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PENSION RULES AND IMPLICIT MARGINAL TAX RATE IN FRANCE

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Abstract

The pension rules link the amount of the future pension to the contributions during the working period. So, in case the pension rules are not actuarial, they induce an implicit tax. In this paper, we evaluate the implicit marginal tax resulting from the legislation on pensions in France. We formulate the analytical expressions of this tax and estimate them as a benchmarking example for a single man, born in 1952 with a full career.

1. INTRODUCTION

Contributions to Pay-As-You-Go pension schemes are included in the tax burden along VAT or income tax. However, the computation rules of pensions rely on contributory principles (Devolder (2005)) that tend to make the benefits received conditional on contributions paid. Hence, considering pension contributions as pure taxes is excessive. Following the study by Feldstein and Samwick (1992) for the United States, we evaluate the fiscal nature of pension contributions for France, by calculating the induced net marginal rate. Explicitly, it consists in using actuarial methods to measure the future amount of additional pension induced by each euro of additional wage.

First, we derive an analytical expression for the implicit marginal tax rate resulting from the specific computation rules of pensions for private employees.

Second, we estimate the implicit marginal tax rate for a man, single, born in 1952 with a complete career, who started working at 21 and retires now at 61.

2. ANALYTICAL EXPRESSIONS

We use actuarial methods, likely present value (LPV) and mortality tables, to estimate the tax consequences of a marginal and instantaneous wage increase. The consequences are twofold:

- In the short run, the contribution is the marginal cost.
  At age x, this marginal cost τ_x can be obtained by taking the derivative of the LPV of payroll taxes with respect to the current wage:

$$\frac{\Delta LPV_x\,(\text{payroll taxes})}{\Delta w_x} = \frac{\Delta}{\Delta w_x}\left(\sum_{y=x}^{R-1} \frac{q_{y,x}}{R_{y,x}} \cdot \tau_y \cdot w_y\right) = \tau_x \ ,$$

  where w_x is the wage at age x, $q_{y,x}$ is the survival probability between age x and y $(y \geq x)$, $R_{y,x}$ is the factor of interest between age x and y $(y \geq x)$, and R denotes the age of the start of the pension.

- In the long run, the gain is the increase of anticipated pensions.
  At age x, this marginal gain can be obtained by taking the derivative of the LPV of pensions with respect to the current wage:

$$\frac{\Delta LPV_x\,(\text{pensions})}{\Delta w_x} = \frac{\Delta}{\Delta w_x}\left(\sum_{y=R}^{120} \frac{q_{y,x}}{R_{y,x}} \cdot p_y\,(W, I_y)\right),$$

  where $p_y(W, I_y)$ is the pension rule with W a vector of the wages, and I_y is a vector of institutional parameters prevailing at age y.

The French Pension System relies on two pillars.

1. The **first pillar** is a defined benefit paid by the CNAV (Caisse Nationale d'Assurance Vieillesse). CNAV's computation formula is given by Legros (2006), Bozio (2006):

$$p_R\,(w, I_R) = \rho\,(R, d, d_{pro.}, d_{cl.}) \cdot \left(\frac{1}{N} \cdot \sum_{w_x \in N \text{best years}} \lambda_{x,R} \cdot \min\,(w_x, SSC_x)\right), \tag{1}$$

where

$$\begin{aligned}\rho\,(R, d, d_{pro.}, d_{cl.}) = \ & 0.5 \times \min\left(1, \tfrac{d}{d_{pro.}}\right) \times \big(1 - \alpha_1 \times \max\big(0, \min\big((65 - R) \times 4, d_{b/m} - d\big)\big) \\ & + \alpha_2 \times \max\big(0, \min\big((R - 60) \times 4, d - d_{b/m}\big)\big)\big)\,.\end{aligned}$$

Here, d is the number of quarters validated, "N best years" denotes the set of the N highest discounted wages, SSC_x is the ceiling basis for social security, $\lambda_{x,R}$ is an updating coefficient of past wages, $d_{pro.}$ and $d_{b/m}$ are the durations used for *pro rata* computation and bonus/malus rates, respectively, $N = 25$ years is the number of best wage-earning years set for the computation of the average wage, α_1 is a penalty (malus) discount factor and α_2 is a reward (bonus) discount factor, equal to 1.25% for each exceeding quarter from January 1st, 2009.

The marginal tax rate for a single worker (no reversion pension) can be obtained as

$$\tau_{\text{marg},x} = \tau_x - \rho\,(.) \cdot \frac{q_{R,x}}{R_{R,x}} \cdot \frac{1_{\text{best years}} \cdot 1_{w_x < SSC_x}}{1 + \tau_x^{emp}} \cdot \frac{\lambda_{x,R}}{N} \cdot \ddot{a}_R \ , \tag{2}$$

with $\tau_x = \tau_x^{SSC} \cdot 1_{w_x < SSC_x} + \tau_x^{totwag}$, where τ_x^{emp} is the payroll tax rate paid by the employer and τ_x^{SSC} and τ_x^{totwag} are the contribution rates applying to the fraction of wage lying below the

CNAV ceiling (SSC_x) and the whole wage, with $\ddot{a}_R$ the value of 1 euro pension annuity perceived from age R, indexed by legal factor $I^p_{y,R}$, and with $\rho\,(.)$ the replacement rate. The expression also contains two dummys: the dummy $1_{\text{best years}}$ takes the value 1 if the wage belongs to the 25 "best wage-earning years", and the dummy $1_{w_x<SSC_x}$ takes the value 1 if the wage lies below the ceiling.

2. The **second pillar** is a defined contribution —notional (point) accounts— paid by the ARRCO and/or the AGIRC[1]. All workers of the private sector pay a contribution to ARRCO for the part of their wage below the SSC. The blue collars (resp. white collars) pay a contribution to ARRCO (resp. AGIRC) for the part of their wage beyond the SSC. The amount of pension depends on the number of points accumulated at the date of the liquidation of the pension plan, see Legros (2006):

$$p_R(W, I_R) = \rho\,(.) \cdot \sum_{y=D}^{R-1} \frac{\tau_y \cdot w_y}{v_x^{buy}} \cdot v_x^{ann}. \tag{3}$$

with v_x^{buy} the buying price of one point and v_x^{ann} the annuity value of one point. The coefficient $\rho(.)$ depends on the number of missing quarters compared either to the legal insurance period defined by the CNAV or to the age for which the length of insurance is not taken into account. The marginal tax rate can be written as

$$\tau_{\text{marg},x} = \tau_x \cdot \left(1 - \rho(.) \cdot \frac{q_{R,x}}{R_{R,x}} \cdot \frac{v_R^{ann}}{v_x^{buy}} \cdot \ddot{a}_R\right). \tag{4}$$

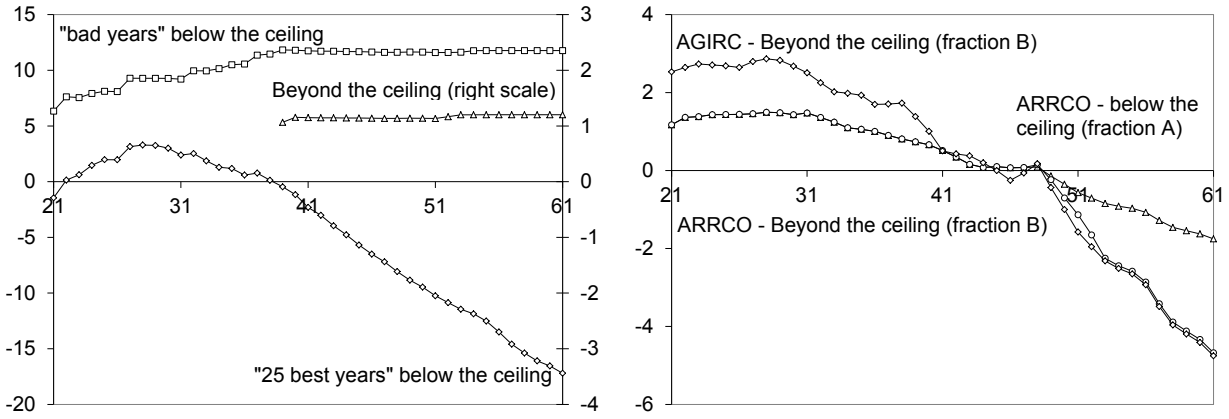
3. COMPUTATION

The benchmark case is a single man born in 1952 with a complete career, who started working at 21 and retires now at 61. Notice that, obviously, no benefits accruing from the reversion pension need to be considered here. People born in 1952 will retire when they are 60 years and 8 months. People born in January 1952 will be allowed to retire from September 2012. Full pension will require 41 years of activity. In our computations, we consider an occupational activity starting at 21 and going on without interruption for 41 years. Retirement age is then reached on the 62nd birthday, which is on January 1st, 2014.

For our prospective analysis, we assume the contribution rates to be constant. To calculate the future values of the points of the supplementary pension plans, we impose that the ratio buying value / liquidation value keeps its trend value. The updating rate of wages and pensions is supposed to be 2% (i.e. long term inflation rate). The discount rate is 4%. We use the TGH/TGF05 mortality tables, which are the prescribed tables for annuities in France.

For wages that both lie below the CNAV ceiling (fraction A) and belong to the set of the 25 best wage-earning years, the marginal rate induced by the basic pension regime follows an increasing trajectory with age, from age 21 (-1.45%) to 28 (3.3%). As shown in Figure 1a, the marginal rate is nil about age 38 and rapidly decreases afterwards to reach -17.2% at 61. For wages that lie

[1]Association pour le régime de retraite complémentaire des salariés (ARRCO), Association générale des institutions de retraite des cadres (AGIRC).



(a) 1st pillar (CNAV)

(b) 2nd pillar (ARRCO or AGIRC)

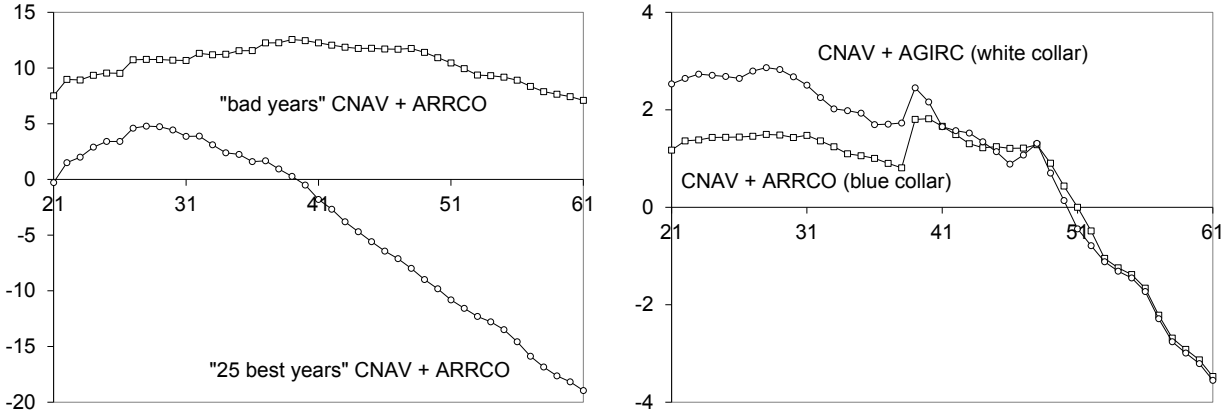
Figure 1: Marginal tax rate of pension contribution for each pillar, with the age on the horizontal axis and the tax rate as a percentage on the vertical axis.

below the CNAV ceiling without belonging to the 25 best wage-earning years, the marginal rate is exactly equal to the contribution rate. It keeps on increasing until age 39, reaching 11.8%, whereas it is 6.3% at 21. The setting, in 1990, of a CNAV contribution rate on the overall gross wage has a very moderate effect because the contribution rate for the fraction under the CNAV ceiling was lowered. For the basic pension regime, the range of the marginal rate is wide, since the latter can reach 11.8% for the wages of the "bad years" and drop as low as -17.2% for the wages of the "25 best years". As to the wages that are above the CNAV ceiling, the marginal rate is zero until age 38. It is slightly above 1% at age 39 and reaches 1.2% about age 53.

Regarding the supplementary pension plan ARRCO (fraction A of wage), the profile of the marginal rate is slightly modified (Figure 1b). The additional marginal rate is stable and positive at the beginning of the career, where it fluctuates around 1.3% until age 31. This stability is due to the increase of the contribution rate. Afterwards, the marginal rate decreases to stabilize again around 0.1% from age 43 on. This new period of stability is a direct effect of the "repurchase rate" on the contributions, which considerably reduces the purchasing power of points through the contribution. From age 49 on, the marginal rate decreases to reach -1.8% at age 61.

To simplify the presentation of the results, the graph does not show the profile for AGIRC's fraction C (between 4 and 8 times the SSC_x), because it is very similar to that of fraction B (between SSC_x and 4 times SSC_x). Beyond the CNAV ceiling (fraction B of the supplementary pension plans ARRCO and AGIRC), the contribution profiles are rather stable until age 31, because of the historical increase of the ARRCO and AGIRC's contribution rates. Afterwards, the marginal rate decreases until 38. As for the ARRCO's fraction A of the wage, the effect of the repurchase rate applies and the marginal rate stabilizes around 1.5% for ARRCO and 2.6% for AGIRC. This stabilization results in a decrease of the marginal rate with age such that it becomes negative after age 49. The range of fluctuation is less than for the ARRCO's fraction A: between -2% and 2% for the AGIRC and between -2% and 1.5% for the ARRCO. The two plans progressively align with the fraction B with time, which explains why the profiles of the marginal rates are very similar from age 50 on.

The computation rule applying to the supplementary pensions results in a narrower variation interval for the marginal rates:$[-1.8\%, 1.5\%]$ for ARRCO (fraction A), $[-4.8\%, 1.5\%]$ for ARRCO (fraction B), $[-4.8\%, 2.9\%]$ for AGIRC (fraction B).



(a) below the ceiling

(b) beyond the ceiling

Figure 2: Marginal tax rate of pension contribution - summary for each wage fraction, with the age on the horizontal axis and the tax rate as a percentage on the vertical axis.

To summarize the implicit marginal rates for each fraction of wage, we must add all the marginal rates (Figure 2): rates for the fractions of wage below and beyond the CNAV ceiling, rates for the ARRCO's and AGIRC's fractions A and B. For fraction A (Figure 2a), the ranges are: $[-19\%, 4.8\%]$ for the 25 best wage-earning years and $[7.1\%, 12.6\%]$ otherwise. For fraction B (Figure 2b), the amplitudes are $[-3.5\%, 1.8\%]$ for the ARRCO contributors and $[-3.6\%, 2.9\%]$ for the AGIRC contributors. A significant increase of all the rates of the B fraction occurs at age 39 due to the setting of a CNAV contribution rate (about 1%) applied to the overall wage without any right to retirement attached to it.

4. CONCLUSION

Our computations show that pension contributions in France induce distortions, expressed by an implicit marginal positive or negative taxation of labor, whose amplitude and profile depend on the pension's rules parameters and individual characteristics. Unsurprisingly, the implicit marginal tax rate depends on the computation rules of pensions. The defined benefit system (CNAV) is affected by a greater distortion than the defined contribution system (ARRCO and AGIRC), because the former does not take into account all the wages in the computation of the pension.

Among many possible extensions, we suggest the following four:

1. Our sensitivity analysis would be more accurate if we could use other mortality tables than the TGH/TGF05, which, being too prudential, underestimates future mortality rates.

2. Another way to assess the heterogeneity among individual careers is to rely on samples of historical (Koubi (2002)) or prospective (dynamic microsimulation) career histories. The

marginal tax rates could be evaluated according to age and generation, by means of a distribution.

3. Our study focuses on single workers, which restricts the analysis, since the reversion pensions are not taken into account.

4. It could be useful to estimate the likely present value of the costs and benefits induced by an earlier or later retirement, see Hairault et al. (2005).

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