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Are we doing enough to discourage early retirement?

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Abstract

Increasing the effective retirement age contributes to the sustainability of pension systems. However, oftentimes policies aiming at rising employment rates of older workers fall short in delaying retirement. This seems to be the case with retirement age flexibility reforms in Portugal.

We analyze the recent Portuguese history of incentives to retire. For 1990-2006 we find that individuals faced very high implicit taxes on working with the result that half the workers had already left the labour force before age 65. We then look at the Social Security reforms in 2007 and find that the incentives to continue working became even smaller than they already were.

We conclude that increasing the labour supply of older workers in a system with flexible retirement age needs policies with more aggressive use of penalties and bonuses than what decision makers were willing to accept.

Keywords: Early retirement, Pensions, Social Security

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1. Introduction

In the early 1960s, when the foundations of today's Portuguese social security were laid, life expectancy at birth was 60.7 years for men and 66.4 years for women. The total fertility rate, the average number of children per woman, was 3.2. Today the total fertility rate is under 1.4 and the life expectancy for men and women has increased by more than 13 years. The length of time an average worker will likely use social security benefits has increased even more since, meanwhile, the labour force participation of women has increased substantially. The increase in social security outlays and the reduction of the payroll tax base endangers the financial sustainability of a system built on different economic and demographic premises.

In this paper we investigate the incentives to retire workers have been facing since the 1990s. In particular, we calculate the implicit taxes on delaying retirement and see how these were affected by legislation changes. The objective of our analyses is twofold. First, we propose an retrospective analysis by focusing on real income profiles and investigating how individuals' incentives for retirement were affected by the pension reforms in 1994 and 1999. Second, we estimate the retirement incentives individuals will face until 2017 due to a major 2007 Social Security reform.

Other authors have already analyzed the incentives to retire in Portugal, thought using a different methodology or with other objectives. For example, Blöndal and Scarpetta, 1997 and Duval, 2003 compared retirement incentives across OECD countries and included Portugal in their samples. However, they focused mostly on gross replacement rates. By contrast we follow the approach in Gruber and Wise (1999) and assume that the incentive to retire is given by comparing net earnings with the change in the present value of all present and future net social security benefits and contributions. We focus on *net incentives* meaning that all indicators computed also take into consideration income tax rules. Also, we work with the median observed earning profiles and therefore we have no need to make distributional assumptions[1].

One objective of this paper is to assess the effect of legislation changes. Whitehouse and al., 2009 contribute to this last point by evaluating the impact of the reforms of the last 20 years for several OECD countries. Instead of focusing on retirement incentives, their approach is more general as they focus on how the several objectives (such as coverage, and financial sustainability and affordability) of retirement income provision are affected by the reforms.

One other study has analyzed retirement incentives in the Portuguese case. Albuquerque *et al,* 2009, focus on the determinants of retirement for the period 1994 to 2001 of 50 to 64 years old individuals. They found that the factors increasing the probability

of an early retirement include poor health, a non-working spouse, a smaller family size, not being a home-owner and having lower earnings. Our approach offers a complementary perspective by focusing on the benefits/contributions financial dimension of the retirement decision.

More precisely, we look at the retirement incentives individuals face considering the two *genders*, three *retiring periods*, and three *working histories*. Our baseline cases are single men and women retiring around the years of 1995, 2000 and 2005. The first two baseline cases are men and women born in 1930 reaching 65 years in 1995. The following two cases are born 5 and 10 years later, respectively. Both men and women baselines are assumed to have had the median labour earnings of their age group at each point in time. For these baseline cases we consider three working histories: *complete working histories* at the margin (40 years of contributions at age 65), complete working histories (45 years of contributions at age 65) and *incomplete working histories* (respectively 30 and 20 years of contributions at age 65 respectively or men and women).

We find that individuals face very high implicit taxes, there is evidence of inter-cohort and gender inequalities, and the system has regressive elements at each moment in time. Additionally, we estimated that the 2007-reform transition has imposed on both genders large increases in implicit taxes before and after age 65, reinforcing the incentives for individuals to retire early.

The remainder of this paper is organized as follows. The second section describes briefly the Portuguese Pension System focusing on the three major legislation changes that have occurred since the 1990s. The third section provides labour market and population background information concerning labour market participation by older people. The fourth section presents the basic concepts and the methodology used in the analysis. In the fifth section we present the results on the incentives for retirement during the period 1993-2006, which we contrast to the hazard rates from the labour market, presented in sixth section. The seventh section studies the effects of the 2007 Social Security reform on the incentives to retire. The last section discusses topics requiring further research and offers some conclusions.

The Portuguese Pension System

The Portuguese social insurance consists of two main systems: the *Regime Contributivo,* in which benefits are linked to past contributions, and the *Regime não Contributivo,* which has mainly poverty alleviation goals and therefore benefits are not related to past contributions. The *Regime Contributivo* has two subsystems: The *Regime Geral* encompasses most private sector employees and the self-employed, and the *Regime Especial Agrícola,* which

is a special system for rural occupations.[2] Our analysis focuses on the retirement incentives for workers under the *Regime Geral*.

Under *Regime Geral* up until 1999 there were three avenues to retirement. Indeed, individuals could apply for an old-age pension i) once they reached the legal age for retirement, ii) if they were coming from a situation of long-term unemployment or iii) they could qualify for a disability pension. In all three cases individuals were given a pension value (*P)* satisfying the general benefit rule *P=RE* x *t* x *N*, where *RE* are the reference earnings, *t* a given accrual rate, and *N* the number of years with social security contributions.

Since 1990 there were three major legislative reforms taking effect in 1994, 1999, and 2007. These reforms changed the rules of access to a pension from any of the 3 avenues, and affected P by introducing changes on *RE*, *t* or *N*. For now we focus the period 1990-2007 and in the seventh section we will analyze the current legislative context.

Old-age pensions, legal age access 1990-2007

Table 4 in Appendix 1 summarizes the two major legislative changes during the period 1990-2007. The 1994 reform increased the *vesting period,* which became 15 years instead of 10. Additionally, a *density* of 120 days of contributions per year was required.[3] Although in 1994 the *length of a full contributory life* was kept at 40 years (i.e., the maximum value for *N* is 40) the *reference earnings (RE)* for the calculus of the pension considered the 10 best inflation-adjusted annual earnings of the last 15 years. Before 1994, only the 5 best non inflation-adjusted annual earnings of the last 10 years were considered.[4] These three changes were applied to new pensions until the end of 2007.

Flexibility in the retirement age was introduced in 1999.[5] From then on individuals 55 years old with at least 30 years of contributions could retire with a penalty of 4.5% per year of anticipation. In addition, workers could postpone retirement until the age of 70, with a 10% bonus per year, a choice only available for those with 40 or more years of contributions.[6] Those anticipating the age of retirement are guaranteed a minimum pension, given by the Social Pension of the *Regime não Contributivo.* The larger *Regime Contributivo's* minimum pension applies to regular pensioners.

Early retirement due to long-term unemployment 1990-2007

Another avenue for early retirement was to apply for an old-age pension from a situation of *long-term unemployment.* Early retirement due to *long-term unemployment* was introduced early in the 1980s for those older than 62 once unemployment benefits had been depleted. In the beginning of the 1990s this possibility was enlarged for those aged 60 and over. This

measure was changed progressively. Two situations were created: retirement without penalty, in the case of longer contributory histories, and retirement with penalties, in the case of shorter ones.[7] In this context, from 1994 on retirement was still possible at 60 but only if the unemployment situation had started at 55 or after. Later, in 1999 another possibility was added: individuals could retire at 55 if unemployed from the age of 50, although with a penalty and only if they had at least 20 years of contributions. Finally, in 2003 a third option was created whereby individuals could retire at 58, without any penalty, if at the age of 55 they had at least 30 years of contributions.

Early retirement due to disability 1990-2007

The third avenue for early retirement was to apply for a *disability* pension, automatically transformed into an old-age pension at 65, the normal age of retirement. The "attractiveness" of a disability pension is that it requires a shorter vesting period (5 years) while it follows exactly the same rules as the old-age pension (and it has been subjected to the same legislative changes) but without penalties. Moreover, while by anticipating the age of retirement individuals are entitled the minimum social pension, when disabled they are entitled the larger minimum pension of the *Regime Contributivo*. As it will become clear our results suggest that Social Security was not too strict enforcing disability requirements.

Labour Market and Retirement Behaviour of Older Persons

In accordance with the trends observed in many European countries and the US (Gruber and Wise, 1999) older Portuguese have decreased their participation in the labor market. In 1974, 24% of the people over 64 were active while in 2009 only 18% were. However such decrease is not as substantial as in other countries since it is masked by a relatively late incorporation of women in the labor force. Indeed, as illustrated in Figure 1, since 1974 while men older than 65 have decreased their rate of participation by 20 percentage points (pp), women's have increased it by 2 pp. Additionally, the women's age group 45-64 has registered an increase in activity rates from 38% in 1974 to almost 62% in 2009 and this increase is likely to carry on as these cohorts age.

<Figure 1 **about here>**

Figure 2 is useful to understand the importance of the three avenues for early retirement with respect to the total of old-age retirees. The first fact to notice is the gain in importance of the old-age access to retirement (not displayed in the figure as it corresponds to the residual share): from 1990 to 2009 the ratio of old age pensions of retirees over 65 to the sum of all old age and disability pensions has increased from 67% to 78%.

<Figure 2 **about here>**

Since its introduction in 1999, flexible retirement is gaining importance although by 2007 it still accounts for less than 3% of all old age pensions. The "old age less than 65" category never reaches 10% of old age retirees.[8] What is impressive is that disability pensions amounted to 35% of old age retirees in 1990 and, despite its noticeable decrease, they still accounted for 18% in 2009.

It is difficult to get hard evidence on an informal practice, but there is plenty of indirect evidence suggesting that disability pensions were used as *de facto* early retirement schemes. To begin with, one would expect that better health would lead to a decrease in disability and that is indeed what is observed. Yet, Figure 3 shows that the shares of disabled retirees on the total population have decreased for all age groups from 1990 to 2009, with the exception of the 60-64 age group from 1995 up to 1999. Indeed, retirement age flexibility was introduced in 1999, providing an alternative to "disability" retirement and therefore pushing down its rates, in particular reversing the previous escalation for the 60-64 age group.

<Figure 3 **about here>**

In the following sections we look at the retirement incentives people face with the aim of providing an explanation for older workers' low activity rates, women's increasing activity rates, and to conclude about the reasonability of considering disability as a *de facto* avenue for retirement.

Retirement Incentives – Methodology

Once fulfilled the legal requirements for retirement, individuals compare the gains of one additional year of working to the retirement benefits they would be entitled to. We assume that retiring at a given age *a* means receiving a given pension benefit for life in real terms. Aiming to capture the incentives individuals face to retire before or after the statutory age of retirement (65) we make use of three indicators: *The Net Replacement Rate, the Social Security Wealth Accrual Rate and the Implicit tax/subsidy*. The *Net Replacement Rate* gives us the relative value of the pension with respect to the last salary. The *Social Security Wealth* (SSW), as in Gruber and Wise (1999), is the present value of all future pension benefits. It is obtained by discounting future pensions, taking into consideration survival probabilities and is computed as follows

$$SSW_{60}(R) = \sum_{a=R}^{110} Pension_a(R)\delta^{(a-60)}\pi_a - \sum_{a=60}^{R-1} c_a W_a \delta^{(a-60)}\pi_a, \quad (1)$$

where *R* is the retirement age, Pension$_a$ (R) is the net annual pension received at age *a* by an individual that retired at age R, π_a is the unconditional probability that a 60 year old will reach age *a*, δ is the discount factor with δ= 1/(1+r), and r is the discount rate (3% in our analysis), W_a is the retirees' contractual wage at age *a*, and c_a is the social security contribution rate at age *a*, including both employers' and employees' shares of the social security contributions.

Equation (1) is valid for a 60 years old individual with a maximum life span of 110 years and retiring after age 59. The methodology used assumes perfect foresight, so it is assumed that individuals correctly anticipate changes in benefit and contribution rules. Notice also that equation (1) has a male and a female version, since gender specific survival probabilities and wage histories differ.

If an individual retires at age *R* she gets SSW_R. If instead she postpones her retirement by working one year more, she gets SSW_{R+1}. The difference is called *Social Security Wealth Accrual* (ΔSSW) our second indicator:

$$\Delta SSW = SSW_{R+1} - SSW_R. \quad (2)$$

If on the one hand by postponing the age of retirement she gets ΔSSW, on the other hand by working one year more she gets the net annual earnings. The ratio of ΔSSW to net annual earnings is an *implicit tax* on earnings if the accrual is negative or an *implicit subsidy* on earnings if the accrual is positive. Workers with negative SSW accrual rates are, *ceteris paribus*, more likely to retire.

Delaying the age of retirement affects the Wealth Accrual in several ways. First, delaying the age of retirement means retirees will receive one year less of pension benefits. Second, it implies considering different survival probabilities so that the present value of an annuity at age *a* and year *t* differs from the present value of an annuity at age *a+1* and year *t+1*. Third, the individual will pay more social contributions and taxes related to the income earned during that year. Fourth, there may be some incremental benefits to consider in calculating the pension, as actuarial adjustments or bonuses may apply if there is a delay in pension claiming. Finally, since later earnings tend to be higher, this implies a later year with higher earnings will be considered in computing the pension instead of an earlier year with lower earnings.

Retirement incentives results

We now take a closer look at the retirement incentives individuals face. Our baseline cases are single men and women retiring around the years of 1995, 2000 and 2005. The first two baseline cases are men and women born in 1930 reaching 65 years in 1995. The following two cases are born 5 and 10 years later, respectively. Both men and women baselines are assumed to have had the median labor earnings of their age group at each point in time. For these 6 baseline cases (3 for each gender) we consider three working histories. The first encompasses individuals with *complete working histories at the margin* with 40 years of contribution at 65 years old. This case aims to capture individuals with few out of the labor force spells. The second considers individuals with *complete working histories* with 45 (40) years of contribution at 65 (60) years old. Even though complete working histories are not representative of the Portuguese reality they act as a benchmark and a limit case of what we expect the future to be.[9] Finally, the third aims to capture a more prevalent situation where retirement is only available through the *disability channel* and looks at men having 30 (25) years of contributions at 65 (60) and women having 20 (15). Indeed, these men and women are not allowed to retire through the old age channel before 65 since they do not meet the requirement of at least 30 years of contributions by age 55. Accordingly, through the disability channel they are neither subject to penalties nor entitled to bonuses.

We analyze the possibility of retirement before and after 65, from the perspective of a 60 years old individual.[10] For each case we compute the Net Replacement Rates, the Net Social Security Wealth Accrual Rate and the implicit Tax/Subsidy, based on net earnings. To capture the precise impact of legislation changes we assume perfect foresight, which implies that the individual anticipates perfectly future legislation changes. The results presented reflect therefore the incentives to retire faced by workers via the retirement age flexibility or the disability access. The third avenue to retirement, long-term unemployment, is not included in our analysis.

<Table 1 **about here>**

Table 1 presents the results for men and women, with incomplete working histories (40 years of contributions at 65), earning median wages, and we consider the three baseline cases aged 65 in 1995, in 2000, and in 2005. Results refer to the retirement incentives faced by an individual eligible to disability or old-age pension. Appendix 2 summarizes all the data sources used in our computations.

The first two columns of Table 1 identify the year and age of retirement. The third and sixth columns are respectively men's and women's *Net Replacement Rates*. All

replacement rates signed with an asterisk (*) refer only to retirees via the disability avenue.[11]

Considering first the baseline case aged 65 in 1995, one can notice that net replacement rates are considerably high and even above 100% if individuals postpone retirement to the age of 69. There is a large increase in replacement rates from 1993 to 1994, where this "discontinuity" is due to the introduction in 1994 of inflation adjustments in the calculation of the *Reference Earnings* in the pension formula.

The fourth and seventh columns of Table 1 are the Net Social Security Wealth (SSW) Accrual rates. With the exceptions of 1994 and 1999, it is always negative for both genders. This means that working an additional year would reduce individuals' SSW, implying that given such rates they would be more likely to retire. The exceptional figures in 1993 and 1998 match two legislation changes. The 1993-discontinuity was mentioned above. The 1998-discontinuity appears because retirement age flexibility was introduced, meaning that those retiring in 1998 at 68 would be granted no bonus while those retiring the year after at 69 would have a 4 years bonus, with the result that working through 1998 would be quite profitable.

The implicit tax on earnings is given by the fifth and eighth columns, and it is always very large, except again for the years 1994 and 1999. This means that if individuals were given the possibility of retiring early, they would certainly have reasons to do it.

We follow by presenting the main conclusions arising from the results of the several baseline cases:

- *Very high implicit taxes.* During the whole period 1993-2006 individuals faced very high implicit taxes on work, at all age groups. In some cases implicit tax rates were even higher than 100% as in 1998 (Table 1). These results are robust to other income profiles and working histories (complete working history or incomplete history requiring the use of the disability channel). [12]
- *Inter-cohort inequity.* Inequity concerns across cohorts arise since there are differing treatments of the same age-gender-income profile at different moments in time. An example is men aged 63. They face an implicit subsidy on working of 69.4% in 1993, but if born 5 years later they face an implicit tax of 101.8% in 1998, and if borne 10 years later they are again subsidized at 4.3% in 2003 (Figure 4). Such inter-cohort inequality is present for both genders, and for other income profiles and working histories.
- *Gender inequality.* Due to differences in income profiles and survival probabilities men and women face different incentives to retire. In general women face lower implicit taxes and higher implicit subsidies. Figure 5 presents the results for individuals aged 65 in 2000 but the fact holds for the different baseline cases. This fact correlates with the

increasing activity rates of older women contrasting with the decreasing activity rate of older men, especially in the later years.

• *Complete working histories at the margin face more often better incentives.* Compared to having a full contributory history (40 years of work at age 60), complete working histories at the margin (40 years of work at age 65) face in general lower implicit taxes and sometimes they are subsidized on working. This effect is stronger for women (Table 1 and Table 2).

• *High incentives for retirement through the disability channel.* In general men and women with respectively 30 and 20 years of contributions at 65 face high implicit tax rates and never face implicit subsidies, unless minimum pensions are binding which is more common for women and low income profiles (Table 1, Table 2, and Table 3).

All in all, these results show a system with very large disincentives for older workers to continue to work. They also show an amount of variation in replacement rates and implicit taxes, that is a reason to be concerned as it shows how arbitrary and inequitable the system may end up being.[13]

Labour Force Exit Rates

Estimating the labour market participation of older workers in Portugal is difficult. However recent Social Security data with annual information on stocks of workers allows for some crucial aggregate estimates.[14] It was assumed that being in the Social Security contributory rolls was a marker for being in the labour force. We used a life-table methodology, i.e. we tracked the number of workers of a given gender/cohort over a few years and estimated both the hazard rates and the "survival in the data" rates[15].

Figure 6 top left panel shows women's hazard rates from the labour force starting at age 55. The hazard rates between 55 and 64 are always above 4% reaching values above 10% in 2005 for ages 61 and 62. At age 65 there is a peak, with more than 50% of the remaining workers leaving. After 66 the annual exit rates hover around 25%.

<Figure 6 **- about here>**

The right panel shows the staying rates, i.e. the cumulated effect of exit from the labour force. From an initial set of 100 workers aged 54, about half the workers retire before they reach 65. In 2005 almost 68% of the workers had retired by 65, whereas in 2007 that figure was 47%, meaning that an increase in the labour force participation of older females occurred in that period. At ages 65 and 66 the exit rates are 53% and 47% respectively. From the initial cohort of 100 at age 54, on average 24.3% retire at 65 and an additional

10.2% at 66. At 68, on average, only 6% of the initial set of female workers remains in the labour force.

The exit and staying rates for men are illustrated in the bottom panels of Figure 6. Starting from a cohort of 100 with age 54, the exit rates are larger for men than for women up to 64. From that age on the male exit rates are slightly lower than female rates for the same ages, including the peak rates at 65. At 64 on average only 36.5% of the initial set of workers are still in the labour force. The male workers that retire at 65 are only 17.8% of that cohort. On average, at 68 only 6.7% of the male workers are still in the labour force.

The analysis shows that there is a difference between the retirement of men and of women, with men exhibiting lower staying rates. The fact that in previous periods women had a lower statutory retirement age provides even more contrast to these findings. The staying rate results are well in line with our implicit tax results: both for complete and complete at the margin work histories men are subjected to higher implicit tax rates on continuing working, so we can interpret the gender difference in exit rates as evidence suggesting the relevance of the Social Security rules' incentives in explaining the retirement decision.

A complementary point can be made with respect to those workers who stay in the labour force after the legal retirement age. Our estimates of the implicit tax rates suggest that after 65 these may decrease substantially. In some cases they actually become subsidies. This may help explaining why the hazard rates after 65 are not increasing in age and why they stay at relatively low levels.

The years to come: the 2007 reform

In 2002 a new Social Security law changed the pension benefits rules. The changes were to have only an impact on those retiring after 2017. However, the Social Security Reform of 2007 anticipated the start of the new regime. The new rules apply fully to workers enrolled in Social Security after 2001. For those who started contributing to Social Security before 2002 there is a transition phase with pensions defined by a weighted mean of the pensions resulting from the new and the old rules, with weights defined by the time spent contributing in the old and in the new regimes.

In this section we present estimates of the 2007 reform impact on a 60-years old individual retiring between 2007 and 2017. Notice that we are focusing on the 2007-reform transitional phase rules since, as detailed below, our baseline individuals started contributing to social security before 2002. We compare two scenarios: one in which we consider that the pre-2007 legislation is still effective and another in which we consider instead the currently ongoing 2007-reform transitional phase.

Table 5 in Appendix 1 summarizes the main differences between before 2007 and the transitional phase of the 2007-reform. In the new regime, the old *RE* (RE_O) is weighted by the years with contributions before 2007 while the new *RE* (RE_N) by the number of years after January 1 2007.[16] In accordance with the old legislation, RE_O considers the average of the best 10 inflation-adjusted annual incomes of the last 15 years. In contrast, RE_N considers the average of the 40 best inflation-adjusted annual incomes.

The *accrual rate* (*t*) becomes a decreasing function of the *RE* level. Regarding the retirement age flexibility, different penalties and a (lower) bonus are applied. The penalty for early retirement has on the one hand increased since it becomes 0.5% per month instead of the previous 4.5% *per annum*. On the other hand it is smaller (and even null) for long contributory lives ($N \geq 30$ at age 55). The bonus for delayed retirement increases in the length of contributory history, reaching the maximum of 1% monthly for $N \geq 40$. However, there is a maximum pension value of 92% of the highest *RE* (either RE_O or RE_N).

We now present estimates of the expected changes on implicit tax rates imposed by the 2007-reform. Our baseline cases are single men and single women with median wages and complete working histories at the margin (40 (35) years of contributions at age 65 (60)). As before, we focus on the retirement incentives a 60-years old individual faces when retiring between the ages of 60 (2007) and 70 (2017).

In contrast with the previous analyses where historical data was used, this exercise contrasts two *hypothetical contexts*. First, in both scenarios we assume that the corresponding legislation remains effective until 2017. Second, we consider (partially) hypothetical working histories since earning's data from *Quadros de Pessoal* only covers the period 1985-2006. For periods before 1985 we assumed median wages to follow the same trend as average wages, which are published in the *Banco de Portugal* Historical series about the Portuguese economy.[17] Third, future projections of all variables are made assuming a 1% annual real growth. And finally, to enhance comparability, we ignore the 2005 freeze of retirement age flexibility.

The analysis shows that the 2007 reform increases implicit taxes or decreases subsidies at all ages except at 65 (Figure 7). A similar analysis for complete working histories (40 years of work at 60 years of age) also shows that the 2007 reform lead to higher implicit taxes. We conclude therefore that the 2007-reform transition phase, as it is effective until 2017 generally increases the incentives to retire early for both men and women with median earnings profiles. Therefore, in the years to come, we expect to observe even higher exit rates at earlier ages, unless other avenues to retirement are limited.

If policy makers want to reverse these incentives there are two natural changes that can be implemented. The first is to eliminate the ceiling limiting pensions to 92% of

reference earnings as this ceiling reduces incentives to delay retirement until after 65. The second is to increase the penalty and bonus rates included in the legislation. Our estimates suggest that a combination of increasing penalty rates by 5% and bonus rates by 15% would reduce substantially the implicit tax rates on working. At the same time these changes should be actuarially advantageous from the standpoint of the Social Security budget, providing a rare win-win policy combination.

Conclusion

Policies to promote an increase in the effective retirement age are often seen as a way to improve the sustainability of public pensions systems around the world (Gruber and Wise, 1999). This paper studied the retirement incentives built-in the policies adopted in Portugal, a southern European country characterized by low incomes, high poverty rates and a pension system less mature than most other countries in the EU 15.

From the work of Albuquerque *et al* (2009) we know that the factors increasing the probability of an early retirement in Portugal include poor health, a non-working spouse, a smaller family size, not being a home-owner and having lower earnings. Our approach offers a complementary perspective by focusing on the financial dimension of the retirement decision. We estimate the incentives for retirement of men and women for the period 1995-2005 and discuss the changes applying for 2007-2017. Before 1999 early retirement was not generally a legal possibility, so that comparison to other countries may only be relevant at 65, the normal age of retirement for men.[18] However, in practice the disability channel overcame that formal inexistence. After 1999 early retirement became legally feasible and international comparisons can be done for most retirement ages.

Our results show that the Portuguese social security system provides quite large incentives for workers to retire early, sometimes with implicit tax rates over 100%. The tax rates on men are larger than on women, so it was not unexpected for the empirical analysis of the exit rates from the labour market to find that women have higher staying rates than men. We also detected a surprising amount of variation in tax rates over the years and across genders that may be a serious reason for concern. The concerns are twofold. First, this variation may lead to gross violations of horizontal equity principles, with similar people being treated very differently depending on small differences in the timing of their retirements. Second, little stability in retirement rules may lead many more people into early retirement as risk averse workers try to lock in benefits perceived to be at risk due to frequent policy changes.

As for future research, one set of questions that deserves attention relates to the labour force attachment of workers over the legal retirement age. What will happen to the

tail of the distribution of workers that stay employed after the statutory retirement age? In the Portuguese case, preliminary research with *Centro Nacional de Pensões* data suggests that workers that stay active beyond 65 tend to have had short working histories, and thus are extending their work years to make up for that. These circumstances may become less frequent since more recent cohorts have longer working histories. Will it be feasible for policy changes to induce a substantial postponement of retirement? Finally, a limitation of the work carried until now is that we are working with aggregate data. Ideally one would like to be able to use individual level data, so that financial incentives are included in more general empirical models of the retirement decision.

Figures and Tables

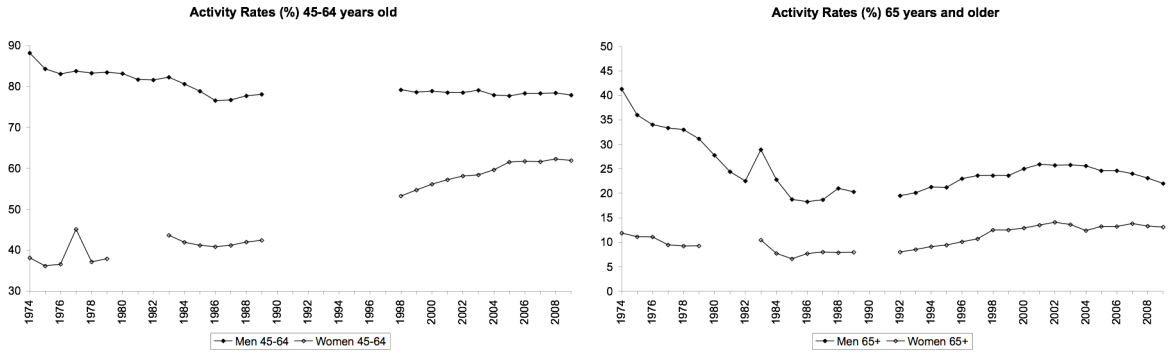

Figure 1– Activity rates by gender and age groups.

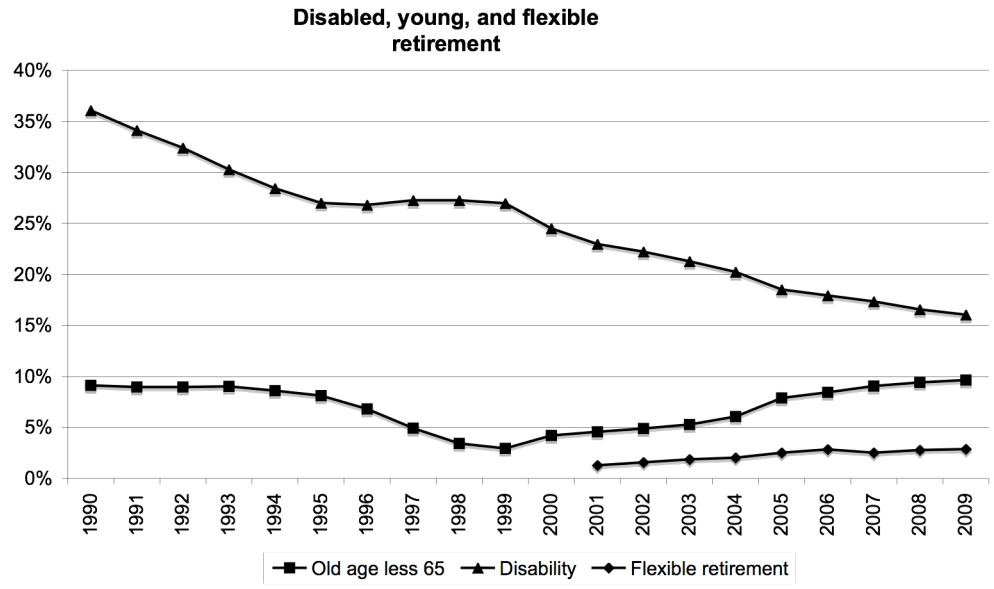

Figure 2 - Relative importance of the three avenues for early retirement.

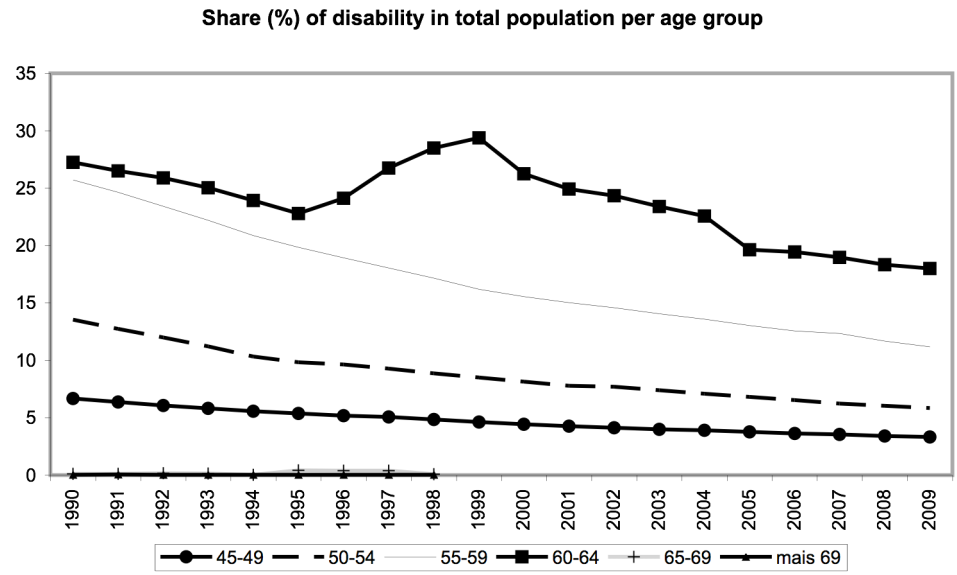

Figure 3 - Share of disability retirees in the population, by age group.

Table 1 - Results for single men and women with median income profile.
Complete working histories at the margin: 40 years of contributions at 65. Aged 65 in 1995, 2000, and 2005.

Retiring at		Men			Women		
Year	Age	Replacement Rate	SSW Accrual Rate	Tax / Subsidy	Replacement Rate	SSW Accrual Rate	Tax / Subsidy
1993	**63**	0.76*		-69.4%	0.72		-65.9%
1994	**64**	0.88*	7.3%	45.5%	0.83	6.3%	28.7%
1995	**65**	0.91	-4.3%	77.8%	0.88	-2.4%	66.2%
1996	**66**	0.90	-7.4%	75.7%	0.86	-5.5%	65.9%
1997	**67**	0.93	-7.6%	93.6%	0.90	-5.8%	87.8%
1998	**68**	0.90	-9.5%	-265.9%	0.89	-7.7%	-333.7%
1999	**69**	1.27	29.1%	30.8%	1.17	31.1%	10.1%
2000	**70**	1.42	-2.5%		1.32	-0.7%	

Retiring at		Men			Women		
Year	Age	Replacement Rate	SSW Accrual Rate	Tax / Subsidy	Replacement Rate	SSW Accrual Rate	Tax / Subsidy
1995	**60**	0.80*		26.7%	0.68*		-16.4%
1996	**61**	0.83*	-2.3%	36.8%	0.70*	1.5%	-4.4%
1997	**62**	0.88*	-3.2%	63.0%	0.73*	0.4%	11.0%
1998	**63**	0.89*	-5.4%	101.8%	0.74*	-1.0%	46.7%
1999	**64**	0.86	-8.9%	16.5%	0.73	-4.2%	-26.4%
2000	**65**	0.92	-1.5%	5.7%	0.77	2.5%	-54.4%
2001	**66**	1.01	-0.5%	-1.7%	0.82	5.0%	-60.3%
2002	**67**	1.12	0.1%	17.0%	0.90	5.4%	-48.1%
2003	**68**	1.19	-1.4%	18.1%	0.98	4.1%	-39.1%
2004	**69**	1.27	-1.4%	39.5%	1.06	3.2%	-33.6%
2005	**70**	1.38	-3.1%		1.16	2.6%	

Retiring at		Men			Women		
Year	Age	Replacement Rate	SSW Accrual Rate	Tax / Subsidy	Replacement Rate	SSW Accrual Rate	Tax / Subsidy
2000	**60**	0.66		4.1%	0.60		-3.6%
2001	**61**	0.71	-0.4%	-14.4%	0.64	0.4%	-20.0%
2002	**62**	0.78	1.4%	-1.8%	0.69	2.2%	-6.9%
2003	**63**	0.84	0.2%	-4.3%	0.75	0.7%	-8.9%
2004	**64**	0.91	0.4%	12.3%	0.81	0.9%	4.6%
2005	**65**	0.93	-1.1%	-3.6%	0.86	-0.5%	-8.6%
2006	**66**	1.03	0.3%		0.93	0.8%	

* The flexibility of retirement age was only introduced in 1999. Replacement rates thus refer to disability pensions.

Figure 4– Men aged 65 in 1995, 2000, and 2005. Complete working histories at the margin, 40 years at 65. Median Incomes.

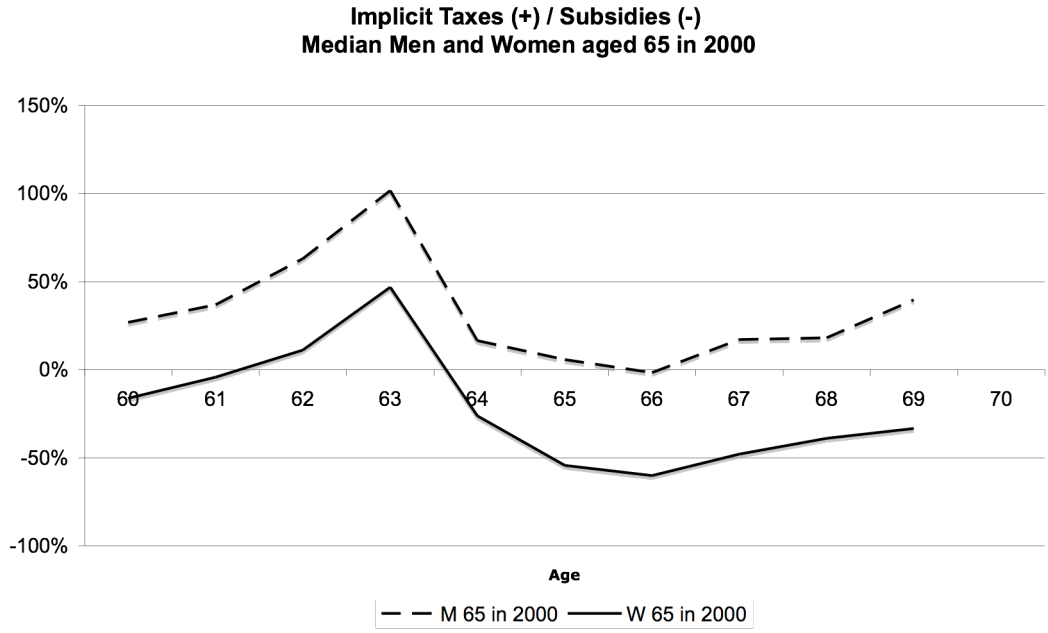

Figure 5 – Men and Women aged 65 in 2000. Complete working histories at the margin. Median incomes.

Table 2 - Results for single men and women with median income profile retiring with complete working histories: 40 years of contributions at 60.
Aged 65 in 1995, 2000, and 2005.

Retiring at		Men			Women		
Year	Age	Replacement Rate	SSW Accrual Rate	Tax / Subsidy	Replacement Rate	SSW Accrual Rate	Tax / Subsidy
1993	**63**	0.80		-45.4%	0.76		-39.0%
1994	**64**	0.90	4.5%	72.9%	0.86	3.5%	59.3%
1995	**65**	0.91	-6.7%	77.8%	0.88	-4.9%	66.2%
1996	**66**	0.90	-7.4%	75.7%	0.86	-5.5%	65.9%
1997	**67**	0.93	-7.6%	93.6%	0.90	-5.8%	87.8%
1998	**68**	0.90	-9.5%	-265.9%	0.89	-7.7%	-333.7%
1999	**69**	1.27	29.1%	30.8%	1.17	31.1%	10.1%
2000	**70**	1.42	-2.5%		1.32	-0.7%	

Retiring at		Men			Women		
Year	Age	Replacement Rate	SSW Accrual Rate	Tax / Subsidy	Replacement Rate	SSW Accrual Rate	Tax / Subsidy
1995	**60**	0.91		65.6%	0.77		8.3%
1996	**61**	0.93	-5.0%	74.2%	0.78	-0.7%	21.1%
1997	**62**	0.95	-5.8%	99.7%	0.79	-1.7%	37.2%
1998	**63**	0.93	-7.9%	135.4%	0.78	-3.0%	72.5%
1999	**64**	0.88	-11.3%	44.2%	0.75	-6.2%	-3.4%
2000	**65**	0.92	-4.0%	5.7%	0.77	0.3%	-54.4%
2001	**66**	1.01	-0.5%	-1.7%	0.82	5.0%	-60.3%
2002	**67**	1.12	0.1%	17.0%	0.90	5.4%	-48.1%
2003	**68**	1.19	-1.4%	18.1%	0.98	4.1%	-39.1%
2004	**69**	1.27	-1.4%	39.5%	1.06	3.2%	-33.6%
2005	**70**	1.38	-3.1%		1.16	2.6%	

Retiring at		Men			Women		
Year	Age	Replacement Rate	SSW Accrual Rate	Tax / Subsidy	Replacement Rate	SSW Accrual Rate	Tax / Subsidy
2000	**60**	0.76		35.2%	0.69		23.6%
2001	**61**	0.79	-3.2%	14.6%	0.71	-2.3%	5.2%
2002	**62**	0.84	-1.3%	28.7%	0.75	-0.5%	19.4%
2003	**63**	0.89	-2.5%	26.0%	0.79	-1.9%	17.4%
2004	**64**	0.93	-2.2%	42.4%	0.83	-1.7%	30.7%
2005	**65**	0.93	-3.6%	-3.6%	0.86	-3.0%	-8.6%
2006	**66**	1.03	0.3%		0.93	0.8%	

Table 3- Results for single men and women with median income profile retiring through the disability channel: men with 30 years of contributions at 65, and women 20. Aged 65 in 1995, 2000, and 2005.

Retiring at		Men			Women		
Year	Age	Replacement Rate	SSW Accrual Rate	Tax / Subsidy	Replacement Rate	SSW Accrual Rate	Tax / Subsidy
1993	**63**	0.56*		-57.0%	0.45		43.9%
1994	**64**	0.66*	8.2%	27.9%	0.46	-6.6%	41.8%
1995	**65**	0.69	-3.6%	34.2%	0.47	-6.4%	38.6%
1996	**66**	0.69	-4.3%	35.8%	0.46	-6.1%	19.3%
1997	**67**	0.74	-4.7%	52.4%	0.50	-3.2%	22.7%
1998	**68**	0.74	-6.7%	45.2%	0.51	-3.7%	19.7%
1999	**69**	0.77	-6.0%	49.7%	0.50	-3.3%	2.6%
2000	**70**	0.83	-6.7%		0.57	-0.5%	

Retiring at		Men			Women		
Year	Age	Replacement Rate	SSW Accrual Rate	Tax / Subsidy	Replacement Rate	SSW Accrual Rate	Tax / Subsidy
1995	**60**	0.57*		11.1%	0.43*		8.9%
1996	**61**	0.60*	-1.4%	19.0%	0.43*	-1.3%	16.3%
1997	**62**	0.64*	-2.3%	38.8%	0.43*	-2.4%	16.5%
1998	**63**	0.65*	-4.6%	31.2%	0.43*	-2.5%	-25.0%
1999	**64**	0.67	-3.7%	44.0%	0.47	3.9%	2.7%
2000	**65**	0.69	-5.3%	55.5%	0.48	-0.4%	-23.9%
2001	**66**	0.71	-6.7%	45.4%	0.50	3.6%	50.3%
2002	**67**	0.75	-5.6%	52.3%	0.48	-7.4%	-6.7%
2003	**68**	0.76	-6.4%	47.6%	0.51	1.1%	24.7%
2004	**69**	0.77	-6.0%	55.7%	0.51	-4.0%	30.5%
2005	**70**	0.81	-7.2%		0.52	-5.1%	

Retiring at		Men			Women		
Year	Age	Replacement Rate	SSW Accrual Rate	Tax / Subsidy	Replacement Rate	SSW Accrual Rate	Tax / Subsidy
2000	**60**	0.61		43.8%	0.51		21.4%
2001	**61**	0.62	-4.9%	25.8%	0.53	-2.8%	29.1%
2002	**62**	0.66	-2.9%	35.7%	0.54	-3.9%	60.1%
2003	**63**	0.68	-3.9%	32.5%	0.54	-8.3%	27.4%
2004	**64**	0.71	-3.6%	43.5%	0.55	-4.0%	57.5%
2005	**65**	0.70	-4.8%	51.4%	0.54	-8.5%	32.9%
2006	**66**	0.73	-6.0%		0.55	-5.2%	

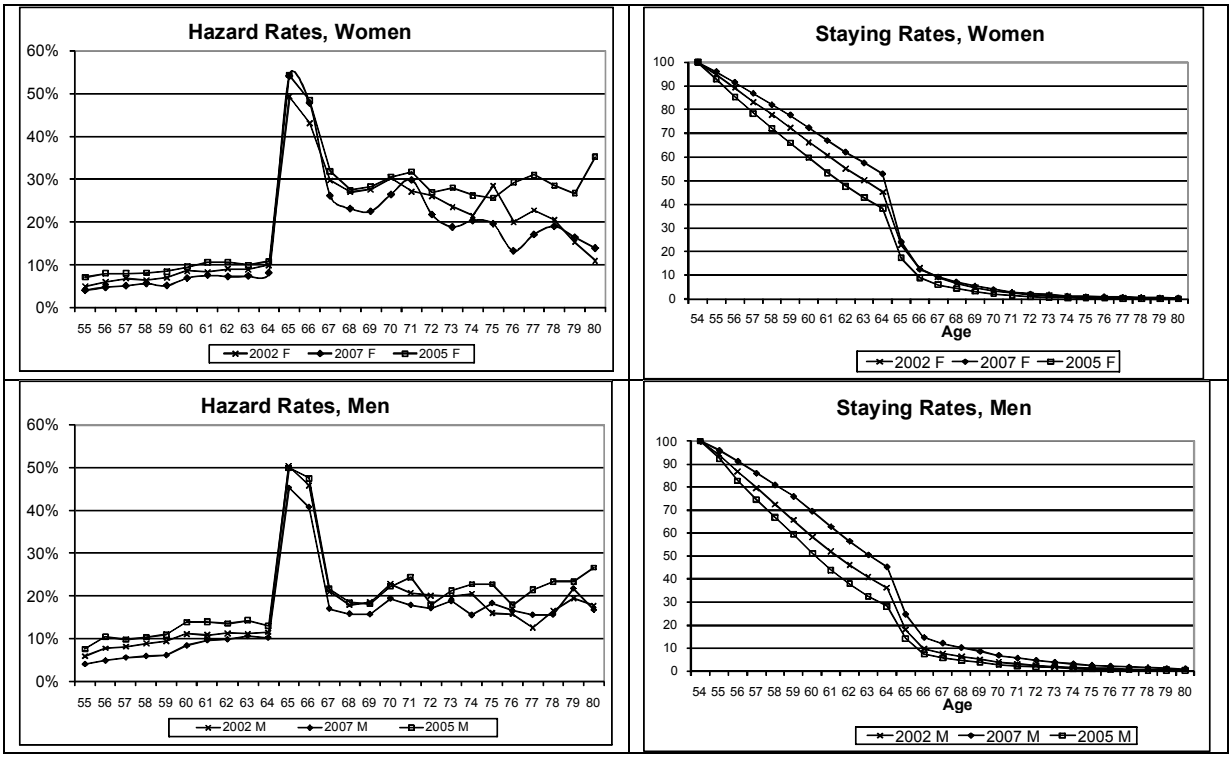

Figure 6– Hazard rates and staying rates, men and women.

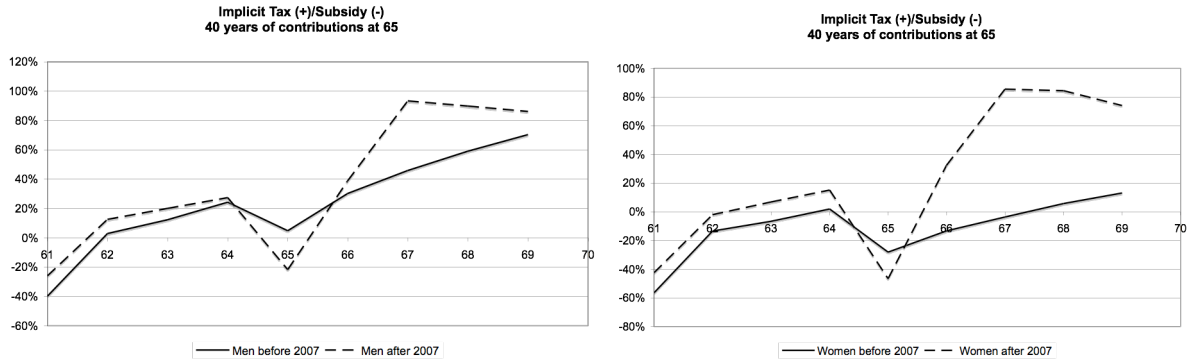

Figure 7 - Effect of the 2007 reform on implicit taxes and subsidies. Men and Women with complete working histories at the margin (40 years of contributions at 65). Median income profile.

Appendix 1: Main Legislation Changes

Table 4-Main legislative changes in the age access to pension. 1990-2007.

	1994	1999	2007
Vesting period	10 years with density 1 day per m, 120 months	15 years with density 120 days per year	-
Statutory age of retirement	Men 65 years, Women 62 years	Men 65 years, Women + 6m per years	Men 65, Women 65
Full Contributory Life (N)	40	40	40
RE- reference earnings	5 best non-inflation adjusted of the last 10 years	10 best inflation adjusted of the last 15 years	10 best inflation adjusted of last 15 years
t- accrual rate	2.2% per year	2% per year	2% per year
Flexible retirement age	n.a.	n.a.	[55,70]
Penalty rate	n.a.	n.a.	4.5% per year, N≥30.
Bonus rate	n.a.	n.a.	10% per year, N≥40.

Table 5 – Main legislative changes of the 2007-reform. Transition phase.

	2007	
RE-reference earnings	RE_O= 10 best inflation adjusted annual earnings of the last 15 years	Average of RE_O and RE_N wrt 01/01/2007. RE_N = 40 best inflation adjusted annual earnings
t- accrual rate	2% year	$t \in [2\%, 2.3\%]$, decreasing in *RE*.
***t* -early retirement**	Penalty of 4.5% year.	Penalty of 0.5% month.
***t* early retirement N≥30**	Penalty of 4.5% year.	Penalty of 0.5% month. Months taken into account for the penalty are reduced 12 months per 36 months exceeding 30 years. Bonus of 0.65% m in access to complete pension.
***t* late retirement**		Bonus from 0.33% up to 1% per month delayed, depending on years of contributions. $P \leq 0.92 * MAX\{ RE_O , RE_N\}$

Appendix 2 - Data Sources

Activity Rates, Figure 1. For the period 1992-2006, mean annual activity rates are given by *Instituto Nacional de Estatística* (INE). However, after 1997 the series for those older than 54 and those between 45 and 54 years old is broken and series for 45-64 and older than 65 are presented instead. For the remaining years, activity rates are for the end of the year and result from the authors' own calculations given INE raw data. Statistics concerning employment are only available from 1974 on, when the first *Inquérito ao Trabalho* took place.

Old-age retirees and sizable retirees, as share of respective age group, Figure 2 **and** Figure 3**.** For the number of retired by age the source is *Centro Nacional de Pensões* and INE is the source for data on residents by age group.

Life Expectancies used to calculate SSW. The source is "The Human Mortality Database", http://www.mortality.org/ accessed September 2007. Their source for Portuguese data is INE.

Old age retirees by types of retirees (disable, young and "early" retirees), Error! Reference source not found.**.** *Instituto de Informática* (IP), *Departamento de Gestão de Informação*: *"Pensionistas de Invalidez por grupo etário"* http://195.245.197.202/left.asp?02.21.03.05.01.01 and *"Pensionistas de Velhice por grupos etários"* http://195.245.197.202/left.asp?02.21.03.05.01.02 . Accessed in May 2010. Other sources are the same as for Disability pension applications as well as in http://195.245.197.202/preview_documentos.asp?r=22093&m=PDF , Accessed on May 2010.

Old age retirees by types of retirees (disable, young and "early" retirees). Pordata Database www.pordata.pt , accessed in April 15, 2010.

Disability pension applications. *Boletim Estatístico, "Invalidez, Velhice e Sobrevivência", Instituto de Informática e Estatística da Solidariedade*, May, 2000, p. 5; November, 2002, p. 5; *"Estatísticas- Pensões e Pensionistas Invalidez Instituto de Informática e Estatística da Solidariedade*", September, 2002, p.2; "*Velhice e Sobrevivência; Estatísticas da Segurança Social, Invalidez, Velhice e Sobrevivência"*, December 2003, p. 7; December 2004, p. 7; December 2005, p. 7; December 2006, p. 7; December 2008, p. 7.

Income Profiles. We use the database "*Quadros de Pessoal" (QP)* available from the *Gabinete de Estratégia e Planeamento, Ministério do Trabalho e da Solidariedade Social* (Ministry for Labour and Social Solidarity). *QP* has individual level data on monthly earnings publicly available from 1985 up to 2006. We used *QP* to build 1985-2006 series of mean, median, 10^{th} percentile and 90^{th} percentile wages by age and gender. For the years 1982-84 we only had access to mean income profiles and we have assumed the median, P10 and P90 to have the same growth rate as mean income profiles for that time period. There is no QP for 1990 and therefore we have assumed that year's annual income to be the average of 1989 and 1991 incomes.

In the seventh section, for periods before 1985 we assumed median wage profiles to evolve as average wages and have used the *Banco de Portugal* long term database.

Pension Calculation. Earnings are actualized at the rates published in the relevant legislation: Portaria 183/94, March 31; Portaria 433/95, May 11; Portaria 244/96, July 5; Portaria 309/97, May 12; Portaria 270/98, April 29; Portaria 684/99, July 5 (2ª série); Portaria 295/2000, May 16; Portaria 949/2001, August 3; Portaria 416/2002, April 19; Portaria 283/2003, March 31; Portaria 439/2004, April 30; Portaria 363/2005, April 4.

Minimum and social pensions are the ones established by the relevant legislation: Portaria 1080-A/1992, November 24; Portaria 1237/93, December 2; Portaria 1066/1994, December 5; Portaria 1417/1995, November 24; Portaria 700/96, December 3; Portaria 1239/97, December 16; Portaria 1018/98, December 4; Portaria 359/1999, May 18; Portaria 1069/1999, December 10; Portaria 1141-A/2000, November 30; Portaria 1323-B/2001, November 30; Portaria 1514/2002, December 17; Portaria 1362/2003, December 15; Portaria 584/2004, May 28; Portaria 1475/2004, December 21; Portaria 1316/2005, December 22.

Marginal income taxes, tax credits and tax deductions, for both labour and pensions earnings, are the ones established in the relevant legislation, *Orçamentos de Estado* (Government Budget) for the period 1993-2005: Law nº 2/92, March 9; Law nº 30-C/92, December 28; Law nº 75/93, December 20; Law nº 39-B/94, December 27; Law nº 10-B/96, March 23; Law nº 52-C/96, December 27; Law nº 127-B/97, December 20; Law nº 87-B/98, December 31; Law nº 176-A/99, December 30; Law nº 3-B/2000, April 4; Law nº 30-C/2000, December 29; Law nº 109-B/2001, December 27; Law nº 32-B/2002, December 30; Law nº 107-B/2003, December 31; Law nº 55-B/2004, December 30.

Social contributions, are the ones established in the relevant legislation: Decree-Law nº 140-D/86, July 14; Decree-Law nº 199/99, April 14.

Fiscal Treatment of Pensions and Labour Earnings. Pensions and labour earnings are subject to very different tax treatments. On the one hand, labour earnings are subject to social security

contributions and to personal income taxes. On the other hand, part of the pension revenue is not subject to personal income tax. Additionally, although the same personal tax rates apply to both earnings and to the remaining taxable pension value, there is a considerable tax credit that is only applied towards pension incomes.

During the period 1993-2009 the annual tax deduction for pension earnings has always been more than 1.5 times greater than the one for labour income, although important changes occurred during this period. In 1994 the ratio of tax deduction for pension earnings to tax deduction for labour earnings increased to 2.9 from 1.6 in 1993. The ratio stayed constant over the following 3 years and in 1997 it started to slowly decrease until 2005 when it reached the value 2.6. Since then the change has been more abrupt and its value went back to the 1993's value in 2008 and 1.5 in 2009.[19] The years of 1994, 2006 and 2007 are thus years of change and therefore we should observe, for each baseline case, an increase in the implicit tax (or a decrease in the implicit subsidy depending on the baseline case) of earnings in 1994 and a decrease in the implicit tax (increase in the implicit subsidy) of earnings in 2006 and 2007.

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NOTES

[1] We also have results for average, percentile 10, and percentile 90 earnings profiles, available upon request.

[2] In addition, outside Social Security, there is the Caixa Geral de Aposentações (CGA) that includes public servants. Both the CGA and the Regime Especial Agrícola were closed to new entries, respectively, since 2006 and 1987, with new workers being enrolled in the Regime Geral.

[3] Before January 1, 1994, it was enough to work 12 days per year to account for one civil year of contributions.

[4] This measure increased significantly pensions' values since inflation had been high for decades and only came under two-digits value after 1992.

[5] There is a set of hazardous jobs that allow retirement with full benefits before 65. We will not look at the details of these specific cases.

[6] Indeed by the end of 2005, the Government froze all possibilities of early retirement and by 2007 new early retirement rules were enacted with different penalty and bonuses rates.

[7] Early retirement due to long-term unemployment should be distinguished from pre-retirement, a status created to help crisis-afflicted industries. Employees under *pre-retirement* are considered active since they do not work but earn a pecuniary compensation as if they were working, usually lower than their past salary. In general it is limited to employees 55 and older although earlier pre-retirement is allowed in particular contexts.

[8] The category "old age less than 65" includes transitions from long-term unemployment, situations of pre-retirement and former workers in hazardous professions in which the statutory retirement age is under 65.

[9]From 1992 up to 2004 65-years-old retired women went from having only 8 years of contributions on average to 22 while the same values for men are 25 and 34 years of contributions. Authors' calculations based on *Centro Nacional de Pensões* (CNP) 2005 microdata.

[10] We focus on the perspective of a 60-years old individual while other authors as Gruber and Wise (1999) and Blöndal and Scarpetta (1997) focus on a 55-years old individual perspective. The lack of data did not allow us to anchor computations at 55 years of age for the period 1990-1995. Aiming to understand the effects of legislation changes we opted to focus on the perspective of a 60-years old individual.

[11] Before 1999 men could not retire before 65 except for disability reasons. Women's normal age of retirement was 62 in 1993, increasing 6 months per year until reaching 65 in 1999. In 1999 retirement age flexibility was introduced with men and women being able to retire after age 55.

[12] Results for the mean, percentile 10 and percentile 90 of the wage distribution are not presented but may be provided upon request.

[13] In this respect it is worth noticing that our analysis reveals that the system is regressive as lower incomes face higher implicit taxes and lower implicit subsidies (results not presented but available on request). The 90th percentile is never the most taxed and it is sometimes the most subsidized. This pattern is similar for both genders and robust to the other two scenarios of incomplete working histories. The 10th percentile is often an exception to this pattern as minimum pensions are often binding.

[14] We are indebted to Mario Centeno for providing us with tabulations of these data. These Social Security rolls include regular workers, ship industry personnel, firms' management, farmers from Azores, people employed in domestic services, the self-employed and participants in the voluntary social insurance scheme.

[15] Correcting exit rates estimates for mortality in the relevant ages did not change the features of the data. Also we assumed that in and out migration rates after 54 years of age are negligible.

[16] For pensions started after 2017 the weighting periods refer instead to 2002. For individuals with the first contributions done after 2002, only new rules apply (Decree-law nº 187/2007, May 10, 2007).

[17] See http://www.bportugal.pt/en-US/Estatisticas/PublicacoesEstatisticas/SLEPort/Pages/SeriesLongasEconomiaPortuguesaposIIGuerraMundial.aspx

[18] Gruber and Wise (1999) did not consider a female base case.

[19] In the year 2006 tax deduction was further reduced for the highest pension values but all our base-cases fall well bellow those values (over 45.000 EUR annual in 2006, 35.000 EUR in 2007 and 30.000EUR in 2008 and 2009).