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

Juan A. Lacomba and Francisco M. Lagos*
University of Granada
September 27, 2010

Abstract

We compare a Social Security system where people can retire at an 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 the one 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 this, 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.


*We are specially grateful to Ignacio Ortuño Ortín for helpful and constructive discussions and suggestions during the elaboration of this paper. We also thank Elena Bárbara, Georges Casamatta, Subir Chattopadhyay, Ramón Faulí, Francisco Marhuenda and Shlomo Weber for valuable comments.
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 held that, unless serious changes take place, the rise in the number of retirees relative to that of workers will threaten 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 Social Security 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 to 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 a flexible retirement age and Social Security. Casamatta et al. (2005) study the distortion caused by the 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 the effects of a simultaneous voting process on the contribution rate and on the decision to introduce or not an early retirement provision with an endogenous retirement age. Simonovits (2004) and (2005) analyzes the optimal design of the pension system with flexible retirement focussing on the importance of 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 greater flexibility in retirement decisions allowed? 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 works for some time and then retires. Individuals differ according to age and according

---

\(^1\)Earlier literature 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 which allows for endogenous retirement show that a mandatory early retirement may be socially desirable in the case of underaccumulation.
to productivity. We study two different PAYG Social Security programmes 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.\textsuperscript{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 these 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 all the population these indirect effects are taken into account and lead to higher preferred legal retirement ages.

In spite of the aforementioned, when there is 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 to 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 labour 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 favour of a legal retirement age as an instrument to increase their pension benefits by forcing lowest-wage workers to work longer.

The paper is organized 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

\textsuperscript{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.
appear in the appendix.

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:

\[
U(c, d) = u(c) + \beta u(d).
\]

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

Both periods are of equal length, normalized to unity. Labour 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 should 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 \(\delta \geq 1\) 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:

\[
c = w(1 - \tau) - s
\]
\[
x = s(1 + r) + Rw(1 - \tau) + (1 - R)p
\]

\(^4\)The quadratic specification used by Casamatta et al. (2005) is a particular case of the specification used here, where \(\delta = 1\). It should also 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 labour and consumption.
where \( s \geq 0 \) is the amount of savings; \( \tau \in [0,1] \) is the Social Security contribution tax rate; and \( p \) is the constant stream of pension benefits per instant of time, collected from a Pay-As-You-Go Social Security system. Similar to Casamatta et al. (2005), we consider a Beveridgean pension system where individuals contribute for an amount proportional to their wages but the total pension benefits received does not differ across them. We also assume that the contribution rate is given. In this way, we focus our attention only on how the different retirement rules affect the financing of the system and the 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 these, concentrating in another specific issue of the pension systems reform problem.

3. Retirement decisions

In this section, we characterize retirement decisions (and savings) of old and young individuals under the two retirement schemes. We denote \((R^*_F, R^*_L)\) the optimal retirement decisions, where \(R^*_F\) is the optimal individual retirement decision of young and old individuals under the flexible scheme and \(R^*_L\) is the optimal legal retirement age of young and old individuals under the legal retirement scheme.

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 labour 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. Pension benefits per instant of time, \(p\):

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

where \( \bar{w} \) denotes the mean wage and

\[
\bar{p}_F = \int_{w_-}^{w_+} R_F w f(w) dw,
\]

(6)
satisfy the government budget constraint (4). Note that a Beveridgean system where total pension received does not differ across individuals implies that under a flexible scheme the total pension \( P \):

\[
P = (1 - R_F) p = \tau \left((1 + n) \bar{w} + \bar{p}_F\right)
\]

(7)
does not depend neither on \( R_F \) nor on \( w \). In other words, although both \( R_F \) and \( p \) are different for individuals with different wages, the product \((1 - R_F)p\) is assumed constant.\(^6\)

3.1.1 The old

The old individuals’ problem can be formally represented as

\[
\max_{R_F} s_F (1 + r) + R_F w (1 - \tau) + (1 - R_F) p - \frac{\gamma R_F^{\delta+1}}{\delta + 1}
\]

(8)
subject to

\[
0 \leq R_F \leq 1.
\]

From (8) we obtain the optimal retirement age, \( R_F^* \),:

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

(9)

It is worth noting that (9) is obtained assuming that the individual considers her pension benefits as given, thereby disregarding the effect of her retirement decision on the pension benefits via the ‘macro’ constraint, (4).\(^7\)

---

\(^6\)The results would not change if a contributory element were introduced in \( P \). In that case we would have \( P = CP + BP \) where the contributory part would be \( CP = \tau \alpha ((1 + n) \bar{w} + R_F w) \), the Beveridgean part would be \( BP = \tau (1 - \alpha) ((1 + n) \bar{w} + \bar{p}_F) \) and \( \alpha \in (0, 1) \) would determine the contributory part of the pension.

\(^7\)That is, we assume \( \partial \bar{p}_F/\partial R_F = 0 \). Besides, note that although retiring later has a cost in term of forgone \( p \), this cost is cancelled out by the increase in \( p \) derived from retiring later. In other words, although \( p \) depends on \( R_F \), the total pension received, \( P \), does not depend on \( R_F \).
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 the 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 diminishes the elasticity of the labour force.

3.1.2 The young

The young individuals’ problem can be formally represented as

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

subject to

\[
0 \leq R_F \leq 1 \text{ and } 0 \leq s_F \leq w(1-\tau).
\]

It is easy to check that the young individual will choose her retirement age according to (9).

On the other hand, we can substitute (9) into (6) and denoting

\[
\xi(w) = \int_{w_-}^{w_+} w^{(\delta+1)/\delta} f(w)dw,
\]

we can rewrite (6) as:

\[
\text{From (10), and for individuals choosing an interior solution, we also get the optimal savings:}
\]

\[
s_F^* = \frac{w(1-\tau) - \rho_F(w)}{2+r}
\]

where

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

See Cassamatta et al. (2005) for a more exhaustive analysis of the optimal decisions in this setting.
\[ \bar{p}_F = \left( \frac{(1 - \tau(1 - \alpha))}{\gamma} \right)^{1/\delta} \xi(w). \]  

(12)

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. Thus, in this setting we consider legal retirement as the age at which workers are obliged to leave the labour force, that is, as a mandatory retirement.

In the following, we shall 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

\[
\tau \left( N^y \int_{w^-}^{w^+} w f(w) dw + N^o R_L \int_{w^-}^{w^+} w f(w) dw \right) = N^o (1 - R_L) \int_{w^-}^{w^+} p f(w) dw. \]  

(13)

Under this scheme, the individual pension is

\[ p = \tau \left( \frac{(1 + n)\bar{w}}{1 - R_L} + \frac{\bar{p}_L}{1 - R_L} \right), \]  

with

\[ \bar{p}_L = R_L \bar{w}. \]  

(14)

(15)

---

9If 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 the age at which pensions can be accessed and the standard retirement age. See Blondal and Scarpetta (1998) or Samwick (1998).
3.2.1 The old
The old individuals’ problem can be formally represented as

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

subject to

$$0 \leq R_L \leq 1.$$  \hspace{1cm} (16)

From (16) we obtain the optimal legal retirement age

$$R_L^* = \left(\frac{w + \tau(\bar{w} - w)}{\gamma}\right)^{1/\delta}. \hspace{1cm} (17)$$

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.\(^{10}\)

However, unlike the flexible system, a higher \(\tau\) 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

\(^{10}\)In this scheme, the total pension received are \(P = (1 - R_L)p = \tau ((1 + n)\bar{w} + R_L\bar{w}).\)
\[
\max_{R_L, s_L} u(w(1 - \tau) - s_L) + \beta u \left( s_L(1 + r) + R_L w(1 - \tau) + (1 - R_L)p - \frac{\gamma R_L^{\delta+1}}{\delta + 1} \right)
\]

subject to

\[0 \leq R_L \leq 1 \text{ and } 0 \leq s_L \leq w(1 - \tau).\]

The young individual will choose her optimal legal retirement age according to (17).\(^{11}\)

3.2.3 The voting process on the legal retirement age

It is easy to check that preferences are single peaked with respect to the legal retirement age 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. Since optimal legal retirement ages are increasing with the wage, the elected one is the median wage individual’s optimum legal retirement age

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

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

\(^{11}\)From (18), and for individuals choosing an interior solution, we also get the optimal savings:

\[
s_L^\gamma = \frac{w(1 - \tau) - \rho_L(w)}{2 + r}
\]

where

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

See Lacomba and Lagos (2007) for a more exhaustive analysis of the optimal decisions in a setting with legal retirement age.
Proposition 1  
i) $R_L^e > R_F^*$ 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 (9) and (17).

ii) (19) and (9) can be respectively rewritten as

$$R_L^e = \left( \frac{w_m(1 - \tau) + \tau \bar{w}}{\gamma} \right)^{1/\delta} \quad (20)$$

and

$$R_F^* = \left( \frac{w(1 - \tau)}{\gamma} \right)^{1/\delta} \quad (21)$$

Needless to say $R_L^e > R_F^*$ for any $w \in [w_-, w_m]$. From (20) and (21) it can be derived that there exists a wage $w_\mu > w_m$, such that $R_F^*(w_\mu) = R_L^e$.\(^{12}\) 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, all else remaining unchanged, if the pension system shifted from a legal retirement age to a flexible scheme.\(^{13}\) Notice that not only the low wage workers but also the middle class, with wages higher than the median wage, would retire earlier.\(^{14}\)

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

\(^{12}\)Notice that if $w_\mu$ were higher than $w^+$, then $R_L^e$ would be higher than $R_F^*$ for any $w \in [w_-, w^+]$.

\(^{13}\)The result would not change if a Bismarckian factor were introduced in the pension formula. The only difference is that the distance between the two retirement decisions would be smaller. In the flexible scheme the Bismarckian factor would reduce the implicit tax of the system on postponing retirement since now contributions would be partly reflected in retirement benefits, which would delay the retirement decisions. On the contrary, in the legal retirement scheme, the Bismarckian factor would cause the opposite effect. Since $\bar{w} > w_m$, the Bismarckian factor would reduce the pension benefits of the median voter, and thus, due to the substitution effect, the elected legal retirement age would be lower.

\(^{14}\)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 shifted from a legal retirement age to a flexible scheme.
legal retirement age is lowered/delayed must be taken into account. And they play such an important role that they 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 attitude yields individual retirement ages lower than the legal one. This result can be defined as the "fiscal externality" from imposing the legal retirement age on everyone.  

4. Financing of the Pension System and Welfare Levels

In this section we study the financing of the pension system and the 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,

$$S_F \equiv \tau \left( N^y \int_{w_-}^{w^+} w f(w) dw + N^o \int_{w_-}^{w^+} R_F w f(w) dw \right), \quad (22)$$

$$S_L \equiv \tau \left( N^y \int_{w_-}^{w^+} w f(w) dw + N^o R^*_L \int_{w_-}^{w^+} w f(w) dw \right). \quad (23)$$

Substituting (9) and (19) into (22) and (23), $S_F$ and $S_L$ can be rewritten as

$$S_F \equiv \tau \left( N^y \overline{w} + N^o \left( \frac{1 - \tau}{\gamma} \right)^{1/\delta} \xi(w) \right) \quad (24)$$

and

$$S_L \equiv \tau \left( N^y \overline{w} + N^o \left( \frac{w_m + \tau (\overline{w} - w_m)}{\gamma} \right)^{1/\delta} \overline{w} \right). \quad (25)$$

The results would not change if the utility function gave raise to income effect. Although income effect induces people to opt for a lower retirement age (the more income, the more demand for leisure), the positive relationship between the wage and the preferred retirement age would still maintain both in the flexible system and in the legal retirement system just assuming that the substitution effect is larger than the income effect. This assumption is usual in the related literature on this topic (see among others Crawford and Lilien, 1981; or Sheshinski, 1978).
The following proposition highlights the main results derived from (24) and (25).

**Proposition 2**  

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

**Proof:** i) It follows straightforward from (25). ii) It follows straightforward from (24).

Raising contribution rates and delaying the retirement age are among the main reforms for eliminating the future financial problems 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 can be observed in (24), an increase in the contribution rate has a negative indirect effect on $S_F$ (apart from the obvious positive direct effect). A higher $\tau$ 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 labour force are crucial in the financing of a flexible retirement system. The higher the wage dispersion or the more elastic the labour supply, the more likely the financing of the system will be enhanced by shifting to a flexible scheme. The intuition is the following. A higher elasticity of the labour force leads lower wage individuals to retire earlier and higher wage individual to retire later. And the increase in the financing of the pension system derived from the delay in the retirement decisions of higher wage individuals is larger than the reduction in the financing derived from the lower retirement ages of lower wage individuals.

We shall now 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 $S_F \geq S_L$, the whole population will prefer a pension system with flexible retirement.
ii) If $S_F < S_L$, a legal retirement system may be majority preferred to a flexible system by the middle-class.

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

The first point of the proposition is obvious. The effect of retirement rules on welfare has two different aspects. On the 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 to a flexible one enhances the financing of the system, all individuals will have, firstly, larger pension benefits and, secondly, they will be able to retire at the age of their own choice, which unambiguously will improve their welfare levels.

A pension system with a legal retirement age yields higher welfare levels only if the related pension benefits are sufficiently large to compensate for the forced retirement. If they are large enough, as the second point of proposition states, a majority formed by the middle class could support a legal retirement system. The intuition is the following. 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 bring about lower pension benefits only for them.

This result gives an intuition as to why social security in most 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.

On the other hand, if pension benefits are not sufficiently large, the disutility derived from the forced retirement in the legal retirement system 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.\textsuperscript{16}

Even if $S_F < S_L$, a majority of the population formed by a coalition

\textsuperscript{16}This result, a coalition made up of the tails of the income distribution, can also be viewed in Epple and Romano (1996).
of low- and high-wage workers may prefer a pension system with flexible retirement.

5. Numerical illustrations

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

\[
\nu(R^*_F(w), w) = R^*_F(w) \left( w(1 - \tau) - \frac{\gamma(R^*_F(w))^\delta}{\delta + 1} \right) + \tau R^*_F. \tag{26}
\]

and

\[
\nu(R^*_L, w) = R^*_L \left( w(1 - \tau) - \frac{\gamma(R^*_L)^\delta}{\delta + 1} \right) + \tau R^*_L \omega. \tag{27}
\]

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.\(^{17}\) The first column of the table below describes the contribution rates used. We consider three possibilities: \(\tau = 0.25\), \(\tau = 0.30\) and \(\tau = 0.35\).\(^{18}\) 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 to 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 increase their welfare level with the system with legal retirement age. They are located between the two previous wages. The fifth, sixth and seventh columns contain

\(^{17}\)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.

\(^{18}\)The contribution rates of most pension systems are around 30% of the gross wage of workers.
the same information as the three previous ones but related to the second wage distribution.

To complete the picture, we consider two different elasticities of the labour force. The first three rows of Table 1 show the results related to a labour 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 $R^*_L = 0.5$ and $R^*_L = 0.51$ respectively. The last three rows contain the results for a more inelastic labour 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 $R^*_L = 0.5$.\footnote{The different labour force elasticities are generated considering $\delta = 4$ for the first case and $\delta = 24$ for the more inelastic labour force. On the other hand, each $\delta$ is related to a different $\gamma$ in order to get the same $R^*_L$ for $\tau = 0.25$.}

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

<table>
<thead>
<tr>
<th>Elastic Lab. f.</th>
<th>$w_m = 2469.14$</th>
<th>$w_m = 2674.22$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\tau = 0.25$</td>
<td>$w_{lo} \quad w_{hi} \quad %$</td>
<td>$w_{lo} \quad w_{hi} \quad %$</td>
</tr>
<tr>
<td>$\tau = 0.30$</td>
<td>3232.1 5060.9 19.5</td>
<td>2985.8 4443.9 26.4</td>
</tr>
<tr>
<td>$\tau = 0.35$</td>
<td>3232.1 5060.9 19.5</td>
<td>2985.8 4443.9 26.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inelastic Lab. f.</th>
<th>$w_m = 2674.22$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\tau = 0.25$</td>
<td>$w_{lo} \quad w_{hi} \quad %$</td>
</tr>
<tr>
<td>$\tau = 0.30$</td>
<td>3374.8 4207.6 10.7</td>
</tr>
<tr>
<td>$\tau = 0.35$</td>
<td>2995.0 5355.6 25.8</td>
</tr>
</tbody>
</table>

We shall start with the analysis of the first three 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 a legal retire-
ment age. As the theory states, this only happens when the pension benefits associated with the legal retirement age are as sufficiently large as those of the flexible system. Also notice that this middle class would be composed of 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 of 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 by 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 shall now turn to the last three rows. The comparison of the results with the previous ones documents the importance of the elasticity of the labour force. The negative effect of a more inelastic labour force in the financing of the flexible scheme means that all the percentages of individuals preferring a pension system with a legal retirement age grow with respect to those related to the more elastic labour force. Only for $\tau = 0.25$ in the first distribution wage is the financing of the system 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 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 eliminating the standard age at which pension benefits are available and imposing a flexible system might have a hidden risk. The legal retirement age divides the population into working people and retired people and this may be a reference point for most individuals. It may be easier for them to comprehend 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 see 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 to a flexible system, when individuals decide on their retirement ages they will not consider that their single decisions affect 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 labour force and on the wage distribution.

In most of pension systems observed in reality there are both a minimum and a maximum retirement ages. Within these two limits, individuals decide freely when to retire. Our result provides a rationale for the existence of this minimum retirement age. The role of the minimum retirement age is to force some individuals to retire later than they would do otherwise. On the other hand letting people choose when to retire above this age makes the system more flexible than a pure mandatory retirement scheme and thus may attract a larger political support.

We have assumed a Beveridgean pension system. But, as mentioned in the introduction, 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 substituting uniform pensions for earnings-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 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, changing the degree of redistribution of the system may be much more difficult to achieve.
Therefore, our results suggest that those countries with a Bismarckian tradition, such as France or Germany, should move towards reforms increasing the flexibility of the retirement rules and those countries with a Beveridgian tradition, such as the Netherlands, the United States or the UK, should move towards reforms delaying the legal retirement age.

Appendix

Proof of Proposition 3

i) Since \( S_F \geq S_L \), there exists a wage level \( \hat{w} \) such that \( R^*_F(\hat{w}) = R^*_L \). Given that \( S_F \geq S_L \) implies that \( \bar{p}_F \geq R^*_L \bar{w} \), then \( \nu(R^*_F(\hat{w}), \hat{w}) \geq \nu(R^*_L, \hat{w}) \).

Now, we obtain the first derivative of (27) and the first and second of (26) with respect to the wage and we get

\[
\frac{\partial \nu(R^*_L, w)}{\partial w} \bigg|_{w=\hat{w}} = R^*_L (1 - \tau) \quad (A1)
\]

\[
\frac{\partial \nu(R^*_F(w), w)}{\partial w} \bigg|_{w=\hat{w}} = R^*_F(w) (1 - \tau) \quad (A2)
\]

\[
\frac{\partial^2 \nu(R^*_F(w), w)}{\partial w^2} \bigg|_{w=\hat{w}} = \frac{(1 - \tau)^{\frac{\delta + 1}{\delta}}}{\delta \gamma^\frac{1}{\delta}} w^{\frac{1-\delta}{\delta}} > 0 \quad (A3)
\]

The strict convexity of (26) guarantees that \( \nu(R^*_F(w), w) > \nu(R^*_L, w) \), and therefore, \( V(R^*_F(w), w) > V(R^*_L, w) \) for any \( w \in (w_-, w^+) \). Q.E.D.

References


