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2008

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Documentos de Trabajo
N.º 0832

BANCO DE ESPAÑA
Eurosistema

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(*) For early versions of this paper the author thanks an anonymous referee, Antonia Díaz, Silvio Rendón, Carlos Urrutia and the participants of the Macroeconomic Workshop and the 8th Annual Conference of the Portuguese Society for Economic Research for useful comments. The opinions expressed here are those of the author and do not necessarily those of the Banco de España.

Documentos de Trabajo. N.º 0832
2008

ISSN: 0213-2710 (print)
ISSN: 1579-8666 (on line)
Depósito legal:
Unidad de Publicaciones, Banco de España

Abstract

In this paper we study the quantitative properties of a policy reform aimed at funding the pension system in the standard model economy with perfect substitution across workers with different experience levels and a model economy where this substitutability is imperfect. With compulsory retirement, the welfare gains for young cohorts are underestimated in the standard model economy with perfect substitution as compared to the imperfect substitution case. However these additional welfare gains displayed in the imperfect substitution case come at the cost of higher welfare losses for the generations living at the time of the policy reform, due to the fall in the experience premium that follows after the elimination of social security. When the policy reform consists of the elimination of both social security and compulsory retirement, we find that in the standard model the status quo problem disappears. However, such policy change is not able to solve the status quo problem when less and more experienced workers are imperfect substitutes because the fall in the experience premium is more pronounced, providing a rationale for the lack of political support in favour of pension reform in the Spanish economy.

JEL classification: E62, H55, J11.

Keywords: Social Security, overlapping generations.

1 Introduction

Despite the process of privatization of pension systems in some Latin American countries (like Argentina, Brazil, Chile, Mexico, and Peru) that started in the 80s, most of the developed countries have not yet accomplished the reform of their pay-as-you-go social security systems even when demographic projections for the next 30 years predict a substantial increase in the number of retirees over the working population. Motivated by this fact, researchers have investigated the ways in which social security can be reformed without harming the welfare of the majority of the population so that the status quo problem against the pension reform is broken. Conesa and Garriga (2003) make a contribution in this line of research in a model calibrated to the Spanish economy, whose population is expected to be one of the oldest in the world by 2050. In particular, they find that removing compulsory retirement as part of the elimination of social security may increase the political support of pension reform in such way that the percentage of the population that experiences welfare gains is higher than the number of individuals with welfare losses, breaking up the status quo. The aim of this paper is contribute to this debate by studying the aggregate implications of imperfect substitution among workers with different experience levels. In particular, I find that this feature changes in a quantitatively relevant way the aggregate effects of such policy mix (elimination of both social security and compulsory retirement) and the welfare of the generations living at the time of the policy reform in such way that the status quo problem does not disappear with the removal of compulsory retirement, providing a rationale for the lack of pension reform observed across a number of developed countries.

This article is not new in addressing the effects of privatizing social security. Some examples close in spirit to this paper are Auerbach and Kotlikoff (1987), Miles (1999) and Broer (1999). These papers are motivated by the potential economic effects caused by the individuals that belong to the baby-boom generation as they enter retirement. In this sense, the recent research effort on social security has mainly concentrated on the efficiency of the current pay-as-you-go pension system (e.g. Imrohoroglu et al. (1995) and Boldrin et al. (1999)), the design of a feasible reform to a funded system (e.g. Conesa et al. (2000) and Huang et al. (1996)) and the fiscal adjustments that prevents from privatization (De Nardi et al. (1999) and Rojas (2005) for the Spanish economy). Most of these studies are characterized by the perfect substitutability of workers with different levels of work experience, namely they abstract from the possible effect that a decrease in the labor supply of younger workers following a privatization of the pension system could have on the relative labor earnings of older workers at the time of the policy reform. In sharp contrast with this assumption, there are many empirical studies (e.g. Borjas (2003), Macunovich (1999), Murphy and Welch (1992), Katz and Murphy (1992), Freeman (1979), Welch (1979) and Berger (1985)) that have found that the age-earnings profile of workers appears to be significantly affected by the relative supply of workers with different years of working experience. Despite the potential implications of this interaction for a variety of macroeconomic issues, there are not many studies that have at-

tempted to introduce these effects in macroeconomic models. Some exemptions are the seminal work of Lam (1989) that studied the effects of changes in age structure on life-cycle wage profiles in stable populations. In addition, Kremer and Thomsom (1998) have studied the implications of the imperfect substitution between young and old workers for the speed of convergence of per capita output between countries and find that the existence of imperfect substitutability creates a kind of adjustment cost in human capital because total output depends positively on each generation generation's human capital but negatively on the change in human capital between generations. And more recently, Rojas (2005) has shown that the effect of the aging of the baby-boom generation on the expected increase in the share of GDP spent on pensions is less severe in a model that accounts for cohort size effects than in one that abstracts from them.

This paper contributes to the pension reform's literature by comparing the quantitative properties of a policy reform aimed at funding the pension system in the standard model economy with perfect substitution across workers with different experience levels with a model economy where this substitutability is imperfect. Notice that with the phasing out of pensions, the social security tax rate falls in response to the eliminated public pensions and as individuals save for retirement through capital markets, the rate of return on capital falls. Both mechanisms usually induce a reallocation of work effort over the life-cycle, substituting hours worked when young by hours worked when labor earnings peak. In the standard model economy this process has no effects on the relative wage rate of less and more experienced workers. However, in the model economy which allows for imperfect substitution, this reallocation process decreases the experience premium and imposes an additional cost (apart from the one caused by the removal of pension benefits) in terms of a lower life-time earnings on those agents that are in the years before retirement at the period of the policy reform. The implications of this mechanism are as follows:

- With compulsory retirement, eliminating social security in the model economy with imperfect substitution induces a higher capital along the transition towards the new steady state. This higher stock of capital translates into a higher output in the medium and long run. Consequently, the standard model economy with perfect substitution underestimates the positive aggregate effects of reforming public pensions. In terms of the welfare effects by generations, the welfare gains for young cohorts are underestimated in the standard model economy with perfect substitution. However these additional welfare gains displayed in the imperfect substitution case come at the cost of higher welfare losses for the generations living at the time of the policy reform, due to the fall in the experience premium that follows after the elimination of social security.

- When the policy reform consists of the elimination of both social security and compulsory retirement, it is found that in the standard model economy with perfect substitution the status quo problem disappears, confirming

the results of Conesa and Garriga (2003). However, such policy change is not able to solve the status quo problem when less and more experienced workers are imperfect substitutes in the production process because the fall in the experience premium is even more pronounced. In fact, in this case, the number of generations that suffers welfare losses stays unaffected.

The rest of the paper is organized as follows. Section 2 describes the model economies I investigate. Section 3 describes how the model is parameterized to be a realistic description of the Spanish economy in 1995. Section 4 presents the main results of the paper and finally Section 5 concludes.

2 The Model

2.1 Demographics

The economy is populated by agents that live a maximum of I periods. Each model period corresponds to 5 years. Each agent is indexed by age i and time t. Upon arrival at the age of I_A (20 years old) an agent starts taking decisions. Each individual is endowed with 1 unit of time that can be allocated to work or leisure up to age I_{R-1} (at 65). After this age agents retire. Each agent faces an age dependent probability of surviving between age i and age $i+1$ at t denoted by $s_{i,t}$. Then the unconditional probability of reaching age i for an individual that has age v at t is $\pi^i_{v,t} = \prod_{k=v+1}^{i} s_{k-1,t+k-v-1}$ with $\pi^v_{v,t} = 1$. Let $\mu_{i,t}$ be the share of age-i over the total population at time t. The population is stationary and evolves according to,

$$\mu_{i+1,t+1} = \frac{s_i \mu_{i,t}}{1+n_t}$$

where n_t is the population growth rate. Finally, the next period share of newly born agents $\mu_{1,t+1}$ is given by

$$\mu_{1,t+1} = 1 - \sum_{i=2}^{I} \mu_{i,t+1}. \tag{1}$$

Agents reach adulthood at 20 and live up to age 95, after which death is certain. The initial steady state is characterized by the stationary age structure of the population associated with the age survival probabilities in 1995 and a population growth rate of zero.

2.2 Preferences

At each point in time agents are assumed to maximize lifetime utility. The problem of the typical agent that at t has age $i = v$ ($v \geq I_A$) is to choose consumption and leisure $l_{i,t} = 1 - h_{i,t}$ to solve the problem

$$Max \sum_{i=v}^{I} \beta^{i-v} \pi_{v,t}^{i} U(c_{i,t+i-v}, h_{i,t+i-v}) \tag{2}$$

subject to the following period-by-period constraint

$$a_{i+1,t+1} = (1 + r_t(1 - \tau_k))a_{i,t} + y_{i,t} - c_{i,t} \tag{3}$$

with $0 \leq a_{i+1,t+1}$, $a_{1,t} = 0$, $a_{I+1,t} = 0$. The discount parameter is β, and is assumed to be the same for all agents. Borrowing is not possible and agents accumulate asset holdings to smooth consumption over time. r_t is the interest rate net of depreciation, $a_{i+1,t+1}$ denotes next period asset holdings, $y_{i,t}$ is labor income net of taxes plus transfers and τ_k is a proportional capital income tax. Let e_i be the efficiency index, $\tau_{ss,t}$ the social security proportional tax, τ_l a proportional labor income tax and $d_{i,t}$ the social security benefits. Finally $w_{i,t}$ denotes real wages per efficiency unit, that are indexed by age in order to account for the imperfect substitution case, and B_t is the accidental bequest received at t. These considerations allow us to define the labor income net of taxes plus transfers as $y_{i,t} = w_{i,t} e_i h_{i,t}(1 - \tau_l)(1 - \tau_{ss,t}) + d_{i,t} + B_t$. The period utility function is of the constant relative risk-aversion class

$$u(c, l) = \frac{(c^{\theta} l^{1-\theta})^{1-\sigma}}{1 - \sigma} \tag{4}$$

where the inverse of the elasticity of substitution σ and the share of consumption θ has been set such that the average time spent working is around 1/3 and the intertemporal elasticity of substitution is consistent with the empirical estimates reviewed in Auerbach and Kotlikoff (1987). Hence we use $\sigma = 2$ and $\theta = 0.35$. The discount rate parameter is set equal to $\beta = 0.986$ so as to reproduce a private capital-output ratio of 2.4 in the Spanish economy as reported by Conesa and Garriga (2003).

2.3 Production Technology and Efficiency unit profile

Production in period t is given by a standard constant returns to scale production function that converts capital K_t and labor N_t into output. The capital share parameter is $\alpha = 0.375$ following the estimates of Domenech and Taguas (1995) for the Spanish economy. Hence,

$$Y_t = F(K_t, N_t) = K_t^{\alpha} {N_t}^{1-\alpha}.$$

The depreciation parameter is set to match the average ratio of gross investment over output I/Y=19%. This yields a value of $\delta = 8\%$ in annual terms.

A decision concerning the aggregation of the labor input across different age groups has to be made. The empirical studies of the effects of changes in the

relative number of workers by age on age earnings profile have usually used the constant elasticity of substitution form and the translogarithmic form. For our purposes the CES functional form is very convenient because it has only one elasticity of substitution across workers with different levels of work experience $(1/\rho)$ and it is flexible enough to account for the perfect substitutability case $(\rho = 0)$ and the imperfect substitutability model economy when $\rho > 0$.

An additional decision has to be made concerning the way in which individuals with different experience levels are sorted into different groups. Our approach follows the standard practice in the labor literature that usually sorts the population into two experience groups. I follow Borjas (2003) and measure labor market experience by the difference between the age of a worker and the age of entry into the labor market. Hence, the first group includes those individuals with less than 25 years of experience, i.e. those who are between 20 and 44 years old. The second group contains those individuals with age more than 45. This choice is also consistent with Murphy and Welch (1992) that although considering 4 groups of ten years of experience, they find that those individuals with less than 20 years of experience are substitutes among them, although they are complements with those of more than 20 years of working experience. Given these considerations, the aggregate labor input is

$$N_t = B(\gamma L_t^{1-\rho} + (1-\gamma)H_t^{1-\rho})^{\frac{1}{1-\rho}} \tag{5}$$

where L_t and H_t are the labor supply in efficiency units of workers with less and more than 25 years of working experience respectively, and B is a parameter that measures the efficiency of aggregate labor. The procedure to set the values of the inverse of the elasticity of substitution ρ, the parameter B, the share parameter γ and the age-dependent efficiency units profile aims at reproducing the age profile of hourly wages in the data. Moreover, the procedure is implemented in such way that the age profile of hourly wages in the two model economies with perfect and imperfect substitution between less and more experienced workers $\{w_{i,t}e_i\}$ match the age profile of hourly wages of the data in the initial steady state.

Hence, we first compute an age specific labor productivity profile e_i using the European Community Household Panel (ECHP, 1994). This is done taking the age specific profile of mean gross hourly wages for workers aged between 20 and 64 normalized by the sample average. Following Conesa and Garriga (2003) in order to obtain the efficiency index of individuals above 65 years old, a projection of this profile is used. Then in order to set the other parameters we distinguish between two cases.

2.3.1 Perfect substitutability

In this model economy, a change in the relative supply of experienced workers does not translate into changes in the relative wages on individuals by age.

This is the case where $\rho = 0$. In addition, the value that governs the overall efficiency of labor input is set to a normalized value of $B = 1$. Finally, the value of the share parameter γ is set such that the age-profile of earnings in the model economy which consists of a product of the market wage w_i and the efficiency index e_i resembles the profile of earnings in the data. However, notice that since by construction the age-specific profile of efficiency units e_i already captures this target, the share parameter γ has to be set such that $\frac{w_h}{w_l} = 1$. Since the relative wage is given by

$$\frac{w_h}{w_l} = \frac{\gamma}{1-\gamma}\Big(\frac{H}{L}\Big)^{-\rho} \tag{6}$$

then, when $\rho = 0$, $\frac{w_h}{w_l} = 1$ if $\gamma = 0.5$.

2.3.2 Imperfect substitutability

Murphy and Welch (1992), among others, have studied the existence of imperfect substitutability among workers with different levels of experience and education. Their estimates of the elasticities of complementarity imply values of the ρ parameter between 0.5 and 2. In this paper we use $\rho = 1.2$ as our benchmark case for the case of imperfect substitution. Finally, the share parameter γ is set (as before) such that $\frac{w_h}{w_l} = 1$, yielding $\gamma = 0.7311$, and the parameter that governs the overall efficiency of the labor input B is set so that the *level* of wages per efficiency unit equals the level of wages per efficiency unit in the benchmark model economy with perfect substitution between less and more experienced workers, so that both model economies are identical in the initial steady state allowing for a useful comparison in terms of the aggregate effects of pension reform. This yields $B = 0.9103$.

2.4 Government

The government levies a proportional social security tax on labor income $\tau_{ss,t}$ to finance a benefit $d_{i,t}$ per retiree. These benefits are computed applying a replacement rate θ of 73.2% over the average earnings per worker in the economy,

$$d_{i,t} = \theta \frac{\sum_{i=1}^{I_r-1} h_{i,t} w_{i,t} e_i \mu_i}{\sum_{i=1}^{I_r-1} \mu_i}$$

and this system is assumed to be self-financed, i.e.

$$\sum_{i=I_A}^{I_R-1} \mu_{i,t} w_{i,t} h_{i,t} e_i \tau_{ss,t} = \sum_{i=I_R}^{I} \mu_{i,t} d_{i,t}.$$

The social security tax rate that balances the pension budget is 26.30%. The government also levies a proportional tax on capital τ_k and labor τ_l income to finance per capita government consumption G_t such that

$$\sum_{i=I_A}^{I} \mu_{i,t}(r_t a_{i,t}\tau_k + w_{i,t}h_{i,t}e_i(1-\tau_{ss,t})\tau_l) = G_t.$$

In particular, we use a value of $\tau_k = 0.186$ and $\tau_l = 0.17$ as reported by Bosca et al. (1999). These values generate a government to output ratio of $G/Y = 11.75$ which is roughly consistent with the average of this number from 1970 to 1994 in Spain.

Table 1: **Calibration**

Parameters	Targets
Preferences	
θ=0.333	Average time working 1/3
σ=2	Kotlikoff's estimation
β=0.987	K/Y=2.4 Puch and Licandro (1997)
Efficiency Units and Technology	
Efficiency index e_i	EHCP (1994)
$\lambda = 1.5\%$	Growth of p.c. consumption (1960-95)
$\alpha = 0.375$	Domenech and Taguas (1995)
$\delta = 8\%$	I/Y=19%
Perfect Substitution	
ρ=0	
γ=0.5	$\frac{w_h}{w_l} = 1$
$B = 1$	
Imperfect Substitution	
ρ=1.2	Katz and Murphy (1992)
γ=0.7311	$\frac{w_h}{w_l} = 1$
$B = 0.9103$	$w_h = w_l$=wage level in baseline model
Government	
$\tau_k = 0.18$, $\tau_l = 0.17$	Bosca, Fernandez and Taguas (1999)
Soc. sec. replacement rate=73.20%	Average value in Spain

2.5 The Equilibrium

In this economy a *Competitive Equilibrium* is a list of sequences of quantities $c_{i,t}$, $h_{i,t}$, $a_{i,t}$, $\mu_{i,t}$, L_t, N_t, K_t, prices $w_{l,t}$, $w_{h,t}$, r_t, social security tax rates $\tau_{ss,t}$ and income tax rates such that, at each point in time t: 1) firms maximize profits setting wages and the interest rate equal to marginal products, 2) agents maximize lifetime utility subject to the period budget constraints taking as given wages, the interest rate, taxes, social security benefits, survival probabilities, the age structure of the population and accidental bequests, 3) the age structure of the population $\{\mu_{i,t}\}$ follows the aggregate laws of motion explained earlier,

4) accidental bequests are given by

$$B_t = \frac{\sum_i \mu_{i-1,t-1} a_{i,t}(1 - s_{i-1,t-1})}{(1 + n_{t-1}) \sum_{i=I_A}^{I} \mu_{i,t}}$$

where n_{t-1} is the growth rate of the population between period $t-1$ and t.
5) Market clearing conditions for capital and each type of labor holds,

$$K_t = \sum_{i=I_A}^{I} \mu_{i,t} a_{i,t}$$

$$H_t = \sum_{i=I_E}^{I} \mu_{i,t} e_i h_{i,t}$$

$$L_t = \sum_{i=I_A}^{I_E - 1} \mu_{i,t} e_i h_{i,t}$$

where I_E denotes the age of becoming an experienced worker. Finally, the budget constraint of the government is satisfied period by period.

3 Findings

In this framework, I perform the same policy experiments as Conesa and Garriga (2003) and are the following. The first is to set to zero the social security benefits and taxes keeping untouched compulsory retirement at age 65 while adjusting the labor income tax rate to balance the government budget, and the second is to allow for endogenous retirement by allowing individuals above age 65 to work. These experiments are presented in the standard model economy with perfect substitution among workers with different experience levels, and another model economy where this substitution is imperfect.

3.1 Pension Reform with Perfect Substitution

The long run effects of eliminating social security are in line with the findings of previous studies (Conesa and Garriga (2003)). In particular, with the pension reform, agents work harder due to the lower distortions associated with the removal of social security taxes (see Table 3). As agents now save for retirement through the capital markets, the capital stock increases by 28% inducing a higher wage rate and a lower market return on capital. The increase in the productivity of labor by 16%, the elimination of social security taxes and the reduction in the labor income taxes induce an increase in after-tax wages of 63%. Labor supply, measured in efficiency units, also increases by 17% due to the fact that agents work harder on average. In addition, there is a reallocation of hours worked towards the early ages of the life-cycle (see Table 2). The overall effect on the welfare (measured in consumption-equivalent variation) of

an individual born in the new steady state is an increase in lifetime utility of 42%. The results when compulsory retirement is removed are slightly different. As older individuals are allowed to work after age 65, labor supply increases more importantly, and the need to save along the life-cycle for retirement is less pronounced. Consequently, the capital stock increases to a lesser extent. The overall effect, is an increase in output by 36.5% (because the increase in labor supply compensates the less important increase in capital) and a slightly lower welfare for new born in the new steady state. These results are quite similar to the ones reported in Conesa et. al. (2003).

Table 2: **Age distribution of labor supply. Perfect Substitution**

	PAYG	**FF+Comp. Ret**	**FF+Endog. Ret.**
Young	0.372	0.359	0.368
Old	0.205	0.348	0.245

Table 3: **Steady-state Features of the model with Perfect Substitution**

	PAYG	**FF+Comp. Ret.**		**FF+Endog. Ret.**	
		Value	% change	Value	% change
After-tax interest rate(%)	5.766	3.435	-40.440	4.639	-19.555
Gross wages unskilled	0.197	0.229	16.159	0.211	7.228
Gross wages skilled	0.197	0.229	16.159	0.211	7.228
After-tax wages unskilled	0.127	0.207	63.135	0.193	52.165
After-tax wages skilled	0.127	0.207	63.135	0.193	52.165
Labor supply	0.071	0.083	17.065	0.090	27.342
Average Hours(%)	30.787	35.502	15.316	33.482	8.755
K/Y ratio	2.320	2.978	28.361	2.607	12.338
G/Y ratio	11.748	8.640	-26.461	8.604	-26.765
Output	0.045	0.061	35.988	0.061	36.553
Labor tax(%)	17.000	9.754	-42.622	8.812	-48.166
Capital tax(%)	18.600	18.600	0.000	18.600	0.000
Social security tax(%)	22.580	0.000	-100.000	0.000	-100.000
Con. equival. variation(%)	-	42.73	-	37.98	-

The transitional dynamics in both cases are displayed in Figure 1. It is worth noting that in the model economy with endogenous retirement, the transition towards the new steady state is faster. The lower increase in the capital stock and the higher response of hours worked accounts for this different behavior. Consequently, with a faster transition the benefits (through higher wages) generated by the reform materializes more quickly and, as it will be shown in the next section, this will allow for a greater proportion of the population alive at the period of the policy reform to attain a higher level of lifetime welfare.

3.2 Pension Reform with Imperfect Substitution

The results are shown in Tables 4 and 5. With the elimination of social security, as agents have perfect foresight, they take into account the general equilibrium effect of a falling interest rate and react by intertemporally substituting future consumption and leisure by present consumption and leisure early in life. This means that there is a reallocation in the life time distribution of labor supply. With funded pensions, young agents work less hours when young and more hours when old being this process common to both model economies. In the model economy with perfect substitution between less and more experienced workers, this reallocation process of labor effort has no effect on the experience premium which stays unaffected. However, if less and more experienced workers are imperfect substitutes in production, as individuals born over the transition work less when young and harder when old, the aggregate relative supply of experienced workers increases over the initial periods of the transition and in the long run. This process brings about a fall in the experience premium (see Figure 2) and partially compensates the tendency to concentrate labor supply in the last periods of the working life.

Table 4: **Age distribution of labor supply. Imperfect Substitution**

	PAYG	**FF+Comp. Ret**	**FF+Endog. Ret.**
Young	0.372	0.384	0.395
Old	0.205	0.292	0.218

It is also worth noting that this process also induce individuals to accumulate relatively more asset holdings over the early period of life and hence the capital stock increases and the rate of return of capital falls relatively more in the model economy with imperfect substitution. The fact that individuals save relatively more in this model economy translates into a higher capital stock and higher wages (a higher increase in the wage when young and a minor decrease in the wage when old), and consequently the welfare of an individual born in the new steady state is 5 % points higher than in the model economy with perfect substitution and compulsory retirement. Again, this is so because young individuals have the time to take advantage of the higher wages when young. We will see that the long-run higher welfare levels for young generations come at the cost of higher welfare losses of older individuals alive at the period of the policy reform, since these individuals experience a fall in wages and do not live enough to save for retirement.

The introduction of endogenous retirement as part of the pension reform only moderate these effects and when those individuals above age 65 are allowed to work, the experience premium suffers a further decline.

Table 5: **Steady-state Features of the model with Imperfect Substitution**

	PAYG	**FF+Comp. Ret.**		**FF+Endog. Ret.**	
		Value	% change	Value	% change
After-tax interest rate(%)	5.766	2.561	-55.585	3.391	-41.195
Gross wages unskilled	0.197	0.269	36.425	0.262	32.647
Gross wages skilled	0.197	0.193	-2.050	0.169	-14.465
After-tax wages unskilled	0.127	0.242	90.716	0.237	86.790
After-tax wages skilled	0.127	0.173	36.930	0.153	20.448
Labor supply	0.071	0.080	12.843	0.084	18.997
Average Hours(%)	30.787	34.660	12.582	31.601	2.646
K/Y ratio	2.320	3.304	42.383	2.993	29.006
G/Y ratio	11.748	8.415	-28.373	8.466	-27.936
Output	0.045	0.062	39.496	0.062	38.649
Labor tax(%)	17.000	10.169	-40.180	9.513	-44.043
Capital tax(%)	18.600	18.600	0.000	18.600	0.000
Social security tax(%)	22.580	0.000	-100.000	0.000	-100.000
Con. equival. variation(%)	-	47.66	-	46.60	-

3.3 Winners and Losers from Pension Reform and the Status Quo

In order to compute the welfare effects of phasing out the pension system on the generations living at the time of the policy reform, I follow the standard practice which consists of calculating equivalent variations at birth for agents alive at the period of the policy reform. The equivalent variation lists the negative of the percentage that consumption must be increase or decrease by each period over the lifetime of individuals so as they stay with the same utility as in the initial steady state with the pay-as-you-go system untouched. Consequently, the measure computed is positive if there is a welfare gain. The results are shown in Table 6. In that Table, it is reported the welfare gain (loss) for each generation with voting rights (those individuals aged 20-95) and the cumulative frequency distribution of this voting population. Hence, it is straightforward to see the percentage of the population that would vote in favour or against the elimination of social security. The results of the experiment with perfect substitution between less and more experienced workers confirms the results found by Conesa et al. (2003). In particular with compulsory retirement, only 46% of the population enjoy welfare gains and consequently there exists the so called status quo bias against the reform. In contrast, when compulsory retirement is removed as part of the pension reform process, a majority of the population (54.3%) would experience welfare gains and the status quo bias would be broken. The reason is the shorter transition towards the steady state, which means that the benefits of the reform materializes earlier in the form of higher wages and consequently affects positively a higher number of individuals living

in the initial period.

The most striking difference between the model with and without imperfect substitution among experience levels concerns the welfare effect of reforming public pensions for those generations that are alive when the policy change is implemented. In particular, in the model economy with imperfect substitution and compulsory retirement, the welfare gains of the young generations are higher than in the standard economy with perfect substitution. For instance, those aged 20-24, would enjoy 32% higher welfare as compared to the 29.4% with perfect substitution, because the capital stock is higher. However, these welfare gains for the younger generations come at the cost of higher welfare losses for the older generations, mainly due to the decrease in the experience wage premium. In summary, in the model with imperfect substitution, the elimination of social security with compulsory retirement, would increase the welfare of the 37.6% of the population as compared to the 46.1% of the standard model economy. To what extent allowing for endogenous retirement would break this status quo bias against the elimination of social security? The results are shown in the last column of Table 4. Notice that although with endogenous retirement older individuals are allowed to work, the change in the relative supply of experienced workers induces a further fall in the wage premium. Consequently, in this case endogenizing retirement not only would not break the status quo bias, but in addition, the proportion of the population that experiences welfare gains (37.6%) would remain unaffected.

Table 6: **Welfare Effects of Eliminating Social Security**

		Perfect Subs.		**Imperfect Subs.**	
Age	Cumulative Freq. Distrib. voting popu.	FF+Comp.	FF+Endog.	FF+Comp.	FF+Endog
20-24	0.099	0.294	0.277	0.320	0.339
25-29	0.195	0.195	0.193	0.192	0.213
30-34	0.287	0.111	0.125	0.089	0.114
35-39	0.376	0.046	0.070	0.012	0.036
40-44	0.461	0.002	0.030	-0.043	-0.023
45-49	0.543	-0.027	0.002	-0.084	-0.071
50-54	0.622	-0.046	-0.017	-0.085	-0.067
55-59	0.696	-0.059	-0.031	-0.084	-0.066
60-64	0.766	-0.072	-0.042	-0.088	-0.067
65-69	0.831	-0.112	-0.051	-0.117	-0.073
70-74	0.888	-0.077	-0.037	-0.080	-0.052
75-79	0.937	-0.052	-0.025	-0.054	-0.034
80-84	0.975	-0.035	-0.015	-0.036	-0.021
85-89	0.997	-0.024	-0.007	-0.025	-0.010
90-94	1.000	-0.005	-0.001	-0.005	-0.001

4 Concluding Remarks

This paper has extended the standard large overlapping generations model to allow for the interaction between changes in the relative labor supply of workers with different experience levels and the lifecycle profile of earnings. It is found that the macroeconomic and welfare effects of phasing out the current pay-as-you-go pension system depends critically on the modelling strategy concerning the complementarity between less and more experience workers. In particular, the results indicate that a model that abstracts from this complementarity *underestimates* the welfare losses of the agents living at the time of the policy reform who are those that should vote for the implementation of such reform. In addition, even when compulsory retirement is removed as part of the reform of pensions, the status quo problem does not dissapear. Hence the results of this paper go in the direction of explaining why the political support for this policy change has shown to be weak in most of developed countries.

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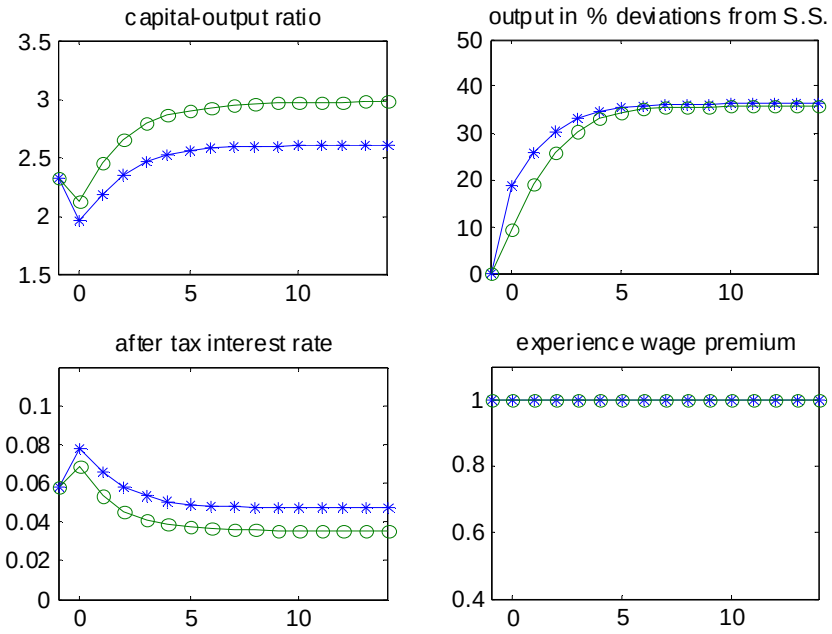
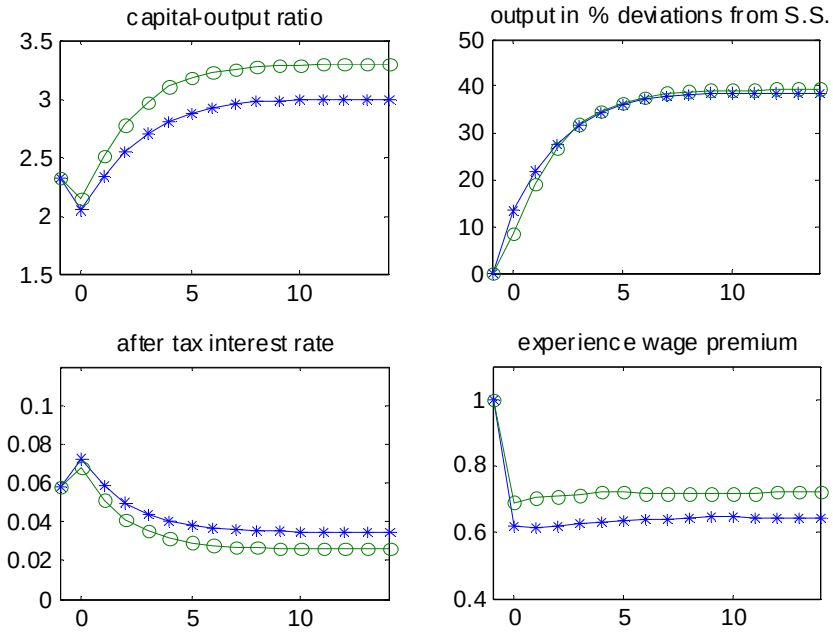
Figure 1: Aggregate Effects of Pension Reform with Perfect Substitution



Note: -o: Compulsory retirement, -*: Endogenous retirement

Figure 2: Aggregate Effects of Pension Reform with Imperfect Substitution.



Note: -o: Compulsory retirement, -*: Endogenous retirement

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