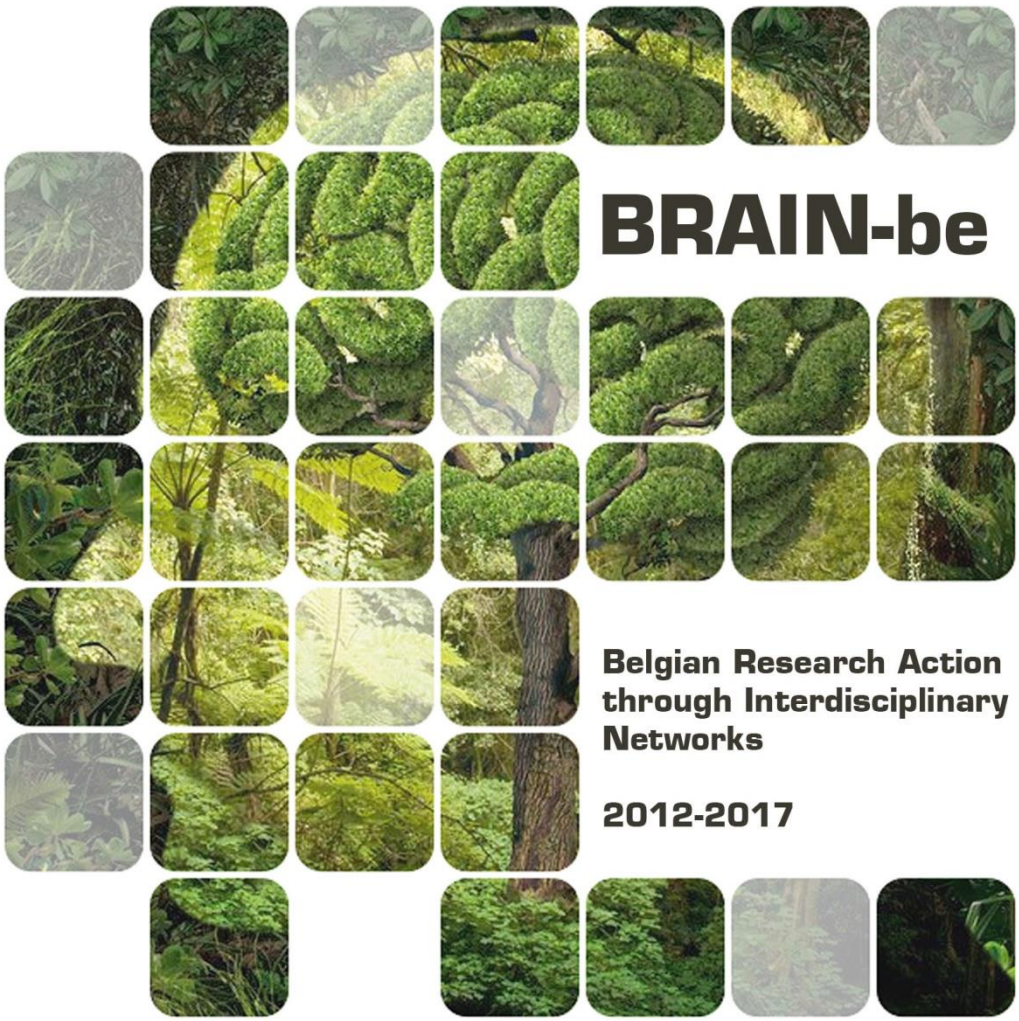

BEL-Ageing

Ageing, pension systems, fiscal sustainability and growth

Lionel Artige (ULiège) – André Decoster (KUL) – Freddy Heylen (UGent) – Mikkel Barslund (CEPS)

Axis 4: Federal public strategies

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NETWORK PROJECT

BEL-Ageing

Ageing, pension systems, fiscal sustainability and growth

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ABSTRACT

All advanced economies are experiencing population ageing - characterized by a low fertility rate and a steady increase in life expectancy – and its consequences in terms of public finances and potential growth. Some countries are more affected than others. Belgium is one of them. The economic and social effects of the 2007-2008 financial crisis and the recent health crisis related to Covid-19 make it even harder for Belgium to absorb the expected increase in public pension spending without jeopardizing its fiscal sustainability, economic growth and welfare. Therefore, like many other advanced countries, Belgium will have to introduce pension reforms.

All existing pension reforms already introduced in advanced economies consist in rebalancing the imputation of the cost of ageing from the active population to the retirees: increase in pensionable age, tighter conditions for early retirement and higher incentives to work after official retirement age. In Belgium, the labour market may be an additional area where reforms could have a positive effect on the sustainability of the pension system.

Reducing the level of structural unemployment could substantially slow down the expected increase in the old-age dependency ratio.

The authors of the present research project, called Bel-Ageing, consider that the reforms likely to improve the sustainability of pension systems are known. The issue is about the fine-tuning of these reforms in order not to kill productivity growth, not to slash the welfare of the elderly or the youth and not to increase inequalities. In other words, the issue is about finding the optimal balance between efficiency, fairness and political feasibility of the reforms in times of high public indebtedness and low growth.

The main objective of this project is to provide various tools to assess quantitatively the sustainability of the Belgian pension system and to test actual and potential pension and labour market reforms. In order to do so, this project brings together the expertise of microeconomists and macroeconomists from the Center of European Policy Studies (Cinzia Alcidi, Daniel Gros and Mikkel Barslund), the Katholieke Universiteit Leuven (André Decoster and Bart Capéau), the Universiteit Gent (Freddy Heylen and Willem Devriendt) and the Université de Liège (Lionel Artige, Sergio Perelman and Pierre Pestieau). The motivation for building this network is to assemble expertise in microsimulation and overlapping-generations models and combine these two approaches to improve the quantitative assessment of the sustainability of the Belgian pension system.

This final report provides a synthesis of the work of this network of researchers. In a nutshell, Belgium's demographic dynamics and potential growth do not allow the status quo to be maintained. The path that seems to us most necessary to maintain a certain generosity of the pay-as-you-go pension system is to increase the employment rate of the working population (especially

young and older people), to promote overtime work among the working population and to extend the length of the period of activity. Fiscal incentives and incentives within the pension system to encourage longer careers are recommended. Otherwise, the level of pensions will have to be reduced to guarantee the financing of pay-as-you-go pensions or move to a fully-funded pension system. Furthermore, since demographic change may also have adverse intragenerational distributional effects, e.g. between individuals with different innate ability, it will be important to also monitor pension reform according to equity criteria.

Keywords: Ageing, growth, labour market, pension, public finance

1. INTRODUCTION

Long-term economic growth and a favourable old-age dependency ratio enabled European countries after the Second World War to build generous welfare states in general and pension systems in particular. Today, the European economy and other advanced economies are experiencing the last stage of demographic transition - population ageing - characterised by low fertility and high life expectancy. As a result, the cost of the current welfare state is rising at a faster rate than productivity. This trend, which is unlikely to be reversed in the coming years, poses a threat both to the financial sustainability of pension systems and to the potential growth of ageing economies.

The sustainability of pension systems in Belgium and other advanced countries depends on the cost dynamics of the pension systems and the growth dynamics of the economies. Population ageing affects both. The effect of ageing on public finances is uncontroversial and predictable: the median age, the number of retirees and the cost of pensions and health care will be increasing with certainty in the next 50 years. This cost will have to be paid by countries' production. The effect of ageing on aggregate growth is less predictable. The share of the population that produces goods and services will decline during this period. This may be an incentive to be more productive in order to satisfy the consumption of the working and retired population. What is unknown is the direct effect of ageing on a country's ability to be as innovative as it is today or even more so.

Another worrying effect is that of public debt on growth. The financial crisis of 2007-2008 and the recent health crisis linked to Covid-19 will worsen the indebtedness of ageing countries such as Belgium. For the time being, this effect is weak because interest rates are very low. If these interest rates were to rise in the medium term, the effect on public and private debt and growth could be devastating.

2. STATE OF THE ART AND OBJECTIVES

Although population ageing and its economic consequences concern all advanced countries, some are affected more than others. Belgium is one of them due to several reasons. First, the level of income per capita, one of the highest in Europe, leaves no much room for significant productivity gains in the future. According to data from the Federal Planning Bureau, labour productivity increased by 0.5% per year on average between 2010 and 2018. Second, the expected increase in the public pension spending is among the highest in Europe (EC 2018). In 2010, Belgium spent 11% of GDP in public pension spending (against 12.2% in the euro area), 12.1% in 2016 (against 12.3% in the euro area) and will spend, according to the projections of the 2018 EC Ageing Report, 14.5% of GDP in 2040 (against 13.5% in the euro area). In the euro area, it is the strongest projected rise after Luxembourg. Third, the tax burden is one of the highest in the world with a tax-revenue-to-GDP ratio close to 44.6% of GDP in 2020. Fourth, the level of gross public debt, close to 98.6% of GDP in 2019 is expected to increase very much after the Covid-19 pandemic. In Table 1, there are some projections made by the European Commission for the 2021 Ageing report. The expected increase in the old-age dependency ratio is steep while the employment rate is assumed to remain stable over time. This is probably an area where economic reforms could have a significant impact.

Table 1 : Demographic and economic projections for Belgium 2019-2070 – 2021 EC Ageing Report

Demographic projections - EUROPOP2019 (EUROSTAT)	2019	2030	2040	2050	2060	2070
Life expectancy at birth						
males	79,8	81,2	82,6	83,9	85,2	86,3
females	84,3	85,7	87,0	88,2	89,3	90,3
Life expectancy at 65						
males	18,9	19,9	20,9	21,8	22,7	23,6
females	22,2	23,2	24,2	25,1	26,0	26,8
Net migration (thousand)	45,0	20,5	19,2	19,8	20,4	20,5
Net migration as % of population	0,4	0,2	0,2	0,2	0,2	0,2
Population (million)	11,5	11,8	11,9	11,9	11,9	11,8
Working-age population (20-64) as % of total population	58,6	56,2	54,7	53,5	52,8	52,5
Elderly population (65 and over) as % of total population	19,0	22,8	25,2	26,4	27,4	28,0
Macroeconomic assumptions*	2019	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1,5	0,9	1,3	1,3	1,4	1,4
Employment (growth rate)	1,0	0,2	-0,2	-0,2	-0,1	-0,1
Labour productivity per hour (growth rate)	0,4	0,7	1,5	1,5	1,5	1,5
Potential GDP per worker (growth rate)	0,5	0,7	1,6	1,5	1,5	1,5
Labour force assumptions	2019	2030	2040	2050	2060	2070
Population growth (20-64)	0,2	-0,2	-0,1	-0,2	-0,1	-0,1
Employment rate (20-64)	70,6	71,6	71,5	71,2	71,1	70,9

Dependency ratios	2019	2030	2040	2050	2060	2070
Old-age dependency ratio 20-64 (3)	32,5	40,5	46,0	49,2	51,8	53,3
Economic old-age dependency ratio (20-64) (6)	45,0	53,6	61,2	65,9	69,7	71,9

LEGENDA:

*** The potential GDP and its components are used to estimate the rate of potential output growth, net of normal cyclical variations**

(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64

(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64

Source: 2021 EC Ageing report

The BEL-Ageing research project brought together the expertise of microeconomists and macroeconomists from the Center of European Policy Studies (Cinzia Alcidi, Daniel Gros and Mikkel Barslund), the Katholieke Universiteit Leuven (André Decoster), the Universiteit Gent (Freddy Heylen) and the Université de Liège (Lionel Artige, Sergio Perelman and Pierre Pestieau).

Our objective was threefold:

1) Explore theoretically the multi-dimensionality of population ageing (decrease in fertility, increase in longevity and migration of skilled workers) and its effects on the labour market, on economic growth, public finances and welfare;

2) Develop various frameworks (generational accounting, micro-simulation models and calibrated overlapping-generations models) to assess quantitatively the micro- and macro-economic effects of ageing, pension and labour market reforms, and fiscal policy adjustments in Belgium and compare this with findings from other European countries.

3) Confront the results of these different frameworks and use the output of each of them as input to enrich the others as appropriate.

3. METHODOLOGY

Two methodological approaches were used in the research work of this project:

1) A macroeconomic approach based on general equilibrium models with overlapping generations calibrated on Belgian data. This approach aims to propose a micro-founded model that replicates the moments of the main macroeconomic variables and to quantify the reactions of the model to projected ageing and to changes in public policies such as labour market reforms or reforms of the pay-as-you-go pension system.
2) A micro-economic approach based on a model of job choice in combination with microsimulation models for direct and indirect taxes. This approach provides a structural framework to estimate the effects of labour supply and labour demand side effects, on labour market participation. These models are used to assess the effects of labour market policies.

   More specifically, a random utility random opportunity (RURO) discrete choice model of labour supply was developed and estimated both on the Belgian version of SILC 2007 and 2015.

   The model allows to distinguish between demand (available job offers) and supply side (preferences) effects determining the final labour market outcomes.

   In conjunction with the microsimulation model EUROMOD this model allows to investigate the distributional consequences of several tax reforms intending to increase labour market participation, especially of the elderly. One such a reform is a tax shift from direct to indirect taxation. A methodology was developed to analyse such joint tax reforms. The methodology was implemented to analyse the Belgian tax shift introduced gradually as of 2016 as well as several other possible joint reforms. To do so, use was made of the recent extension of the EUROMOD model with an indirect tax module, to the development of which we actively contributed (See De Agostini et al., 2017, and Akoğuz et al., 2020).

   Analysing the welfare effects of reforms stimulating labour market participation implies to take into account the trade-off between increased income due to labour market participation and the welfare cost of reduced leisure time. The compensating and equivalent variations do not guarantee that this is indeed the case. An alternative to cure this potential defect was proposed.

4. SCIENTIFIC RESULTS AND RECOMMENDATIONS

4.1 Preferences, labor market and public policies

Capéau and Decoster (2016) investigated the contribution of on the one hand changing preferences (more intense preferences for leisure as people grow older) and, on the other hand, differences in opportunities (older people getting less or less attractive job offers) to explain the lower employment rate of older people who are still available for the labour market (those who did not retire yet, did not leave by an early leaver scheme, or are not disabled).

Thereto a Random Utility and Random Opportunity (RURO) model of job choice was used. We estimated such a model on Belgian SILC data for 2007. Capéau, Decoster and Dekkers (2016) present the full methodology of estimating and simulating with such a RURO model of job choice.

Capéau and Decoster (2016) then performed two counterfactual simulations. First, variation of intensity of preferences for leisure due to age was eliminated. Next, variations in the intensity of job offers with respect to age were eliminated.

Capéau, Decoster, Maes and Vanheukelom (2018) developed a methodology to analyse the budgetary and distributional effects of a joint income and indirect tax reform, including behavioural reactions, in absence of an overall encompassing model. The methodology was applied to the Belgian tax shift of 2016.

They also developed a proposal to integrate demand side effects into such an evaluation model. To that respect they use the labour demand elasticities from the calibrated OLG-model of Devriendt and Heylen (U Gent).

To that end RURO was re-estimated on SILC 2015 data. The extension of the direct tax microsimulation model EUROMOD with an indirect tax module, to which the team actively contributed (See De Agostini, at al., 2017, and Akoğuz et al., 2020) is indispensable to that end.

Later on Capéau, Decoster and Maes (2019) applied the methodology also to several hypothetical joint reforms of direct and indirect taxation.

Capéau, Decoster and De Sadeleer (2019) show that the usual compensating and equivalent variation (CV and EV) criteria to assess the welfare effects of tax reforms fail to satisfy the following criterion. Suppose two persons mutually agree that the first is better off than second pre-reform and that after the reform, both gained in welfare, but the second has become better off than the first. Then it may stand to reason to say that the second gained more in welfare than the first. The EV and CV do not satisfy this criterion. It was shown that this is due to the use of individual specific valuations for leisure (the persons' own wages) in the expenditure function underlying the CV and EV. The problem could be cured by evaluating leisure/labour time at the same wage for all in the expenditure function.

Backhaus and Barslund (2019) and Barslund and Schomaker (2019) study labour supply in connection with grandparenting. Backhaus and Barslund find a large negative effect on women's (grandmother's) labour supply from becoming a grandparent. They argue this is causally related.

Barlsund and Schomaker focus on the impact of grandparental childcare on mother's labour supply. They find a large positive effect for mothers' participation in the labour market from regular access to childcare from a grandparent.

KU Leuven hosted David Rodrìguez (University of Essex) at KU Leuven for a short stay during the fall of 2017, in order to share expertise on estimating job choice models of the RURO-type. Assistance was given to the Centraal Plan Bureau of the Netherlands (Henk-Wim de Boer) and the microsimulation research team of Tom Truyts (UCL Campus Saint-Louis Bruxelles) in developing tools to estimate RURO models of job choice.

In order to answer the question on the life cycle effects of a taxshift, dynamic aspects of behaviour (impact of future price and income changes on current labour market choices) need to be taken into account. Together with Stefan Etgeton (DIW Berlin), Mathieu Lefebvre (University of Strasbourg), and Sergio Perelman (ULg), André Decoster and Bart Capéau (KU Leuven) explored the possibility to integrate these aspects in a structural discrete choice model of the RURO-type for Belgium. This turned out to be a more involved task, due to lack of a tractable micro-economic behavioural model that integrates the mean features of the Belgian pension and early leavers schemes, and due to lack of datasets that both cover histories of careers (to calculate expected pensions), and information on education. We therefore abandoned this research track for now and postpone it for another occasion.

Main results

1) Preferences versus opportunities explaining differences in employment rates.

Capéau and Decoster (2016) find that the decline of suitable job offers with respect to age are at least as an important factor in explaining low participation rates for the elderly, as is increasing preference for leisure. The effect of opportunities seems to work primarily through the extensive margin, whereas the effect of preferences is more outspoken in the intensive than in the extensive margin.

2) Joint direct and indirect tax reforms

Capéau, Decoster, Maes and Vanheukelom (2018) find that cost-recovery of the current Belgian tax shift is only very partial. Consequently, the increase in indirect taxes is not sufficient to guarantee budget neutrality. Partly this is due to an effect which can only be detected by using a RURO-type of job choice model: by subsidising low wages, low wage jobs might also become more attractive for persons who had chosen a higher wage job pre-reform. As RURO models jobs as packages of labour time regimes and wages, they can observe the potential presence of such an effect, while this is not possible for traditional labour supply models where wages are fixed characteristic of the individuals (productivity). However, preliminary simulations show that cost recovery is also low when wages are considered to be fixed and exogenously given. Capéau, Decoster, and Maes (2018) therefore also investigated the consequences of an alternative more budget neutral reform, increasing nonzero VAT-rates by 4 percentage points.

The simulations confirm that the losers of such a reform are the currently old generation (pensioners), at least those with low pensions. Pensioners with high enough pensions do profit from the reduction in marginal rates (suspension of the 30% bracket). Among the biggest losers are the unemployed for whom the reform did not provide enough incentives to switch to labour market participation or who cannot find a job, even after labour demand has augmented.

3) Money metrics with person specific wages

Using the 2015 estimates of the RURO job choice model, Capéau, Decoster and De Sadeleer (2019) illustrate that in one quarter of the cases where two persons would unanimously agree who is the better of the two, the expenditure function underlying the CV and EV would point into the opposite direction. It is advocated to use the same reference price for all in the expenditure function when evaluating the welfare changes of tax reforms. This might lead to considerable qualifications in the assessments of such reforms.

Recommendations

KU Leuven team wants to stress two important points when evaluating the effects of labour market participation of elderly. Firstly, labour market outcomes are not only the result of preferences (intensitiy of preference for leisure), but are also affected by demand side restrictions (job offers suited to the capacities of elderly). RURO models of job choice try to capture the contribution of both empirically. In the light of the available data, this is a difficult endeavour. Therefore the continuation of developing other models that might better identify both factors deserves attention in future research agendas. Secondly, in the discussion of shifting taxes from labour to consumption in order to stimulate labour market participation, it is important not to confuse a tax shift with a tax cut. If a tax shift is budgetary neutral, the cost recovery contributions are rather modest, when one successfully accounts negative effects on purchasing power of indirect tax lifts.

4.2 Longevity, pensions and economic growth

The type of social security (defined benefits or defined contributions, funded or not, Bismarckian or Beveridgian, flexible or rigid retirement age) and the type of aging (increased longevity or decreasing fertility) are shown to interact with the process of aging. Results show that when aging is driven by an increasing longevity, unregulated retirement age systems lead to greater improvements in welfare. In contrast, with a decreasing fertility, mandatory retirement systems with defined contributions fare better.

Artige, Dedry and Pestieau (2014) analyzes the impact of economic integration on capital accumulation and capital flows when countries differ in their social security systems. Funding and early retirement both foster capital accumulation relative to pay-as-you-go pensions with flexible retirement. When economies integrate, both imply capital outflow possibly resulting in utility losses.

On a macroeconomic point of view, standard neoclassical growth models show that a decline in fertility reduces the dilution of the capital stock and, therefore, always yields higher capital accumulation and per-capita income, which is empirically confirmed by Brander and Dowrick (1994), Kelley and Schmidt (1995) or more recently by Li and Zhang (2007). Nonetheless, empirical studies

find a negative effect of an increase in the old-age dependency ratio on saving and investment (Li, Zhang, and Zhang 2007). Regarding longevity, a rise in life expectancy will, with certainty, increase the old-age dependency ratio and (private and public) expenditures of the elderly. In the absence of any transfer to the elderly, the macroeconomic effect depends on the reaction of the old individuals. If they do not change their retirement age, they will save more and capital accumulation will be higher. If they decide to work longer, they may save less and capital accumulation will be lower. Empirically, an increase in longevity appears to be favourable to saving and investment (Li, Zhang, and Zhang 2007). In total, one cannot be conclusive on the macroeconomics of aging. One conclusion that can be drawn, however, is that there is no parallelism between the financial accounting and macroeconomic effects of aging.

The introduction of intergenerational transfers under the form of PAYG pensions complicates further the macroeconomics of aging. If the effect of a decline in the fertility rate is clearly positive on capital accumulation when young people save for retirement in a fully funded pension scheme, the result is much less clear, as we show in Artige, Cavenaile and Pestieau (2014), if the pension system is PAYG because the dilution of the capital stock is reinforced in a defined-contribution system while it is weakened in a defined-benefit system. As for longevity, the macroeconomic effect is ambiguous if retirees are promised to receive defined annuities. All different PAYG pension schemes are not macroeconomic equivalents and their economic relevance depends strongly on demographic trends. In a number of countries over the last decades the nature of pension plans has changed dramatically as coverage has shifted from defined-benefit to defined-contribution arrangements. This shift started in funded private pension schemes in the US and in the UK. Recently it has hit the unfunded public social insurance programs. In particular, a number of Continental European countries with generous pay-as-you-go public schemes have shown an interest in moving towards defined-contribution format including notional defined-contribution schemes. This evolution has been motivated by two joint concerns: a better risk-taking balance between the retirees and the workers and the financial sustainability of the plans in aging societies. Is this evolution sound on a macroeconomic point of view? What are the macroeconomic effects of changes in fertility and longevity when pension is PAYG and assess the macroeconomic relevance of the shift from defined-benefit to defined-contribution pension in an aging society. Using an OLG model à la Diamond (1965) and general functions for technology and preferences, we study the implications of a decline in the fertility rate and of an increase in longevity on the capital accumulation and the welfare of a society with unfunded pensions that can be either of the defined-contribution (DC) or of the defined-benefit type (defined total benefit (DB) and defined annuities (DA)). Despite ambiguous effects of declining fertility and of rising longevity on capital accumulation and welfare depending on the pension scheme, we show that the shift from a defined-benefit (DB or DA) to a defined-contribution plan is a right move in terms of both per-capita income and life-cycle welfare.

Barslund and Ludolph (2019) look at the potential impact of low interest rates on Belgian interest payments over the coming decades and compare projected savings on interest payments with projected increases in public expenditures due to population ageing. They find that if interest rates stay low, and they argue they likely will for the coming decade, the savings on interest payments roughly offset the increase in ageing related expenditures.

Recommendations

Longevity increases for all but not in a uniform way (Pestieau and Ponthière 2016). Poor people do not benefit from those increases as much as the rest of the population. This implies that traditional measures of poverty are understated as they not take into account what has been called the missing poor. In other words, it is crucial to look at the distribution of longevity across income classes and not just at the average.

4.3. Macroeconomic and distributional effects of demographic change in Belgium

Without behavioral changes in labor supply, education and savings, which may all affect investment in physical capital, this demographic transformation will certainly cause a significant loss in per capita output and income. As a matter of simple arithmetic, if fewer active people are available to produce output for more dependent people, and no one changes his or her behavior, lower per capita output is unavoidable (Onder and Pestieau, 2014). Fortunately, individual behavior can change. A large theoretical literature has demonstrated that falling fertility and increasing life expectancy (aging) will also affect the incentives for individual households and firms to work, to save, and to invest in human and physical capital. At least four major questions remain, though: (i) Will these incentives go in the right direction? The literature remains ambiguous; (ii) If they go in the right direction, will they be strong enough to reverse the negative effects of demographic transformation on per capita output? (iii) Given that not everyone has the same abilities and/or chances to study or work, what will be the impact of demographic change and the induced behavioral responses on income inequality and unemployment? (iv) What is the impact of the underlying components of demographic change (reduced fertility versus increasing life expectancy)?

Devriendt and Heylen (2020a) set up a rich 28-period OLG model for an open economy, with exogenous time-varying fertility and life expectancy and individuals that differ by innate ability and productivity of schooling. While the labor market for high and medium ability individuals is perfectly competitive and clears, above market-clearing wages imply (involuntary) unemployment among low ability individuals. The model was calibrated to Belgium.

Predictions are not optimistic. Arithmetically, i.e. for unchanged household and firm behavior, projected demographic change may cut off about 0.4%-points on average of the annual per capita growth rate in the next 25 years. Although we do observe sizeable (and mostly positive) behavioral adjustments by households and firms to the demographic transformation, their effects can only partially counteract the unfortunate arithmetical consequences of the rapidly increasing dependency ratio. A net negative effect on future annual per capita growth of 0.29%-points remains. The reasons are multiple. First, some of the behavioral responses are negative, in particular the response of private investment in physical capital. Private investment suffers mainly from the negative effect on the productivity of physical capital induced by reduced fertility and a declining population at working age. Second, the strong increase in savings that we also observe cannot counteract this negative effect: in an open economy these savings may also be invested abroad (capital outflow). Third, some of the positive behavioral adjustments have already taken place in previous decades.

Decomposing the behavioral responses and their growth effects according to the separate components of demographic change, it is clear from our results that the main problem is reduced (low) fertility after the baby boom. This has not only resulted in a reduced population at working age, with negative effects on investment in physical capital, the retirement of the baby boom generation is now also a major factor behind the growing share of retirees. The induced behavioral effects from rising life expectancy are broadly positive and almost strong enough to compensate for the quantitative effect of longer life spans on the number of retirees.

Our findings on the income distributional effects of demographic change are nuanced. The capacity of individuals with a high ability (and income) to respond to increasing life expectancy by building more human capital, and by saving more, are clearly forces that lead to higher income inequality. To some degree, individuals of low ability may counter these forces by working more hours, but this then goes at the cost of their leisure and welfare. As to unemployment among low Ability individuals, we find no noticeable impact of demographic change. Last but not least, our results highlight the major role of the pension system for inequality. If pensions do not follow wages, a rapidly rising share of elderly people will be another important force to higher income inequality.

Recommendations

The loss of aggregate per capita growth and income is a reason for concern. Not only will it be more difficult to finance future public pension expenditures and other costs related to aging, so it will be to cope with rising inequality. Our result that lower fertility and a reduced population at working age are the main problem (while increased life expectancy is not) also provides a clear perspective on policy implications. Policies that encourage people to join, remain in or re-enter the labor force will be paramount, as well as policies to enable those willing to work to actually do so. In Belgium, there still is an enormous potential to raise hours worked as they are currently far below the level in most other OECD countries, in particular among low educated and older individuals. In this context, we support reforms of the tax system to reward work, investment in education and training, pension reform encouraging longer careers, policies helping workers to combine family and work life, etc. In the end, however, the dramatic demographic shift may also force policymakers to rethink migration policies to boost labor supply.

4.4. Macroeconomic performance and welfare inequality effects of public pension reform

In the first part of this research, Devriendt and Heylen (2020b) use their calibrated 28-period OLG model for Belgium to study alternative reforms of the public PAYG pension system. Although raising the retirement age and reducing (defined) pension benefits will directly reduce expenditures and improve the *financial sustainability* of public pension arrangements, the question arises if these frequent reforms also dominate other reforms when it comes to *promoting macroeconomic performance and welfare,* and to *avoiding inequality*. Maybe other reforms are possible with equally good budgetary effects, but better results regarding employment and all-inclusive per capita growth and welfare? The question is important. Considering the downward pressure of demographic change on per capita income, the underemployment of older and low educated people in many economies, and the increasing sensitivity in society to the problem of inequality, not only budgetary outcomes, but also productive efficiency and - especially - equity demand attention.

Our main findings are as follows. Public pension reforms involving an increase of the normal retirement age or a reduction in the pension benefit replacement rate can guarantee the financial sustainability of the system, but they fail when the objective is also to improve macroeconomic performance without raising intergenerational or intragenerational welfare inequality. A reduction of the replacement rate to restore the financial balance of the public pension system fails on both criteria. An increase of the retirement age promotes long-run macroeconomic performance, but will create more welfare inequality. The different capacities of high and low ability individuals to respond to an increase in the retirement age by building more human capital, is a key element behind rising inequality.

Our results prefer a more comprehensive reform which supplements an increase of the retirement age with an intelligent adjustment of the linkage between the pension benefit and earlier labor earnings. First, this design conditions pension benefits on past individual labor income, with a high weight on labor income earned when older and a low weight on labor income earned when young. Such a linkage between the pension benefit and earlier labor income provides strong incentives to invest more in education by reducing its opportunity cost when young, and stimulates working more hours when older. Second, to avoid rising welfare inequality this linkage is complemented by a strong rise in the benefit replacement rate for low ability individuals (and a reduction for high ability individuals). Low ability individuals are not productive in education at the tertiary level. Since their low
ability is a circumstance for which they cannot be held responsible, a compensation mechanism is justified. Attempts to cope with rising inequality by introducing an unconditional minimum pension are negative for aggregate employment and welfare. Alternatively conditioning the level of the minimum pension on an individual's hours worked over the career brings much better results, which are fairly close to those of our preferred reform.

These policy implications are fully in line with those highlighted by Buyse et al. (2017). Their model and analysis, however, neglected demographic change and ageing, and therefore the main source of rising pressure on social security and pension systems.

In a second part of this research Devriendt (2018) focused on *how to share the burden of population ageing between the working population and retirees*. Four possible scenarios are compared within the architecture of a pension points system as proposed by the Belgian Academic Council for Pensions: (i) a defined benefit (DB) system in which contribution rates of workers are raised to maintain financial equilibrium, (ii) a defined contribution system (DC) in which pension benefits are reduced, (iii) a system which organizes a balanced adjustment of both contribution rates and benefits (DM, Musgrave rule), and (iv) government financing of (additional) pension expenditures via the consumption tax (GF). Devriendt finds that an increase in the contribution rate should be avoided due to its detrimental impact on incentives to work and study and consequently on per capita growth (in the DB and DM scenario). The choice between the government financing scenario and the defined contribution scenario is a hard one, because no scenario dominates the other on all criteria.

The results reveal a preference for the government financing scenario (iv), i.e. for adjusting the consumption tax rate when demographic or other economic shocks hit the economy and the financial balance of the pension system. First, this financing scenario implies relatively good macro performance. Second, it not only implies that the burden of demographic change is shared between workers and retirees, but also between labor and capital income. Moreover, it brings about an extra

reduction of uncertainty about future pensions. Within the pension points system the value of a point will be much more predictable if financial imbalances are ultimately financed by consumption taxes.

Barslund (2020) discusses the idea of differentiated retirement ages. It is often argued that people with low educational attainment tend to have more difficulties maintaining their health towards end of working life due in part to more physical work; and partly as a consequence life expectancy at the age of retirement differs among socio-economic groups. He argues that while *average* health status differs markedly among socio-economic groups, there are large variations in health status *within* groups. The point is illustrated looking at educational attainment and health. The analysis implies that care is warranted when considering the idea of differentiating the statutory age of retirement. Barslund and Ludolph (2020) use SHARE data to look at the trend in health inequality between socio-economic groups from 2004 to 2015. As expected, they find large difference in health inequality but they do not find a worsening of health inequality over the period.

Recommendation

Based on our analysis in Devriendt and Heylen (2020b) and Devriendt (2018), our optimal pension reform has – in brief – the following characteristics:

- An extension of the normal retirement age.

- Pension benefits are conditioned on past individual labor income, with a high weight on labor income earned when older and a low weight on labor income earned when young. This smart linkage between the pension benefit and earlier labor income provides strong incentives to invest in education by reducing its opportunity cost when young, and stimulates working more hours when older.

- If a reduction of intragenerational inequality is an explicit goal of pension policy, then our analysis recommends a strong rise in the benefit replacement rate for low ability individuals and a lower replacement rate for high ability individuals. From an equity perspective this can also be justified from the fact that high ability individuals can much better optimally respond to the opportunities that increasing life expectancy brings (longer life, longer education, higher future wages).

- The architecture of a pension points system.

- A Musgrave-rule but with the consumption tax rate as the adjusting instrument when demographic or economic shocks hit the economy.

5. DISSEMINATION AND VALORISATION

The research work resulting from this project has been published in the form of working papers and publications in Belgian and international scientific journals and in chapters of scientific books.

6. PUBLICATIONS

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BEL-Ageing Workshop “Labor market, pensions, and debt in Europe: live long, retire late or die poor?” Ghent University, Friday 5 June 2015.

Artige, L (2014) “The Macroeconomics of PAYG Pension Schemes in an Aging Society”, Bel-Ageing Meeting, KUL, 16 May 2014.

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Artige, L (June 2016), “Public Education Expenditures, Growth and Income Inequality”, 2016 Taipei International Conference on Growth, Trade, and Dynamics, Taiwan.

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Artige, L (September 2019), Organization of Entrenova Conference, Rovinj (Croatia).

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Barslund, M. February 2017, ‘Ageing, work and productivity’ presentation at ‘Productivity in Ageing Societies – what impact on the economy’ workshop in CEPS, February 2017.

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Barslund, M., September 2017, ‘Recent trends in health inequalities among old-age groups across Europe’, presentation at Expert Workshop on Differential Mortality, 14 March 2017

Barslund, M., June 28 2017, 'How Denmark as ‘linking’ pioneer delivers longer working lives', EC/OECD conference 'Delivering higher effective retirement ages' in Brussels.

Barslund, M. Hosted half day workshop in CEPS on ‘Productivity in Ageing Societies – what impact on the economy’, February 2017.

Barslund, M. hosted Conference in CEPS Are longer working lives for all? Exploring Emerging inequalities’, April 26, 2017

Barslund, M. Hosted event in CEPS on ‘Preventing inequality in Ageing’, December 2017.

Bart Capéau – May 20, 2016, Workshop on Risk, Fairness and Well-being (Leuven, Belgium), presentation of “Accounting for random preference Differences in individual welfare”.

Bart Capéau – October 21, 2016, Center for Research in Economics Workshop (FUSL, Bruxelles Belgium), presentation of “Accounting for random preference differences in individual welfare”.

Bart Capéau – November 14, 2016, internal workshop Institute of Fiscal Studies (London, UK), presentation of “Potential trumps of the random utility random opportunity model to assess the impact of demand side effects on labour supply”.

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André Decoster – August 10, 2016, Conference of the International Institute of Public Finance in Lake Tahoe, US, presentation of paper “Getting tired of work? or re-tiring in absence of decent job opportunities?”.

André Decoster – September 5, 2016, EUROMOD 20th Anniversary Conference Essex (UK), poster on “Individual welfare metrics with random terms”.

André Decoster – September 5, 2016, EUROMOD 20th Anniversary Conference Essex (UK), presentation of “EUROMOD@20: versatile enough to evaluate a tax shift”.

André Decoster – September, 13, 2016, Seminar at the Central Planning Bureau Den Haag (NL), presentation of paper “Getting tired of work? or re-tiring in absence of decent job opportunities?”.

André Decoster – September, 27, 2016, Seminar at the Federal Planning Bureau in Brussels, presentation of paper “Tax shift: rechtvaardigheid en efficiëntie”.

André Decoster – October, 19, 2016, Seminar at the Institute for New Economic Thinking (INET) in Oxford, presentation of paper “Getting tired of work? or re-tiring in absence of decent job opportunities?”

Willem Devriendt – March 10 2016, UGent Faculty of Economics and Business Administration, PhD Day, poster on “A computable OLG model to study effects of demographic change and pension reform in Belgium”.

Willem Devriendt – May 23 2016, Ghent University Workshop on Empirical Macroeconomics – 4th edition, poster on “A computable OLG model to study effects of demographic change and pension reform in Belgium”.

Willem Devriendt – May 22 2017, Ghent University Faculty of Economics and Business Administration Research Day, presentation of paper “Macroeconomic effects of demographic change in an OLG model for a small open economy – The case of Belgium”.

Willem Devriendt – June 14-17 2017, 31st Annual Conference of the European Society for Population Economics (Glasgow, Scotland), presentation of paper “Macroeconomic effects of demographic change in an OLG model for a small open economy – The case of Belgium”.

Willem Devriendt – June 28-30 2017, SCE 23rd International Conference on Computing in Economics and Finance (New York, USA), presentation of paper “Macroeconomic effects of demographic change in an OLG model for a small open economy – The case of Belgium”.

Willem Devriendt and Freddy Heylen – September 7 2017, Public Economics Seminar KU Leuven, and meeting with members of the Belgian Commission Pension Reform 2020-2040, presentation of the paper “Macroeconomic effects of demographic change in an OLG model for a small open economy – The case of Belgium”.

Freddy Heylen – June 17 2016, MoPAct Workshop “Economic Aspects of Demographic Change” (Helsinki, Finland), presentation of paper “On the possibilities and driving forces of secular stagnation”

Freddy Heylen – June 30 2016, DG EcFin Seminar (European Commission, Brussels), presentation of paper “On the possibilities and driving forces of secular stagnation”

Freddy Heylen – October 26 2016, ECARES Seminar (ULB), presentation of paper “On the possibilities and driving forces of secular stagnation: A general equilibrium analysis applied to Belgium”

Pierre Pestieau (23-26 June 2014) “The combined effect of aging and PAYGO pensions on capital accumulation and welfare”, Journées LAGV – AIX-en-PROVENCE.

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