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Welfare Effects of Social Security Reforms across Europe: the Case of France and Italy

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Welfare Effects of Social Security Reforms Across Europe : the case of France and Italy

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Abstract

This paper uses a calibrated life cycle model to quantify the distributional effects of Social Security reforms. We focus only on two countries: Italy and France because they adopted two different strategies to cope with aging. While France marginally modified its defined pension plan, Italy switched from a defined pension plan to a contributive system. We find both reforms redistributes welfare unevenly: high skilled workers are the primary winners of the French reform and self employed individuals, especially unskilled workers, are the losers under the new Italian Social Security arrangement.

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1 INTRODUCTION

All industrialized countries have adopted reforms to support the PAYG system jeopardized by ageing. The funding of pension systems is one of the major concerns in view of the changing demographic trends. However there are other issues to address when thinking about the pension system. Retirement age, replacement rates and internal return rate on pension are key variables to understand the individual pension and redistribution across individuals. We argue that it is also important to identify who pays the reform. Beyond financial assessment, a welfare study across different individuals should be implemented. Reforms must have desirable properties in terms of redistribution between generations and across workers. Some careers are naturally longer than others. Some workers expect to live longer after retirement that others. Social security wealth is related to individual saving and labour supply behaviour. These facts underlines that Social Security (hereafter SS) is not only an individual insurance but also a social insurance.

This paper develops an unified theoretical framework in order to quantify the welfare effects of SS reforms across countries. Along the lines of Rust & Phelan (1997), Huggett & Ventura (1999) and Fuster, Imrohoroglu, & Imrohoroglu (2003), we use a life-cycle model, in which individuals are heterogenous with respect to their endogenous wealth, labour status (employed / unemployed / retired with endogenous retirement choice) and social group (unskilled to skilled workers). Besides, agents are altruistic and face a financial constraint. Our model allows individuals to differ in ability levels, which permits a rich analysis of intragenerational welfare changes. We examine the impact of incentives on retirement decisions looking at different reforms across Europe. We focus only on two countries: Italy and France because they adopted different strategies to cope with ageing. While France marginally modified its defined pension plan, Italy chose to move from a defined pension plan to a totally contributive system. Using the same analytical tool and presenting similar simulations in each country provides a mean for comparing retirement incentives across countries.

In a recent literature, some studies use microsimulation models to investigate institutional differences across countries as Gruber & Wise (2004) and Blondal & Scarpetta (1998), Blanchet & Pelé (1997) and Brugiavini (1997) for France and Italy respectively. For want of a complete theoretical setting, such studies can not assess welfare implications of SS reforms. However, it is crucial to quantify distributional implications of alternative SS changes in order to identify who wins and who loses after the reform. In addition, a detailed investigation of welfare effects is required as such effects are not summarized by a present - value calculation of benefits and taxes paid. Indeed, SS systems distort labour and savings decisions and modify insurance possibilities, in addition to redistributing income across households.

When analyzing the impact of changes in SS arrangements, the contribution rate is held constant so that the SS budget is not balanced by an endogenous payroll tax. Indeed, the Italian reform fixed the contribution rates. In France, the Raffarin government relies on optimistic projections on growth that would leave the contribution rate unchanged. We propose to assess the impact of reforms under the scenarios advocated by the Italian and French governments. In order to measure the ability of the reform to finance the expected SS deficit, we compare the SS deficit due to the increase in life expectancy and without reform to the deficit observed after the reform.

We find that, in France, high skilled workers are the primary winners of the reform as they can take advantage of the flexibility in pension schemes introduced by the Raffarin government. However, our results do not fully support the reform as the change in pension formula alone can finance only 20% of the expected deficit. In our view, an increase in the contribution must be expected, which could actually decrease welfare, especially for low income groups.

In the wake of the Italian reform, the fall in SS generosity particularly affects self - employed. For, the new Italian system is based on the capitalization of a fraction of earnings. Self - employed contribute less to the pension system and are characterized by lower earnings. The dramatic fall in SS generosity accounts for the ability of the reform to finance the expected deficit.

We first present the model, then describe pension reforms in France and Italy. This allows us to contrast the French system based on a defined pension system with the Italian contributive system. Third, we solve the model in a benchmark calibration, then check its ability to reproduce the prevailing features of SS and retirement profiles. Finally, we compare welfare effects of SS reforms in both countries.

2 DESCRIPTION OF THE ECONOMY

We build a life cycle model of retirement and wealth. The model analyzed in this section is a modified version of the stochastic neoclassical growth model with uninsured idiosyncratic risk and no aggregate uncertainty. Beyond the heterogeneity arising from uninsurable shock to household employment opportunities, life cycles features are also considered. We build on Hairault, Langot, &

Sopraseuth (2004) that extends Rust & Phelan (1997)'s model by introducing wealth accumulation. Following Castañeda, Diaz-Gimenez & Rios-Rull (2002), agents age stochastically.

Both countries are modelled as an overlapping generation model with Markovian transitions on the labour market. As a result, the history of each individual affect their saving behaviour: individuals are heterogenous with respect to their wealth. Finally, retirement behaviour is endogenous. Our model is thus able to capture the interaction between retirement choices and savings : as SS reform aim at delaying retirement, will individual respond to this reform by saving more, the financial income allowing them to retire earlier? Our model is able to capture such effect.

In order to analyze retirement decisions we take into account several key features. First, pension depends on life-time wage, which is crucially related to unemployment spells during the working life. Transitions on the labour market from employment to unemployment is a salient feature of our model. Second, our model is able to take into account the issue of indexation of pensions on prices, which was is used in both countries as a way of reducing SS generosity. A last important feature of the model is the social structure adopted in this paper. In each country, we distinguish several social groups. In France, statistics categorize the population according to their skill levels. Since we are interested in the reforms affecting workers of the private system (that covers 70% of the labour force), we retrain 4 broad categories: blue collar workers, clerks, white collars and executives. We discard self - employed workers and civil servants. In Italy, we include workers of the private sector (52% of the labour force) and self-employed people (28 % of the labour force). Due to data availability, 4 educational levels are investigated : no studies and primary studies, Secondary studies, Pre-Superior studies and Superior studies. The model then takes into account 8 social groups : 4 educational level for workers of the private sector and self employed. We discard civil servants. Mortality risk, unemployment transitions, life-time wage, age of end of education is specific to each social category. Finally, the model will be able to predict the retirement decision across and within each social group.

2.1 Population dynamics and employment opportunities

2.1.1 Population dynamics

Each period, some households are born and some households die. We assume that the measure of the new-born is growing at a constant rate n. For sake of simplicity, individuals face a mortality from the age of normal retirement age on. In order to take into account a typical wage life-cycle profile, we assume that the population can be divided into three classes of age, the young, the adult and mature individuals respectively denoted J, A and M. As a worker accumulates experience during her life-cycle, we assume that the efficiency of the labour input grows with the age of the agents. The mature period encompasses the ages of normal retirement age (ERA) to 70, ($M = \{ERA, 60, ..., 70\}$). From the age of ERA on, each agent chooses to remain in her current state (employed, pre-retired or unemployed) or retire the following period.[1] Each individual is born as a young worker. The probability of remaining a young (experienced) worker the next period is π_{JJ} (π_{AA}). From the age of ERA on, the individual of age $k \geq ERA$ faces a rising probability to die $(1 - \pi_k)$. The mortality matrix takes into account the inequality in surviving probabilities across social groups. Matrix $\mathcal{P}$ that governs the age Markov-process is, for instance, in France, given by:

$t \backslash t+1$	J	A	59	60	61	$\cdots$	69	R
J	π_{JJ}	$1-\pi_{JJ}$	0	0	0	$\cdots$	0	0
A	0	π_{AA}	$1-\pi_{AA}$	0	0	$\cdots$	0	0
59	$1-\pi_{59}$	0	0	π_{59}	0	$\cdots$	0	0
60	$1-\pi_{60}$	0	0	0	π_{60}	$\cdots$	0	0
61	$1-\pi_{61}$	0	0	0	0	$\cdots$	0	0
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\ddots$	$\vdots$	$\vdots$
69	$1-\pi_{69}$	0	0	0	0	$\cdots$	0	π_{69}
R	$1-\pi_{RR}$	0	0	0	0	$\cdots$	0	π_{RR}

2.1.2 Employment opportunities and intergenerational opportunities

There are three components in the real wage : a deterministic exogenous productivity trend growing at a rate of γ^T, the experience component the profile which has been described above, and an idiosyncratic risk. Taking into account the idiosyncratic risk of being employed or unemployed is then essential in the understanding of retirement decisions.

At all ages, people face the risk of being unemployed. Transitions to these states are determined by exogenous probabilities denoted by π_{uuk} (probability of an unemployed of age k of remaining unemployed at age $k+1$) and π_{eek} (probability of an employed of age k of remaining employed at age $k+1$). Exogenous transitions to unemployment are specific to each skill level.

Finally, we assume that a newly-born household's social status is determined by her parents'

[1] The early retirement age is specific to each country. It is 60 years old for France, 60 years old for Italy in the pre-reform scenario and 57 years old in the post - reform period.

rank. This social mobility Φ is modelled as an exogenous Markov matrix

$$\pi(\epsilon'|\epsilon) = Pr\{\epsilon_{it+1} = \epsilon'_i|\epsilon_{it} = \epsilon_i\}$$

where ϵ_i (ϵ'_i) denotes the random variable embodying the social status of the father (of the son). It is assumed that, once born with a random social status (linked to that of her father), an individual's social status is not modified in her life-time.

2.2 The household's decision: retirement choice, consumption and wealth

2.2.1 Preferences

Households only derive utility from their consumption when their are alive as well as from the consumption of their progenies. The intertemporal utility function of an household is given by

$$\sum_{t=0}^{\infty} \beta^t \left\{ \sum_{s_t \in \mathcal{V}} \pi(s_t|s_{t-1}) u(C_t, l_t) + \varrho \Phi \beta \sum_{s_t \in S1} \pi(s_{t+1}|s_t) V(A_{t+1}, s_{t+1}) \right\} \tag{1}$$

where the period utility function u is strictly concave, the time-discount factor verifies $\beta \in]0, 1[$, consumption C_t and leisure l_t are positive. $s_t \in S$ is a compact notation to denote the age and the employment opportunities of the household. This variable follows a finite state Markov chain with conditional transition probability given by

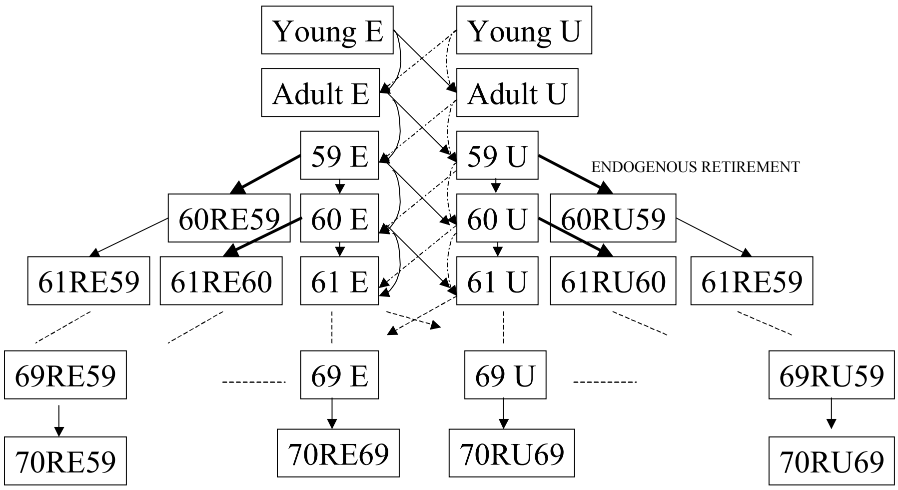
$$\pi(s'|s) = Pr\{s_{t+1} = s'|s_t = s\}$$

Finally, the last term of the intertemporal utility function describes the utility derived by the parents from their bequests. The parameter $\varrho > 0$ captures the household's concern for the welfare of his off-spring. Thus, $V(A_{t+1}, s_{t+1})$ denotes the expected utility of a new-born child who begins his career according to a stochastic productivity ladder linked to that of her parents, conditional on his age, and inherits a stock of wealth A_{t+1}. We assume that the instantaneous utility function u is a CRRA:

$$u(c) = \frac{(c^{1-\eta}(1-l)^{\eta})^{1-\tilde{\sigma}}}{1-\tilde{\sigma}}$$

with $\tilde{\sigma}$ the risk aversion and η the weight of leisure $(1-l)$ in the instantaneous utility. In addition, the household faces two sources of capital market inefficiency. The first stems from market incompleteness that prevents them from insuring against idiosyncratic risks. The second relies on a borrowing constraint : net asset holding cannot be negative ($A_{t+1} \geq 0$).

Figure 1: Decision tree faced by each individual in France (Early retirement age is 60 years old)



2.2.2 The steady state

In order to define a stationary equilibrium, we divide consumption, wealth, real wages and pension by the growth rate of technological progress $(1+\gamma^T)$ and population growth $(1+n)$. The household of age k has 2 state variables : the pair (a, s) with s the realization of the household-specific process and a the beginning-of-period financial wealth. The occupational status (employed or unemployed) is a key element in the retirement decision since it determines current and future income flows as well as expected pensions. From the age of ERA on, individuals of age $k \geq ERA$ choose whether to retire or not the following year by comparing the expected future value function at age $k+1$ when retired to the future value function at age $k+1$ if she remains on the labour market, taking into account the probabilities of transitions to employment or unemployment.

As we want to be able to assess the impact of the indexation of pension on prices, for each age group after the ERA, retirees are classified according to their retirement age. For instance, among retirees of age 63, we are able to identify those who retired at age 60, 61 and 62[2]. Figure 1 summarizes the decision tree faced by each individual. Optimizing programs are reported in appendix A.

Given the vector of prices (r, w), the stationary equilibrium consists of households' choices for

[2] Labor force surveys show that, when old and unemployed, an individual has little chance to work again, the calibration is then such that, after 59 (After the Italian reforms, the early retirement age 57 instead of 60) years old, when unemployed, an individual remains unemployed.

consumption, savings and retirement $\{c(a,s), a'(a,s), \Psi(a,s)\}$, value functions $v(a,s)$ and $V(a,s)$, a stationary distribution of households $\lambda(a,s)$ and a set of aggregate variables (A, R, D) where A is the aggregate asset holding, D (respectively R) refers to expenditures (respectively the revenues) of the retirement scheme X. The stationary equilibrium is such that:

(i) The real interest rate is given, which is consistent with a small open economy hypothesis. This leads to a constant capital to labour ratio, thus making real wages w exogenous.

(ii) Saving decisions $a' = g(a,s)$ and retirement behaviour $\psi = \Psi(a,s)$ are solutions to the lifetime maximization program where

$$\Psi(a,s) = \begin{cases} 1 & \text{si} \quad v(a,\{s,k\}) \geq v(a,\{R,k\}) \\ 0 & \text{sinon} \end{cases}$$

for $s = e, u$. Finally, let $a' \equiv \mathcal{A}(a,s)$ be the households' policy that depends on her state on the labour market (employed or unemployed). $\mathcal{A}(a,s)$ is such that:

$$\mathcal{A}(a,s) = \Psi(a,s)g(a,\widehat{s}) + [1 - \Psi(a,s)]g(a,R)$$

where an agent's policy in state $\widehat{s} = e, u, p$ is denoted by $a' \equiv g(a,\widehat{s})$.

(iii) The new-born's utility $V(a,s)$ is similar to the utility of people who begin working $v(a,s)$.

(iv) The endogenous probability distribution$\lambda(a,s)$ is the stationary distribution associated with $(\mathcal{A}(a,s), \pi(s'|s))$ such that:

$$\lambda(a',s') = \sum_{s} \sum_{\{a:a'=\mathcal{A}(a,s)\}} \lambda(a,s)\pi(s'|s)'$$

(v) In the pre-reform scenario, SS budget is balanced:

$$R = D$$

given pension arrangements specific to each country. Pensions are financed with payroll taxes.

(vi) Aggregate capital stock is given by

$$A = \sum_s \sum_a \lambda(a, s) g(a, s)$$

We implement numerical techniques based on a discretization of state variables (Sargent & Ljungqvist (2000)). This study compares steady states that prevail before and after SS reforms. Our life cycle model allows for endogenous retirement and savings with heterogeneity in wealth, labour status and skills, which yields interesting results on distributional effects of SS reforms. We choose to discard transitional dynamics in order to focus on the impact of reforms after the transition is over, which allows to identify long run welfare consequences of the reforms. The calibration of each country relies on micro-data using a model period of one year. Appendices B and C summarize the calibration.

3 SOCIAL SECURITY REFORMS

Descriptions of the French and Italian SS systems can be found in Blanchet & Pelé (1997) and Brugiavini (1997). In the model, rather than relying on calibrated replacement rates, we compute pensions based on pension formulas applied today by the SS. This section aims at underlying the key elements of each reform.

3.1 The French reform : A defined pension plan

For private workers, the benefit consists of two elements : a "basic general regime" (Caisse Nationale d'Assurance Vieillesse, hereafter CNAV) and mandatory complementary schemes (ARRCO and AGIRC). Both retirement plans are pay-as-you-go systems. Table 1 summarizes the computation formulas that are considered in real life and in our model.

3.1.1 The pre-reform system (post-Balladur system, 1993):

Since the Balladur reform, each individual of the private sector has to contribute 40 years before being entitled to full pension. In case of retirement before 40 contributive years, the basic pension decreases by roughly 10% per missing years. In addition, the French system is characterized by a tax on continued activity : in case of delayed retirement, beyond 40 years of contribution, the basic pension does not increase.

Table 1: Social Security Reforms in France

	Pre-reform	Post reform
Early Retirement Age	60	idem
Pension indexation	prices	idem
Pension Formula	$P(k) = P^{basic}(k) + P^{ARRCO}(k)$	idem
	Defined pension plan : $P^{basic}(k) = \min\left(1, \frac{d}{40*4}\right)$ $\times \frac{1}{25}\sum_{t=1}^{25} Min(w_t, cap_t^{SS})$ $\times \phi$ with $\phi = 0.5$ -0.0125 $\times \max\{0, \min[(65-k)*4, 40*4-d)]\}$ with d = number of contributive quarters and k = age in years	$P^{basic}(k) = \min\left(1, \frac{d}{42*4}\right)$ $\times \frac{1}{25}\sum_{t=1}^{25} Min(w_t, cap_t^{SS})$ $\times \phi$ with $\phi = 0.5$ -0.0094 $\times \max\{0, \min[(65-k)*4, 42*4-d)]\}$ $+0.03 \max\{0, d*4-42\}$
	Defined contribution plan : $P^{ARRCO}(k) = points(k) \times v_d \times penalty(k)$	idem

This basic pension is supplemented by mandatory schemes based on a contribution plan. Pension paid by mandatory scheme are also reduced (by 4% per missing year) in case of retirement before 40 contributive quarters. "Points" are purchased by each individual during her career. Each year, a fixed proportion of the wage τw is devoted to the purchase of these points. One euro of earning yields $1/p^{ARRCO}$ points. The contribution rate τ is fixed by ARRCO and AGIRC each year. At the age of retirement, points are converted into euros of pension by multiplying the number of points by a coefficient denoted v_d, the value of each point at the date of retirement. Pension at age k then amounts to $P^{ARRCO}(k)$ where $points(k) = \sum_{i=1}^{k} \frac{c(i)w(i)}{p^{ARRCO}(i)}$ denotes the total number of points accumulated throughout the years. For non executives, contributions are collected by ARRCO. Different contribution rates are applied to the part of the wage below and above the SS cap. For executives, ARRCO (respectively AGIRC) collects the contribution for the part of the wage below (respectively above) the SS cap. [3]

[3]Finally, ARRCO and AGIRC introduce a wedge between the contribution rate paid by workers (c') and the contribution rate that grants them points (c). In the data, $c' > c$: by imposing this discrepancy between the tax paid and tax yielding points, complementary schemes anticipate the expected deficit associated with the future demographic change. ARRCO and AGIRC apply different wedges. Let $\frac{c'_{ARRCO}}{c_{ARRCO}} = \tau^{ARRCO}$ (respectively $\frac{c'_{AGIRC}}{c_{AGIRC}} = \tau^{AGIRC}$) be the wedge used by ARRCO (respectively AGIRC) for the part of the wage below and above the Social Security cap. τ^{AGIRC} and τ^{ARRCO} are endogenously determined at the stationary equilibrium in the pre-reform

Table 2: Social Security Reforms in Italy

Pension	Pre-1992 regime	Post 1997 regime
Early Retirement Age	60	from 57 years old on
Pension Private	$P(T) = \left(\frac{1}{5}\sum_{t=1}^{5} w_{age-t}\right) \times Max\,(T, 40) \times \tau$ with T number of contributive years	$P(k) = c \times \sum_{t=1}^{R} 0.33 \times w_t(1+\gamma)^{k-t}$ with k retirement age
Pension Self-employed	$P(T) = \left(\frac{1}{10}\sum_{t=1}^{10} w_{age-t}\right) \times Min\,(T, 40) \times \tau$	$P(k) = c \times \sum_{t=1}^{R} 0.20 \times w_t(1+\gamma)^{k-t}$
Pension benefits	$\tau = 2\%$ of pensionable wages	$\gamma = 5$ year moving average of GDP growth $c =$ Conversion coefficients
Pension indexation	wages	prices

3.1.2 The post reform system (Raffarin Reform, 2003)

The required contributive years to draw full pension is extended from 40 to 42 years. However, in order to make old age pension more actuarially fair, the reduction in pension in reduced in case of early retirement (5% per missing year instead of 10%) and the pension is increased in case of delayed retirement (3% per additional year beyond 42 years). The last elements aim at introducing more freedom in the choice of retirement age.

3.2 The Italian reform : Switching to a contributive system

Table 2 summarizes the computation formulas that are considered in our model.

3.2.1 The pre - reform system (before 1992)

The normal retirement age was 60 for men and 55 for women. The pensionable earnings were the average of last 5 years real earnings (converted to real values through price index). The pension benefit was 2% of the pensionable earnings by years of tax payments (at most 40 years). Pension benefits were indexed to wages.

3.2.2 The post - reform system (after 1997)

The post - reform regime stems from a series of reforms : in 1992 (Amato), 1995 (Dini) and 1997 (Prodi). In the post - reform system, each individual has an account in which contributions equal

scenario.

Table 3: Dependency ratios

	France	Italy
Dependency ratio 2002 Data (%)	27	29
Dependency ratio 2002 Model (%)	30	33
(Expected) Dependency ratio 2040 without reform Data (%)	70	67
Dependency ratio 2040 without reform Model (%)	55	54
Contribution rate (firm + employee) - Data (%)	29.6	25.3
Contribution rate (firm + employee) - Model (%)	21.3	24.8

Data Source : Italy- Visco (2001) -Brugiavini & Galasso (2003), France-COR(2001)

to 33 per cent of earnings for employees and 20 per cent for the self-employed. Contributions for each year are indexed to a five-year moving average of GDP. A conversion coefficient is then applied to total contributions.[4] Pensions are indexed to prices.

In contrast to France, Italy chose to switch from a defined pension plan to a totally contributive system. The comparison between both countries allows to quantify the welfare implications of these opposite strategies.

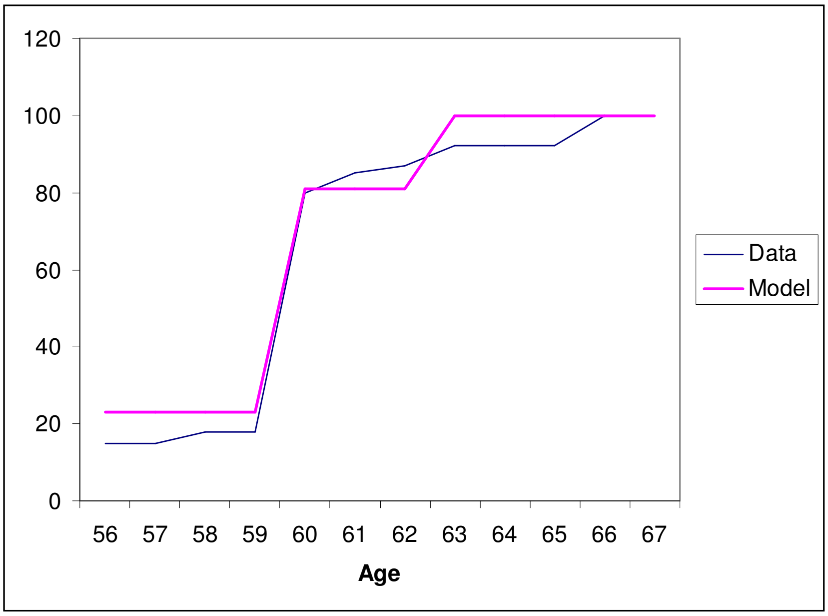
4 DOES THE MODEL FIT THE DATA?

We first check that the theoretical framework is consistent with the French and Italian data (see Appendix B). Comparing the dependency ratios, the model matches the demographic structure observed in year 2002. After taking into account the increase in life expectancy predicted by official statistics (Source : Italy - Visco (2001) 5 years of increased life expectancy, France - COR (2001) 6 years of increased life expectancy), the model underpredicts the worsening of the dependency ratio in 2040. Indeed, our steady state analysis captures only the part of the dependency ratio due to the increased life expectancy, not the retirement of baby boomers, which is relevant when one investigates transitional dynamics. Finally, the model seems to match the contribution rates observed in the data. Table 3 summarizes these results.

We also analyze the cumulative retirement rate in the data and in our model. In France (figure 2, Data Source : Bac, Bonnet, Bontout & Cornilleau (2000)), the model matches early exits before 60, (due to unemployment), the spike at 60 and, to a lesser extent, the smaller peak at 63. Since we discard heterogeneity in health status and specific female participation, the model cannot capture the complete distribution of retirement age. However, figure 2 indicates that our theoretical

[4] This conversion coefficient c depends on life expectancy by retirement age and gender.

Figure 2: Cumulative retirement age - France



framework provides a reasonable proxy for the current retirement behaviour. In Italy, our model predicts that all individuals retire at age 60. Retirees before 60 are in the model old unemployed workers, which is consistent with the retirement age observed in Italy before 1992 (figure 3).

We report replacement rates in tables 4 and 5. In France, replacement rates indicate that SS has distributional effects. Indeed, low skilled workers are characterized by higher replacement rates than high skilled workers whose wage profile is much steeper. This distributional effect stems from the presence of SS cap in the pension formula. The model is able to capture this feature. In Italy, the profile in the replacement rates by educational level is slightly different. More educated workers have a higher replacement rate in spite of SS capping and minimum pension. As pointed out by Borella (2001), the Italian defined plan takes into account only the last wages, which guarantees an overgenerous pension to individuals with steeper earnings profile, namely high skilled workers.

We also checked that the model is able to approximate Gini coefficients and other inequality indicators on earnings, income and wealth computed on the French and Italian microdata (Enquête Patrimoine 1998, labour Force Survey and SHIW 1991 - 2002). For a discussion of the extent to which similar models can match features of the distribution of wealth and savings, see Castañeda, Diaz-Gimenez & Rios-Rull (2002) and Fuster (2003).

Figure 3: Distribution of Retirement Age in Italy (Source : INPS)

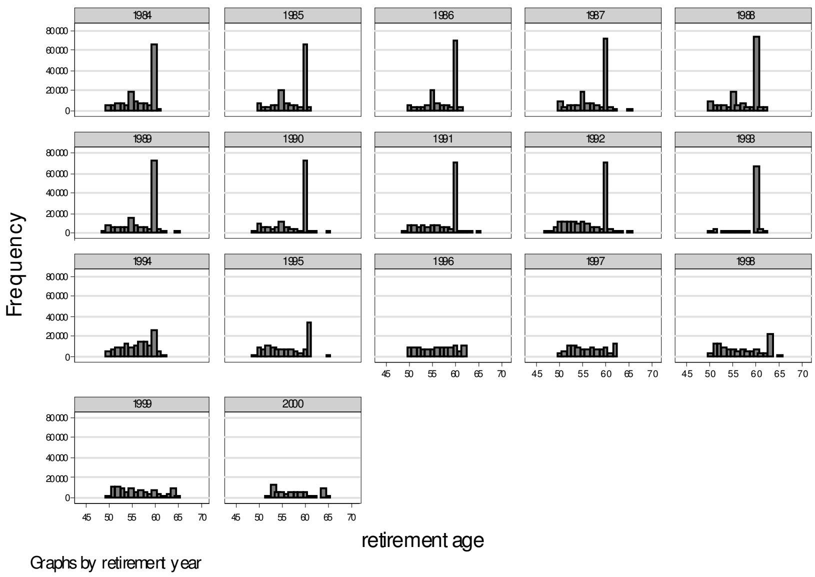


Table 4: Replacement Rates in the Model and in the Data - France

Occupational group	Data	Model
Executives	59	50
While Collars	64	62
Clerks	72	78
Blue Collars	80	82

Data Source : Chagny, Dupont, Sterdyniak & Veroni (2001)

Table 5: Replacement Rates in the Model and in the Data - Italy

		Data	Model
Self employed	No studies and primary studies	0.66	0.67
	Secondary studies	0.68	0.69
	Pre-superior studies	0.80	0.86
	Diploma, degree and post-degree	0.82	0.80
Private Sector	No studies and primary studies	0.678	0.77
	Secondary studies	0.69	0.75
	Pre-superior studies	0.71	0.81
	Diploma, degree and post-degree	0.72	0.80
Total		0.706	0.754

Data Source : Italy-SHIW1991-2002, authors' calculations

5 WELFARE EFFECTS OF SOCIAL SECURITY REFORMS

In order to know whether the reform is able to sustain the PAYG system, we compute the SS deficit without reform and after the increase in life expectancy. We then compare this deficit to the deficit in the post - reform regime.

We compare 2 steady state equilibria (pre or post reform scenarios). We quantify distributional effects of reforms under the scenarios endorsed by each government. In the post reform regime, we chose to discard the endogenous adjustment of the contribution rate. The Italian contribution rate is fixed by the reform (33% for workers in the private sector and 20% for self-employed). The French government relies on optimistic projected growth to argue that the contribution rate shall not change much. The post-reform payroll tax is then set at the level endogenously determined in the pre-reform regime.

5.1 France

Following Fuster, Imrohoroglu, & Imrohoroglu (2003), table 6 reports the welfare measured as the welfare of new born defined as

$$W = \int_a V(:, J)\lambda(:, J)da$$

Each row in table 6 corresponds to a steady state ex - ante welfare in the pre-reform system (column (1)) and the post - reform regime (column (2)). Table 6 suggests that all social groups are better off under the post reform regime. A longer life expectancy entices individuals to save more to insure themselves against the risk of outliving their assets. Combined with a constant contribution rate, the increase in financial asset accounts for the higher welfare. In order to assess the magnitude of welfare variations, we convert them into changes in permanent consumption (column (4) [5]).

Executives benefit more from the reform. Figure 4 provides an intuition for this result. Lower social groups retire as soon as they reach the age of the "full rate": given their age of first job, white collars, clerks and blue collars claim their benefits as soon as they are accumulate the required contributive quarters. The Raffarin reform that aimed at providing more flexibility in retirement

[5] The permanent consumption $\bar{C}$ is computed as

$$W = \int_a V(:, J)\lambda(:, J)da = \frac{1}{(1-\beta)(1-\sigma)}\bar{C}^{1-\sigma}$$

Table 6 displays $\frac{\bar{C}'-\bar{C}}{\bar{C}}$ with $\bar{C}'$ (respectively $\bar{C}$) the permanent consumption in the post - reform system (respectively in the pre-reform regime).

Table 6: Welfare of New Borns - France

	2000 (1)	2040 (2)	Welfare change (3)	Consumption change (4)
Executives	-10.6086	-10.3898	0.0455	0.0476
White Collars	-16.9144	-16.6789	0.0312	0.0322
Clerks	-22.4713	-22.2726	0.0322	0.0333
Blue collars	-23.2987	-23.0206	0.0258	0.0264

choice fails along this dimension : given the benchmark calibration of leisure, unskilled workers do not take advantage to the more flexible scheme either to retire earlier or to delay retirement.

The retirement age of clerks and blue collars who enter the job market at very young ages (18 and 16 respectively) retire at 60 before and after the reform : they accumulate the required number of contributive quarters at this age before the reform (40 years of contributive quarters) and after the reform (42 years of contributive quarters). White collars have to delay retirement by 2 years but the increase in savings does compensate for this loss in leisure. Interestingly, as displayed in figure 4, only executives take advantage of the more flexible arrangement introduced in the reform. Some of them decide to retire before 64 thus taking advantage of the reduced decrease in pension in case of early retirement. These executives have enough financial income to compensate for the reduced pension, which underlines the role of savings in retirement decisions.

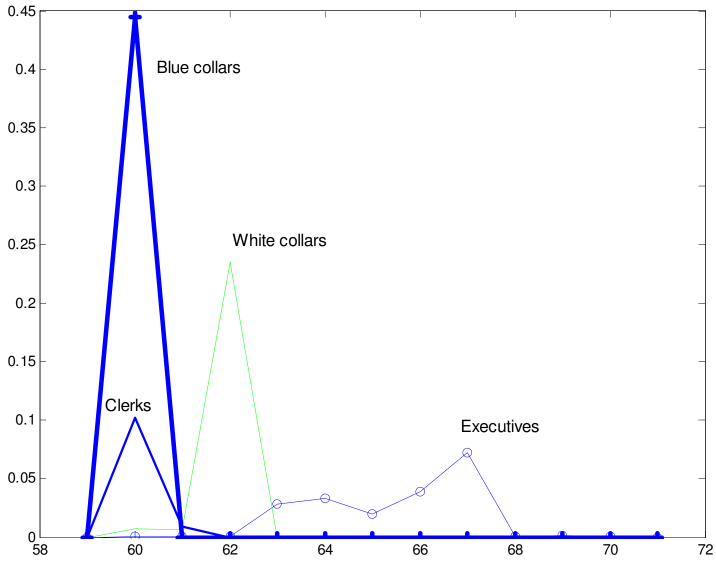
In addition, given the benchmark calibration on leisure, some executives work beyond the age of the full rate, thereby increasing their pension. Indeed, as executives fear that their off-springs might be born in a lower social group, they are willing to work longer to accumulate more bequest. Again, saving, through altruism, affect retirement decisions [6].

In spite of the increase in welfare for all social groups, our results do not totally support the Raffarin reform. Our model predicts that the reform alone can finance roughly 20% of the expected SS deficit. For, the contribution rate remains constant. In addition, clerks and blue collars who constitute 55% of the labour force do not delay retirement. The increase in the contribution rate seems inevitable, which would result in a *decrease* in welfare for all social groups, especially for low income workers. [7].

[6] Wealth thus affects retirement through two opposite channels : wealthy individuals retire earlier while the desire to accumulate bequest results in delayed retirement. See Hairault, Langot, & Sopraseuth (2004) on this point.

[7] We computed the steady state with reform and an endogenous contribution rate such that Social Security budget is balanced. We find that, in spite of the reform, the contribution rate has to increase, which actually leads to a reduced welfare, especially for low income groups.

Figure 4: Retirement age in the post-reform regime - France

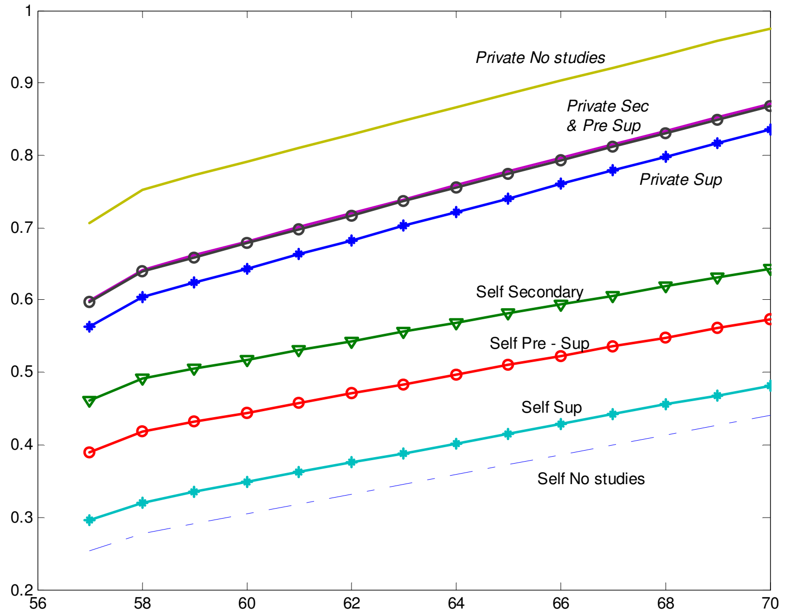


5.2 Italy

What welfare effects can we expect from the Italian reform? One the one hand, a longer life expectancy induces individuals to save more. The resulting increase in financial income yields a higher permanent consumption and welfare. However, several elements negatively affect welfare. First, old age pensions are now indexed on prices, not on wages. Secondly, the Italian reform results in a drop in replacement rates. Figure 5 displays replacement rates as a function of retirement age in the post - reform regime. The figure must be compared to the pre-reform replacement rates in table 5. Those who want to benefit from generous replacement rates must now delay retirement. The drop in replacement rates is particularly keen for self - employed workers as their contribution rate is fixed to 20% instead of 33% for private workers. The lower contribution rate for self - employed results in this dramatic fall in replacement rates that are now well below those of the private sector. Furthermore, self - employed are characterized by lower earning profiles than workers of the private sector. With the contributive system, the pattern of pensions reflect this wage inequality.

Table 7 summarizes the welfare effects of the Italian reform. With the increase in life expectancy and savings, all agents are better off in the post - 1997 regime, except low skilled self - employed.

Figure 5: Replacement rates by social group



Indeed, their low wage profile results in low savings and low retirement pension.

The model predicts that the reform will be able to finance the expected deficit. This large impact of the reform on the expected deficit is due to the lower generosity of Social Security (indexation on prices rather than wages and the fall in replacements rates). Even though all social groups, except low skilled private workers, delay retirement (figure 6), their replacement rates remain well below the levels prevailing in the pre - reform regime.

6 CONCLUSION

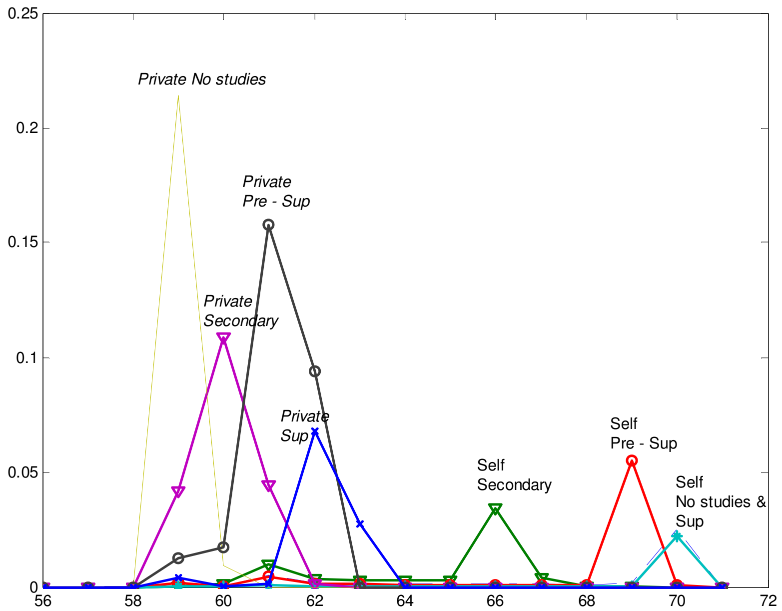
This article examines the impact of SS reforms on welfare across social groups in a life cycle model with heterogeneous agents and endogenous retirement and savings. The model is calibrated on French and Italian micro-data. France marginally modified its defined pension plan. In contrast, Italy has given up its generous SS system to a system with a strong contributive flavor.

Our preliminary results indicate that executives are the only social group that takes advantage of the more flexible pension arrangement introduced in the French reform. Wealthy high skilled

Table 7: Welfare of New Born - Italy

		2000	2040	Welfare Change	Consumption Change
Self employed	No studies and primary studies	-18.9508	-21.4595	-0.1324	-0.1131
	Secondary studies	-9.6989	-10.5158	-0.0842	-0.0749
	Pre-superior studies	-8.9406	-8.6142	0.0365	0.0401
	Diploma. degree and post-degree	-7.7777	-7.3834	0.0507	0.0560
Private Sector	No studies and primary studies	-10.2903	-9.6280	0.0644	0.0713
	Secondary studies	-7.2825	-6.8313	0.0620	0.0680
	Pre-superior studies	-5.9696	-5.2696	0.1173	0.1342
	Diploma. degree and post-degree	-4.8200	-4.4745	0.0717	0.0792

Figure 6: Distribution of retirement age after the reform - Italy



workers retire earlier while the bequest motive entices a fraction of executives to delay retirement. High skilled workers are the primary winners of the reform. Our results also suggest that the change in SS arrangement will finance only 20% of the expected PAYG deficit. Indeed, the payroll tax rate remains constant and the lengthening of the number of contributive quarters does not affect blue collars and clerks that enter the job market at very young ages : before and after the reform, lower skilled workers that constitute 55% of the labour force retire at age 60.

In the wake of the Italian reform, the fall in SS generosity particularly affects self - employed. For, the new Italian system is based on the capitalization of a fraction of earnings. Self - employed contribute less to the pension system and are characterized by lower earnings. This dramatic decrease in SS generosity account for the ability of the reform to finance the expected deficit.

Obviously, our analysis abstract for important elements. We discarded multimember households so we cannot address issues regarding retirement decision within families, with a specific look at female labour participation and distributional effects between parents and children. Secondly, we chose to simplify our paper by neglecting transitional dynamics. This choice allowed us to make the implications of reforms more transparent but prevents us from having any conclusion about intergenerational welfare effects. We leave these topics for future research.

APPENDIX

A Optimizing programs

We present the programs faced by individuals in the case where the normal retirement age is 60 years old. .

Choice when young ($s \in J^x$) with $x = E$ (Employed) or U (unemployed) : optimal savings solve the following program

$$\begin{aligned} v(a, J^E) &= \max_{c \geq 0} u(c,l) + \tilde{\beta} \left\{ \begin{array}{c} \pi_{JJ} \left[\pi_{\pi_{ee,\,J}} v(a', J^E) + (1 - \pi_{\pi_{ee,\,J}}) v(a', J^U) \right] \\ +(1 - \pi_{JJ}) \left[\pi_{\pi_{ee,\,A}} v(a', A^E) + (1 - \pi_{\pi_{ee,\,A}}) v(a', A^U) \right] \end{array} \right\} \quad (2) \\ (1+g)a' &= (1+r)a + w(J) - \Theta(w(J)) - c \\ a' &\geq 0 \end{aligned}$$

where v denotes the household's value function, r and w the interest rate and the wage. The value function (2) is written for a Young employed. The program of a Young unemployed can be inferred by symmetry. $\Theta(w(J))$ are taxes used to finance the PAYG system. Only the share paid by employees is introduced in households' budget constraint. Given the specification of the utility function, the discount rate becomes $\tilde{\beta} = \beta/(1+g)^{(1-\eta)(1-\tilde{\sigma})}$.

Choice when adult ($s \in A^x$) with $x = E$ or U :

$$\begin{aligned}
v(a, A^E) &= \max_{c\geq 0} u(c,l) \\
&\quad +\tilde{\beta}\left\{ \begin{array}{l} \pi_{AA}\left[\pi_{ee,A}v(a',A^E) + (1-\pi_{ee,A})v(a',A^U)\right] \\ +(1-\pi_{AA})\left[\pi_{ee,59}v\left(a',59^E\right) + (1-\pi_{ee,59})v\left(a',59^U\right)\right] \end{array} \right\} \\
(1+g)a' &= (1+r)a + w(A^E) - \Theta(w(A^E)) - c \\
a' &\geq 0
\end{aligned}$$

Choice when mature ($s \in M$) : From the age of 59 on, individuals have the legal right to retire the following year. Each individual compares the future value of a retiree to the future value of remaining on the labour market, given the probability of death $(1 - \pi_{kk'})$.

1. age $k = \{59, ..., 69\}$

   If the individual is employed at age k : When an individual dies, he gives birth to a Young unemployed whose social group is determined by the mobility matrix Φ.

$$\begin{aligned}
v(a, k^E) &= \max_{c\geq 0} u(c,l) \\
&\quad +\tilde{\beta}\left\{ \begin{array}{l} (1-\pi_{kk'})\Phi\varrho v(a',J^U) \\ +\pi_{kk'}\max[\pi_{ee,k'}v(a',k'^E) + (1-\pi_{ee,k'})v(a',k'^U), v(a',k'^{RE})] \end{array} \right\} \\
(1+g)a' &= (1+r)a + w(k^E) - \Theta(w(k^E)) - c \\
a' &\geq 0
\end{aligned}$$

   If the individual is unemployed at age k : where θ^u denotes the replacement ratio associated with unemployment benefits. Notice that the value function of a retiree depends on the status on the labour market the previous period : indeed, the pension of an employed differs from the pension of an unemployed.

$$\begin{aligned}
v(a, k^U) &= \max_{c\geq 0} u(c,l) \\
&\quad +\tilde{\beta}\left\{ \begin{array}{l} (1-\pi_{kk'})\Phi\varrho v(a',J^U) \\ +\pi_{kk'}\max[\pi_{u\,u,k'}v(a',k'^U) + (1-\pi_{u\,u,k'})v(a',k'^E), v(a',k'^{RU})] \end{array} \right\} \\
(1+g)a' &= (1+r)a + \theta^u w(k) - c \\
a' &\geq 0
\end{aligned}$$

If retiree at age k :

$$\begin{aligned} v(a, k^{Rx}) &= \max_{c \geq 0} u(c, l) + \tilde{\beta} \left\{ (1 - \pi_{kk'}) \Phi \varrho v(a', J^U) + \pi_{kk'} v(a', k^{Rx}) \right\} \\ (1+g)a' &= (1+r)a + \omega(k) - c \\ a' &\geq 0 \end{aligned}$$

where k^{Rx} (with $x = E$ or U) denotes that the individual is a retiree of age k after being previously E or U.

2. An individual of age 69 becomes retiree the next year.

$$\begin{aligned} v(a, 69^x) &= \max_{c \geq 0} u(c, l) + \tilde{\beta} \left\{ (1 - \pi_{kk'}) \Phi \varrho v(a', J) + \pi_{kk'} v(a', R^x) \right\} \\ (1+g)a' &= (1+r)a + w(69) - \Theta(w(69)) - c \\ a' &\geq 0 \end{aligned}$$

with $x = E, U$ and $y(69^x) = w(69) - \Theta(w(69))$ if $x = E$ or $\theta^u w(69)$ otherwise.

B Data

The calibration relies on micro - data. In order to set values at their "steady state" values, we average all variables over 1990 - 2002 (depending on data availability).

France: labour Force Survey (Enquête Emploi, 1990 through 2002). Data on financial assets and bequest are retrieved from 1998 Wealth Survey (Enquête Patrimoine).

Italy: 1991-1993-1995-1998-2000 and 2002 Survey of Household Income and Wealth. This database from the Bank of Italy Survey of Household Income and Wealth (SHIW) collects information on demographics, labour status, social mobility and household's income, consumption and wealth. Wages are computed to private and self-employment by education and age group. Social mobility matrix is computed for 1993 through 2002 years. Employment Proportions and unemployment durations are computed using the ISTAT labour Force Survey from 1992-1993 and 1998-1999. We decompose them by class of age and by education.

Other macroeconomic data are based on OECD data.

Table 8: Life expectancy at age 60 across occupational groups

	Blue collars	Clerks	White collars	Executives
Life expectancy	17	19	19.5	22.5

Table 9: French death probabilities between 59 and 70

	59	60	61	62	63	64	65	66	67	68	69	70
Executives	0.0333	0.0342	0.0351	0.0361	0.0371	0.0382	0.0394	0.0407	0.042	0.0434	0.0449	0.0466
White collars	0.039	0.0403	0.0416	0.043	0.0444	0.046	0.0478	0.0496	0.0516	0.0538	0.0561	0.0587
Blue Collars	0.0433	0.0448	0.0464	0.0482	0.0501	0.0521	0.0543	0.0567	0.0593	0.0622	0.0654	0.0689

C Calibration

C.1 Demographics, technology, real interest rate and preferences

In all scenarios, the population is constant ($n = 0$). Life expectancy is heterogeneous across social groups (Table 8 based on COR (2001)).

Blanchet & Monfort (1996) provide life expectancy at age 65. This allows us to compute the fall in life expectancy between 60 and 65. We then assume that this drop applies in a uniform way at all ages. Death probabilities (Table 9) then display an exponential pattern that is consistent with INSEE (1996).

In Italy, life expectancy is based on INPS (Table 10). For want of data on life expectancy disparity across educational groups, we assume that the heterogeneity in life expectancy observed in France also applies in Italy.

Table 11 displays the parameters of the model. Following Charpin (1999)'s report, the technological trend is set to 2% a year for the case of France and 1.92% is computed for the case of Italy following OECD (2000). The discount factor is set to 0.96 for France and 0.985 in Italy (Brugiavini & Peracchi (2003), D'Amato & Galasso (2002)). The annual real interest rate equals 5% which corresponds to the average value observed in the last 20 years in France and Italy (authors' calculations based on OECD Main Economic Indicator with long term interest rate and GDP deflator). We set $\sigma = 2$, which is consistent with Attanasio , Banks, Meghir & Weber (1999).

Table 10: Life expectancy by age - Italy

Age	60	61	62	63	64	65	66	67	68	69	70
Life Expectancy	20.03	19.23	18.43	17.66	16.9	16.16	15.43	14.72	14.03	13.36	12.7

Table 11: Parameters of the model - France and Italy

Parameters		France	Italy
Growth productivity	g	2%	1.92%
Discount rate	β	0.96	0.985
Interest rate	r	5%	
Risk aversion coefficient	σ	2	
Leisure of worker	$1-l$	2/3	
Full time leisure unemployed - retirees	l	0	
Weight of leisure in utility	η	0.84	0.82
Altruism	ϱ	0.9	0.6
bequest to financial asset ratio	q	1.4%	2-3%

Assuming that 8 hours are devoted to labour per day of 24 hours, we get $1-l = 2/3$. Unemployed and retirees enjoy full time leisure ($l = 1$). The current pension system is highly constrained : individuals bear a strong decrease in pension in case of early retirement and little increase in pension in case of continued work. As a result, the current data on retirement behaviour does not allow to reveal preferences for leisure. It then difficult for us to pin down η the weight of leisure in the utility function. To circumvent this difficulty, we do the following: we know that when η is very low, individuals retire at very old age. We then set η to the minimum value such that individuals retire at age 60 (for France and Italy before reform) . Their values yield the value of 0.84 (for France) and 0.82 (for Italy). Our calibrated value for η are close to the value of 0.77 chosen by Huggett & Ventura (1999) on US data. For want of data, the leisure parameter in each country is similar across social groups.

In the benchmark calibration, the altruism is set to $\varrho = 0.9$, which corresponds to the value chosen by Hairault & Langot (2002) so as to replicate the ratio of bequest to financial asset of 1.4%, as observed in the French data (Arrondel & Laferrère (1991)). This parameter value for Italy is set to $\varrho = 0.6$ to match the bequest to financial asset ratio of 3% as computed on SHIW 1991 - 2000 microdata.

Table 12: Annual Gross Wage in French Francs

	Executives	Middle White Collars	Clerks	Blue Collars
J	155974.991	103281.0853	76613.675	79072.5814
A	245349.62	140853.335	103066.6014	96133.9282
M	278709.125	129085.094	83606.011	85538.0168

Table 13: French Social Mobility Matrix

		Son's social group			
		Executives	Middle White Collars	Clerks	Blue Collars
Father's social group	Executives	48.221	27.892	10.114	13.773
	Middle White Collars	24.102	32.493	12.043	31.362
	Clerks	15.295	25.619	13.97	45.116
	Blue Collars	6.718	18.25	8.597	66.435

C.2 Wages, employment risks and social mobility

In order to provide a calibration coherent with a steady state analysis, we seek parameter values that are consistent with micro-evidence over a long period. When possible, calibration of wage profile, unemployment risks, and social mobility is based on averages computed over the last decade.

France Table 12 reports average wages in French Francs by occupational groups and by age group. .

Let θ_u be the replacement ratio associated with unemployment benefits :

	Executives	Middle White Collars	Clerks	Blue Collars
θ_u	0,50	0,49	0,52	0.50

In our benchmark calibration, altruism is positive, $\varrho > 0$. In addition, the correlation of the parents' human capital and that of their off-spring is given by the social mobility matrix (Table 13). This matrix implies that 20% of the population consists of executives, 25% belongs to the middle white collar group, 10% are clerks and 45% blue collars. These proportions are roughly consistent with the share of each social group as given by the French LFS 1990-2002.

Italy Average wages in thousand of Liras are displayed in table 14.

As in Italy, there are no unemployment benefits that last longer than a year (the frequency of our model), θ_u is set to zero. In addition, the correlation between the parents' human capital and that of their off-spring is given by the social mobility matrix extracted from SHIW 1991 - 2002 (table 15).

France and Italy. The computation of unemployment risk is calibrated based on the au-

Table 14: Lifetime wage in Italy in millions of liras

	Age group	J	A	M
Social group				
Self employed	No studies and primary studies	0.914	10.546	16.28
	Secondary studies	12.329	20.908	20.903
	Pre-superior studies	6.108	22.336	24.139
	Diploma, degree and post-degree	3.267	31.728	42.517
Private Sector	No studies and primary studies	6.954	16.694	18.165
	Secondary studies	16.117	19.911	20.439
	Pre-superior studies	17.568	27.551	31.885
	Diploma, degree and post-degree	19.375	39.061	46.080

Table 15: Intergenerational Social Mobility Matrix

		Son's Status $(t+1)$				
		No studies	Primary	Secondary	Pre-superior	Superior
Fathers' Status (t)	No studies	0.1768	0.0069	0.0038	0.0000	0.1600
	Primary	0.4810	0.2635	0.0315	0.0330	0.3754
	Secondary	0.2199	0.3462	0.2280	0.0771	0.2386
	Pre-super.	0.1095	0.3182	0.5630	0.5661	0.1688
	Superior	0.0128	0.0652	0.1738	0.3238	0.0572

Table 16: Age of end of education - France

	Executives	White Collars	Clerks	Blue Collars
k^{eva}	21,7	19	18,2	16,4

thors' computations of unemployment duration and unemployment rates using French LFS and Italian micro-data (ISTAT labour Force Survey from 1992-1993 and 2001-2002). We finally have to calibrate labour market transitions for each age k and each social group i.

$$\Pi_{k,i} = \begin{pmatrix} \pi_{ee,ki} & \pi_{eu,ki} = 1 - \pi_{ee,ki} \\ \pi_{ue,ki} & \pi_{uu,ki} = 1 - \pi_{ue,ki} \end{pmatrix}$$

where $\pi_{ee,ki}$ ($\pi_{ue,ki}$ respectively) is the probability of being employed at the subsequent age $k+1$, after being employed (unemployed respectively) at age k. The computation of unemployment risks by age k and by social group i are based on the following formulas:

$$D_{ki} = \frac{1}{\pi_{eu,ki}}$$

where D_{ki} denotes the number of years of unemployment, as documented by the micro-data. Besides, given that $E_{ki} = \frac{1}{\pi_{eu,ki}}$ (with E_{ki} the number of years of employment) and $U_{ki} = \frac{D_{ki}}{E_{ki}+D_{ki}}$ (U_{ki} the unemployment rate of the social group i of age k), we have

$$\pi_{eu,ki} = \frac{U_{ki}}{D_{ki}(1-U_{ki})}$$

We used the French (Italian) data on unemployment duration and unemployment rates, both elements by age and occupational group (education group) to compute the series of matrices $\Pi_{k,i}$ for all age k, and all social group i. In the Italian case, we compute employment risk based on data on workers of the private sector. Income risk of self - employed is then assumed to be the similar to their counterparts of the private sector, which is consistent with Italian data (Guiso, Jappelli & Pistaferri (2002)).

C.3 Social Security

The SS cap used to compute the pensions paid by the general regime and complementary schemes is set to its 1993 value, *i.e.* 148320 Francs a year. The age of end of education differs across occupation category (table 16 for France; table 17 for Italy).

Table 17: Age of end of school education

	No Studies	Primary	Secondary	Pre-superior	Superior
k^{eva}	16.83	17.14	18.27	20.54	24.59

In the French and Italian regimes, 2/3 of the SS contribution rate is paid by the employer, leaving 1/3 of the contribution to the employee. In contrast, Italian self - employed pay 100% of their contribution rate.

French Complementary Schemes The calibration of parameters of complementary schemes is given by tables 18 and 19. 60% of contributions to the complementary schemes are paid by employers and 40% by the employee.

Table 18: Complementary schemes based on 1994 values

c_1^{ARRCO}	c_2^{ARRCO}	p^{ARRCO}	v_d^{ARRCO}	c_2^{AGIRC}	p^{AGIRC}	v_d^{AGIRC}
0,04	0,1	22,4	2,455	0,12	19,52	2,303

Table 19: $penalty(k)$

Age k	55	56	57	58	59	60	61	62	63	64
$penalty(k)$	0.43	0.50	0.57	0.64	0.71	0.78	0.83	0.88	0.92	0.96

At the stationary equilibrium, the wedges τ^{ARRCO} and τ^{AGIRC} endogenously adjust to balance the budget of complementary schemes.

Italian post-1997 system The conversion coefficient c are displayed in table 20. Contributions are capitalized at rate $g = 1.5\%$.

Table 20: Conversion coefficients

Age	Less than 57	58	59	60	61	62	63	64	65 and more
Conversion Coefficients c	4,720%	4,860%	5,006%	5,163%	5,334%	5,514%	5,706%	5,911%	6,136%

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