Reforming the retirement scheme: Flexible retirement vs. Legal retirement age

Juan A. Lacomba
University of Granada

Francisco M. Lagos*
University of Granada

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Abstract

We compare a Social Security system where people can retire at the age of their own choice with one in which there is a legal retirement age elected through a majority voting process. We analyze how incentives on retirement decisions change depending on the retirement rules. We show that individuals prefer a legal retirement age higher than that they would choose in the flexible scheme since in this scheme they ignore the impact of their decisions on the Social Security budget constraint. In spite of that, we show that when the legal retirement age significantly limits the retirement age of high-wage workers, a flexible scheme would improve the financing of the pension system. Finally, we show that even when pension benefits are higher with a legal retirement age, a flexible system might be implemented since it would be preferred by a majority of the population composed by low- and high-wage workers.

Keywords: Social security, Flexible retirement, Legal retirement age.

JEL Classification: H55, J26.

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1. Introduction

Reforms of Social Security systems are now one of the main issues of most of industrialized countries' economic policy agenda. It is widely considered that, unless serious changes take place, the rise in the number of retirees relative to that of workers will threat the viability of pay-as-you-go public pension systems in the long-run. With the aim of eliminating these future financing problems, one of the main goals of pension reforms is to raise the average age of retirement of workers, see Blondal and Scarpetta (1998) or Gruber and Wise (1999).

In order to achieve this objective, one of the main economic policy measures is to allow a greater flexibility in the Social Security's retirement rules (e.g. Germany, Italy or Sweden). Indeed, this measure is one of the policy conclusions of *Maintaining Prosperity in an Ageing Society*, OECD (1998, p.8): "...the most appropriate reform would be allow people to retire at the age of their own choice and to adjust the pension level so that the pension system is neutral on average ".

There is recent literature dealing with flexible retirement age and Social Security. Casamatta et al. (2005) study the distortion imposed on continued activity of elderly workers in a setting with flexible retirement. They allow individuals to vote on the level of the payroll tax and provide sufficient conditions for the existence of a voting equilibrium. Conde Ruiz and Galasso (2003) analyze a simultaneous voting process on the contribution rate and on the decision to introduce or not an early retirement provision with endogenous retirement age. Simonovits (2004) and (2005) analyzes the optimal design of the pension system with flexible retirement focussing on the importance of the asymmetric information.[1]

The present article explicitly examines the effectiveness of increasing the flexibility of the pension system.[2] Should the pensionable age be eliminated and be allowed a larger flexibility in the retirement decisions? Similar to Casamatta et al. (2005), we consider a two-period OLG model where in the first period each individual works one unit of time and in the second period he works for some time and then retires. Individuals differ according to age and according to productivity. We study two different PAYG Social Security

[1] Earlier literature has mainly focussed on the effect of the introduction of a pension system on the individual retirement decision (see among others Sheshinski, 1978; Burbidge and Robb, 1980 or Crawford and Lilien, 1981).

[2] Michel and Pestieau (1999) in a model where allow for endogenous retirement show that a mandatory early retirement may be socially desirable in case of underaccumulation.

programs with flat pension benefits. In the first setting people can retire at the age of their own choice. In the second one, there is a legal retirement age elected through a majority voting process.[3]

We analyze how incentives on retirement decisions change depending on the retirement rules. We also compare both the financing of the pension system and the welfare of the population associated with each retirement rule. The preferences with regard to the two opposite systems, flexibility vs. legal retirement age, will depend on the effect on welfare. We interpret these preferences as a voting decision on the retirement rules.

We show that individuals prefer a legal retirement age higher than that they would choose in the flexible scheme. This result highlights the different incentives on prolonging the working period related to each retirement scheme. In a flexible system individuals ignore the impact of their decisions on the Social Security budget constraint, as they only optimize their own retirement ages. But in a system with a legal retirement age that affects to all population these indirect effects are taken into account and lead to higher preferred legal retirement ages.

In spite of the aforementioned, when there exists a sufficient dispersion in retirement ages, that is, when the legal retirement age significantly limits the retirement age of high-wage workers, a shift from a pension system with legal retirement age into a flexible scheme might enhance the financing of the pension system. This retirement dispersion mainly depends on the wage distribution and on the elasticity of the labor force.

Finally, we show that even if pension benefits were higher with a legal retirement age, a majority of the population, formed by low- and high-wage workers, might prefer the flexible system. Only the middle class would be in favor of a legal retirement age as an instrument to increase their pension benefits by forcing lowest wages workers to work longer.

The paper proceeds as follows. Section 2 develops the model. In Section 3 optimal retirement decisions are obtained. In Section 4 we compare the financing of the pension system and welfare levels under each retirement scheme. In Section 5 a numerical example illustrates the results obtained in the previous sections. Section 6 summarizes the main results. The proofs appear in the appendix.

[3]To date, there are few studies that have examined the role of the legal retirement age in the pension system. Lacomba and Lagos (2006) and (2007) study the problem of a direct vote on the legal retirement age and the effect of the aging of the population on the optimal legal retirement age.

2. The model

This model is similar to Casamatta et al. (2005). Individuals live for two periods. They are located between a minimum and a maximum wage level per unit of time (productivity), $[w_-, w^+]$ with mean $\bar{w}$ and median $w_m < \bar{w}$.

The intertemporal utility function is as follows:

$$U(c,d) = u(c) + \beta u(d). \tag{1}$$

The utility function $u(.)$ is as usual, increasing and concave: $u'(.) > 0$, $u''(.) < 0$; c and d are respectively first and second period consumptions; β is the time preference factor which is equal to $1/1+r$, being r the interest rate.

Both periods are of equal length, normalized to unity. Labor supply is assumed to be inelastic in the first period. In the second period, we have to distinguish between the two settings. In the first case, individuals choose their own retirement age by deciding the fraction of the second period they continue working, $R \in [0,1]$; so R can be interpreted as an indicator of the individual retirement age. In the second case, individuals have to work the fraction of the second period chosen through a majority voting process; this fraction can be interpreted as the indicator of the legal retirement age of the system.

It has to be noted that the second period consumption d includes the normal consumption minus the monetary disutility of working in this second period. We assume a particular specification for this disutility, $d = x - \gamma R^{(\delta+1)}/(\delta+1)$ where x is the normal consumption in the second period and $\gamma > 0$ and $\delta \geqslant 1$ can be interpreted as intensity factors of the disutility of work.[4] So, first and second period consumptions for an individual of wage w are:

$$c = w(1-\tau) - s \tag{2}$$

$$x = s(1+r) + Rw(1-\tau) + (1-R)p, \tag{3}$$

where $s \geqslant 0$ is the amount of savings and $\tau \in [0,1]$ is the Social Security contribution tax rate; p is the constant stream of flat pension benefits per

[4] The quadratic specification used by Casamatta et al. (2005) is a particular case of the specification used here, where $\delta = 1$. It has also to be noted that with this utility function income effects are disregarded: changes in the optimal retirement decision will only be caused by variations in the relative price of labor and consumption.

instant of time, collected from a Pay-As-You-Go Social Security system. We assume that the contribution rate is given. In this way, we want to focus attention only on how the different retirement rules affect the financing of the system and welfare levels of individuals. The optimal design of the Social Security parameters has already been analyzed in recent literature.[5] Our study can be considered as complementary to them, concentrating in another specific issue of the pension systems reform problem.

3. Retirement decisions

3.1 Flexibility in retirement decision

Under this pension scheme, individuals in the second period are allowed to retire at the age of their own choice and pension benefits are paid out after leaving the labor force. Let R_F be the individual retirement age. The budget constraint of a feasible Social Security system must satisfy

$$\tau \left(N^y \int_{w_-}^{w^+} w f(w) dw + N^o \int_{w_-}^{w^+} R_F w f(w) dw \right) = N^o \int_{w_-}^{w^+} (1 - R_F) p f(w) dw, \quad (4)$$

where N^o and $N^y = (1+n)N^o$ are respectively the numbers of old and young individuals and n is the population growth rate. From (4) we obtain the pension benefits per instant of time, p:

$$p = \tau \left(\frac{(1+n)\bar{w}}{1 - R_F} + \frac{\overline{p}_F}{1 - R_F} \right), \quad (5)$$

where $\bar{w}$ denotes the mean wage and

$$\overline{p}_F = \int_{w_-}^{w^+} R_F w f(w) dw. \quad (6)$$

3.1.1 The old

The old individuals' problem can be formally represented as

$$\max_{R_F} \; s_F(1+r) + R_F w (1 - \tau) + (1 - R_F) p - \frac{\gamma R_F^{\delta+1}}{\delta + 1} \quad (7)$$

[5] See among others Breyer (1994), Casamatta et al. (2000a), (2000b) and (2005) or Conde Ruiz and Galasso (2003).

subject to

$$0 \leqslant R_F \leqslant 1.$$

From (7) we obtain the optimal retirement age, R_F^*, :

$$R_F^* = \left(\frac{1-\tau}{\gamma}\right)^{1/\delta} w^{1/\delta}. \tag{8}$$

It is worth to note that (8) is obtained assuming that the individual considers her pension benefits as given, thereby disregarding the effect of her retirement decisions on the pension benefits via the 'macro' constraint, (4).[6] As Sheshinski (1978) states, this is a plausible assumption under competitive conditions with many individuals.

Due to the positive substitution effect and the absence of income effect, the retirement decision is positively related to the wage level. On the other hand, a larger contribution rate reduces the net wage and consequently leads individuals to retire earlier. Finally, a higher intensity factor of the disutility of work δ, not only reduces optimal retirement ages but also it diminishes the elasticity of the labor force.

3.1.2 The young

The young individuals' problem can be formally represented as

$$\max_{R_F, s_F} \; u(w(1-\tau)-s_F)+\beta u\left(s_F(1+r)+R_F w\,(1-\tau)+(1-R_F)p-\frac{\gamma R_F^{\delta+1}}{\delta+1}\right) \tag{9}$$

subject to

$$0 \leqslant R_F \leqslant 1 \text{ and } 0 \leqslant s_F \leqslant w(1-\tau).$$

It is easy to check that the young individual will choose her retirement age according to (8).[7]

On the other hand, we can substitute (8) into (6) and denoting

[6] That is, we assume $\partial \overline{p}_F / \partial R_F = 0$.

[7] From (9), and for individuals choosing an interior solution, we also get the optimal savings:

$$s_F^y = \frac{w(1-\tau)-\rho_F(w)}{2+r}$$

where

$$\xi(w) = \int_{w_-}^{w^+} w^{\frac{(\delta+1)}{\delta}} f(w)dw, \tag{10}$$

we can rewrite (6) as:

$$\overline{p}_F = \left(\frac{(1-\tau(1-\alpha))}{\gamma}\right)^{1/\delta} \xi(w). \tag{11}$$

3.2 Legal retirement age

In some countries there are direct restrictions on work beyond the standard retirement age (in Portugal and Spain entitlement to pension benefits beyond the standard age is conditional on complete withdrawal from work), or, frequently, individuals have to leave their current jobs to receive their pensions (see Blondal and Scarpetta 1998,or Gruber and Wise 1999). So, we can observe that the average retirement age in some OECD countries, such as the United Kingdom, Portugal and Ireland is very close to this standard retirement age.[8] Thus, in this setting we consider legal retirement as the age at which workers are obliged to leave the labor force, that is, as a mandatory retirement.

In the following, we first derive the optimal legal retirement age of individuals. Then, we shall turn our attention to the majority voting process and obtain the elected legal retirement age.

Let R_L be the legal retirement age. A feasible Social Security system's budget constraint must now satisfy

$$\tau\left(N^y \int_{w_-}^{w^+} wf(w)dw + N^o R_L \int_{w_-}^{w^+} wf(w)dw\right) = N^o(1-R_L)\int_{w_-}^{w^+} pf(w)dw. \tag{12}$$

$$\rho_F(w) = \frac{\delta(1-\tau(1-\alpha))^{(\delta+1)/\delta} w^{(\delta+1)/\delta}}{(\delta+1)\gamma^{1/\delta}} + \tau\left((1+n)\bar{w} + (1-\alpha)\overline{p}_F\right).$$

See Cassamatta et al. (2005) for a more exhaustive analysis of the optimal decisions in this setting.

[8] If there is a possibility of early access to pension benefits with some adjustment to the value of retirement benefits, the average retirement age is usually found between this age at which pensions can be accessed and the standard retirement age. See Blondal and Scarpetta (1998) or Samwick (1998).

Under this scheme, the individual pension is

$$p = \tau \left(\frac{(1+n)\bar{w}}{1-R_L} + \frac{\overline{p}_L}{1-R_L} \right), \tag{13}$$

with

$$\overline{p}_L = R_L \bar{w}. \tag{14}$$

3.2.1 The old

The old individuals' problem can be formally represented as

$$\max_{R_L} \; s_L(1+r) + R_L w\,(1-\tau) + (1-R_L)p - \frac{\gamma R_L^{\delta+1}}{\delta+1} \tag{15}$$

subject to

$$0 \leqslant R_L \leqslant 1.$$

From (15) we obtain the optimal legal retirement age

$$R_L^* = \left(\frac{w + \tau(\bar{w} - w)}{\gamma} \right)^{1/\delta}. \tag{16}$$

Under this scheme the positive relationship between the wage and the preferred legal retirement age can again be explained by the substitution effect which calls for a higher retirement age. A higher intensity factor of the disutility of work also reduces optimal legal retirement ages.

However, unlike the flexible system, a higher τ delays the optimal legal retirement age for those individuals with wages lower than the mean wage. In order to explain this result, let us recall the double effect associated with changing the legal retirement age. These changes affect the working population's lifetime income in two ways: fixing the length of the working period and, in an indirect way, determining the pension benefits via the dependency ratio. For instance, a delay in the legal retirement age not only increases the working period but also increases the pension benefits by increasing the dependency ratio. Thus, the larger the pension benefits, the bigger the indirect effect on the lifetime income of a change in the legal retirement age. The reason is the larger relative weight of the pension benefits on the individuals'

lifetime income. Therefore, the increase in net pension benefits of low wage workers caused by a greater contribution rate augments the importance of these indirect effects increasing the relative price of leisure so that individuals relocate their demand from leisure to consumption and delay their retirement age.

3.2.2 The young

The young individuals' problem can be formally represented as

$$\max_{R_L, s_L} \; u(w(1-\tau)-s_L)+\beta u\left(s_L(1+r)+R_L w\,(1-\tau)+(1-R_L)p-\frac{\gamma R_L^{\delta+1}}{\delta+1}\right) \tag{17}$$

subject to

$$0 \leqslant R_L \leqslant 1 \text{ and } 0 \leqslant s_L \leqslant w(1-\tau).$$

It is easy to check that the young individual will choose her optimal legal retirement age according to (16).[9]

3.2.3 The voting process on the legal retirement age

Optimal legal retirement ages are increasing with the wage and thus a Condorcet winner exists. The majority voting process leads to a legal retirement age, R_L^e, that divides the population into two groups of equal size: those who prefer a retirement age above the elected age and those who prefer a retirement age below the elected one

$$R_L^e = \left(\frac{w_m + \tau(\bar{w} - w_m)}{\gamma}\right)^{1/\delta}. \tag{18}$$

Since $\bar{w} > w_m$, we obtain that a larger contribution rate will lead to a higher elected legal retirement age and therefore to a longer working period.

[9] From (17), and for individuals choosing an interior solution, we also get the optimal savings :

$$s_L^y = \frac{w(1-\tau)-\rho_L(w)}{2+r}$$

where

$$\rho_L(w) = \frac{\delta(w(1-\tau(1-\alpha))+\tau(1-\alpha)\varpi)^{(\delta+1)/\delta}}{(\delta+1)\gamma^{1/\delta}} + \tau(1+n)\varpi.$$

See Lacomba and Lagos (2007) for a more exhaustive analysis of the optimal decisions in a setting with legal retirement age.

This result contrasts with the one obtained in the flexible system, where a larger contribution rate yields lower retirement ages.

Comparing the retirement decisions obtained under the two retirement schemes, the following proposition can be stated.

Proposition 1 *i)* $R_L^* > R_F^*$ *for any* $w \in [w_-, w^+]$.
ii) $R_L^e > R_F^*$ *for any* $w \in (w_-, w_\mu)$ *with* $w_\mu > w_m$.

Proof: i) It follows straightforward from (8) and (16).
ii) (18) and (8)can be respectively rewritten as

$$R_L^e = \left(\frac{w_m(1-\tau) + \tau \bar{w}}{\gamma} \right)^{1/\delta} \tag{19}$$

and

$$R_F^* = \left(\frac{w(1-\tau)}{\gamma} \right)^{1/\delta}. \tag{20}$$

Needless to say $R_L^e > R_F^*$ for any $w \in [w_-, w_m]$. From (19) and (20) it can be derived that there exists a wage $w_\mu > w_m$, such that $R_F^*(w_\mu) = R_L^e$.[10] Q.E.D.

The first point of the proposition states that any individual would have her preferred legal retirement age higher than that under a flexible system. Moreover, the second point shows that more than 50% of the population would retire earlier than the legal retirement age, keeping everything else unchanged, if the pension system shifted from a legal retirement age to a flexible scheme.[11] Notice that not only the low wage workers but also the middle class, with wages higher than the median wage, would retire earlier.

This result crucially relies on the different incentives on retirement decisions embedded in each pension scheme. As mentioned above, in a majority voting process on the legal retirement age, the effects on the aggregate constraint of the adjustment made in the ratio of workers and retirees when the legal retirement age is lowered/delayed must be taken into account. And they

[10] Notice that if w_μ were higher than w^+, then R_L^e would be higher than R_F^* for any $w \in [w_-, w^+]$.

[11] It would be possible to find individuals who would prefer a higher legal retirement age than the current one, but they would retire even earlier than that if the pension system shiftted from a legal retirement age into a flexible scheme.

play such an important role that lead people to prefer higher legal retirement ages.

On the contrary, in a flexible scheme the individual ignores the impact of her decision on the aggregate constraint (and therefore on her pension benefits) and considers that her retirement decision only affects the length of her working period. This ignorance yields individual retirement ages lower than the legal one.

4. Financing of the Pension System and Welfare Levels

In this section we study the financing of the pension system and welfare levels associated with each retirement scheme. In order to do so, we define S_F and $S_L$as the amount of money collected with flexible retirement and with a legal retirement age respectively,

$$S_F \equiv \tau \left(N^y \int_{w_-}^{w^+} w f(w) dw + N^o \int_{w_-}^{w^+} R_F^* w f(w) dw \right), \tag{21}$$

$$S_L \equiv \tau \left(N^y \int_{w_-}^{w^+} w f(w) dw + N^o R_L^e \int_{w_-}^{w^+} w f(w) dw \right). \tag{22}$$

Substituting (8) and (18) into (21) and (22), S_F and S_L can be rewritten as

$$S_F \equiv \tau \left(N^y \bar{w} + N^o \left(\frac{1-\tau}{\gamma} \right)^{\frac{1}{\delta}} \xi(w) \right) \tag{23}$$

and

$$S_L \equiv \tau \left(N^y \bar{w} + N^o \left(\frac{w_m + \tau(\bar{w} - w_m)}{\gamma} \right)^{1/\delta} \bar{w} \right). \tag{24}$$

The following proposition highlights the main results derived from (23) and (24).

Proposition 2 *i) S_L is increasing with τ.*

ii) S_F is increasing with $\xi(w)$.

Proof: i) It follows straightforward from (24). ii) It follows straightforward from (23).

Raising contribution rates and delaying the retirement age are among the main reforms for eliminating the future financial problem of pension systems. The first point of the proposition tells us that in a system with legal retirement age these two measures may complement each other to achieve an increase in the amount of money collected (an increase in the contribution rate would facilitate the delay of the legal retirement age). On the contrary, in a flexible system, it seems more difficult to implement these two measures together. As it can be observed in (23), an increase in the contribution rate has a negative indirect effect on S_F (apart from the obvious positive direct effect). A higher τ would reduce the incentives to prolong the working period worsening the financing of the system.

On the other hand, the second point states that both the wage distribution and the elasticity of the labor force are crucial in the financing of a flexible retirement system. The higher the wage dispersion or the more elastic the labor supply, the more likely the financing of the system will be enhanced by shifting into a flexible scheme.

We now turn to compare the role the retirement scheme plays in determining the welfare of the population. Notice that the preferences of population with regard to retirement rules will depend on how their welfare levels are affected by the different retirement rules. Thus, these preferences can be interpreted as a voting decision on changing the retirement scheme. In this manner, we can also examine whether a flexible retirement system would be implemented or not. The results are characterized in the next proposition.

Proposition 3 *i) If $S_F \geqslant S_L$, the whole population will prefer a pension system with flexible retirement.*

ii) Even if $S_F < S_L$, a majority of the population formed by a coalition of low- and high-wage workers may prefer a pension system with flexible retirement.

Proof: i) See Appendix. ii) See numerical example below.

The first point of proposition is obvious. The effect of retirement rules on welfare comes from two different aspects. On one hand, the effect on pension benefits and on the other hand the effect on retirement decisions. Needless to say, if a shift from a legal retirement age scheme into a flexible one enhances the financing of the system, all individuals will have, firstly, larger pension benefits and, secondly, they will be able of retiring at the age of their own choice, which unambiguously will improve their welfare levels.

A pension system with legal retirement age yields higher welfare levels only if the related pension benefits are sufficiently great to compensate the forced retirement. If they are not greater enough, as the second point of proposition states, the disutility derived from the forced retirement could lead a majority formed by a coalition made up of the low- and the high-wage workers to prefer the flexible scheme even with lower pension benefits. The low-wage group in order to be able to retire earlier without penalties and the rich group in order to retire later.[12] In this case, the legal retirement age would only be supported by the middle class. Their optimal retirement ages are similar to the legal one, and therefore the forced retirement would not be very harmful, so a flexible system would only bring about lower pension benefits for them.

This result gives an intuition of why the social security in most of countries has been related to a standard age of entitlement to public pensions instead of allowing total flexibility in the retirement decision. The legal retirement age might have been used by a vast middle class as a tool for improving their pension benefits. The underlying idea is the following. By fixing a determined age at which workers are eligible for benefits, low-wage workers were forced to work longer. In this way, these workers had more income which implies less redistribution from the richest workers to them, resulting in larger pension benefits for the middle class.

5. Numerical illustrations

In this numerical example we illustrate the effect of the two different retirement schemes on the financing of the pension system and on the individuals' welfare levels. In order to do so we denote the intertemporal utility function of individuals (1) in the following way. Let $V\left(R_F^*, w\right)$ and $V\left(R_L^e, w\right)$ be the indirect utility functions under flexible retirement and under legal retirement age respectively. It is easy to check that $V\left(R_F^*(w), w\right) > (<) V\left(R_L^e, w\right)$ if $\nu\left(R_F^*(w), w\right) > (<) \nu\left(R_L^e, w\right)$, with

$$\nu\left(R_F^*(w), w\right) = R_F^*(w)\left(w\left(1-\tau\right) - \frac{\gamma\left(R_F^*(w)\right)^{\delta}}{\delta+1}\right) + \tau\overline{p}_F. \tag{25}$$

and

[12] This result, a coalition made up of the tails of the income distribution, can also be viewed in Epple and Romano (1996).

$$\nu\left(R_L^e, w\right) = R_L^e\left(w\left(1-\tau\right) - \frac{\gamma\left(R_L^e\right)^\delta}{\delta+1}\right) + \tau R_L^e \varpi. \tag{26}$$

Thus, to obtain the results we use the following specifications. We consider two different distributions. In both of them, wages are distributed on $[w_-, w^+]$ with $w_- = 300$ and $w^+ = 16000$. They have the same mean wage, $\bar{w} = 3067.79$, but different median ones: $w_m = 2469.14$ in the first distribution and $w_m = 2674.22$ in the second one.[13] The first column of the table below describes the contribution rates used. We consider three possibilities: $\tau = 0.25$, $\tau = 0.30$ and $\tau = 0.35$.[14] The second, third and fourth columns of the table are related to the first wage distribution. The second and third columns contain the wages of the individuals indifferent between both schemes (indifferent individuals with low wage and with high wage respectively). These individuals have the same welfare level under the two retirement schemes. The fourth column denotes the percentage of individuals that increases her welfare level with the system with legal retirement age. They are located between the two previous wages. The fifth, sixth and seventh column contain the same information than the three previous ones but related to the second wage distribution.

To complete the picture, we consider two different elasticities of the labor force. The three first rows of Table 1 show the result related to a labor force where, for $\tau = 0.25$, the range of optimal retirement ages under the flexible scheme is $R_F^*(w) \in [0.26; 0.72]$, and the legal retirement ages for each wage distribution are $R_L^e = 0.5$ and $R_L^e = 0.51$ respectively. The last three rows contain the results for a more inelastic labor force. In that case the range of optimal retirement ages under flexibility is less disperse, $R_F^*(w) \in [0.45; 0.53]$ for $\tau = 0.25$, and now the legal retirement age for both wage distributions is $R_L^e = 0.5$.[15], [16]

[13] Data from the first distribution have been obtained from an income distribution of Spain (as an approximation of the wage distribution) estimated with the Dagum triparametric model. Annual data in thousands of pesetas. Year 1996. The second one is a different Dagum distribution skewed to the right.

[14] Contribution rates of most of pension systems are around 30% of the gross wage of workers.

[15] The different labor force elasticities are generated considering $\delta = 4$ for the first case and $\delta = 24$ for the more inelastic labor force. On the other hand, each δ is related to a different γ in order to get the same R_L^e for $\tau = 0.25$.

[16] $\xi(w, \delta)$ has the following values for each distribution: $\xi(w, 4) = 24201.77$ for the first

Table 1. Numerical examples: indifferent wages and percentages in between

	w_m= 2469.14			w_m= 2674.22		
	w_{lo}	w_{hi}	%	w_{lo}	w_{hi}	%
Elastic Lab. f.						
$\tau = 0.25$	–	–	–	2985.8	4443.9	26.4
$\tau = 0.30$	–	–	–	2807.8	5265.5	37.8
$\tau = 0.35$	3232.1	5060.9	19.5	2642.6	6194.0	47.5
Inelastic Lab. f.						
$\tau = 0.25$	–	–	–	2891.0	4563.2	30.6
$\tau = 0.30$	3374.8	4207.6	10.7	2733.6	5386.1	41.3
$\tau = 0.35$	2995.0	5355.6	25.8	2578.0	6337.9	50.8

We start with the analysis of the three first rows. The results illustrate the main intuitions suggested in the previous sections. For the first distribution, we obtain that a flexible retirement pension system would always be preferred by the majority of the population. However, for $\tau = 0.35$ the flexible system would be financially undesirable. This can be deduced by the existence of a middle class preferring the system with legal retirement age. As the theory states, this only happens when the pension benefits associated with the legal retirement age are larger enough than those of the flexible system. Also notice that this middle class would be composed by workers with wages higher than the median one, $w_m = 2469.14$.

The importance of the wage distribution is highlighted when we compare the results obtained with those of the second distribution. In this case the main objective of the reform, to improve the financing of the system, is never achieved. Pension benefits is always larger with the legal retirement age regardless the contribution rate. This is because the higher median wage, $w_m = 2674.22$, implies a higher legal retirement age resulting in larger pension benefits. In spite of that, in all cases the reform would be supported for the majority of the population. Also notice that for $\tau = 0.35$ a coalition of the low- and high-wage individuals is needed to support a pension scheme with flexible retirement.

We now turn to the last three rows. The comparison of the results with

Dagum distribution, and $\xi(w, 4) = 23500.3$ for the second one. And for the more inelastic labor force: $\xi(w, 24) = 4321.07$ for the first distribution and $\xi(w, 24) = 4303.35$ for the second one.

the previous ones documents the importance of the elasticity of the labor force. The negative effect in the financing of the flexible scheme of a more inelastic labor force causes that all the percentages of individuals preferring a pension system with legal retirement age grow with respect to those related to the more elastic labor force. Only for $\tau = 0.25$ in the first distribution wage the financing of the system is still improved with the flexible scheme. The lower dispersion of the retirement ages in the flexible scheme also implies that in the second wage distribution, unlike in the first one, the majority of the population, mainly the middle class, would be in favour of a legal retirement age for $\tau = 0.35$.

5. Conclusions

This paper has studied the importance of the retirement rules for the financing of the pension system and for the welfare levels of individuals by comparing two polar cases, total flexibility in the retirement decision versus a system with a legal (mandatory) retirement age.

We have shown that individuals retire earlier in the flexible system than their preferred legal retirement ages. This result suggests that to eliminate the standard age at which pension benefits are available and to impose a flexible system might have a hidden risk. The legal retirement age divides the population into working people and retired people and it may be a reference point for most of individuals. It may be easier for them to realize the indirect macro effects related to this age (apart from the direct effects on their own working periods). For instance, to perceive the positive effects on the financing of the pension system from a delay in the legal retirement age. They may easily note that the improvement is derived from a reduction in the number of retirees and an increase in the number of workers. However, if we shift into a flexible system, when individuals decide on their retirement ages they will not consider that their single decisions affect to the financing of the pension system (which is plausible, on the other hand). And this misperception may lead them to retire earlier than the existing legal retirement age.

Thus, for that flexible system to succeed, the legal retirement age should considerably limit the current retirement ages of a large percentage of the population, mainly those of high-wage workers. We have shown that this will crucially depend on the elasticity of the labor force and on the wage distribution.

We have assumed a uniform pension. But, as mentioned in the introduc-

tion, pension reforms allowing a greater flexibility in the retirement decision should be accompanied by an increase in the neutrality of the system. The reason is the following. In a neutral flexible system, additional contributions would be fully reflected in pension benefits in an actuarially neutral way and, consequently, the retirement decision would not be distorted. Neutrality, therefore, would require to substitute uniform pensions by earning-related ones. Needless to say, the introduction of this additional measure should, of course, improve the results of the flexible system, but the problem shown here, the misperception of the indirect macro effects related to retirement decisions, would still remain. Moreover, as Casamatta et al. (2000a) point out, the more or less redistributive character of most of Social Security systems are by now strongly anchored in countries' traditions. So, although a shift to a flexible system may be easily implemented, as we have shown with the welfare analysis, to change the redistribution degree of the system may be much more difficult to achieve.

Therefore, we might conclude that those countries with a Bismarckian tradition, like France or Germany, should move towards reforms increasing the flexibility of the retirement rules and those countries with a Beveridgean tradition, like Netherlands, United States or UK, should move towards reforms delaying the legal retirement age.

Appendix

Proof of Proposition 3

i) Since $S_F \geqslant S_L$, there exists a wage level $\hat{w}$ such that $R_F^*(\hat{w}) = R_L^e$. Given that $S_F \geqslant S_L$ implies that $\overline{p}_F \geqslant R_L^e \varpi$, then $\nu\left(R_F^*(\hat{w}), \hat{w}\right) \geqslant \nu\left(R_L^e, \hat{w}\right)$.

Now, we obtain the first derivative of (26) and the first and second of (25) with respect to the wage and we get

$$\left.\frac{\partial \nu\left(R_L^e, w\right)}{\partial w}\right|_{w=\hat{w}} = R_L^e\left(1-\tau\right) \tag{A1}$$

$$\left.\frac{\partial \nu\left(R_F^*(w), w\right)}{\partial w}\right|_{w=\hat{w}} = R_F^*(w)\left(1-\tau\right) \tag{A2}$$

$$\left.\frac{\partial^2 \nu\left(R_F^*(w), w\right)}{\partial w^2}\right|_{w=\hat{w}} = \frac{\left(1-\tau\right)^{\frac{\delta+1}{\delta}}}{\delta \gamma^{\frac{1}{\delta}}} w^{\frac{1-\delta}{\delta}} > 0 \tag{A3}$$

The strict convexity of (25) guarantees that $\nu\left(R_F^*(w), w\right) > \nu\left(R_L^e, w\right)$, and therefore, $V\left(R_F^*(w), w\right) > V\left(R_L^e, w\right)$ for any $w \in \left(w_-, w^+\right)$. Q.E.D.

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