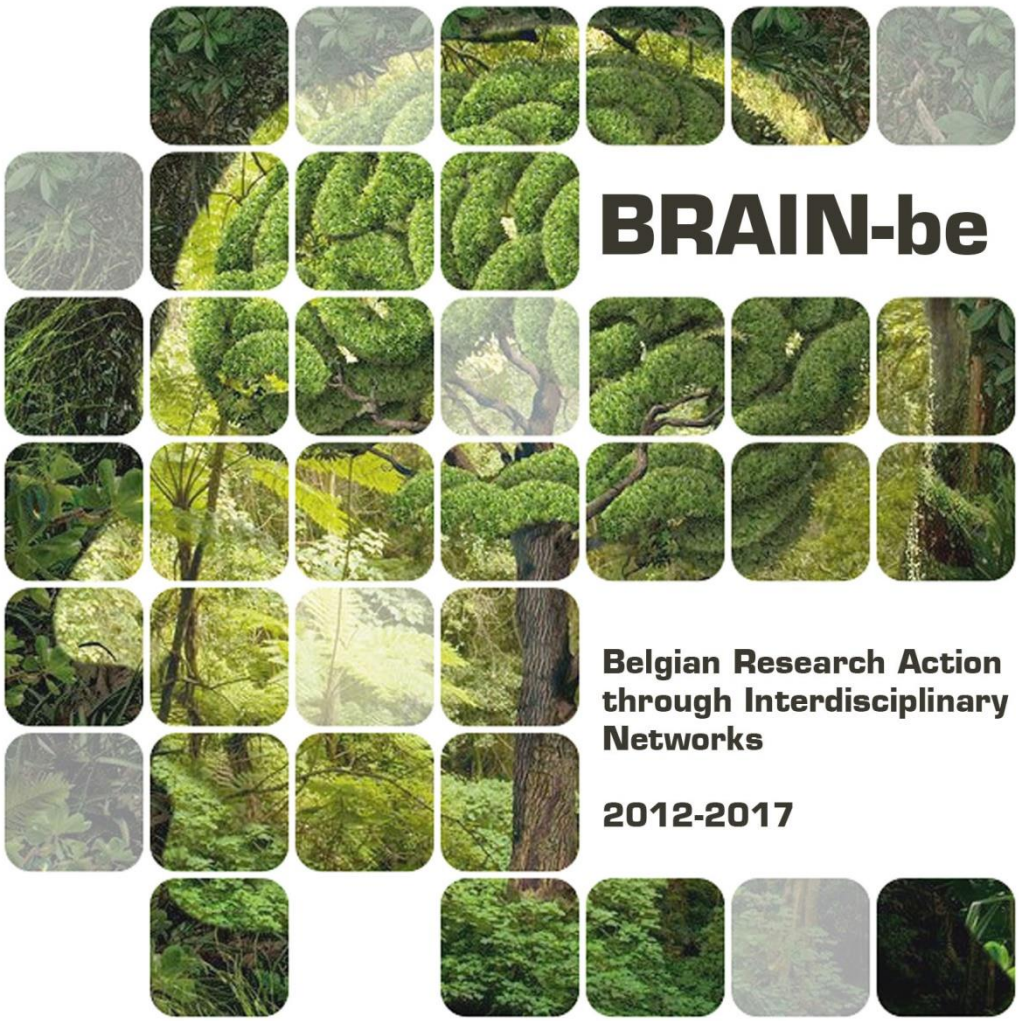

CRESUS

Measuring and mobilizing wealth for a cohesive, inclusive and fair society

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Axis 5: Major societal challenges

NETWORK PROJECT

CRESUS
Measuring and mobilizing wealth for a cohesive, inclusive and fair society

Contract - BR/121/A5/CRESUS

FINAL REPORT

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Published in 2019 by the Belgian Science Policy Office
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Kuypers, S., Decoster, A., Klimaviciute, J., Lefebvre, M., Marx, I., Perelman, S., Pestieau, P., Schoenmaeckers, J., Spiritus, K., Verbist, G. ***CRESUS. Measuring and mobilizing wealth for a cohesive, inclusive and fair society***. Final Report. Brussels : Belgian Science Policy Office 2019 – 68p. (BRAIN-be - (Belgian Research Action through Interdisciplinary Networks))

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ABSTRACT

At the start of the CRESUS project we knew quite a lot about the distribution of market and disposable incomes in Belgium, yet mostly relying on survey data, while we knew hardly anything about the distribution of net wealth. Thanks to the research carried out in the framework of the CRESUS project we now know much more about the distributions of net wealth and intergenerational transfers and of the share of top incomes, based on fiscal data, as well as the extent to which income and wealth go hand in hand. We have used this information to calculate poverty, inequality and redistribution indicators based on the joint distribution of income and wealth, to describe (optimal) wealth taxation from a theoretical and empirical perspective and to analyse the impact of wealth in social policies such as MIP schemes, asset-building policies, public pensions and long-term care provision. Our results lead to many interesting policy recommendations such as the need to complement existing social indicators with indicators including information on wealth, the fact that it is optimal to tax capital income at non-zero rates and equally across all types of income and that together with the inheritance & gift tax it should form a broad-based comprehensive tax system, that wealth is an important factor to consider in the awarding of social benefits as well as the way in which benefits are provided, that long-term care insurance schemes should be based on a deductible and that pension reforms should be announced early so that people have sufficient time to adapt their private savings accordingly.

Keywords

Wealth, inequality, poverty, redistribution, optimal taxation, inheritance, long-term care

1. INTRODUCTION

1.1. Income, wealth and their relation

Intuitively income and wealth are often considered to be two sides of the same coin because an important part of wealth accumulation originates from the saving of earned income. However, their relationship is more complex than that; wealth can also be accumulated by receiving inheritances and gifts, by means of mortgages and loans, through rising asset prices and the income generated by wealth itself. Hence, although the relationship between income and wealth is strong, it is far from perfect. In other words, those who earn the highest (lowest) income do not necessarily own the highest (lowest) wealth. Only between 25 and 50 per cent of households who belong to the lowest income quintile (i.e. lowest 20 per cent of incomes) also belong to the lowest wealth quintile, at the top between 35 and 65 per cent of households belong to the richest 20 per cent both in terms of income and in terms of net wealth (Arrondel et al., 2014). The imperfect income-wealth correlation implies that analysing just one of the two distributions provides only partial insights into the overall level and division of financial resources and its associated benefits in a society.

1.2. A brief overview of the historical importance of wealth

It is only recently that the importance of analysing income and wealth jointly has been acknowledged. Throughout modern history we have witnessed a shift of focus from wealth to income and then recently back to wealth. Until the early twentieth century national wealth was the main focus of attention because back then it consisted of highly visible types of assets such as rural land and real estate and afterwards also industrial assets, while income was often much more difficult to gauge (Piketty & Zucman, 2014). Because of these reasons taxes were at the time also mainly levied on wealth (Scheve & Stasavage, 2016).

After the two world wars and the Great Depression, however, focus shifted from wealth to income in part because the Great Depression emphasised the importance of short-term fluctuations and partly because it became much harder to estimate wealth due to extremely volatile asset prices (Piketty & Zucman, 2014). Around the First World War most countries introduced income taxes, which were made increasingly more progressive after the Second World War (Scheve & Stasavage, 2016). In other words, the roles reversed; information on income became much more accessible than on wealth, which had collapsed strongly anyway. In this context, research on living standards, inequality and poverty was largely based on the analysis of income flows, abstracting from any wealth considerations.

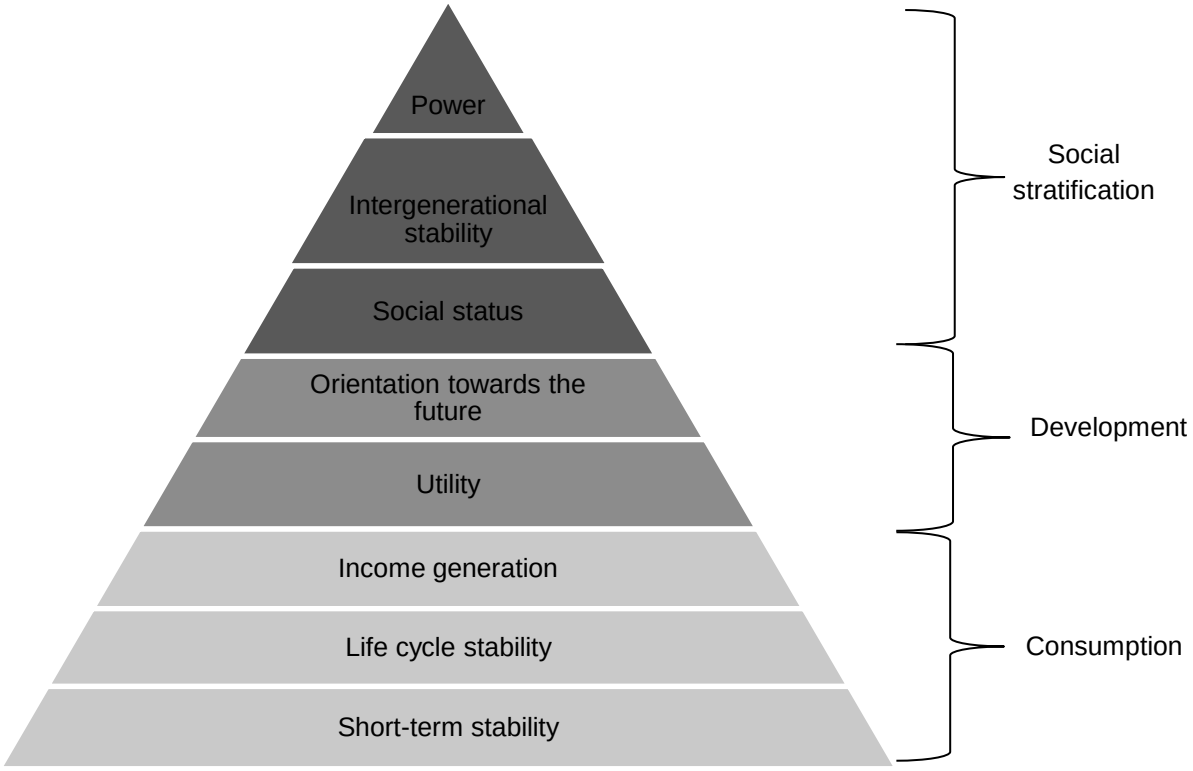
In the post-war decades of peace and strong economic growth, wealth grew strongly and became more widespread, resulting in the emergence of a ‘patrimonial middle class’ (Piketty, 2014). Hence, for a relatively large part of the population wealth became an important part of their financial resources. Nevertheless, the economic and sociological literature remained largely focused on analysing national income and its distribution. As a result a lot is known about the distribution of income in modern societies, while there is relatively little evidence about total wealth and its distribution. One major reason is the fact that it has become much

harder to estimate wealth because its structure has changed considerably. There now exists a much wider variety of asset types, including some which are difficult to value, and it has also become easier to own (and hide) wealth abroad (Zucman, 2015). Furthermore, research on inequality and poverty has over the last decades largely relied on information from household surveys, which for a long time included little or no questions on household wealth holdings.

1.3. Reasons for the renewed interest in wealth

It is only recently that wealth and its distribution are at the forefront of sociological and economic research again. By exploring this direction researchers and policymakers are trying to find answers to some new emerging socio-economic questions for which the emphasis on the income distribution seems no longer sufficient. Indeed, the current framework was created to analyse socioeconomic issues related to the 20th century characterised by industrial and relatively stable labour markets. At that time a person's financial situation was largely determined by whether he/she was employed, in other words whether he/she earned an income. The 21st century, however, has witnessed the increasing threat of labour insecurity, due for instance to globalisation and automatisation, while wealth has continuously increased since the Second World War through natural accumulation processes as well as reinforced by the emergence of new asset types (for instance robots) and increasing prices of existing assets (such as for housing, see e.g. Philiponnet & Turrini, 2017). Hence, the economic situation of an individual, household or society is increasingly more dependent on wealth rather than income, as is also indicated by the increasing wealth to income ratios (Piketty, 2014; Piketty & Zucman, 2014) and the declining share of labour in national income (Karabarbounis & Neiman, 2013). The changing economy also has a social impact. Indeed, the increasing incidence of non-standard forms of employment and rising levels of in-work poverty (Atkinson, 2015; Lohmann & Marx, 2018) for instance underline the increasing importance of owning wealth as a safety net to counterbalance these insecurities (short-term stability). Yet, wealth ownership also contributes to living standards in many other ways and generally with higher wealth more channels become applicable (see Figure 1). Wealth ownership is for instance also key in supporting consumption after retirement (e.g. Ando & Modigliani, 1963; Shefrin & Thaler, 1988) and increases income without having to sacrifice leisure (McDonnell, 2013). Moreover, wealth accumulation is considered to be an important factor in personal economic and social development as it provides utility to its owner(s) above and beyond the consumption it facilitates and increases future-oriented behaviour among owner(s) (McKernan et al., 2012; Sherraden, 1991). Wealth is also an important contributor to achieving or maintaining class status as well as having economic and political power (Keister, 2000; Spilerman, 2000). For instance, owning a good home or owning a small business has historically been identified with middle and upper class status (Vaughan-Whitehead, 2016). Finally, all these functions of wealth can also be transmitted across generations through inheritances and inter vivos gifts, which enables intergenerational stability.

Figure 1: Functions of wealth



Source: Own extension to Fessler & Schürz (2017).

Furthermore, many studies have reported increasing levels of inequality in both income and wealth (e.g. Alvaredo et al., 2018; OECD, 2008, 2011, 2015) and its detrimental impact in social, economic, political and environmental terms. Although it appears that inequality is relatively low and has remained more or less stable in Belgium, underneath there are some very important gaps as poverty still affects a relatively large part of the population. Within the context of the "Europe 2020 Agenda" Belgium is committed to reduce poverty and social exclusion by a substantial number by 2020. However, in the context of an ageing population, a shrinking work force, intensifying international competitive pressures and the need for fiscal consolidation it is clear that this objective is not likely to be achieved. Understanding the distribution of wealth and its correlation with the income distribution may be an important tool for poverty and inequality reduction. Indeed, how net wealth is distributed and correlated with income is a crucial element to be considered in the design and evaluation of equitable and efficient tax-benefit systems. In addition, wealth accumulation is likely to affect labour supply decisions (and in particular retirement decisions), entrepreneurship, long term care decisions and many other issues that are of scientific interest and have a high policy relevance.

Also demographic evolutions such as population ageing compels researchers and policymakers to look beyond the income distribution. One of the main functions of wealth is consumption smoothing after retirement and this is likely to become more important in the future. Many welfare states are facing rising pressures on public pension provision and have shifted from defined benefit to defined contribution pension plans. The role of wealth accumulation in general and private pension saving in particular will therefore become

increasingly essential to insure decent living standards after retirement. Furthermore, population ageing leads to increasing long term care (LTC) needs. Due to failing insurance markets for LTC, increasing needs should result in higher precautionary savings. They are also expected to increase exchange behaviour within families: children taking care of their dependent parents in exchange of bequests. They also lead to quasi-fraudulent behaviour: parents impoverishing themselves to benefit from social assistance. This later behaviour could lead public authorities to recoup their investment in long term care at the death of the beneficiary if they leave some estate. Finally, population ageing may also contribute to increasing levels of wealth inequality as the elderly are generally the wealthiest and descendants receive inheritances later in life when they often have already accumulated significant amounts of wealth themselves.

Under the impulse of these socio-economic and demographic processes the number of wealth studies has increased exponentially over the last decade, further stimulated by the influential work of Thomas Piketty and his colleagues (e.g. Piketty, 2014; Piketty & Zucman, 2014; Saez & Zucman, 2016). This renewed interest in wealth research has gradually also resulted in an expansion of available wealth data. Yet, although the interest in wealth is booming, attention towards some of the issues we addressed in the CRESUS project is still remarkably low. In particular, there remains an important void regarding wealth research from a social viewpoint, i.e. what does the wealth distribution and its correlation with income imply for the definition and analysis of poverty and inequality, taxation and redistribution, long term care, etc.?

2. STATE OF THE ART AND OBJECTIVES

The overall aim of the CRESUS project is to integrate wealth in the analysis of social inclusion policy and to equip the relevant policy agencies with the facts and tools to adjust their policies. In what follows we explain in more detail the different underlying objectives of the project.

2.1. Describing and understanding the wealth and income distribution in Belgium

Over the last decades many studies have been carried out focusing on the distribution of wages and disposable incomes in Belgium in particular (e.g. Horemans et al. 2011; Kuypers & Marx, 2016; Marx & Verbist, 2018) as well as in comparative studies (e.g. OECD, 2015, 2011, 2008). Also the effect of (changes in) taxes and benefits has been mainly studied in terms of its effects on the income distribution (Decoster et al., 2019; OECD, 2008).

However, before the start of the CRESUS project hardly anything was known about the distribution of wealth in Belgium. Studies for other countries indicated that wealth was far more unevenly distributed than income (with the 10% richest owning about 50% of total wealth), that real estate wealth is the most important asset for the majority of the population and that financial wealth is much more unequally distributed than real wealth. Yet, up until recently it was unclear whether the same patterns hold for Belgium. Hence, the first objective of the CRESUS project was to describe the distribution of wealth in Belgium in order to understand the underlying patterns of who owns how much and in which types of assets.

In second instance, we also made a first attempt at filling the gap for Belgium in the rapidly expanding World Wealth and Income Database (https://wid.world/) set up by Thomas Piketty and colleagues. This database is generally based on official tax data and the common finding is that top income shares have increased in most countries over the last decades. However, so far Belgium was not yet represented in the database. As mentioned before income inequality and its evolution have mostly been studied based on survey data. This line of research showed that Belgian income inequality has not really increased in the last decades, and hence that Belgium had not followed the common trend. Unfortunately, however, these estimates are based on three different surveys[1], which use different income concepts and survey methodologies. Often these surveys also suffer from underreporting at the top of the distribution (see also methods section). Therefore, our second objective was to estimate the evolution of top income shares based on fiscal data supplemented with among others information on capital incomes from the HFCS.

Yet, what we were mostly interested in was to which extent these estimates of wealth and income inequality go hand in hand. In other words, to which extent are income and wealth correlated with each other? A small number of previous studies have found that the correlation coefficient is approximately 0.5 between disposable income and net wealth (Arrondel et al., 2014; Brzozowski et al., 2010; Skopek et al., 2012) and about 0.25 between labour income

[1] These are Sociaal Economisch Panel (SEP) for 1985, 1988, 1992 and 1997, European Community Household Panel (ECHP) yearly between 1993-2000 and EU Statistics on Income and Living Conditions (EU-SILC) yearly since 2004.

and net wealth (Arrondel et al., 2014; Lerman & Mikesell, 1988). This means that those who earn the highest (lowest) income do not necessarily own the highest (lowest) net wealth. Therefore, several high-level authors and organisations have recommended to give more prominence to the *joint* distribution of income and wealth (e.g. OECD, 2013; Stiglitz et al., 2009). However, there are still remarkably few studies looking into these issues, and they focus mostly on the top (e.g. Alvaredo et al., 2013; Cowell et al., 2017; Kontbay-Busun & Peichl, 2014) or the middle of the distribution (Jäntti et al., 2013). Our third objective was therefore to describe the relationship between income and wealth in Belgium, with special attention towards their correlation at the bottom.

2.2. Including wealth in the analysis of poverty, inequality and redistribution

The imperfect relationship between income and wealth implies that analysing just one of the two distributions provides only partial insights on poverty, inequality and redistribution. Indeed, a common criticism of the existing poverty measures is that they do not take account of economic resources beyond current income, disregarding assets and liabilities of the worst-off. For instance, in the case of the elderly it has been argued that a sole focus on current income yields poverty figures that are biased and generally too high. It is essential to gauge if, and to what extent, this criticism is valid. Inequality and redistribution are usually also understood in terms of income; as a way to rank individuals as well as to determine ability to pay or benefit entitlements. The aim of the CRESUS project is to improve the traditional approaches to measure poverty, inequality and redistribution. A very limited number of studies has tried to extend poverty measures beyond current income (see e.g. Van den Bosch, 1998; Brandolini et al., 2010). In general these studies come to the following conclusions: (1) poverty estimates including wealth are considerably lower than the traditional income-based measures, (2) poverty rates of the elderly are more affected than those of the non-elderly and (3) poverty rates are especially affected by the wealth represented in the household's main residence. Yet, much work remained to be done with regard to the methodological operationalisation of these joint income-wealth poverty measures. In the CRESUS project we assessed the sensitivity of poverty outcomes to various plausible measurement assumptions, among others the determination of the poverty line, the types of assets included and choices with respect to the equivalence scale. Furthermore, we extended one of the approaches developed in the joint income-wealth poverty literature to the analysis of inequality and redistribution. These aspects are further discussed in the methodology section below.

2.3. The role of wealth in social policy design

If outcomes in terms of poverty, inequality and redistribution are different when wealth is taken into account this may hold consequences for social policy. Households who have low incomes, but own substantial amounts of assets may have a lower comparative need for social benefits such as minimum income protection (MIP) provided by the state, and possibly their legitimate claim on such resources. And in effect, means-tested transfer schemes in Europe and elsewhere tend to include not only income tests but also asset tests of various sorts. Whereas

asset tests may succeed in singling out the more deserving of the poor, there are also disadvantages. Certain assets may not be immediately or fully fungible, or only at a significant cost. It seems unfair to expect people to sell certain types of assets, such as the family home, to meet income needs that are a fraction of the total value of that asset. Asset tests also imply additional administrative burdens and hence potential barriers in the claiming process. Since they have so far almost exclusively been studied in a Anglo-Saxon context, our objective was to analyse the design and effects of asset-tests in minimum income protection in Belgium.

On the other hand, a joint income-wealth perspective on poverty and inequality may result in proposing new types of policies. European welfare states now focus on the redistribution of market incomes, while there is also an important (and increasing) need for distributing wealth resources more evenly. Over the years several authors have made proposals in the direction of supporting asset accumulation among the poor. For instance, Atkinson (2015) argues that there should be a capital endowment for all paid at adulthood, Ackerman & Alstott (1999, 2004) made similar arguments striving for a 'stakeholder society', and Sherraden (1991, 2001) has been advocating pro-poor asset-building policies for three decades already. Although currently Belgium and many other European countries encourage the ownership of real estate and financial assets through tax deductions and credits, these policies are typically unavailable to the poor (McKernan & Sherraden, 2008). Hence, we investigated the potential for introducing so-called pro-poor asset-building policies in Belgium.

Yet, finding a correct balance between asset-testing on the one hand and encouraging asset accumulation among the poor on the other hand might be a difficult trade-off. When eligibility for social benefits are means-tested against wealth, it could result in so-called 'saving traps', i.e. households could be discouraged to save so as to remain below the asset threshold (Alcock & Pearson, 1999; Fehr & Uhde, 2013; Jäntti et al., 2008; Sefton et al., 2008). Hence, while the aim of new asset policies would be to encourage the poor to accumulate assets, proper means-testing punishes them for owning such assets. In particular, we studied whether there exists substitution between private assets and pension entitlements or social security wealth (SSW). In fact, different pensions' entitlements may explain different behaviours with respect to wealth accumulation and composition.

2.3. Wealth taxation: theory and practice

Besides social policy, there is of course also the other side of the redistributive process consisting of taxation. While there is a large literature discussing the design and effects of labour taxes and levies (such as social insurance contributions), wealth taxes have been studied much less, both from a theoretical and empirical perspective.

An important result from the theory of optimal taxation is that when the structure and the progressivity of the taxation on earnings are optimal from a societal point of view, the risk-free returns on wealth should go untaxed. Based on this finding the Mirrlees Review (2011: 297) argues in favour of a Rate of Return Allowance (RRA), exempting a *risk-free* rate of return from taxation, but including all incomes from wealth that deviate from it in the tax base. In the CRESUS project we investigated how the RRA can be used to correct for non-optimality of

the income tax schedule. Boadway and Pestieau (2011) have investigated the problem of optimal mixed taxation with non-optimal income taxes in a one-period model with quasi linear preferences, showing that when linear income taxes are not sufficiently progressive, it is optimal to tax luxury goods more heavily than necessities. Building upon the work of Spiritus (2012) we show how this can be translated into a two-period model with more general preferences and study the conditions under which it is optimal to tax the normal returns of wealth. In a second step we then look for a method to integrate these results in the menu of tax schemes proposed by the Mirrlees review (2011). It is shown that by giving the choice between an earnings tax and an expenditure tax, both implementing the RRA, tax payers are given the opportunity to smooth their taxes over the life cycle. This solves a problem with classical earnings taxes, namely that the average tax rate over the life cycle increases as the variability of income increases. We will investigate how to optimize the parameters of the schedules that are offered to the tax payers in order to compensate for the non-optimality of the income tax.

A strong assumption in the proposal of offering a menu of tax schedules to the tax payer is that households are patient, rational and have perfect foresight. Yet, in reality this assumption is likely to be violated. Smarter people are likely to make better choices. For this reason Banks and Diamond (2010) suggest to introduce an age-dependent RRA instead offering a choice to the tax payer. Recent results from behavioural economics show that changing the default option can improve the welfare of the agents who do not behave as assumed by standard economic theory, while maintaining the advantages of offering different choices to the other households (see e.g. Bernheim and Rangel, 2007). We investigated the welfare impact of offering different default tax schedules based on the demographic profile of the client. In addition, financial institutions have more information about the individual than what can possibly be implemented by the government in a tax-benefit system. We will compare a number of policy designs in which individuals behave as realistic individuals, rather than perfect utility maximizers and where financial institutions tailor tax schedules to characteristics and needs of the customer that may be unobserved by the government.

An important reason for the non-taxation of a risk-free rate of return is that households try to smooth their consumption over the life cycle, enabling themselves to sustain their preferred level of consumption e.g. when retiring or providing long term care to relatives. Once the earnings tax system is optimal, the efficiency losses of distorting these intertemporal decisions are likely to outweigh the gains from increased redistribution. There are a number of possible reasons why households may not be able to adequately smooth their consumption over the life cycle. One possible reason is that, often at a younger age, they face borrowing constraints. Aiyagari (1995) and Chamley (2001) have investigated borrowing constraints in a standard setting, finding sizeable precautionary saving rates. As the standard arguments against the taxation of risk-free returns of wealth do not apply in this case, some taxation of risk-free returns seems warranted. We investigate how precautionary saving influences the optimal parameters of the tax schedules offered to the agents.

Wealth tax systems can, however, only be improved when we can compare the optimal tax parameters with the current situation. Unfortunately, the empirical literature on wealth taxation

is even smaller than on its theoretical underpinnings. Figures on the contribution of wealth-related taxes to government revenues indicate that there seems to be a general trend towards less wealth taxation. Several OECD countries have abolished their net wealth tax over the last decades and have cut back the taxation of capital income and wealth transfers (OECD, 2018). Yet, little is known about how current and proposed alternative wealth taxes in practice (might) affect aspects such as redistribution and inequality, investment and portfolio choices, labour supply, etc. Exceptions include Halvorsen & Thoresen (2017) who study the distributional effects of the Norwegian net wealth tax. Krenek & Schratzenstaller (2018) and Lawless & Lynch (2016) simulate the potential budgetary and redistributive effects of an annual net wealth tax at the EU level and in Ireland respectively. In the CRESUS project we contributed to this newly emerging literature by analysing the budgetary and equity impact of currently existing wealth tax systems as well as some simulated alternatives.

2.4. Intergenerational transmission of wealth

One of the key functions of net wealth is that it can be passed on from one generation to the next (see Figure 1), which is often seen as one of the reasons for the increasing wealth concentration in the long term (Piketty, 2014). Before the CRESUS project information on inheritances and gifts was only available from tax records which cannot be linked with socio-demographic information. Therefore, our first objective in the intergenerational framework was to describe the incidence and distribution of intergenerational bequests, i.e. who receives inheritances and gifts and how much are they worth?

The literature lists a number of motives why parents pass down wealth to their (grand) children. First, parents may care about the likely lifetime utility of their children. In presence of these *altruistic bequests*, wealthier parents tend to make larger bequests and children with higher labour earnings will receive smaller bequests. Second, parents can be motivated by the direct utility they receive from the act of giving. This phenomenon is also referred to as "*warm glow" giving*. It can be explained by some internal feeling of virtue arising from sacrifice in helping one's children or by the desire of controlling their life. Finally, *exchange-related* models consider children choosing a level of "attention" to provide to their parents. In exchange, parents "remunerate them" through a prospective bequest. The exchanges can involve all sorts of non-pecuniary services and they can be part of a strategic game between parents and children. The next objective is, therefore, to study which bequest motives are most important.

Finally, we study the interaction between wealth accumulation and the growing needs for long term care (LTC) resulting from ageing from a theoretical point of view. First, because of failing insurance markets, LTC needs should generate precautionary saving. They are also expected to increase exchange behaviour within families: children taking care of their dependent parents in exchange of bequests. They also lead to quasi-fraudulent behaviour: parents impoverishing themselves to benefit from social assistance. The later behaviour could lead public authorities to recoup their investment in long term care at the death of the beneficiary if they leave some estate. We integrate those ideas in a theoretical model that is both positive and normative. We designed an optimal policy regarding LTC and wealth taxation.

3. METHODOLOGY

3.1. Data used

As was mentioned in the introduction, one of the main reasons for the lack of wealth studies is that for a long time there was hardly any data available on the topic. Administrative data generally do not cover all the information necessary because most countries do not have a general wealth register and most asset types are either tax exempt or taxed through a separate withholding tax. Survey data also hardly covered any information on savings and asset accumulations. The start of the Luxembourg Wealth Study in 2003 (see Sierminska et al., 2006) was a first major advancement for the study of household wealth across countries, but unfortunately it does not include Belgium. A small number of previous studies have built on proxy indicators of wealth rather than direct, detailed information (e.g. Meulemans & Marannes, 1993; Praet & Vuchelen, 1978; Rademaekers & Vuchelen, 1999).

For a long time the only scientifically validated survey containing direct measures of wealth for Belgium was the Survey of Health, Ageing and Retirement in Europe (SHARE), but it only covers the population over the age of 50 and has not been exploited to its fullest potential when it comes to the analysis of wealth (Van den Heede et al., 2010). A few years ago a new cross-country wealth initiative was launched by the central banks (and some statistical offices) of the Euro Area countries and the European Central Bank. The new Eurosystem Household Finance and Consumption Survey (HFCS) covers detailed information on household assets and liabilities as well as on gross incomes, intergenerational transfers and socio-demographic variables. The first HFCS wave contains information on more than 62,000 households in 15 Euro Area member states[2] which were surveyed mostly in 2010 and 2011. The second wave supplies information on more than 84,000 households in 20 EU member states[3] surveyed mostly in 2014. For Belgium 2,364 households were surveyed in 2010 for the first wave, while the second wave covers 2,238 households surveyed in 2014. Interesting features of the HFCS data are the oversampling of the wealthy to get a better coverage of the top of the distribution and multiple imputation to deal with item non-response. In Belgium the oversampling was based on average regional taxable incomes and average housing prices (HFCN, 2013, 2016).

In the CRESUS project we mostly relied on the new HFCS dataset and the SHARE dataset. Since the first contains information on both income and net wealth it is the ideal dataset to study the correlation between income and wealth and the SHARE dataset covers the necessary information to study the wealth accumulations of the elderly and wealth transfers across generations. As mentioned above, for the second objective we relied on fiscal data, corrected in three ways: calculating back from net to gross taxable income, redefining the borders of top income groups by accounting the amount of non-filers at the bottom and assessing the magnitude of income which does not appear in tax files (for more information

[2] The countries covered are Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Italy, Luxembourg, Malta, Netherlands, Portugal, Slovenia, Slovak Republic and Spain.
[3] The original 15 countries and Estonia, Ireland, Latvia, Hungary and Poland.

on the methods used for the second objective see Decoster et al., 2017). In most of our results we focus on Belgium, but where possible we compare with other countries.

In the project we started with the concept of net worth as wealth measure, which is defined as the sum of financial assets (e.g. bank accounts, bonds, shares, etc.) and real assets (i.e. real estate, vehicles, valuables and self-employment business wealth) less liabilities (e.g. mortgages, loans, credit card debt, ...). In this definition entitlements to public and occupational pension plans are not included, but as we discuss below we attempted to estimate this. The income concept covers employee income, self-employment income, rental income from real property, income from financial investments, income from pensions (public, occupational & private), social & private transfers, income from private business and income from other sources. In the HFCS these incomes are only available gross of taxes and social security contributions, but as discussed below we used a micro-simulation model to estimate these.

3.2. A joint measure of income and wealth

A large part of our analyses are based on a joint measure of income and wealth. In previous studies two main approaches were proposed to take account of the contribution of assets to households' living standards. The first approach follows a two-dimensional approach by developing separate poverty lines for income and net wealth. In this regard income poverty retains its traditional interpretation, while wealth poverty is seen as the situation where net wealth holdings are insufficient to maintain the household at a minimally acceptable living standard when income from labour or social transfers is not available (Brandolini et al., 2010; Haveman & Wolff, 2004). In most studies the asset poverty threshold is set as a fraction (ζ) of the official income poverty line (Z_t):

$$Asset\ poverty: NW_{t-1} < \zeta Z_t$$
$$Income\ poverty: Y_t < Z - r_t NW_{t-1}$$

This approach enables one to identify three types of poverty groups: households which are poor in both dimensions (twice poor), households that fall under the income poverty line, but can rely on substantial amounts of assets (only income poor) and households who have an income above the income poverty threshold, but own little or no assets to fall back on (only net wealth poor) (Azpitarte, 2012).

The second approach summarises the wealth and income dimensions into a unidimensional poverty index by annuitizing net wealth as proposed by Weisbrod & Hansen (1968). In other words, wealth is converted into a flow of resources, so as to end up with an augmented income concept (Azpitarte, 2011; Brandolini et al., 2010). This concept is derived as follows:

$$AY_t = Y_t + \left[\frac{\rho}{1-(1+\rho)^{-n}}\right] NW_{t-1}$$

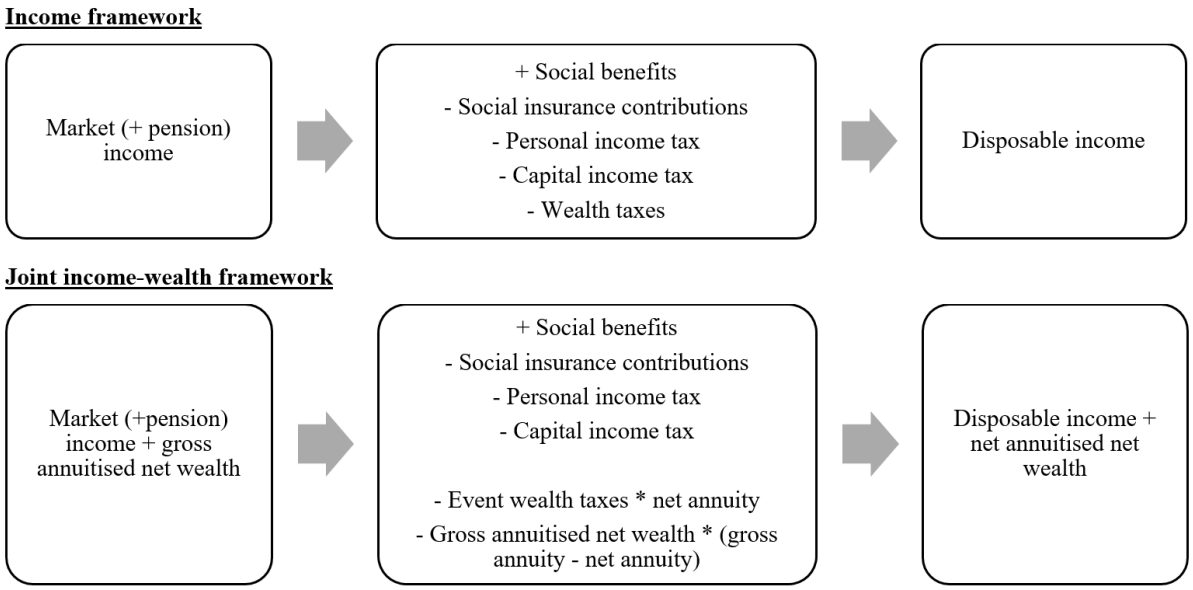
$$n = T\ for\ unmarried,$$
$$T_1 + (T - T_1)b\ for\ married$$

Where AY_t refers to annuitised income, Y_t equals income received in year t, NW_{t-1} is net wealth held at the beginning of the period and ρ and n are the interest rate and length of the annuity respectively. The latter is expressed in terms of life expectancies, where T_1 refers to time to death of the person who dies first, T time to death of the survivor and b is the reduction in the equivalence scale coefficient which results from the death of the first person (for a detailed derivation of this formula see Brandolini et al., 2010, pp.269-271 & 273). Income (Y_t) should be interpreted as net of the yield from net worth because this yield would be lost if net worth is depleted (Weisbrod & Hansen, 1968).

We also extend this annuitisation approach to be able to the analysis of inequality and redistribution. We do this by assuming that wealth taxes are not paid with income, but instead lower the amount of their tax base, i.e. wealth. In other words, we propose to define pre-tax and post-tax concepts of annuitised wealth as follows. One-time event wealth taxes (i.e. inheritance & gift and real estate transfer taxes) are taken into account in the wealth that is subject to the annuitisation, while the yearly recurrent wealth taxes (i.e. real property and net wealth taxes) are captured by the difference between a gross and a simulated net interest rate of the annuity (ρ). We start from a 5% gross interest rate for everyone (long-term pre-tax interest rate assumed in Piketty (2014)) and then simulate for each individual a net interest rate depending on the recurrent wealth taxes paid.

Figure 2 illustrates the gross-to-net transition in the traditional versus the joint income-wealth framework. In the traditional income framework we move from market to disposable income by adding cash social benefits and subtracting social insurance contributions, personal and capital income taxes. In contrast to previous studies we also subtract wealth taxes to get a more accurate measure of disposable income and a more comprehensive overview of the redistributive capacity of the tax-benefit system. In the joint income-wealth framework the transition to disposable income still reflects the effects of benefits, social insurance contributions and income taxes, but now there is also a transition from gross annuitised wealth towards net annuitised wealth reflecting the impact of event and recurrent wealth taxes. As the event wealth taxes are subtracted from the wealth that is annuitised the effect is equal to multiplying the taxes with the net annuity, while the impact of yearly wealth taxes is equal to gross annuitised wealth times the difference between the gross and net annuity.

Figure 2. Gross-to-net transition in traditional and joint income-wealth frameworks



Source: authors' illustration (included in Kuypers, Figari & Verbist, 2019)

The following (fictive) example further clarifies our proposal for the annuitisation process and the different treatments of wealth taxes in the two frameworks (Table I). Imagine a single-person household with a market income of €25,000, who receives social benefits of €5,000 and pays personal and capital income taxes and social insurance contributions which sum to €7,500. This person also has a wealth stock equal to €150,000, which includes a house for which he yearly pays €800 real estate tax and an inheritance received in year 1 on which a one-time tax of €5,000 is levied. In the traditional framework market income is equal to €25,000 and disposable income to €25,000 + €5,000 - €7,500 - €800 - €5,000 = €16,700. Hence, the wealth tax is in this case equal to €5,800. In the joint income-wealth framework (assuming a life expectancy of 40 years) market income + gross annuitised wealth is equal to €25,000 + $\frac{0.05}{1-(1+0.05)^{-40}}$ * €150,000 = €33,742. To calculate disposable income + net annuitised wealth, we first derive the net interest rate for annuitisation, which is (0.05*€150,000 - €800)/€150,000 = 0.0447. We then find that post-tax post-transfer resources are equal to (€25,000 + €5,000 – €7,500) + $\frac{0.0447}{1-(1+0.0447)^{-40}}$ * (€150,000 – €5,000) = €30,346. In this framework the wealth tax paid in year 1 is then equal to (€5,000 * $\frac{0.0447}{1-(1+0.0447)^{-40}}$) + (€150,000 * ($\frac{0.05}{1-(1+0.05)^{-40}}$ - $\frac{0.0447}{1-(1+0.0447)^{-40}}$)) = €900.

The example shows clearly that the two frameworks may lead to very different effects of wealth taxes in a cross-sectional analysis. The €5,800 in the income framework reflects the amount of wealth tax that the individual is supposed to report to the tax authority in the year the inheritance is received. However, from an economic perspective the consideration of the resources in a single point in time poses some doubts about their implications in terms of living standards. We believe that the wealth tax amount in the joint income-wealth framework provides a better measure of the wealth tax burden, as it smooths out the event-based tax

over the remaining life time that the individual could enjoy the wealth component and it also capitalises the effect of the recurrent wealth tax on the lifetime value of wealth. The effects are similar when considered in a life cycle perspective. Indeed, in the income framework the €800 real estate tax is paid yearly. Assuming a life expectancy of 40 years the total tax this person will pay throughout his/her life is equal to €5,000 + €800*40 = €37,000. In the joint income-wealth framework this person will be able to use €900 less of his wealth in each of the next 40 years, such that the effect of wealth taxation in a life cycle framework will be equal to €36,000.

Table I. Example incorporation wealth taxes in two frameworks

Basic information for year 1			
Market income	25,000	Wealth (includes inheritance in year 1)	150,000
Social benefits	5,000	Real estate tax	800
Social contributions, personal and capital income taxes	7,500	Inheritance tax	5,000
Resources	**Income framework**	**Joint income-wealth framework**	
Pre-tax pre-transfer resources	25,000	33,742	
Post-tax post-transfer resources	16,700	30,346	
Wealth taxes	**Income framework**	**Joint income-wealth framework**	
Wealth taxes in year 1	5,800	900	
Wealth taxes over the life cycle	37,000	36,000	

3.3. Microsimulation

To be able to study the policy applications, we built a flexible policy simulation model which allows to estimate the budgetary and redistributive impact of current and hypothetical tax-benefit systems including wealth information. In particular, we adapted the original HFCS data such that they can be used as underlying database for EUROMOD. EUROMOD simulates cash benefit entitlements and direct tax and social insurance contribution liabilities on the basis of the tax-benefit rules in place and information available in the underlying datasets for all EU countries. Instruments which are not simulated (mainly contributory pensions), as well as market income, are taken directly from the data (Sutherland & Figari, 2013). By using the HFCS as the underlying database we are able to estimate disposable incomes for the HFCS sample.

Furthermore, we extended the current simulation scope of EUROMOD which focuses on personal income taxes and cash social transfers, with simulations of wealth-related taxes and policies. For Belgium we included the simulation of the recurrent real estate tax (i.e. “onroerende voorheffing/précompe immobilier”), the real estate transfer tax (i.e. “registratie- en hypotheekrechten/droits d’enregistrement et d’hypotheque”), the inheritance and gift taxes (i.e. “successie- en schenkingsrechten/droits de succession et donation”) and the tax on long-term savings (i.e. “taks op het langetermijnsparen/taxe sur l’épargne à long terme”). We also improved the simulation of asset-tests in minimum income protection schemes (i.e. “leefloon/revenue d’intégration” and “inkomensgarantie voor ouderen/garantie de revenues aux personnes ägées”) and tax expenditures related to asset ownership (e.g. “woonbonus/chèque habitat”). Simulating these instruments allows us to understand and

measure the redistributive role of wealth policies, also in relation to the other tax-benefit programs. The results of the micro-simulations based on HFCS have been thoroughly validated against results based on the standard EUROMOD underlying database, EU-SILC, as well as administrative information (see Kuypers et al., 2016, 2017 and Boone et al., 2019 for more information).

Moreover, we also constructed a model which computes detailed levels of 'social security wealth' (SSW), i.e. the wealth entitlements under social security schemes. For this purpose we relied on the retrospective life–histories present in wave 3 of the SHARE dataset. This wave provides retrospective information on childhood, health, living and professional career. By combining the first two waves with the retrospective data, we obtain a full career history for each individual and we are able to calculate the entitlements to benefits. As the dataset contains detailed information on life histories, we are able to construct a panel with one observation per year for each individual, from the first job until the interview year. The wage path is obtained using linear interpolation between the years for which we have wage information. On this basis we calculate benefits for every retirement scheme that is accessible to the individual. These benefits are obtained by following as close as possible calculation rules from the social security through a tailored microsimulation model. The SSW is computed as the time discounted value of the benefits.

3.4. Optimal taxation models

To answer questions related to the optimal progressive taxation of wealth and capital income, we work in the optimal tax framework developed by Mirrlees (1971, 1976) and Atkinson and Stiglitz (1976). We thus consider a heterogeneous population, where individuals allocate their labour earnings over the life cycle. Individuals differ in their labour earning abilities and e.g. in their preferences for saving, expected rates of return and outcomes of risky investments. We look for the combination of tax instruments that maximizes social welfare, taking into account the government's revenue constraint. Most models in this literature assume that individuals differ in only one dimension. To be able to research questions where individuals differ in labour ability and capital-related dimensions simultaneously, we develop new optimization techniques relying on multivariable calculus.

3.5. Important footnotes regarding the methods

Since a large part of the analyses are based on survey data from the HFCS our results possibly suffer from some flaws. It is, for instance, well known that household surveys, especially those inquiring about financial resources such as income and wealth, often have trouble to reach respondents at the very bottom and top of the distribution. These people are often harder to track down, are less inclined to participate in surveys and to misreport when they do participate, either willingly or out of ignorance. With regard to the wealth distribution it has been found that particularly underrepresentation at the top of the distribution is an important issue. Within the framework of the HFCS oversampling of the wealthy is applied in order to

address this issue (see HFCN, 2016, 2013 for more information). Yet, in practice this oversampling is often not sufficient. The maximum amount of net wealth present in the Belgian HFCS data is 8.5 million euro in the first wave and a little over 10 million in the second wave, while the assets of the wealthiest Belgians mentioned in rich lists is typically estimated at several hundreds of millions. Moreover, the total amount of financial wealth estimated based on the HFCS data covers only 58 per cent of financial wealth included in the national accounts (which is still considerably more than for some other countries) (Vermeulen, 2016). In other words, our results which are based on the HFCS data might be slightly biased by the underrepresentation of the very wealthy. In particular, our estimated level of wealth inequality should be considered as a sort of lower boundary.

In common with other analyses based on a microsimulation approach (e.g. Avram et al. 2014; Decoster & Van Camp, 2001; Piketty & Saez, 2007), our empirical evidence considers the pre-tax pre-transfer income and wealth distribution as given. In the interpretation of the results one needs to keep in mind that the direct impact of taxes and benefits on household income and wealth is only one way in which redistribution may happen (Boadway & Keen, 2000). One could consider, for example, the impact of individual behavioural reactions (Bergh, 2005) such as decisions regarding labour supply, savings and investment, macro-economic shocks which can be affected by the tax system (Poterba, 2007) as well as tax evasion (Zucman, 2015) and benefit non-take-up. The latter is taken into account in EUROMOD for direct taxes on income and cash benefits as good as possible given data limitations. Although tax evasion is also an important issue with respect to wealth taxation, we believe it may have a minor impact on our simulations as we expect the wealth that is missing in the HFCS is likely to correspond to the wealth that is not declared to tax authorities such that the effect of tax evasion may in fact be weak in the HFCS data. We focus on the cash part of the income redistribution process, and not on the in-kind benefits people can derive from the use of publicly provided services.

Due to data limitations we cannot simulate certain aspects of the tax-benefit system such as capital gains taxes and taxes on financial transactions. Other data limitations include the fact that taxable values of real estate are approximated as a share of market values, that inheritances & gifts between spouses are not recorded and that regional information is missing. The latter may affect the results the most as several countries have regional elements in place in their wealth taxes. For Belgium the regional differences are the most extensive so we do simulate these regional elements by assigning sample households at random to the Flemish, Walloon and Brussels Capital Region in accordance to their respective population shares. For the other countries there are often regional or municipal differences in tax rates of the real estate tax and the real estate transfer tax, in which case we used averages.

4. SCIENTIFIC RESULTS AND RECOMMENDATIONS

We first focus on the scientific results for the different objectives described in section 2, afterwards we bundle the recommendations that follow from these results in section 4.6.

4.1. The distributions of wealth and income

The discussion of our results start with a brief overview of how the distribution of wealth looks like in Belgium. First, Table II presents some summary indicators of Belgian net wealth. Based on the HFCS data total wealth of all Belgian households together is estimated to be almost 1,600 billion euros. In nominal terms net wealth remained about the same between the first and the second HFCS wave, but taking into account inflation implies a drop in the purchasing power of net wealth between 2010 and 2014. Mean net wealth is about €330,000, while the median (i.e. net wealth of the household at the middle of the distribution) was equal to €206,000 in 2010 and in nominal terms increased to €218,000 in 2014. The difference between mean and median net wealth is in both years relatively high and also the Gini coefficient is relatively high (inequality is higher the closer the figure is to 1), which both indicate an unequal distribution of net wealth. Further analyses (see Kuypers & Marx, 2017) show that the wealth of Belgian households consists mainly of the value of the main residence (on average slightly more than half of the total asset portfolio), followed by other real estate property and bank and savings accounts. The main changes between 2010 and 2014 reflect a slight shift from savings accounts towards investments in other real estate property and from direct investments in bonds and shares towards more indirect investments through mutual funds. We also found that the asset portfolio of those at the top of the wealth distribution is much more diversified than among their poorer counterparts.

Table II. Key figures of net wealth distribution in Belgium

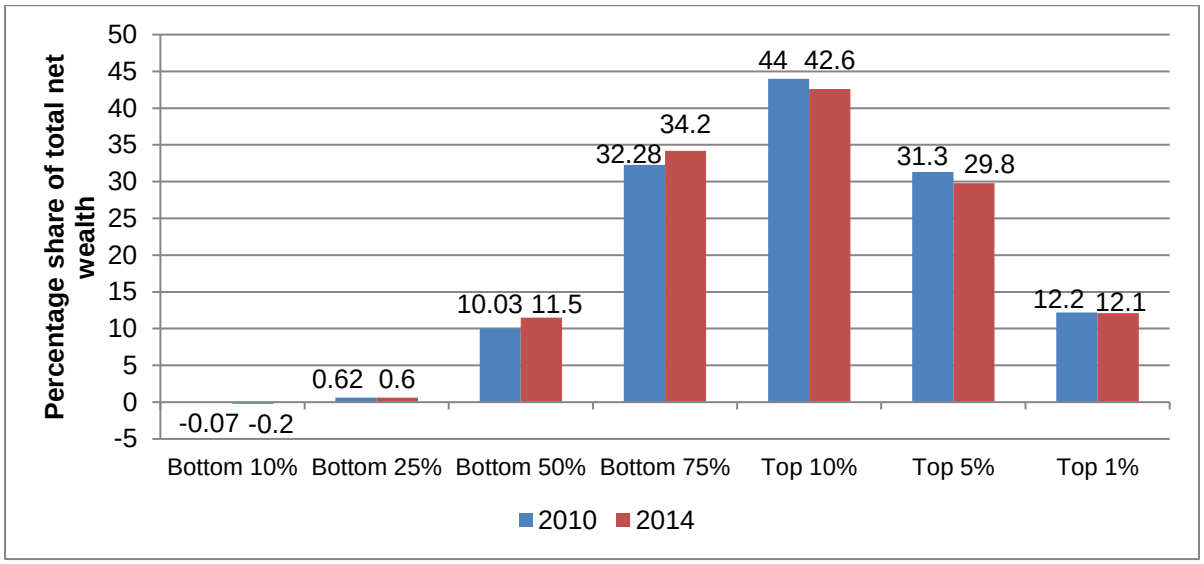
	2010	2010 in 2014 prices	2014
Total	1589 billion	1715 billion	1584 billion
Mean	338 600	365 400	330 300
Median	206 200	222 500	217 900
Gini coefficient	0.608	0.608	0.589

Source: authors' calculations based on HFCS data of wave 1 and 2 (included in Kuypers & Marx, 2017)

Figure 3 presents the distribution of the share in total net wealth. It shows that the 25 per cent least wealthy households own hardly anything. For the bottom 10 per cent net wealth is even negative, meaning that their debts are larger than their assets. The bottom 50 per cent of the wealth distribution still only hold 10 to 11 per cent of total net wealth, the next 40 per cent of households own about 46 per cent and the 10 per cent wealthiest own more or less 43 per cent. The shares of the top 5 and top 1 per cent of households are about 30 and 12 per cent of total wealth respectively. In other words, net wealth is very unequally distributed as households in the top 10 per cent own about as much net wealth as the other 90 per cent of the population. As mentioned above, although the HFCS oversamples the wealthy, shares of the top are still underestimated. In the academic literature several studies have tried to

address this issue by combining the HFCS data with information from rich lists (Bach et al., 2014; Eckerstorfer et al., 2016; Vermeulen, 2018, 2016). For Belgium Vermeulen (2018, 2016) shows on the basis of the first HFCS wave and information from the Forbes list that the share in total net wealth of the top 1% wealthiest is equal to 17 rather than 12 per cent (for the top 5 per cent this is 34 instead of 31 per cent). A more detailed analysis across wealth components (see Kuypers & Marx, 2017) indicates that the value of the main residence, vehicles and private pensions savings are the most equally distributed, while listed shares, bonds and mutual funds are the most unequally distributed. In 2014 the top 10 per cent wealthiest households owned about 67 per cent of all mutual funds, 56.7 per cent of bonds and 78 per cent of listed shares. As expected, the largest shares of debts are owned by those at the bottom of the wealth distribution, but interestingly the share in non-mortgage debt has increased between 2010 and 2014 among households in the middle and the top of the distribution.

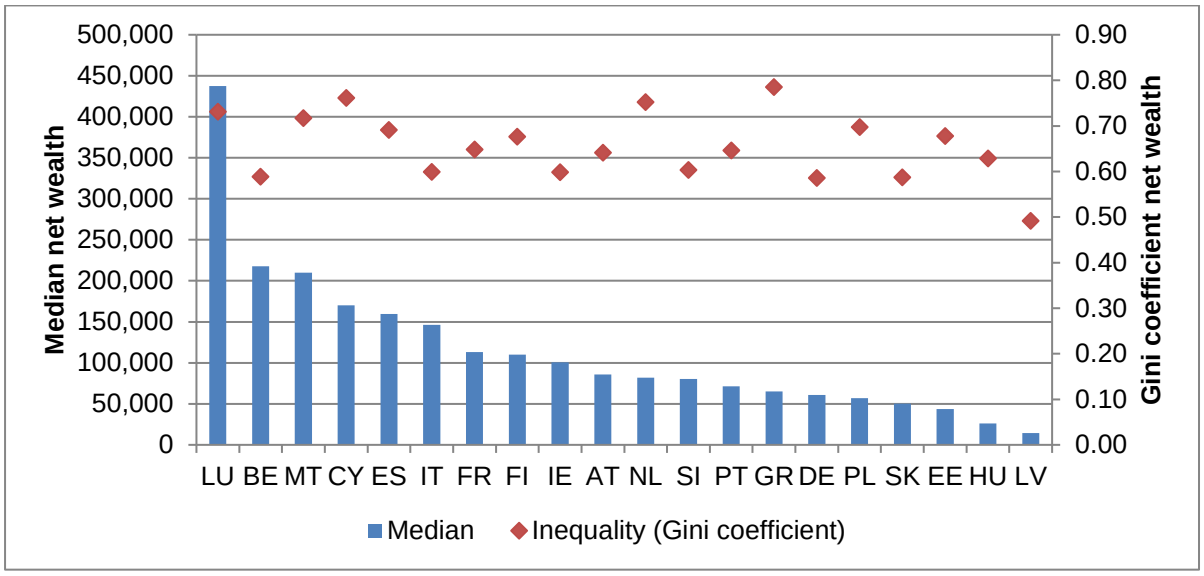
Figure 3. Percentage share in total net wealth of different parts of the wealth distribution



Source: authors' calculations based on HFCS data of wave 1 and 2 (included in Kuypers & Marx, 2017)

Figure 4 compares median net wealth and wealth inequality among the countries included in the second wave of the HFCS. It is clear that the median wealth holdings of Belgian households are the second highest, after Luxembourg. Moreover, net wealth appears to be less unequally distributed than in most other countries. Although there are a few countries with lower levels of wealth inequality, mainly the combination between high median wealth and relatively low inequality seems to be rather unique to Belgium. The unique position of Belgium is for instance also mentioned in the Global Wealth Reports by Credit Suisse (2014).

Figure 4. A cross-country comparison of median wealth and wealth inequality

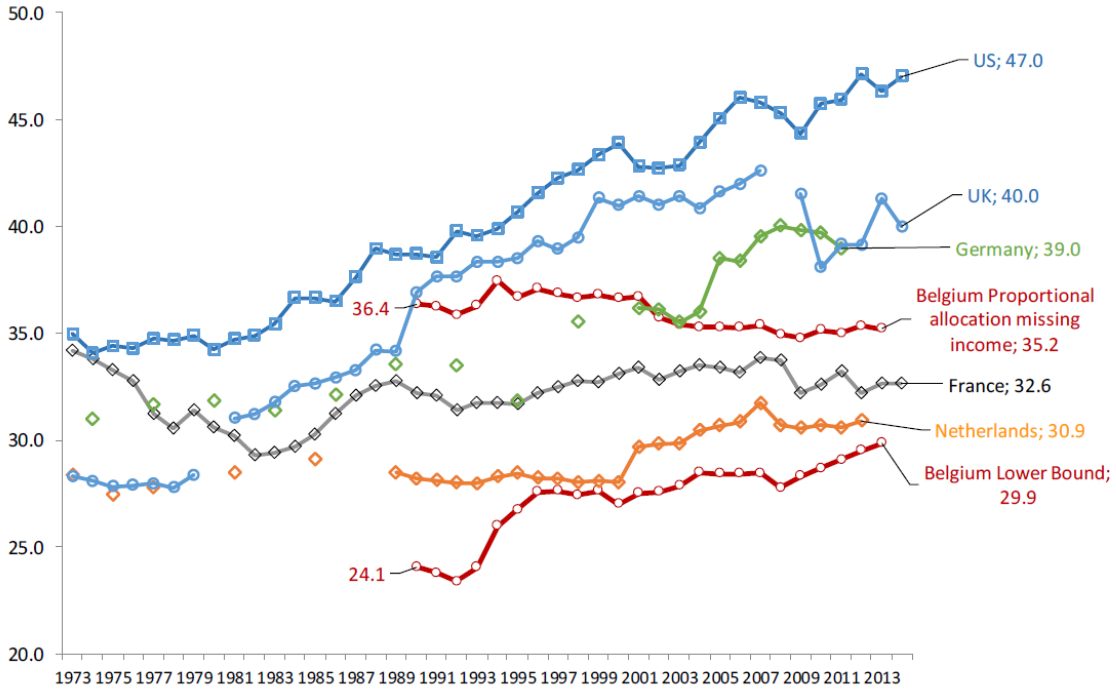


Source: authors' calculations based on HFCS wave 2 (included in Kuypers & Marx, 2017).

Related to providing the first estimates for the wealth distribution in Belgium, we also made a first attempt at filling the gap for Belgium in the rapidly expanding World Wealth and Income Database (https://wid.world/) by estimating the evolution of top income shares based on corrected fiscal data. In contrast to similar analyses for other countries, the results show that there is little evidence that Belgian top income shares have increased over the last 25 years. Figure 5 shows the share of the top decile and Figure 6 the share of the top percentile. It is clear that the lower bound (i.e. allocating all income missing in tax files to groups below the top decile respectively percentile) of the income share of the top decile and percentile is lower than in other countries, but increasing over the period studied. However, the preferred series at the moment is the one where all the missing income would be allocated proportionally across income groups. In that case, the top income shares are higher, but relatively flat.

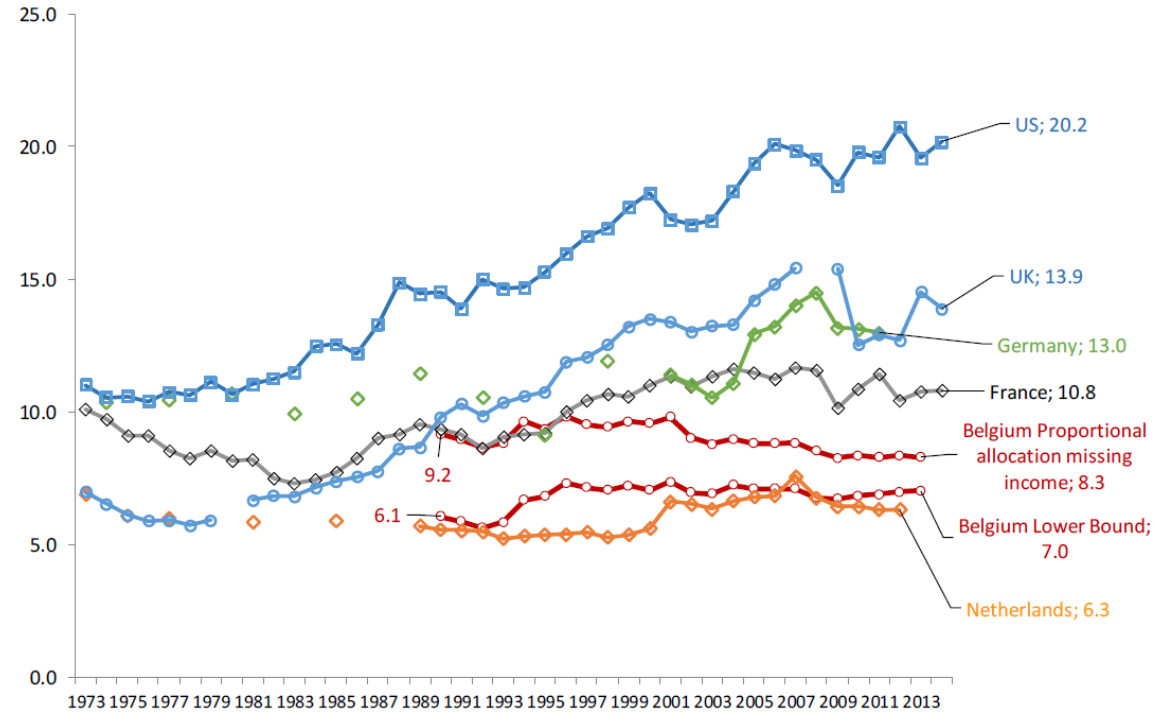
So far we have discussed the wealth and income distribution separately, but more importantly we have also studied the correlation between the two. Figure 7 first shows how wealth is distributed among households belonging to the same income decile. We find that wealth accumulations in the bottom income deciles are generally lower than in the top deciles. Mainly 10th percentile and median values of net worth are substantially higher when one moves up the income distribution. However, even within the first income decile there are some households that have a net worth equal to €200,000 or more.

Figure 5. Share of Belgian top income decile (compared with other countries in WID-database)



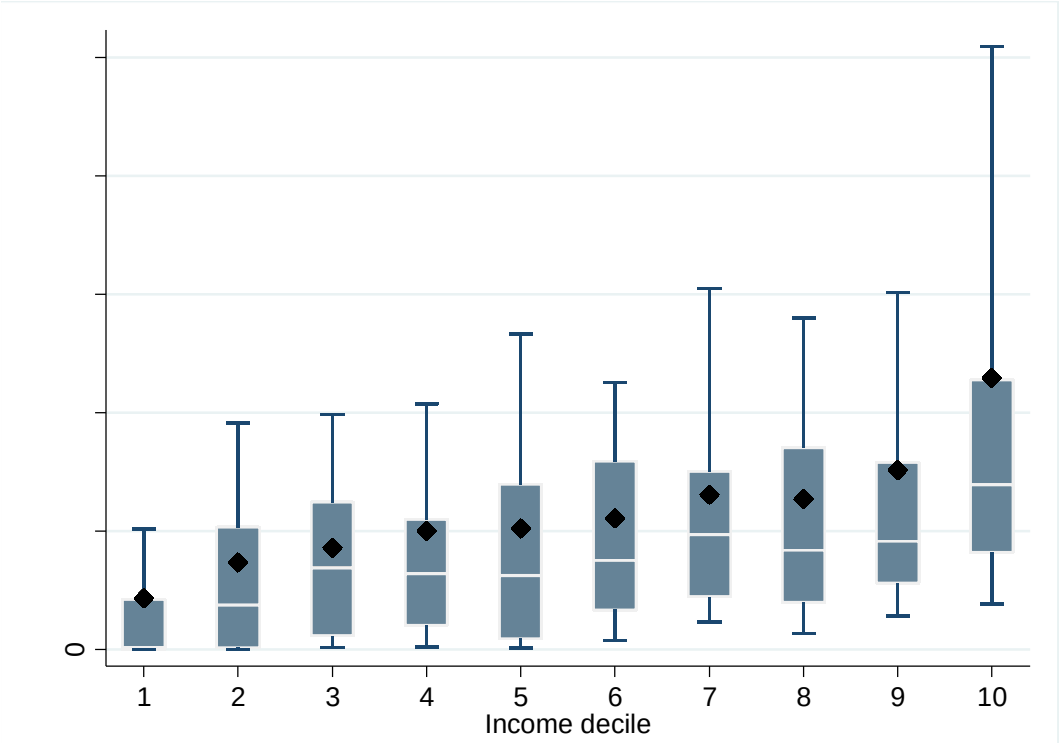
Source: Decoster et al. (2017).

Figure 6. Share of Belgian top income percentile (compared with other countries in WID-database)



Source: Decoster et al. (2017).

Figure 7. Distribution of net wealth along income deciles



Notes: The white line refers to the median, the black diamond to the mean, the thick bars show the range between the 25th and 75th percentile and the tin bars show the range between the 10th and 90th percentile.
Source: Authors' calculations based on HFCS wave 2 (included in Kuypers & Marx, 2019).

One could wonder what the driving factor is for the large inequality in net worth among households with similar incomes. One major possibility is age as suggested by the life cycle model of wealth accumulations (Ando & Modigliani, 1963). This model implies that people borrow during the early years of adult life to fund investments and then gradually accumulate wealth until retirement, after which it goes down again. Therefore, Table III provides the ratio between average net wealth and average income for each income decile and separately for elderly and non-elderly households (i.e. with a household head younger or older than 65 years). We find that systematically throughout the entire income distribution wealth-to-income ratios are substantially higher for elderly than for non-elderly households. While non-elderly households own wealth equal to about 5 to 7.5 years of income, this is generally more than double for their elderly counterparts. This implies that among those with about the same income (i.e. belonging to the same income decile) net wealth is much larger for households with a retired household head. Yet, most noteworthy is the fact that the difference is particularly large in the bottom income decile. Hence, age plays an important role in explaining wealth inequality within income groups, but especially among those with the lowest incomes. In other words, among those traditionally considered as poor there is a share of households which can rely on substantial assets to support their consumption, while others do not have these opportunities. It is clear that living standards of the latter are much lower and therefore we can consider them as the truly vulnerable.

Table III. Net wealth to income ratios by income decile and age

Income decile	Non-elderly	Elderly
1	5.1	28.1
2	6.1	12.3
3	7.5	10.6
4	7.2	10.7
5	6.2	10.6
6	5.1	10.8
7	5.7	10.4
8	4.3	10.4
9	4.1	13.7
10	4.9	12.0
Total	5.1	11.6

Note: Elderly is defined as the household head being equal or older than 65 years.
Source: Authors' calculations based on HFCS wave 2 (included in Kuypers & Marx, 2019).

As mentioned above our objective was to mainly focus on the bottom of the distribution. Therefore, we introduce the concept of triple precariousness, which is defined as belonging to the bottom two deciles of the income distribution, belonging to the bottom two deciles of the net wealth distribution and having insufficient liquid assets to face an unexpected cost of €1,000. We find that this situation affects about 6.7 per cent of Belgian households, which represent about one third of the income poor. In other words, an important share of low income households can rely on some wealth holdings or at least an adequate level of liquid assets, and thus are less financially deprived than their incomes suggest. In Table IV we show which households are at high risk of being trapped in this situation of triple precariousness through a logistic regression of several socio-demographic characteristics. The results show that households who are at high risk of being in triple precariousness are mainly those who have a reference person that is young, unemployed or inactive, low educated, migrant, single, and above all a tenant. Indeed, the most striking composition is found with regard to tenure status; tenants and free users have almost 300 times more chance on belonging to the triple precariousness group, while this figure is only 1.7 in case of low income. Owning your main residence clearly is the most important requirement of not being in triple precariousness. Moreover, the results also show some marked discrepancies between the low income population – those conventionally labelled as poor or near-poor – and the population in triple precariousness. Compared to the demographic characteristics that are highly correlated with low income we mainly find an overrepresentation in triple precariousness of young and tenant households, while older households are clearly underrepresented.

Table IV. Logistic regression of demographics on risk being in triple precariousness vs low income

	Triple precariousness		Low income	
	Odds ratio	**Significance**	**Odds ratio**	**Significance**
Age (ref: 55-74 years)				
16-34 years	1.485011	n.s.	1.253807	n.s.
35-54 years	1.215271	n.s.	1.07817	n.s.
75+ years	0.1309561	**	1.193027	n.s.
Gender (ref: male)	1.442239	n.s.	1.078963	n.s.
Educational attainment (ref: tertiary)	9.742896		5.518125	***
No or primary	6.480187	***	3.964123	***
Secondary		***		
Labour market status (ref: employee)	0.2476818	n.s.	1.795481	
Self-employed	6.73186	***	8.80264	n.s.
Unemployed	2.042815	n.s.	1.520893	***
Retired	9.854786	***	5.737489	n.s.
Inactive				***
Household type (ref: couple)				
Couple with children	0.7849542	n.s.	1.04077	n.s.
Single	0.9890564	n.s.	1.24245	n.s.
Single with children	0.8370084	n.s.	4.582028	***
Other	0.3723905	n.s.	0.5408338	n.s.
Tenure status (ref: outright owner)	n/a		0.3527816	***
Owner with a mortgage	295.2042	***	1.72784	**
Tennant/free user				
Origin (ref: native)	1.86446	n.s.	3.019082	***
Constant	0.0000782	***	0.0348894	***
Pseudo R^2:	*0.4093*		*0.2377*	

Notes: *** significant at 1%, ** significant at 5%, n.s. not significant; characteristics refer to the household reference person; triple precariousness=belonging to bottom two deciles of gross income and wealth distribution and inadequate liquid assets (N=116); low income=belonging to bottom two deciles of gross income distribution (N=423), total households (N=2,238).
Source: authors' calculations based on HFCS wave 2 (included in Kuypers & Marx, 2019).

4.2. Applying a joint income-wealth perspective on the analysis of poverty, inequality and redistribution

In this section we describe our results of analysing poverty, inequality and redistribution from a joint income-wealth perspective. First, Table V shows poverty rates for Belgium and five other countries comparing the traditional income approach (i.e. at-risk-of poverty rate with poverty line at 60% of median equivalised disposable household income) with the two joint income-wealth approaches discussed in the methods section. The poverty rates were calculated based on the standard assumptions implemented in the literature: for the unidimensional approach the interest rate (ρ) is set at 2 per cent and life expectancies by country, age and gender are used as proxy for time till death, in the two-dimensional approach the income poverty line retains its traditional interpretation and the asset poverty line is set at

¼ of the income poverty line. With regard to the unidimensional approach we make a further distinction in terms of the poverty line that is used, as there is substantial disagreement on this issue in the existing literature and it has an important impact on the obtained results and conclusions. In most studies the poverty line is kept at the same level as for the calculation of the income poverty, which is compatible with the view that the current poverty line reflects the true resources needed by households to sustain an acceptable living standard. A competing view argues that if wealth is accounted for as a financial resource, then the poverty line should be adjusted upwards in order to reflect the fact that it implies a higher level of consumption possibilities (Lerman & Mikesell, 1988, p.360). The poverty line would then be set as a percentage of 'median equivalised income + annuitised net worth, which is "more consistent with a fully relative approach" (Brandolini et al., 2010, p.275). Of course any percentage could be chosen, but to keep things consistent we choose here similarly as for income poverty a threshold of 60%. The operationalisation of the unidimensional as well as the multidimensional approach to joint income-wealth poverty also requires several other methodological choices, but these are found to have a smaller effect on the obtained results (Kuypers & Marx, 2018).

The results of Table V show that in all five countries poverty rates would decrease if annuitized wealth is taken into account and when the poverty line is kept at the same level as for traditional income poverty. In Belgium poverty rates would decrease to about 10 per cent, representing a 30 per cent decrease. In the other countries similar drops take place, a little bit less in Germany, but interestingly poverty rates drop by half in Spain. However, if the same annuitization approach would be applied and also the poverty line would be adapted to 60 per cent of median income + annuitized net wealth then poverty rates would increase rather than decrease in all countries. As this implies a fully relative approach this again points towards the very skewed distribution of (annuitized) net wealth. The multidimensional approach towards joint income-wealth poverty results for Belgium in 8.5 per cent of people being only income poor, while 5.7 per cent are both income and wealth poor. In other words, 60 per cent of the income poor own a sufficient amount of net wealth to be able to bridge three months living at the income poverty line. Similar figures are found for the other countries, with even 75 and 85 per cent of the income poor owning a sufficient amount of wealth as a safety net in France and Spain respectively. In contrast, a non-negligible share of people are in the traditional poverty measurement not considered poor, but they own little or no assets to fall back on. In Belgium this concerns about 4.6 per cent, while it is very high in Finland and Germany. In line with the results of Table IV poverty rates decrease much more among the elderly than among the working age population (see Kuypers & Marx, 2018 for separate poverty rates for elderly and non-elderly for Belgium and Germany).

Table V. Comparing income poverty rates with poverty rates based on joint income-wealth measures

	Income poverty	Income + annuitized net wealth (same poverty line)	Income + annuitized net wealth (adapted poverty line)	Multidimensional poverty		
				Only income poor	Only net wealth poor	Twice poor
Belgium	**14.2%**	**9.9%**	**16.4%**	**8.5%**	**4.6%**	**5.7%**
Finland	7.8%	5.4%	11.8%	4.8%	18.0%	3.0%
France	10.2%	6.8%	12.6%	7.7%	8.9%	2.4%
Germany	13.4%	10.3%	18.2%	8.0%	14.6%	5.4%
Italy	19.5%	13.1%	24.3%	12.7%	4.6%	6.8%
Spain	21.0%	10.5%	24.0%	17.8%	2.4%	3.2%

Source: authors' calculations based on HFCS data of wave 2 and EUROMOD.

As mentioned above we extended the annuitization approach so that it can also be used to analyse inequality and redistribution. Following the literature initiated by Musgrave and Thin (1948) and Kakwani (1977) we measure the redistributive effects (RE) of tax-benefit systems in the Lorenz curve framework. The overall redistributive effects are given by the difference between the Gini of a pre-transfer pre-tax concept and the Gini of a post-transfer post-tax concept. In order to facilitate cross country comparability, such a difference is also shown as a percentage of the pre-transfer pre-tax Gini. In the traditional income approach used in the literature this means taking the difference between the Gini's of market (MI) and disposable income (DI). A common critique on this approach is the fact that pensions are included as social benefits and not in the definition of market income, which may be problematic for cross-country comparisons given the characteristics of the pension systems. "In countries with comprehensive public pension systems … pensioners [will] make little other provision for retirement… Thus, pre-tax income inequality (and poverty) will be artificially high and the reduction in inequality also exaggerated" (Bradley et al., 2003). Therefore, by assuming public pensions to be a source of postponed market income (Immervoll et al., 2006) we also show inequality and redistributive effects considering the sum of market income and public pension income (MPI) as the original income distribution. When wealth is brought into the picture, the value of annuitised wealth net of liabilities is added gross of wealth taxes (i.e. gross annuitised wealth, GAW) to the market income concept or to the market income and public pension income concept. The value of annuitised wealth net of wealth taxes (i.e. net annuitised wealth, NAW) is added to the disposable income concept resulting in the overall redistributive effect.

$$RE = GINI_{M(P)I(+GAW)} - GINI_{DI(+NAW)}$$

Table VI provides an overview of the Gini coefficient of the different living standards concepts as well as the absolute and relative redistributive effects calculated from these, again comparing Belgium with the five countries mentioned before. First, across all countries the Gini coefficient of MI + GAW is lower than the Gini of MI alone. This is largely due to the fact that elderly often have zero MIs, while holding important amounts of wealth. The inclusion of these wealth holdings then by definition results in a decrease of inequality of MIs. Secondly, the inclusion of GAW increases the inequality of the distribution of MPIs in particular in France, Germany and Italy, countries characterized by the highest wealth inequality. Finally, the high

disparities observed in the distribution of wealth imply that the distribution of DI + NAW shows a higher inequality than the distribution of DI in all countries. Comparing the redistributive effects in the left and right panel and considering public pensions as social transfers, we find that in the broader joint income–wealth framework, the tax–benefit system is still found to reduce overall inequality although to a much lesser extent than considering the traditional notion of income inequality. In all countries except Finland, the redistributive effect of the tax–benefit system is at least halved, with a particular large reduction in Spain. This is because the tax–benefit system is almost unilaterally focused on reducing income inequalities, which do not necessarily coincide with wealth inequalities. Considering public pension income as postponed MI, the redistributive effect of tax–benefit systems is, as expected, lower than evaluated against the distribution of MI alone, in particular in countries characterized by relatively generous pensions with respect to other social benefits (e.g. Spain and Italy). Again a reduction of the redistributive effect is observed in the joint income–wealth framework compared to the traditional framework.

Next, we also decomposed the overall redistributive effect into the contribution of each tax or benefit instrument following the approach initiated by Lambert & Pfähler (1988) and Duclos (1993). In this approach the overall redistributive effect is the result of a vertical equity (VE) and a reranking effect (RR) that captures the impact of individuals that may swap positions in the income ranking before and after transfers and taxes:

$$RE = VE - RR = RS - RR$$

The vertical equity effect measures the total reduction of inequality that would occur if there were no reranking of income units and it is traditionally captured by the Reynolds-Smolensky (RS) (1977) index which can be decomposed to highlight the contribution of each tax-benefit instruments T_i which represent individual taxes and/or benefits while g_i the individual tax/benefit rates (i=1…I). The overall 'net fiscal rate' is $g = t - s$, where t is the average tax rate and s is the average benefit rate. The decomposition of the difference between the Gini before redistribution and after redistribution takes the form:

$$VE = \frac{1}{(1-g)} \sum_{i=1}^{I} g_i \prod_{i}^{K}$$

Vertical equity is expressed in terms of a progressivity (measured by the Kakwani index (Kakwani, 1977)) and an average rate effect. Overall progressivity is measured as the weighted sum of the i indices of tax progressivity of each tax/benefit. Here, we only show the results in terms of progressivity (Table VII), the other results can be found in Kuypers, Figari & Verbist (2020 forthcoming)[4].

In line with previous studies, we find that social benefits are the most progressive instrument, followed by taxes on income. With the exception of Spain, taxes on capital income are more progressive than taxes on other types of income, which is what is expected given that capital income is in general more unequally distributed than income from work. Evidence on SICs

[4] Results for the first HFCS wave in terms of consumable income (taking into account indirect taxes) can be found in Kuypers et al. (2019) and in terms of disposable income in Kuypers et al. (2018).

and wealth taxes is more mixed across the six countries, with regressivity in some cases and progressivity in others. Indeed, when assessed against the income distribution wealth taxes are regressive in Belgium, Finland and Spain, while they are slightly progressive in France, Germany and Italy. Such a different pattern observed across countries is not yet investigated in the fiscal literature and might provide novel insights in the design of new fiscal and social policies which could give more prominence to wealth in the definition of ability to pay taxes and benefit eligibility.

The comparison of the two living standards frameworks shows that social benefits remain relatively strongly pro-poor when assessed against the joint income–wealth distribution, sometimes even more so than by the distribution of income alone. This implies that those receiving social transfers such as unemployment benefits are typically households with both low incomes and low wealth, such that they are concentrated at the very bottom of the joint distribution. In contrast, the progressivity of personal income taxes drops relatively drastically between the income and joint income–wealth frameworks. Capital income taxes become slightly more progressive when evaluated against the joint income–wealth distribution than against the income distribution in Belgium and Spain, while about the same pro-poorness is found for the other countries. As expected, wealth taxes become more pro-poor when wealth is included in the ranking variable (or less regressive in the case of Spain). As a result, wealth taxes are more progressive than personal income taxes in France, Germany and Italy, while the opposite is true for Belgium, Finland and Spain.

In a sensitivity analysis (see appendix of Kuypers et al., 2019) we only took liquid assets into account in the annuitization as the approach implicitly assumes that income and wealth are perfectly fungible, while the conversion of non-liquid assets into cash is typically associated with a certain cost. As expected, the difference between the income and joint income–liquid assets frameworks is relatively small as a consequence of the fact that most households' wealth mainly consists of real estate wealth and/or that liquid assets are more strongly correlated with income than real assets.

Table VI. Overall redistributive effects of tax-benefit systems in two frameworks

Income framework								**Joint income-wealth framework**						
	Gini MI	Gini MPI	Gini DI	Abs. RE (MI - DI)	Rel. RE (as % of Gini MI)	Abs. RE (MPI - DI)	Rel. RE (as % of Gini MPI)	Gini MI + GAW	Gini MPI + GAW	Gini DI + NAW	Abs. RE (MI+ GAW - DI + NAW)	Rel. RE (as % of Gini MI+GAW)	Abs. RE (MPI + GAW – DI + NAW)	Rel. RE (as % of Gini MPI+GAW)
Belgium	**0.476**	**0.375**	**0.265**	**0.211**	**44.37**	**0.111**	**29.49**	**0.419**	**0.393**	**0.339**	**0.081**	**19.26**	**0.055**	**13.90**
	0.010	***0.010***	***0.009***	***0.010***		***0.009***		***0.013***	***0.012***	***0.011***	***0.006***		***0.005***	
Finland	0.371	0.363	0.228	0.143	38.53	0.135	37.19	0.366	0.364	0.262	0.104	28.49	0.102	28.04
	0.003	*0.003*	*0.002*	*0.002*		*0.002*		*0.003*	*0.002*	*0.002*	*0.002*		*0.002*	
France	0.514	0.402	0.266	0.248	48.20	0.136	33.81	0.474	0.439	0.351	0.123	26.02	0.088	20.07
	0.004	*0.004*	*0.003*	*0.004*		*0.004*		*0.006*	*0.005*	*0.005*	*0.003*		*0.002*	
Germany	0.524	0.438	0.322	0.202	38.58	0.116	26.51	0.512	0.469	0.411	0.101	19.71	0.058	12.35
	0.009	*0.009*	*0.009*	*0.005*		*0.004*		*0.010*	*0.010*	*0.010*	*0.005*		*0.004*	
Italy	0.534	0.413	0.336	0.198	37.12	0.077	18.68	0.467	0.430	0.390	0.076	16.33	0.040	9.27
	0.006	*0.007*	*0.006*	*0.003*		*0.002*		*0.006*	*0.006*	*0.006*	*0.002*		*0.001*	
Spain	0.534	0.452	0.393	0.141	26.39	0.059	12.96	0.470	0.459	0.428	0.043	9.04	0.031	6.76
	0.009	*0.010*	*0.010*	*0.004*		*0.004*		*0.010*	*0.010*	*0.010*	*0.002*		*0.002*	

Notes: MI= market income, MPI= market income + public pensions, DI= disposable income, GAW= gross annuitized wealth, NAW= net annuitized wealth, RE= redistributive effect. Standard errors are shown in italics.

Source: authors' calculations based on HFCS wave 2 and EUROMOD (included in Kuypers, Figari & Verbist, 2020 forthcoming).

Table VII. Progressivity of tax-benefit instruments in two frameworks (Kakwani indices)

		Social benefits	Personal income tax	Capital income tax	Social insurance contributions	Wealth taxes	Total
Belgium	**Income**	**0.793** ***(0.026)***	**0.108** ***(0.006)***	**0.146** ***(0.036)***	**0.032** ***(0.008)***	**-0.135** ***(0.057)***	**0.299** ***(0.021)***
	Joint income-wealth	**0.822** ***(0.025)***	**0.040** ***(0.010)***	**0.256** ***(0.037)***	**-0.060** ***(0.011)***	**0.030** ***(0.020)***	**0.251** ***(0.021)***
Finland	Income	0.766 *(0.006)*	0.069 *(0.002)*	0.368 *(0.012)*	0.047 *(0.003)*	-0.108 *(0.005)*	0.630 *(0.011)*
	Joint income-wealth	0.769 *(0.007)*	0.055 *(0.003)*	0.335 *(0.017)*	-0.009 *(0.004)*	0.026 *(0.006)*	0.605 *(0.012)*
France	Income	0.872 *(0.008)*	0.147 *(0.003)*	n.a.	-0.021 *(0.005)*	0.087 *(0.034)*	1.036 *(0.044)*
	Joint income-wealth	0.886 *(0.011)*	0.082 *(0.005)*	n.a.	-0.122 *(0.007)*	0.256 *(0.011)*	1.083 *(0.052)*
Germany	Income	0.892 *(0.016)*	0.235 *(0.004)*	0.290 *(0.039)*	-0.136 *(0.009)*	0.075 *(0.053)*	0.368 *(0.017)*
	Joint income-wealth	0.933 *(0.016)*	0.154 *(0.010)*	0.284 *(0.051)*	-0.211 *(0.010)*	0.177 *(0.014)*	0.287 *(0.019)*
Italy	Income	0.793 *(0.017)*	0.172 *(0.004)*	0.263 *(0.016)*	0.035 *(0.006)*	0.100 *(0.024)*	0.268 *(0.005)*
	Joint income-wealth	0.738 *(0.018)*	0.140 *(0.004)*	0.269 *(0.014)*	-0.040 *(0.008)*	0.239 *(0.017)*	0.225 *(0.007)*
Spain	Income	0.785 *(0.025)*	0.295 *(0.008)*	0.260 *(0.045)*	-0.129 *(0.015)*	-0.078 *(0.032)*	1.243 *(0.146)*
	Joint income-wealth	0.696 *(0.024)*	0.228 *(0.009)*	0.314 *(0.037)*	-0.198 *(0.012)*	-0.006 *(0.009)*	1.607 *(0.271)*

Notes: A positive Kakwani index refers to a pro-poor instrument. Standard errors are shown in italics. n.a. means that there is either no capital income tax in the respective country, that it is included in the general income tax or that it cannot be distinguished from the general income tax in EUROMOD. All Kakwani indices are statistically significant at the 5% level (i.e. significantly different from proportionality) except for the following: wealth taxes Belgium in joint income-wealth framework, wealth taxes Germany in income framework and wealth taxes Spain in joint income-wealth framework.

Source: authors' calculations based on HFCS wave 2 and EUROMOD (included in Kuypers, Figari & Verbist, 2020 forthcoming)

4.2. The role of wealth in social policy design

4.2.1. Asset-testing in minimum income protection schemes

Minimum income protection (MIP) schemes, usually financed from general tax revenues, have as prime objective to provide a last safety net. Their prime awarding criterion is financial need. Whereas there are different approaches to identify the most vulnerable, in Western MIP schemes policy makers usually rely on an assessment of the means of claimants (Bahle et al., 2011; Gough et al., 1996). Most EU countries take account of assets in the assessment of means.

Based on a comparison of asset tests in European MIP schemes (see Marchal et al., 2020), we distinguish two main types of asset-tests: i) a threshold above which the possession of assets disqualifies for MIP: assets need to be realized first, and only afterwards MIP will be provided, and ii) assets are taken into account at a fictional rate of return, above what can realistically be expected, so that over time, assets will need to be realized. The first type seems to be the most prevalent, although there are large differences in actual thresholds. In addition, some countries favour a mixed type, that combines elements of both. In most countries the family home is exempt from asset-testing, but some countries list requirements that it should only be of modest size (e.g. Germany, Bulgaria, Cyprus). Countries that do include the family home in the disqualifying amount usually have conditions in place in order to mitigate the impact of this requirement. Some amounts of cash and savings in private pension accounts are usually also exempt, as well as vehicles which do not surpass a certain value or are used for certain objectives. Finally, a number of countries have a more atypical assessment of assets: France and Poland only assess assets if there is a large discrepancy between declared income and shown living standards, whereas Estonia fully depends on a discretionary assessment by the municipality of all assets and income in combination.

Belgium belongs to the second type since assets are assessed at a fictional rate of return that will one on one decrease the value of the benefit. In the case of movable property a first band of around €6,000 is disregarded, a second band is assessed at 6% (4% for the elderly), and assets higher than €12,000 (€18,000 for the elderly) are assessed at 10%. The calculation of the rate of return of immovable property hinges on the unindexed cadastral revenue of the immovable property the claimant owns. In addition, important amounts of the cadastral income are exempt, and these exemptions increase with the number of children living in the dwelling. For those of active age, if property is rented out, the actual rent income is taken into account. This does not apply to the elderly.

In Table VIII we first assess the change in coverage that follows from removing the asset test from the eligibility conditions for MIP benefits in active age relative to the active age population, and the coverage of MIP benefits in active *and* old age relative to the total adult population. For those at active age coverage increases with about 1.8% when fully abandoning the asset test. Only the combination of taking account of real estate and financial capital leads to a significant difference. The relatively mild assessment of real estate value has no obvious effect. The impact of removing asset tests is – unsurprisingly – far larger when we look at the

MIP benefits for those in active and for the elderly jointly. Even though assets for the elderly are less heavily taken into account in Belgium, the asset test clearly has an impact on coverage because the elderly generally have the highest asset holdings (see above). Again, the increase is mainly driven by the abolishment of the inclusion of fictional revenue of financial assets, and far less due to the disregards of real estate property. Still, taking account of real estate value has (somewhat) more of an impact when including the elderly than when solely looking at those of active age, for two reasons. For one, the elderly have amassed more real estate property. Second, the asset test for the elderly only looks at notional value of real estate property, even when it is rented out, whereas for those of active age, the asset test includes rental income for rented out property, and notional value otherwise. Since rental income constitutes an actual income, this remains in the means-test in our "no asset test" scenario, whereas in the case of the elderly, all real estate value is then disregarded.

A wider MIP coverage does not translate to significantly lower poverty rates at the 60% at-risk-of-poverty threshold (AROP60). MIP schemes are relatively small, and the impact of the few additional percentages of the population that gets covered may not be consequential. In addition, MIP benefits are notoriously low, and are often below the AROP60 poverty threshold. Therefore, we also assess the impact of a widened coverage on poverty rates as measured against the 40% at-risk-of-poverty threshold, and by looking at the mean poverty gap among the poor. Abolishing the asset test does decrease severe poverty, by well over 1 percentage point and there is a significant decrease in the mean poverty gap among the poor when the coverage of the MIP schemes is broadened.

Finally, the bottom part of Table VIII shows the median value of MIP benefits under different asset test scenarios. Abolishing the asset test has an impact on awarded benefit levels in two ways: first, as imputed value of real estate and financial assets diminishes the benefit before causing ineligibility, it increases the benefits of those that already were eligible in the original scenario. We indeed observe that the median MIP benefit awarded to original beneficiaries increases significantly from €501 to €578. At the same time, abolishing the asset tests also causes a new group of beneficiaries to become eligible, who are clearly eligible for lower benefits. The median benefit awarded to this group is only €154, significantly different from the median value of €578 awarded to the original beneficiaries under the new rules. Hence, mainly persons who still have some form of income would become eligible, which in turn implies that it will rather be the combination of income and assets that render people ineligible for MIP. In other words, those that become eligible through abolishing assets appear to be the "better off" of the poor, even when not considering their higher assets.

Table VIII. Coverage rates and median benefits for Belgian MIP and poverty rates among the total population, under different asset test assumptions

		Estimate	Confidence interval
Coverage rate of MIP benefits			
Active age	Full Asset Test	8.22%	[6.59%; 9.84%]
	No Cadastral Income	8.23%	[6.59%;9.87%]
	No Financial Capital	9.83%***	[8.01%;11.65%]
	No Asset Test	9.97%***	[8.12%;11.81%]
Adult	Full Asset Test	9.35%	[7.84%;10.85%]
	No Cadastral Income	9.63%**	[8.08%;11.17%]
	No Financial Capital	11.19%***	[9.47%;12.91%]
	No Asset Test	12.03%***	[10.30%;13.77%]
Poverty rate at 60% of median equivalent disposable household income			
All	Full Asset Test	14.53%	[11.98%;17.08%]
	No Cadastral Income	14.30%*	[11.81%;16.78%]
	No Financial Capital	14.26%	[11.79%;16.72%]
	No Asset Test	13.92%**	[11.53%;16.30%]
Poverty rate at 40% of median equivalent disposable household income			
All	Full Asset Test	2.03%	[1.17%;2.89%]
	No Cadastral Income	1.91%	[1.12%;2.71%]
	No Financial Capital	1.08%***	[0.30%;1.86%]
	No Asset Test	0.85%***	[0.24%;1.46%]
Mean poverty gap among the poor (in euro)			
All	Full Asset Test	210	[177;243]
	No Cadastral Income	210	[177;242]
	No Financial Capital	178***	[148;208]
	No Asset Test	176***	[148;204]
Median value MIP benefit (in euro)			
Original MIP recipients	Full Asset Test	504	[412;595]
	No Asset Test	573***	[507;640]
New MIP recipients	No Asset Test	151***	[72;231]

Note: */**/***: significant difference with estimated coverage/poverty rate/mean poverty gap at Full Asset Test at p< 0.1/0.05/0.01 level. Full Asset Test: means-test as legislated; No Cadastral Income: Part of the means-test including real estate value is disregarded; No Financial Capital: part of the means-test including financial assets is disregarded; No Asset Test: part of the original means-test focusing on wealth is disregarded. Mean poverty gap calculated over the poor in each respective scenario.
Source: authors' calculations based on HFCS wave 1 and EUROMOD (included in Marchal et al., 2020).

4.2.2. Asset-building policies

As mentioned above, a joint income-wealth perspective on poverty and inequality may also result in proposing new types of policies. European welfare states now focus on the redistribution of market incomes, while there is also an important (and increasing) need for distributing wealth resources more evenly. Although currently Belgium and many other European countries encourage the ownership of real estate and financial assets through tax deductions and credits, these policies are typically unavailable to the poor (McKernan & Sherraden, 2008).

Under the impulse of the work of Sherraden (1991) asset building policies targeted at or inclusive to the poor were first introduced in the United States in the 1990s. Over time countries such as the UK, Canada and some English-speaking countries in Southeast Asia followed (Laurinavičius & Galinienė, 2013). One of the largest and most effective initiatives are the 'Individual Development Accounts' (IDA's) of the US. IDA's are savings accounts for low income households that provide matched funds (financed by private and/or public resources) at the time of withdrawal if the savings will be used for one of the pre-set goals (e.g. higher education, homeownership or entrepreneurship) (McKernan & Sherraden, 2008; Sherraden, 1991). In Europe examples are much scarcer and often consist of local social innovation projects. Besides a pilot project funded by the European Commission that has been implemented in Belgium, France and Hungary (see Guisse & Gilles, 2013), programs for promoting saving among low income people are largely absent. Yet, it may be interesting to explore such a policy option also for European welfare states. Therefore, we looked into the possibilities for initiating a pro-poor asset building policy inspired by the IDA's in six European countries. Yet, compared to these programs which are focused on providing access to illiquid wealth (homeownership, entrepreneurship) or goods which are publicly provided in Europe (higher education), liquid savings are here considered important in and of themselves in order to provide short-term financial stability. In other words, the considered policy consists of matching (i.e. doubling) household savings.

The target group of the designed policy are those who have low income, low wealth and inadequate liquidity, which are considered to be the most vulnerable households (see Table IX). The country specific parameters to determine eligibility for the new policy are presented in the top half of Table IX. Low income is considered to be below 80 per cent of national median equivalised disposable household income. The threshold used to determine insufficient liquid assets is taken from the EU-SILC question *"Can your household afford an unexpected required expense of [national specific amount] paid using its own resources?".* The asset types which are assessed against this threshold include deposits, bonds, shares, mutual funds and managed accounts. Using a slightly higher threshold for income than the official AROP-poverty line in combination with a liquidity threshold implies that both those who fall below the poverty line are included as well as those with incomes just above the poverty line, but who own insufficient liquid assets to face unexpected costs. In order to avoid subsidising large wealth owners who choose to invest only in illiquid assets we also control for total assets held, including both liquid and illiquid assets, which should belong to the bottom two deciles of the distribution. We use gross assets instead of net wealth (i.e. not subtracting outstanding debt) as it might imply subsidising households with large outstanding debt but equally large gross assets available to spend in times of need. However, debt repayments are subtracted from disposable income to take into account only income available for spending. As is presented in Table IX the share of individuals living in a household eligible for the matched savings benefit according to these criteria is around 10 per cent in France and Germany, around 8 per cent in Belgium, Italy and Spain and 6 per cent in Finland.

The middle and bottom part of Table IX present some summary outcomes of the simulated policy in terms of the likely beneficiary population and the potential budgetary range. Since not all households currently own a savings account (Ampudia & Ehrmann, 2017) and the

HFCS does not allow to distinguish between sight and savings accounts for Finland, the matching is here simulated for savings accounts separately as well as for all types of accounts together. Although sight accounts are less appropriate to determine the matched savings benefit because the amount depends strongly on the timing of the interview (i.e. before or after the pay check is received), the simulated amounts lie somewhat closer to the findings of the European pilot project and the existing Anglo-Saxon programs. The results show that the share actually receiving a benefit (i.e. those who currently own a positive amount of savings) is generally lower than the eligible population, especially in the case when only savings accounts are taken into account and most strongly so in Italy. This indicates that saving among vulnerable households is currently indeed very low. The average amount currently saved, and hence the potential benefit amount, ranges between €100 and €200 for most countries in the case when only savings deposits are taken into account, while it lies between €250 and €350 when also balances on sight accounts are included. The amounts are somewhat higher for Italy, but the potential beneficiary population is very small. The cost of this type of asset building policy is likely to be below 1 per cent of total tax revenues.

Table IX. Overview of key parameters and outcomes hypothetical pro-poor asset building policy

	BE	FI	FR	DE	IT	ES
Eligibility thresholds						
Lower middle class income	**€17,836**	€18,920	€17,370	€17,020	€12,998	€10,945
Low gross assets	**€64,163**	€25,366	€11,093	€10,828	€26,339	€58,692
Insufficient liquid assets	**€1,100**	€1,200	€1,000	€1,000	€800	€650
Eligible population	**8.5%**	6.0%	10.1%	10.5%	8.5%	7.8%
Outcomes (only savings deposits)						
Beneficiary population	**2.0%**	N.A.	5.5%	2.4%	0.2%	0.2%
Average benefit	**€164**	N.A.	€127	€165	€383	€191
Total cost (million)	**€20**	N.A.	€199	€199	€19	€7
Total cost (% of tax revenue)	**0.03%**	N.A.	0.14%	0.06%	0.01%	0.02%
Outcomes (all deposits)						
Beneficiary population	**6.6%**	6.0%	9.2%	7.1%	1.1%	4.8%
Average benefit	**€309**	€346	€358	€262	€474	€246
Total cost (million)	**€108**	€70	€970	€935	€114	€223
Total cost (% of tax revenue)	**0.16%**	0.25%	0.70%	0.26%	0.08%	0.74%

Source: Eligibility thresholds: Lower middle class income threshold is calculated as 80 per cent of median equivalised disposable income reported by Eurostat. The low assets threshold is calculated as the bottom two deciles of the gross asset distribution in the HFCS dataset. The liquid assets threshold is taken from the national amount used in the EU-SILC question “Can your household afford an unexpected required expense of [amount] paid using its own resources?”, Bottom half: authors’ calculations based on HFCS wave 1 and EUROMOD.

4.2.3. Public pension wealth and household asset holdings

Another policy area which may be affected by wealth and its distribution is the provision of public pensions. Pay-as-you-go public pension systems expanded quickly over the last half-century thanks to the arrival of baby-boomers to the labour market. Today, the same generation of baby-boomers is reaching the age of retirement and this is the reason most European countries introduced reforms to keep pension schemes sustainable. Other than

encouraging older workers to stay longer in activity, another expected consequence of these reforms is a decreasing path of pension benefits' generosity in the next decades.

One of the main reasons explaining households' saving behaviour is to keep their standard of living at the same level after retirement. How will they react to changing pension generosity? Will they substitute one by one any euro decrease in expected public pension entitlements? If they do not, or only do that partially, the living standard of future generations of pensioners will be lower than that observed among today's pensioners.

Using the public pension wealth estimated for Belgium based on the retrospective data from SHARE and our microsimulation model (see methods section) we tested econometrically the effect of lifetime income and public pension wealth, using a model derived from the life-cycle theory of capital accumulation (Gale, 1998). The results we obtain (see Lefebvre and Perelman, 2019), for Belgian households aged 55 to 85 years old, show that the effect of public pension wealth is far away of the expected one-to-one substitution. We estimate that an extra euro of public pension wealth is associated with about a 14 to 25 cents decline in households' wealth, which is rather close to the effect estimated for lifetime income. Table X summarizes the main results of the study. In each case - OLS, robust regression and median regression models - were run using alternative sample definitions. We observe that the results are very stable across different models and sample definitions: full sample, retired, aged 60 to 75 years old, men and women separately. The only exception is among women, in which case the substitution effect, between individual's public pension wealth and household's non-pension wealth, is very low and statistically not significant.

Table X. Effect of public pension wealth on non-pension wealth

	OLS	*Robust Regression*	*Median Regression*
	Full sample, aged 55-85 (n=1082)		
Public pension wealth	-0.238*** (0.067)	-0.127*** (0.042)	-0.143*** (0.050)
Lifetime income	0.169*** (0.062)	0.171*** (0.047)	0.184*** (0.040)
	Retired (n=860)		
Public pension wealth	-0.222*** (0.073)	-0.121*** (0.044)	-0.144*** (0.050)
Lifetime income	0.169*** (0.060)	0.171*** (0.047)	0.184*** (0.036)
	Aged 60-75 (n=682)		
Public pension wealth	-0.277*** (0.101)	-0.132** (0.058)	-0.140* (0.075)
Lifetime income	0.153** (0.067)	0.188*** (0.051)	0.177*** (0.043)
	Men (n=572)		
Public pension wealth	-0.268** (0.113)	-0.141** (0.056)	-0.155** (0.061)
Lifetime income	0.188*** (0.072)	0.190*** (0.050)	0.172*** (0.032)
	Women (n=510)		
Public pension wealth	-0.008 (0.113)	-0.059 (0.099)	-0.040 (0.096)
Lifetime income	-0.166 (0.201)	0.056 (0.165)	-0.065 (0.157)

Note: Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Each regression includes age, age squared, marital status, gender, the number of children, education and health as controls.
Source: Lefebvre & Perelman (2019).

4.4. Wealth taxation: theory and practice

The theoretical results that arrive at the recommendation that capital income should not be taxed, most notably Atkinson and Stiglitz (1976), use the assumption that all individuals differ only in their labor earnings abilities. Given equal disposable incomes, all individuals would thus save the same amount, and obtain the same capital incomes. All differences in capital incomes can be brought back to differences in labor earning ability, and any redistribution through taxes on capital income can also be obtained through taxes on labour income. Given the assumption that all income ultimately stems from labour and given that any tax reduces the purchasing power of an additional hour worked, taxes on capital income and labour income distort labour supply decisions alike. A tax on capital income though also distorts the savings decisions, while a tax on labour income does not. Given that in this model, both taxes can accomplish the same redistribution, and the labour tax can do so with less distortion than the capital income tax, it follows that capital income should not be taxed and all redistribution should occur through the labour income tax.

Even if the assumptions that lead to this conclusion are very strong and even unrealistic, the finding that capital income should not be taxed has strongly affected policy recommendations. Yet many extensions exist that relax the assumptions underlying the zero-tax recommendations, studying e.g. inheritances, differences in tastes and dynamic inefficiencies, demonstrating how taxes on capital income should in fact differ from zero. We extend this literature in a previously unexplored direction, namely where different individuals receive a different rate of return.

Differences in rates of return, especially after correcting for risk, have long been discarded by economists, since any such differences would be arbitrated away by individuals seeking profitable investment opportunities. Yet a rich literature documents how individuals make investment mistakes (Benartzi and Thaler, 2001; Calvet et al., 2007; Goetzmann and Kumar, 2008; Choi et al., 2010) and how individuals do not have the financial literacy that economic models assume that they have (Lusardi and Mitchell, 2011, 2014; Van Rooij et al., 2011). These differences between individuals make that different individuals earn different rates of return or pay different fees for similar financial services. More recent literature, following the anecdotal evidence brought by Piketty (2014), shows more directly that individuals do indeed differ in their rates of return, even after correcting for risk (Yitzhaki, 1987; Bach et al., 2018; Fagereng et al., 2019)). Rates of return depend both on scale, so richer individuals obtain higher rates, and on individual-specific characteristics, most commonly interpreted as investment ability. A third branch of the literature simulates the evolution of wealth in life-cycle models, showing that the current extent and fast evolution of wealth inequality cannot be explained, unless by taking into account returns to scale and skill premiums in investment (Benhabib et al., 2019; Lusardi et al., 2017; Kacperczyk et al., 2018; Gabaix et al., 2016). Together, these branches of the literature paint a clear picture where individual returns to capital are indeed heterogeneous, even after correcting for risk.

We explore the consequences of heterogeneous rates of return in three different papers. In Gerritsen, Jacobs, Rusu and Spiritus (2019), we extend the traditional Atkinson and Stiglitz

(1976) model, to include rates of return which depend either on ability or in the amount of wealth invested. If rates of return depend on earnings ability, then the assumption of Atkinson and Stiglitz (1976), that individuals with equal disposable incomes earn equal capital incomes, is no longer valid. Capital incomes now differ even conditionally on labour income, and it becomes optimal to tax both at non-zero rates. The size of the optimal capital income tax is inversely related to the ensuing distortions of the savings decisions, and it is proportional to the societal benefits of redistribution. In a simulation calibrated to empirically observed heterogeneity of the rates of return, we find that the optimal tax on capital income is about 30%. When rates of return depend on scale, we also find that capital income should be taxed, for a different reason. If capital returns depend on scale, that means that there is a market failure, which prevents poor individuals from saving at the same rates of return as the rich. The rich would in fact like to borrow money from the poor and invest it at higher rates of return. The fact that this does not happen, indicates that there is a missing market, e.g. due to informational constraints. If the government decreases the progressivity of the labour tax and increases the progressivity of the capital income tax, then rich individuals will end up saving more, obtaining higher rates of return, which are then redistributed through the capital income tax. Another way to see this is to say that the government redistributes less at the beginning of the life cycle, effectively saving on behalf of the poor and handing them part of the higher returns later in life. In a numerical exercise, we find that the optimal tax on capital income again should be about 30%.

In Boadway and Spiritus (2019), we introduce risk in the returns to capital income, and we study the optimality of the Rate of Return Allowance that was recommended by the Mirrlees Review (2011). Returns to capital in our model exhibit both idiosyncratic and aggregate risk, and even if returns to capital do not depend directly on investment skills, they do depend on the size of the portfolio. We model an optimal tax progressive on labour income and distinguish between linear taxes on normal (risk-free) capital income and excess returns to capital – following the terminology used by the Mirrlees Review (2011). We confirm traditional results that state the in presence of idiosyncratic risk, the government should symmetrically tax excess returns, compensating for eventual lower returns, effectively offering investment insurance by pooling all risks. Similarly, in presence of aggregate risk, the government should symmetrically tax the excess returns. With aggregate risk though, government revenues become risky, and someone needs to bear that risk. The government disposes of its risk by returning it back to the households. The optimal tax on excess returns then balances private consumption risk against public consumption risk. We model two methods for the government to dispose of its revenue risk and to balance its budget: through a stochastic public good, or through a stochastic lump sum – approximating government budget balancing measures on the expenditure side and on the income side. We find that the Rate of Return Allowance, recommending zero taxes on normal capital income but positive taxes on excess returns, is optimal when individuals optimize according to the mean-variance framework, and returns to capital do not exhibit rates of return. When rates of return are increasing in scale, then a tax on capital income should be combined with a wealth subsidy, encouraging the returns to scale to be realized. The latter recommendation assumes that returns to scale are productive and

not zero sum. Redistribution of the returns to scale should then occur through the labour income tax, since our model assumes one-dimensional ex ante heterogeneity.

Our third paper, Lehmann, Renes, Spiritus and Zoutman (2019), is an ongoing methodological contribution. Almost all contributions in the literature assume that before any risks are realized, individuals differ in only one dimension. Also in Gerritsen et al. (2019) and Boadway and Spiritus (2019), all ex ante differences between individuals can be brought back to differences in labour earning abilities. When individuals differ in their investment skills, we assume that these investment skills are perfectly correlated with labour earning skills. When returns to capital exhibit returns to scale, differences in wealth stem from differences in labour abilities. This one-dimensionality of the population in our models is a serious constraint and prevents us from studying for example how tax rates should differ for individuals who earn similar capital incomes and different labour incomes. Saez (2002) calls an extension to a truly multidimensional population an “extremely useful” and “important task”. Also Atkinson and Stiglitz (2015) name this problem as one of the important current challenges in public finance. The problem was first formulated mathematically by Mirrlees (1976). No published progress has since been made on solving the problem. We abstract for now from the intertemporal dimension of the problem, tackling the mathematically similar problem of taxing couples’ incomes when partners differ in their labour productivities. We follow a hybrid mechanism design and perturbation approach, to show how optimal taxes at each combination of incomes depend on a number of sufficient statistics. The exact intuition of the results still eludes us. However, we are the first to simulate the optimal taxes, and show how optimal tax rates at each combination of incomes depend negatively on the labour supply elasticities of both individuals and on the proportion of te population choosing the given combination of incomes, and positively on the degree of assortative mating and on the benefits of redistributing to couples who are just worse off. This research is still ongoing, we focus now on producing comparative statics and extending our results to capital taxation.

So far we have discussed the theoretical side of wealth taxation, in what follows we will show some results on how wealth tax systems work in practice. Comparing these results with the optimal tax parameters then allows to identify how wealth taxes can be improved.

In Table VII we already discussed the progressivity of all wealth taxes considered jointly, in Table XI we now show for some of the countries a more detailed overview of the progressivity of the different types of wealth related taxes, again using Kakwani indices. While we had two assessment frameworks above, here we assess wealth taxes against three assessment frameworks. Again we are mostly interested in the assessment in the joint income-wealth framework, but because wealth taxes are the sole focus now, we also show how progressive they are against the stock of wealth as originally observed in the HFCS as well as against annuitized net wealth by itself.

First, we find that overall progressivity (last column) is substantially higher when assessed against the joint income-wealth framework compared to when only (annuitised) wealth is used. Progressivity is strongest in France, Finland and Italy, while relatively low in Spain. More interestingly, however, are the Kakwani indices for each of the different types of wealth taxes

separately. When assessed against the distribution of (annuitised) wealth alone capital income taxes are the most progressive type of wealth tax in Belgium, Finland and Italy (in the latter closely followed by the real estate tax), while in France and Spain the general net wealth tax is the most progressive which is expected given that the threshold for liability is equal to €1,300,000 and €700,000 respectively. In Germany, however, wealth taxes are either regressive or proportional (i.e. Kakwani index not significantly different from zero) when evaluated against (annuitised) net wealth. Interestingly, the incidence of the real estate tax and the real estate transfer tax is regressive in all countries except for the Italian recurrent real estate tax.

While redistributive effects and progressivity measures tell us something about wealth taxes from a vertical equity perspective, i.e. the extent to which those with different abilities to pay are treated differently by the tax system, we are also interested in the concept of horizontal equity, i.e. the extent to which those equal abilities to pay are treated similarly. To this end, Figure 6 shows the total tax rate (i.e. sum of income taxes, social insurance contributions and annuitised wealth taxes as a percentage of pre-tax income + annuitised net wealth) by quintiles of the joint income-wealth distribution for two groups: those who predominantly derive their living standard from income and those who predominantly derive it from annuitised wealth (we use 65 per cent as threshold). The results clearly show an immense difference in tax rates throughout the entire distribution. Those who derive their living standard predominantly from income bear much higher taxes than those who derive it predominantly from wealth, implying that there is substantial horizontal inequity. Moreover, while the tax rate paid among those predominantly retrieving their living standard from income is clearly progressive, it is more or less flat among those having mainly annuitised net wealth. It should be noted, however, that confidence intervals are large for those having predominantly net wealth in the first quintile, due to too few observations at the bottom of the joint distribution who derive their living standard from net wealth. This implies, as expected, that wealth is most important at the top of the distribution. For Germany confidence intervals are large for all quintiles as wealth is much less important for the average German than their counterparts in other countries.

Finally, we also simulated a few possible alternative taxation systems. Table XII first compares average tax rates of the current tax system with a system in which the total living standard, i.e. sum of income and annuitized net wealth, would be taxed under the rules of the personal income tax, an example of improving horizontal equity in the tax system. With some exceptions, average tax rates increase in the alternative scenario. In general, they increase more in the top quintiles than at the bottom, or there is even a decrease in tax rates in some lower quintiles (Finland, Spain) such that progressivity increases. Striking is the very strong increase in tax rate in the bottom quintile in France. Broadening the tax base of the personal income tax by including both income and annuitised net wealth would increase total tax revenues by 7 per cent in Spain, 23 per cent in Finland, 31 per cent in Germany, 39 per cent in France, 45 per cent in Italy and even by 80 per cent in Belgium. This increase in tax revenues due to more horizontal equity, would then also possibly allow for a decrease of the applicable tax rates, especially at the bottom of the distribution, which would then in turn be an additional improvement on vertical equity grounds.

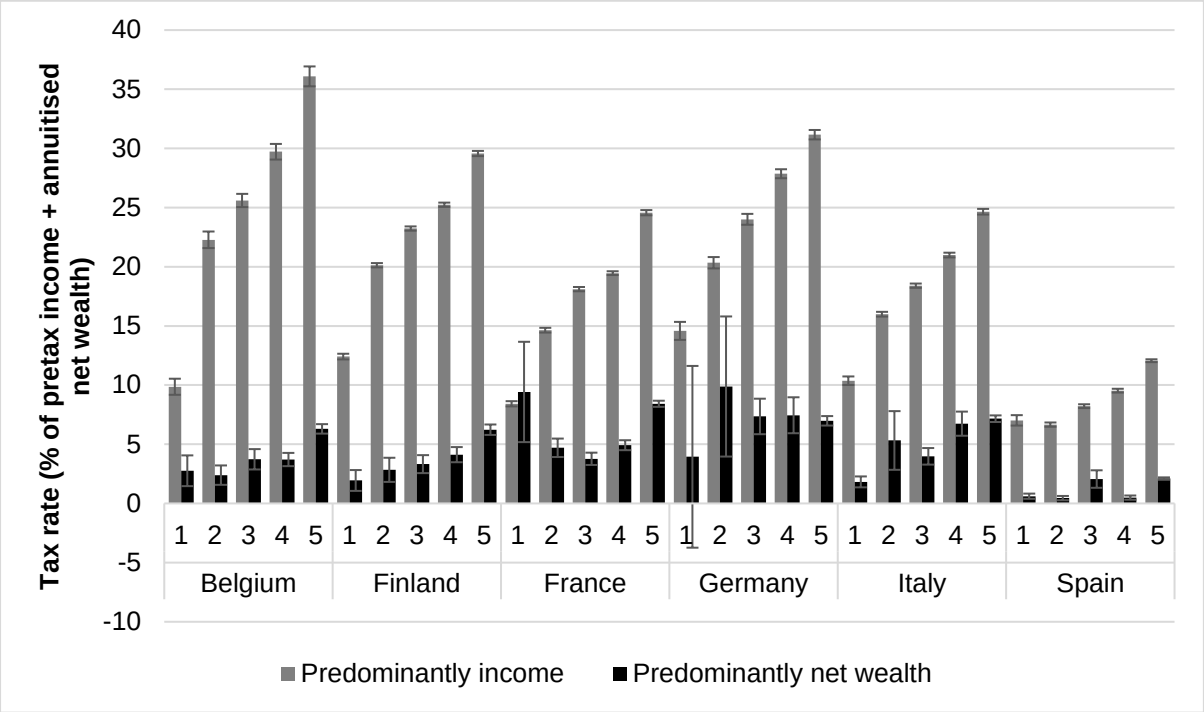
Table XI. Progressivity of separate wealth-related taxes by three frameworks

		Capital income tax	Real estate tax	General/specific net wealth tax	Real estate transfer tax	Inheritance & gift tax	Total
Belgium	**Stock of wealth**	**0.186* *(0.050)***	**-0.087* *(0.007)***	**0.043 *(0.058)***	**-0.453* *(0.069)***	**0.038 *(0.063)***	**-0.093* *(0.038)***
	Annuitised wealth	**0.207* *(0.041)***	**-0.034* *(0.006)***	**0.003 *(0.052)***	**-0.486* *(0.070)***	**0.085 *(0.071)***	**-0.059 *(0.045)***
	Joint income-annuitised wealth	**0.447* *(0.042)***	**0.163* *(0.009)***	**0.197* *(0.074)***	**-0.165* *(0.060)***	**0.328* *(0.072)***	**0.193* *(0.044)***
Finland	Stock of wealth	-0.068* *(0.012)*	-0.142* *(0.004)*				-0.097* *(0.008)*
	Annuitised wealth	0.081* *(0.007)*	0.002 *(0.002)*				0.049* *(0.005)*
	Joint income-annuitised wealth	0.456* *(0.009)*	0.302* *(0.003)*				0.393* *(0.006)*
France	Stock of wealth		-0.075* *(0.004)*	0.328* *(0.004)*	-0.162* *(0.032)*	0.108* *(0.027)*	0.012 *(0.012)*
	Annuitised wealth		-0.045* *(0.003)*	0.299* *(0.004)*	-0.201* *(0.31)*	0.075* *(0.024)*	0.006 *(0.012)*
	Joint income-annuitised wealth		0.250* *(0.004)*	0.633* *(0.003)*	0.199* *(0.028)*	0.412* *(0.024)*	0.342* *(0.011)*
Germany	Stock of wealth	-0.031 *(0.034)*	-0.042* *(0.008)*		-0.187* *(0.035)*	0.076 *(0.058)*	-0.068* *(0.023)*
	Annuitised wealth	-0.008 *(0.026)*	0.005 *(0.006)*		-0.247* *(0.034)*	0.001 *(0.048)*	-0.089* *(0.020)*
	Joint income-annuitised wealth	0.240* *(0.052)*	0.267* *(0.008)*		-0.032 *(0.050)*	0.386* *(0.044)*	0.171* *(0.031)*
Italy	Stock of wealth	0.151* *(0.021)*	0.162* *(0.007)*	-0.253* *(0.023)*	-0.145 *(0.076)*		0.121* *(0.007)*
	Annuitised wealth	0.169* *(0.018)*	0.137* *(0.007)*	-0.152* *(0.023)*	-0.266* *(0.065)*		0.103* *(0.007)*
	Joint income-annuitised wealth	0.418* *(0.018)*	0.329* *(0.009)*	0.071* *(0.023)*	0.052 *(0.074)*		0.307* *(0.009)*
Spain	Stock of wealth	0.106* *(0.017)*	-0.139* *(0.005)*	0.397* *(0.006)*	-0.370* *(0.043)*	0.037 *(0.050)*	-0.117* *(0.017)*
	Annuitised wealth	0.116* *(0.013)*	-0.068* *(0.003)*	0.369* *(0.005)*	-0.406* *(0.048)*	-0.017 *(0.049)*	-0.117* *(0.020)*
	Joint income-annuitised wealth	0.303* *(0.019)*	0.078* *(0.006)*	0.613* *(0.006)*	-0.061 *(0.052)*	0.161* *(0.061)*	0.103* *(0.020)*

Notes: Standard errors are shown between parentheses, * denotes that the Kakwani index is significantly different from zero (at 5% confidence level), i.e. significantly different from proportionality.

Source: authors' calculations based on HFCS wave 1 and EUROMOD (included in Kuypers, 2018).

Figure 8. Total tax rate by quintile and main source of living standard



Notes: predominantly income or predominantly net wealth refer to households where at least 65% of their total living standard (i.e. income + annuitized net wealth) is derived from income or annuitized net wealth respectively.
Source: authors' calculations based on HFCS wave 1 and EUROMOD (included in Kuypers, 2018).

Table XII. Simulation of alternative tax system: taxing joint income-wealth in personal income tax

	Baseline (current system)	Taxing everything under PIT		Baseline (current system)	Taxing everything under PIT
Belgium			**Germany**		
1	9.26 *(0.31)*	12.50 *(0.35)*	1	14.52 *(0.37)*	20.96 *(0.17)*
2	18.55 *(0.35)*	21.47 *(0.34)*	2	19.57 *(0.24)*	21.68 *(0.20)*
3	21.35 *(0.30)*	29.37 *(0.23)*	3	21.63 *(0.25)*	24.94 *(0.20)*
4	23.43 *(0.35)*	37.65 *(0.15)*	4	24.41 *(0.23)*	28.78 *(0.18)*
5	22.77 *(0.37)*	46.33 *(0.13)*	5	23.85 *(0.23)*	33.46 *(0.17)*
Total	19.06 *(0.17)*	29.44 *(0.20)*	Total	20.79 *(0.12)*	25.96 *(0.10)*
Finland			**Italy**		
1	12.16 *(0.12)*	13.01 *(0.06)*	1	9.31 *(0.16)*	12.26 *(0.19)*
2	19.02 *(0.10)*	15.90 *(0.08)*	2	14.26 *(0.10)*	10.38 *(0.13)*
3	21.22 *(0.11)*	20.33 *(0.07)*	3	15.89 *(0.09)*	12.83 *(0.14)*
4	22.38 *(0.11)*	24.51 *(0.06)*	4	17.83 *(0.10)*	19.15 *(0.11)*
5	24.47 *(0.13)*	32.03 *(0.07)*	5	18.14 *(0.13)*	29.25 *(0.11)*
Total	19.83 *(0.06)*	21.12 *(0.05)*	Total	15.08 *(0.06)*	16.77 *(0.08)*
France			**Spain**		
1	8.33 *(0.10)*	18.83 *(0.09)*	1	5.89 *(0.18)*	5.10 *(0.07)*
2	13.29 *(0.10)*	19.87 *(0.07)*	2	5.89 *(0.09)*	5.54 *(0.05)*
3	15.26 *(0.10)*	20.63 *(0.05)*	3	7.10 *(0.08)*	5.89 *(0.05)*
4	15.84 *(0.09)*	21.86 *(0.05)*	4	8.16 *(0.08)*	7.70 *(0.06)*
5	17.86 *(0.09)*	25.92 *(0.06)*	5	9.28 *(0.06)*	12.40 *(0.04)*
Total	14.12 *(0.05)*	21.42 *(0.03)*	Total	7.26 *(0.04)*	7.32 *(0.03)*

Notes: 1 to 5 denotes quintiles of pre-tax income + annuitised net wealth, standard errors are shown between parentheses.
Source: authors' calculations based on HFCS wave 1 and EUROMOD (included in Kuypers, 2018).

In Table XIII another hypothetical scenario is simulated, namely a tax shift from labour to net wealth. More specifically, we lower the amount of social insurance contributions by five percent for employees and self-employed, and the budgetary loss associated with this tax cut is compensated by the introduction of a new general net wealth tax. The tax rate is proportional and set such that the simulated wealth tax revenue corresponds with the amount of social insurance contributions that has to be compensated for. We find that the tax rate on net wealth needed to cover a tax cut of 5% of social insurance contributions ranges between 0.0286% in Spain and 0.1388% in Germany. Belgium lies somewhere in the middle with a net wealth tax rate of 0.0774%. Hence, even with a very small tax rate, a substantial amount of revenue could be raised (ceteris paribus, so without taking account of possible behavioural effects). The size of the tax rate depends on the importance of social contributions and the net wealth level in the countries. It is for instance relatively high in Germany, which is characterized by high social contributions and low net wealth (as compared to other countries). Further analysis shows that in terms of inequality reduction and progressivity, hardly anything changes when shifting taxes from social insurance contributions to net wealth. These outcomes show that a larger and/or different reform is needed in order to have a sizeable impact on inequality.

Table XIII. Simulation of alternative tax system: tax shift from social insurance contributions to net wealth tax

Country	Total social insurance contributions	Total net wealth	Net wealth tax rate (%)	Revenue net wealth tax
Belgium	**24,656**	**1,592,778**	**0.0774**	**1,233**
Finland	6,737	381,662	0.0883	336.80
France	96,201	7,110,382	0.0677	4,810
Germany	236,105	8,508,584	0.1388	11,805
Italy	62,973	5,597,000	0.0560	3,149
Spain	27,280	4,769,000	0.0286	1,364

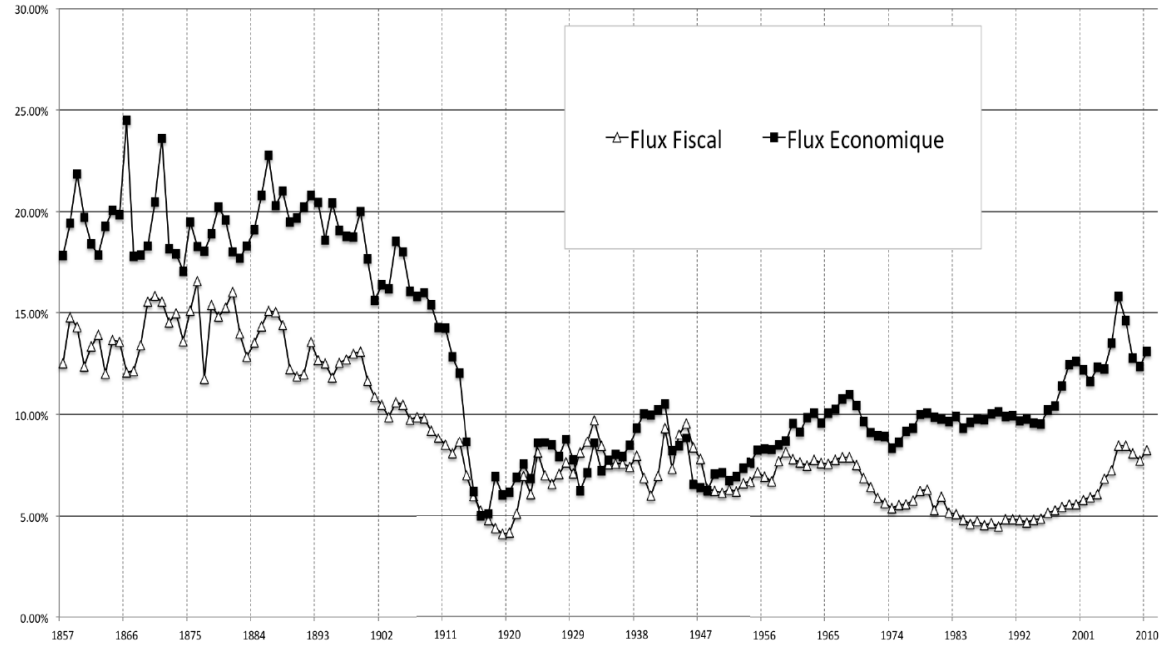
Note: Net wealth tax revenue equals 5% of social insurance contributions budget.
Source: authors' calculations based on HFCS wave 2 and EUROMOD (included in Boone et al., 2019).

4.5. The intergenerational transmission of wealth and long-term care provision

In this section we discuss our results in terms of the intergenerational transmission of wealth and how it may affect taxation and long-term care provision. First, Figure 9 shows the annual flow of inheritances based on two approaches developed by Piketty (2011) (for more information on the methods used see Dedry, 2014). Overall, we find that the Belgian annual flow of inheritances has followed a U-shape in the long-term. Based on the fiscal approach the flow of inheritances fluctuated between 12 and 16 per cent of national income between 1857 and 1900, afterwards it gradually decreased to 3.98 per cent at the end of the First World War and has stayed more or less stable for a small period. Over the last twenty years the annual flow of inheritances has increased again substantially, on average it has been multiplied by a factor of two. If this trend would continue we would return to the level of 1860 in a decade already. The results for the economic approach leads to similar results, although the percentages are somewhat higher, especially in the period before the First World War and

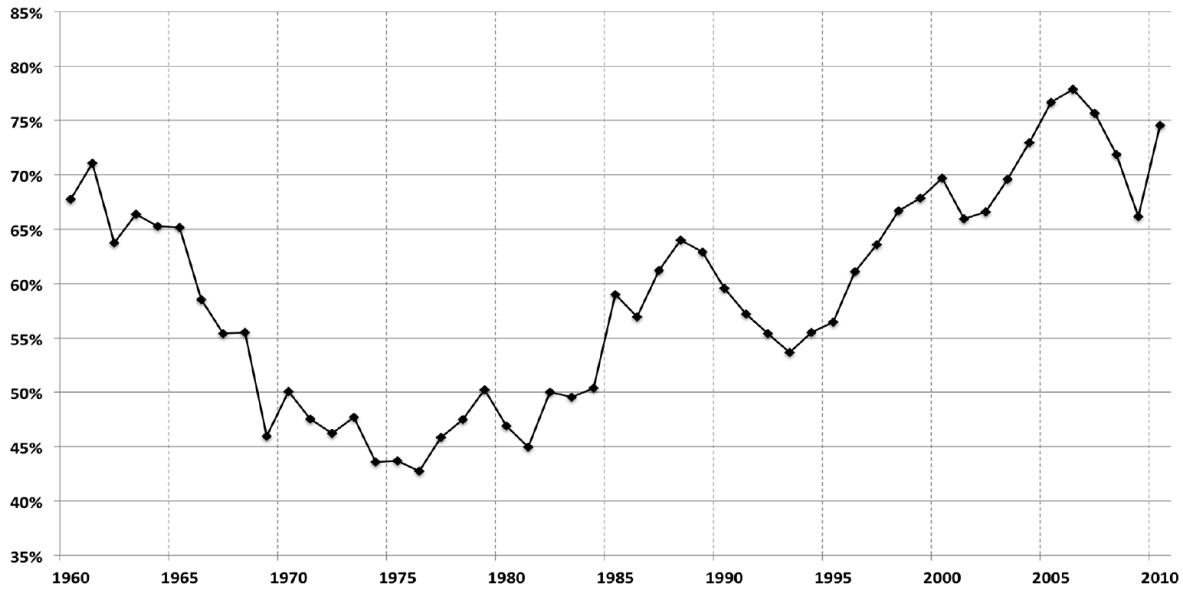
the recent decades. Figure 10 then shows what this means in terms of the stock of inheritances as a percentage of total wealth, which again follows a U-shaped pattern. Importantly, in 2006 almost 80 per cent of total wealth consisted of inherited wealth.

Figure 9. Long term evolution of the annual share of inheritances, 1857-2010



Source: Dedry (2014)

Figure 10. Evolution of stock of inheritances, 1960-2010



Source: Dedry (2014)

Inspired by these results we have dealt with the issue of intergenerational transmission of wealth under different point of views. First, in a couple of papers, Boadway and Pestieau (2018a,b) have argued that to correct the growing wealth inequality the best instrument would be a comprehensive taxation of inheritance and not an annual tax of wealth such as advocated by Piketty and others.

Second, aging entails a double risk, one of a premature death and one of a long and costly dependence. In a series of papers we have tried to deal with the issue of long-term care (LTC) spending leading to spend out all the wealth of a household and thus making it impossible for parents to bequeath anything to their children. In an ideal world, people would buy annuities for their retirement and a LTC insurance; so doing they would put aside a fixed amount for bequests. In the real world, annuities are partial and the LTC insurance market is lacking. Given those constraints, one idea is to finance LTC benefits with a tax on inheritance. This has been analysed by Cremer, Pestieau an Roeder (2016). Another issue is how to prevent people to make inter vivos transfers to their children so that they can benefit from means-tested LTC social assistance. This issue has been studied by Schoenmakers (2018) in his thesis and by Cremer and Pestieau (2016). Our recommendation is that any LTC insurance policy, either private or public, abides to the deductible principle. In other words this means that in case of a too long period of dependence an insurance scheme should refund all the expenses incurred for LTC (Klimaviciute and Pestieau, 2018a, b, c).

Third, Klimaviciute, Onder and Pestieau (forthcoming) and Onder and Pestieau (2016) have analysed the effects of the two main factors of aging, namely the decline of fertility and the increase in longevity, on the level of capital accumulation and on the share of inherited wealth in the total wealth held by households. Their main result is that aging does not explain the increase in the ratio of inherited to total wealth. A possible explanation is the trend towards defined contribution pensions and thus a decline in the annuitization of retirement saving. Dedry, Onder and Pestieau (2017) have analysed the effect of aging on capital accumulation and show that this effect does depend on the importance and the type of benefits or contributions of social security.

Furthermore, in several papers Klimaviciute, Perelman, Pestieau and Schoenmaeckers (2017a,b) have tried to elicit the motives explaining why children provide assistance to their dependent parents. The three motives we consider are exchange, altruism and social norm. We show that the social norm explains part of the caring. This has several important implications regarding the design of LTC social insurance and the importance of intergenerational wealth transmission. If the exchange motive prevails, one expects more inheritance as parents buy assistance from their children in exchange of some bequests. In the same line, Klimaviciute, Pestieau and Schoenmaeckers (2019a, b) show the role of altruism in the design of LTC insurance policy.

4.6. Summary and policy recommendations

At the start of the CRESUS project in 2013 we knew quite a lot about the distribution of market and disposable incomes in Belgium, yet mostly relying on survey data, while we knew hardly anything about the distribution of net wealth. Thanks to the research carried out in the framework of the CRESUS project we now know much more about the distributions of net wealth and intergenerational transfers and of the share of top incomes, based on fiscal data, as well as the extent to which income and wealth go hand in hand. We have used this information to calculate poverty, inequality and redistribution indicators based on the joint distribution of income and wealth, to describe (optimal) wealth taxation from a theoretical and empirical perspective and to analyse the impact of wealth in social policies such as MIP schemes, asset-building policies, public pensions and long-term care provision. Of course several issues remain unresolved and require further research into the matter.

In line with previous research we find that Belgium is somewhat of an exception in cross-country comparisons, in the sense that inequality of income is low and has not increased over the last decades nor the share of the top, while wealth inequality is obviously substantially higher than that of income, compared to other countries with similar levels of median wealth, wealth inequality is also relatively low. Nevertheless, there exists a general sense among the population that inequality and poverty is increasing. The exact reasons why Belgium is such an outlier and why this is not necessarily the prevailing feeling among the population would be an interesting path for further research. This would, however, require more and better data. First, our study of the evolution of top incomes showed that correcting fiscal data is very important to get correct estimates, yet more corrections are needed to arrive at the best possible figures. Second, for several countries such as France, the UK and the US, studies have shown that wealth inequality has increased over the last few decades. Since the HFCS is the only survey that includes information on net wealth representative for the full Belgian population and currently only two survey waves are available, it is not yet possible to say anything about the long-term trends of wealth inequality in Belgium. Finally, given the crowding out effect we found of public pension provisions on private savings, it implies that cross-country comparisons of wealth inequality of only private wealth are not completely correct. Indeed, differences in private wealth inequality may be partially due to differences in pension and social security provisions, but also within countries the comparability of private wealth accumulations may be undermined between covered and non-covered individuals (Bönke et al., 2018). Simulating public wealth for more countries would be a very interesting idea for future research.

The research of the CRESUS project also showed that including wealth information in social indicators of poverty, inequality and redistribution is of high relevance. Our results indicate that there is an important difference in the ranking of households from poor to rich when both income and wealth are accounted for. This implies a different incidence and socio-demographic profile of poverty and vulnerability and as wealth is not as important in all countries its inclusion might have different effects, potentially affecting cross-country poverty rankings. We therefore, recommend to enrich the current set of social indicators used at the European and national level with indicators including information on households' wealth

holdings. Moreover, we showed that existing tax-benefit systems do not yet sufficiently reflect the vulnerabilities we addressed with these indicators; they are mainly focused on reducing income inequalities, while wealth considerations are often still absent. As a result we find that redistribution is much lower when wealth is accounted for such that after tax and transfer inequality is substantially higher. The new set of social indicators including wealth information would then also allow to more properly assess and evaluate the effectiveness of current and proposed policy directions. For future research it would be interesting to look into whether we can extend the set of proposed indicators for static distributions with indicators of social mobility. In order to design proper social and tax policies it is crucial to understand who is poor only at a certain point in their life and who remains chronically poor. Also, in our analyses so far we mainly focused on the positive side of the balance sheet, but low wealth is of course often also the result of debt. In future research, it would be interesting to disentangle the negative effects of debt and which policy action is necessary to address these effects.

The decomposition of the total redistributive effect showed that all tax-benefit instruments are less effective if assessed against the joint distribution of income and wealth. Social benefits are, however, the important exception; they remain a strongly pro-poor instrument when wealth is taken into account is the assessment framework. In other words, social benefits are primarily received by households who are both income and asset poor, which is mainly due to the effect of asset-testing in the awarding of certain benefits such as MIP. Although our analysis of the effects of asset-testing is still preliminary, this hence suggest that this mechanism succeeds in excluding the 'better-off' of the income poor from benefit entitlements. Yet, further research is needed to address how issues such as liquidity need to be dealt with as well as the way in which asset-testing increases complexity in the claiming process and hence potentially increases non-take-up and limits automatized awarding of benefits.

Even though asset-testing might insure that benefits end up with the worst-off, there is still the issue that MIP benefits often lie below the poverty line. Renowned researchers such as Atkinson (2015), Milanovic (2016) and Ackermann & Alstott (1999, 2004) have argued in favour of supplementing existing social provisions with a type of policy that would equalise initial endowments, for instance through a minimum inheritance. In this context we looked into the prospects of supplementing existing social provision with so-called asset-building policies. Our results indicate that such a policy would preferably focus first on the accumulation of liquid asset holdings and that it would costs less than the tax exemptions and credits currently awarded in the tax system for the accumulation of assets (i.e. mortgage interest deduction, credit for private pension savings and the tax free amount of interests on savings accounts). Yet, this consisted of a simple exploration, much more research into this topic is needed in order to derive clear policy recommendations.

Yet, finding a correct balance between asset-testing on the one hand and encouraging asset accumulation among the poor on the other hand might be a difficult trade-off. While the aim of new asset policies would be to encourage the poor to accumulate assets, proper means-testing punishes them for owning such assets. We estimated the potential crowding out effect of another important social provision, public pensions, on private wealth accumulation. Our results are of high relevance in the debate on pension reforms currently going on in Belgium

and many other European countries, especially with regard to the impact that such reforms might have on individuals' welfare. The latest reforms in the Belgian context are heading towards an increase of the mandatory retirement age but also to a reduction of generosity. If our cross-sectional results of the substitution effect between public pensions and private savings hold also for a reduction in public pension benefits, this implies that people would not sufficiently increase their private savings to fully compensate for the loss of welfare induced by reforms. This means that the living standard of future retirees would not be as high as that of current retirees. In order to avoid this negative impact on individuals' welfare, we recommend that reforms affecting individuals' pension rights must be announced several years in advance, such that people will have the opportunity to adjust their wealth accumulation for retirement accordingly. Alternatively one can think of incentive programs towards saving that would compensate the loss of future revenue.

Taking an intergenerational perspective we showed that inherited wealth constitutes the most important share of total wealth. Furthermore, we identified that intergenerational transfer motivations are mainly driven by altruism and family norm reasons, which are argued to matter for the design of an optimal public long-term care policy. Regarding the latter we recommend to introduce the deductible formula in both private and public LTC insurance and to better control the phenomenon of strategic impoverishment that makes middle class households benefit from schemes that are targeted to the poor.

Finally, we also studied the topic of wealth taxation, both from a theoretical and empirical perspective. In contrast to the classic recommendation of the optimal tax literature our results have shown that it is optimal to tax capital income. We argue that it is optimal to tax capital income at a lower rate than labour income, but the difference between the two rates should not be too large. Moreover, the income of all types of assets should be treated equally among others to ensure horizontal equity and to prevent tax avoidance by shifting wealth. This means that also capital gains should be taxed and tax expenditures – which are regressive instruments – should be abolished. Our research indicated that the best way to tax capital income would be through the so-called 'Rate of Return Allowance', in which 'normal' capital income would be exempt from taxation and only excess returns (i.e. the return received as a consequence of risk taking and economic rents) would be subject to the capital income tax. Yet, there may be other reasons why taxes on normal capital income may also be relevant. In line with the OECD (2018) recommendation we argue that if there exist a well-designed tax system combining comprehensive capital income and inheritance & gift taxation, there are only limited reasons to introduce a net wealth tax on top of these. Yet, our empirical analysis looking at the vertical and horizontal equity of currently existing capital income and wealth taxes indicated that such a comprehensive system does not exist today. Indeed, although capital income taxes and the general net wealth taxes of France and Spain are progressively distributed, their size is just too small to achieve any redistribution. This is mainly because effective tax rates are a lot lower than marginal tax rates due to the many tax exemptions, deductions and credits. As a consequence those who live mainly of labour income pay much higher taxes than those living of their net wealth and the capital income it generates. In other words, the current tax system is far from comprehensive and in that context there are arguments to introduce a general net wealth tax, especially in cases where wealth inequality

has reached very high levels (Yunker, 2010). How the complete wealth tax system should like in practice remains subject for further research (then also the effects of corporate income taxation should be accounted for). However, it is clear that in order to be able to tax wealth efficiently and fairly we recommend the introduction of a wealth register. Together with the international advancements on the automatic exchange of information this will also make it easier to detect tax evasion and avoidance. The proceeds of increased or new capital or wealth taxes could then be used to finance the proposals mentioned before for e.g. asset-building policies or a LTC social insurance scheme.

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5. DISSEMINATION AND VALORISATION

The topic of wealth and especially its taxation has not only received increased interest in academia, but it has also been the subject of fierce policy debates. The main aim of the CRESUS project was therefore to carry out analyses which are also able to better inform public actors. Throughout the project duration we have shared our findings among both academic and policy circles as well as the wider public. We have attended and presented on numerous academic national and international conferences, workshops, seminars, etc. We have also organised two events ourselves in the framework of the project, which were open to all interested persons: a mid-term workshop in June 2016 and a final conference in November 2019. Based on their work carried out for the CRESUS project three persons were able to defend their PhD, one person at each of the partner institutions: Kevin Spiritus at the KU Leuven (2017), Sarah Kuypers at the University of Antwerp (2018) and Jerôme Schoenmaeckers at the University of Liège (2018). As the list below shows the results of our project have also been published in many renowned peer-reviewed journals as well as publications to the wider public (in Dutch).

6. PUBLICATIONS

6.1. Peer-reviewed publications

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6.2. Working papers

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6.3. PhD theses

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6.4. Publications to the general public

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7. ACKNOWLEDGEMENTS

The researchers involved in the CRESUS project would like to express their gratitude to the members of the follow-up committee for their valuable comments and inputs; Philip Du Caju (Nationale Bank van België), Christian Valenduc (FOD Financiën), Karel Van den Bosch (Federaal Plan Bureau), Philip Neyt (Belgische Vereniging van Pensioeninstellingen), Chris Serroyen (Studiedienst ACV), Axel Mathot (Studiedienst SERV), Siska Vandecandelaere (Centrale Raad voor het Bedrijfsleven), Jef Vuchelen (VUB), Luc Arrondel (Paris School of Economics), Virginie Vaes (FOD Werkgelegenheid, Arbeid en Sociaal Overleg), Frédéric Poupinel (FOD Werkgelegenheid, Arbeid en Sociaal Overleg), Josee Goris (POD Maatschappelijke Integratie), Pol Gerits (FOD Volksgezondheid), Marielle Smeets (FOD Volksgezondheid). We also would like to thank the guest speakers and participants of the events of the project, namely the mid-term workshop in June 2016 and the final conference in November 2019. In particular we are indebted to Philip Vermeulen (ECB), Daniel Waldenström (Research Institute of Industrial Economics), Luc Arrondel (Paris School of Economics), Michael Förster (OECD) and Erik Schokkaert (KU Leuven) and Bea Cantillon (CSB, UA). We acknowledge that the information described and views expressed in this project and report are those of the authors only.