comparison based on the 65 years borderline results in misleading conclusions. Also, projections based on a fixed age limit, known to be changing over time and known to be dependent on education and health conditions, adds an unjustified bleakness to the expected future.

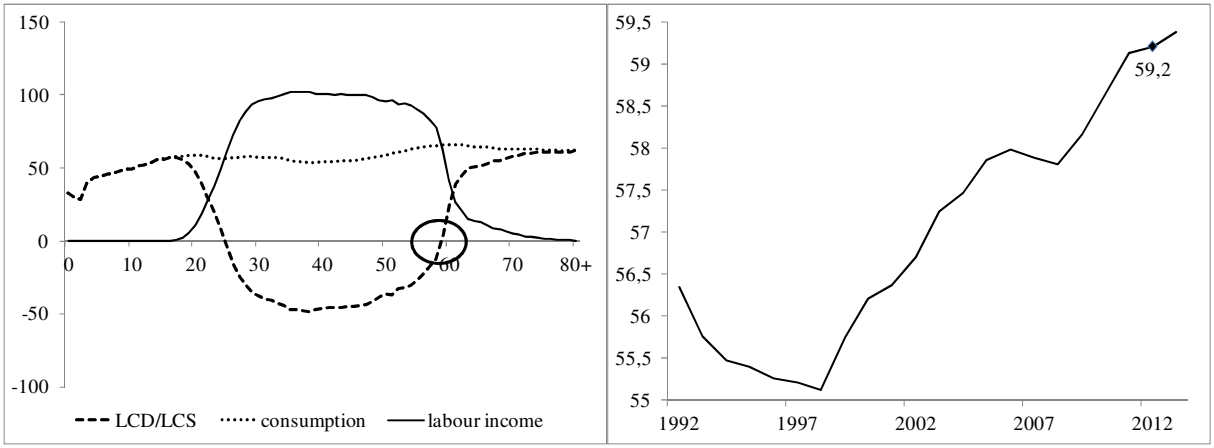

Figure 3: The age limit between active age and old age in Hungary in two different approaches, 2012

Notes: Left hand panel: per capita lifecycle deficit/surplus, consumption and labour income by age in the national economy normalised on the per capita labour income of persons aged 30-49 and given as percents; right hand panel: average age of leaving the labour market.
Source: Authors' calculation.

Here we will apply an empirically driven entry age of becoming old for the base year of our projection. However, we will not make efforts to adjust it to expected future levels of education and health. That is beyond the scope of the simple projection presented here. Neither will we manipulate the age limit as a balancing item between future levels of labour income and consumption. The focus of the present exercise is exclusively savings.

In Figure 3 we present two measures for the entry age to old age in the base year of our main projection exercise, 2012. The two panels of the figure are separate but they both point to the same age, 59 years, making a case for selecting this particular age as the age-limit. The left hand panel is the same, per capita age-profiles of lifecycle deficit/surplus, consumption and labour income in the national economy, as the central panel of Figure 1 but on newer data. The cross-cutting age, circled in the figure, when lifecycle deficit becomes lifecycle surplus that is the age when people change from net worker to net consumer, is 59 years. This borderline is empirical and it reveals both cross-country variation and changes over time. It was a year less in 2000 in Hungary; 56 years in Slovenia (in 2004), but 63 in Sweden (in 2003).[10]

The right hand panel of the figure gives an estimation of the average exit age from the labour market.[11] Being a force in raising the cross-cutting age from LCD to LCS it is related to but not fully correlated with it. In 2012 both ages happened to be 59 years. Their concurrence is partly coincidental but together they make a strong case for choosing 59 years against the usual 65 years as the entry age to old age.

Asset-based income financing old age

Asset-based income that is revenues drawn from past savings play a marginal role in financing old age in Hungary. In Table 2 we present data on income composition of the elderly in Hungary based on the 2012 wave of EU-SILC. We apply three definitions of old age: 59 years as our default choice (see above), 62 years, which was the standard retirement age in Hungary in 2012 and 65 years, which is the regularly applied definition for old age in public statistics. The EU-SILC contains information on gross income. Knowing the Hungarian tax regulations we could deduce taxes from the various income sources. Results are presented in the upper panel of Table 2.

The table reveals an overwhelming dependence of old age consumption on public transfers. At the age of 59 about three quarters of net income are public transfers in cash (mostly pensions). If old age starts at higher ages, the transfer share is even higher. Asset-based revenues are marginal; they represent a mere 1.1 percent. This is low even in European context. The lower panel of Table 2 contains such a comparison. Since we could not deduce taxes source by source for all countries we cannot compare net but gross figures.

In this panel we present only shares of asset revenues. Hungarian figures are compared to unweighted and population weighted European averages. Results show that asset-based

[10] These are data from the International NTA Database (www.ntaccounts.org).

[11] The estimation, based on 5-year cohort data on population and labour market participation of OECD, follows a formula by Latulippe (1996), which defines the average exit age from the labour market as:

$$\overline{RA} = \frac{\sum_{x=40,45}^{75} {}_5R^z_{x,x+4} \cdot (x+5)}{\sum_{x=40,45}^{70} {}_5R^z_{x,x+4}}.$$

The function ${}_5R^z_{x,x+4}$ represents the number of people in a particular age group, x to x+4, expected to retire within the next five years in year z. ${}_5R^z_{x,x+4} = (A^z_{x,x+4} - A^z_{x+5,x+9}) \cdot P^z_{x,x+4}$, where $P^z_{x,x+4}$ = number of individuals of cohort x to x+4 alive in calendar year z, and $A^z_{x,x+4}$ = average participation rate in cohort x to x+4 in calendar year z. Latulippe applies a weigh for the 40 to 44 cohort not used here. Here the calculation goes from the 40 to 44 cohort to the 75+ cohorts.

income is significantly less important in Hungary than in Europe. If Hungary is compared as a country to other countries the relative importance of asset income in the portfolio of the elderly is about one third of the European average; if her population is compared to the aggregate European population the relative importance of asset revenues is less than one fourth than elsewhere in Europe. Any effort to increase the share of asset income in old age revenues has to start from a low base.

Table 2: Income composition of the elderly

Sources of income in old age after taxation under different definitions of old age (%)					
	labour income	asset-based income	transfer income	*of which pensions*	total
59+	24.7	1.1	74.2	*68.3*	100.0
62+	17.7	1.1	81.2	*77.2*	100.0
65+	14.4	1.1	84.5	*81.4*	100.0

Share of asset-based income before taxation in HU and the EU under different definitions of old age (%)			
	HU	EU28 unweighted	EU28 weighted
59+	1.4	4.5	6.5
62+	1.5	4.8	6.8
65+	1.6	5.0	7.1

Notes: weighted: national figures weighted by population.
Source: Calculations by Márton Medgyesi from the 2012 wave of EU-SILC within the framework of the Social Situation Monitor of the European Commission.

Hungary's experiment with mandatory pre-funding

In 1998, the national pension system, based on the pay-as-you-go principle and characterised by nearly universal coverage, was extended with a privately managed, mandatory, pre-funded scheme. The reform created a mixed system. Members paid part of their mandatory contributions to a fund of their choice; the rest was sent to the first pillar. In exchange they gave up part of their future claims in the pay-as-you-go scheme. New entrants to the labour market were obliged to join the mixed system; people with established accruals could choose. By June 2011 the number of fund members reached 3.1 million, about three quarters of the labour force; reserves grew up to an amount equivalent of about 12.5 percent of GDP. This build-up of reserves rapidly reversed. The government elected the year before created conditions that made 97 percent of members of the mixed system return to full pay-as-you-go. These conditions included the restoration of accruals in the first pillar which went lost at the time of opting out to the mixed scheme. By September 2011 the number of members of the mixed system dropped to 0.1 million; this number has further decreased to 0.06 million since then. The pre-funding experiment can be considered a closed chapter in the history of Hungarian public pensions.

The maturation of the funded pillar was to create a limited double-burden problem: while pensions in payment had to be financed all along a part of contributions was saved in order for pre-funding future pensions. The resulting deficit of the National Pension Insurance Fund had to be financed by government. This transition cost was to be covered from reduced public spending on other chapters of the budget rather than debt.

This could have been achieved at a relatively low social cost. As seen in Figure 2, the period between the late 1990s and mid-2010s, that is the maturation phase of the funds, coincided with a favourable demographic background. As mentioned above the current Hungarian age-pyramid has two large humps, two relatively big generations, those who were born in the mid-1950s and their children born twenty years later in the mid-1970s. The entry of the latter, in

the late 1990s, to the labour market resulted in two large taxpayer generations and no similarly large cohorts in dependent age.

This opportunity, however, was not exploited. Although no special pensions-related flows were earmarked, so the exact extent of debt-financing cannot be determined, it is safe to say that the transition was not based on current but future revenues (see e.g. an OECD report by Égert, 2012). The trends of public spending on other chapters and the rapid increase of government debt over this period all imply a debt-financed transition. So the reserves accumulating in the second pillar were more an illusion of savings than net wealth. In parallel with the build-up of the funds government debt of similar size was gathering. The pre-funding experiment, the effort to increase the share of asset-based revenues in old-age income, was an effort that was not. We will return to this in the next section.

3. Projections

Below we present the results of a projection made on a simple cohort model. As a counterfactual we fix current age-profiles of labour income and consumption and combine them with expected changes in the age composition of the population. We apply two balancing items and ask how much additional savings and/or how large initial capital endowment would keep up the current balance till 2100 in light of an increasing mismatch of labour income and consumption. We repeat the exercise with 1995 as base year in order to demonstrate the significance of the opportunity offered by the demographic window between the mid-1990s and mid-2010s and missed by the mismanagement of the pre-funding experiment in the pension system. In addition, we feed an alternative set of age-profiles into the model in order to show how the savings and/or capital have to change if we extend the national economy with the household economy and take into account the fact that consumption and labour in the household are less exposed to the effects of population ageing.

Point of departure

In Figure 4 we show the age patterns of labour income and consumption in 2012 per capita (upper left hand panel) and in aggregate (upper right hand panel). The per capita figure depicts the general pattern of relatively smooth consumption across cohorts in different age and labour income concentrated in cohorts of active age. As before, figures of the upper left hand panel are normalised on the average per capita labour income of the 30-49 year old generation. In contrast, aggregates in the upper right and the lower left panels are normalised on the aggregate labour income of an average cohort, instead of an average member of the cohorts involved, between the ages of 30 and 49 years. In the upper right hand panel, the curves of current aggregates show two relatively large generations described in the Background section. The asymmetry between the two curves, the fact that labour income peaks among people in their mid-30s whereas consumption is higher among the original baby-boomers, is a consequence of a retirement process of the latter age-group that had already started. Nevertheless, aggregate consumption is largest among octogenarians and their older contemporaries combined here as one single cohort; it is as much as 174 percent of the aggregate labour income of an average cohort in prime working years.

A mere projection of current age patterns reveals an unsustainable imbalance between consumption and labour income if they are combined with the expected future age composition. The mechanics of population ageing dictate an aggregate consumption of the 80 year old and older population nearly 60 percent the combined labour income of the 30-49 year old active cohorts (11.7 times the aggregate labour income of an average cohort of 20

cohorts). The resulting lifecycle deficit is shown in the lower right hand panel. It grows from zero to €8 billion in the course of forty years and remains at that level over the rest of century. In cumulative terms this reaches €540 billion by the end of the century. As mentioned in the Motivation section, aggregate consumption exceeds aggregate labour income even in the base year. This initial gap, an equivalent of €6.6 billion or 9 percent of national income, is covered by asset-based revenues.[12] The lower right hand panel does not include this lifecycle deficit. It only shows outstanding LCDs on top of the original level generated by population ageing.

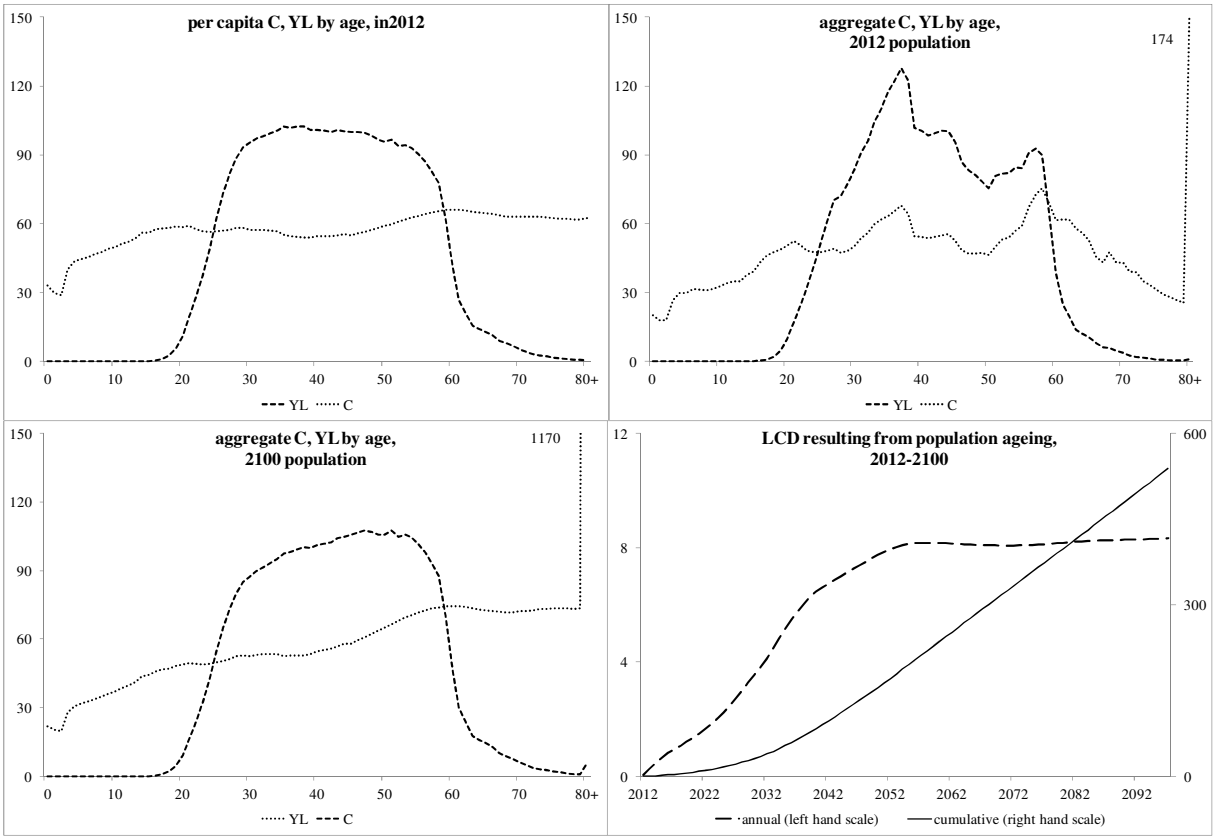

Figure 4: Current per capita age-profiles of labour income and consumption combined with current and expected future populations and the aggregate lifecycle deficit resulting from population ageing

Notes: YL: labour income, C: consumption, LCD: lifecycle deficit (aggregate consumption less aggregate labour income). Upper left hand panel: values normalised on the average labour income of an individual in the 30-49 year old generation and given as percent; upper right hand and lower left hand panels: values normalised on the aggregate labour income of a cohort in the 30-49 year age bracket and given as percent; lower right hand panel: values in billion Euros.
Source: Authors' calculation.

Assumptions

In our simple projection exercise we calculate the additional savings needs or required initial capital endowment that would keep the consumption/labour balance at the initial level. We calibrate the model to current Hungarian realities but we make a number of simplifying assumptions. We model a small, open, export-oriented economy in which interest rates, output and growth are exogenously determined. Savings are assumed to have no specific age

[12] In reality, some of asset-based income is drawn from debt. In our stylised projection we set this fact aside and focus on the consequences of population ageing.

characteristics so we reduce consumption of all cohorts by the same percentage. Savings have a double effect on the balance of consumption and labour income. They directly reduce the gap because savings are made from consumption and they also induce additional growth, which diminishes the need for consumption cuts.

We introduce a windfall capital endowment in the base year and see how much such a windfall would mitigate the need for consumption reduction. Such an endowment serves as a reserve through the demographic transition but its returns also accelerate growth. These returns could be taken as a stylised equivalent of structural and cohesion funds from richer EU member states.

Definition of consumption follows NTA standards (United Nations, 2013), which is consumption net of taxes. It includes private and public individual consumption expenditures (category P.31 in national accounts) and collective consumption expenditures (P.32) less the consumption share of taxes on products (D.2). In net terms, Hungary consumed an amount of €56.2 billion in 2012, about three quarters of national income. Net savings were an equivalent of €1.8 billion, 2.36 percent of national income[13] and, more importantly, 3.17 percent of consumption.

In the base case productivity (*g)* grows by 1.5 percent. We apply this rate for discounting so in practice we set aside the effect of growth coming from increases in productivity. Our focus is the capital requirements of balancing the effect of shrinking and ageing population. Rate of return (*r*) is set at 1.5 percent higher than *g* that is at 3.0 percent. There is no inflation in the model. Capital produces returns used by assumption as additional investments, which in turn induce additional growth (*g2*). We calibrate this component so that the effect would be roughly comparable to the additional growth generated by EU funds in Hungary.[14]

Results

The main interest in the projection exercise is to see how much capital is needed in maintaining the original level of aggregate lifecycle deficit till the end of the 21st century. We examine two ways of accumulating the capital in question, through additional savings or a windfall of capital in the base year. These two alternatives can be combined. Here we present the two extreme scenarios, first, keeping savings rates fixed at the original level but adding a balancing capital endowment and second, excluding any such windfall but raising the saving rate to a level that would keep the consumption/labour income balance at the 2012 level till 2100. Results are shown in Figure 5.

The figure reveals that under conditions set in the previous subsection a capital endowment worth of €232 billion, or 307 percent of national income in 2012, is required to offset the effect of population ageing on the consumption/labour balance. This reserve would grow by a further €65 billion in the first forty years before it would start decreasing provided the original savings rate of the base year did not change over the entire period. The alternative path without any capital injection would require a saving rate of 8.07 percent of net consumption against the actual 3.17 percent in 2012. Such an effort would produce a net wealth of about €120 billion by 2047 only to be consumed by the end of the century.

[13] The gap between national income and the sum of net savings and consumption are made of taxes on products (€16.6 billion, 22 percent of national income) and net transfers (categories D.5+D.61+D.62+D.7) to the rest of the World (€0.8, 1.1 percent)

[14] On the effect of EU funds on growth in Hungary see Borkó and Oszlay (2007) and Nyikos (2013).

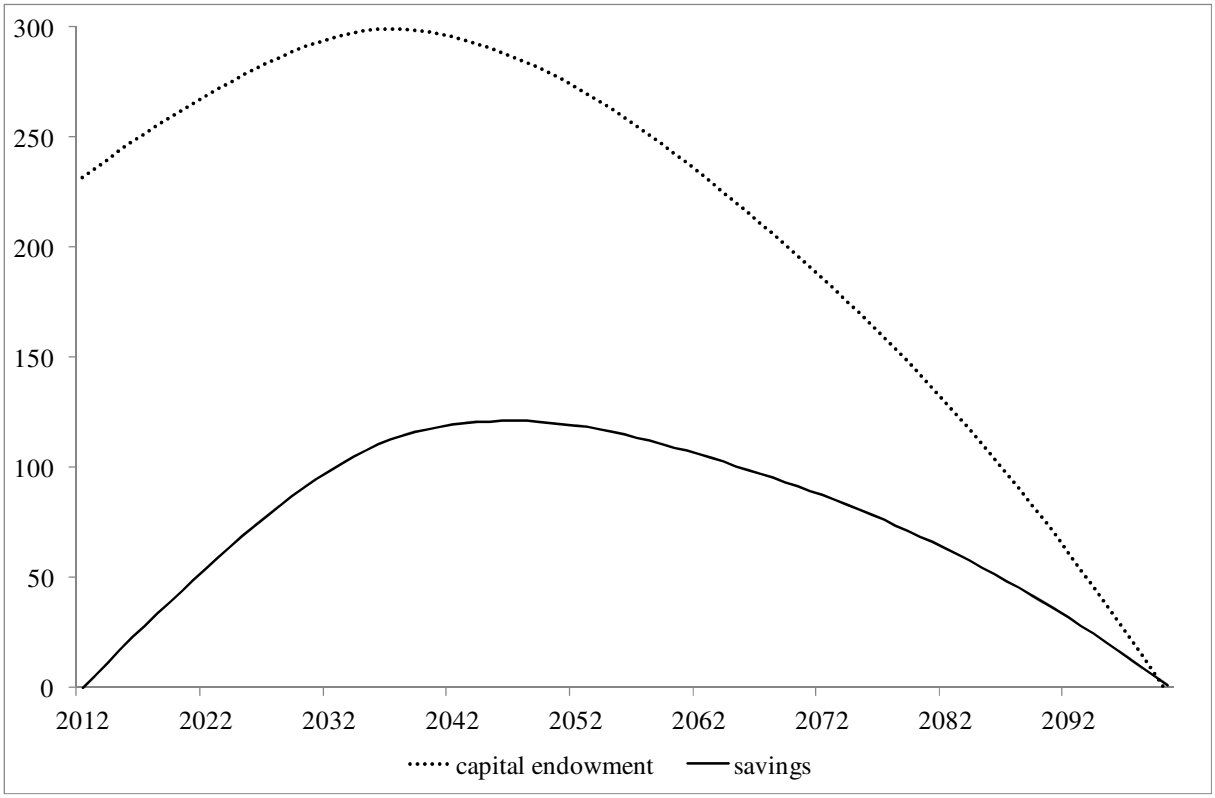

Figure 5: Balancing reserves generated by a capital endowment or savings, billion Euros

Notes: Balancing reserves: reserves assuring that the lifecycle deficit does not exceed its initial level in the base year till 2100.
Source: Authors' calculation.

The key results of the base case scenario are summarised in the first column of Table 3. In the other two columns we show the outcome of two alternative model settings. In the first one we replace the age-profiles of consumption and labour income of the national economy with their equivalents in the total economy consisting of the national as well as the household economy. We demonstrated in Figure 1 that the age-profile of household labour peaks among young adults (parents, mostly women, caring for their children) and again after retirement. We give a closer look in Figure 6. In the left hand panel we draw current per capita age-profiles, which we combine first with current then with expected future populations in the other two panels the same way as we have done before with age-profiles of the national economy. Results are normalised on market labour income, which itself is expected to decrease due to the decreasing number of workers. So a seemingly similar aggregate consumption of household labour by children in 2100 is in fact hardly more than half of its current level. In contrast, the value of household labour produced by the oldest old is increasing, up to a 285 percent of the aggregate labour income of an average cohort in the reference generation, a development unparalleled in the national economy where labour income practically disappears above the age of 60 years. Another difference is consumption. Although the sheer mechanics of population ageing would make consumption of octogenarians and their older contemporaries soar, this would not be as sharp as in the national economy; it would go up to only 563 percent of the aggregate reference labour income in contrast to the 1170 percent in the national economy. In short, the household economy, though exposed to the effects of changing age composition, is less vulnerable to the demographic transition than the national economy.

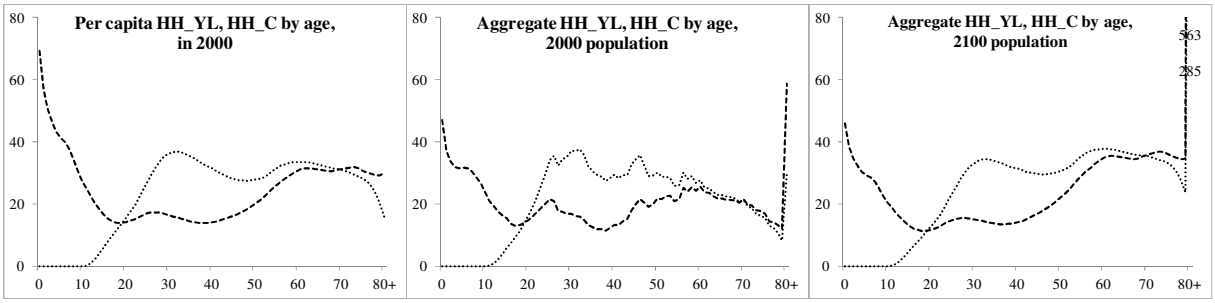

Figure 6: Current per capita age-profiles of value of household labour produced and consumed combined with current and expected future populations

Notes: HH_YL: value of household labour produced, HH_C: consumption of household labour. Left hand panel: values normalised on the average labour income of an individual in the 30-49 year old generation and given in percent; central and right hand panels: values normalised on the aggregate labour income of an average cohort in the 30-49 year age bracket and given in percent.
Source: Gál, Szabó and Vargha (2015); authors' calculation.

This affects the results of our projections, for which we applied 2000 age profiles and adjusted them to 2012 macro aggregates, as well. As shown in the second column of Table 3 the initial requirement for a balancing capital endowment is 259 percent of national income against the 307 percent in the base case scenario. Alternatively, the necessary saving rate (including both the additional balancing savings and the original saving rate in 2012) is 7.21 percent against the 8.07 percent above. We also made an estimation of how long the base-case endowment of 307 percent of national income would last if added to this revised pair of age-profiles. It would be depleted after 120 years, later than the 88 years in the base case.

Table 3: Summary results of projections under three different scenarios

	base case	household economy included	demographic window opens
if gap is balanced exclusively by capital endowment it takes … % of national income			
	307	259	209
if gap is balanced exclusively by capital endowment it is depleted in … years			
	88	120	beyond the projection horizon
if gap is balanced exclusively by savings total saving rate is …			
	8.07	7.21	6.31

Notes: Base case: 2012 age-profiles of the national economy; household economy included: age-profiles of the total economy (including the household economy); demographic window opens: projection starts in 1995.
Source: Authors' calculation.

Finally, we demonstrate the demographic window of opportunity, which, as shown in Figure 2, was open between the mid-1990s and the mid-2010s. We apply 2012 age profiles and macro aggregates but start the projection with 1995 demography in order to focus on the effect of an initial period favourable for capital accumulation. Results prove the expectation right. If based solely on savings a rate of 6.31 percent would make the stabilisation through the entire projection period of 88 years (see the third column in Table 3). If stabilisation would have been based on windfall capital an amount of 209 percent of the 2012 national income would have been enough against the 307 percent in the base case. These results support the view that the opportunity for the accumulation of net wealth was real. Timing of the pre-funding pension reform was right. If proper tools, such as an earmarked tax on fund

members or dedicated reductions in the public budget, were introduced net wealth could have been accumulated at a relatively low consumption cost.

Conclusions

We have applied simple projection techniques frequently used in the analysis of sustainability of welfare systems in order to measure the sustainability of current consumption patterns. We asked how much more savings or how large a windfall capital endowment would assure that consumption would not exceed labour income in 2100 more than it does today in Hungary. We also checked how much the results would change if the projected age-profiles of consumption and labour income included unpaid household labour as well. Finally, we repeated the base case projection starting in 1995 instead of 2012 in order to demonstrate the demographic window that was open between the mid-1990s and mid-2010s.

We found that in the base case savings should more than double from the current 3.2 percent to 8.1 percent of net consumption or the economy should receive a windfall capital equivalent of about 3 times the national income. We also found that despite its exposure to population ageing the household economy is less vulnerable than the national economy. Finally, we showed that the demographic opportunity was real. If started in the mid-1990s preparations for the demographic transition would have been less painful. Since this period coincides with the botched pre-funding experiment in the public pension system the mismanagement of this reform proves to be a missed opportunity in particular.

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