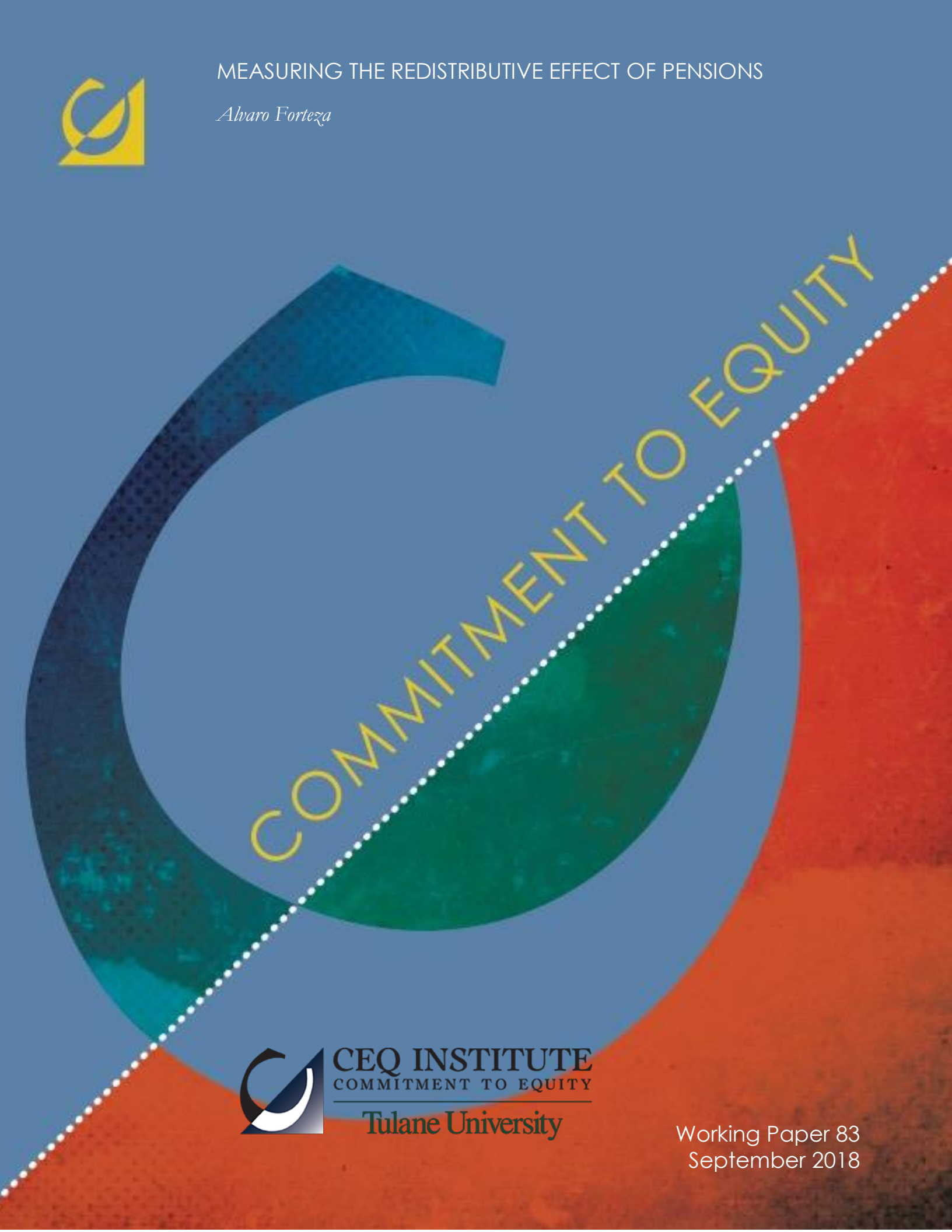
MEASURING THE REDISTRIBUTIVE EFFECT OF PENSIONS

Alvaro Forteza



CEQ INSTITUTE
COMMITMENT TO EQUITY
Tulane University

Working Paper 83
September 2018

The CEQ Working Paper Series

The CEQ Institute at Tulane University works to reduce inequality and poverty through rigorous tax and benefit incidence analysis and active engagement with the policy community. The studies published in the CEQ Working Paper series are pre-publication versions of peer-reviewed or scholarly articles, book chapters, and reports produced by the Institute. The papers mainly include empirical studies based on the CEQ methodology and theoretical analysis of the impact of fiscal policy on poverty and inequality. The content of the papers published in this series is entirely the responsibility of the author or authors. Although all the results of empirical studies are reviewed according to the protocol of quality control established by the CEQ Institute, the papers are not subject to a formal arbitration process. Moreover, national and international agencies often update their data series, the information included here may be subject to change. For updates, the reader is referred to the CEQ Standard Indicators available online in the CEQ Institute's website www.commitmentoequity.org/datacenter. The CEQ Working Paper series is possible thanks to the generous support of the Bill & Melinda Gates Foundation. For more information, visit www.commitmentoequity.org.

The CEQ logo is a stylized graphical representation of a Lorenz curve for a fairly unequal distribution of income (the bottom part of the C, below the diagonal) and a concentration curve for a very progressive transfer (the top part of the C).

COMMITMENT
TO EQUITY

CEQ INSTITUTE
COMMITMENT TO EQUITY
Tulane University

MEASURING THE REDISTRIBUTIVE EFFECT OF PENSIONS

Alvaro Forteza[*+]

CEQ Working Paper 83

SEPTEMBER 2018

ABSTRACT

In this document, I present a conceptual framework for the analysis of the redistributive effect of pensions. The paper makes specific recommendations on the controversial issue of whether pensions should be treated as transfers or deferred income. I show that most pension programs have both dimensions in different degrees and present a proposal to deal with them in a unified framework. The proposal has specific recommendations in terms of accounting and counterfactuals. Using some simple examples, I show that usual accounting and "nonbehavioral" assumptions —particularly regarding non- labor income— may be very misleading.

JEL Codes: D31, H55, I38

Keywords: Pensions, redistribution, fiscal incidence analysis.

[*] Departamento de Economía, FCS-UDELAR, Uruguay. Alvaro.forteza@cienciassociales.edu.uy.

[+] This research project was conducted for the Commitment to Equity (CEQ) Institute. The study was made possible thanks to the generous support of the Bill & Melinda Gates Foundation. For more details about the CEQ Institute, visit www.commitmentoequity.org. I am in debt with Nora Lustig, Andrea Vigorito and participants at the workshop "Methodological Advances in Fiscal Incidence Analysis: Commitment to Equity Institute (CEQ)" held in Universidad de San Andrés, Argentina, in November 2017. The usual disclaimer applies.

Measuring the Redistributive Effect of Pensions

Alvaro Forteza *†

October, 2018

Abstract

In this document, I present a conceptual framework for the analysis of the redistributive effect of pensions. The paper makes specific recommendations on the controversial issue of whether pensions should be treated as transfers or deferred income. I show that most pension programs have both dimensions in different degrees and present a proposal to deal with them in a unified framework. The proposal has specific recommendations in terms of accounting and counterfactuals. Using some simple examples, I show that usual accounting and "nonbehavioral" assumptions —particularly regarding non-labor income— may be very misleading.

Keywords: Pensions, redistribution, fiscal incidence analysis.

JEL Codes: D31, H55, I38

*Departamento de Economía, FCS-UDELAR, Uruguay. Alvaro.forteza@cienciassociales.edu.uy.

†This research project was conducted for the Commitment to Equity (CEQ) Institute. The study was made possible thanks to the generous support of the Bill & Melinda Gates Foundation. For more details about the CEQ Institute, visit www.commitmentoequity.org. I am in debt with Nora Lustig, Andrea Vigorito and participants at the workshop "Methodological Advances in Fiscal Incidence Analysis: Commitment to Equity Institute (CEQ)" held in Universidad de San Andrés, Argentina, in November 2017. The usual disclaimer applies.

1 Introduction

In this document, I present a methodological proposal for the analysis of the redistributive effect of pension programs. The analysis is challenging and has generated controversies in the literature. One of the issues is to what extent pensions should be treated as transfers or deferred income (Lustig and Higgins 2017). In my view, this is basically a question about the correct counterfactual for non labor income. In other words, the main challenge is to estimate the income from property of wealth individuals would have earned had the pension program not been present. I use a standard life cycle model to provide a consistent answer.

I consider a pension program that may redistribute income across individuals and/or across time. I follow a net fiscal system approach in that I consider the whole program, including both benefits and resources used to finance the program (Lambert 1993). The basic methodology will be to compare the distribution of income or wealth with and without the program. This comparison can be made, for example, using the Reynolds-Smolenski index, but the contribution in this document is not related to this choice so I will not discuss this point.

Fiscal incidence analysis is usually done looking at the direct impact of the program, disregarding behavioral responses. The assumption is that the program does not impact on income *before* the program and hence income *after* the program can be computed as income before plus net transfers received from the program. But programs are known to induce behavioral responses like, for example, changes in labor supply or demand. Therefore, income *before* (*after*) is not necessarily the same as income *without* (*with*) the program. The before-after approach assumes it is.

Of course, experts in the field are well aware that the non-behavioral assumption is a strong one. The justification for adopting it is twofold. First, it is extremely difficult if not impossible to spell out all the indirect effects that government programs have on individual income. Second, the non-behavioral approach (hopefully) captures the first order effects.

I argue however that simple accounting implies that assuming that the before program income does not change when a government program is introduced amounts to assuming that all the adjustment takes place through consumption. In this sense, the decision the analyst must make is not on whether to assume any response but on where this response will be. I show some cases in which the assumption that income does not respond is probably too strong and propose options that are arguably more reasonable.

In studies of the fiscal incidence of an existing program —an ex-post analysis—, the analyst observes income (and wealth) with the program and has to infer income without the program. So the challenge in this case is to build a reasonable counterfactual for the economy without the program. The non-behavioral approach assumes that (the unobservable) income without equals (the observed) income with

the program minus benefits from plus contributions to the program. In turn, in an ex-ante analysis, the analyst observes income without the program and has to build a counterfactual for income with the program. For the sake of concreteness, I will focus in what follows in the ex-post analysis, but the issues that arise and possible ways out are similar.

I present in section 2 a brief discussion of the involved income and wealth concepts. To do it consistently, I use a life cycle model. Section 3 contains the proposal for the analysis of the redistributive impact of pensions. I present first the case of an actuarially fair pension program and then turn to the more challenging case of programs that are not actuarially fair. In order to focus on issues regarding the treatment of returns from wealth, I maintain the non-behavioral assumption for labor income. The goal is to show that the non-response assumption regarding returns from wealth can be particularly problematic in the case of a pension program. In section 4, I comment on several assumptions and discuss some simple extensions. The document ends with some concluding remarks in section 5.

2 Preliminaries: the distribution of what?

2.1 The setting

Consider a population of individuals who live T periods. Let a_{it} represent the wealth (or net assets) held by individual i at the beginning of period t, ra_{it} be the return from those assets, y_{it} be other sources of income, and c_{it} be consumption.[1] Individual i's per period budget constraints are:

$$a_{it+1} - a_{it} = ra_{it} + y_{it} - c_{it} \quad ; t = 1, ..., T \tag{1}$$

In this setting, ra_{it} accounts for the return of wealth held in period t, no matter the specific form this wealth takes. It includes interest collected from bank deposits, dividends from bonds, rents from land or houses, etc. It does not include labor income, remittances from abroad, or transfers, which should be included in y_{it}. For the sake of brevity, I will often refer to y_{it} as labor income, even when other sources of income are included in this variable.

The intertemporal or life time budget constraint is computed from the T flow budget constraints (1):

$$\sum_{t=1}^{T} \frac{c_{it}}{(1+r)^{t-1}} = \sum_{t=1}^{T} \frac{y_{it}}{(1+r)^{t-1}} = \bar{y}_i \tag{2}$$

where, for simplicity, I have assumed that there are no bequests: $a_{i1} = a_{iT+1} = 0$, so life-time wealth equals the present value of life-time labor income $\bar{y}_i$.[2]

The intertemporal budget constraint (2) implies that the consumption bundles that the individual can afford depend on life-time wealth. The consumption possibilities do not depend on either the

[1] For simplicity, I assume the rate of return r is constant.

[2] With bequests, the right hand side of equation (2) is $\bar{y}_i + a_{i1} - a_{iT+1}$.

distribution of labor income in the life cycle —i.e. which of the infinite combinations of $(y_{i1}, ..., y_{iT})$ that satisfy $\bar{y}_i = \sum_{t=1}^{T} \frac{y_{it}}{(1+r)^{t-1}}$ arise—, or how much individuals save in each period. The wealth saved in period t, a_{it+1}, allow the individual to defer consumption from period t to the future. But deferred consumption and the associated returns from savings do not move the consumption possibilites frontier determined by equation 2. Notwithstanding, analysts of inequality are usually interested in the distribution of per-period income, so they look at y_{it} and ra_{it}. Probably because of the lack of data, there is much less analysis of the distribution of wealth.

In this document, I will focus on the distribution of two variables: total per period income $(ra_{it} + y_{it})$ and life time wealth $(\bar{y}_i)$.

2.2 An example

Suppose that the population lives two periods and is composed of two type of individuals, $i \in \{A, B\}$, with the same labor income in both periods, $y_{At} = y_{Bt} = y_t$, but different preferences. Specifically assume that A saves part of his first period income, but he is more impatient than B, so he consumes more than B in the first period. As a result, A saves less than B: $0 < a_{A2} < a_{B2}$.

How should we analyze the distribution of income/wealth in this case? We would conclude that the distribution is totally egalitarian if we based our assessment on either lifetime wealth or labor income. However, if we analyzed the distribution of total income, we would conclude that individual A is "poorer" than individual B in the second period: $y_2 + ra_{A2} < y_2 + ra_{B2}$.

Furthermore, the difference between A and B in the second period is even higher if we consider the distribution of purchasing power rather than of income. B has an even larger purchasing power because the stock of wealth saved in the first period is available to finance consumption in the second period. So the second period purchasing power will be $y_2 + ra_{A2} + a_{A2} < y_2 + ra_{B2} + a_{B2}$.

This is an example in which inequality arises because of different preferences rather than of different initial wealth or non-wealth income. Because of this, some analysts could be inclined to choose measures that indicate that the distribution is equalitarian. The only difference between A and B is, after all, that A preferred to consume more than B in his first period of time. Notwithstanding, in this document, I am agnostic regarding which is the best mesasure to consider. Given the methodological aims of this note, I do not pronounce any judgement regarding how appropriate these different descriptions are. My only goal is to present internally consistent ways of characterizing inequality, and all of the above are consistent, even if they yield different pictures.

3 The redistribution of income and wealth

3.1 An actuarially fair pension program

Consider again individuals who live T periods. Individual i works and pay contributions τ_{it} until he retires and start receiving a pension p_{it} in period t_P. In this example, y_{it} represents labor income *strictu senso*.

Saving in the pension program is compulsory, but individuals can also save privately. I then write two per period budget constraints, one for the accumulation of pension wealth (a^p_{it}) or "mandatory savings" and the other one for "voluntary savings" (a^v_{it}):

$$a^p_{it+1} - a^p_{it} = ra^p_{it} - p_{it} + \tau_{it}, \qquad t = 1, ..., T \tag{3}$$

$$a^v_{it+1} - a^v_{it} = ra^v_{it} + y_{it} + p_{it} - \tau_{it} - c^p_{it}, \qquad t = 1, ..., T \tag{4}$$

where c^p_{it} stands for consumption in the economy with the pension program.

Equations (3) and (4)) can be added to compute total savings:

$$(a^p_{it+1} + a^v_{it+1}) - (a^p_{it} + a^v_{it}) = r(a^p_{it} + a^v_{it}) + y_{it} - c^p_{it} \tag{5}$$

The intertemporal budget constraint is

$$\sum_{t=1}^{T} \frac{c^p_{it}}{(1+r)^{t-1}} = \bar{y}_i + ssw_i \tag{6}$$

where ssw_i stands for the social security wealth and is computed as follows

$$ssw_i = \sum_{t=1}^{T} \frac{p_{it} - \tau_{it}}{(1+r)^{t-1}} \tag{7}$$

Because the program is actuarially fair, i.e. $ssw_i = 0$, it has no impact on life-time income (equation (6). This implies that individuals should consume the same with and without the program: $c_{it} = c^p_{it}$ (see, for example, Azariadis 1993).[3] Using this in the flow budget constraints (1) and (5) I get that:

$$a_{it} = a^p_{it} + a^v_{it} \tag{8}$$

Therefore, assets accumulated in the economy without the program are equal to *total* assets in the economy with the pension program, and hence the unobserved returns from wealth in the economy *without* the pension program can be computed as $r(a^p_{it} + a^v_{it})$. Notice the difference with the common non-behavioral assumption that income in the economy *without* the program is equal to income *before* the program in the economy *with* the program. The assumption of unresponsive income implies an

[3]This result can be challenged on several grounds, including distortionary taxation, credit rationing and myopia, to name a few. I briefly comment on these issues in section 4.

assumption of responsive consumption. Macroeconomics in turn predicts that it is consumption what should not respond in this case, while savings, and hence income from past savings, should accommodate.

This also implies that contributions to the program are actually "mandatory savings" and pensions paid by the program are the returns from those savings. Therefore, total per period income both *without* and *with* the program should be computed as $r(a_{it}^p + a_{it}^v) + y_{it}$. Also, total life time income both *without* and *with* the program equals $\bar{y}_i$. The program has no impact whatsoever in the distribution of income.

Lustig and Higgins' "false poor" is the best example I am aware of the errors caused by the assumption that returns from wealth do not respond to the existence of a pension program (Lustig and Higgins 2017). Suppose that individual i retires in period t_p so $y_{it} = 0, t \geq t_p$, and pensions are such that i has decided not to save for retirement, out of the pension program: $a_{it}^v = 0, t \geq t_p$. This individual plans to live in retirement exclusively on pensions (something that is very common for large swaths of the population in many countries). The non-behavioral assumption applied to voluntary savings would imply that income in the counterfactual economy without pensions would be zero from t_p onwards. In this view, the pension program would be taking many people out of extreme poverty in old age, including individuals who have a high life time income and simply decided not to privately save because the compulsory pension program made them save enough in the program. According to conventional macroeconomics, this is not a reasonable counterfactual for the economy without pensions. It is more sensible to predict that individual i would save for old age in the economy without pensions.

To see how the "false poor" would bias the fiscal incidence analysis, consider again the example in section 2.2, and assume that contributions to social security are exactly equal to the savings that individuals A are willing to make without the program. Conventional macroeconomic analysis suggests that the introduction of such a pension program would cause that the individual A stopped saving voluntarily and the individual B reduced voluntary savings to $a_{B2} - \tau$. With the non-behavioral assumption, the pension program would appear to raise individuals second period income from 0 to p and from (ra_{B2}) to $(ra_{B2} + p)$ in the cases of individuals A and B, respectively. Therefore, the actuarially fair pension program would appear to be reducing inequality, which is of course misleading.

All the results in this section also hold true in an unfunded program, provided it is actuarially fair. I can always compute the "implicit assets" contributors hold against the pension program using equation (3). The analysis thus goes through on exactly the same terms, irrespective of the legal form assets a_{it}^p take. Most unfunded programs do not compute these assets, but it is just a matter of accounting. In notional accounts or non-financial-defined contributions (NDC) programs, this assets are computed and contributors are periodically informed, even when the programs are unfunded (for analysis of these programs, see Holzmann and Palmer 2006; Holzmann, Palmer, and Robalino 2012a,b, among others). The implicit debt that unfunded programs have with their contributors is the counterpart of these implicit assets.

3.2 A pension program that is not actuarially fair

In a non actuarially fair pension program the rate of return in the pension fund is not necessarily equal to the market interest rate. Furthermore, it will typically vary across individuals. It can be computed as the internal rate of return of the flow of funds to social security:

$$\sum_{t=1}^{T} \frac{p_{it} - \tau_{it}}{(1+\rho_i)^{t-1}} = 0 \tag{9}$$

Therefore, the flow budget constraints are now as follows:

$$a^p_{it+1} - a^p_{it} = \rho_i a^p_{it} - p_{it} + \tau_{it}, \qquad t = 1, ..., T \tag{10}$$

$$a^v_{it+1} - a^v_{it} = r a^v_{it} + y_{it} + p_{it} - \tau_{it} - c^p_{it}, \qquad t = 1, ..., T \tag{11}$$

The intertemporal budget constraint is still given by equation (6), but $ssw_i \neq 0$ if $\rho_i \neq r$. A non actuarial pension program does change individuals lifetime wealth and hence induces changes in consumption. Therefore, I now introduce some hypothesis regarding the choice of consumption.

Suppose individuals choose consumption to maximize utility subject to the intertemporal budget constraint:

$$\begin{array}{ll} \underset{c_{it} \geq 0}{Maximize} & \sum_{t=1}^{T} \beta u(c_{it}) \\ s.t. & equation\ (6) \end{array} \tag{12}$$

where $ssw_i = 0$ in the economy without the pension program or in an economy with an actuarially fair pension program.

The first order conditions for a solution are:[4]

$$\frac{u'(c_{it})}{\beta u'(c_{it+1})} = 1 + r \tag{13}$$

Using the Euler condition (13) and the intertemporal budget constraints (2) and (6), I compute the consumption series for individual i in the economy without and with the pension program, respectively.[5] I then compute assets in the economy without the pension program a_{it} substituting the estimated c_{it} in the flow budget constraint (1). Similarly, I compute assets in the pension program a^p_{it} and voluntary savings a^v_{it} substituting the estimated c^p_{it} in the flow budget constraints (10) and (11). With these elements, I have all I need to compute income without the program, i.e. $ra_{it} + y_{it}$, and with the program, i.e. $ra^v_{it} + \rho_i a^p_{it} + y_{it}$.

In order to do these computations, I must simulate the whole series of labor income y_{it}, contributions τ_{it} and pensions p_{it}. The details of these simulations depend of course on the specific norms of each pension program.

[4] I assume an interior solution.

[5] To have an operational expression, I have to assume a specific functional form for the utility function. Common choices are the CRRA, $u(c) = \frac{c^{1-\gamma}}{1-\gamma}$, and the log function $u(c) = ln(c)$.

Admittedly, these computations require making some assumptions regarding individuals life cycle that look quite strong, especially when only cross section information is available. But it does not seem possible to elude doing this type of computations if one wants to assess the redistributive impact of a pension program. In any case, it is always possible to analyze how sensitive the results are to different sets of assumptions.

3.3 Some implementation challenges

The most challenging steps in implementing the methodology presented in subsection 3.2 are the simulation of non financial income y_{it}, taxes paid to finance the pension program τ_{it} and pensions received p_{it} during the whole life time, i.e. for $t \in [1, T]$. No general rules can be provided to do these simulations, but some considerations are relevant in most cases:[6]

1. Pension experts usually estimate age income profiles either from longitudinal or even cross sectional data and then apply these profiles to each individual using the observations available about individual income. If the information is cross sectional, like in most household surveys, there will be only one observation per individual.

2. Taxes paid to finance the program τ_{it} should ideally include not only contributions to social security (both personal and employer contributions), but also other taxes that finance the program. In some countries, for example, pension programs are partially financed with ear marked taxes or with a share of the revenues from the value added tax. More generally, PAYG programs are often financed from general government revenues. Tracing individual tax payments that finance the program is of course challenging. It is also very specific to each program and country, so no general guidelines can be provided.

3. Pensions can be computed using the simulated labor income and the pension rules.

4. In this presentation, I assumed that the age at which individuals die is certain. Under this assumption, T can be computed as life expectancy at birth.[7] A simple extension would be to introduce uncertain longevity, in which case the survivor function should be used to compute social security wealth and the implicit rate of return ρ_i (Gruber and Wise 1999).

5. For ease of exposition, I have assumed no bequests, i.e. $a_{i1} = a_{iT+1} = 0$. Dropping this assumption implies that the intertemporal budget constraint is

$$\sum_{t=1}^{T} \frac{c_{it}^{p}}{(1+r)^{t-1}} + a_{iT+1} = a_{i1} + \bar{y}_i + ssw_i \tag{14}$$

[6] For empirical implementations of this procedure to the study of the impact of pension programs on lifetime income, see Fajnzylber (2012), Forteza (2014), Forteza and Mussio (2012), Moncarz (2015), and Zylberstajn (2011).

[7] It is at birth because the lifetime flow of consumption is being considered.

Standard macroeconomic models provide concrete guidance on how to include a bequest motive. I only want to point out here that allowing for non-zero initial and final assets can be useful to match observed returns from wealth, non financial income and consumption. Probably the simplest possibility is just to assume that $a_{i1} = a_{iT+1}$ —i.e. the bequest received equals the bequest left to the next generation—, without assuming that the bequest is zero. This is important in practice if survey data show individuals with very small non financial income and high consumption and/or financial income.

4 Discussion and extensions

The methodology proposed rests on some maintained assumptions which I now discuss.

1. Exogenously given interest rate. According to macroeconomics, pension programs should modify the interest rate, unless the programs are fully funded and actuarially fair. The assumption I have made that the interest rate is exogenous could be questioned on these grounds. However, it can be reconciled with conventional macroeconomics assuming that we are modeling a small open economy with perfect mobility of capital. The economy we are modeling is price taker in financial markets.

2. Nonresponsive labor income. The assumption that social security does not impact on labor income before contributions contradicts empirical evidence. Gruber and Wise (2002) and Jiménez Martín and Sánchez Martín (2007), among many others, show that pension programs induce individuals to retire earlier. If one is concerned about this possibility in a specific application, it is possible to simulate different retirement ages in the economy with and without pensions. This is simple and provides a clear idea of the sensitivity of the results on the assumption that labor income is exogenous.

3. Rationality. The methodology I propose assumes individuals choose consumption and savings maximizing expected utility subject to an intertemporal budget constraint, using efficiently all the information they have. In particular, the counterfactual I propose for the economy without pensions rests on the hypothesis that without the pension program individuals would save for old age. However, it is often argued that one of the reasons why pension programs are needed is that individuals behave myopically and may not save enough for old age (Barr 2001). This type of concerns might be addressed assuming hyperbolic preferences. But this is not the same as just assuming that a pension program does not impact on financial income, as it is usually done in non-behavioral fiscal incidence analysis.

4. Lagged response and counterfactuals. It can be argued that individuals will not immediately adjust

savings decisions when there is a change in pension programs. In particular, cohorts that are alive when a reform takes place will of course not fully adjust. The methodology is not designed for the analysis of pension reform dynamics. The goal is to compare the distribution of income with and without the program so I focus on the steady states. In the case of the ex-post analysis, the economy without the program is not observed. What this methodology provides is a systematic way of building a reasonable counterfactual for the observed economy.

5. Credit rationing. I have assumed that individuals have complete access to credit. Credit rationing might induce paths of consumption and savings different from what I have assumed in this document. While theory provides good guidance on how to deal with this issue, the empirical implementation looks challenging.

5 Concluding remarks

I make two main points in this document, regarding the **accounting** and the **counterfactuals** in fiscal incidence analysis of pension programs.

Regarding accounting, I argue that contributions and pensions should not be computed as income, but as investment. For the same reasons a purchase of a bond is not registered as a decrease of income, a contribution to a pension program should not be computed as a reduction in disposable income. Also, for the same reasons individuals income is not increased when individuals sell a bond, it is not increased when the individual "withdraw" a pension from his pension fund. The bond sale and the pension are disinvestments that will affect the following period income, but the operations of selling a bond and receiving a pension do not have the nature of income. The concept of income that should be associated to the pension program is the flow of returns from the pension wealth. Contributions and pensions have the nature of "deposits" to and "withdrawals" from the pension wealth.

Notice that it is not necessary that a pension fund exists for this to be a valid representation. In unfunded or PAYG programs, there are no explicit assets backing the social security promise of a future pension, but the promise is a debt for the sponsor of the program and wealth for contributors.

The second point I make is that the common assumption that the non-pension income from wealth does not change when a pension program is introduced or significantly reformed does not look appropriate in many relevant cases. Standard macroeconomics suggests that pension wealth will most likely crowd out private wealth. In particular, if the program is actuarially fair, it could be argued that the most reasonable prediction would be of total crowding out so the program should have no effects on income. Weather the crowding out is total or partial —or even there is some crowding in— depends on preferences and characteristics of the program, but the non-behavioral assumption that there is no response is extreme indeed. It amounts to assuming that there is no crowding out at all.

In practical terms, the no response assumption implies that many retirees who earned high wages when they were active and are receiving good pensions in retirement are assumed to become poor without the program. While this assumption can be justified to some extent arguing myopia, it looks like an extreme assumption that requires at least some more careful justification.

Bibliography

Azariadis, Costas (1993). *Intertemporal Macroeconomics*. Blackwell.

Barr, Nicholas (2001). *The Welfare State as Piggy Bank*. Oxford University Press.

Fajnzylber, Eduardo (2012). *Implicit Redistribution in the Chilean Social Insurance System*. Working Paper 019, School of Government, Universidad Adolfo Ibáñez.

Forteza, Alvaro (2014). "Assessing Redistribution within Social Insurance Systems. The cases of Argentina, Brazil, Chile, Mexico and Uruguay". In: *Social Security, Informality and Labor Markets. How to Protect Workers While Creating Good Jobs.* Ed. by Markus Frölich et al. UK: Oxford University Press, pp. 264–290.

Forteza, Alvaro and Irene Mussio (2012). "Assessing Redistribution in the Uruguayan Social Security System". In: *Journal of Income Distribution* 21.1, pp. 65–87.

Gruber, Jonathan and David A. Wise, eds. (1999). *Social Security and Retirement Around the World*. Chicago and London: The University of Chicago Press.

— (2002). *Social Security Programs and Retirement Around the World: Micro Estimation*. NBER, WP 9407.

Holzmann, Robert and Edward Palmer, eds. (2006). *Pension Reform Issues and Prospects for Non-Financial Defined Contribution (NDC) Schemes*. The World Bank.

Holzmann, Robert, Edward Palmer, and David A. Robalino, eds. (2012a). *Nonfinancial Defined Contribution Pension Schemes in a Changing Pension World*. Vol. 1. The World Bank.

— (2012b). *Nonfinancial Defined Contribution Pension Schemes in a Changing Pension World*. Vol. 2. The World Bank.

Jiménez Martín, Sergi and Alfonso R. Sánchez Martín (2007). "An Evaluation of the Life Cycle Effects of Minimum Pensions on Retirement Behavior". In: *Journal of Applied Econometrics* 22.5, pp. 923–50.

Lambert, Peter (1993). *The Distribution and Redistribution of Income. A Mathematical Analysis.* Manchester University Press.

Lustig, Nora and Sean Higgins (2017). "The CEQ Assessment: Measuring the Impact of Fiscal Policy on Inequality and Poverty". In: *Commitment to Equity Handbook. Estimating the Impact of Fiscal Policy on Inequality and Poverty*. Ed. by Nora Lustig. Brookings Institution Press and CEQ Institute, Tulane University.

Moncarz, Pedro E. (2015). "Implicit redistribution within Argentina's social security system: a microsimulation exercise". In: *Latin American Economic Review* 24 (2), pp. 1–35.

Zylberstajn, Eduardo (2011). *Assessing Implicit Redistribution in the Brazilian Social Security System*. Fundacao Getúlio Vargas.