

International Social Security Review

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- ▶ An actuarial balance sheet of the Swiss old-age pension scheme
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Linking taxation and social protection: Evidence on redistribution and poverty reduction in Ethiopia

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Abstract Although redistribution results from the simultaneous effects of taxes and transfers, analyses of their distributional effects in low-income countries have largely been undertaken from singular perspectives. This article jointly assesses the distributional effect of taxes and transfers (through social protection) using Ethiopia as a case study. We find that Ethiopia's flagship social protection programme is more effective than income taxation in achieving poverty reduction, while neither policy achieves a sizeable reduction in overall inequality. We also find that Ethiopia does not currently have the capacity to close the poverty gap or to fully fund its main safety net programme using domestic income sources alone.

Keywords social protection, income redistribution, taxation, poverty, Ethiopia

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Introduction

The need to jointly assess taxes and transfers to understand the distributional effects of social policy has long been recognized in high-income countries. Welfare state typologies, such as that of Bradley et al. (2003), are grounded in the understanding that policy can reshape poverty and inequality through the combination of spending and revenue collection. Studies suggest that redistributive impacts are substantial; a comparative study across 28 Member countries of the Organisation for Economic Co-operation and Development (OECD) finds that welfare systems reduce inequality by 35 per cent on average (Wang, Caminada and Goudswaard, 2012). Such findings are of particular pertinence in the context of large and growing income discrepancies in many OECD countries against a backdrop of shrinking welfare states and social spending (Adema, Fron and Ladaique, 2014).

The distributional effects of tax policy and social protection¹ in low-income countries have for the most part been studied separately. An expanding evidence base speaks to the effectiveness of social protection, and particularly cash transfers, to tackle poverty and inequality (Cornia and Martorano, 2012; Roelen, Sabates-Wheeler and Devereux, 2016). In these countries, taxation is seen as less effective due to large informal economies and a heavy reliance on indirect taxes that are often only mildly progressive or even regressive (Muñoz and Cho, 2003; Bird and Zolt, 2005; Emran and Stiglitz, 2005; Bastagli, 2015). Moreover, there is mounting evidence from the African continent showing that tax systems that are proportional or progressive on paper may still be regressive in practice (Mascagni and Mengistu, 2016; Mascagni, Monkam and Nell, 2016). The common policy prescription is therefore that taxation should mostly focus on generating revenue for social spending (Bird and Zolt, 2005).

The evidence on the joint distributional effect of tax and social protection in low-income countries remains limited – although some progress has recently been made using the Commitment to Equity methodology (Lustig and Higgins, 2013).² There is

1. In the remainder of this article, the term “social protection” is used to denote the spending or transfer element of welfare systems.

2. The Commitment to Equity (CEQ) methodology takes a more comprehensive view of the fiscal system and has been used to analyse the redistributive effect of taxation and social spending in various countries (Lustig and Higgins, 2013). For example, Inchauste et al. (2015) find taxes and transfers to be progressive in South Africa, reducing inequality by 0.14 units (or 14 percentage points) in 2010/11. Similar impacts are found in Argentina, with the Gini coefficient reducing by 0.12 units (or 12 percentage points) after taking into account indirect subsidies, taxes and in-kind transfers (Lustig et al., 2012). By contrast, while cash transfers in Bolivia and Brazil were found to significantly reduce poverty, the regressivity of consumption taxes offset any distributional impact (Lustig, Pessino and Scott, 2014). Based on the same method, a recent World Bank study shows that in Ethiopia the combination of taxes and transfers reduces the Gini coefficient only by 0.02 units (or 2 percentage points) (World Bank, 2015a).

expanding acknowledgement of the importance of joint assessments of tax policy and social protection to understand the overall progressivity of public policies and the extent to which they contribute to reductions in poverty and inequality in middle- and low-income countries (Engel, Galetovic and Raddatz, 1999; Bird and Zolt, 2005; IMF, 2011). A first reason for this is that both social protection and taxation have redistributive effects, as denoted above. A second reason pertains to concerns regarding social protection's need for a stable resource base, particularly in light of efforts to scale up social protection programmes and systems (Devereux, Roelen and Ulrichs, 2015). The Sustainable Development Goals look to address this concern, with target 1.3 calling for the implementation of nationally appropriate social protection systems by 2030 and target 17.1 highlighting the need to strengthen domestic resource mobilization (UN, 2015). Tax revenue is already one of the most important revenue bases for social protection (Bastagli, 2015). It is also the only source of financing that would make these programmes viable in the context of long-term independence from foreign aid (Niño-Zarazúa et al., 2012). However, most low-income countries often do not have the capacity to fund their own development programmes, most notably for the eradication of poverty, with income from taxation alone (Ravallion, 2010).

Against this background, this article attempts to contribute to the literature in two ways. First, we analyse and compare the effectiveness of income taxes and social protection on redistribution and poverty reduction in Ethiopia. Using a static microsimulation model, we evaluate both current and reformed policies. Second, building on Ravallion (2010), we assess the potential and limitations of taxation as a sustainable source of funding for poverty reduction, through and beyond social protection. By doing this, we aim to establish a link between taxation and social protection that we believe is still largely under-researched in the literature.

Ethiopia offers an interesting case study. First, it is a low-income country that has experienced fast economic growth – annual GDP growth averaging 10 per cent over the last decade (World Bank, 2015b). This growth was led by a strong performance of the agricultural sector and, as a result, poverty rates declined rapidly, though, in absolute terms, still remain high (World Bank 2015b). Moreover, while income inequality has remained low (World Bank, 2015b), the ongoing structural transformation of the economy (Martins, 2014; World Bank, 2015b) is expected to widen the income distribution in the country (Seid, Taffesse and Ali, 2015). Therefore, redistribution is likely to have an important role in the future if Ethiopia is to maintain its track record in reducing poverty. Our analysis focuses on two policy tools in Ethiopia: personal income taxation and the Productive Safety Net Programme (PSNP) – among the largest social protection schemes in sub-Saharan Africa (Slater and McCord, 2013).

The structure of the remainder of the article is as follows. The next section describes the current state of income taxation and social protection in Ethiopia.

We then describe the data and methods before presenting the results and concluding observations.

Background

Income taxation in Ethiopia

In Ethiopia, direct taxes represent 35 per cent of total tax collections and personal income taxes contribute a third of that share, or about 11 per cent of total revenue (see Table A1 in the Appendix). Wage earners and the “self-employed”³ are subject to personal income taxes. This article focuses on personal income taxation for two reasons. First, income taxes are a key tax policy tool to address equity and redistribution. Income taxes are more progressive than indirect taxes by design, because the rate at which they are levied increases with income. The second reason to focus on income taxation stems from the adoption of a new law in July 2016, which makes it timely to assess its likely effects on progressivity and redistribution. The pre-2016 income tax system was based on laws from 2002 (Proclamation 286/2002 and Regulation 28/2002), which had been updated only marginally since then. Over the years, the thresholds for personal income tax, applicable both on wage earners and the self-employed,⁴ have been dramatically eroded by inflation – an effect known as *bracket creep*.⁵ These thresholds should have increased five-fold to retain the real value they had in 2002. Most strikingly, the pre-2016 exempt threshold of 1,800 Ethiopian birr (ETB) was well below the poverty line⁶ and the lowest government wage. The pre-2016 progressive income tax structure is summarized in Table 1.

Responding to increasing concerns about the equity and appropriateness of the previous income tax structure, the government adopted a new income tax law in July 2016. Among other provisions,⁷ the new law dramatically increased all income tax thresholds (see Table 2). The exempt threshold increased four-fold

3. Note that the “self-employed” include individual businesses, such as sole proprietorships, that can be large firms even if they are not incorporated.

4. Corporate businesses are subject to a flat 30 per cent tax rate and taxes on other types of income (e.g. from interest payments or capital gains) are also subject to flat rates.

5. In other words, bracket creep refers to the process whereby inflation causes earnings to rise and enter higher tax brackets.

6. The Ethiopian national poverty line was estimated at 3,781 birr (ETB) in 2010/11 (MoFED, 2013). Due to high inflation over the last years, the current poverty line adjusted for inflation would be considerably higher. In 2017, ETB 1,000 = USD 42.50 approx.

7. The new income tax proclamation represents a broad modernization of the income tax system, with more detailed provisions on international taxation, changes in loss carry-forward provisions and reporting requirements, amongst several other innovations. In addition, the income tax proclamation was issued along with a tax administration proclamation.

Table 1. *Progressive tax structure (2002 laws)*

Bracket	From (in ETB)	To (in ETB)	Rate
0	0	1,800	Exempted
1	1,801	7,800	10%
2	7,801	16,800	15%
3	16,801	28,200	20%
4	28,201	42,600	25%
5	42,601	60,000	30%
6	Over 60,000		35%

Note: Thresholds of yearly income.

Source: Proclamation 286 of 2002.

Table 2. *Progressive tax structure (2016 reform)*

Bracket	From (in ETB)	To (in ETB)	Rate
0	0	7,000	Exempted
1	7,001	19,300	10%
2	19,301	37,750	15%
3	37,751	62,350	20%
4	62,351	93,100	25%
5	93,101	130,000	30%
6	Over 130,000		35%

Note: Thresholds of yearly income.

Source: Draft Proclamation of 2016.

and it is now well above the poverty line. Other thresholds also increased substantially, but proportionally less. By doing this, the reform aimed to relieve the poorest from paying income tax and generally to decrease the tax burden for all, especially those on lower incomes. Moreover, it may also improve the perceived equity of the system, thus potentially encouraging compliance. Despite its important merits, it is worth noting that the 2016 reform fell short of substantially simplifying the income tax system, which still presents a more complex structure than that of other similar countries, such as Kenya, Rwanda, Uganda or the United Republic of Tanzania.

Productive Safety Net Programme in Ethiopia

Ethiopia's social protection efforts form a core part of the country's response to food insecurity, poverty and vulnerability. The country's national social protection policy indicates that, although Ethiopia does not operate a comprehensive and integrated system, it does implement many social protection interventions. These cover social insurance programmes (pensions), access to basic social services (fee waivers), the national nutrition programme and the Food Security Programme (MoLSA, 2012). The latter includes the Productive Safety Net Programme (PSNP), the cornerstone of social protection in Ethiopia. The programme has been in place for a decade and is one of the largest social protection interventions in sub-Saharan Africa (Slater and McCord, 2013).

The Government of Ethiopia started the implementation of the PSNP in 2005 with the support of international donors. The programme was developed in response to widespread food insecurity and a continual need for emergency food relief to provide food insecure households with a transfer in lean times to avoid asset depletion and to protect livelihoods (Slater and McCord, 2013). The two main components are a public works programme for households with labour capacity and a direct support element that provides direct cash or food transfers to households without labour capacity. Since its inception, the programme has expanded widely, undergone a number of reforms and been subject to rigorous mixed methods programme evaluations (Van Domelen and Coll-Black, 2010). Currently, the programme operates in chronically food insecure districts (*woredas*) in six regions: Afar; Amhara; Oromia; Somali; Southern Nations, Nationalities and Peoples' Region; and Tigray. The *woreda* administrators have a certain quota of PSNP beneficiaries and, based on this quota, they select the sub-districts (*kebeles*) to be part of the programme. Within the selected *kebeles*, community-based targeting is applied: the community selects eligible households to participate in public works or receive direct support.

The redistributive impacts of social protection programmes such as the PSNP depend on two aspects: targeting and the impact on beneficiaries. The PSNP meets these two criteria. First, a number of different studies of the PSNP's implementation process indicate that the targeting is accurate (e.g. Coll-Black et al., 2012; Berhane et al., 2013), meaning that transfers are generally received by households with fewer assets and with a higher risk of experiencing food insecurity in areas in which the PSNP operates. The World Bank (2015a) estimates that 66 per cent of direct transfers are concentrated in the bottom 40 per cent of the income distribution.

Second, impact evaluations show that the programme has reduced household food insecurity and the distress sale of assets and increased household expenditures and uptake of agricultural inputs (Hoddinott et al., 2012; Berhane et al., 2014).

Moreover, using panel data estimation techniques, census data and multiple rounds of nationally representative household data for Ethiopia, Vargas Hill and Tsehaye (2014) estimate that since its implementation in 2005 the PSNP has reduced poverty by 0.5 percentage points each year. We are not aware of studies that look at the PSNP's impact on overall inequality in the country.

Data and methods

We construct a static microsimulation model to analyse the redistributive effects of income taxation and social protection in Ethiopia. The model has at least two limitations. First, it only simulates changes in personal income taxation (specifically, employment and self-employment incomes) and the PSNP. We do not vary any other tax or subsidy, therefore we assume that they remain unchanged while our policies of interest are adjusted. A more comprehensive incidence analysis of the whole fiscal system of Ethiopia can be found in World Bank (2015a). Second, our simple model does not incorporate behavioural responses to changes in tax or social protection policies.⁸ For example, decreased effective tax rates might lead to less tax evasion. Similarly, the removal of social protection benefits from households may encourage them to seek alternative income sources. Our model does not capture such second-round effects and incorporating them is not within the scope of this study.

Total income comprises seven components: agricultural and non-agricultural wages, crop income, livestock income, income from self-employment, transfers and other income (e.g. incomes received from land and non-land assets). The tax reform simulations apply taxes on non-agricultural wages and incomes from self-employment. We computed again the total incomes using net wages and net incomes from self-employment, together with the other non-adjusted income components. The final step consists of again computing the inequality and poverty measures using this new income aggregate. In what follows, we use the three different scenarios described in the section on income taxation in Ethiopia (above): base scenario (gross incomes), pre-2016 reform scenario and 2016 reform scenario. Since the survey (described below) does not allow us to distinguish between formal and informal incomes, the tax system is applied to all – with the implicit assumption of zero evasion. However, we do not apply taxes to agricultural wages, assuming that they would, either legally or illegally, be largely untaxed.

The social protection simulations follow a similar idea. We identified the PSNP beneficiaries in the data using information about transfers that the households reported to have received. We first calculate the total income that each

8. Micro-simulation models that do not consider behavioural responses of the economic agents are sometimes called arithmetical models in the literature (see Bourguignon and Spadaro, 2006).

household receives from PSNP (either through public works or through direct support). These incomes are then deducted from household total incomes. We then compute again the inequality and poverty measures using this income net of PSNP.⁹ Finally, we also consider another scenario in which all PSNP funds captured in the survey are distributed equally among the poor (i.e. those whose household income falls under the poverty line) in the country.¹⁰

Table 3 summarizes the different simulation scenarios regarding the adjustments on different income components.

Our data come from the Ethiopian Socioeconomic Survey (ESS). ESS is a longitudinal survey conducted by the Central Statistics Agency of Ethiopia (CSA) and the World Bank Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS–ISA) team (CSA and World Bank, 2013 and 2015). We use the second round (2013–14) of this panel survey that covered 5,469 households from all 11 administrative regions. The survey has a number of features that make it particularly suited for our task. First, the survey includes detailed income modules that attempt to measure household incomes as accurately as possible. Second, the dataset provides information about the social protection benefits that households receive. Finally, the survey is nationally representative, covering both rural and urban areas of the country.

The usual caveats common to any household survey data apply. First, measuring income in a context where a large part of the (agricultural) production is based on subsistence farming is difficult and subject to a large margin of error (Deaton, 1997, pp. 29–32). In addition, household surveys have a tendency to underestimate incomes and to miss altogether top income earners in the society (Atkinson, Piketty and Saez, 2011). Due to these factors, there may be considerable error in measuring incomes. These are serious concerns that make the use of income data less appealing also in our application. It is for these reasons that most low-income countries, including Ethiopia, rely on consumption data for their poverty and inequality estimates.

In our case, the challenge of using consumption data is that the tax simulations require applying taxes on different income components. We attempt to solve this issue in the following way. First, we estimate the share of household total income coming from the different income sources listed in Table 3. Second, we multiply

9. It should be noted that the overall goal of the PSNP is to reduce food insecurity in the country, not poverty reduction – although these two often go hand in hand.

10. This is done in steps. In the first step, we calculate the total PSNP receipts estimated from the survey data (i.e. the total PSNP transfers received by all households in the sample). In the second step, we calculate the number of poor people in our sample. In the third step, we calculate the amount in Ethiopian birr (ETB) as if the total PSNP transfers were distributed equally to all poor people; we divide the total PSNP receipts in the data by the number of poor people. In the final step, we add this amount to the pre-transfer income of all poor people in the sample.

Table 3. *Description of the simulation scenarios*

Income component / Scenario	Base	Pre-2016 tax	Post-2016 tax	No PSNP	Re-targeted PSNP
Agricultural wages	X	X	X	(3)	(4)
Non-agricultural wages	X	(1)	(2)	X	X
Crop income	X	X	X	X	X
Livestock income	X	X	X	X	X
Income from self-employment	X	(1)	(2)	X	X
Transfers	X	X	X	(3)	(4)
Other income	X	X	X	X	X

Notes: X = As estimated from the survey. (1) = Net of taxes (pre-2016 scheme). (2) = Net of taxes (post-2016 scheme). (3) = Net of direct support and public works payments. (4) =PSNP redistributed equally among those who fall below the poverty line.

Source: Developed from CSA and World Bank (2013 and 2015).

these shares by the household's total consumption dividing the household consumption into the seven components. Finally, we apply taxes on the wage and self-employment components before re-constructing the total household consumption variable.¹¹

Our consumption variable is based on the consumption aggregate constructed by the LSMS–ISA team (for more details about the construction, see CSA and World Bank, 2013). For income, we utilize the income aggregates constructed by the Rural Income Generating Activities (RIGA) project – a collaboration between the Food and Agriculture Organization of the United Nations (FAO), the World Bank and American University in Washington, DC.¹² All income and consumption values are expressed in annual and in per adult equivalent terms. Table A2 in the Appendix provides the summary statistics for the different income components based on the consumption and income data.

We measure the redistributive effects using the Gini coefficient and different poverty indices. The Gini coefficient computes the difference between all available income pairs in the data and calculates the total of all absolute differences. This total is then normalized by dividing it by population squared

11. Note that, by doing this, we might overestimate the total tax payments for those households that have more than one wage earner and/or one self-employed person. By taxing those incomes at the household level as a sum, rather than separately, we apply a higher marginal rate and only one exempt threshold. However, the majority of households in our data have only one wage earner and/or one self-employed person.

12. See Quiñones et al. (2009). FAO (2016) provides a comprehensive description of the methodology used to construct the different income components and the aggregate income measure.

times mean income. The Gini coefficient ranges between 0 and 1, where 0 means perfect equality (all individuals earn the same) and 1 refers to maximum inequality (1 person earns all income).

The disadvantage of the Gini coefficient is that it only measures overall inequality in the country. Policy-makers in low-income countries are often more interested in the poorest segment of the society. This motivates us to also simulate impacts on poverty. For this, we use the Foster, Greer and Thorbecke (1984) class of poverty measures; namely, the poverty headcount index, the poverty gap index and the poverty severity index. Poverty headcount (P0) captures the fraction of individuals that fall below the poverty line. The poverty gap index (P1) measures the aggregate poverty deficit of the poor relative to the poverty line as a proportion of the total population. Finally, the poverty severity index (P2) captures the (squared) proportional shortfall from the poverty line. The key to this exercise is how the poverty line is defined.¹³ This is somewhat problematic because the ESS survey was not designed originally to accurately measure poverty in the country.¹⁴ We solve this issue by calibrating our poverty line so that the poverty headcount in the data matches the official estimate (MoFED, 2012): 30 per cent.¹⁵

Results

Table 4 provides the results based on the consumption data, while we present those based on income data in the Appendix (Table A3). Each Gini coefficient and poverty estimate is reported as a variation with respect to the base scenario – that is before taxes and after social protection payments. Column 1 of Table 4 shows the estimated impacts of the pre-2016 tax scheme. Of the population under this scheme, about 27 per cent (19 per cent of the rural population and 80 per cent of the urban population) is subject to income tax.

According to our estimates, the previous tax scheme had little redistributive impact: the Gini coefficient falls by 0.016 points, but poverty does not decrease. In contrast, the headcount poverty rate is estimated to increase by one percentage point. This is a sizeable increase in poverty, which is likely due to outdated thresholds. Under the previous system, the exempt threshold was ETB 1,600 (annual income), which is well below both the official and our

13. The calculation of the official poverty line in Ethiopia is based on the cost of basic needs method and takes into account both food and non-food requirements (MoFED, 2012).

14. Household Consumption Expenditure Survey (HCES) serves as the official source for poverty statistics in the country. The consumption modules in the HCES are much more extensive than in ESS. As a result, the total consumption values may not be entirely comparable.

15. More specifically, this calibration is done by sorting the population by consumption (or income) and selecting the consumption (income) level capturing the 30th percentile in the (weighted) sample as the poverty line. This automatically yields a poverty headcount rate of 30 per cent.

Table 4. *The estimated impacts under each scenario with respect to the base scenario using consumption data*

	(1)	(2)	(3)	(4)
	Pre-2016 tax	2016 scheme	No PSNP	Re-targeted PSNP
Gini coefficient	-0.016	-0.013	0.003	-0.004
Poverty estimates:				
Headcount	1.0 %p	0.2 %p	0.9 %p	-1.4 %p
Poverty gap	0.3 %p	0.1 %p	0.4 %p	-0.6 %p
Poverty severity	0.1 %p	0.0 %p	0.3 %p	-0.4 %p

Note: %p refers to percentage point.

Source: Authors' calculations based on the ESS-LSMS 2013/14 survey.

calibrated poverty line. This means that the poor were still liable to pay income taxes – a result consistent with the findings of the fiscal incidence analysis of the World Bank (2015a). That World Bank study shows that, although income taxes are more progressive than indirect taxes, one in ten households is impoverished because of the combined effect of taxation and the benefit system. In those households, taxes are larger than benefits, therefore pushing them into poverty or making those who are already poor, even poorer (World Bank, 2015a). Higgins and Lustig (2016) document similar fiscal impoverishment in several other low-income countries.

Column 2 of Table 4 reports the estimated impacts of the July 2016 income tax scheme. According to our survey data, nearly 18 per cent of the population (11 per cent of the rural and 74 per cent of the urban) is subject to income tax under this scheme. This is a considerable decrease in the number of taxpayers, from 27 per cent under the pre-2016 scenario. This reduction is mostly due to the four-fold increase in the exempt threshold, which resulted in relieving the poorest from paying any income tax. Similar to the previous scheme, this scenario also yields negligible redistributive effects in terms of change in the Gini coefficient. The adjustment in the first tax bracket means that we no longer see such a drastic increase in the poverty headcount rate as under the previous scheme. Therefore, it seems that the reform successfully corrected the distortions of the previous system and re-aligned income taxation with the broad policy objective of poverty reduction.

The attention now shifts to the social protection analysis. About 10 per cent of the population receive PSNP benefits in our data.¹⁶ Column 3 of Table 4 shows the

16. This is close to official figures, according to which 8.29 million individuals (out of the total population of 89 million) benefitted from PSNP in 2014 (World Bank, 2016).

estimated effect of removing the PSNP on overall inequality and poverty. Our results suggest that the PSNP has considerable effect on poverty, reducing it by 0.9 percentage points.¹⁷ This figure, taken together with the tax simulation, implies that the poverty reducing effect of the PSNP was essentially cancelled out by the pre-2016 tax system that increased poverty by a similar amount. However, our simulations show that the programme results in there being no change in the Gini coefficient.

The last column of Table 4 reports the estimates based on a scenario in which all PSNP funds are distributed equally among those who fall below the poverty line. This hypothetical redistribution makes two changes with respect to the PSNP, as currently implemented in Ethiopia. First, by keeping the total PSNP funds fixed but re-assigning all funds to the poorest, we assume perfect targeting based on income. Although the PSNP has performed well in terms of targeting, its limited geographical coverage means that many poor households are not covered by the programme (World Bank, 2015a). As a result, our hypothetical redistribution involves re-channelling PSNP funds also to the districts where it is not currently operational. This perfect re-targeting of the PSNP suggests considerable poverty impacts, as the programme now reaches the poor regardless of their location. Indeed, according to our model estimates, the re-allocated PSNP results in a fall of the headcount poverty rate by 1.4 percentage points, a larger change than the current programme (see Table 4, Column 3). However, the estimated change in overall inequality (Gini coefficient) remains small. This is possibly due both to the relatively small per capita amounts involved in the programme and to a relatively small number of beneficiaries that can be reached based on current financing.

Finally, using income instead of consumption data yields qualitatively very similar results (see Table A3 in the Appendix), thus confirming the robustness of our findings.

Ethiopia's capacity for redistribution and poverty reduction through income taxation

Our simulation results suggest that taxation post-2016 has no impact on poverty, while it actually had adverse effects pre-2016. By contrast, social protection holds more promise in terms of poverty reduction. Still, taxation has an important role in two respects. First, the tax system must remain up-to-date, to avoid adverse

17. Of note is that this estimate is somewhat higher than the one by Vargas Hill and Tsehaye (2014), according to which since its implementation in 2005 the PSNP has reduced poverty by 0.5 percentage points per year.

effects similar to those resulting from bracket creep under the pre-2016 system. Second, it is an important source of revenue for social protection, both currently and potentially. This leads us to wonder whether the current tax scheme would be able, in theory, to generate enough revenues to finance PSNP without donor support. This section attempts to respond to this question. Moreover, following Ravallion (2010), we also assess Ethiopia's capacity to completely close the poverty gap through taxation.

The PSNP budget was ETB 3.9 billion¹⁸ in 2013/14; the year of our analysis. Donors currently almost exclusively finance the PSNP (99 per cent), with a small contribution from domestic revenues. This PSNP budget compares with total domestic revenue of about ETB 106 billion in the government budget for the same year.¹⁹ Therefore, if the PSNP were fully funded through domestic revenue, it would absorb 3.7 per cent of such budgeted revenue. The government budget has increased rapidly in recent years, with an approved budget for the fiscal year 2016/17 of over ETB 274 billion. Although full domestic financing of the PSNP would certainly require a substantial additional expense and re-allocations across expenditures, it may not seem completely unrealistic. However, a more accurate assessment requires closer consideration of the revenue generating capacity of specific tax types, which we provide next.

To assess the distributive capacity of Ethiopia, we follow the method proposed by Ravallion (2010). Essentially, he asks whether countries that are currently aid recipients would have enough capacity for redistribution to tackle poverty entirely through domestic redistribution – quite aside from whether they would have the political will to do so. The measure for redistribution capacity is the marginal tax rate that would need to be applied to the rich²⁰ to obtain sufficient revenue to either close the poverty gap or finance a basic income scheme. If the necessary marginal rate were to be too high, then that country would not have enough capacity for redistribution without aid. Clearly, there is no clear threshold for “too high”, but most high-income countries apply top marginal rates well below 60 per cent. Ravallion (2010) shows that in most low-income countries the marginal rate to cover even half of the poverty gap would indeed be prohibitive, while it may be more feasible in middle-income countries.

We build on Ravallion's method, but depart from it to adapt it to the Ethiopian context and make it more relevant to policy-makers in the country. In terms of

18. The total annual PSNP expenditure according to the government budget (2006 fiscal year in the Ethiopian calendar – 2013/14 in Gregorian calendar) is ETB 3,906,449,780. Total annual PSNP flows (public works plus direct support payments) estimated from the ESS data are ETB 2,371,180,798.

19. Total domestic revenue includes tax and non-tax revenue, but excludes foreign loans and grants. In the budget proclamation for Ethiopian fiscal year 2006, it totaled ETB 105,919,265,400.

20. The “rich” in Ravallion (2010) are defined as those who would not be considered poor by rich countries' standards.

revenue needs, we consider both poverty eradication and the current PSNP financing. Moreover, we evaluate Ethiopia's capacity for redistribution based on incremental changes to the current tax system (post-2016), with two implications. First, although we adjust the top rate, incomes under the top threshold are still taxed according to the post-2016 schedule. As a result, the overall tax burden in our case is higher than in Ravallion (2010). Second, we only consider additional revenue compared to the post-2016 reform, rather than to the total tax take. In other words, only additional revenues stemming from the increase in the top tax rate are considered to be available for funding the PSNP or for closing the poverty gap.²¹ We think this is more realistic and policy-relevant, since the government would still have to fund all other existing commitments in the budget, in addition to the transfer needed for the PSNP or for eliminating poverty.

We begin by calculating the necessary amount of revenue that would be required to close the poverty gap, as we already know the total PSNP budget (ETB 3.9 billion). Based on our consumption data and our calibrated poverty line, we calculate the cost of eliminating poverty as follows. We first multiply the poverty gap index by the poverty line, thus obtaining the per capita average gap in monetary terms. This number is then multiplied by the number of people in Ethiopia. This yields a total cost for eliminating poverty of about ETB 24.6 billion.²²

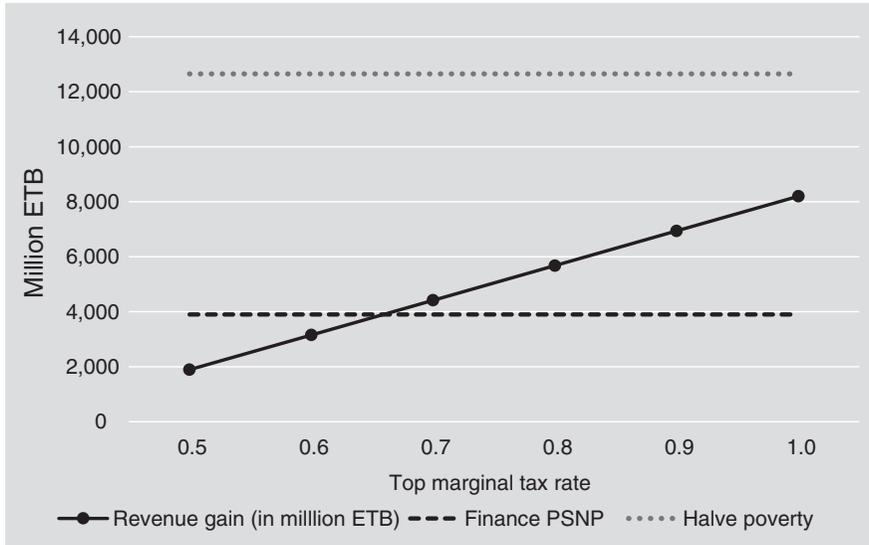
We then assess whether there would be a feasible top marginal rate to cover the poverty gap (ETB 25.3 billion) and the PSNP budget (ETB 3.9 billion) in Ethiopia. Using the survey data and our simple microsimulation model, we estimate the revenue gains that would be obtained by applying various top marginal rates to the higher bracket in the post-2016 tax system (above ETB 130,000).²³ Figure 1 shows the revenue gains resulting from increasing the top marginal rate above the current 35 per cent, calculated as additional revenue from the post-2016 scenario. However, in doing this, we are abstracting from the cost of the

21. The alternative would be to consider total income tax revenue as the available amount, including the tax that was already collected before the rise in the marginal tax rate and the additional revenue coming from this hypothetical policy change.

22. The per capita cost of eliminating poverty is calculated based on our consumption variable. The total cost is obtained as: Poverty Gap Index * Poverty line * Total population = ETB 25,301,477,020. The equivalent figure based on income data is ETB 24,589,709,884 (see Table A3 in the Appendix for full results using income).

23. As noted elsewhere in this article, this exercise comes with at least two caveats. First, we make the unrealistic assumption of the absence of an informal economy and no tax evasion. This would result in overestimating the revenue gains. Second, since the survey misses the rich and generally underestimates incomes, the revenue gains may be underestimated. These two caveats operate in different directions so it is hard to know how the real picture differs from the simulations. For this reason, this is not a prediction of what would happen by increasing the top rate, but rather a discussion on hypothetical capacity to fund redistribution domestically, under assumptions that we fully recognize as unrealistic.

Figure 1. Top marginal rate needed to eliminate poverty or fund the PSNP



Note: The revenue gains in this figure are calculated based on our consumption variable.

Source: Authors' calculations based on the ESS-LSMS 2013/14 survey.

2016 reform that, by decreasing the effective tax rate on everyone, generates some revenue losses – which may, however, be counterbalanced by behavioural responses.²⁴

Figure 1 shows that, based on consumption data, Ethiopia could cover the cost of the PSNP by applying a top rate slightly below 70 per cent on incomes above ETB 130,000.²⁵ We do not consider this achievable: such high tax rates would almost certainly be politically unfeasible and lead probably to considerable tax evasion. In turn, covering the poverty gap is impossible, as even halving poverty would require a top rate well above 100 per cent. If we use income data as an alternative for this analysis, no top rate would be sufficient to generate sufficient revenue for either target (see Figure A1 in the Appendix).²⁶ We therefore conclude that Ethiopia does not currently have the capacity to fund poverty eradication or

24. Behavioral responses to a decrease in the effective tax burden would increase tax revenue, through lower evasion and avoidance.

25. ETB 130,000 correspond to PPP USD 18,665, based on the World Bank PPP conversion factor tables available at <data.worldbank.org/indicator/PA.NUS.PPP>. Therefore: 18,665 / 365 = ETB 51 per day.

26. While with consumption the two targets were hypothetically achievable with a 70 and 90 per cent top rate, using income there is no feasible top rate. This difference in the consumption (Figure 1) and income (Figure A1) results are likely due to under-reporting of income in the survey data, especially at the top part of the income distribution (see the discussion in Data and methods).

the PSNP with income taxation alone. This is consistent with the broader result for low-income countries presented by Ravallion (2010).

Finally, it is worth noting that increases in tax revenue do not necessarily need to come from higher marginal rates on wages and the self-employed. Taxpayers in these two categories still represent a relatively small share of the labour force in many low-income countries that typically rely much less on personal income taxes than high-income countries. There are other taxes whose potential is still untapped. A notable example is property taxation, as real estate remain largely untaxed in many low-income countries, including in Ethiopia (Goodfellow, 2015). However, they are an important way to generate income and store wealth, particularly in countries with limited financial development.

Concluding discussion

This article seeks to address two related questions. First, we consider the comparative effectiveness of income taxation and social protection in addressing poverty and inequality in Ethiopia. We find that currently the PSNP is more effective than income taxation in achieving poverty reduction, while neither policy achieves any sizeable reduction in overall inequality (measured through the Gini coefficient). Overall, our findings provide support to the common belief that social spending is more suitable than taxation to achieve redistribution. However, our results present a more nuanced picture that partly challenges this common belief. By analyzing the pre-2016 tax system, we show that income taxation can actually have substantial adverse effects on poverty. In Ethiopia, this resulted from the combined effect of high inflation and a lack of revision of tax thresholds for 14 years, which led to a gradual and sustained increase in effective tax rates without corresponding increases in real income. This adverse effect, pre-2016, completely cancelled out the poverty reduction effect of the PSNP. Therefore, while our analysis reinforces the importance of social protection, it also shows that taxation can have a direct redistributive effect, not necessarily positive, in addition to being a key generator of domestic revenue.

Second, we asked whether Ethiopia would have the capacity to achieve the desired level of redistribution by applying higher marginal rates on relatively high incomes. Building on the method used by Ravallion (2010), we argue that Ethiopia does not currently have the capacity to close the poverty gap or fund the PSNP using domestic redistribution alone. Although some of our calculations would suggest that a top tax rate of 70 per cent could generate enough revenue to fund the PSNP, we argue that this top tax rate is unfeasible in practice. Indeed, the highest income tax rate observed in Africa is 60 per cent (Chad and Côte d'Ivoire), with most other countries standing between 30 per cent and 40 per cent.

This study has some important limitations. First, although we use alternative measures of income from our survey, we are aware of their limitations. Nonetheless, we believe these data represent a sufficiently accurate representation of reality for our purposes. However, the analysis presented here should be taken more as a conceptual exercise, rather than generating specific and actionable policy recommendations. The second limitation lies in the simplicity of our microsimulation model, which only considers two specific policies, rather than the fiscal system as a whole, and excludes behavioural and second round effects. Therefore, the estimated changes in inequality or poverty rates should not be interpreted as representing causal effects of changing tax or social protection policies. Finally, since we do not have information on whether incomes are formal or informal, we have to make the assumption of the absence of evasion as well as the informal economy. We fully recognize that this assumption is unrealistic, in a context such as Ethiopia where the informal economy is estimated to represent over 35 per cent of national economic activity (Schneider and Williams, 2013). However, by looking at variations under different scenarios, we believe we can still draw some general conclusions and insight into the potential of tax and social protection policies.

Notwithstanding these limitations, our results are in line with the findings of similar studies in the literature, which also support the validity of our analysis. First, the PSNP seems to perform well and it could be usefully expanded to areas that are currently excluded. Our simulations show that even re-targeting to the population below the poverty line, while keeping the same total budget, can increase its effectiveness towards poverty reduction. Second, our analysis suggests that income taxation may turn regressive if the tax brackets are not regularly adjusted to keep up with inflation. This is particularly important in countries characterized by high inflation, such as Ethiopia.

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Appendix

Table A1. *Tax composition in 2013/2014*

Tax type	% total tax	% direct tax	% indirect tax	% trade tax
Business profits	21.5	61.9		
Sales/excise/VAT on trade	17.6			49.7
Sales/excise/VAT on services	15.5		52.1	
Sales/excise/VAT on goods	13.7		45.8	
Custom duties	11.3			31.9
Personal income taxes	10.2	29.3		
Surtax on imports	6.6			18.5
Land fees	1.0	2.8		
Other income	0.9	2.6		
Stamp duties	0.6		2.1	
Rental income	0.6	1.6		
Interest income	0.3	0.8		
Agricultural income	0.2	0.7		
Capital gains	0.1	0.3		
	100	100	100	100

Table A2. *Summary statistics of the income components*

Income component	Based on consumption data		Based on income data	
	mean	std. dev.	mean	std. dev.
Agricultural wages	1,498	151	512	17
Non-agricultural wages	2,494	70	2,895	112
Crop income	14,989	227	8,881	76
Livestock income	1,983	202	1,375	28
Income from self-employment	4,100	261	1,460	86
Transfers	1,117	39	487	12
Other income	1,937	380	518	20

Notes: Means and standard deviations (std. dev.) estimated using survey weights. All values are in annual and in per capita terms.

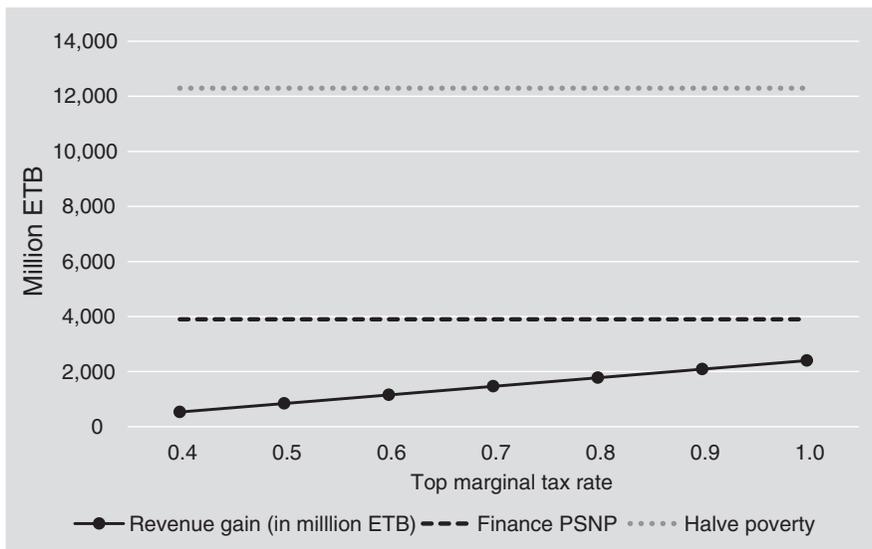
Table A3. *The estimated impacts under each scenario with respect to the base scenario using income data*

	(1)	(2)	(3)	(4)
	pre-2016 tax	2016 scheme	no PSNP	PSNP, re-targeted
Gini coefficient	-0.036	-0.017	0.004	-0.005
Poverty estimates:				
Headcount	0.1%p	0.0%p	0.6%p	-1.4%p
Poverty gap	0.1%p	0.0%p	0.6%p	-1.0%p
Poverty severity	0.0%p	0.0%p	0.5%p	-0.9%p

Note: %p refers to percentage point.

Source for Tables A1, A2 and A3: Authors' calculations based on the ESS-LSMS 2013/14 survey.

Figure A1. *Top marginal rates and revenue gains using income data*



Note: The revenue gains in this figure are calculated using income data.

Source: Authors' calculations based on the ESS-LSMS 2013/14 survey.

An actuarial balance sheet of the Swiss old-age pension scheme

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Abstract Following the recent update of the international System of National Accounts (2008 SNA), internationally comparable estimates of accrued-to-date pension liabilities (ADL) of unfunded social security pension schemes will soon be available in the supplementary table to the National Accounts. Against this background, this article analyzes the medium-term sustainability of the Swiss old-age pension scheme (*Alters- und Hinterlassenenversicherung – AHV*). This is achieved by estimating a “Swedish” actuarial balance sheet, which compares pension liabilities with the explicit and implicit assets of the pension scheme. Our results show that the current financing of the AHV is unsustainable, with about 30 per cent of the liabilities not backed by corresponding assets. In order to close this financing gap either the contribution rate should rise from 8.4 per cent to 12 per cent or all pension liabilities should be cut by about 38 per cent.

Keywords actuarial valuation, old age benefit, pension scheme, Sweden, Switzerland

Introduction

The unfunded pension entitlements of private households from social security schemes, especially from retirement pension schemes, contribute significantly to

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the income of elderly households (OECD, 2013, p. 71). While funded pension entitlements are annually estimated in the core accounts within the System of National Accounts (SNA), unfunded entitlements for government-sponsored and social security pension schemes have so far been neglected in official statistics in most countries,¹ although contributing significantly to overall household wealth (see Kaier and Müller, 2015). Differing financing approaches of pension schemes with respect to funding hamper the international comparability of National Accounts. Thus, with the recent update of the international System of National Accounts (SNA, 2008), which has been adopted into the European System of National Accounts (ESA, 2010), it has become mandatory for European Union (EU) Member States, from 2017, to publish unfunded pension liabilities for government-sponsored as well as social security pension schemes in a supplementary table to the National Accounts.² Consequently, each EU country is now obliged to develop a model to estimate accrued-to-date liabilities (ADL)³ and will publish the results every third year. As part of the bilateral treaties with the EU and especially the convention on statistical cooperation, Switzerland has also adopted ESA 2010. The publishing of ADL is undoubtedly helpful in giving an overview on overall unfunded pension wealth for private households or the implicit liabilities of pension schemes and their evolution over time. However, by definition, such figures nevertheless capture only one side of a pension scheme's balance sheet, namely, the liabilities.

The question whether a pension scheme is sustainable or not, which should be of crucial importance to policy-makers, can of course not be answered by looking only at the amount of accrued-to-date liabilities.⁴ To assess the question of sustainability, we use a "Swedish" actuarial balance sheet (ABS) and apply this to develop an estimate for the example of the Swiss old-age pension scheme (*Alters- und Hinterlassenenversicherung* – AHV). We compare the aggregate pension liabilities with all explicit and implicit assets of the pension scheme, permitting us to draw some conclusions about the sustainability of the pension scheme. Besides using

1. Exemptions include Sweden (Swedish Pension Agency, 2014); the United States (Board of Trustees, 2016); and Canada (Government of Canada, 2015).

2. Entitlements to funded pension schemes as, for example, the second pillar of the Swiss pension scheme (*Berufliche Vorsorge*), are already included in the National Accounts.

3. Accrued-to-date liabilities (ADL) refer to the pension liabilities legally accrued until a specific date, which would have to be settled if the pension scheme were to be closed by that date. A more detailed description of the definition and calculation of ADLs is given later in this article.

4. In the following sections, the term sustainable is referred to as reflecting balanced assets and liabilities of the pension scheme, analogous to the Swedish model. Boado-Penas, Valdés-Prieto and Vidal-Meliá (2008) are synonymously using the term solvent.

ADL, we also estimate the balance sheet using a different definition of net liabilities (current workers and pensioners' liabilities (CWL))⁵, which also takes into account future contribution payments and the pension accruals of current contributors. In both definitions of net liabilities, a closed group approach is used, which omits the pension liabilities of new entrants to the pension scheme.

The balance sheet framework builds on the accounting mechanisms of the Swedish notional defined contribution (NDC) pension scheme presented in Settergren and Mikula (2005).⁶ “Swedish” actuarial balance sheets have already been estimated by Boado-Penas, Valdés-Prieto and Vidal-Meliá (2008) and Vidal-Meliá, Boado-Penas and Settergren (2009) for the Spanish pension system, by Takayama (2004) for the Japanese pension scheme, and by Billig and Menard (2013) for the Canada Pension Plan. On an annual basis, the Swedish pension authority publishes the balance sheet of the pension scheme that takes into account accrued-to-date liabilities (Swedish Pension Agency, 2014). The Swedish balance sheet estimations consider future contributions as a type of asset, labelling these the “contribution asset” (CA). We additionally consider general public subsidies from tax revenue as an asset of the pension scheme, which enables this accounting framework to be applied to differently-financed pension schemes found in other countries.

Against the backdrop of ageing populations, questions concerning pension policy are expected to rise in importance. With the central government often representing the “lender of last resort” to social security pension schemes, the question of the sustainability or solvency of the pension scheme may have important implications for government budgets in future. Kelley (2014) suggests that unfunded pension liabilities increase in line with the political power of pensioners. Following this line of reasoning, future adjustments to liabilities might not be achievable through cutting pension levels, but primarily through raising contribution rates or subsidizing the pension scheme. Additionally, public budgets could be influenced indirectly by unfunded liabilities through higher interest rates on public debt.⁷

Estimating a balance sheet of a pension scheme on a regular basis should significantly increase transparency, because the costs of reforms arising in the mid-term, for example, would appear immediately in the changing positions of

5. CWL are equivalent to what is called the “closed group approach including future benefit accruals” by Billig and Menard (2013).

6. A detailed theoretical presentation and discussion of this approach can be found in Ventura-Marco and Vidal-Meliá (2014).

7. Martell, Kioko and Moldogaziev (2014) showed that the funding ratio of state-administered pension plans significantly influenced the state's credit quality and thus interest rates. Novy-Marx and Rauh (2014) provide comprehensive estimates of the various fiscal implications created by unfunded pension liabilities for government employees, although these results may not be transferred directly to social security pension schemes.

the balance sheet. Although we present an estimated example for one social security pension scheme (Switzerland), the accounting framework should also be applicable to government-sponsored pension schemes and across countries.

The objective of this article is thus twofold. First, it presents an example for extending and using the soon available comparable estimates of accrued-to-date pension liabilities (ADL) that, in turn, can be used to estimate a balance sheet of social security pension schemes. For this purpose, we apply the Swedish balancing framework, as presented by Settergren and Mikula (2005). Subsequently, we set out the first estimate of the balance sheet of the Swiss social security pension scheme (AHV). Second, it discusses estimation issues arising from the accounting methodology as well as some policy implications, which can be drawn from the estimations.

The remainder of this article is structured as follows. After outlining the balance-sheet methodology and the methodology for the estimation of liabilities and assets of the Swiss social security pension scheme (AHV), the empirical results for the balance sheet for 2010 are presented. This is followed by a discussion of additional policy measures to support the fiscal sustainability of the AHV. The article concludes by considering the implications and limitations of this approach.

Methodology

The periodical budget balance of a pension scheme financed on a pay-as-you-go (PAYG) basis is based on a flow concept. In its simplest form, this states that contributions have to equal pension payments. In cases where a buffer fund is used, any potential financing gap has to be balanced by a change to this buffer fund. Thus, in its simplest form, already-accrued future pension entitlements, even for the following year, are not considered.

In order to cope with these shortcomings, for long-term projections of contributions and pension flows, it is common to consider also new entrants into the system (this is referred to as an “open group” approach). The open group approach has the advantage of a long time horizon and presents an appropriate method to assess long-run sustainability and the long-run effects of reforms. For an infinite horizon, there already exists another accounting framework with respect to sustainability, namely generational accounting.⁸ However, these open group approaches rely on assumptions about future migration flows, mortality and fertility rates, which are themselves uncertain. With respect to the considered time horizon, the balancing approach used here

8. For an overview on the methodology see, for example, Auerbach, Gokhale and Kotlikoff (1991; 1994). Generational accounting is applied to the Swiss pension scheme (AHV) by Moog et al. (2015).

lies in between the pure periodic budget balance and the infinite horizon of generational accounting. It takes into account all pension entitlements by current pensioners and contributors, but neglects simultaneously the liabilities owing to future entrants to the pension scheme (hence, this is referred to as a “closed group” approach). Although the estimation of liabilities is based on a closed group approach, the contributions of new entrants are considered to some extent under the assumption of a constant population structure and thus constant migration and fertility patterns through the “contribution asset” (further outlined below). The question of sustainability that is answered by the “Swedish” balancing methodology is thus different from that of generational accounting. The latter assesses the sustainability of the pension scheme in the very long run given the underlying assumptions about the future development of, for example, migration flows and mortality and fertility rates. By contrast, the “Swedish” balancing model used here measures the sustainability of the pension scheme from a different perspective; namely, under a steady state assumption with respect to base year characteristics. Hence, the sustainability measure to be answered is whether the pension scheme is sustainable if the population structure were to stay constant, without considering future changes in migration and fertility. It resembles a cross-sectional snapshot of the current situation that yields an informative measure for changes over time and which takes into account actual demographic and economic developments. Generally, the Swedish balancing methodology can be regarded as an application of double-entry bookkeeping, which is standard for private or occupational funded pension schemes, to PAYG-financed social security pension schemes. Generally, two features distinguish the “Swedish” actuarial balance sheet from another commonly applied model, the US model.⁹ First, the US model relies on an open group approach while the “Swedish” model applies a closed group approach with an extension for the contributions of new entrants. The second difference is with respect to the applied interest rate for estimating the present values of liabilities and contributions. The US model uses the effective yield on the trust funds assets, while the Swedish model uses the wage growth rate as discount factor.

In line with standard double-entry bookkeeping, the balancing of a pension scheme requires consideration of all types of liabilities and assets. In the following sections, we first develop the concept of balancing a PAYG pension scheme in general. Thereafter, the balancing positions are outlined in detail with a focus on the example of the Swiss old-age pension scheme (AHV).

9. Detailed discussions of both models can be found in Boado-Penas and Vidal-Meliá (2012), Billig and Menard (2013), Ventura-Marco and Vidal-Meliá (2014), and Plamondon et al. (2002).

Budget balance

With the aim of assessing its sustainability or solvency, balancing a PAYG pension system should follow the same basic accounting principles as balancing a funded pension scheme. The appropriate budget constraint states that total assets have to equal total liabilities:

$$\text{Liabilities} - \text{Assets} = 0 \quad (1)$$

The liabilities of a pension system consist of the pension liabilities to all individuals currently entitled to a pension payment in the future (i.e. current pensioners as well as current contributors). In the following, the term pension liabilities (PL_t) is used in line with Settergren and Mikula (2005) and describes pension liabilities net of contributions.¹⁰ With respect to assets, several types of assets can be distinguished. Most pension schemes have at least some financial reserves or a small buffer fund (BF_t) to cope with short-period deficits.¹¹ However, for a PAYG pension system the most relevant source for financing existing pension liabilities are the contributions of current and future generations. Relying on future contributions, or the “contribution asset” (CA_t) (Settergren and Mikula, 2005), is therefore an inherent feature of all pension schemes based on PAYG financing.¹² We extend the more general framework of Settergren and Mikula (2005) by including public subsidies; hereafter, we call this the public contribution asset (PCA_t). Many public pension schemes rely to some extent on public financing via taxes either as a general subsidy or as targeted contributions to finance specific subsidies or benefits; for instance, with respect to childcare or providing care for the elderly.

However, if the overall budget constraint does not add up to zero the remaining unfunded (overfunded) part of the liabilities can also be interpreted as unintended intergenerational redistribution (UIR_t) at the expense of future (current) generations. Combining these balance positions leads to equation 2.

$$PL_t = BF_t + CA_t + PCA_t + UIR_t \quad (2)$$

Thereby, unintended intergenerational redistribution corresponds to the definition of “accumulated deficit” used by Boado-Penas, Valdés-Prieto and Vidal-Meliá (2008). Actually, both definitions measure the same amount, namely

10. A similar concept of liabilities is also applied by Billig and Menard (2013), Boado-Penas, Valdés-Prieto and Vidal-Meliá (2008), and Vidal-Meliá and Boado-Penas (2013).

11. For an overview, see OECD (2013, p. 195).

12. The definition and features of this “contribution asset” are discussed in more detail later in the article.

the uncovered liabilities. The term “accumulated deficit” emphasizes the fact that these deficits have implicitly already been accumulated whereas our focus is on the burden imposed on future generations through the unsustainable financing of the pension system.

Liabilities

The liabilities of a pension scheme are based on the promise to pay pensions in the future to the members of the scheme, current pensioners as well as current actively or passively insured individuals. Thus, each liability simultaneously represents an individual’s asset or entitlement. The sum of all liabilities to individuals, either direct or indirect through survivors’ pension entitlements, is therefore equal to the total (actuarial) liabilities of the pension scheme.¹³ In principle, one could also include administration expenses among liabilities. However, we concentrate solely on pension liabilities in the following sections.

For the purpose of balancing a pension scheme, only the consideration of liabilities net of future contributions is appropriate. The relevant amount of net liabilities can be estimated using two slightly different but essentially connected calculation procedures. First, we can estimate ADL. This concept includes the present value of all pension entitlements accrued up to the respective base year; no future accrual of pension entitlements from contributions or additional service years is taken into account.

The second approach expands ADL so that further accruals of pension entitlements through contributions or service years by current workers are also considered, leading to the concept of “current workers and pensioners’ liabilities” (CWL).¹⁴ As we are only interested in net liabilities within this context, the discounted value of future contributions of current workers have to be further subtracted.¹⁵

We may illustrate the difference between both definitions of net liabilities with the help of a simple three-period model, assuming a discount rate of zero. An individual is working and paying contributions τ when young and middle-aged,

13. A crucial question hereby is the choice of the appropriate discount rate, which will be discussed in more detail below.

14. The concept of ADL used here is equal to the term “projected benefit obligation (PBO)” used in accounting as well as the term actuarial (accrued) liability. By contrast, (gross) CWL are also referred to as “present value of future benefits”; “actuarial present value of projected benefits” in an actuarial context. For a more detailed description of the different distinctions of liabilities in the context of unfunded pension systems, see Holzmann, Palacios and Zviniene (2004), Eurostat (2011) or Kaier and Müller (2015). Although there exist various terminologies for pension liabilities, we will further label them ADL (without further accrual) or CWL (with further accrual) in line with the methodology of the supplementary table in the National Accounts (see Eurostat, 2011).

15. This procedure equals the “prospective method” used by Vidal-Meliá and Boado-Penas (2013).

accruing some pension entitlements in present value terms (p_{t-2}^Y when young and p_{t-1}^M when middle-aged). Accrued-to-date liabilities of the young cohort at the end of the first period are equal to the accrued pension entitlement p_{t-2}^Y . By contrast, CWL at the end of the first period equals the accrued entitlement when young p_{t-2}^Y plus the pension entitlement to be accrued when middle-aged p_{t-1}^M minus the present value of contributions τ_{t-1}^M to be paid when middle-aged. Hence, it equals the ADL plus the difference between the further accrual of pension entitlements and paid contributions, as shown in equation 3.

$$CWL_{t-2}^Y = ADL_{t-2}^Y + p_{t-1}^M - \tau_{t-1}^M \quad (3)$$

In a steady-state, both measures of liabilities are equal for an actuarially fair system such as the Swedish NDC scheme. However, this is only true if the mortality rate used for calculating the pension annuity equals the future observed mortality during retirement. If the system is not actuarially fair, in the sense that the present value of the additionally accrued pension entitlements exceeds the present value of the corresponding future contributions because of, for example, the scheme's institutional features or decreasing mortality, then CWL are larger than ADL and vice versa. In the following we will additionally report the concept of CWL – even though only the concept of ADL is applied in the supplementary table in the System of National Accounts (see Eurostat, 2011) – because CWL can be obtained by a simple extension of the ADL model and incorporates additional information.

For the estimation of pension liabilities it is important to distinguish between pension entitlements accrued by present retirees and pension entitlements accrued by current contributors. For the former, their working and contribution period is already completed and they are therefore entitled to a full pension benefit. For the estimation of accrued-to-date liabilities it is important to take into account that current contributors have not yet accrued 100 per cent of their future (expected) full pension benefits upon retirement. And they still have an (expected) contribution period ahead of them. Pension entitlements reflect the present value of all future pension benefits that have been accrued-to-date. Contrary to other figures of national accounts, accrued-to-date liabilities are calculated not only on the basis of historic data. In fact, a projection of future pension payments is required. For a more detailed discussion of the methodology and arising issues, see Eurostat (2011). In the next sections, we first outline the general estimation procedure for ADL regardless of the specific pension scheme. Afterwards we turn to the specific properties of the Swiss AHV pension scheme.

Pension liabilities of current pensioners. Our estimation of individual pension entitlements of current retirees is based on equation 4. As shown, individual pension entitlements $E_{x,g,b}$ of a current retiree in base year b of gender g and age x depend on two factors. The first factor represents the annual pension benefit paid out $B_{x,g,b}^{accrued}$ in base year b for a person of gender g and age x , as this pension is already fully accrued.

$$E_{x,g,b} = B_{x,g,b}^{accrued} * CAF_{x,g,b} \quad (4)$$

The second factor for the entitlement calculations is called the cumulated annuity factor $CAF_{x,g,b}$. The $CAF_{x,g,b}$ represents the sum of remaining retirement periods each weighted with cumulated discount rates, survival probabilities and pension indexation effects. The potential retirement periods of a retiree aged x years in the base year b extends from the base year $b + 1$ until the year $b + (D - x)$, i.e. the year in which the retiree will reach the maximum considered age of D .¹⁶

$$CAF_{x,g,b} = \sum_{f=b+1}^{b+(D-x)} \left(\prod_{s=b+1}^f (1 + a_s) * \prod_{s=b+1}^f p_{x+(s-b),g,s} * \prod_{s=b+1}^f \frac{1}{(1 + d_s)} \right) \quad (5)$$

The value of the $CAF_{x,g,b}$ depends on (i) the annual increase a of pension benefits in a future year f , i.e. on the indexation regime, (ii) the gender-specific one year survival probabilities p in future years f at age $x + (f - b)$ and (iii) the discount rate d applied.

The estimation of entitlements of current receivers of child, orphan, and disability pensions follows in principle the same procedure as for old-age pensions with one exception. The benefits are only paid out until a specific age. Child and orphan pensions in Switzerland are only paid out until the child reaches age 18 or until he or she finishes education (up to a maximum of age 25) whereas disability pension payments end with reaching the regular retirement age.

Additionally, married pensioners have accrued an entitlement to survivors' pensions if the spouse dies. Either the surviving spouse receives 80 per cent of the pension of the deceased spouse or an additional supplement of 20 per cent of their own pension. These survivors' pension entitlements are also included in the estimates of accrued-to-date liabilities.

Pension liabilities of current contributors. The estimation of pension entitlements of current contributors follows closely the approach described in the previous section. However, two further aspects need to be considered when calculating the

16. In our model the maximum considered age D is 110 years.

accrued pension rights of this group. On the one hand, it has to be taken into account that present contributors are not entitled to a full pension received after an entire contribution career. On the other hand, current contributors are not yet retired. Hence, their future pension payment has to be estimated.

Current contributors are, generally, expected to accrue further pension rights in the future. Furthermore, they only reach age s in the future year f with the cumulated survival probability $p_{s,g,f}^{accum}$. These aspects differentiate them from present retirees. To indicate to what extent a future paid-out full pension $B^{full(r)}$ assuming retirement age r has been accrued-to-date, the so called accrual factor AF^r is introduced (see equation 6). This future paid-out full pension $B^{full(r)}$ corresponds to the actually paid-out pension including future pension indexation.

$$E_{x,g,b}^r = \sum_{s=r}^D \underbrace{B_{s,g,f}^{full(r)} * AF_{x,g,b}^r}_{B_{x,g,b}^{accrued(r)}} * p_{s,g,f}^{accum} * (1 + d)^{x-s} \quad (6)$$

Equation 6 illustrates the relationship between the estimation of accrued-to-date pension entitlements (ADL) and current workers' and pensioners' liabilities (CWL) again. Whereas the latter concept considers only pensions after a full contribution career (B^{full}), only a certain proportion (represented by the accrual factor AF) of these "full" pensions (in case of current contributors) is used for estimation of the ADL. Taking into account the full pension after the completed contribution career and further subtracting the present value of the future contributions necessary to receive this full pension, we end up with the net liabilities of current workers after a full contribution career (CWL).

The value of AF ($0 \leq AF \leq 1$) may differ by age and gender. For present pensioners the accrual factors are equal to unity, as they are already fully entitled to their pensions paid in future years. For current contributors, the accrual factor amounts to less than one, as they are still expected to earn further pension rights in the future.¹⁷

The **accrual factor** AF^r at the age of retirement r depends on the number of contribution years CY^b accrued by the end of the base year b relative to the contribution years accrued at the age of retirement r , CY^r , as shown in equation 7:¹⁸

$$AF_{x,g,f}^r = \frac{CY_{x,g,b}^b}{CY_{x,g,b}^r} \quad (7)$$

17. Compare Eurostat (2011, p. 80).

18. The accrual factor might even be zero although currently contributing, due to a legal vesting period.

To estimate the total entitlement of an individual, we must take into account that retirement is possible at different ages and pension entitlements at different retirement ages must not be equal owing to non-actuarially neutral pension adjustment factors. Therefore, pension entitlements are first estimated for any possible retirement age, as shown in equation 6. The final total pension entitlement equals the sum of these entitlements, each weighted with the retirement probability at that respective age.¹⁹ If adjustment factors for early and late retirement are not actuarially neutral, the resulting pension liabilities depend upon the chosen retirement age. If adjustments for early retirement are too low from an actuarial point of view, aggregate pension liabilities will rise if more individuals retire early.

For present pensioners, the level of pension benefits can be directly obtained from the Swiss social insurance agency (BSV). For current contributors, on the contrary, future retirement income has to be estimated. We estimate these individual pension entitlements based on individual contribution records (IK-Konten), supplied by BSV.

Having estimated individual pension entitlements, aggregate pension entitlements or liabilities are equal to the sum of all individual entitlements of current pensioners and current contributors.

Assets

Having outlined the concept and calculation of the liabilities entering the balance sheet, the following section will present and discuss the calculation of the assets usually present in a PAYG pension scheme.

Buffer fund. First of all, financial reserves (buffer funds) are obviously assets of the pension scheme, with data on their value usually made available through official statistics. The size of the buffer fund of a pension scheme can vary widely from about twice the monthly expenditures, as in Germany (Deutsche Rentenversicherung, 2015, p. 26), to over four times the yearly pension disbursements, as in Sweden (Swedish Pension Agency, 2014). In Switzerland the buffer fund of the old-age pension system (AHV-Fonds) has financial reserves of about 1.2 times the annual expenditure.²⁰

From an accounting perspective, the buffer fund should enter the balance sheet in nominal terms, as its rate of return equals the appropriate discount rate, the rate of return on financial assets.

19. For a more detailed discussion of this approach, see Eurostat (2011, p. 88).

20. This figure includes a loan of 5 billion Swiss francs (CHF) to the disability pension system; see BSV (2015, p. 1).

Implicit intergenerational redistribution or contribution asset. If the pension scheme is not closed, merely considering closed group liabilities is insufficient to assess the pension scheme's sustainability. In such cases, the contributions of new entrants to the system can be used to finance existing liabilities, which is the essence of PAYG financing. Thus, a kind of implicit liability to future generations is found in pension schemes financed on a PAYG basis, which is taken into account by extending the pure closed group approach to these future contributions. However, it is difficult to estimate the exact amount of this "intended" intergenerational redistribution or contribution asset (CA).²¹ While some authors have proposed to use the sum of implicit taxes or the so-called "hidden asset" as a measure of the implicit intergenerational redistribution,²² for several reasons we use the concept of a "contribution asset" as outlined by Settergren and Mikula (2005). The first reason is that the existence and size of implicit taxes depend on the difference between the internal rate of return of the pension system relative to the return of an alternative investment, the interest rate of the financial market (Vidal-Meliá and Boado-Penas, 2013). As we are interested in the pension scheme's sustainability, a more appropriate measure of the implicit intergenerational redistribution seems to be the system-inherent contribution asset, as it abstracts from any investment comparisons and therefore from other factors determining the financial market interest rate (see Boado-Penas, Valdés-Prieto and Vidal-Meliá, 2008, p. 94). The second reason is the progressivity of the Swiss pension formula with a fixed minimum and maximum pension (twice the minimum pension), which induces the implicit tax to vary extensively with income and probably more within than between generations.

The concept of the contribution asset refers to the sum of contributions collected until all liabilities within the pension system are turned over once given a stable population, as well as income and pension replacement rate patterns (steady state). As a starting point, we have to ask how long on average does a euro of contributions take until it is paid out as a pension benefit? This equals the duration until all liabilities are, on average, turned over once. In order to obtain this turnover duration TD_t the money-weighted average age of contributors A_t^c is deducted from the money-weighted average age of retirees A_t^r .²³

$$TD_t = A_t^r - A_t^c \quad (8)$$

21. Lee (1994) uses a similar concept in order to measure the claim on future contributions but calls it transfer wealth.

22. See for example Sinn (2000), Fenge and Werding (2003), and Vidal-Meliá and Boado-Penas (2013).

23. Money-weighted average age means that the average amount of pension or contributions by age are used as weights in calculating the average age of pensioners or, respectively, contributors. If a pension system has flat-rate benefits and contributions, the money weighted average age will equal the unweighted average age.

The contribution asset measures the sum of contributions paid until all liabilities are on average turned over and thus equals the turnover duration times the sum of contributions of the base year (C_t).²⁴

$$CA_t = TD_t * C_t \quad (9)$$

The calculation of the contribution asset is generally based on cross-sectional population and pension data because of the steady state assumption. It therefore relies on the actually observed situation and does not take into account possible but uncertain developments in the future. However, if calculated on a regular basis, it presents a repeated measure of the expected inherent redistribution and therefore an important indicator regarding the evolution of the pension system's long-term contribution base (Pérez-Salamero González, Regúlez-Castillo and Vidal-Meliá, 2017). The turnover duration, and thus the contribution asset, is only a correct measure of the implicit assets of the pension scheme in a steady state with stable mortality, income and replacement rate patterns.²⁵ Yet, if the time interval between new estimates of the contribution asset is sufficiently small (a year, or even up to three years), each interval between can be interpreted as a transitory steady state.

Although the contribution asset in the Swedish scheme is originally defined for use together with ADL, we also apply the same cross-sectional turnover duration to estimate the contribution asset when using (net) CWL. From a steady-state perspective, the use of (net) CWL together with the standard contribution asset is outlined by Settergren and Mikula (2005) and Vidal-Meliá and Boado-Penas (2013) and is used by Vidal-Meliá (2014).

Public contribution asset. In most countries, additional subsidies from general tax revenue also play a significant role in financing the pension system. As well as to provide subsidies, these may also finance non-contributory rights, or both. Pérez-Salamero González, Ventura-Marco and Vidal-Meliá (2017) include public subsidies for non-contributory rights as a “Public Contribution Asset”. However, the purposes for which public subsidies are used are often difficult to disentangle empirically, and are often not actuarially equivalent to the corresponding non-contributory liabilities. These public subsidies are often connected to the total amount of pensions paid or may be nominally fixed with or without indexation. Takayama (2004) includes the present value of future public subsidies in line with his open group approach.

24. For a more detailed derivation and discussion of the contribution asset, see Settergren and Mikula (2005) and Vidal-Meliá and Boado-Penas (2013).

25. For a more detailed discussion, compare Settergren and Mikula (2005, p. 121).

While calculating the present value of public subsidies connected to pension expenses is fairly simple, the consideration of other public subsidies is not that intuitive. In Switzerland, the largest part of public subsidies to the old-age pension system is proportional to pension expenses and amounts to 19.55 per cent of these expenses. The present value of these public subsidies can be derived easily by taking the same proportion of the pension liability in present value terms. This procedure implicitly assumes the same discount factor used for the calculation of the pension liabilities, which is appropriate if the sum of these public subsidies in present value terms is considered to be transferred to the pension system immediately to finance these future obligations.

By contrast, the correct specification of unconditional transfers or subsidies from tax revenue is more difficult. For example, in Switzerland, 0.83 percentage points of the value added tax are used to help finance the old-age pension system. Additionally, a fraction of the revenues from state-owned casinos is transferred directly to the buffer fund. The difficulty with these unrelated subsidies is to consider the fraction relevant for financing the existing pension liabilities of the base year. As these liabilities are on average completely turned over within the length of the turnover duration, we only consider the unrelated subsidies to the pension system to be paid for the existing base year liabilities and thus only until these liabilities are completely turned over, which is measured by the turnover duration. Accordingly, we use the calculation methodology of the contribution asset in order to estimate the asset stemming from these public subsidies that are unrelated to pension expenses. With θ denoting the fraction of pension payments to be directly subsidized, the resulting public contribution asset (PCA_t) consists of θ times the pension liabilities, plus the pension system's unrelated subsidies (S_t) times the turnover duration.

$$PCA_t = \theta * PL_t + TD_t * S_t \quad (10)$$

Empirical results

Having outlined the calculation methodology for all balance sheet items, we now briefly outline the pension system, the dataset and the remaining assumptions. In turn, the empirical estimates for the balance sheet of the Swiss old-age pension system (AHV) at the end of 2010 are presented and some policy implications are drawn.

The Swiss old-age pension scheme

The Swiss old-age pension system (AHV) can be characterized as a classical defined benefit system with the pension amount depending on average earnings and the

number of contribution years. The pension amount and entitlements are indexed according to a combination of price and nominal wage growth (known as the *Mischindex*). It differs from other defined benefit systems in two ways. First, while most pension systems are linked predominantly to employment, every person living in Switzerland, whether employed or not, is insured in the pension system and is obliged to pay at least a minimum contribution. Insurance in this old-age pension system is also standard for self-employed workers and civil servants. Second, the pension formula constrains a large degree of redistribution: the maximum pension equates to twice the minimum pension, depending on individual contribution years.²⁶ The AHV is financed mainly by contributions (71 per cent) and public subsidies (24 per cent) (BSV, 2015). The contribution rate is 8.4 per cent, which is shared equally between employers and employees. Non-working individuals are obliged to pay the minimum annual contribution of 478 Swiss francs (CHF).

Data

We rely on two detailed micro-datasets supplied by the Swiss social insurance agency (BSV) for the empirical estimates of net pension liabilities. The first is a randomly chosen 10 per cent subsample of all current and former contributors covering the complete individual annual contribution records for non-retirees until the end of the base year 2010 (*IK-Konten*). The second micro-dataset is a randomly chosen 10 per cent subsample of the official pension registry containing detailed pension relevant information on an individual level of current pensioners at the end of 2010 (*Rentenregister*). As age is an important determinant of pension liabilities, the samples are randomly chosen among each age cohort and by sex. These administrative and process-produced datasets allow us to estimate pension entitlements on an individual level in a very detailed and exact way, relying on actual individual contribution records. The individual projected final pension amounts are calculated by microsimulation. To estimate the aggregate liabilities of the AHV, grossing-up factors by pension type, age and gender are used to match the official aggregate numbers of pensioners and contributors.²⁷ The figures on aggregate contributions and total public subsidies are taken from AHV official statistics (BSV, 2015, p. 1).

26. At the same time, contributions are not capped.

27. The sampling and grossing-up procedures should avoid the problem of a possible non-representativeness of the sample as noticed by Pérez-Salamero et al. (2017) for the set of anonymized microdata of the Spanish social security records.

Assumptions

As outlined above, the estimation of the AHV's pension liabilities requires some basic assumptions about the long-term indexation of pension benefits, the growth rate of wages and the future evolution of survival probabilities. With pension benefits indexed to a mixture of inflation and nominal wage growth, we need assumptions about future inflation as well as real wage growth. For both we adopt the assumptions used in Bundesrat (2013), namely an annual inflation rate of 1.5 per cent and real wage growth equal to annual productivity growth, which is assumed to be 1 per cent. For the future evolution of gender-specific survival probabilities we use the assumptions of the European Population Projections 2013 (EUROPOP2013) for Switzerland. Strictly speaking, to assume changing mortality patterns would also entail a changing population structure and would thus require an adjustment in the underlying turnover duration. The theoretical justification for this adjustment would, however, go beyond the scope of this article. Thus, we take the turnover duration of the base year. We remain conscious of the fact that the turnover duration and thus the contribution asset should be slightly higher if mortality decreases. It is probable that we are slightly overestimating the unfunded liabilities.

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A crucial question within the calculation of pension liabilities in present value terms regards the choice of the appropriate discount rate. As Aaron (1966) has pointed out, the implicit rate of return of a PAYG pension system equals the growth of the wage bill or the sum of wages and growth in size of the working population.²⁸ If future changes in the working population are neglected given the steady-state assumption, which is also applied in the estimation of the contribution asset, the appropriate internal rate of return of the pension system equals wage growth.²⁹ Following this approach, we use the assumed nominal wage growth of 2.5 per cent as the discount factor. While we have chosen the rate of wage growth as the appropriate discount rate for the calculation of the accrued-to-date pension liabilities, a real discount rate of 3 per cent reflecting the European average ten-year government bond yields is recommended by Eurostat (2011) for the estimation of the Supplementary Table. Furthermore, we only consider the old-age pension system, whereas the absolute values of ADL estimated by the National Statistical Office and published in the Supplementary Table also include the liabilities of the disability pension scheme.

28. As Settergren and Mikula (2005) point out, this is only true if increases in longevity are neglected.

29. The growth in the contributory base is also proposed or used as the discount factor for PAYG-financed liabilities by Settergren and Mikula (2005), Boado-Penas, Valdés-Prieto and Vidal-Meliá (2008) and Billig and Menard (2013).

Balance sheet

Based on these assumptions, we present the empirical estimates of the balance sheet of the Swiss old-age pension scheme for the year 2010. We estimate the balance sheet, first, by applying a pure accounting approach using accrued-to-date liabilities (ADL) and, second, by incorporating a projection of future contributions and further accrual of pension rights for current workers (Table 1). To derive these current workers and pensioners' liabilities (CWL), we first

Table 1. *Balance sheet of the AHV (in billion CHF end-2010)*

		ADL	Net
		PBO	Full pension contributions
Balance position	details		
(net) liabilities	(= PV pensions - PV contributions)	1,882	2,198
<i>Old-age pensions</i>			
Present value pensions	(current pensioners)	545	545
Present value pensions	(current active)	1,264	2,324
<i>Survivors pensions</i>			
Present value pensions	(current pensioners)	47	47
Present value pensions	(current active)	25	37
Present value contributions	(current active)	-	754
Assets		1,308	1,518
Funds	(end of year)	49	49
Public contribution asset	(present value of federal contributions, 19.55% of AHV-expenses)	368	577
Public contribution asset	(present value of federal contributions, independent of AHV-expenses)	78	78
Contribution asset	(future actives, = Turnover duration x contributions)	814	814
Accumulated deficit	(= (net-)liabilities - assets)	573	680
Necessary pension cut in %		37.9	38.5
Necessary contribution rate in %		14.3	12.0
Funding ratio(= assets/(net-) liabilities)		0.695	0.690

Note: ADL = accrued-to-date liabilities; PBO = projected benefit obligation.

Source: Author's calculations based on micro data from the Swiss pension system and BSV (2015).

Table 2. *Turnover duration*

	A ^r	A ^c	TD
Old-age pensions	74.7	43.7	31.0
Old-age and survivors' pensions	73.4	43.7	29.6

Notes: A^r = money-weighted average age of retirees; A^c = money-weighted average age of contributors; TD = turnover duration.

Source: Author's estimations.

estimate total pension entitlements after a full contribution career and subtract future contributions of current workers. Every model calculating accrued-to-date liabilities as proposed by Eurostat (2011) implicitly projects pension benefits after a full contribution career³⁰ and can therefore be extended easily to additionally estimating CWL. Both approaches render equal figures for present-value pension liabilities of current pensioners due to their already accrued full pension. However, gross pension liabilities of current active contributors rise from CHF 1,290 billion to CHF 2,360 billion if the future accrual of pension rights is additionally taken into account. At the same time, when assuming the contribution rate to stay constant at 8.4 per cent, the further contributions of current contributors amount to CHF 754 billion in present-value terms, which is less than the rise of the pension liabilities.

Hence, net liabilities increase from CHF 1,882 billion to CHF 2,198 billion if the concept of CWL is used instead of ADL. With the larger part of public subsidies being connected to pension expenses and therefore to gross liabilities, the present value of this part of public subsidies simultaneously increases from CHF 368 billion to CHF 577 billion, if net liabilities increase. The remaining assets are not subject to any changes between both approaches. The money-weighted average age of pensioners and contributors are estimated using the micro data on pensions and contributions paid in 2010, and are shown in Table 2.

The turnover duration for old-age pensions alone is 31 years. Considering old-age and survivors' pensions, the turnover duration decreases to 29.6 years owing to orphan and child pensions.

Thus, the largest asset position derives from the future contributions of current and future working generations used to finance today's liabilities, measured by the contribution asset. The unintended intergenerational redistribution (UIR), or

30. Eurostat (2011) recommends the use of the projected benefit obligations approach (PBO). Within this approach the projection of the future contribution career of current workers takes into account future wage increases either by general wage growth or by individual promotions; compare Eurostat (2011, p. 20).

the uncovered liabilities, amount to about 30 per cent of the net liabilities in both approaches, suggesting that the pension system is actuarially already running deficits to be covered by future contributors. Or, stated differently, assets cover only about 70 per cent of the liabilities. Although both measures of liabilities are built upon a slightly differing time horizon, they yield nearly identical measures of the fiscal sustainability of the pension system.

Policy implications

We will now briefly discuss some possible reform steps and their impact on the entries on the balance sheet (Table 3). Starting with the contribution asset, there are only a few reforms that influence the size of the contribution asset. A change in the contribution rate or the contribution base changes the contribution asset proportionally as base year contributions change.

Changing contribution patterns simultaneously change CWL, because as future contribution levels change so do net liabilities. By contrast, ADL are not influenced

Table 3. *Effect of reforms on the entries on the balance sheet*

Measure	Contribution Asset	Public Contribution Asset	Liabilities	
			Liabilities to pensioners	Liabilities to contributors
Change in contribution base	Proportional change	No change	No change	Change in future contributions (CWL change)
Change in contribution rate	Proportional change	No change	No change	Change in future contributions (CWL change)
Change in years for retirement base	No change	Proportional change to (gross) liabilities	No change	Change in future benefits (ADL and CWL change)
Change in replacement rate	No change	Proportional change to (gross) liabilities	No change	Change in future benefits (ADL and CWL change)
Change in necessary contribution years for full pension	No change	Proportional change to (gross) liabilities	No change	Change in future benefits (ADL and CWL change)
Change in pensions in payment	No change	Proportional change to (gross) liabilities	Net liability change (ADL and CWL)	Change in future benefits (ADL and CWL change)
Change in retirement age	No change	Proportional change to (gross) liabilities	No change	Change in future contributions and benefits (ADL and CWL change)

Source: Author, based on Vidal-Meliá, Boado-Penas and Settergren (2009, p. 305).

by a change in the contribution base or rate. All other changes in the final pension amount lead to changes in ADL for current contributors as well as for CWL. Increasing the retirement age will affect CWL for current contributors more than ADL, as not only the decrease in pension entitlements is reflected but, additionally, the increase in future contributions. Liabilities to pensioners only change if pensions in payment are also affected by the reform, for example by changes in indexation. Regarding all reforms which affect gross pension liabilities, in Switzerland public subsidies are partly connected to liabilities and are thus also subject to a change if pension liabilities change.

Within our accounting framework, it is necessary to now identify the policy measures required to ensure the fiscal sustainability of the Swiss pension system. We reiterate that all conclusions refer to the underlying assumption of a constant population structure (Contribution Asset) with increasing longevity. Hence, policy actions may not necessarily ensure sustainability in the long run with changing fertility and migration patterns. Instead, they would ensure sustainability of the pension scheme if the base year population structure was to stay constant. Accordingly, these results sketch the general direction and size of necessary policy actions for ensuring sustainability in the mid run. Applying the accounting framework to the pension scheme on a regular basis would then reveal changes to sustainability stemming from real observed demographic developments.

A first possibility is either to reduce the pension level or to increase the contribution rate until it is sufficiently high to finance the current pension level. The sustainable contribution rate and the necessary cut in pension liabilities are derived in the Appendix and the estimates are included in Table 1.

The higher the share of pension expenses financed by public subsidies, the higher will be the necessary pension cut owing to the simultaneously decreasing public contribution asset. In the Swiss case, the necessary cut in pension levels amounts to 37.9 per cent with the ADL approach, and 38.5 per cent with the CWL approach. The difference between both approaches stems from the non-actuarially neutral contributions, given the assumed discount rate.

In contrast, the applied approach to net pension liabilities plays a crucial role in determining the fiscally sustainable contribution rate of the pension scheme. This becomes clear by deriving the formula for this sustainable contribution rate (see Appendix). While under the ADL approach the contribution rate has to be raised from the current level of 8.4 per cent to 14.3 per cent, this necessary increase turns out to be smaller in the case of the CWL approach, with a sustainable contribution rate of 12.0 per cent (Table 1). This difference can be explained by the different time horizon of both approaches. The CWL approach considers current workers' future contributions and therefore the financing basis reacts in

a more pronounced manner to an increase in the contribution rate. In order to estimate the necessary steady state contribution rate of a pension system, using the concept of CWL yields the more appropriate results than using ADL. Given the size of the necessary cut in pension levels, one might argue that this might not be a relevant policy option, but contribution rates should be raised instead. The choice of the policy option is then ultimately a question of intergenerational redistribution, as an increasing contribution rate is shouldered by current and future contributors only, while cutting pension levels affects both contributors and pensioners.³¹ Of course both policy actions could also be combined using the relationship stated in equation 15 (see Appendix). If neither decreasing pension levels nor increasing contribution rates are available as policy options, the resulting deficit has to be financed in the long run either by subsidies from general tax revenue or by issuing new debt. Both these options increase the fiscal pressure on future budgets.

Implications, limitations and outlook

Estimating a “Swedish” actuarial balance sheet, we assess the fiscal sustainability of the Swiss old-age pension system. Our results indicate that about 30 per cent of total liabilities are unfunded and thus turned over to future generations, which is in addition to the inherent intergenerational redistribution of a PAYG financed pension system. Furthermore, we show how an ADL estimation model can easily be extended to also incorporate current workers’ and pensioners’ net liabilities and therefore to cover a medium-term time horizon. Having assessed the underfinancing of the Swiss old-age pension system, we present two policy measures to restore fiscal sustainability; namely, an increase in the contribution rate to 12.0 per cent or a general cut in pension levels of about 38 per cent, and discuss the validity within both liability approaches.

Generally, one could view the steady-state assumption as a limitation of this balancing framework. It is our view that this is not a substantial limitation, as the approach allows to assess the pension system’s sustainability – it relies only on a few long-term assumptions regarding wage growth, inflation and the future evolution of survival probabilities, but not on assumptions regarding volatile migration and long-term fertility rates. The effect of the business cycle on the results of one particular year may need to be seriously considered, but as the figures on ADL will be available on a yearly basis, comparing outcomes for several years should overcome this limitation. With information on ADL soon to be provided on a comparable basis, this framework offers a valuable opportunity for policy-makers and administrations to assess the sustainability of pension

31. At least if there are no exemption rules for existing pensioners.

schemes early and to react to imbalances in a timely manner. Given the availability of annual estimates of pension liabilities, changes in variables relevant for fiscal sustainability are incorporated readily into the contribution base (for example, life expectancy being higher than that assumed, or higher than expected migration flows) and can be used to minimize generational imbalances within the pension scheme. Comparing estimations before and after policy reforms could be very helpful in assessing some of the costs of the specific reforms. However, to assess the long-run implications of reforms, including for intergenerational redistribution, accompanying open group projections are helpful and necessary.

Our results reveal the unsustainable financing of the Swiss pension scheme (AHV) and thus the need for its reform. If the contribution rate is immediately raised to the sustainable level of 12 per cent, the AHV would accumulate surpluses over the next years. However with an already existing and well-working fund, these surpluses could be used to smooth future adjustments, to share the burden of these unfunded liabilities more evenly among generations and to maintain the current pension level.

For reasons of simplicity, we have focused only on old-age and survivors' pensions. However, the methodology can easily be extended to additionally include disability pension schemes, as shown by Ventura-Marco and Vidal-Meliá (2014) and Pérez-Salamero González, Ventura-Marco and Vidal-Meliá (2017), making it applicable to other pension schemes as well.

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Appendix

By inserting equation 10 and equation 9 into equation 2 and solving for the net pension liabilities, we get the following equation for the pension liabilities PL_t :

$$PL_t = \frac{TD_t*(C_t + S_t) + BF_t + UIR_t}{(1 - \theta)} \quad (11)$$

Fiscal sustainability requires UIR_t to be equal to zero and therefore the fiscal sustainable net pension liabilities PL_t^* can be expressed as in equation 12.

$$PL_t^* = \frac{TD_t*(C_t + S_t) + BF_t}{(1 - \theta)} \quad (12)$$

Combining equation 11 and equation 12, the necessary change in pension liabilities and thus in average pension levels amounts to:

$$\Delta PL_t = \frac{PL_t^* - PL_t}{PL_t} = - \frac{UIR_t}{(1 - \theta) * PL_t} \quad (13)$$

To estimate the sustainable contribution rate, one has to consider the impact of a changing contribution rate on the contribution asset as well as on future contributions. Changing equation 2, writing the net pension liabilities as gross pension liabilities GPL_t minus the present value of future contributions of current contributors PVC_t and setting the uncovered liabilities or the unintended intergenerational redistribution UIR_t to zero, we end up with equation 14.

$$GPL_t - PVC_t = BF_t + CA_t + PCA_t \quad (14)$$

We can write the present value of future contributions PVC_t as the sum of future income in present value terms FY_t times the contribution rate τ_t . The contribution asset CA_t equals the sum of contributable income in the base year Y_t times the contribution rate τ_t times the turnover duration TD_t . Inserting these expressions in equation 14, we only need to solve for the contribution rate in order to maintain the expression for the sustainable contribution rate, which is presented in equation 15. The fiscally sustainable contribution rate equals the gross pension liabilities not covered either by the buffer fund or the public subsidies divided by the sum of current workers' future contributable income and the sum of income subject to contributions until the pension scheme has technically rolled over all net liabilities once.

$$\tau_t^* = \frac{GPL_t - BF_t - PCA_t}{Y_t * TD_t + FY_t} \quad (15)$$

Towards an adequate and sustainable replacement rate in defined benefit pension systems: The case of Spain

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Abstract The main objective of this article is to determine, based on internal data, replacement rates for a defined benefit pension system, with two aims: the adequacy of pensions – measured in terms of the expenditure of retirees – and the sustainability of the system. For this purpose two instruments are used: the internal rate of return, and techniques based on systems of notional accounts. These figures, derived from internal data, will serve, by comparison with the replacement rate of the system, to assess whether the system tends more towards adequacy or sustainability. The system studied is that of Spain.

Keywords actuarial, defined benefit plan, pension scheme, adequacy, Spain

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Introduction

Population ageing has meant that the debate on public pension systems has for some time focused on their sustainability. For this reason, reforms in all countries have been aimed at ensuring the sustainability of systems, overlooking other essential tasks such as guaranteeing the right to adequate pensions.¹ However, in recent years the discussion has come to focus more on the adequacy of pensions, with the aim of ensuring that the systems guarantee citizens the maintenance of a comfortable standard of living after retirement, providing them with the income necessary for this purpose.²

One of the indicators most used to assess the adequacy level of a pension system and, at the same time, facilitate comparison between countries is the so-called Replacement Rate (hereafter RR), which is defined as the initial pension expressed as a percentage of the last wage received by the beneficiary. The RR hence shows to what extent the pension system provides adequate substitute income for the income lost after cessation of economic activity.

The RR is a standard indicator and easy to understand because it measures what percentage of purchasing power is retained on reaching retirement. For this reason it is widely used worldwide, but its use as an indicator of pension system adequacy is not without its drawbacks, for several reasons, as we shall explain below.

First, there is no consensus on the scope of or specific content that should be included in the denominator of the equation. Thus, for example, Biggs and Springstead (2008) use four different measures of income for the period prior to retirement as the denominator of the RR. Their results show that the RR can vary significantly depending on the content of the indicator. Sánchez-Álvarez, López-Ares and Quiroga-García (2007) conducted a study on the RR of Spanish households, concluding that in the years prior to retirement, a decrease in the well-being of the individual is usual, due to voluntary reductions in their working hours, processes of ageing and physical disability, or as a consequence of unemployment. Hence, in order to calculate the RR, longer periods than the so-called “last wage” should be taken into account. In contrast, Cole and Liebenberg (2008) consider the question on the basis of income and expenditure to analyse the adequacy of pensions, approaching the level of income and the level of expenditure of pensioners using two indicators: the RR of Income and the RR of Expenditure.

Second, as noted by Borella and Fornero (2009), Grech (2013) or Chybalski and Marcinkiewicz (2015), the RR is an imperfect indicator of adequacy, since its

1. In the case of Spain, this right is covered by Article 50 of the Spanish Constitution, which states: “The public authorities shall guarantee, through adequate and periodically updated pensions, sufficient financial means for senior citizens”.

2. On this issue see, among others, Bajtelsmit, Rappaport and Foster (2013), Hurd and Rohweder (2008), or Van Derhei (2006).

approach is based on a one-dimensional perspective, as it measures adequacy on the basis of a single value and, moreover, one that is static, since it relates two variables generated at a single moment in time: the date of retirement.

According to Durán Valverde and Pena (2011), the main determinants of the RR can be classified into two broad categories:

- *Factors that are exogenous to the pension system.* These are factors that are not linked to the functioning of the pension system as such, but depend on others outside it. These factors, in general, can be modified by decisions on public policy and/or legislation. They include the amount of mandatory contributions, the density of the worker's contributions – which depends on the structure of the labour market – the retirement age, the years of career, and the evolution of the worker's wage.
- *Factors that are endogenous to the pension system.* These elements are more typical of funded defined contribution [capitalization] systems. They include factors that are directly linked to the functioning of the pension system, such as the returns generated by the system itself, the fees charged by pension funds, and the promotion of voluntary savings, which in turn depends on factors outside the pension system, such as the fiscal framework governing long-term savings and conditions affecting the family economy.

Holzmann and Guven (2009, p. 37) investigate RRs: “Replacement rates are a useful yardstick for measuring the adequacy of pension benefits, because they express benefits relative to preretirement earnings, thereby indicating the degree to which income is replaced when workers retire.” They suggest two main variants, gross RRs and net RRs, depending on whether taxes and social benefits are included or not, and include the indexation of the pension in their analyses.

In general average premium systems,³ such as most European pension systems, the determination of the RR is not based on the objective of adequacy or sustainability. This is why so far no attention has been given to the problem of determining a minimum and specific RR to ensure that the system's pensions are adequate. The World Bank defines an adequate pension system as one that “provid[es] benefits to the full breadth of the population that will be sufficient to prevent old-age poverty as well as provide a means to smooth lifetime consumption” (Holzmann and Hinz, 2005, p. 193). Similarly, the Commission of the European Communities (2003, p. 24) defines an adequate pension system as one intended to “prevent poverty among the elderly; allow people to maintain, to a reasonable degree, their living standard after retirement; and promote solidarity within and between generations”.

However, the challenge of how to relate the RR simultaneously to the sustainability and adequacy of the system has not been addressed. A comparison

3. A “general average premium” system is a financing system, with variants, wherein the contribution rate, as a percentage of the insured payroll, is set according to assumptions which will ensure financial viability. See ILO (1984).

between the value of the RR that the system really offers and the values of the RR based on endogenous factors, by the methods proposed in the present article, can give us an idea of what the implicit objective of the analysed system is: adequacy or sustainability.

These two specific issues are the main objectives of this study: first, a method will be developed making it possible to obtain, based on endogenous data, the minimum level of the RR that is necessary for retirement pensions to be adequate (or sufficient) and, in addition, for these to be so not only at the moment of retirement, but throughout retirement as a whole. In this way we would be linking a static indicator, such as the RR, to the adequacy or sufficiency of the system from a dynamic perspective.

The second objective is an endogenous determination of the RR that is such that it ensures that the system is sustainable, for which two possibilities are suggested:

- Link the RR to an actuarial indicator of sustainability such as the real Internal Rate of Return (hereafter IRR) of the pension system. The IRR can be defined as the interest rate needed in the law of compound capitalization to make the current actuarial value of the benefits equal to the current actuarial value of the contributions. In this way we can relate a static indicator, such as the RR, with a dynamic indicator, such as the IRR.

- Obtain the RR from the previous determination of the initial retirement pension, by applying the same scheme as that used in notional accounts systems: capitalizing the contributions on the basis of a specific index and converting the accumulated virtual fund so obtained into the amount of the initial pension using an actuarial element, such as life expectancy. This technique makes it possible to relate defined contribution systems to those with defined benefits on a financial-actuarial basis.

The remainder of this article is structured as follows. In the next section we analyse the main features of the RR. We then focus on the model based on endogenous factors that is needed to determine the RR in terms of adequacy. In turn, we define and comment on the main features of the IRR and notional accounts systems, and consider the two models of the RR that are related to sustainability. Thereafter, we calculate, in the case of Spain, three endogenous RRs, based on the methods developed, and compare them with the real RR of the system. Finally, we offer some conclusions.

Indicators of the adequacy of pension systems and their relationship to the RR

The RR can be defined as the ratio of the initial retirement pension to the last wage. According to this definition, the RR can be expressed as follows:

$$RR = \frac{P_0}{W_f} \tag{1}$$

where:

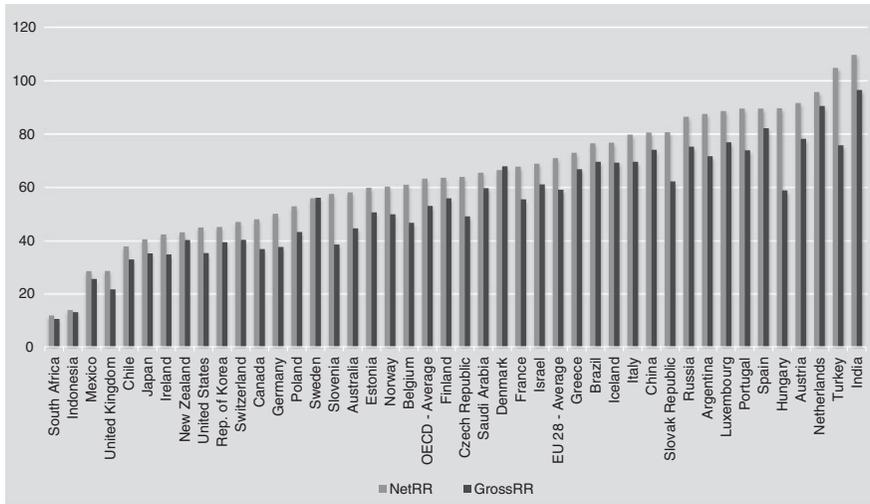
RR: Replacement Rate.

P₀: Initial pension on retirement.

W_f: Last wage.

As noted above, several authors agree that this way of defining the RR implies that it is not the best indicator to measure the adequacy of a pension system. Nevertheless, it is the one that is most used at the international level for its ease of calculation, and is hence very useful for comparisons between different countries. Without looking further afield, within the Member States of the European Union (EU28) and the Member countries of the Organisation for Economic Co-operation and Development (OECD) its use is very widespread. Figure 1 shows the values of gross RR and net RR (after taxes) for OECD countries and the average for the EU28. In some cases, public pensions provide a large part of the RR, while in others most of it comes from compulsory private savings, under various complementary or quasi-compulsory formulas in addition to that provided by the public pension. For example, in Spain the gross RR is 82.1 per cent, supported entirely by the public social security system. By contrast,

Figure 1. Gross and net replacement rates in OECD countries



Source: Author's figures, based on OECD (2015, 2016a, 2016b).

in the OECD the average is 52.9 per cent, with 41.3 per cent coming from the public system and 11.6 per cent from the compulsory private system.

When using the RR to compare different countries, a series of relevant variables must be considered, chief among which is the financial-actuarial financing system used by the pension system of the country in question:

- In defined contribution capitalization systems, the RR depends exclusively on the contributions made and the returns obtained by the fund. Therefore, it cannot be known a priori, although forecasts can be made using criteria that are easy to apply, such as the geometric growth of contributions, a constant interest rate, and mortality tables with values estimated at the time of retirement. These tables may be different for men and women. An actuarial criterion is hence applied to determine the initial pension.

- In defined benefit capitalization systems, the RR can be estimated more easily, since the contributions have to be adjusted to achieve the desired final amount. A mortality table must be used to provide the information necessary to calculate the initial pension. This highlights one of the disadvantages of the RR: it does not take into account the total amount of contributions. An actuarial criterion is also used to determine the initial pension.

- General average premium systems with defined contributions (also termed notional account systems) have certain features similar to those found in capitalization systems, but it is necessary to replace the interest rate risk by the risk attached to variations in the index used to revalue the amount of virtual contributions (see, for example, Disney (1999), Palmer (2006), or Vidal Meliá, Domínguez Fabián and Devesa Carpio (2006)). In addition, the formula used to calculate the initial pension may differ from that used in capitalization systems, and the mortality tables used do not normally differentiate between men and women. In this case there is no comprehensive actuarial criterion, although the use of mortality tables would provide the system with a higher actuarial level than in other systems.

- Defined benefit general average premium systems, on which we shall focus, are the most interesting from the point of view of determining the RR. One of the main differences with respect to notional account systems is that the determination of the initial pension is not totally related to the contributions paid into the system, nor are any formulas normally used to take account of life expectancy or any other actuarial element. Normally, the calculation of the initial pension takes into account the retirement age, a certain number of contributions, the number of years for which contributions were paid, and some coefficient to reflect whether retirement is early or differs from some pre-established age. There is hence no comprehensive actuarial criterion.

More specifically, these features of defined benefit delivery systems lead us to ask whether the RR obtained by comparing the initial pension with the last wage is in

line with the aim of ensuring an adequate pension or the sustainability of the system, or, alternatively, to determine which of the two aims is closest to reality.

In view of the disadvantages of the RR as normally applied, in this article we shall first analyse how the RR would have to be determined in order to serve as a true indicator of the adequacy of pensions, and then try to answer the question of which type of RR would ensure that the system was sustainable. Comparison of these values with the value of the real RR calculated according to the OECD definition will show, between these, which is the pension system's implicit goal: adequacy or sustainability.

Our approach is based on the assumption that adequacy, measured in terms of the RR, is an objective to be achieved by every pension system, so that, if the system is sufficient, it serves the aim that its definition implies: protection against poverty and economic stability to cope with expenditure once the individual retires.

Determination of the Replacement Rate based on internal factors to ensure adequate pensions

To obtain the RR that ensures adequate pensions, calculated on the basis of internal factors, let us start with equation (1).

As regards the final wage, it is assumed that this is known, using aggregate data, such as those from a wage survey. Average or median values or an interval scale could be used.

The initial "sufficient" retirement pension will be calculated on the basis of the actual expenditure of retirees obtained from a specific survey. To determine its value we shall use the equation that makes the current actuarial value of pensions equal to the current actuarial value of the expenditure of retirees, and this can be increased by some arbitrary amount of available resources or savings, which may be set as a percentage of the expenditure. This provides the initial pension that makes it possible to cover expenditure during the retirement phase. As stated above, it would also be possible to apply a percentage of the mean or median value, or one from an interval scale.⁴

The final equation would have to be stated as:

$$P_0 \beta^{a_{xj}} = G_0 \alpha^{a_{xj}} \quad (2)$$

where:

$\beta^{a_{xj}}$: Current value of a single annual income that is life-long, payable henceforth, increasing geometrically at an annual rate β , for an individual of age x_j .

4. Some criterion related to the relative poverty threshold could also be used, which can be defined as 60 per cent of the median disposable income in each country.

β : Annual revaluation index of the initial retirement pension. This could be based on wage growth, inflation, some specific indicator⁵ or a combination of the above.
 x_j : retirement age.

G_0 : Initial annual expenditure of retirees, which may be increased by some amount, for example, to take account of the use of savings. It can be obtained from any specific survey.

$^{\alpha}a_{x_j}$: Current value of a single annual income that is life-long, payable henceforth, increasing geometrically at an annual rate α , for an individual of age x_j .

α : Cumulative annual variation in expenditure. The Consumer Price Index (CPI) could be used, or a specific CPI for retirees, or it could be obtained from real data on expenditure of retirees.

Based on the above, it is only necessary, in equation (1), to replace the value of the initial “sufficient” retirement pension as determined by equation (2), to obtain the appropriate RR, RR_a :

$$\frac{RR_a = G_0 {}^{\alpha}a_{x_j}}{W_f {}^{\beta}a_{x_j}} \quad (3)$$

This gives an adequate RR, obtained from endogenous factors in such a way that, depending on the expenditure scheme used, we obtain a minimum, average, or median RR, or one based on an interval scale.

This would apply to a single individual, whereas to obtain the RR_a under a specific system it is only necessary to use aggregate data.

Comparison between the RR_a estimated by the previous procedure, and the real RR (RR_r) provided by the system, calculated according to OECD methodology, will indicate how close to or far from providing adequate pensions the system actually is:

- If $RR_a \geq RR_r$, it is not necessary to revise the pension system, as this would indicate that the system provides adequate pensions, although this may or may not be sustainable.
- If $RR_a < RR_r$, it is necessary to analyse to what extent the value of the RR could be increased by satisfying some additional condition, such as: maintaining the system’s index of sustainability, or decreasing its sustainability up to a certain limit, etc. It should also be emphasized that there is the possibility of modifying a system parameter to obtain the desired RR.

5. In the case of Spain, the Pension Revaluation Index (IRP) could be used, which is obtained as an arithmetic average, calculated over an eleven-year period, of the values of the variables involved in calculating the financial balance of a pension system. Its objective is to adjust expenditure to income in order to achieve a zero deficit. On this topic, see Devesa Carpio et al. (2015).

Determination of the Replacement Rate based on endogenous factors to ensure sustainable pensions

In this case the aim is, based on endogenous factors, to obtain the highest RR possible that is compatible with ensuring that pensions are sustainable. However, given that any change in the RR would only apply to new pensions and not to the totality of the benefits paid by the system, our objective will be to determine the RR that makes the set of initial retirement payments in a given year sustainable. This means that although different indicators can be used to measure the sustainability of a pension system, some of them, for example the Structural Budget Deficit,⁶ cannot be used because their calculation only makes sense if all the pensions in the system are considered, and not only those of new retirees.

However, the following sustainability indicators can be used for the purposes of our study:

- *The internal rate of return (IRR)*. The IRR is an actuarial indicator⁷ that is defined as the real interest rate that sets the current actuarial value of the benefits equal to the current actuarial value of the contributions, expressed in real terms, that is, after discounting for inflation. In this case, the sustainable RR will be determined by an initial pension value that makes the IRR equal to estimated gross national product (GNP) growth.⁸

- *Notional accounts system*. In this case, we will approach the definition of a sustainable RR by replicating a system of notional accounts, that is, relating the RR to the contributions that have actually been paid into a pension system, their revaluation based on a certain notional index, and the subsequent transformation of the accumulated virtual fund⁹ into the amount of the initial pension, using an actuarial operator such as life expectancy or a life annuity (whether increasing or not). This method could be termed “mixed”, since it includes a financial and an actuarial element. In this way we are linking a defined contribution system, such as the system of notional accounts, with a defined benefit system, which is the subject of this study.

The following subsections analyse how to define the sustainable RR based on these indicators.

6. The Structural Budget Deficit can be defined as the cash deficit of the pension system, corrected by the economic cycle.

7. Defined as an actuarial indicator since it takes into account the entire life cycle of a group of individuals, adjusting the amounts by interest rates and by probability.

8. For the relation between IRR and GNP, see Samuelson (1958), or Jimeno and Licandro (1999).

9. This term is used because the contributions are an element of accountancy and are not paid into a financial account where interest is received.

IRR and RR

The aim of defining a sustainable RR based on the IRR could be approached as an optimization problem whose objective is to maximize the RR, on condition that the IRR of the system is less than or equal to the average annual variation in expected GNP (GNP_m), which is the necessary condition for sustainability:

$$Max : RR = \frac{P_0}{W_f} \tag{4}$$

where: $IRR \leq GNP_m$

However, given the structure of the problem posed, the optimal solution will always be found where the two sides of the restricting condition are equal ($IRR = GNP_m$), which makes it possible to approach this optimization problem in three steps.

First step. Obtain the IRR using the following equation of actuarial equivalence:

$$\sum_{k=1}^N \sum_{t=x}^{x_j-1} C_{t,k} (1 + IRR)^{x_j-t} x_{j-t} P_t = \sum_{k=1}^N \sum_{s=0}^{\omega-x_j} P_{0,k} (1 + \beta)^s (1 + IRR)^{-s} {}_sP_{x_j} \tag{5}$$

where:

$P_{0,k}$: Initial retirement pension for individual “k” as calculated using the system under discussion.

IRR: Internal Rate of Return.

$C_{t,k}$: Contribution of individual “k” over time “t”.

x_j : Retirement age.

N: Number of initial retirements.

${}_sP_t$: Probability that an individual of age “t” survives for “s” years, or attains the age “t+s”.

β : Annual revaluation index of the initial retirement pension.

However, for the reasons indicated above, our aim is to determine the RR that makes the total of all retirement payments made in a given year sustainable, and the first member of the last equation could then be rewritten, making all possible values for the probability of survival equal to unity, since we are dealing with individuals who have survived until their retirement date. However, the probabilities in the second member of the equation must be maintained, since we are performing a valuation at the very moment of retirement, and it is not therefore known how long they will survive. Therefore, the equation to verify the necessary IRR would be as follows:

$$\sum_{k=1}^N \sum_{t=x}^{x_j-1} C_{t,k} (1 + \text{IRR})^{x_j-t} = \sum_{k=1}^N \sum_{s=0}^{\omega-x_j} P_{0,k} (1 + \beta)^s (1 + \text{IRR})^{-s} P_{x_j} \quad (6)$$

Second step. Using equation (6) and making the IRR equal to GNP_m , we would obtain the value of the initial pension for each individual, which would have to be adjusted by some method to satisfy the aggregate equation of equivalence. In this case we have opted to apply the same coefficient, γ , to the amounts of all the pensions initially obtained.

$$\sum_{k=1}^N \sum_{t=x}^{x_j-1} C_{t,k} (1 + \text{GNP}_m)^{x_j-t} = \sum_{k=1}^N \sum_{s=0}^{\omega-x_j} \gamma * P_{0,k} (1 + \beta)^s (1 + \text{GNP}_m)^{-s} P_{x_j} \quad (7)$$

where:

GNP_m : Annual average variation in expected GNP.

γ : Coefficient of adjustment used to achieve the aim of making the IRR equal to average GNP. A value for γ that is less than 1 would indicate that, before such adjustment, the system is actuarially unsustainable.

This gives the system's average sustainable initial pension, P_{0s} :

$$P_{0s} = \frac{\sum_{k=1}^N \gamma * P_{0,k}}{N} \quad (8)$$

This value of the average sustainable initial pension maximizes the RR on condition that the system is actuarially sustainable, although financial imbalances may appear, since this is still a general average premium system, and is therefore exposed to the usual risks of such systems, such as demographics.

Third step. Based on these first two steps, it is then only necessary to substitute, in equation (1), the value of the average sustainable initial pension determined in equation (8), which gives the sustainable RR (RR_s) of the system:

$$\text{RR}_s = \frac{P_{0s}}{W_f} \quad (9)$$

A comparison between the sustainable RR (RR_s) as estimated by this procedure, and the real RR (RR_r) achieved by the system, calculated according to the OECD methodology, will show how close or far the system is from providing sustainable pensions:

- Where $RR_s \geq RR_r$, there is no need to revise the pension system, since this would indicate that the system already provides sustainable pensions, although these may or may not be adequate.
- Where $RR_s < RR_r$, the system would be providing unsustainable pensions, and it would then be necessary to review some system parameter to ensure its sustainability.

Notional account systems and the RR

Notional account systems¹⁰ are characterized as general average premium systems with defined contributions. This allows the RR to be set directly on the basis of the contributions actually made to the system, their revaluation, and the conversion factor used to calculate the initial pension.

The advantage of this method is that it implicitly takes into account the actuarial sustainability of the system, although financial sustainability is not fully guaranteed, since it is exposed to the risks inherent in a pay-as-you-go (PAYG) system.

First step. To calculate the accumulated fund of individual F_k at the time of retirement:

$$F_k = \sum_{t=x}^{xj-1} C_{t,k} (1 + r_a)^{xj-t} P_t \tag{10}$$

Since our aim is to determine the RR that makes the sum of all initial retirement pensions of a given year sustainable, the data for contributions may be regarded as certain, as a result of which all the probabilities would be equal to unity and the previous equation could be expressed as follows:

$$F_k = \sum_{t=x}^{xj-1} C_{t,k} (1 + r_a)^{xj-t} \tag{11}$$

Second step. To obtain the amount of the initial pension for any individual, “k”, by distributing their accumulated virtual fund on the basis of the conversion factor, fc_k , for that individual:

$$P_{0,k} = \frac{F_k}{fc_k} \tag{12}$$

This conversion factor is related to the number of years the individual “k” is expected to live. Various factors can be used: life expectancy, the current value of a constant or variable annuity, etc. In order to compare this with our

10. It is not our intention in this work to apply the proposed method to a system of notional accounts, but to replicate the technique used in notional accounts systems, since they are actuarially sustainable by “definition” and this hence enables us to define an adequate replacement rate that ensures that a defined benefit system is adequate.

discussion of the IRR (see section IRR and RR), we shall assume that the initial pension grows in geometric progression at rate β and that the valuation interest rate is r_p :

$$fc_k = \sum_{s=0}^{\omega-x_j} (1 + \beta)^s (1 + r_p)^{-s} P_{x_j} \quad (13)$$

This would be valid for an individual, while for the set of all initial retirement pensions for a given year, the average initial pension, P_0 , is obtained by aggregating the values for each individual and obtaining it from the following equation:

$$\sum_{k=1}^N P_{0,k} = \sum_{k=1}^N \frac{F_k}{fc_k} = \sum_{k=1}^N \frac{\sum_{t=x}^{x_j-1} C_{t,k} (1 + r_a)^{x_j-t}}{\sum_{s=0}^{\omega-x_j} (1 + \beta)^s (1 + r_p)^{-s} P_{x_j}} \quad (14)$$

where:

- F_k : accumulated virtual fund of individual “k”.
- r_a : Notional contribution revaluation index.
- fc_k : Conversion factor for individual “k”.
- $P_{0,k}$: Initial retirement pension of individual “k”.
- P_0 : Average initial retirement pension in the system.
- r_p : Interest rate applied to update the pension amount.
- N : Number of initial retirement pensions.

This is different from the case of the IRR, since now the initial pension is not adjusted, because the notional accounts system itself implicitly provides the level that pensions must have in order for the condition of sustainability to be met.

The average sustainable initial pension, P_{0S} , of the system can then be calculated:

$$P_{0S} = \frac{\sum_{k=1}^N P_{0,k}}{N} \quad (15)$$

As in the previous case, the sustainable RR can be obtained on the basis of the sustainable average initial pension, and then compared with the real RR of the system.

The value of the average sustainable initial pension obtained maximizes the RR, provided that the system is sustainable. However, as with the IRR, financial imbalances may occur, since this is still a PAYG system, for which a series of hypotheses have been established regarding the revaluation of the contributions

and the fund's conversion factor. This last factor may be an approximate value, such as life expectancy, or a value closer to actuarial criteria, such as a life annuity, the main drawback of which is that it is then necessary to set the technical interest rate and the estimated growth of the pension.

Determination of sufficient and sustainable RR values in the Spanish retirement pension system, based on endogenous factors

In order to analyse, on the basis of internal factors, the viability of the different methods of determining adequate RR and sustainable RR, as defined in the previous sections, we have chosen initial retirement pensions in 2014 in the Spanish public pension system.

The reference RR of the selected system has been calculated on the basis of the Continuous Survey of Working Lives¹¹ of 2014 (*Muestra Continua de Vidas Laborales* – MCVL), which provides data up to 2014. The average pension in the system in 2014 has been determined; for the final wage, S_p , we have opted to use different values to analyse variations in the RR. Data were taken from the Wage Structure Survey (EES),¹² the Tax Agency (AEAT),¹³ the Active Population Survey (EPA)¹⁴ and the MCVL.

To determine the RR corresponding to adequate pensions, two surveys have been used that provide information on the expenditure of retirees:

- Survey by the Edad&Vida (Age & Life) Foundation (E&V):¹⁵ carried out in 2015 and covering 828 individuals aged 65 or older. Its most important feature is that it provides average expenditure data for three age groups: aged 65–70; aged 71–79; and aged 80+.
- Family Budget Survey (EPF):¹⁶ published by the National Institute of Statistics of Spain (INE), which provides a single average expenditure figure for all retirees. In the case of the Family Budget Survey, equation (3) can be applied, but in the

11. The MCVL is a random sample, not stratified, of 4 per cent of the individuals covered by social security in Spain. It provides information, inter alia, on monthly contribution bases and initial pensions under different benefits. See <www.seg-social.es/Internet_1/Estadistica/Est/Muestra_Continua_de_Vidas_Laborales/index.htm>.

12. Encuesta de Estructura Salarial (EES).

13. Agencia Tributaria (AEAT).

14. Encuesta de Población Activa (EPA).

15. This survey (E&V) is not published in its entirety, and was financed with aid granted to the research team for the 11th Edition of the Age & Life Award.

16. Encuesta de Presupuestos Familiares (EPF).

case of Age & Life, it would have to be adjusted, as in equation (16), in order to be able to use the data for the three age ranges:

$$RR_a = \frac{G_1 \sum_{s=1}^{xk+1-xj} (1+i)^{-s} {}_sP_{xj} + G_2 \sum_{s=xk+2-xj}^{xl+1-xj} (1+i)^{-s} {}_sP_{xj} + G_3 \sum_{s=xl+2-xj}^{\omega} (1+i)^{-s} {}_sP_{xj}}{S_f^{\beta} a_{xj}} \quad (16)$$

For the cumulative annual growth of expenditure, α , three values were used: 1.5 per cent, 2 per cent and 2.5 per cent.

For the cumulative annual growth of pensions, β , three values have also been used: 0.25 per cent, 0.75 per cent and 1.5 per cent.

For the interest rate to update capital, three values have also been applied: 1 per cent, 1.5 per cent and 2 per cent.

For the determination of the RR in the case of sufficiency, the MCVL of 2014 has also been used, based on a number of hypotheses, of which the following are highlighted:

- The number of initial retirement pensions recorded in the MCVL was 11,816. A total of 3,321 individuals were excluded because they distorted the global data as a result of their belonging to one of the following groups:

- Partial or flexible retirement: data describe only the initial partial retirement pension, but not the total amount that they will receive when they enter full retirement.

- Those who contributed, in addition to the Spanish system, to other foreign schemes: it is not known how much was paid in contributions outside Spain, and it was hence impossible to determine their entire contribution history.

- Those who receive, in addition to their retirement pension, benefits resulting from other contingencies, such as widows, orphans, and those receiving family benefits. The existence of a maximum pension amount makes it impossible to determine what proportion derives from retirement and which from other benefits.

- Individuals who have not paid more than 19 years of contributions have also been excluded: those with 19 years of contributions or less were able to complete calculation bases for periods prior to 1980, thus swelling the MCVL data.

- For GNP and the CPI, prior to 2015 historical data have been used.
- The contribution rate for retirement pensions used was 16.80 per cent, obtained by applying to 23.80 per cent (contribution rate for all common contingencies under the Spanish general social security scheme) the proportion of total pension expenditure (57.50 per cent) represented by retirement expenditure.

- A figure of 1.5 per cent has been used for future growth in the CPI.

Table 1. *Values of the main variables: Initial retirement pensions, 2014, Spain*

Variable	Value
Average annual initial pension	17,664
IRR	3.7261%
Average statutory base	20,030
Gross replacement rate (initial pension/statutory base)	88.19%
Coefficient γ	0.6537
Average annual initial pension where IRR=2.5%	11,547
Average annual initial pension, notional accounts	6,926

Source: Author's figures, based on data from the 2014 MCVL. Monetary amounts are in euros (EUR).

- For future data on the annual revaluation of pensions (IRP),¹⁷ values have been taken ranging from 0.25 per cent (the minimum under current regulations) to a maximum of 0.56 per cent in 2020.¹⁸

- For cases based on the system of notional accounts, the nominal GNP growth has been used to capitalize total contributions. The factor used to convert the accumulated fund into the initial pension was an average of current values of life annuities increasing in geometric progression. Use was also made of life expectancy, which gave very similar results.

- The mortality-survival tables used were the Swiss GR95 tables.

The values of the main variables are given in Table 1.

As Table 1 shows, all the variables indicate that the system under analysis (initial Spanish retirement pensions in 2014) is very generous, since:

- It offers an IRR of 3.73 per cent,¹⁹ much higher than average growth in GNP in Spain over the last 30 years, which was 2.5 per cent.

- The gross RR (calculated on the average statutory base) is slightly higher than 88 per cent, somewhat higher than that provided by the OECD, 82.10 per cent, and which has been included in Figure 1.

17. See footnote 5.

18. For actual figures, see Devesa Carpio et al. (2015).

19. In reality, the IRR of the system should be somewhat different from that calculated here, since on the one hand individuals have not been taken into account if they have contributed to the system but do not receive a retirement pension because they fail to meet any of the requirements; also excluded are individuals who contributed but who died before their retirement date (although in this case it is understood that their beneficiaries will have received widow, orphan, or family benefits); on the other hand, minimum complementary pension allowances have been included, which are financed out of taxation and not contributions. The combined effect of these factors is difficult to determine, but it would probably reduce the IRR.

Table 2. *Endogenous replacement rates: Initial retirement pensions, 2014, Spain*

Final wage used to calculate the RR	Current	Adequacy		Sustainability	
	System RR	RRa Expenditure E&V	RRa Expenditure EPF	RRs IRR=2.5%	RRs NA
Statutory base	88.19%	58.36%	71.92%	57.65%	34.58%
Average wage EES 2013 Aged 60–64	78.86%	52.19%	64.31%	51.55%	30.92%
Average wage AEAT 2014 Aged 56–65	71.85%	47.55%	58.60%	46.97%	28.17%
Gross wage EPA 2014 Aged 55+	57.40%	37.98%	46.81%	37.52%	22.51%

Source: Author's own calculations. NA = Notional accounts.

- The gross RR (calculated using the average statutory base pension)²⁰ is slightly higher than 88 per cent, somewhat higher than that provided by the OECD (82.10 per cent), and has been included in Figure 1.

- For the system to be sustainable – the criterion being that the IRR does not exceed the GNP growth rate of 2.5 per cent – initial pensions would have to be reduced by just under 35 per cent, which would bring the annual average pension in the system to EUR 11,547.

- If the philosophy of the notional accounts system were applied, the average initial pension would have to be reduced by 60 per cent, to EUR 6,926.

The different values for the RR are shown in Table 2.

In view of the data in Table 2, it can be concluded that the RR provided by the system is adequate to meet expected expenditure in retirement, under both the E&V and the EPF surveys.

However, the sustainability of the system is in question, since according to the IRR criterion, the RR, with respect to the Statutory Base, would have to be 57.65 per cent, and if the notional accounts criterion is applied, it would have to be lowered to 34.58 per cent.

There is a point of equilibrium, at which the RR would allow the system to be both sustainable – using the IRR criterion – and adequate, if we use expenditure figures from the E&V Survey, in which case the RR would have to be around 58 per cent. This would at once ensure adequacy and sustainability, but it would mean a reduction in new retirement pensions of 35 per cent compared to current levels.

20. This is the average of the contribution bases of the past few years, capitalized using a figure for CPI from up to two years before the date of retirement.

Conclusions

This article sets forth a model to determine the RR endogenously within the pension system. This accords the system's RR greater importance than it is usually granted by making it possible to compare it with the RR proposed in the developed model.

Moreover, the different RRs obtained endogenously enable us to discuss them in relation to the two most important objectives or features of any pension system: sustainability and adequacy.

The key is to compare the RR of a given pension system not only with the RR that would ensure that retirees will be able to meet their projected expenses, but also with the RR that would ensure the sustainability of the system. In the latter case, the comparison has been made with respect to two points of reference: the maximum IRR that a defined benefit PAYG scheme can offer, and that which would be obtained if a system of notional accounts was applied; that is, a PAYG scheme with defined contributions.

Adequacy and sustainability are two interrelated objectives and, although in principle they might be regarded as mutually opposed, this is not necessarily the case, since the maximization problem posed above can be solved by applying the restricting condition of making them equal, which makes solving it much easier, since this is sufficient to solve what is an actuarial problem.

These considerations lead us to believe that it is very useful to compare the RR provided by the system with endogenously determined RRs, in order to determine whether the current design of the system analysed moves it closer to either of its fundamental objectives.

It has also been interesting to apply the model to a specific case – that of initial retirement pensions under the Spanish pension system in 2014.

As shown by the data obtained, the Spanish system is very generous because it offers an RR close to 90 per cent, which is sufficient to meet the expected expenses of retirees. In contrast, however, the sustainability of the system would be challenged by the major difference between the RR of the system itself and the RRs offered by the two methods used here, based on the IRR and on the use of notional accounts.

It can hence be seen that the Spanish system is clearly favouring adequacy and sufficiency, but is endangering its own sustainability.

However, it is worth noting that there is a point at which adequacy and sustainability can both be satisfied, which is when the RR is around 58 per cent. At this level the system could cover the expenditure of retirees obtained from the E&V Survey while at the same time making it possible for the IRR of the system not to exceed its upper limit of 2.5 per cent. The price to be paid for this achievement would be to reduce the initial pensions under the system by 35 per cent.

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Analysis of the implementation of a social protection initiative to admit the poorest of the poor to mutual health funds in Burkina Faso

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Abstract To enable mutual health funds to extend coverage to poor people, the Mutual Health Support Network (*Réseau d'appui aux mutuelles de santé – RAMS*) in 2012 launched an initiative in collaboration with the Ministry of Social Action and Solidarity (*ministère de l'Action sociale et de la Solidarité nationale – MASSN*) in Burkina Faso. This article reveals difficulties in the initiative's implementation, which resulted in the continued exclusion of poor people from health services. Poor people were required not only to make co-payments, but also to accept a limitation of coverage to three episodes of illness per year. Additional challenges to service takeup were the geographical distance of the homes of some beneficiaries covered by a mutual fund agreement from a health centre and the failure by some health workers and managers of pharmacies to recognize the mutual membership card. A formal framework was lacking that brought together all the

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actors involved in planning and implementing the initiative. Those involved did not all have the same information. Each structure performed the tasks within its scope, according to its own interests, but without consulting the other parties, and there was no platform for discussing implementation difficulties.

Keywords mutual benefit society, health insurance, social protection, social economy, poverty, social security planning, Burkina Faso

Introduction

The issue of social protection is becoming more and more acute in African countries. In recent years, countries in Africa have aligned themselves with the global health agenda by taking initiatives to formulate and implement policies that address universal health coverage (UHC) (Lagomarsino et al., 2012; WHO, 2010). The purpose of these policies is to provide all residents with access to quality health care based on their needs and without the risk of impoverishment (Evans et al., 2013). But there is no single solution for achieving UHC (Reich et al., 2016; WHO, 2010). For the moment, in Africa, UHC is built on a combination of a number of strategies and funding methods: (i) exemption from payment of fees for certain benefits (childbirth, caesarean section) or for certain target groups (children younger than age five); (ii) compulsory health insurance for workers in the formal sector (public and private); (iii) voluntary health insurance through mutual health insurance schemes for non-salaried workers and those in the informal economy (Kelley et al., 2014; Ridde et al., 2014)

With a view to improving social protection health care through UHC, since 2008 Burkina Faso has begun a process of organizing universal health insurance (*assurance-maladie universelle* – AMU) (Zett and Bationo, 2011; Agier et al., 2016). The national social protection policy adopted in 2012 demonstrated a determination to apply mutual health insurance as a solution for the health coverage of workers in the informal and agricultural sectors and for low-income populations (PNPS, 2012). According to the International Labour Office (ILO), a “mutual health fund is a voluntary non-profit association whose functioning is based on solidarity among its members. On the basis of the decisions of the latter and by means of their contributions, the mutual fund acts on their behalf and on behalf of their families to promote their welfare, mutual assistance, and solidarity

in the field of social risks” (ILO, 2003). Mutual health insurance, or community-based health insurance, emerged in Africa in the early 1990s under pressure from external partners (Waelkens and Criel, 2004; Adebayo et al., 2014). The advent of UHC, which involves strategies adapted to each category of the population, has aroused interest in mutual health schemes among governments. For example, Ghana and Rwanda have supported the establishment of “progressive compulsory membership” schemes (Letourmy, 2008; Agyepong et al., 2016). However, in French-speaking West Africa, the uptake of such mutual schemes has never reached more than 10 per cent of the target population (De Allegri, Sanon and Sauerborn, 2006). For instance, the accession rate was 4.5 per cent in Benin in 2007 (Ridde et al., 2010; Haddad et al., 2012) and 8.6 per cent in Burkina Faso in 2009 in the Nouna health district (Robyn et al., 2012b).

Despite their low uptake, mutual health care schemes are improving the use of health services by their members (Acharya et al., 2012; Mebratie et al., 2013; Boidin, 2015). In Mali, members of mutual schemes were more likely to use health services to treat fever and diarrhoea in children (Franco et al., 2008). The Hygeia Community Health Care (HCHC) programme in Nigeria has increased health care utilization by more than 15 per cent on average (Gustafsson-Wright, van der Gaag and Tanovic, 2013). In addition, mutual health care schemes have improved access to preventive and curative child care in Rwanda (Binagwaho et al., 2012).

Despite this positive impact on the use of services, mutuals remain inaccessible to those who do not have the financial capacity to cover membership fees, annual fees, or co-payments. Mebratie et al. (2013) argue that community insurance schemes improve the use of health care by their members, but fail to improve the inclusion of the poorest. Alatinga and Fielmua (2011) show that mutual health organizations (MHO) improve access to care for the rural poor in Ghana and that the use of mutual health services is three times higher than that of non-mutuals. However, other studies confirm that the Ghanaian insurance system is not pro-poor, even though the poor are exempt from the admission fee (Sarpong et al., 2010; Jehu-Appiah et al., 2011; Kusi et al., 2015; Williams et al., 2017). In the United Republic of Tanzania, households in the government-initiated community insurance programme were more likely to receive treatment for disease (Msuya, Jütting and Asfaw, 2007). However, the poorest were unlikely to join, even though the district council was supposed to cover in full the membership fees of those who were exempted. The village council had difficulty in granting exemptions, since they wished to encourage membership through payment.

In Burkina Faso, experience of mutual health schemes is only recent. Several operational difficulties are faced, including the low degree of affiliation and lack of equity in membership. In 2011, there were 181 mutuals with only 260,000 beneficiaries, representing a national coverage rate of 0.01 per cent of the population (Zett and Bationo, 2011). Research on community insurance in the town of Nouna

in the province of Kossi found that fewer poor people were registered than others because they lacked the financial capacity to pay the admission fee (De Allegri, Sanon and Sauerborn, 2006; Dong et al., 2009). An improvement in the use of outpatient services was observed only among wealthy households (Gnawali et al., 2009; Hounton, Byass and Kouyate, 2012; Parmar et al., 2014). A subsidy of 50 per cent of the cost of the admission fee was accordingly introduced for the poorest. This increased the annual membership from 18 households (1.1 per cent) in 2006 to 186 (11.1 per cent) in 2007 (Souares et al., 2010).

To our knowledge, this was the only example in the country until 2012, as most promoters of mutuals do not take measures to exempt the poor from paying contributions. This observation was made by the Mutual Health Support Network (*Réseau d'appui aux mutuelles de santé – RAMS*), which has been supporting around 30 health mutuals since 2000 in nine provinces of the country. Thus, in the interests of equity, in order to allow mutuals to cover the poorest, the RAMS 2012 launched a new initiative, in collaboration with the Ministry of Social Action and National Solidarity (*ministère de l'Action sociale et de la Solidarité nationale – MASSN*), whereby the latter was to finance the admission of the poorest to mutual health schemes, including the payment of membership fees for 4,800 beneficiaries in nine provinces. The aim of this research is to analyse the implementation of this initiative in two provinces of the country.

Analysis framework

For this analysis, we were inspired by the use of the theory of “currents” in public policy (Ridde, 2009; Lemieux, 2002; Kingdon, 1984). Action to assist the poorest is considered a public policy, as interpreted by Lemieux (2002), since the actors involved have mobilized resources to support measures to solve a problem; namely, the exclusion of the poor from access to health services. Lemieux (2002) describes the process of putting public policies into practice as involving three sub-processes. This analysis focuses on implementation, while the two other processes, namely emergence and formulation, are analysed in a separate article (Kadio et al., 2017).

For Kingdon (1984), the implementation of a public policy is neither a linear process nor a “rational choice” in which actors know what they want. He suggests that it is rather a complex process, resulting from the presence of three independent but related currents: problems, solutions, and directions.

The **problem current** is the process whereby a situation at some point receives major attention and becomes a problem. Ridde (2006) demonstrates in Burkina Faso that a long-standing situation becomes a public problem when the actors feel concerned by it, become aware of its importance, and know its causes and

consequences and the people affected by it. In addition, events, crises, symbols, opportunities for feedback, and stakeholder values help to focus attention on a situation that eventually becomes a problem. The **solutions current** refers to the knowledge and perspectives that can be mobilized to solve a problem. The current of solutions can be likened to a reservoir of knowledge in which ideas are born and die (Kingdon, 1984). The choice of solutions is associated with ideas that are compatible with community values and budgetary constraints, and must be approved by the public and elected officials. Finally, there is the **current of orientations**, which is based in particular on “ideas whose time has come and which are in the spirit of the time” (Lemieux, 2002). This current also concerns political opinion, change, and social movements. The role of the stakeholders is central to the theory of currents. They can assume the role of political entrepreneurs to exploit windows of opportunity (Ridde, 2009; Lemieux, 2002).

Kingdon’s central proposition is that public policy emerges when there is a meeting between the current of problems and that of orientations, provoked by a political entrepreneur at the moment when an opportunity appears (window). By extending this interpretation, Lemieux and Ridde have demonstrated that the formulation is the meeting of the current of solutions and orientations, while implementation corresponds to the coupling of solutions and problems (Ridde, 2009; Lemieux, 2002). In all cases, the third current remains present. The application of current theory to implementation has already been possible in the context of Burkina Faso (Ridde, 2009), and we have shown in another article that this offers a rich basis for understanding the emergence and formulation of such policy (Kadio et al., 2017). We are hence now in a position to extend this analysis to study the implementation phase.

It is recalled that the results concerning emergence and formulation highlighted the ambiguity of the chosen solution, which did not explicitly address the benefits of the scheme’s members. Nevertheless, we assume that the operationalization of this solution in the implementation phase implies the exemption, for poor people, from any payment for health care in the form of fees for their admission to mutual health insurance. This must be achieved through the “exemption” from membership fees and co-payments charged at the point of service. Indeed, the actors recognized that exemption from any payment was the best solution to reduce exclusion from access to health services (Kadio et al., 2017).

Our starting hypothesis was as follows: the implementation of the initiative is explained by the coupling of the solutions current (exemption) with the problems current (exclusion of the poor). However, the collection of data to study emergence and formulation revealed major implementation challenges. From the perspective of the theory of currents, we have therefore formulated an inverse hypothesis to understand why the exemption of the payment of services for the poor did not work:

The policy was not implemented, since the exemption from payment for health services was not organized, because there were no political entrepreneurs or windows of opportunity to bring the solutions current into contact with the problems current.

Methodological approach

Our research borrows from the case study approach (Yin, 2008). As a reasoned choice, we selected two of the nine provinces that implemented the programme in order to diversify the situations studied by including a very rural area (Kaya) and a very urban one (Ouagadougou). The rural area, which is in the province of Sanematenga (capital city, Kaya city), was chosen because we conducted a research programme there in 2011. We selected all seven mutuals in the province. Kadiogo Province (Ouagadougou, capital of Burkina Faso) is home to the largest mutual supported by the RAMS in terms of the number of members. It is also the most professional, with a board of directors and employees.

We collected discursive data using interview guides covering four themes: (i) the organization of actors for implementation, (ii) the beneficiary selection process, (iii) the factors that favoured or affected the use of services, and (iv) the actors' perception of implementation. Data was collected from the stakeholders involved in the programme's implementation in both provinces. A total of 57 detailed individual interviews (27 in Ouagadougou and 30 in Kaya) were conducted, fully transcribed and analysed. In addition, the documentary analysis using a reading grid enabled us to make use of the records for each group of actors (activity reports, press clippings, MASSN orientation documents, and the Ministry of Health). The content analysis method (Paillé and Mucchielli, 2012), using the analysis framework inspired by the theory of currents, made it possible to organize the actors' statements. Data were collected between 5 August and 24 December 2013. The research was authorized by the Health Research Ethics Board of Burkina Faso and the CRCHUM Ethics Committee in Canada.

Context for the development of the initiative and the problems current

A previous article (Kadio et al., 2017) has shown that the actors involved in the initiative perceive the exclusion of some Burkinabe from health services as a public problem requiring action by the State. In fact, poor people have always been excluded from health services. This long-standing situation became a problem when it attracted attention and the actors became aware that appropriate measures could be organized. The actors involved in the initiative

were aware of the scale of the phenomenon and its consequences. They named the people and groups affected by exclusion, and felt very close to them and even personally concerned. Senior MASSN staff, social workers and health professionals, as well as RAMS and MHOs, realized that the situation could change in the light of their feedback efforts to inform decision-makers. In addition, any responses or action to change the situation were in line with their values. As a political entrepreneur, RAMS sent a request for partnership and for a grant to MASSN. This request met with a favourable response to cover the needs of poor households. The desire of the government at the time (2012) to show greater solidarity with the poor (social discontent, protests against the cost of living) had strengthened the MASSN's interest in a partnership. The MASSN accordingly asked its Directorate General for Solidarity (*Direction générale de la solidarité* – DGNS) to allocate resources to the RAMS to cover health care for the poor through mutual health schemes. The solution adopted after discussions in the minister's office in June 2012 was to award a grant of CFA francs 25 million (XAF) to RAMS. This amount was supposed to make it possible to admit (without further technical details) 1,200 households as members of mutual health schemes affiliated to the RAMS, with four beneficiaries per household. The goal was to remove the financial barrier to access to health services when needed, but that was the only direction given by officials on how to achieve this.

The process of implementing the solution

To implement the initiative, the DGNS proposed a beneficiary distribution key. It had planned to cover 20 households for village mutuals, 80 households for mutuals in semi-urban communes, and 200 households for urban communes. In total, social services drew up a list of 230 households (920 beneficiaries) in Sanematenga province and 200 households (800 beneficiaries) in Kadiogo province.

The process of passive selection without resources

The selection of beneficiaries was entrusted to the MASSN, which through its provincial and communal directorates proceeded to select poor people. MASSN alone coordinated the identification process, without involving the RAMS or mutual health insurance schemes. The argument put forward was that the MASSN's decentralized services already had lists of disadvantaged people who could benefit from the initiative. Indeed, as part of their daily activities, social services continuously record people who come to seek assistance. Many poor people regularly enrol with communal and provincial social services.

Social workers from the Kadiogo communes followed the recommendations and established the list of poor people using the register of those who said they were disadvantaged in order to select the beneficiaries:

They were vulnerable people who visited the social services here. They are well-known people who have been visiting the services for a long time. We have a certain amount of information about these people. (ASK–SN)

The destitution suffered by some of them was well known, since they were beneficiaries of the social services programme. They had been the subject of a social survey. According to one social worker, health care could help improve the performance of existing programmes:

The solidarity fund had granted loans to some people for them to engage in income-generating activities to support themselves. We also realized that this poses a lot of problems. If two children get sick during the period of the loan, the money is gone. So when we had the opportunity to identify families, we decided to prioritize those people. (ASK–NM)

The Provincial Directorate of Sanematenga Social Services (*Direction provinciale de l'action sociale* – DPAS) proposed a list of beneficiaries for the seven mutuels. The social workers used the register of the poor to choose the beneficiaries. They claim to have compiled the lists without further enquiry in their office as a result of the lack of resources to carry out a social survey.

There was no means of transport available to identify the beneficiaries. Normally if there had been a means of transport it would have been necessary to conduct a social survey. We had no fuel, we had no phone credits, we were given nothing. So we said that, since that's the way it is, I will stay in my office and draw up a list. (AS–S1)

In addition, they felt they were not given enough time to make a good selection. In a hurry to compile lists, they turned to the records of vulnerable people available.

Within the space of a week, you are asked to identify 80 people with nothing [no resources]. In the case of a social survey, one has to visit the family to appreciate their living conditions before deciding. So we used what tools we had, including our records of the destitute who visit regularly for foodstuffs. (AS–S2)

Sometimes they used associations of vulnerable people:

As I am the President of the disabled [association] here, we collaborate. The Ministry of Social Action asked us to select disabled people near me or elsewhere so that we can help them. (Beneficiary S1)

Criteria for the selection of beneficiaries and enrolment process

The selection criteria used in the two provinces are not known. However, the desire to include various categories of vulnerability seems to have guided the selection of the Sanematenga DPAS. A mutual scheme manager explains:

Take the example of Kaya. There, they touched all those in need: the elderly, the physically handicapped, people living with HIV, retired people.

This pattern of egalitarian distribution by category of vulnerability often led to the selection of people who were not destitute, according to the president of a health mutual.

The pensioners selected were not poor people, since they have a pension, so that means it was not very well done. We saw people in the list who were better off than the president of the mutual. (Mut-S1)

MHOs were not involved in the selection process. A Sanematenga mutual manager confirms this:

We were not involved; we were only informed when the initiative was launched. (Mut-S3)

This situation led to the targeting errors noted by some mutuals. The selection did not take into account the place of residence. Thus, some beneficiaries lived in areas where there was no RAMS mutual. Others lived more than 20 kilometres from any health facility that had signed an agreement with a health mutual. Thus, by agreement with the social services, the list was revised.

At the end of the selection process, the RAMS organized meetings with stakeholders to inform and sensitize the beneficiaries about mutuality, how to use the card, and their rights and duties regarding the mutuals admitting them. The beneficiary households were then enrolled into mutual health insurance schemes and received membership cards with the same rights as any other member for a period of 12 months.

The mutual of Kadiogo Province (Ouagadougou) registered 686 people out of a list of 800 beneficiaries proposed by the DGSN. The seven mutuals in Sanematenga province registered 680 out of a total of 920 beneficiaries proposed by social services. Indeed, some people refused enrolment, considering that the conditions of coverage by the mutual were not adequate. Other selected beneficiaries could not be registered because they could not be found, being “without a fixed abode” or drifters.

Coverage and use of health services by beneficiaries

In the province of Sanematenga, care was limited to services in Health and Social Promotion Centres (*Centres de santé et de promotion sociale* – CSPS), that is, access to consultations and generic essential drugs (*médicaments essentiels génériques* – MEG) available in the main health facilities. General medical check-ups were excluded. A beneficiary explains:

They said we did not have access to hospitals. They should also make an effort to add specialties [specialty medication]. (Beneficiary S2)

This limitation to primary health care was inadequate for the needs of certain beneficiaries such as people living with HIV and those with chronic disease (diabetes, high blood pressure, epilepsy).

The Kadiogo mutual covered hospital care and basic medical examinations (stool and urine tests), without reimbursing specialty drugs. A beneficiary recounts her experience:

I went to the hospital. My eyes were hurting. I went there, I was given a prescription. And when I went to the pharmacy [referring to the MEG repository], they told me that these are specialty drugs, and that they do not cover such medications. (Beneficiary K1)

Moreover, all the beneficiaries of the two provinces had to make a co-payment of 20 per cent to 30 per cent of the total amount of the services depending on the mutual covering them, except for a single mutual in Sanematenga which covered all the expenses.

I went to the clinic, the fees were XAF 2,000; they made me pay XAF 600. (Beneficiary K1)

The provision of services to beneficiaries varied according to the health facility, the health worker, or the manager of the pharmaceutical depot. Beneficiaries were denied services. A Kadiogo beneficiary explains:

At S1 CSPS and P1 CMA, they said they had not been informed. They refuse the card, so we have to pay the costs. (Beneficiary K1)

Another beneficiary from a rural commune in Sanematenga adds:

I only used my card once. The manager refused to give me the drugs, which meant I had to get some money and go back. (Beneficiary S3)

Beneficiaries believe that this attitude of refusing to recognize the mutual fund card is a matter of bad faith on the part of health workers and pharmacy managers. The words of a Sanematenga beneficiary illustrate this:

When we go to get the drugs we have the impression that the manager does not want to see the card. And sometimes he tells us that he does not work for the moment on such cases. However, we know that in order to decide to give us cards and even to give us permission to come and obtain treatment in the CSPS, it is because there have been consultations with them. So sometimes this makes some people hesitate to use their cards. (Beneficiary S4)

Some service providers (health workers and pharmacy managers) claim that they have not been informed of the mutual scheme arrangement. One of the reasons given is the mobility of health personnel. For a nurse:

The difficulties are the changes in staff. There may be newcomers who are not aware, so it is not obvious. (ICP K21)

In contrast, treatment is offered in other health facilities without major difficulty. These are health centres with a long tradition of working with mutual schemes. A health worker from a Kadiogo hospital explains:

No problem. Even when the person shows up without the card and you prescribe using an ordinary prescription, the pharmacy accepts it because the manager already has the list of mutual members who are up to date with their contributions provided by the mutual. (Health worker K30)

Whether in Kadiogo or Sanematenga, beneficiaries were entitled to care for up to three episodes of illness in the same year. In the fourth episode, they were forced to pay the full costs. In Sanematenga, the mutuals provided an opportunity to use the cards of other members of the household who had not yet exhausted their entitlement.

Some could not use their mutual insurance card because their village was not near a health centre having an agreement with a health mutual. Health care was impossible in such cases because the beneficiary was unable to visit the health facilities in question (long distance). In addition, co-payment and non-recognition of the card by some health workers and pharmacy managers limited the use of services. In sum, implementation of the initiative suffered from a lack of consultation and a lack of communication. It lacked a formal framework bringing together all the actors to plan and execute it. Stakeholders did not enjoy access to the same information on content and implementation. Each actor performed the tasks within their competence, according to their interests but without consulting others. There was no context in which it was possible to discuss implementation difficulties.

Matching problems and solutions

Our hypothesis was that exemption from payment for health services did not work because there were no political entrepreneurs or windows of opportunity to allow the solutions current to be matched to the problems. In this empirical research, implementation consists in the organization of the solution (the contribution subsidy), which was supposed to help solve the problem of the exclusion of the needy from health services. The removal of direct payment from point-of-service health care is recognized as facilitating access to health services (Kadio et al., 2017). For example, the government's grant of XAF 25 million to health mutuals was intended to remove the financial barrier and improve the access of poor people to health services. However, the results showed that the initiative made it possible to admit poor people to mutual health insurance, but did not solve the problem of their exclusion from health services. There was therefore no meeting of currents, since implementation was defective and the solution of abolishing direct payments was not applied.

Why did the actors involved not take measures to ensure full exemption from payment?

Implementation of the initiative made it possible to identify poor people without guaranteeing them access to the health care they need. Their admission to membership of the mutuals did not fully remove the financial barriers, even though this was the solution advocated. Identified beneficiaries could not easily use the health services when needed, since financial constraints related to services remained (co-payment, etc.). However, to improve the coverage of the poor, the cost of co-payments should be included in the contribution subsidies paid for each beneficiary, as was the case in Senegal (Diop and Ba, 2010; Sow, 2007).

Absence of a political entrepreneur promoting exemption. It is recalled that the design of the initiative foresaw the affiliation of poor people to mutual health care schemes so as to promote the use of health services, but did little to specify how this should be organized (Kadio et al., 2017). The details of the initiative were not set out clearly. For instance, the exemption from payment of membership fees and annual contributions was more or less clear. Yet, questions concerning co-payments, medical examinations and check-ups, specialized care and specialized medicines were not raised by anyone. Nor were these aspects discussed by the actors during the design phase as a basis for choosing a suitable solution. This ambiguity could have been avoided and could have led to a revision of the implementation process if an interested entrepreneur had taken

action. This was not the case. Indeed, the situation raises questions about the involvement of local actors in the implementation of policies in Africa. Local actors implement decisions made by central government. The initiative was formulated by the central government, which proposed a vague and ambiguous solution, which Matland (1995) would have called an experimental type of implementation. Without support from the central authority in a context where that central authority has a key role, local actors made choices and acted according to their understanding (Pressman and Wildavsky, 1984) and their room for manoeuvre (Lipsky, 2010; Ridde et al., 2018). In this context, the beliefs, commitment and resources of an entrepreneur are necessary for the implementation or adaptation of the solution. However, our research has shown that the actors lacked commitment and conviction to act to ensure full exemption.

The logic of “grabbing” mobilized by the actors. An analysis of the design showed that the decision-makers had a different perception of the solution (Kadio et al., 2017). For MASSN, a grant was awarded to admit poor people to coverage by mutual health schemes in order to remove all financial barriers and make health services accessible. For the health mutuals, affiliation enabled the destitute to join a scheme, and entitled them to all the benefits available to any other member in accordance with the mutuals’ principles of operation (exemption from annual contributions and co-payments). However, according to those principles, mutuals reimburse between 70 per cent and 80 per cent of the costs related to care and generic essential drugs available in the pharmacies of health centres, the rest being borne by the beneficiary (co-payment). The mutuals hence applied the same principles in the implementation of the initiative: they brought the practical application of the initiative into line with their values. Fear of having to pay costly benefits that damage the financial capacities of mutuals is the reason why they retain the co-payment system (Kadio et al., 2017). Direct payments by patients increase the receipts of health establishments, in a context where the latter are kept up to standard, which has an impact on the amount of the premiums paid to health professionals. It is therefore logical, in such circumstances, not to favour full exemption from payment. A similar observation was made concerning the Nouna Mutual in Burkina Faso. Robyn et al. (2012a) mention the need to secure the support of health workers by taking into account their preferences regarding payment arrangements so as avoid generating attitudes that may have a negative impact on the performance of a community insurance system. Ridde (2011) highlighted the logic of actors who favoured “immobility and the status quo rather than social change” in the context of implementing a policy aimed at achieving more equitable access to health care for poor people. Our results show that the logic of “grabbing” (Ridde, 2011;

Olivier de Sardan, 2007) was applied by mutuals and health professionals who were more attracted by the “maximization of their profits than by redistribution” (Ridde, 2011) to benefit the needy. RAMS disbursed financial resources for mutuals and monitored the implementation of the programme, with the aim of respecting the operating principles of mutuals. As a result, co-payments were maintained and poor people remained excluded. Mutual health insurance schemes increased their membership and their funds directly as a result of the grant made under this policy. In addition, the destitute are perceived as new members and their admission to coverage should not hinder, or endanger, access to care for members able to pay contributions. In Ghana, it was found that the staff and premium collectors of the local insurance schemes did not aim at equity. Their logic contributed to the exclusion of the poor. Insurance premiums in fact contribute significantly to the accumulation of funds that cover part of the operating costs of the local agencies. The funds so generated are a criterion on which to judge the performance of the schemes. Thus, the actors made choices that significantly reduced the number of exemptions and excluded the needy from health services (Kotoh and van der Geest, 2016; Derbile and van der Geest, 2013).

The interests and preferences of the actors involved resulted in a situation that was not favourable to the emergence of political entrepreneurs ready to work to ensure full exemption from payment for the destitute.

Targeting beneficiaries

The MASSN, which financed the initiative through a solidarity fund, decided that it would draw up the list of beneficiaries. This stage in implementation of the initiative enabled social workers and the MASSN to do their jobs, even on an ad hoc basis. Indeed, the initiative was created in part so as to enable the MASSN to play its role as the Ministry of National Solidarity and contribute to the implementation of the solidarity charter (Kadio et al., 2017). On the basis of the records available, the social workers proposed beneficiaries. The effectiveness of their targeting has been challenged by the mutuals, who believe that most beneficiaries did not have the profile of destitute people. Their view is that the targeting process excluded the poor in remote villages and those who had never used social services. This view concerning efficiency raises questions about the challenge of targeting beneficiaries in pro-poor initiatives in Africa. The limited evidence available on the issue (Morestin and Ridde, 2009) does not provide any consensus on the best course of action, whether in terms of the targeting process (community or administrative) or the targeting method (individual, geographic or by category) (Ridde et al., 2015). However, it is known that the participatory

community method has the advantage of enabling people with good knowledge of the environment to identify the poorest people in rural Africa (Jehu-Appiah, 2012; Simpore et al., 2013; Souares et al., 2010). But it did not prove applicable to urban Burkina Faso (Ridde et al., 2015). In urban areas, the expertise of social workers could be put to use, provided that the State provides the necessary means (Ridde et al., 2015). In this case, the social workers explain their confinement to their offices and the low degree of involvement of local associations (source of gaps in the targeting process) by the lack of material and financial resources and of time to make visits to identify beneficiaries. These resources are recognized as criteria that determine the successful implementation of an initiative (Gunn, 1978).

Enrolment of beneficiaries, an unused window of opportunity

Despite these shortcomings, the initiative enabled the MASSN to improve its performance indicators, including the number of clients recorded as having received assistance. Beyond its institutional objectives, it seems to us that the MASSN could have invested in promoting the objectives of the initiative. Although the exclusion of poor people is recognized as a public problem (Kadio et al., 2017), the results show that the provision of coverage for them through this initiative was not discussed in any concerted or collective way. There was no framework for discussing the factors limiting the use of services by the poor. This situation is not new. A similar finding was made regarding the subsidy policy for emergency neonatal obstetric care (SONU). The full exemption from payments related to childbirth for destitute women, provided for by the policy, was ineffective in most health districts and was not on the agenda in any discussion framework (Ridde et al., 2011; Belaid and Ridde, 2012).

The social workers did not seize the opportunity available when drawing up the lists or during the information meetings for beneficiaries to redesign the initiative. Indeed, during these meetings, some poor people identified by the social services clearly stated their inability to make co-payments in refusing admission to the mutual schemes. This attitude on the part of beneficiaries could be an expression of a lack of confidence in the initiative, as has been observed in Ghana (Aryeetey et al., 2013; Duku, van Dullemen and Fenenga, 2015). This refusal to participate could have been taken as an opportunity to propose new solutions with a view to the effective use of health services, without any barriers. The social workers did not do so and gave no excuse for not doing so. We think they must have felt unable to change a decision coming from above (since they were not involved in the design phase), or that they were complicit in demonstrating a logic of “avoidance” (Ridde, 2011) so as to avoid provoking a conflict with health professionals and the mutual schemes, who had an interest in maintaining co-payments.

It should also be noted that the actors involved in the design phase were not involved in the implementation: one criterion for successful implementation is the willingness of decision-makers to invest beyond the design phase (Bridgman and Davis, 2004). Empirical evidence shows that MASSN decision-makers, the main actors with RAMS in the design, were absent from the implementation, leaving each actor to act according to their own understanding. Perhaps the effective participation and involvement of MASSN decision-makers could have fostered opportunities for discussion with RAMS on the issue of co-payments and prescriptions? Their presence would certainly have made it possible to adapt the design to promote a meeting of currents. But only the agents (social workers), who are technicians, were involved. They confined themselves to executing the instructions of their superiors, an attitude shown elsewhere in Burkina Faso (Ridde, 2009).

In short, the opportunity available during the solutions current (refusal of membership cards during enrolment) could not be seized so as to favour a meeting of currents as a result of the logic of avoidance on the part of social workers and the absence of MASSN decision-makers.

Conclusion

With a view to expanding social protection, Burkina Faso adopted the UHC Act (*loi sur l'assurance maladie universelle*) in September 2015. This was a great social and political advance. Mutuals are recognized as management organizations operating by a delegation of functions, established by a delegated management agreement. The Act also states that “the State is liable to pay the full contributions of the destitute to the management bodies and is responsible for their payment”, without specifying which management body. Nevertheless, there is ultimately an interest on the part of the State to cover the needy by recourse to mutuals.

This study highlights elements that have been an obstacle to the provision of health coverage to the poor through health mutuals. The support provided to beneficiaries was only partial, since they were not only required to make co-payments, but also to accept the rationing of services to three episodes of illness per year. Yet the needy are poor people, and do not have the financial resources needed to make co-payments or cover other expenses. It is undeniable that the co-payments imposed by mutuals limit the use of health services by beneficiaries. We should therefore work to eliminate co-payments for the destitute as now advocated by the Act. An experiment in the coverage of the destitute through health mutuals combined with performance-based financing is under way in the Boucle de Mouhoun region (Ouédraogo et al., 2017), and future research will describe its implementation.

This study has also shown that shortcomings, including ambiguities in the design phase, can lead to implementation difficulties and frustrate an initiative. Other research has also shown this. In Kenya, the divergence of interests and views regarding the pooling of funds (during the design phase) resulted in undeclared opposition by the private sector and led to failure in the implementation of the health insurance scheme (Abuya, Maina and Chuma, 2015).

This analysis of an initiative of 2012 in the provision of health coverage for poor people through mutual health care schemes can inspire the design and implementation of future public policies. If the UHC Act in Burkina Faso is to succeed, it requires better planning and better coordination among stakeholders, as well as a beneficiary targeting strategy that is more context-specific. Failure to take into account differences in understanding among the social actors regarding the choice of solutions can lead to failure in implementation, as we have shown.

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BOOK REVIEW

Taylor-Gooby, P., Leruth, B. and Chung, H. (eds). **After austerity – Welfare state transformation in Europe after the Great Recession.** Oxford, Oxford University Press. 2017. 229 pp. ISBN 978-0-19-879026-6.

This volume starts by analysing the complex interacting economic, social and political pressures that transformed and undermined the post-Second World War European welfare state settlement at varying speeds in different national, historical and institutional contexts. The settlement was originally based on the solidarity of broad class coalitions and social cleavages, formalized in the institutions of political parties and trade unions, to support high standards of social protection for middle- and working-class groups. These have been gradually displaced by attitude cleavages grouped around common interests or identities, such as class, age, gender, ethnicity, immigration and nationalism, which support political action (e.g. populist, nationalist or “welfare chauvinist”), but which bypass political parties or collective institutions such as trade unions.

First, the book points to three economic shifts – globalization, technological change and the growing role of international agencies – that have promoted the market vis-à-vis nation states. The first concerns the rapid growth of the global economy, driven by the massive entry of Asia and South America into the world market, plus the emergence of China as a major exporter, the collapse of the Soviet Union, and the negotiation of multilateral trade liberalization treaties by the World Trade Organization and regional organizations.

Second, the widespread use of new technologies, which have increased productivity in some hi-tech industries in developed economies, and the massive outsourcing of manufacturing employment to emerging countries, as jobs in the former rapidly moved to the broad and heterogeneous services sector. These developments were accompanied by expanding international trade and growing capital mobility. The pace and intensity of de-industrialization differed across Europe (and the US), as did the related decline in unionization from the late 1970s to the late 1990s. Neoliberal pressures increased labour market dualization, with growing gaps in pay and job security between the higher-skilled and unionized core workers and marginalized lower-skilled, lower paid workers with precarious job status.

Third, the growing role of international agencies in promoting market liberalization in European nation states, via the single European market and monetary policies, depriving governments from using devaluation to counter economic cycle downturns (notably during the Great Recession).

Attention is given to the social changes that influence welfare state policies (e.g. demographic ageing, shifts in family patterns and gender roles, growing income and wealth inequalities, and immigration waves). Population ageing implies increasing welfare costs (related to growing demands and expectations for better coverage and adequate social benefits and services) that coincide with a larger non-active population that is dependent on a smaller workforce. The cost implications of these changes in welfare provision up to 2050 are forecast at around 4 per cent of GDP on

average in Europe. It is doubtful that the financing gaps in social expenditure can be filled, given slow productivity growth and the resistance to absorb considerable extra-European migration. Also important is the reluctance to better employ, promote and remunerate women, to benefit from their capacity to fill workforce gaps due to declining fertility and population ageing, despite the positive changes in gender roles and family patterns and women's improved educational achievements. Yet, the rising incidence of single parent and lone-adult households should reinforce demands for greater gender equality in pay and career opportunities, besides challenging the outdated male breadwinner model of the traditional welfare state. Another concern is the negative trend in remuneration since the 1960s, with the steady shrinkage of the share of growth devoted to wages and with the progression of hourly earnings lagging behind price inflation. However, over the past decade, social protection has responded more effectively to greater inequality in some countries.

Armed conflicts and social strife in the Balkans, the Middle East and North and sub-Saharan Africa have led to growing immigration, mainly to Scandinavia, France, Germany and the UK, fuelling an anti-immigration backlash among nationals who feel displaced in their access to jobs, housing, education and welfare benefits. This has given rise to populist, nationalist, protectionist and anti-European Union (EU) movements that led EU Member States to impose welfare coverage restrictions on non-EU immigrants (and even on some EU-immigrants).

Turning to the political changes, it is clear that the adverse impact of the economic and social transformations, further aggravated by the Great Recession of 2007–09 that hit harder the most vulnerable in society, led to two closely related trends.

First, the emergence of new needs for skills upgrading and training and for family-friendly work and childcare services (to meet “new social risks”) among young labour market entrants, lower-skilled workers, female workers and immigrants, which are neither adequately recognized nor met by the welfare state. Indeed, younger persons and women were hardest hit by the Great Recession, but 70 per cent of social welfare expenditure remained focused on traditional “old risks” (pensions, healthcare, sickness and disability) across the EU. This underlines that there has not been a major policy shift in public debate and political bargaining in consensus democracies in favour of addressing new social risks. But some analysts suggest that there may be possible inroads in this regard where social policy measures do not require large increases in social spending (i.e. via regulation, for example, by requiring employers to share a part of the costs of parental leave schemes).

Second, the political forces that traditionally supported good wages for the majority of the working population and the welfare state were undermined by coinciding developments. These include the decline of industrial employment, the increase in labour market dualization and the deregulation of labour legislation, all of which have weakened trade unions and the previous solidarity-based coalition between working- and middle-class groups. Indeed, the success of “old risk” groups to secure increasingly costly welfare services for the elderly heightens the pressure for cost efficiency as well as for cuts in services for the poor, particularly for non-working people of working age. Another concern is the rise of “welfare chauvinism”, particularly in countries with a growing immigrant population, where the low-paid and the jobless may seek to exclude immigrants from welfare coverage, ignoring their possible economic contribution to compensate for a declining labour force due to demographic ageing.

Yet, coalitions between “new risk” groups can still induce positive policies for tackling selected welfare issues. They can convert benefit provisions into social investment in training and skills upgrading, childcare, parental leave and other workplace rights that enable women (and fathers) to engage in paid work. These can gain sufficient support for public spending on these because these services are relatively cheap and can be addressed, in part, via regulation. Some political parties across the EU have promoted interventionist responses to the Great Recession, the subsequent economic slowdown as well as to EU-imposed austerity. These include counter-cyclical state spending on benefits to promote economic activity, investment in education, training, research and development, social infrastructure, as well as measures to help women into paid work and to create employment opportunities for low-skilled workers, immigrants and labour market entrants. The volume also analyses policy responses associated with the economic crisis and their impact on social segmentation and solidarity, including measures that wind back the interventionist state (cutbacks, privatization, austerity, promoting increasing individual responsibility), as well as new forms of interventionism (job creating investment, welfare spending to maintain demand from the poor, social investment via training and family support, high minimum wages, better job opportunities, national protectionism).

These considerations suggest the genesis of a new welfare state, but its form is still undefined. However, there are evident pressures to reduce the state’s role and to promote a more liberal market approach associated with increased individual responsibility. On the one hand, there are growing concerns for containing public deficits and debts, while, on the other hand, there are growing income and wealth disparities and weaker provision for the most vulnerable in society. The necessary responses to these will better inform how welfare states pursue the new policy directions.

This broad contextual background leads to an examination of national case studies that shine light on the process of welfare state development and transformation, particularly concerning policy responses to recession and austerity. The case studies, which constitute the bulk of the book, illustrate the breadth of welfare states, and include Denmark, France, Germany, Greece, Italy, Norway, Slovenia, Spain, Sweden and the UK. Particularly insightful is the analysis of the background context and current policy directions, pointing to the specific characteristics of policy approaches and the issues considered as important in each country (e.g. political and economic features, including public opinion; welfare “regime” type and social protection policy objectives; the role of the state as provider, funder and regulator; labour markets; demography; and economic trends).

These considerations lead this volume to suggest a possible future for a common European social policy, in the wake of the long recession, and in a context of rising populism, protectionism and nationalism, given the basic commitment of the European integration project (1957 Treaty of Rome) to the reduction of socioeconomic inequalities across EU Member States. The book notes that the EU institutions’ neoliberal austerity responses to the Great Recession failed to protect living standards or tackle large and rising social inequalities, nor did they succeed in generating solidarity among its members in managing mass extra-European immigration. The Stability and Growth Pact imposes strict limits of national public debt and public deficits in core EU Member States that may result in a two-speed Europe, and/or reduced social solidarity to ensure economic cohesion. Moreover, some Member States played with the EU “exit” idea, eventually adopted by the UK, with little knowledge of its socioeconomic and political impact on the EU’s future. These developments and trends deepened intergenerational divisions and widened attitudes concerning “deserving/undeserving” populations, constraining welfare spending, leading to the decline in trust in the political establishment



and the main parties. This has given rise to populist movements and parties across Europe, leaving open the question of the possible survival of welfare states to meet the needs of the most vulnerable.

The book contains timely, precious material and analysis that can contribute to the formulation of more socially and economically coherent policies across EU Member States and at the EU level. It is a “must” read book for policy-makers, the business sector, trade unions and NGOs concerned about the future of democracy and ensuring a sound economy underpinned by an equitable welfare state.

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