labour market as part-time workers). On the other hand, incentives to continue working full-time after age 65 were introduced in the regular retirement path, as detailed above. Finally, there is a possibility to exit the labour market through pre-retirement, i.e. through a special agreement with the firm that leads to private or public subsidies until the age of eligibility.

Table 1

RETIREMENT PATHS IN SPAIN ACCORDING TO LABOUR STATUS

Labour Status	Retirement path	Eligibility requirements and rules determining benefits (2007)
Disabled	Disability*	At age 65 disability pensions are converted into retirement pensions, but keeping the same benefit level
Unemployed	Back to work (all)	
	Early retirement from age 60 (Old system)	Minimum $n = 30$ 8% penalty per year until age 65 (gradually reduced to 6% if $n \geq 40$)**
	Early retirement from age 61 (New system)	Minimum $n = 30$ 7.5% penalty per year until age 65 (gradually reduced to 6% if $n \geq 40$)**
	Regular retirement at 65	(See conditions bellow)
Worker	Special retirement at age 64	No early retirement penalty Substitution contract in the same firm
	Early retirement from age 60 (Old system)	8% penalty per year until age 65
	Regular retirement from age 65 (includes delayed retirement)	<65: Reduced age for special professional activities with no penalty Age 65: Minimum $n=15$ (2 in the last 15) >65: Increases beyond 100% of *RB* by 2% per year (3% if $n \geq 40$)
	Partial retirement**	From age 60 Minimum $n = 15$ years Part-time work and proportional reduction of pension If age < 65 substituting contract No early retirement penalty
Retired	Flexible retirement	Part-time work and proportional reduction of pension

Notes: $n=$ number of years of contribution; * Only disabled below age 65 might change state back to work; ** 7.5% (n=30-34), 7% (n=35-37), 6.5% (n=38,39), 6% $n \geq 40$; *** In 40/07 Act the minimum n was increased to 30 and 6 years of seniority in the same firm were required.

Table 2 shows the distribution of new entries to retirement in Spain in the last six years. Clearly, ordinary retirement is the most common and includes both a small share –around 1%– of early retirement at fixed age and a sizeable share –above 10%– of delayed retirement[9].

Table 2

DISTRIBUTION OF NEW ENTRIES BY PATHWAYS (SPAIN 2002-2007)

Year / Retirement Pathway	2002	2003	2004	2005	2006	2007
From disability	**6.86%**	**5.84%**	**4.48%**	**2.33%**	**1.92%**	**0.60%**
Early retirement	29.42%	33.79%	33.86%	24.02%	28.28%	26.77%
Old system: from age 60 on	25.44%	29.50%	27.95%	19.62%	22.57%	20.24%
From unemployment	12.58%	14.10%	14.18%	10.18%	11.21%	10.76%
From employment	12.86%	15.40%	13.77%	9.44%	11.36%	9.48%
New system: from age 61 and unemployment	0.51%	0.92%	1.60%	1.47%	1.88%	2.32%
Special retirement at age 64	2.35%	2.19%	3.40%	2.13%	2.57%	3.14%
Collective wage settlements	0.00%	0.05%	0.06%	0.10%	0.23%	0.27%
Pre-retirement	1.12%	1.13%	0.86%	0.70%	1.02%	0.81%
Partial retirement (from employment)	**3.45%**	**5.30%**	**8.10%**	**7.78%**	**11.80%**	**12.82%**
Flexible retirement (from retirement)	**0.24%**	**0.52%**	**0.30%**	**0.31%**	**0.31%**	**0.20%**
Ordinary retirement pensions (Including delayed)	**60.04%**	**54.55%**	**53.26%**	**65.56%**	**57.69%**	**59.60%**
<60	1.14%	1.11%	0.98%	0.81%	1.11%	1.25%
60	0.97%	0.49%	0.49%	0.40%	0.24%	0.20%
61-64	1.83%	1.07%	1.35%	1.09%	1.22%	1.05%
65	44.83%	39.84%	38.25%	43.36%	41.93%	45.43%
>65	11.26%	12.05%	12.19%	19.90%	13.19%	11.66%
Missing age	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Note: Pre-retirement includes only those which can be identified as receiving public subsidies.

Interestingly, while the share of pensioners opting for the *OS* early retirement rules is still 20.24% per cent, early retirement at age 61 has not been very attractive. To some extent, this fact is explained by the requirement of being unemployed, but one can think that workers have opted for other less costly ways

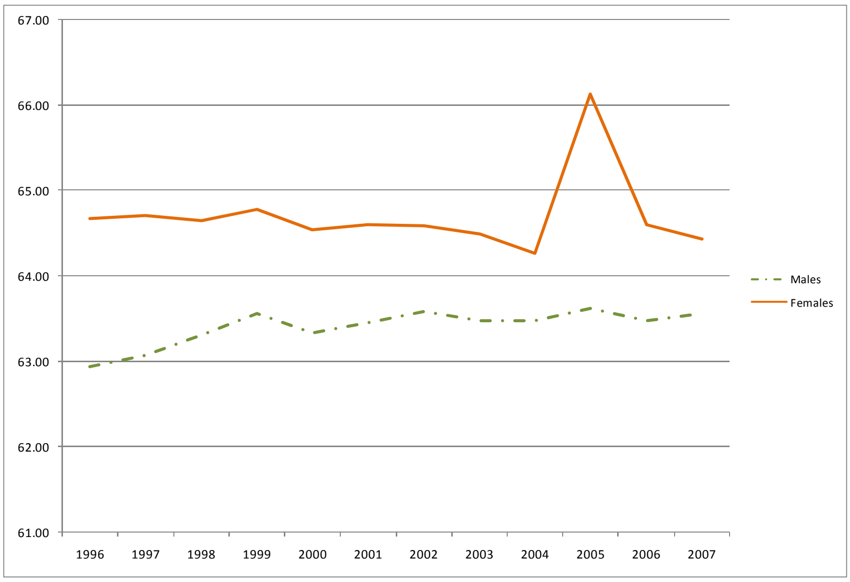
[9] The table classifies new pensions using the variables "type of pension" and "situation of the pension" in the MCVL. In the next section a description of the database is provided.

to access early retirement, like partial retirement. In some cases they even use the flexible retirement situation to improve their benefits once retired (in 2006 only 12.38% of pensioners in this situation were below age 65)[10]. Indeed, in practice, some of the measures intending to delay retirement have still been used as a way to improve the pension benefit by early retirees. 98.75% of new entries and 87.76% of pensioners in partial retirement situation in 2006 were below age 65. Flexible retirement has indeed been used to stay longer in the labour market, but its impact is very limited as only 0.20% of new entries in 2007 have chosen this option.

Despite the abovementioned reform efforts, the average retirement age for males has been quite stable in the last years (Figure 1). Interestingly, at present females retire later, perhaps due to a joint retirement decision or to the need to complete their shorter contribution histories. This would also explain some of the differences observed between male and female retirement probabilities. Despite the stability of the average retirement age, Figure 2 indicates that the evolution of the share in new entries by age and sex has undergone substantial changes which seem to be driven by cyclical movements. Notice that changes in early and delayed retirement move in different directions. The share of those retiring after age 65 is only slightly affected by incentives to delay retirement introduced in the 35/2002 Act. One should bear in mind that most collective wage settlements deny workers the possibility of delaying retirement, so that incentives to work beyond age 65 might become inoperative.

Figure 1

EVOLUTION OF AVERAGE RETIREMENT AGE BY GENDER



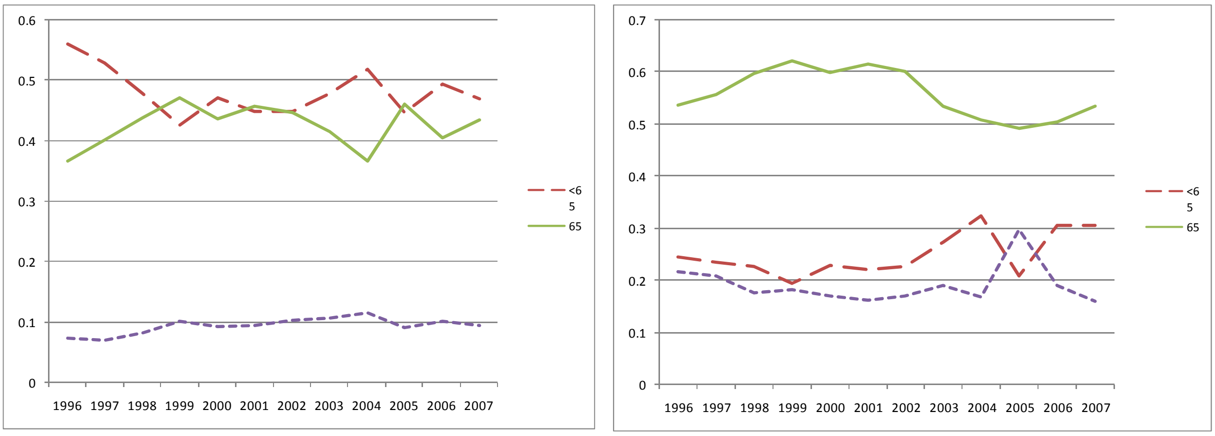
Note: The sharp increase in average retirement for females in 2005 is due to a legal change allowing for compatibility of widow and retirement pensions from the old *SOVI* system.
Source: Own elaboration from MCVL.

[10] With respect to partial retirement that could start before retirement but could in principle be extended beyond 65, only 6.56% of pensioners in 2006 were older than 65.

Figure 2

SHARE OF NEW ENTRIES TO RETIREMENT BY AGE AND SEX (2002-2007)

a) Males **b) Females**



Source: Own elaboration from MCVL.

Clearly the labour status before retirement matters. Ideally, a comprehensive consideration of the retirement decision should allow for transitions between the four different states and the best approach would be estimating a multinomial model for all the pathways simultaneously. Nevertheless, none all these transitions implies a voluntary decision, i.e. a decision that might be affected by changes in retirement incentives[11]. Hence, given the complexity of the decision and that we are interested in the possibility of delaying retirement voluntarily, we simplify the decision as follows. First, we focus on employed workers – those who are more likely to delay retirement age[12]. Second, as being disabled and becoming unemployed are usually external shocks and tend to affect all workers in the same way, as far as we can see, we abstract from the probability of workers reaching these states.

Note that, as shown in Table 1, workers who cannot opt for *OS* early retirement see their pathways to early retirement limited, special retirement at age 64 and partial retirement being their only options. These options tend to be dependent on the firm's decision, especially in the first option which implies the offer of a part-time job. Hence, we end up with the regular retirement option, which includes the possibility to delay retirement. We add to this the early retirement choice for OS workers, as this is the only alternative of early full-

[11] See Maes, 2008a for a survey comparing multinomial logit to binary response models.

[12] In particular we select those whose last contract was not labelled as special, including unemployment, civil servants, and some other categories. This way we eliminate both those who already accessed retirement through unemployment and those who might do so in year 2007.

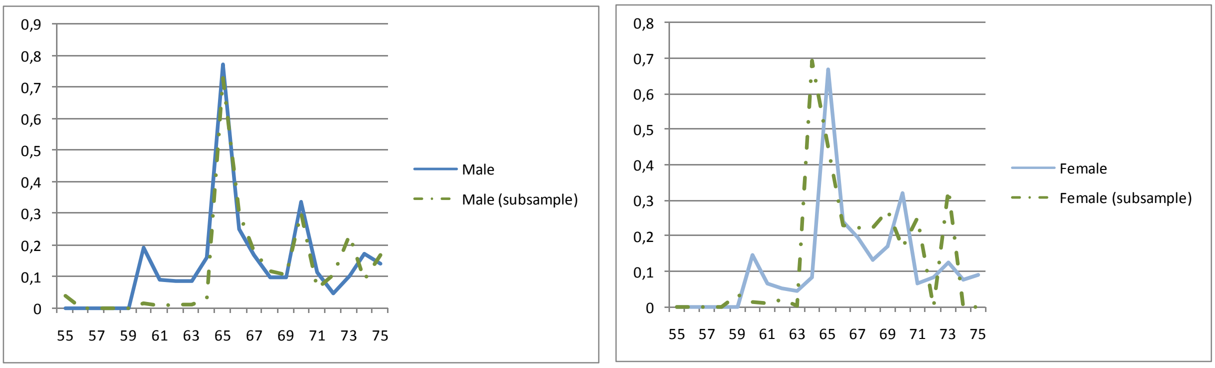
time retirement for those who retire straight from work. Finally, we also eliminate those workers who can access retirement at a reduced variable or fixed age[13]. Summarizing, we focus on the shaded area in Table 1. Employed workers can opt for ordinary retirement either at age 65 or delayed. We basically focus on this choice though we take into account that a subgroup of them –identifiable *ex-ante* as OS worker– can opt for early retirement under special conditions.

Figure 3 shows the observed hazard rates for the whole sample of individuals at retirement age (73,356 individuals aged 56-75) and the subsample on which we focus. The latter includes 28,318 individuals aged 56-75, including the 46.5% of males and the 23.6% of females in the sample. The small share of females implies that their behaviour is less representative. In the case of males, by selecting employed workers who can opt for delayed retirement, the probability of retiring shifts to the right, while this is not so clear in the case of females. The probability of retiring before age 65 is thus low and basically due to early retirement of *OS*. The subsample selected that retires on average later (1.81 and 0.26 years later for males and females, respectively) is the starting point for the subsequent simulation analysis.

Figure 3

OBSERVED HAZARD RATES BY GENDER (SAMPLE VERSUS SUBSAMPLE)

a) Males **b) Females**



Source: Own elaboration from MCVL.

[13] We can identify all these workers both ex ante and ex post. In particular workers before 01/01/1967 can be identified ex-ante by their entry date in the labour market and ex-post by the type of retirement path. Special professions can be identified ex-ante by their contribution regime in most cases (except firemen) and one can also indirectly identify them ex-post by looking at their retirement age and the absence of the corresponding early retirement penalty.

3. THE DATA: THE CONTINUOUS WORKING LIFE SAMPLE (MCVL)[14]

The MCVL is a sample extracted from Social Security administrative data. Four per cent of all individuals registered with the Social Security administration – both contributors and recipients of benefits – over the sampling year are selected and their entire life history in the social security records is included in the data set[15]. Thus, although it is not a pure panel, the data set is rich in longitudinal data. This feature, however, complicates the structure of the information as the registration unit varies substantially ranging from the person – in the personal data file – to the contract – in the affiliation file – or to the contract and year – in the contribution file. This structure also complicates the data selection. Furthermore, the quality of data is not homogenous, deteriorating the further back in time we go as more data are missing. The data collection itself was initiated at different points in time: data on pensions were first included around 1996; data on contributions around 1980; while some data on affiliation (contract registering) are available from as early as 1970. Clearly all these factors condition our analysis. We provide details of the data employed below. We focus primarily on the pension file whose registration unit is defined by the individual, the benefit and the year, but we also recover contributory data for those individuals in our sample.

Among the difficulties of dealing with such a large administrative data set –the sample size reaches about a million people in 2005– the most challenging are dealing with empty contribution bases and relating contribution, affiliation and benefit data from the same individual, all defined with different registration units. In particular, in order to extract reliable data regarding contributions in a specific time unit, it is necessary to follow up all the contracts in which an individual has been involved, computing time and contribution separately so as to avoid an erroneous correspondence between working time and contribution per unit of time. Below we describe in detail how we dealt with this.

As outlined above, this paper seeks to examine the impact of certain reform measures on the probability of retiring. The MCVL allows for this kind of analysis because it contains data of the main factors included in the initial pension formula. Specifically, over the period covered by the data base, we are able to recover the number of working years, the life-cycle contributions of the individual and the retirement age, thus determining any penalizations for early retirement. It is also possible to recover these variables – except the not yet

[14] See MTAS (2006b) for a detailed description of the *Muestra Continua de Vidas Laborales* (MCVL), available upon request at www.seg-social.es/Internet_1/Lanzadera/index.htm?URL=82.

[15] Both workers and pensioners are thus included and also individuals receiving unemployment benefits or benefits prior to early retirement. The latter can be identified by the type of relation they have with the Social Security.

observed retirement age –to analyze future pension rights for potential pensioners– i.e., all the individuals in the sample who can opt for retirement. For pensioners, the total number of lifetime working years considered in computing the initial pension is also registered in the MCVL. Nevertheless, it is also necessary to obtain the annual working time in order to fill the gaps in the contribution data, in line with Spanish legislation[16]. Hence the annual contribution period or working time is obtained by recovering all the contracts signed by the individual for each year, taking into account part-time work as well as the possibility of contracts that ran simultaneously.At the same time, the average hourly contribution is obtained. One of the main problems we faced was the existence of missing contribution data. This can occur either within a contract registered in the contribution file or due to a lack of correspondence between the affiliation data –starting long before 1980– and contribution data – starting in 1980. For example, we might find, even after 1980, no recorded contribution for one specific worker, while data regarding affiliation showed the worker to be actually contributing[17]. An imputation process is developed to provide figures for the missing contributions. By tracking affiliation and contribution data, we treat missing values differently considering whether the individual is actually working– actual missing value –or not– if he is out of the labour force. In the former case, data from the same individual are used in order to recover absent contributions. If this is not available in the same year, the average value in the last 15 years is used, so that the value of RB is not affected by the missing contribution. In the latter case, the gaps occurring in the last 15 years are filled with the minimum contribution threshold, according to Spanish legislation.

4. METHODOLOGY

We follow the general approach taken by Gruber and Wise (2004), among others, by considering the alternative retirement paths as perfect substitutes so that a binary response model can be estimated and a weighted incentive measure can be used as an explanatory variable[18]. Nevertheless, we partially deviate from this approach as explained below.

[16] When the individual presents a non-contributory period within the last 15 years considered for computing the *RB*, the minimum contribution threshold rather than zero is considered to compute the *RB*.

[17] Information regarding contributions was first gathered in 1980, but it is more reliable after 2001. The providers of the sample found that the share of contracts with missing data fell from 78% in 1984 to 94% in 1992 and to 99% in 2003.

[18] See Maes 2008a for a survey.

For each worker, i, a latent variable is defined, Y_i^*, which denotes the change in utility of moving from the state of working in year 2006 to retirement in 2007. The change in the utility is determined by a vector of observable explanatory variables, including incentives for retirement, personal characteristics, labour market conditions, etc, and a stochastic error term, u_i:

$$Y_i^* = U_i - U_{i,work,2006} = \beta_1 SSW_i + \beta_2 I_i + \beta X_i + u_i \qquad (2)$$

Where X_i is a vector that includes individual socio-demographic characteristics, SSW_i is the Social Security Wealth of a worker, and I_i stands for the incentive measures derived from SSW_i. The latter is calculated for each individual –the individual subscript is omitted here– as the expected present value of future pension benefits in case of retirement at age, h, higher than the actual age (a), as:

$$SSW_h = \sum_{s=h+1}^{S} \gamma^{s-a} \pi_s B_s(h) \qquad (3)$$

Where S is the age of certain death, γ denotes the time discount factor, π_s is the conditional survival probability at age *s* for an individual alive at age *a*, and $B_s(h)$ is the pension expected at age s>h in case of retiring at age h[19].

Note that what we observe are the discrete choices of retirement in 2007,

$$Y_i = \begin{cases} 1 \text{ if } Y_i^* > 0 \text{ (retirement in 2007)} \\ 0 \text{ otherwise (working in 2007)} \end{cases} \qquad (4)$$

Thus, the probability of choosing retirement in 2007 can be expressed as

$$\Pr ob(\text{worker select retirement}) = \Pr ob(Y_i = 1) = \Pr ob\left(Y_i^* > 0\right) \qquad (5)$$

We assume that u_i of equation (2) is type I extreme-value and i.i.d. across both alternatives (retirement and working) and individuals. The estimation can then be implemented through a logit model:

$$P_i = \Pr ob\left(Y_i = 1\right) = \frac{\exp\left(\beta_1 SSW_i + \beta_2 I_i + \beta_3 X_i\right)}{1 + \exp\left(\beta_1 SSW_i + \beta_2 I_i + \beta_3 X_i\right)} \qquad (6)$$

In order to deal with the possibility of different retirement paths we proceed as follows. As seen above, in our subsample the old-age benefits are generally determined by the “standard” public old-age pension system which includes the possibility of delayed retirement. However, we also consider the incidence of a different retirement pathway only available for employees who contributed in the old system (OS), i.e. before 1967. This type of pension is not available to all individuals, and might be relevant for the individual’s economic incentives to retire, so it should be included in the model. Here we assume that the

[19] According to Spanish legislation, pensions are updated to inflation once created.

probability of receiving this kind of benefit is determined as a discrete choice model. Let w_i^* be the difference in utility of retirement via OS or standard retirement in 2007. This change in the utility is determined by a vector of observable explanatory variables (Z) such that,

$$w_i^* = \delta_1 Z_i + \varepsilon_i \qquad , \qquad (7)$$

though, we only observe the discrete choice of retirement in 2007 as,

$$w_i = \begin{cases} 1 \text{ if } w_i^* > 0 \text{ (path of retirement in 2007 : old system)} \\ 0 \text{ otherwise (path of retirement in 2007 : standard)} \end{cases} \qquad , \qquad (8)$$

where $w_i = 1$ indicates that the individual has access to an OS retirement pension in 2007. z_i denotes a vector of individual characteristics, and ε_i represents the error term. We estimate equation (7) by means of logit procedure (similar to (6)).

Taking into account (2) and (7), each incentive measure I_i is –for those who are identified *ex-ante* as eligible for OS retirement– a weighted average of this option and the ordinary retirement option. Following Eklöf and Hallberg (2006) we can construct a system of simultaneous equation as,

$$\begin{aligned} Y_i^* &= \beta_1 SSW_i + \beta_2 \left(w_i I_i^{OS} + (1 - w_i) I_i^{std} \right) + \beta X_i + u_i \\ w_i^* &= \delta_1 Z_i + \varepsilon_i \end{aligned} \qquad (9)$$

Where the superscript OS refers to the incentive if the individual has access to the old system pension entitlements and *std* refers to the standard pensions in the general retirement rules. Nevertheless, our estimation method is simpler as we can observe *ex-ante* OS workers while they can only identify them *ex-post*. We first estimate (8) and use the estimated probabilities to obtain the weighted incentive measure for those who *ex-ante* can opt for the OS retirement path.

There is some previous work applied to Spain in this framework. First, Boldrin and Jiménez-Martín (2004) and Jiménez-Martín (2006), estimate retirement probabilities using an earlier preliminary version of the MCVL, not generally available. They also focus on employed individuals, though in this case the alternative pathways to retirement are long-term unemployment benefits and disability. These are considered as fully exogenous to the agents so that the probabilities used as weights are the observed average[20]. As said above, we ignore those exogenous choices that can indeed affect retirement behaviour but to the same extent for all the agents. Instead, given the focus of the paper we

[20] Argimón *et al.* (2009) also estimated retirement probabilities but retirement incentives are not considered among the explanatory variables. They find that employment status determines the pathway to retirement.

control for the possibility that some agents can still opt for early retirement straight from employment if they were workers in 1967.

Second, more recently and using the MCVL, in the context of the employment search behaviour García-Pérez *et al*. (2009) perform a reduced form estimation of the joint determination of the exit rate from employment and unemployment, using a duration model. They argue that the combination of generous unemployment benefits and strong early retirement penalties reduces the search effort of workers near retirement age. As a result, access to retirement through unemployment turns out to be the chosen path for a substantial share of low-skilled males. Besides the estimation method, we deviate from them, mainly by focusing on the choice between ordinary or delayed retirement.

The variables included in our estimation are some socioeconomic variables detailed in the results section and the incentive measures detailed below. Four incentive measures are derived from the measure of Social Security Wealth (SSW) defined in equation (3)[21]. All of them measure gains in SSW from delaying retirement from now to a future age/year. First, the social security accrual (SSA) only considers the present age (a) and the next (a+1) and, hence, it is defined as the difference between SSW_{a+1} and SSW_a. Second, the implicit tax (T) measures the work disincentives as the ratio between SSA and the potential wage earned over the year, with a negative sign. Third, the peak value (PV) considers all the possible future ages(*h*)/years, up to maximum retirement age. Hence, it is defined as the maximum difference between SSW_h and the initial, given, SSW_a. Finally, the last incentive measure –the option value (OV)– is, on the one hand, similar to T, in that it takes into account future expected wages. On the other hand, similarly to PV, it measures the gain from postponing retirement to any future feasible age, but in terms of utility. In particular, following the specification in Gruber and Wise (2004), assuming that the utility function is linear in SSW, we can express the OV of retiring as a function of PV as follows,

$$OV_h = \sum_{s=h+1}^{S} \gamma^{s-a} \pi_s w^*(h) + zPV_h \qquad (10)$$

Being z the constant relation between utility and SSW in the utility function. The first term on the right-hand side in equation (10) is the present value of expected wages until retirement and the second term is proportional to PV – the gain in SSW from postponing retirement until the best option[22].

[21] The incentives used have become standard in empirical studies. The term social security wealth should, in principle, refer to the net receipts from the pension system –the present value of pension benefits, minus contributions–, but most empirical studies avoid considering the whole life cycle, taking into account only the revenue side, the pension benefits.

[22] In particular we assume a value of 0.99 for the discount factor γ and a value one for z.

5. RESULTS

5.1. Baseline results

Tables 3 and 4 show the results of the regression analysis for males and females, respectively. As in other studies, several specifications are tried for age. In particular, retirement age is included as a variable, either using a quadratic specification (Tables 3a and 4a), or using age dummies (Tables 3b and 4b). First, it is interesting to note that results are robust to the incentive chosen as they are quite similar in all four cases. Second, as could be expected, a strong impact of age is found, especially when introduced using age dummies, so that other relevant variables lose significance.

In the quadratic specification, age has a positive and decreasing significant effect. Nevertheless, the incentive variable fails to be significant and/or does not have the expected negative sign, while at least the option value –which could be considered the most complete incentive measure–, turns significant and has the expected sign in the age dummies specification[23]. Furthermore, as shown in Figure 4, the age profile of the hazard rate is more realistic in the age dummies specification. In fact, this specification turns out to be the best way to capture the strong impact of age dummies, usually interpreted as the fact that they capture some of the legal settings and social norms not fully reflected by the incentive variables. This also happens in our case, despite the attempt to neatly isolate those who can opt for delayed retirement. Clearly the difficulties in capturing the role of the firm in the retirement decision are also behind this lack of significance.

Table 3a

REGRESSION RESULTS FOR MALES (QUADRATIC AGE)

	A) Option Value	B) Accrual	C) Tax	D) Peak Value
Number of obs	22,354	22,354	22,354	22,354
LR chi2(17)	4,420	4,515	4,496	4,437
Prob > chi2	0.00	0.00	0.00	0.00
Pseudo R2	0.62	0.63	0.63	0.62
Log likelihood	-1,374	-1,326	-1,336	-1,365
Age	7.213 * (0.003)**	5.490 * (0.003)*	6.172 * (0.0044) *	6.615 * (0.0032)

(Follow)

[23] For Germany, Börsch-Supan *et al*. (2004) also find a better fit when using age dummies, but incentive measures are significant in both cases.

(Continuation)

	A) Option Value	B) Accrual	C) Tax	D) Peak Value
Age^2	-0.055 * (-2.26E-05)**	-0.040 * (-1.85E-05)*	-0.046 * (-3.28E-05)*	-0.049 * (-2.42E-05)*
Wage	-1.44E-04 * (-5.94E-08)**	-1.51E-04 * (6.94E-08)*	-1.31E-04 * (-9.32E-08)*	1.60E-04 * (-7.82E-08)*
SSW	7.88E-06 * (3.26E-09)**	4.17E-06 * (1.92E-09)*	6.01E-06 * (4.29E-09)*	7.69E-06 * (3.76E-09)*
Incentive	-8.46E-07 (-3.50E-10)	4.39E-06 * (2.02E-09)*	3.43E-04 * (2.45E-07)*	1.33E-06 * (6.51E-10)**
Share part-time	2.065 * (8.54E-04)**	2.082 * (9.57E-04)**	2.44 * (1.74E-03)*	1.836 * (8.99E-04)**
Days last contract	6.18E-05 ** (2.56E-08)**	6.21E-05 ** (2.85E-08)**	6.26E-05 ** (4.47E-08)**	6.09E-05 ** (2.98E-08)**
Days worked	-8.96E-05 * (-3.71E-08)**	-7.83E-05 * (-3.60E-08)**	-8.47E-05 * (-6.05E-08)**	-1.10E-04 * (-5.39E-08)*
High skill	0.087 (3.70E-05)	0.262 (1.32E-04)	0.342** (2.76E-04)	0.011 (5.42E-06)
Medium skill	-0.028 (-1.14E-05)	-0.036 (-1.65E-05)	0.044 (3.17E-05)	-0.080 (-3.96E-05)
Industry	0.091 (3.79E-05)	0.094 (4.38E-05)	0.101 (7.28E-05)	0.085 (4.22E-05)
Construction	0.214 (9.51E-05)	0.206 (1.02E-04)	0.206 (1.58E-04)	0.223 (1.18E-04)
Inc.	-0.193 ** (-8.00E-05)	-0.201 (-9.27E-05)	-0.208 ** (-1.49E-04)**	-0.294 ** (-1.44E-04)**
College	-0.1366 (-5.32E-05)	0.004 (1.91E-06)	0.003 (2.13E-06)	-0.112 (-5.23E-05)
Marry	-0.111 (-4.62E-05)	-0.122 (-5.66E-05)	-0.140 (-1.01E-04)	-0.122 (-6.01E-05)
Young dependants	-0.129 (-5.08E-05)	-0.205 (-8.76E-05)	-0.167 (-1.12E-04)	-0.134 (-6.25E-05)
Old dependants	6.29E-04 (2.60E-07)	-0.026 (-1.17E-05)	-0.076 (-5.23E-05)	-0.014 (-6.73E-06)
Constant	-240.173 *	-188.908 *	-209.377 *	-223.167 *

Notes: For each variable marginal effect in brackets. The symbol * implies that variable is significant at 95% level of confidence and ** that it is significant at 90% level of confidence.

Table 3b

REGRESSION RESULTS FOR MALES (AGE DUMMIES)

	A) Option Value	B) Accrual	C) Tax	D) Peak Value
Number of obs	22,354	22.354	22,354	22,354
LR chi2(17)	4,839	4.782	4,782	4,781
Prob > chi2	0.00	0,00	0.00	0.00
Pseudo R2	0.68	0,67	0.67	0.67
Log likelihood	-1,164	-1,193	-1,193	-1,193
Age60 (1)	2.768 * (1.43E-03)**	3.068 * (O.012)*	3.063 * (0.012)*	3.062 * (0.011)*
Age61 (1)	1.399 ** (3.48E-04)**	2.160 * (5.01E-03)**	2.165 * (5.18E-03)**	2.155 * (4.97E-03)**
Age62 (1)	1.285 ** (3.02E-04)**	2.235 * (5.43E-03)**	2.241 * (5.61E-03)**	2.229 * (5.37E-03)**
Age63 (1)	1.430 ** (3.72E-04)**	2.500 * (7.44E-03)**	2.506 * (7.69E-03)**	2.494 * (7.36E-03)**
Age64 (1)	1.871 * (6.39E-04)**	3.118 * (0.014) **	3.124 * (0.015)**	3.111 * (0.014)**
Age65 (1)	5.664 * (0.029)**	6.629 * (0.321)*	6.560 * (0.313)*	6.592 * (0.313)*
Age66 (1)	3.601 * (4.48E-03)**	4.681 * (0.076)**	4.824 * (0.089)**	4.785 * (0.084)**
Age67 (1)	2.752 * (1.87E-03)**	3.980 * (0.039)**	4.135 * (0.047)**	4.096 * (0.044)**
Age68 (1)	2.092 * (9.15E-04)	3.469 * (0.024)	3.631 * (0.029)	3.585 * (0.027)
Age69 (1)	1.844 ** (6.86E-04)	3.249 * (0.019)	3.436 * (0.024)	3.365 * (0.022)
Age70 (1)	3.007 * (2.47E-03)	4.943 * (0.099)**	5.071 * (0.114)**	5.040 * (0.108)**
Age71 (1)	1.105 (2.61E-04)	2.755 ** (0.012)	2.875 ** (0.014)	2.847 ** (0.013)
Age72 (1)	1.268 (3.30E-04)	3.474 * (0.024)	3.589 * (0.028)	3.547 * (0.026)
Wage	2.26E-05 (2.92E-09)	-1.32E-04 * (-1.06E-07) *	-1.30E-04 * (-1.07E-07)*	-1.32E-04 * (-1.06E-07)*

(Follow)

(Continuation)

	A) Option Value	B) Accrual	C) Tax	D) Peak Value
SSW	1.90E-06 * (2.46E-10)	3.26E-06 * (2.61E-09) **	2.86E-06 * (2.35E-09)*	2.96E-06 * (2.36E-09)*
Incentive	-1.52E-05 * (-1.97E-09) **	-4.17E-07 (-3.34E-10)	2.65E-05 (2.18E-08)	7.42E-09 (5.91E-12)
Share part-time	3.180 * (4.12E-04) **	2.620 * (2.10E-03)*	2.617 * (2.15E-03)*	2.601 * (2.07E-03)*
Days last contract	7.23E-05 * (9.36E-09)**	6.84E-05 ** (5.47E-08)**	6.88E-05 ** (5.67E-08)**	6.85E-05 ** (5.46E-08)**
Days worked	-6.31E-06 (-8-17E-10)	-9.36E-06 (-7.49E-09)	-9.85E-06 (-8.11E-09)	-8.93E-06 (-7.12E-09)
High Skill (1)	0.510 ** (7.92E-05)	0.695 ** (7.16E-04)**	0.720 ** (7.70E-04)**	0.702 ** (7.22E-04)
Medium Skill (1)	0.146 (1.87E-05)	0.161 (1.28E-04)	0.164 (1.34E-04)	0.158 (1.24E-04)
Industry (1)	0.042 (5.41E-06)	0.060 (4.85E-05)	0.064 (5.26E-05)	0.063 (5.07E-05)
Construction (1)	0.158 (2.16E-05)	0.126 (1.05E-04)	0.133 (1.14E-04)	0.129 (1.08E-04)
Inc. (1)	0.064 (8.35E-06)	0.123 (9.86E-05)	0.110 (9.05E-05)	0.119 (9.49E-05)
College (1)	-0.098 (-1.22E-05)	0.103 (8.68E-05)	0.116 (1.01E-04)	0.110 (9.23E-05)
Marry (1)	-0.106 (-1.38E-05)	-0.125 (-1.01E-04)	-0.124 (-1.03E-04)	-0.123 (-9.86E-05)
Young dependants (1)	-0.406 ** (-4.56E-05) **	-0.383 ** (-2.68E-04)**	-0.379 ** (-2.73E-04)	-0.381 ** (-2.65E-04)**
Old dependants (1)	-0.131 (-1.60E-05)	-0.157 (-1.17E-04)	-0.159 (-1.22E-04)**	-0.154 (-1.15E-04)
Constant	-7.127 *	-7.741 *	-7.757 *	-7.723 *

Notes: For each variable marginal effect in brackets. The symbol * implies that variable is significant at 95% level of confidence and ** that it is significant at 90% level of confidence. (1) Marginal effect is for discrete change of dummy variable from 0 to 1.

Table 3c

AUXILIARY EQUATION (MALES)

	Total Effects	Marginal Effects
Age	185.757	0.019
Age^2	-1.499	1.52E-04
Share part-time	21.232	2.15E-03
Days last contract	8.42E-05	8.53E-09
Days worked	3.08E-04	3.12E-08
High Skill (1)	0.151	1.61E-05
Industry (1)	-0.149	-1.52E-05
Construction (1)	-0.730	-5.67E-05
College(1)	4.001	4.74E-03
Secondary	0.754	9.48E-05
Constant	-5770.655	

(1) Marginal effect is for discrete change of dummy variable from 0 to 1.

Table 4a

REGRESSION RESULTS FOR FEMALES (QUADRATIC AGE)

	A) Option Value	B) Accrual	C) Tax	D) Peak Value
Number of obs	5,936	5,936	5,936	5,936
LR chi2(17)	926	918	919	925
Prob > chi2	0.00	0.00	0.00	0.00
Pseudo R2	0.61	0.60	0.60	0.61
Log likelihood	-302	-305	-305	-302
Age	4.805 * (2.48E-03)**	5.478 * (3.46E-03)**	5.399 * (3.83E-03) **	4.820 * (-2.51E-03)**
Age^2	-0.035 * (-1.83E-05)**	-0.041 * (-2.58E-05)**	-0.040 * (-2.83E-05)**	-0.035 * (-1.84E-05)**
Wage	-1.89E-04 * (-9.78E-08)**	-1.71E-04 * (-1.08E-07)**	-4.42E-04 * (-3.14E-07)**	-1.88E-04 * (-9.80E-08)**
SSW	7.66E-06 * (3.96E-09)**	9.33E-06 * (5.89E-09)**	9.21E-06 * (6.53E-09)**	7.62E-06 * (3.97E-09) **
Incentive	-4.57E-06 * (-2.37E-09) **	3.24E-04 * (2.05E-07)	2.90E-04 ** (2.06E-07) **	4.58E-06 * (2.38E-09) **

(Follow)

(Continuation)

	A) Option Value	B) Accrual	C) Tax	D) Peak Value
Share part-time	0.627 (3.24E-04)	0.549 (3.47E-04)	0.568 (4.03E-04)	0.624 (3.25E-04)
Days last contract	3.99E-05 (-2.06E-08)	-3.89E-05 (-2.45E-08)	-3.21E-05 (-2.28E-08)	-3.92E-05 (-2.04E-08)
Days worked	-4.65E-05 (-2.40E-08)	-5.41E-05 (-3.42E-08)	-3.35E-05 (-2.37E-08)	-4.68E-05 (-2.44E-08)
High skill	0.110 (5.50E-05)	-0.272 (-1.57E-04)	0.011 (7.99E-06)	-0.123 (-6.14E-05)
Medium skill	-0.362 (-1.92E-04)	0.0347 (2.24E-04)	0.411 (3.00E-04)	0.360 (1.92E-04)
Industry	0.0908 ** (3.790E-05)	0.593 ** (4.50E-04)	0.596 (5.09E-04)	0.590 ** (3.69E-04)
Construction	-4.125 ** (-5.43E-04) **	-3.852 (-6.57E-04) **	-3.681 (-7.33E-04)**	-4.108 ** (-5.46E-04) **
Inc.	-0.212 (1.13E-04)	0.207 (1.35E-04)	0.261 (-1.92E-04)	0.213 (1.14E-04)
College	-0.399 (-1.75E-04)	-0.302 (-1.68E-04)	-0.336 (-2.07E-04)	-0.391 (-1.73E-04)
Marry	0.309 (-1.66E-04)	-0.294 (1.92E-04)	0.310 (2.28E-04)	0.310 (1.67E-04)
Young dependants	-0.478 (-5.080E-05)	-0.526 (-2.69E-04)	-0.486 (-2.84E-04)	-0.487 (-2.08E-04)
Old dependants	0.0006 (2.04E-04)	0.658 (5.55E-04)	0.625 (5.84E-04)	0.641 (4.42E-04)
Constant	-164.451 *	-184.769 *	-183.662 *	-164.940

Notes: For each variable marginal effect in brackets. The symbol * implies that variable is significant at 95% level of confidence and ** that it is significant at 90% level of confidence.

Table 4b

REGRESSION RESULTS FOR FEMALES (AGE DUMMIES)

	A) Option Value	B) Accrual	C) Tax	D) Peak Value
Number of obs	5,936	5,936	5,936	5,936
LR chi2(17)	1,024	1,022	1,022	1,022
Prob > chi2	0.00	0.00	0.00	0.00
Pseudo R2	0.67	0.67	0.66	0.67
Log likelihood	-252	-254	-253	-254
Age60 (1)	4.774 * (0.017)**	4.801 * (0.020)**	4.821 * (0.019)**	4.803 * (0.020)**
Age61 (1)	3.253 ** (4.37E-03)	3.376 ** (5.70E-03)	3.374 ** (5.47E-03)	3.377 ** (5.72E-03)
Age62 (1)	3.222 ** (4.49E-03)	3.354 ** (5.93E-03)	3.353 ** (5.69E-03)	3.355 ** (5.94E-03)
Age63 (1)	3.789 ** (8.13E-03)	3.949 * (0.011)	3.947 * (0.011)	3.950* (1.10E-02)
Age64 (1)	1.906 (1.19E-03)	2.110 (1.73E-03)	2.104 (1.65E-03)	2.111 (1.74E-03)
Age65 (1)	7.374 * (0.230)**	7.298 * (0.244)**	7.418 * (0.258)**	7.304 * (0.245)**
Age66 (1)	5.606 * (0.057)	6.276 * (0.120)	6.095 * (0.099)	6.267 * (0.120)
Age67 (1)	4.525 * (0.020)	5.201 * (0.044)	4.997 * (0.035)	5.191 * (0.044)
Age68 (1)	4.229 ** (0.015)	4.694 ** (0.028)	4.540 ** (0.023)	4.686 ** (0.027)
Age69 (1)	4.246 ** (0.015)	4.770 ** (0.030)	4.603 ** (0.024)	4.763 ** (0.030)
Age70 (1)	5.179 * (0.038)	5.721 * (0.074)	5.590 * (0.063)	5.716 * (0.073)
Age71 (1)	4.539 ** (0.020)	5.197 ** (0.045)	5.038 ** (0.037)	5.189 ** (0.045)
Age72 (1)	5.036 ** (0.033)	6.008 * (0.096)	5.804 ** (0.077)	5.996 ** (0.095)
Wage	-1.86E-06 (-4.21E-10)	-1.81E-04 * (-4.76E-08)	-1.84E-04 * (-4.65E-08)	-1.81E-04 * (-4.76E-08)

(Follow)

(Continuation)

	A) Option Value	B) Accrual	C) Tax	D) Peak Value
SSW	7.11E-06 * (1.61E-09)	5.83E-06 * (1.54E-09)	6.53E-06 * (1.65E-09)	5.86E-06 * (1.55E-09)
Incentive	-1.99E-04 (-4.51E-08)	6.49E-07 (1.71E-10)	-7.15E-05 (-1.81E-08)	5.97E-07 (1.58E-10)
Share part-time	1.234 (2.80E-04)	1.063 (2.80E-04)	1.107 (2.80E-04)	1.063 (2.80E-04)
Days last contract	-4.2E-05 (-9.48E-09)	-3.97E-05 (-1.04E-08)	-3.96E-05 (-1.00E-08)	-3.96E-05 (-1.05E-08)
Days worked	-2.2E-05 (-4.98E-09)	-6.49E-06 (-1.71E-09)	-7.32E-06 (-1.85E-09)	-6.68E-06 (-1.76E-09)
High Skill (1)	0.200 (4.86E-05)	0.392 (1.19E-04)	0.381 (1.10E-04)	0.389 (1.18E-04)
Medium Skill (1)	0.331 (7.65E-05)	0.366 (9.86E-05)	0.365 (9.45E-05)	0.366 (9.88E-05)
Industry (1)	0.394 (1.01E-04)	0.410 (1.22E-04)	0.405 (1.15E-04)	0.410 (1.23E-04)
Construction (1)	-2.859 ** (-2.24E-04)	-3.113 ** (-2.64E-04)	-2.932 ** (-2.51E-04)	-3.105 ** (-2.65E-04)
Inc. (1)	0.471 (1.15E-04)	0.457 (1.29E-04)	0.475 (1.30E-04)	0.458 (1.30E-04)
College (1)	-0.358 (-6.98E-05)	-0.401 (-8.94E-05)	-0.371 (-8.03E-05)	-0.399 (-8.91E-05)
Marry (1)	0.359 (8.49E-05)	0.378 (1.04E-04)	0.374 (9.90E-05)	0.378 (1.04E-04)
Young dependants (1)	-0.555 (-1.01E-04)	-0.471 (-1.03E-04)	-0.507 (-1.05E-04)	-0.474 (-1.03E-04)
Old dependants (1)	0.664 (2.02E-04)	0.645 (2.26E-04)	0.632 (2.11E-04)	0.645 (2.26E-04)
Constant	-7.373 *	-7.450 *	-7.456 *	-7.450 *

Notes: For each variable, marginal effect in brackets. The symbol * implies that variable is significant at 95% level of confidence and ** that it is significant at 90% level of confidence. (1) Marginal effect is for discrete change of dummy variable from 0 to 1.

Table 4c
AUXILIARY EQUATION (FEMALES)

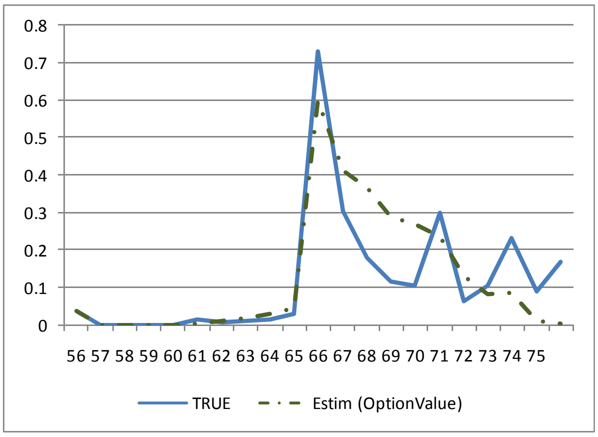
	Total Effects	Marginal Effects
Age	82.777	0.089
Age^2	-1.290	-1.01E-04
Share part-time	3.531	0.695
Days last contract	-6.15E-04	-1.21E-04
Days worked	9.85E-05	1.94E-05
High Skill (1)	1.057	0.166
Industry (1)	-0.467	-0.093
Construction (1)	-0.212	-0.044
College(1)	0.089	0.017
Secondary (1)	0.071	0.014
Constant	-2.553	

(1) Marginal effect is for discrete change of dummy variable from 0 to 1

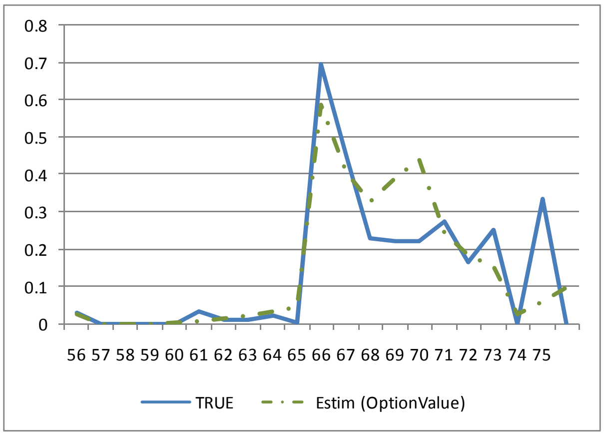
Figure 4
OBSERVED VERSUS ESTIMATED HAZARD RATES BY AGE AND GENDER

a) Quadratic age

Males

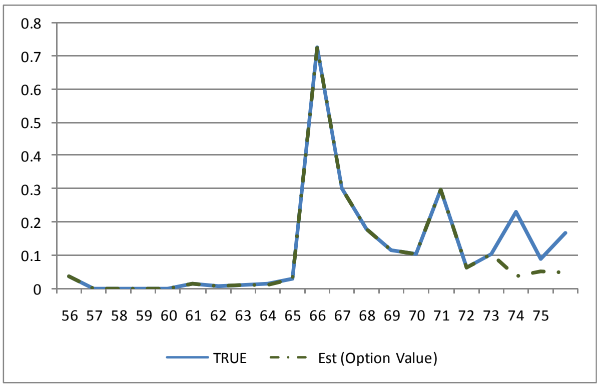


Females

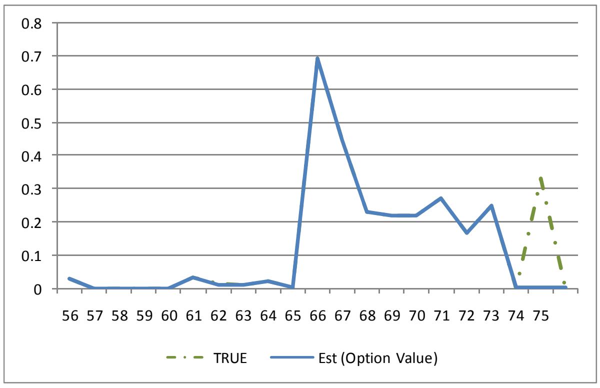


b) Age dummies

Males



Females



Source: Own elaboration.

Given that our main focus is simulating the effect of some reforms in a realistic way, we opt for the age dummies specification[24]. Tables 3b and 4b show the corresponding regression results for males and females, respectively. As said above, only in the case of the option value, the coefficient for the incentive measure has the expected negative sign, showing that the probability of retiring is lower the higher the incentive. Gruber and Wise (2004) summarize comparable results from an international project finding that, although for most countries the coefficients for incentives have the expected negative sign and are significant for the retirement decision, this does not happen in some of them. This is the case, in particular, in the results for Spain, where only the accrual –a short run incentive– turns significant and has the expected sign in the linear age specification (Boldrin *et al*., 2004)[25].

Regarding the other variables, it is interesting to note that SSW turns significant and that the estimated coefficient has a positive sign. The coefficient for *SSW* is usually interpreted as a measure of the income effect the worker is experiencing when delaying retirement for one year and hence exchanging consumption for leisure. If leisure is a normal good, we should expect a positive coefficient and this is what we obtain. Some studies obtain the opposite sign. The reason is usually that *SSW* is partially endogenous and is closely related to tastes for work, which might tend to have the opposite effect: the higher the income the lower the probability of retirement. Some studies try to palliate this problem by using instrumental variable estimates or by introducing a proxy for the taste for work as an explanatory variable. In our case, some of the variables

[24] We also tried a more stylized specification in which dummies tried to capture the retirement peaks at specific ages, but as the dummies specification was satisfactory enough, we opt for this, which allows for a better account of reforms, as we will see in the reforms section.

[25] The abovementioned results correspond to the general employees regime –which groups the majority of both contributors and pensioners–; while, for the self-employed, the option value also turns significant and negative.

included could play this role: estimated wage, college education and qualification level. Only being a qualified worker[26] is significant in the specification chosen, taking *OV* as the incentive, while it also has a positive sign. The opposite happens –a significant positive or negative sign is obtained for the estimated wage– in the case of the other three incentives and the specification using quadratic age. Interestingly, in a similar framework, Maes (2008b) obtains a positive sign for *SSW* and a negative one for lifetime wages, while Börsch-Supan *et al*. (2004) obtain a negative sign for *SSW* and a positive sign for estimated wage.

Clearly there is an identification problem that also interacts with the effect of age discussed above. As Gruber and Wise (2004) point out, when age increases the retirement desire increases, but not necessarily linearly. The introduction of wage as an explanatory variable might help to capture heterogeneous tastes for work, but the problem is, then, that both age and wage enter the incentives calculation. Hence, the introduction of all these variables worsens the identification of the effect of the incentives. In fact, as seen above, the age dummies specification gives a very realistic shape or retirement probability by age but implies that age is the main explanatory variable in the regression.

In the case of females similar results are obtained, while some differences remain[27]. First, the incentive measure is significant only at the 10% confidence level in the specification chosen and being a qualified worker is not significant. Second, the additional significant variables besides age and incentives differ. The share of part-time work has a positive and significant effect for males while for females this happens only at the 10% confidence level. The duration of the last contract has a significant effect which turns out, quite surprisingly, to be positive – the duration of the whole working life has a negative but not significant effect. Only one other variable turns significant for males: having kids at home decreases the probability of retirement as in Börsch-Supan *et al*. (2004) and Maes (2008b). For females, two variables referring to the industry sector are significant. First, being in construction has a negative effect on the probability of retirement, while there are few cases and probably performing administrative tasks. Second, the legal type of firm –being a public limited company– has a positive effect.

5.2. The scope for reform

Overall, the results shown above indicate that the incentive measures explicitly governed by legislation have a small impact on the retirement decision. This conclusion will also influence the effect of the reforms we will simulate below. The starting point of our simulation is the age dummies specification

[26] The MCVL contains information about worker educational attainment but is not reliable due to its unclear updating process. Hence, we use the contribution group as a proxy.

[27] We refer to the chosen specification –using the OV incentive– unless specified.

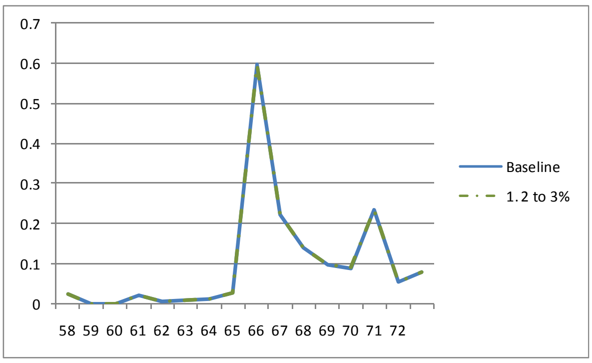
using the option value as incentive. As said above, our main focus is analyzing the scope for measures delaying retirement in Spain. Nevertheless, we relate these measures to some proposals that have been on the political agenda for a long while. These are mainly driven by two sometimes conflicting main goals, i.e. fostering sustainability and contributivity.

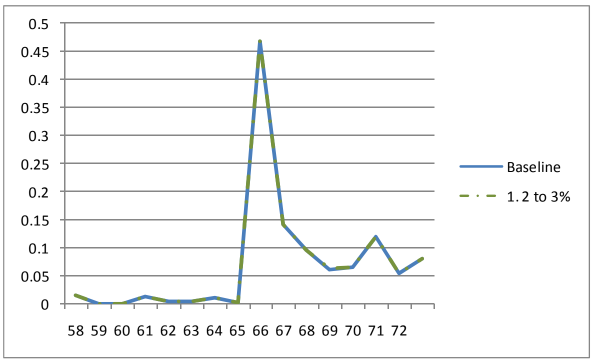
First, we deal with measures directly aiming to delay retirement age and, hence, to reach sustainability in the face of future population ageing. In a first step, we simulate the effect of the last measure introduced in this line in the Spanish Social Security system. In particular, the 35/02 Act introduced an increase of one percentage point in the incentive to delay retirement for those who had contributed 40 years – at the moment fixed at 2% for those who already reached 35 years.

The effect of this measure is plotted in Figure 5, as well as in Table 5 at the end, which summarizes the effect of all the measures on retirement age analyzed. It has a very limited impact in the expected direction, but so small that it is not observable, either in the Figure or in the average retirement age. This is not surprising as it is a marginal change and only affects a small share of pensioners – only 1.87% of 2007 male new entries had 40 or more years of contribution (0.57% for females). As seen above, a stronger version of this measure – the introduction of 2% in 2002 – does not seem to have had a big impact according to the evolution of average retirement age shown in Figure 1. In any case, there seems to be no scope for increasing this incentive further, given that 3% is near the actuarially fair value. At the moment, 100% of RB is obtained by working 35 years, which would mean 2.86% per year if the scale were fully proportional. Only a whole reformulation of the weight scale given to the working career would potentially have an impact on the retirement age, as discussed below[28].

Figure 5

EFFECT OF CHANGING THE INCENTIVE TO DELAY RETIREMENT FROM 2% TO 3% (WITH 40 OR MORE YEARS OF CONTRIBUTION) ON THE HAZARD RATES MALES FEMALES





Source: Own elaboration.

[28] See the appendix for a discussion of the shape of *p(n)*.

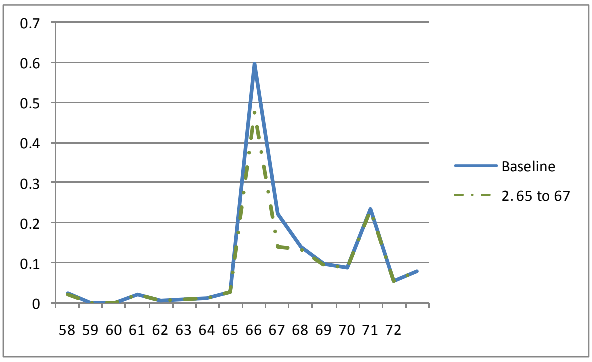
Given the small impact of marginal incentives to delay retirement, the most effective measure would be a direct change in the legal retirement age. Hence, in a second step, we simulate a measure of this kind. In particular, we directly move the legal retirement age from 65 to 67 and redefine the incentive measures consequently. The effects are shown in Figure 6. Panel a) shows only the effect of the change in the incentive, while panel b) shows the total effect – including that of switching the age dummies two years. In the first case the effect is more limited given the reduced response of retirement probability to incentives, while in the second case there is a sizeable effect as the peak at age 65 moves towards 67. Although the hazards show a high impact for females, the change in average retirement age is higher for males: 0.53 years compared to 0.40 when only the change in incentive is considered, and 1.7 compared to 1.10 when the total effect is considered.

Figure 6

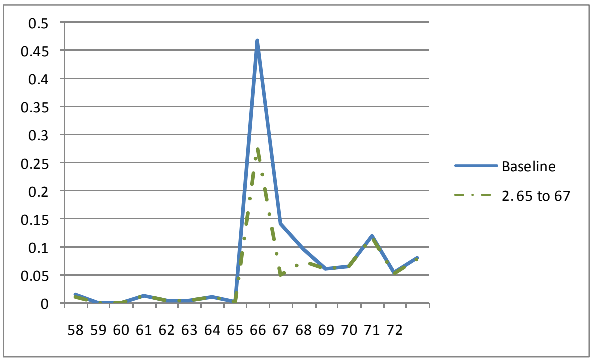
EFFECT OF DELAYING THE LEGAL RETIREMENT AGE FROM 65 TO 67

a) Effect of the change in the incentive on the hazard rates

Males

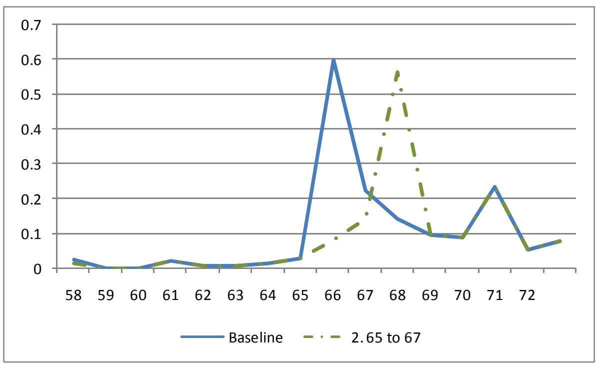


Females

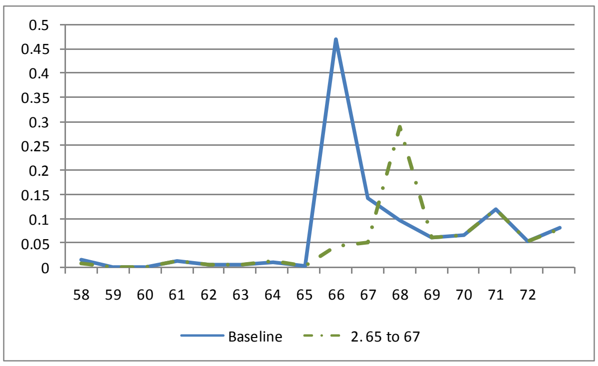


b) Total effect: change in the incentive and switch of age dummies

Males



Females

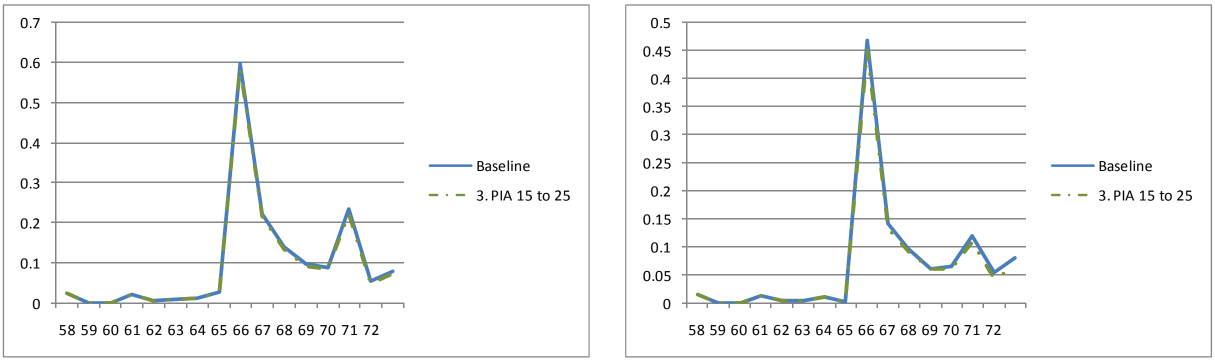


Second, measures aiming to foster the contributory nature of the system are analyzed. On the one hand, it is proposed to use the full working career to compute the RB, instead of the last 15 years as is done now. On the other hand, a linear relation between the number of years of contribution and the share of RB received as a pension has been proposed, instead of the present system which establishes a particular scale giving more weight to the first years and less to the last years and establishing, at the same time, a minimum eligibility threshold[29]. In fact it would be interesting to simulate the effect of both measures which clearly would change the age profile of SSW, hence affecting retirement age. Nevertheless, it is not yet possible to fully develop these analyses with the available waves of the MCVL. Only the former can be completely simulated, while the latter only to some extent, as the MCVL only registers contributions since 1981[30]. Hence, as an approximation we simulate the effect of going back to the last 25 years instead of the last 15 in order to compute *RB*. Figure 7 shows the results. The expected effect of this measure is a cut in pension entitlements as the *RB* is computed by using older –and lower– wages[31]. Hence, we could expect a delay in retirement age. Nevertheless the hazard rate seems to be the same in the case of males, while there is a reduction in the probability of retirement in the last years for females. On average, retirement age increases only by 0.07 years in the case of males, while for females it does not move in the expected direction –the average retirement age decreases– probably due to their shorter earnings histories.

Figure 7

EFFECT OF COMPUTING THE *RB* USING 25 INSTEAD OF 15 YEARS

Males **Females**



Source: Own elaboration

[29] See the appendix for details on past legal changes.

[30] As said above, contribution data start being collected in 1980 and the problem of missing data is quite strong at the beginning.

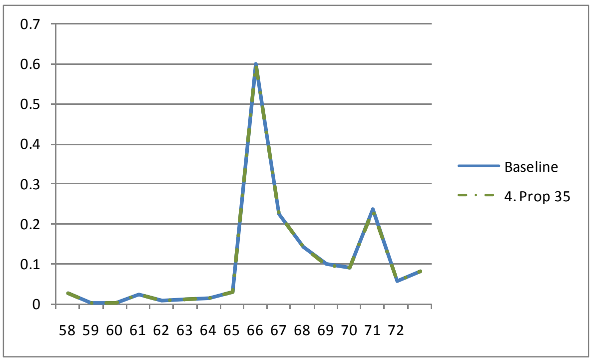
[31] Though inflation is recovered in 13 of the 15 years by inflation uprating, the rest of wage increase due to productivity growth is not.

Figure 8

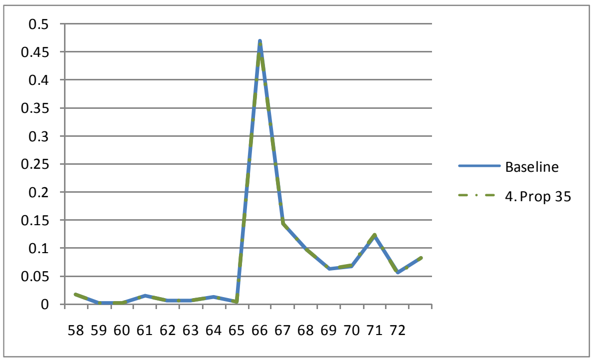
EFFECT OF MOVING TO A PROPORTIONAL RELATION BETWEEN THE SHARE OF *RB* AND THE NUMBER OF CONTRIBUTED YEARS (35 YEARS GIVES 100%)

a) 35 years gives 100%

Males

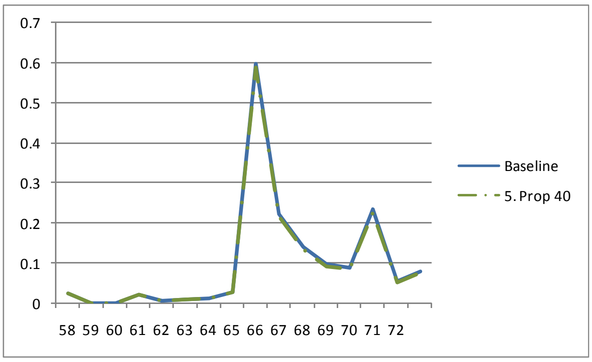


Females

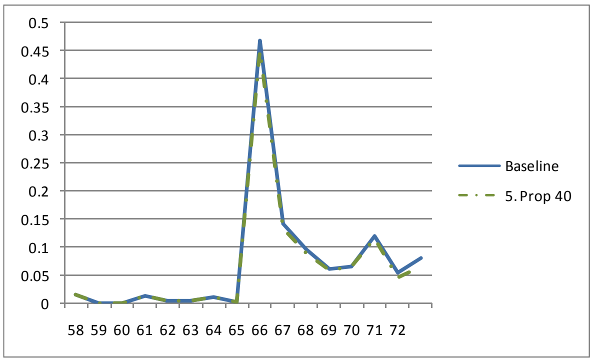


b) 40 years gives 100%

Males



Females



Source: Own elaboration.

With respect to the reform establishing a linear relation between the number of years of contribution and the share of RB received as a pension, we simulate two possibilities. In the first case, the current maximum is held so that individuals get 100% for 35 years of contribution, meaning 2.86% a year. This has a small impact as it affects a small share of pensioners. Hence we derive a second case, in which the maximum is increased to 40 years, so that each year entitles individuals with 2.50% of the RB. The results are shown in Figure 8. In the latter case, there is also a sizeable pension cut (see also Figure 9) and the shape of SSW changes. The small response to incentives implies that the retirement age only changes by 0.01 when 35 years are considered and by 0.06 years when 40 years are considered – the latter moving again in the opposite direction for females (-0.04 years).

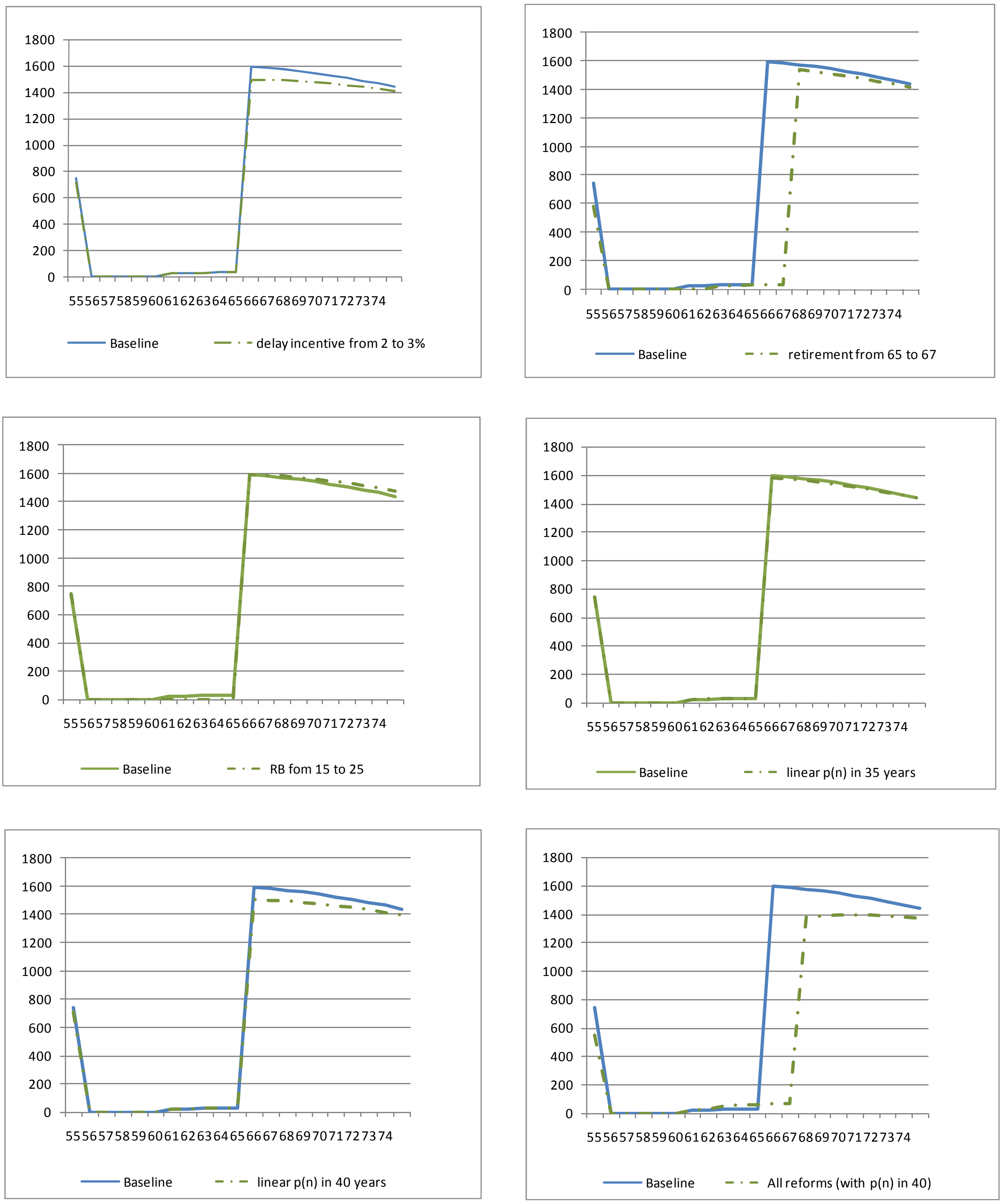
Finally, it is worth noting that measures fostering the *Bismarckian* nature of the system might have a positive impact on sustainability as they tend to decrease the level of initial pension entitlements. Regarding the measures simulated above it is clear that the effect of the former is a cut in pension benefit, while the latter is not so clear, as it could favour the workers with short working careers below the minimum eligibility threshold (see the Appendix).[32] Interestingly, as said above, the combination of both reforms could change the age profile of SSW and have an impact on retirement age, especially for the present baby boom cohorts whose entry in the labour market was substantially delayed by obtaining a degree. Nevertheless, given the small response of changes in incentives to the probability of retirement, there is only a very small change in the retirement age. In order to see the direct effect on pension rights, Figure 9 plots the average pension by age obtained in the baseline case, compared to the different reform scenarios. One can see that abovementioned Bismarckian measures have a sizable but not huge impact on pension entitlements. On the one hand, the change to a 40-year period of contribution with a linear relation to the share of *RB* received as a pension benefit has a significant effect. On the other hand, the change from 15 to 25 years used to compute *RB* has a very limited direct impact. The reason is that by going back ten years the steepest part of the wage longitudinal profile is not yet reached. Forward extensions of this measure do, however, have potentially stronger effects. Again, the direct change of the legal retirement age proves the most effective measure.

Overall, given the scarce effect of changes in incentives on the probability of retirement, the direct increase of retirement age seems to be the most secure way to delay retirement. As shown in Table 5, this would have a sizeable impact on the average retirement age, which could increase by 1.7 years in the case of males. Considering that the subsample employed in the analysis, which omits early retirement, contains 46.5% of males, the average retirement age for males could increase by 0.8 years. In the case of females it is more difficult to extrapolate, given the present change in female labour participation.

[32] Quite interestingly, the main measure also has a clear redistributive impact. High income workers tend to have steeper longitudinal wages profiles and are hence more affected by going back to past contribution history. Jimeno (2003) finds a similar effect using hypothetic working careers.

Figure 9

EFFECT OF THE DIFFERENT REFORMS ON THE (INITIAL) PENSION BENEFIT



Source: Own elaboration.

Table 5

EFFECT ON AVERAGE RETIREMENT AGE (ARA) IN POLICY SCENARIOS

	ARA		Increase in ARA due to reform	
Observed ARA	**Male**	**Female**	**Male**	**Female**
Sample	64.32	65.00		
(Number of observations)	(48,089)	(25,267)		
Subsample	66.13	65.26		
(Number of observations)	(22,357)	(5,961)		
Estimated ARA	**Male**	**Female**	**Male**	**Female**
Baseline	66.02	67.38		
1. Increase *p(n)* above 100% from 2% to 3% per year ($n \geq 40$)	66.02	67.38	0.00	0.00
2. Retirement age 65 to 67				
a) Effect of changes in incentive	66.55	67.79	0.53	0.41
b) Total affect (delaying age b) dummies)	67.71	68.48	1.70	1.10
3. Years to compute *RB* from 15 to 25	66.09	67.31	0.07	-0.07
4. Linear *p(n)* maximum 35 years	66.03	67.39	0.01	0.01
5. Linear *p(n)* maximum 40 years	66.08	67.34	0.06	-0.04

6. FINAL REMARKS

In this paper we have analyzed the scope for measures delaying retirement age in Spain using the MCVL. As a first step, after discussing all the available retirement paths, a subsample is extracted for those individuals who access retirement in 2007 and can opt for delayed retirement. The analysis focuses on the retirement decision of employed workers who can opt for ordinary retirement at age 65 or delayed retirement. Among the alternative pathways, the one that is most dependent on the worker decision –and least on the firm– is considered, i.e. the regular retirement option, which includes the possibility to delay retirement. We also control for the possibility of eligible workers choosing early retirement choice in the OS. The analysis leaves aside special retirement at age 64, partial and flexible retirement.

We estimate retirement probabilities in 2007 and their sensitivity to legal pension incentive measures. Overall, our results indicate that, despite our attempt to focus on the relevant subsample, the incentive measures explicitly governed by legislation have a limited impact on the retirement decision, this being mostly determined by age. When age is specified as single year dummy it captures most of the significance and hence there is little room for policy simulations. If age is introduced as a quadratic, some of the variables included turn out significant, but the estimated probability does not fit the age profile and the effect of incentives is not significant. Clearly, the difficulties in capturing the role of the firm in the retirement decision are also behind this lack of significance.

Based on the age dummies specification, we proceed to simulate reforms using the option value incentive measure, the only one which turns out significant with the expected sign. According to the focus of our analysis, we first simulate the impact of the last reform introduced in Spain fostering delayed retirement, finding a small impact. This is not surprising, given that it affects a small share of pensioners and is a marginal change.

We analyze other measures often discussed in order to foster the Bismarckian nature of the system. Interestingly, these measures would in most cases produce a cut in pension entitlements and/or a change in the *SSW* age profile, which could foster a delay in retirement age, improving sustainability. We simulate those most feasible, given constrains present in the data set. In particular, an extension of the number of past wages used to compute the *RB* from 15 to 25 and a linear relation between the share of *RB* received as a pension and the number of years of contribution. Those measures have an effect on retirement age, mainly due to the reduction in pension that they motivate for most pensioners. Nevertheless, it is still limited, given that in the model specified incentives have a small impact on the probability of retirement. Finally, we simulate the effect of a direct delay in the legal retirement age from 65 to 67, which produces a substantial delay of average retirement age for males of 1.7 years in the subsample chosen – implying a change of average age in the whole male sample of 0.8 years. Changes for females are a bit lower but in any case the change in female labour force participation makes it more difficult to extrapolate to the future, given the expected changing patterns in female labour force participation.

APPENDIX: CHANGES IN THE WEIGHT ATTACHED TO THE TOTAL NUMBER OF YEARS CONTRIBUTED IN THE SHARE OF *RB* OBTAINED AS A PENSION

In this appendix we focus on the first term in the r.h.s. of Equation [1] $p(n)$, i.e. the weight attached to the number of contribution years, so as to compute the share of the *RB* received as a pension. Table I.1 summarizes the different legal changes undergone by this scale. According to the present one fixed by the 24/1997 Act, $p(n)$ is decreasing after the minimum, so that the weight attached to the first years is higher –which results in a redistributive effect. The former scale gave a lower weight to the initial years. The following columns show further reforms in line with the Toledo Agreement proposal, fostering the Bismarckian nature of the system: specifically, full proportionality considering the present maximum of 35 years– that is 2.86% a year –or a maximum of 40 years– that is 2.5% a year. As shown in Table I.1, for the various scales considered, the weight attached to one particular year oscillates between 5% in the first ten years prior to the 1997 reform, to 2% during the last years of the current legislation.

Figure I.1 illustrates the potential effect of reforms on this legal parameter. On the one hand, the function $p(n)$ is plotted for each of the legal scales considered. It is worth noting, first, that individuals who do not meet the minimum eligibility requirement would clearly benefit from a proportional rule. Second, it is clear that for those crediting between 15 and 35 years, both the previous and the present rules (26/1985 and 24/1997 Acts, respectively) are more generous than the two proportional rules.

On the other hand, the cumulative distribution of new registration with respect to the number of contribution years, in the 2004 MCVL wave, is also shown. This highlights the share of individuals affected by each legal scale and hence its specific effect. First, note that most individuals –72%– credit up to 35 contribution years and, as such, are affected neither by the legal changes already enacted nor by moving to a system of full proportionality with a maximum of 35 years. Second, we can see that the legal change introduced in 1997 only affected 6% of new pensions. Finally, it is interesting to note that an eventual change to full proportionality would affect almost 50% of individuals, which accounts for the highest effect obtained for this simulated legal change.

Table I.1

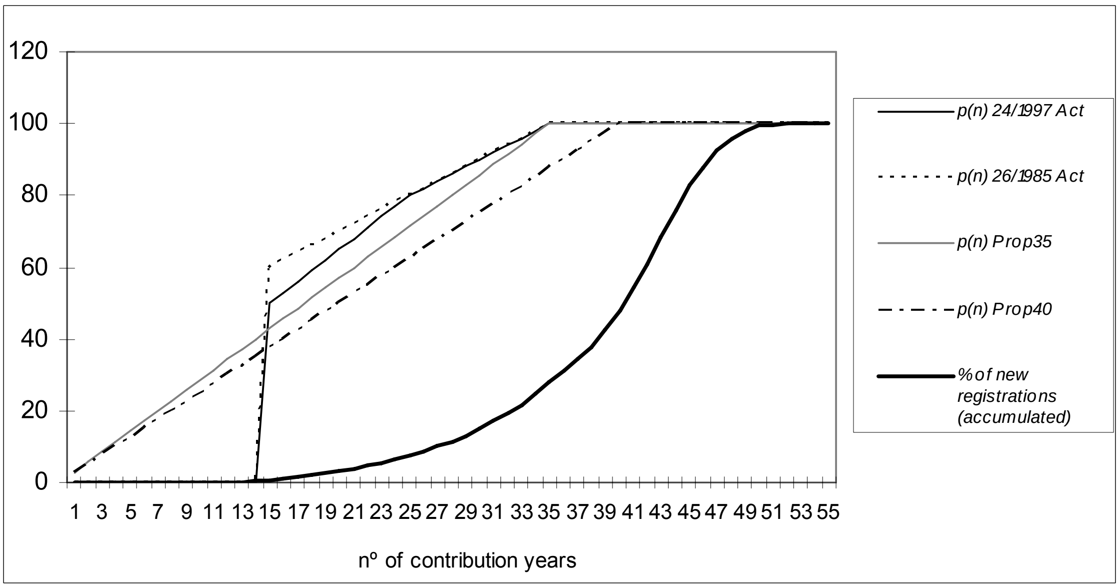
WEIGHT ATTACHED TO CONTRIBUTION YEARS IN THE SHARE OF *RB* (several legal scenarios)

	Prior to 1985	26/1985 Act	24/1997 Act	Total Proportionality
Minimum eligibility condition	10 years	15 years	15 years	–
Contribution years	Total p(n) (per year)			
10	50% (5.0%)	–	–	–
15	(2.0%)	60% (*) (5.0%) (2.0%)	50% (3.3%)	In 35 years (2.86%)
16-25		(2.0%)	(3.0%	In 40 years (2.50%)
26-35			(2.0%)	

(*) 60%: according to the same previous scale, 50% from the first 10 years (5% a year) plus 10% from the next 5 years (2% a year).

Figure I.1

AVERAGE EFFECT ON PENSIONS FROM FIXING DIFFERENT FUNCTIONS OF *P(N)*



Source: Authors' calculations using MCVL data and legal parameters.

REFERENCES

ARGIMÓN, I; GONZÁLEZ, C.I. and VEGAS, R. (2007): Jubilación entre los 60 y 65 años. Algunas características. *Presupuesto y gasto público*, n.º 47, pp. 161-184.

BENAVIDES, A. (2006): *Análisis Práctico de las Prestaciones de la Seguridad Social*. Lex Nova, Valladolid.

BOLDRIN, M.S. JIMENEZ, and PERACCHI, F. (2004):"Micro-modeling of Retirement Behaviour in Spain", In *Social Security and Retirement around the World* (Jonathan Gruber & David Wise, eds.). NBER, University of Chicago Press, 2004, pp. 499-567.

BÖRSCH-SUPAN, A.; SCHNABEL, R.; KOHNZ, S. and G. MASTROBUONI, G. (2004): "Micro-Modeling of Retirement Decisions in Germany". In *Social Security and Retirement around the World* (Jonathan Gruber & David Wise, eds.). NBER, University of Chicago Press, 2004, pp. 499-567.

EKLOF, M.-HALLBERG, D. (2006): "Estimating retirement behaviour with special early retirement offers", Department of Economics Discussion Paper, Uppsala University.

EUROPEAN POLICY COMMITTEE (2009): 2009 Ageing Report, Economic and Budgetary Projections for the EU-27 Member States (2008-2060). European Economy 2/2009.

GARCÍA-PÉREZ, J.I.; JIMÉNEZ-MARTÍN, S. and SÁNCHEZ-MARTÍN, A.R. (2009): "Transitions between employment, unemployment and retirement: the effect of financial incentives and business cycle fluctuations", Paper presented at the 2009 ESPE meeting in Seville, Spain.

GRUBER and WISE (2004): "Introduction and Summary", In *Social Security and Retirement around the World* (Jonathan Gruber & David Wise, eds.). NBER, University of Chicago Press, 2004, pp. 499-567.

HERCE, J.A. y ALONSO, J. (1998): *Los Efectos Económicos de la Ley de Consolidación de la Seguridad Social: Perspectivas Financieras del Sistema de Pensiones tras su Entrada en Vigor*. *Documento de Trabajo de FEDEA* 98-16.

JIMENEZ, S. (2006): "Evaluating the Labor Supply effects of Alternative Reforms of the Spanish Pension System", *Moneda y Credito*, 222, pp. 271-307.

JIMENO, J.F. (2003): "La Equidad Intrageneracional de los Sistemas de Pensiones". *Revista de Economía Aplicada*, n.º 31, pp. 5-32.

MAES, M. (2008a): "Survey of empirical research on retirement behaviour and retirement incentives", Working Paper 2008-18, Department of Economics, University of Brussels.

MAES, M. (2008b):" Redistributive impact of reforming the old-age pension system in Belgium", Working Paper 2008-19, Department of Economics, University of Brussels.

MINCER, J. (1974): *Schooling, Experience and Earnings*. New York, Columbia University Press.

MONASTERIO, C.; SÁNCHEZ, I. y BLANCO, F. (1996): *Equidad y Estabilidad del Sistema Español de Pensiones.* Serie Economía Pública, Fundación BBV.

MTAS (2003): *La Renovación del Pacto de Toledo*. MTAS, Madrid.

– (2006a): *Acuerdo sobre Medidas en Materia de Seguridad Social*. MTAS, Madrid.

– (2006b): *La Muestra Continua de Vidas Laborales*, Colección Informes y Estudios, Seguridad Social, Ministerio de trabajo y asuntos sociales (MTAS), Madrid.

SÍNTESIS

PRINCIPALES IMPLICACIONES DE POLÍTICA ECONÓMICA

En este artículo se analiza el margen que queda para establecer medidas destinadas a incentivar el retraso de la edad de jubilación en España. Para ello se realiza un experimento de micro simulación a partir de la Muestra continua de vidas laborales (MCVL) del Ministerio de Trabajo e Inmigración. En concreto, en primer lugar se parte del análisis de la distribución de las altas de pensión en los últimos años con el fin de acotar la muestra de los individuos relevantes –aquellos que pueden optar a la jubilación retrasada. Con ello se eliminan alrededor de un 30% de las altas de jubilación que acceden a la misma pasando por el desempleo.

En segundo lugar se estima la probabilidad de jubilarse en 2007, en función de características socioeconómicas y de variables que recogen los incentivos a retrasar la edad de jubilación. Éstas últimas resultan tener poco impacto. En tercer lugar, partiendo de la estimación anterior se simula el efecto de la última medida dirigida a aumentar la edad de jubilación: El aumento de la proporción de la base reguladora a recibir como pensión del 2% a 3% por año cotizado más allá de los 65. Como era de esperar, dado que se trata de una reforma marginal, se obtiene un resultado muy limitado sobre la edad media de jubilación.

Asimismo, se simula el efecto de las medidas dirigidas a reforzar al contributividad del sistema –la consideración de toda la carrera laboral en el cálculo de la base reguladora y del porcentaje de la misma a recibir como pensión–, con el fin de analizar su posible impacto sobre la edad de jubilación. Sin embargo, a pesar del considerable recorte en la pensión que suponen, el impacto sobre la edad de jubilación es, de nuevo, limitado.

El trabajo concluye que, dada la actual estructura de la fórmula de cálculo de la pensión, no queda margen para una extensión de los incentivos, sino que sólo una completa reformulación de la fórmula de cálculo de la pensión, o un retraso directo de la edad de referencia para la jubilación más allá de los 65 años, puede tener un efecto sustancial en la edad media de jubilación. El efecto de ésta última se estima en un retraso de la edad media de jubilación de 1,7 años para los hombres de la muestra, lo cual equivale a un retraso de 0,8 años para el total de los hombres en edad de jubilación en 2007.

Con todo, es necesario realizar más investigación para analizar hasta qué punto los resultados se deben a la especificación empleada y/o al hecho de que se mide el impacto ex ante en lugar del impacto ex post.

NORMAS DE PUBLICACIÓN DE PAPELES DE TRABAJO DEL **INSTITUTO DE ESTUDIOS FISCALES**

Esta colección de *Papeles de Trabajo* tiene como objetivo ofrecer un vehículo de expresión a todas aquellas personas interasadas en los temas de Economía Pública. Las normas para la presentación y selección de originales son las siguientes:

1. Todos los originales que se presenten estarán sometidos a evaluación y podrán ser directamente aceptados para su publicación, aceptados sujetos a revisión, o rechazados.

2. Los trabajos deberán enviarse por duplicado a la Subdirección de Estudios Tributarios. Instituto de Estudios Fiscales. Avda. Cardenal Herrera Oria, 378. 28035 Madrid.

3. La extensión máxima de texto escrito, incluidos apéndices y referencias bibliográfícas será de 7000 palabras.

4. Los originales deberán presentarse mecanografiados a doble espacio. En la primera página deberá aparecer el título del trabajo, el nombre del autor(es) y la institución a la que pertenece, así como su dirección postal y electrónica. Además, en la primera página aparecerá también un abstract de no más de 125 palabras, los códigos JEL y las palabras clave.

5. Los epígrafes irán numerados secuencialmente siguiendo la numeración arábiga. Las notas al texto irán numeradas correlativamente y aparecerán al pie de la correspondiente página. Las fórmulas matemáticas se numerarán secuencialmente ajustadas al margen derecho de las mismas. La bibliografía aparecerá al final del trabajo, bajo la inscripción "Referencias" por orden alfabético de autores y, en cada una, ajustándose al siguiente orden: autor(es), año de publicación (distinguiendo a, b, c si hay varias correspondientes al mismo autor(es) y año), título del artículo o libro, título de la revista en cursiva, número de la revista y páginas.

6. En caso de que aparezcan tablas y gráficos, éstos podrán incorporarse directamente al texto o, alternativamente, presentarse todos juntos y debidamente numerados al final del trabajo, antes de la bibliografía.

7. En cualquier caso, se deberá adjuntar un disquete con el trabajo en formato word. Siempre que el documento presente tablas y/o gráficos, éstos deberán aparecer en ficheros independientes. Asimismo, en caso de que los gráficos procedan de tablas creadas en excel, estas deberán incorporarse en el disquete debidamente identificadas.

Junto al original del Papel de Trabajo se entregará también un resumen de un máximo de dos folios que contenga las principales implicaciones de política económica que se deriven de la investigación realizada.

PUBLISHING GUIDELINES OF WORKING PAPERS AT THE **INSTITUTE FOR FISCAL STUDIES**

This serie of *Papeles de Trabajo* (working papers) aims to provide those having an interest in Public Economics with a vehicle to publicize their ideas. The rules governing submission and selection of papers are the following:

1. The manuscripts submitted will all be assessed and may be directly accepted for publication, accepted with subjections for revision or rejected.

2. The papers shall be sent in duplicate to Subdirección General de Estudios Tributarios (The Deputy Direction of Tax Studies), Instituto de Estudios Fiscales (Institute for Fiscal Studies), Avenida del Cardenal Herrera Oria, nº 378, Madrid 28035.

3. The maximum length of the text including appendices and bibliography will be no more than 7000 words.

4. The originals should be double spaced. The first page of the manuscript should contain the following information: (1) the title; (2) the name and the institutional affiliation of the author(s); (3) an abstract of no more than 125 words; (4) JEL codes and keywords; (5) the postal and e-mail address of the corresponding author.

5. Sections will be numbered in sequence with arabic numerals. Footnotes will be numbered correlatively and will appear at the foot of the corresponding page. Mathematical formulae will be numbered on the right margin of the page in sequence. Bibliographical references will appear at the end of the paper under the heading "References" in alphabetical order of authors. Each reference will have to include in this order the following terms of references: author(s), publishing date (with an a, b or c in case there are several references to the same author(s) and year), title of the article or book, name of the journal in italics, number of the issue and pages.

6. If tables and graphs are necessary, they may be included directly in the text or alternatively presented altogether and duly numbered at the end of the paper, before the bibliography.

7. In any case, a floppy disk will be enclosed in Word format. Whenever the document provides tables and/or graphs, they must be contained in separate files. Furthermore, if graphs are drawn from tables within the Excell package, these must be included in the floppy disk and duly identified.

Together with the original copy of the working paper a brief two-page summary highlighting the main policy implications derived from the research is also requested.

ÚLTIMOS PAPELES DE TRABAJO EDITADOS POR EL INSTITUTO DE ESTUDIOS FISCALES

2004

1/04 Una propuesta para la regulación de precios en el sector del agua: el caso español.
Autores: M.ª Ángeles García Valiñas y Manuel Antonio Muñiz Pérez.

2/04 Eficiencia en educación secundaria e *inputs* no controlables: sensibilidad de los resultados ante modelos alternativos.
Autores: José Manuel Cordero Ferrera, Francisco Pedraja Chaparro y Javier Salinas Jiménez.

3/04 Los efectos de la política fiscal sobre el ahorro privado: evidencia para la OCDE.
Autores: Montserrat Ferre Carracedo, Agustín García García y Julián Ramajo Hernández.

4/04 ¿Qué ha sucedido con la estabilidad del empleo en España? Un análisis desagregado con datos de la EPA: 1987-2003.
Autores: José María Arranz y Carlos García-Serrano.

5/04 La seguridad del empleo en España: evidencia con datos de la EPA (1987-2003).
Autores: José María Arranz y Carlos García-Serrano.

6/04 La ley de Wagner: un análisis sintético.
Autor: Manuel Jaén García.

7/04 La vivienda y la reforma fiscal de 1998: un ejercicio de simulación.
Autor: Miguel Ángel López García.

8/04 Modelo dual de IRPF y equidad: un nuevo enfoque teórico y su aplicación al caso español.
Autor: Fidel Picos Sánchez.

9/04 Public expenditure dynamics in Spain: a simplified model of its determinants.
Autores: Manuel Jaén García y Luis Palma Martos.

10/04 Simulación sobre los hogares españoles de la reforma del IRPF de 2003. Efectos sobre la oferta laboral, recaudación, distribución y bienestar.
Autores: Juan Manuel Castañer Carrasco, Desiderio Romero Jordán y José Félix Sanz Sanz.

11/04 Financiación de las Haciendas regionales españolas y experiencia comparada.
Autor: David Cantarero Prieto.

12/04 Multidimensional indices of housing deprivation with application to Spain.
Autores: Luis Ayala y Carolina Navarro.

13/04 Multiple ocurrence of welfare recipiency: determinants and policy implications.
Autores: Luis Ayala y Magdalena Rodríguez.

14/04 Imposición efectiva sobre las rentas laborales en la reforma del impuesto sobre la renta personal (IRPF) de 2003 en España.
Autoras: María Pazos Morán y Teresa Pérez Barrasa.

15/04 Factores determinantes de la distribución personal de la renta: un estudio empírico a partir del PHOGUE.
Autores: Marta Pascual y José María Sarabia.

16/04 Política familiar, imposición efectiva e incentivos al trabajo en la reforma de la imposición sobre la renta personal (IRPF) de 2003 en España.
Autoras: María Pazos Morán y Teresa Pérez Barrasa.

17/04 Efectos del déficit público: evidencia empírica mediante un modelo de panel dinámico para los países de la Unión Europea.
Autor: César Pérez López.

18/04 Inequality, poverty and mobility: Choosing income or consumption as welfare indicators.
Autores: Carlos Gradín, Olga Cantó y Coral del Río.

19/04 Tendencias internacionales en la financiación del gasto sanitario.
Autora: Rosa María Urbanos Garrido.

20/04 El ejercicio de la capacidad normativa de las CCAA en los tributos cedidos: una primera evaluación a través de los tipos impositivos efectivos en el IRPF.
Autores: José María Durán y Alejandro Esteller.

21/04 Explaining. budgetary indiscipline: evidence from spanish municipalities.
Autores: Ignacio Lago-Peñas y Santiago Lago-Peñas.

22/04 Local governmets' asymmetric reactions to grants: looking for the reasons.
Autor: Santiago Lago-Peñas.

23/04 Un pacto de estabilidad para el control del endeudamiento autonómico.
Autor: Roberto Fernández Llera

24/04 Una medida de la calidad del producto de la atención primaria aplicable a los análisis DEA de eficiencia.
Autora: Mariola Pinillos García.

25/04 Distribución de la renta, crecimiento y política fiscal.
Autor: Miguel Ángel Galindo Martín.

26/04 Políticas de inspección óptimas y cumplimiento fiscal.
Autores: Inés Macho Stadler y David Pérez Castrillo.

27/04 ¿Por qué ahorra la gente en planes de pensiones individuales?
Autores: Félix Domínguez Barrero y Julio López-Laborda.

28/04 La reforma del Impuesto sobre Actividades Económicas: una valoración con microdatos de la ciudad de Zaragoza.
Autores: Julio López-Laborda, M.ª Carmen Trueba Cortés y Anabel Zárate Marco.

29/04 Is an inequality-neutral flat tax reform really neutral?
Autores: Juan Prieto-Rodríguez, Juan Gabriel Rodríguez y Rafael Salas.

30/04 El equilibrio presupuestario: las restricciones sobre el déficit.
Autora: Belén Fernández Castro.

2005

1/05 Efectividad de la política de cooperación en innovación: evidencia empírica española.
Autores:Joost Heijs, Liliana Herrera, Mikel Buesa, Javier Sáiz Briones y Patricia Valadez.

2/05 A probabilistic nonparametric estimator.
Autores: Juan Gabriel Rodríguez y Rafael Salas.

3/05 Efectos redistributivos del sistema de pensiones de la seguridad social y factores determinantes de la elección de la edad de jubilación. Un análisis por comunidades autónomas.
Autores: Alfonso Utrilla de la Hoz y Yolanda Ubago Martínez.

4/05 La relación entre los niveles de precios y los niveles de renta y productividad en los países de la zona euro: implicaciones de la convergencia real sobre los diferenciales de inflación.
Autora: Ana R. Martínez Cañete.

5/05 La Reforma de la Regulación en el contexto autonómico.
Autor: Jaime Vallés Giménez.

6/05 Desigualdad y bienestar en la distribución intraterritorial de la renta, 1973-2000.
Autores: Luis Ayala Cañón, Antonio Jurado Málaga y Francisco Pedraja Chaparro.

7/05 Precios inmobiliarios, renta y tipos de interés en España.
Autor: Miguel Ángel López García.

8/05 Un análisis con microdatos de la normativa de control del endeudamiento local.
Autores: Jaime Vallés Giménez, Pedro Pascual Arzoz y Fermín Cabasés Hita.

9/05 Macroeconomics effects of an indirect taxation reform under imperfect competition.
Autor: Ramón J. Torregrosa.

10/05 Análisis de incidencia del gasto público en educación superior: nuevas aproximaciones.
Autora: María Gil Izquierdo.

11/05 Feminización de la pobreza: un análisis dinámico.
Autora: María Martínez Izquierdo.

12/05 Efectos del impuesto sobre las ventas minoristas de determinados hidrocarburos en la economía extremeña: un análisis mediante modelos de equilibrio general aplicado.
Autores: Francisco Javier de Miguel Vélez, Manuel Alejandro Cardenete Flores y Jesús Pérez Mayo.

13/05 La tarifa lineal de Pareto en el contexto de la reforma del IRPF.
Autores: Luis José Imedio Olmedo, Encarnación Macarena Parrado Gallardo y María Dolores Sarrión Gavilán.

14/05 Modelling tax decentralisation and regional growth.
Autores: Ramiro Gil-Serrate y Julio López-Laborda.

15/05 Interactions inequality-polarization: characterization results.
Autores: Juan Prieto-Rodríguez, Juan Gabriel Rodríguez y Rafael Salas.

16/05 Políticas de competencia impositiva y crecimiento: el caso irlandés.
Autores: Santiago Díaz de Sarralde, Carlos Garcimartín y Luis Rivas.

17/05 Optimal provision of public *input*s in a second-best scenario.
Autores: Diego Martínez López y A. Jesús Sánchez Fuentes.

18/05 Nuevas estimaciones del pleno empleo de las regiones españolas.
Autores: Javier Capó Parrilla y Francisco Gómez García.

19/05 US deficit sustainability revisited: a multiple structural change approach.
Autores: Óscar Bajo-Rubio. Carmen Díaz-Roldán y Vicente Esteve.

20/05 Aproximación a los pesos de calidad de vida de los "Años de Vida Ajustados por Calidad" mediante el estado de salud autopercibido.
Autores: Anna García-Altés, Jaime Pinilla y Salvador Peiró.

21/05 Redistribución y progresividad en el Impuesto sobre Sucesiones y Donaciones: una aplicación al caso de Aragón.
Autor: Miguel Ángel Barberán Lahuerta.

22/05 Estimación de los rendimientos y la depreciación del capital humano para las regiones del sur de España.
Autora: Inés P. Murillo.

23/05 El doble dividendo de la imposición ambiental. Una puesta al día.
Autor: Miguel Enrique Rodríguez Méndez.

24/05 Testing for long-run purchasing power parity in the post bretton woods era: evidence from old and new tests.
Autor: Julián Ramajo Hernández y Montserrat Ferré Cariacedo.

25/05 Análisis de los factores determinantes de las desigualdades internacionales en las emisiones de CO_2 *per cápita* aplicando el enfoque distributivo: una metodología de descomposición por factores de Kaya.
Autores: Juan Antonio Duro Moreno y Emilio Padilla Rosa.

26/05 Planificación fiscal con el impuesto dual sobre la renta.
Autores: Félix Domínguez Barrero y Julio López Laborda.

27/05 El coste recaudatorio de las reducciones por aportaciones a planes de pensiones y las deducciones por inversión en vivienda en el IRPF 2002.
Autores: Carmen Marcos García, Alfredo Moreno Sáez, Teresa Pérez Barrasa y César Pérez López.

28/05 La muestra de declarantes IEF-AEAT 2002 y la simulación de reformas fiscales: descripción y aplicación práctica.
Autores: Alfredo Moreno, Fidel Picos, Santiago Díaz de Sarralde, María Antiqueira y Lucía Torrejón.

2006

1/06 Capital gains taxation and progressivity.
Autor: Julio López Laborda.

2/06 Pigou's dividend *versus* Ramsey's dividend in the double dividend literature.
Autores: Eduardo L. Giménez y Miguel Rodríguez.

3/06 Assessing tax reforms. Critical comments and proposal: the level and distance effects.
Autores: Santiago Díaz de Sarralde Míguez y Jesús Ruiz-Huerta Carbonell.

4/06 Incidencia y tipos efectivos del impuesto sobre el patrimonio e impuesto sobre sucesiones y donaciones.
Autora: Laura de Pablos Escobar.

5/06 Descentralización fiscal y crecimiento económico en las regiones españolas.
Autores: Patricio Pérez González y David Cantarero Prieto.

6/06 Efectos de la corrupción sobre la productividad: un estudio empírico para los países de la OCDE.
Autores: Javier Salinas Jiménez y M.ª del Mar Salinas Jiménez.

7/06 Simulación de las implicaciones del equilibrio presupuestario sobre la política de inversión de las comunidades autónomas.
Autores: Jaime Vallés Giménez y Anabel Zárate Marco.

8/06 The composition of public spending and the nationalization of party sistems in western Europe.
Autores: Ignacio Lago-Peñas y Santiago Lago.Peñas.

9/06 Factores explicativos de la actividad reguladora de las Comunidades Autónomas (1989-2001).
Autores: Julio López Laborda y Jaime Vallés Giménez.

10/06 Disciplina credititicia de las Comunidades Autónomas.
Autor: Roberto Fernández Llera.

11/06 Are the tax mix and the fiscal pressure converging in the European Union?.
Autor: Francisco J. Delgado Rivero.

12/06 Redistribución, inequidad vertical y horizontal en el impuesto sobre la renta de las personas físicas (1982-1998).
Autora: Irene Perrote.

13/06 Análisis económico del rendimiento en la prueba de conocimientos y destrezas imprescindibles de la Comunidad de Madrid.
Autores: David Trillo del Pozo, Marta Pérez Garrido y José Marcos Crespo.

14/06 Análisis de los procesos privatizadores de empresas públicas en el ámbito internacional. Motivaciones: moda política *versus* necesidad económica.
Autores: Almudena Guarnido Rueda, Manuel Jaén García e Ignacio Amate Fortes.

15/06 Privatización y liberalización del sector telefónico español.
Autores: Almudena Guarnido Rueda, Manuel Jaén García e Ignacio Amate Fortes.

16/06 Un análisis taxonómico de las políticas para PYME en Europa: objetivos, instrumentos y empresas beneficiarias.
Autor: Antonio Fonfría Mesa.

17/06 Modelo de red de cooperación en los parques tecnológicos: un estudio comparado.
Autora: Beatriz González Vázquez.

18/06 Explorando la demanda de carburantes de los hogares españoles: un análisis de sensibilidad.
Autores: Santiago Álvarez García, Marta Jorge García-Inés y Desiderio Romero Jordán.

19/06 Cross-country income mobility comparisons under panel attrition: the relevance of weighting schemes.
Autores: Luis Ayala, Carolina Navarro y Mercedes Sastre.

20/06 Financiación Autonómica: algunos escenarios de reforma de los espacios fiscales.
Autores: Ana Herrero Alcalde, Santiago Díaz de Sarralde, Javier Loscos Fernández, María Antiqueira y José Manuel Tránchez.

21/06 Child nutrition and multiple equilibria in the human capital transition function.
Autores: Berta Rivera, Luis Currais y Paolo Rungo.

22/06 Actitudes de los españoles hacia la hacienda pública.
Autor: José Luis Sáez Lozano.

23/06 Progresividad y redistribución a través del IRPF español: un análisis de bienestar social para el periodo 1982-1998.
Autores: Jorge Onrubia Fernández, María del Carmen Rodado Ruiz, Santiago Díaz de Sarralde y César Pérez López.

24/06 Análisis descriptivo del gasto sanitario español: evolución, desglose, comparativa internacional y relación con la renta.
Autor: Manuel García Goñi.

25/06 El tratamiento de las fuentes de renta en el IRPF y su influencia en la desigualdad y la redistribución.
Autores: Luis Ayala Cañón, Jorge Onrubia Fernández y María del Carmen Rodado Ruiz.

26/06 La reforma del IRPF de 2007: una evaluación de sus efectos.
Autores: Santiago Díaz de Sarralde Míguez, Fidel Picos Sánchez, Alfredo Moreno Sáez, Lucía Torrejón Sanz y María Antiqueira Pérez.

27/06 Proyección del cuadro macroeconómico y de las cuentas de los sectores institucionales mediante un modelo de equilibrio.
Autores: Ana María Abad, Ángel Cuevas y Enrique M. Quilis.

28/06 Análisis de la propuesta del tesoro Británico “Fiscal Stabilisation and EMU” y de sus implicaciones para la política económica en la Unión Europea.
Autor: Juan E. Castañeda Fernández.

29/06 Choosing to be different (or not): personal income taxes at the subnational level in Canada and Spain.
Autores: Violeta Ruiz Almendral y François Vaillancourt.

30/06 A projection model of the contributory pension expenditure of the Spanish social security system: 2004-2050.
Autores: Joan Gil, Miguel Ángel Lopez-García, Jorge Onrubia, Concepció Patxot y Guadalupe Souto.

2007

1/07 Efectos macroeconómicos de las políticas fiscales en la UE.
Autores: Oriol Roca Sagalés y Alfredo M. Pereira.

2/07 Deficit sustainability and inflation in EMU: an analysis from the fiscal theory of the price level.
Autores: Óscar Bajo-Rubio, Carmen Díaz-Roldán y Vicente Esteve.

3/07 Contraste empírico del modelo monetario de tipos de cambio: cointegración y ajuste no lineal.
Autor: Julián Ramajo Hernández.

4/07 An empirical analysis of capital taxation: equity *vs*. tax compiance.
Autores: José M.ª Durán Cabré y Alejandro Esteller Moré.

5/07 Education and health in the OECD: a macroeconomic approach.
Autoras: Cecilia Albert y María A. Davia.

6/07 Understanding the effect of education on health across European countries.
Autoras: Cecilia Albert y María A. Davia.

7/07 Polarization, fractionalization and conflict.
Autores: Joan Esteban y Debraj Ray.

8/07 Immigration in a segmented labor market: the effects on welfare.
Autor: Javier Vázquez Grenno.

9/07 On the role of public debt in an OLG Model with endogenous labor supply.
Autor: Miguel Ángel López García.

10/07 Assessing profitability in rice cultivation using the Policy Matrix Analysis and profit-efficient data.
Autores: Andrés J. Picazo-Tadeo, Ernest Reig y Vicent Estruch.

11/07 Equidad y redistribución en el Impuesto sobre Sucesiones y Donaciones: análisis de los efectos de las reformas autonómicas.
Autores: Miguel Ángel Barberán Lahuerta y Marta Melguizo Garde.

12/07 Valoración y determinantes del *stock* de capital salud en la Comunidad Canaria y Cataluña.
Autores: Juan Oliva y Néboa Zozaya.

13/07 La nivelación en el marco de la financiación de las Comunidades Autónomas.
Autores: Ana Herrero Alcalde y Jorge Martínez-Vázquez.

14/07 El gasto en defensa en los países desarrollados: evolución y factores explicativos.
Autor: Antonio Fonfría Mesa.

15/07 Los costes del servicio de abastecimiento de agua. Un análisis necesario para la regulación de precios.
Autores: Ramón Barberán Ortí, Alicia Costa Toda y Alfonso Alegre Val.

16/07 Precios, impuestos y compras transfronterizas de carburantes.
Autores: Andrés Leal Marcos, Julio López Laborda y Fernando Rodrigo Sauco.

17/07 Análisis de la distribución de las emisiones de CO_2 a nivel internacional mediante la adaptación del concepto y las medidas de polarización.
Autores: Juan Antonio Duro Moreno y Emilio Padilla Rosa.

18/07 Foreign direct investment and regional growth: an analysis of the Spanish case.
Autores: Óscar Bajo Rubio, Carmen Díaz Mora y Carmen Díaz Roldán.

19/07 Convergence of fiscal pressure in the EU: a time series approach.
Autores: Francisco J. Delgado y María José Presno.

20/07 Impuestos y protección medioambiental: preferencias y factores.
Autores: María de los Ángeles García Valiñas y Benno Torgler.

21/07 Modelización paramétrica de la distribución personal de la renta en España. Una aproximación a partir de la distribución Beta generalizada de segunda especie.
Autores: Mercedes Prieto Alaiz y Carmelo García Pérez.

22/07 Desigualdad y delincuencia: una aplicación para España.
Autores:Rafael Muñoz de Bustillo, Fernando Martín Mayoral y Pablo de Pedraza.

23/07 Crecimiento económico, productividad y actividad normativa: el caso de las Comunidades Autónomas.
Autor: Jaime Vallés Giménez.

24/07 Descentralización fiscal y tributación ambiental. El caso del agua en España.
Autores: Anabel Zárate Marco, Jaime Vallés Giménez y Carmen Trueba Cortés.

25/07 Tributación ambiental en un contexto federal. Una aplicación empírica para los residuos industriales en España.
Autores: Anabel Zárate Marco, Jaime Vallés Giménez y Carmen Trueba Cortés.

26/07 Permisos de maternidad, paternidad y parentales en Europa: algunos elementos para el análisis de la situación actual.
Autoras: Carmen Castro García y María Pazos Morán.

27/07 ¿Quién soporta las cotizaciones sociales empresariales?. Una panorámica de la literatura empírica.
Autor: Ángel Melguizo Esteso.

28/07 Una propuesta de financiación municipal.
Autores: Manuel Esteban Cabrera y José Sánchez Maldonado.

29/07 Do R&D programs of different government levels overlap in the European Union.
Autoras: Isabel Busom y Andrea Fernández-Ribas.

30/07 Proyecciones de tablas de mortalidad dinámicas de España y sus Comunidades Autónomas.
Autores: Javier Alonso Meseguer y Simón Sosvilla Rivero.

2008

1/08 Estudio descriptivo del voto económico en España.
Autores: José Luis Sáez Lozano y Antonio M. Jaime Castillo.

2/08 The determinants of tax morale in comparative perspective: evidence from a multilevel analysis.
Autores: Ignacio Lago-Peñas y Santiago Lago-Peñas.

3/08 Fiscal decentralization and the quality of government: evidence from panel data.
Autores: Andreas P. Kyriacou y Oriol Roca-Sagalés.

4/08 The effects of multinationals on host economies: A CGE approach.
Autores: María C. Latorre, Oscar Bajo-Rubio y Antonio G. Gómez-Plana.

5/08 Measuring the effect of spell recurrence on poverty dynamics.
Autores: José María Arranz y Olga Cantó.

6/08 Aspectos distributivos de las diferencias salariales por razón de género en España: un análisis por subgrupos poblacionales.
Autores: Carlos Gradín y Coral del Río.

7/08 Evaluating the regulator: winners and losers in the regulation of Spanish electricity distribution (1988-2002).
Autores: Leticia Blázquez Gómez y Emili Grifell-Tatjé.

8/08 Interacción de la política monetaria y la política fiscal en la UEM: tipos de interés a corto plazo y déficit público.
Autores: Jesús Manuel García Iglesias y Agustín García García.

9/08 A selection model of R&D intensity and market structure in Spanish forms.
Autor: Joaquín Artés.

10/08 Outsourcing behaviour: the role of sunk costs and firm and industry characteristics.
Autoras: Carmen Díaz Mora y Angela Triguero Cano.

11/08 How can the decommodified security ratio assess social protection systems?.
Autor: Georges Menahem.

12/08 Pension policies and income security in retirement: a critical assessment of recent reforms in Portugal.
Autora: Maria Clara Murteira.

13/08 Do unemployment benefit legislative changes affect job finding? Evidence from the Spanish 1992 UI reform act.
Autores: José M. Arranz, Fernando Muñoz Bullón y Juan Muro.

14/08 Migraciones interregionales en España y su relación con algunas políticas públicas.
Autora: María Martínez Torres.

15/08 Entradas y salidas de la pobreza en la Unión Europea: factores determinantes.
Autores: Guillermina Martín Reyes, Elena Bárcena Martín, Antonio Fernández Morales y Antonio García Lizana.

16/08 Income mobility and economic inequality from a regional perspectiva.
Autores: Juan Prieto Rodríguez, Juan Gabriel Rodríguez y Rafael Salas.

17/08 A note on the use of calendar regressors.
Autor: Leandro Navarro Pablo.

18/08 Asimetrías y efectos desbordamiento en la transmisión de la política fiscal en la Unión Europea: evidencia a partir de un enfoque VAR estructural.
Autor: Julián Ramajo.

19/08 Institutionalizing uncertainty: the choice of electoral formulas.
Autores: Gonzalo Fernández de Córdoba y Alberto Penadés.

20/08 A field experiment to study sex and age discrimination in selection processes for staff recruitment in the Spanish labor market.
Autores: Rocío Albert, Lorenzo Escot, y José A. Fernández-Cornejo.

21/08 Descentralización y tamaño del sector público regional en España.
Autor: Patricio Pérez.

22/08 Multinationals and foreign direct investment: main theoretical strands and empirical effects.
Autora: María C. Latorre.

23/08 Una aproximación no lineal al análisis del impacto de las finanzas públicas en el crecimiento económico de los países de la UE-15, 1965-2007.
Autor: Diego Romero Ávila.

24/08 Consolidación y reparto de la base imponible del Impuesto sobre Sociedades entre los Estados Miembros de la Unión Europea: consecuencias para España.
Autores: Félix Domínguez Barrero y Julio López Laborda.

25/08 La suficiencia dinámica del modelo de financiación autonómica en España, 2002-2006.
Autores: Catalina Barceló Maimó, María Marquès Caldentey y Joan Rosselló Villalonga.

26/08 Ayudas públicas en especie y en efectivo: justificaciones y aspectos metodológicos.
Autores: Laura Piedra Muñoz y Manuel Jaén García.

27/08 Las ayudas públicas al alquiler de la vivienda. un análisis empírico para evaluar sus beneficios y costes.
Autores: Laura Piedra Muñoz y Manuel Jaén García.

28/08 Decentralization and spatial distribution of regional ecomonic activity: does equalization matter?.
Autores: Santiago Lago-Peñas y Diego Martínez-López.

29/08 Childcare costs and Spanish mothers's labour force participation.
Autora: Cristina Borra.

30/08 Pro-poor economic growth, inequality and fiscal policy: the case of Spanish regions.
Autores: Luis Ayala y Antonio Jurado.

2009

1/09 Does the balance of payments constrain economic growth?. Some evidence for the new EU members.
Autores: Oscar Bajo-Rubio y Carmen Díaz-Roldán.

2/09 Imputación a valor de mercado de los rendimientos de la vivienda en Propiedad del IRPF.
Autores: Luis Ayala Cañón, Jorge Onrubia Fernández y María del Carmen Rodado Ruiz.

3/09 Income poverty and multidimensional deprivation: lessons from cross-regional analysis.
Autores: Luis Ayala Cañón, Antonio Jurado y Jesús Perez-Mayo.

4/09 Reglas fiscales activas: el caso de España (1981-2007).
Autor: Juan E. Castañeda Fernández.

5/09 Índices trimestrales de volumen encadenados, ajuste estacional y *Bechmarking*.
Autores: Ana M.ª Abad, Ángel Cuevas y Enrique M. Quilis.

6/09 Fiscal decentralization and economic growth in OECD countries: matching spending wit revenue decentralization.
Autores: Norman Gemmell, Richard Kneller e Ismael Sanz.

7/09 Una estimación del voto estratégico en las elecciones generales españolas, 2000-2008.
Autores: Enrique García Viñuela y Joaquín Artés.

8/09 La tributación del transporte como instrumento frente al cambio climático.
Autor: Miguel Buñuel González

9/09 The ins and outs of unemployment and the assimilation of recent immigrants in Spain.
Autores: José I. Silva y Javier Vázquez.

10/09 Decomposing the determinants of health care expenditure: the case of Spain.
Autores: David Cantarero Prieto y Santiago Lago-Peña.

11/09 La clase beta de medidas de desigualdad.
Autores: Luis José Imedio Olmedo, Elena Bárcena Martín y Encarnación M. Parrado Gallardo.

12/09 Right incentives to enhance efficiency in public expenditure.
Autor: Tamón A. Takahashi Iturriaga.

13/09 Fiscal decentralization and public sector employment: a cross-country analysis.
Autores: Jorge Martínez-Vázquez y Ming-Hung Yao.

14/09 Factores explicativos de los resultados de las Comunidades Autónomas Españolas en PISA 2006.
Autores: José Manuel Cordero Ferrera, Eva Crespo Cebada y Daniel Santín González.

15/09 A proposal to empirically evaluate the sensitivity of the speed of convergence in the EU.
Autoras: Sonia de Lucas Santos, Inmaculada Álvarez Ayuso y M.ª Jesús Delgado Rodríguez.

16/09 An assessment of the sustainability of current account imbalances in OECD countries.
Autores: Mariam Camarero, Josep Lluís Carrion-i-Silvestre y Cecilio Tamarit.

17/09 Tax mimicking among local governments: some evidence from Spanish municipalities.
Autores: Francisco J. Delgado y Matías Mayor-Fernández.

18/09 La desigualdad en las intensidades energéticas y la composición de la producción. Un análisis para los países de la OCDE.
Autores: Juan Antonio Duro Moreno, Vicent Alcántara Escolano y Emilio Padilla Rosa.

19/09 On the sustainability of government deficits: some long-term evidence for Spain, 1850-2000.
Autores: Oscar Bajo-Rubio, Carmen Díaz-Roldán y Vicente Esteve.

20/09 Who bears Social Security taxes? A meta-analysis approach.
Autores: José Manuel González-Paramo and Ángel Melguizo.

21/09 Fostering the contributory nature of the Spanish retirement pension system: an arithmetic micro-simulation exercise using the MCVL.
Autores: Ció Patxot, Guadalupe Souto y Jaime Villanueva.

22/09 Obtaining lifetime earnings patterns for Spain.
Autores: Ignacio Moral-Arce, Ció Patxot y Guadalupe Souto.

23/09 Efectos del gasto militar sobre la rentabilidad de la industria de defensa en España.
Autor: Antonio Fonfría Mesa.

24/09 El papel de la igualdad de género en la solución de la crisis económica.
Autora: María Pazos Morán.

25/09 Inequality and polarization impact of the European redistribution architecture on the Spanish population: an analysis using microsimulation techniques.
Autores: Xisco Oliver, Luca Piccoli y Amedeo Spadaro.

2010

1/10 Fostering delayed retirement in Spain: a micro simulation exercise using the MCVL.
Autores: Ignacio Moral-Arce, Ció Patxot y Guadalupe Souto.