Intergenerational and economic impacts of a pension reserve fund: the French case

Stéphane Hamayon*and Florence Legros**

Life expectancy and fertility rates are the key factors of ageing populations in the world. The likely evolutions of these factors suggest an inescapable rise in the share of elderly people in the overall population; this sharp increase in dependency ratios will have important impacts on public finances, potential output, etc., and overall, on the financial equilibrium of retirement pension schemes.

These forecasted difficulties have induced a lot of political reactions. Policymakers have realised for some time that deficits of the pay-as-you-go (PAYG) pensions schemes would quickly reach unsustainable levels, if no changes were introduced, whether in benefits or in contributions, so that reforms have been whether implemented of planned (OECD 2000).

These reforms are of two types: parametric reforms within the PAYG system or reforms that are based on a partial or full shift towards funded schemes.

- Parametric reforms of PAYG include rather marginal adjustments; with an increase of the number of potential beneficiaries, there are only few solutions for balancing the system: to pay more, or to pay longer or to receive less. Increased contributions or decreased benefits. There are, also, more structural changes such as transformation into notional, defined-contribution schemes (Sweden, Italy, Poland, etc.);
- Moving towards funded schemes can be organised by the way of a mix of public and private components but also by creating a reserve fund within the PAYG systems (like in France or in Ireland with the "national pension reserve fund", in Spain, or in Sweden where the funds are "buffer funds", etc.).

One of the advantages of the reserve funds or buffer funds is to smooth the intergenerational welfare and consumption. Because the dependency ratios will know a huge increase between 2010 and 2020, the equilibrium contribution rates would have to double during this period and limit or decrease the households' life level gains. The aim of this paper is to explore the consequences of the creation of such a reserve fund – in the French case - with the help of a simple computable general equilibrium model (CGEM). The consequences will be explored in terms of intergenerational equilibrium, taking into account the various consequences of the reserve fund on the economic aggregates and prices.

This paper is organised as follows: the first part describes both the model and the French pension system; the second one presents the results of various simulations according to our assumptions (no reform, increase in the pensionable age with or without creation of a reserve fund and with two different production functions). The last part concludes and examines the intergenerational impacts of such a reform.

The problematic is then usual, it deals with the problem of the introduction of a funded part in a pension scheme; the form of this funded part is particular: it consists in a reserve fund created with the surplus of the PAYG pension scheme that appears when increasing the retirement age. We opt for this device instead of the allocation the privatisations receipts to the fund that implies – in case of efficient financial markets – a transfer of debt towards the following generations. This avoids dealing with fiscal consequences (Disney 2000).

Our model is a closed economy model, the funds that belong to the reserve fund are supposed to be invested in domestic assets whose yields are given by the domestic economic conditions. We are aware that this can appear as a major limit; but one can argue that the similarity of the demographic changes between the countries and, further, of the economic consequences of these demographic changes imply that the closed economy approach is a more correct approximation of the reality than a "small open economy". In addition, we can suppose (like Blanchet 1992) that the financial investments of such a fund will suffer a domestic bias; this domestic choice is explicit in the Spanish case, by the way (table 2).

* *Quantix Conseil*
** *University Paris Dauphine*

1 - Demography, pensions schemes and growth: the model

BOX 1: THE VARIABLES

In the **production function**, we shall note:
Y, the output,
A, the production function parameter that reflects the technology,
γ, the substitution parameter of the production function,
g, the rate of technical progress.

As usual the elasticity of substitution is: $\sigma = \frac{1}{1+\gamma}$

Wages, labour market and capital return rate

âr, the workers' activity rate (here in, the share of the population which is covered by the average workers pension scheme)
P, the population
u, the unemployment rate

Let us note:
w, the cohorts' gross average wages (the *m* index is used for males and *w* for females)
L, the labour supply, equal to the demand when in equilibrium
r_g , the capital gross rate of return,
r_n , the net rate of return of capital,
δ , the rate of depreciation of capital.

The capital stock

It is noted *K* and is given by *K=Ks+Kr*
with:
***Ks* : structural capital (belonging to the heirs)**
sv, share of the gross capital income which is reinvested
Kr : the retirement capital
This one is composed by the surplus of the PAYG pension scheme. This surplus comes from the gap between $\hat{\tau}$ (which is the effective – observed – rate of contribution) and τ*, which is the equilibrium – technical – rate of the scheme (see box 3).

The PAYG pension schemes are described in a dedicated box (box 3).

As usual, the variables that are written with a star (*) are equilibrium variables while those that are distinguished by a ^ represent an effective variable.

The index *t* represents the temporal dimension while *s* represents the gender (whether *w or m*) and the a index represents ages.

The model is summarized in the box 2. It has been especially built in order to study the pension schemes.
The wage earners (contributors to the pension schemes) are ranked within a "real" pyramid of ages (it distinguishes the individuals according to their occupational status: occupied workers, unemployed, disabled…) doubled by a nominal pyramid of ages (it integrates the wages profiles, the computation of pensions…). While ageing, the pyramid is deformed by:

- the impact of demography that moves the cohorts and changes their size according to the fertility rate and the life expectancies;
- the impact of wage profiles by ages;
- the impact of macro-economic variables that change the prices, wages, yields as well as employment and capital stock, and, further the economic growth.

The model is a neo-classical model with two types of agents (Kessler *et alii* 1991):

- The first ones are wage earners who contribute to the pension schemes;
- The second ones are capitalists; at each period, they are supposed to re-save a constant share of the financial products provided by their wealth. They realise the "non retirement" accumulation. This capital, so-called structural, is the sum of the old capital plus the re-investment of the capital products. The re-invested part is exogenous; it determines the place of the economy *vis-à-vis* the golden rule.

The labour supply is exogenous; it only depends on the age pyramid which moves according to the demographic hypotheses as well as with the labour market participation rate.

The firms' behaviour is successively simulated by two production functions: a CES – so-called "reference production function" and an endogenous growth type production function.
The chosen type of endogenous growth production function is very convenient; first, it uses the usual production factors (capital and labour; whose remunerations are well known and easy to assess); second, it introduces a transitional dynamic by substituting K/L to K, a convenient characteristic when assessing the effect of demographic changes.

The firms demand for labour and capital; the labour cost includes the pension scheme contributions and the capital yield (gross of the depreciation rate). The factors' demand depends on their remunerations (equations /3/ and /4/). The labour demand is constrained by the effective wage level (and its gap with the equilibrium wage); the firms choose a constrained labour quantity and maximize their profits.

The total stock of capital within the economy is due to the accumulation behaviour. Savings are invested and directed towards productive capital (the equality between savings and investment is realised *ex ante*). This means that an excess capital induces a decrease of the capital yield (equation /4/).

The retirement pension schemes perceive contributions and pay benefits according to the PAYG principle, but, the usual equation:

$$Contributions_{\ t} = Benefits_{\ t}$$

becomes:

$$Contributions_{\ t} + (1+r_{n,t-1})\ RRF_{\ t-1} = Pensions_{\ t} + RRF_{\ t}$$

When we introduce a retirement reserve fund (RRF). The dynamic of the RRF is given by equation /7/: the fund is increasing when the effective contribution rate exceeds the equilibrium contribution rate (defined in /9/), the fund is decreasing when the effective contribution rate is lower than the equilibrium rate. The retirement reserve fund, part of the retirement savings, is used, together with the structural capital, for the productive activities (capital of the production function).

BOX 2 : A QUICK DESCRIPTION OF THE MODEL

The reference production function is a CES type. The technical progress is supposed to be labour augmenting.

/1/ $Y_t = F(K_t, L_t) = A\left[\alpha K_t^{-\gamma} + \beta\left((1+g)^{t-t_0} L_t\right)^{-\gamma}\right]^{-1/\gamma}$

A, α, and β are determined to be consistent with K/Y exogenous whom initial ratio is drawn from the French National accounts.

An alternative production function is introduced:

at the micro-economic level: (the index i denotes the firm i) :

/2/ $Y_{i,t} = K_{i,t}^{\alpha}(AL_{i,t})^{1-\alpha} = K_{i,t}^{\alpha}((Be^{gt}K_t^{\phi})L_{i,t})^{1-\alpha}$;

at the macro-economic level, aggregate capital provides positive externalities:

/1bis/ $Y_t = B^{1-\alpha} e^{g(1-\alpha)t} K_t^{\alpha+\phi(1-\alpha)} L_t^{1-\alpha}$

Wages, labour market and capital return rate

Equation/ variable	Reference production function	Endogenous type production function
/3/ w^*	$\frac{\beta(1+g)^{(t-t_0)}}{A^{\gamma}}\left(\frac{Y^*}{(1+g)^{t-t_0}.L^*}\right)^{1+\gamma}$	$(1-\alpha)[Be^{gt}]^{1-\alpha} K^{\alpha+\phi(1-\alpha)} L^{-\alpha}$
/4/ r^*_g	$\frac{\alpha}{A^{\gamma}}\left(\frac{Y}{K}\right)^{1+\gamma} = (r_n + \delta)$	$\alpha[Be^{gt}]^{1-\alpha} K^{(1-\alpha)(\phi-1)} L^{1-\alpha}$

Wages and labour market

The wages are supposed to suffer a certain rigidity:

/5/ $\hat{w}_t = \max[(1-\lambda)(1+g)\hat{w}_{t-1} + \lambda w_t^*; w_t^*]$ where λ can be interpreted as the trade unionists' negotiation power.

/5/ provides the wage growth rate; the gap – expressed in percentage - between males' and females' wages is exogenous.

The effective wage provides also the unemployment rate (if the effective wage differs from the equilibrium one); the employment volume $\hat{L}_t$, consistent with $\hat{w}$ is inferred from /3/.

Capital stock

The structural capital stock is determined by equation /6/ : $Ks_{t+1} = Ks_t[1 - \delta + sv.r_{g,t}]$

The capitalists' saving behaviour consists of a re-investment of a constant share (*sv*) of their gross capital income. *Ko,* that totally belongs to the capitalists is consistent with the initial observed level of K/L.

The retirement savings which are accumulated in come from the surplus of the PAYG pension scheme.

/7/: $Kr_t = Kr_{t-1}.(1 - \delta + r_{gt}) + (\hat{a}r_t.(1-u_t).P_t).[\tau_t - \tau^*_t].w_t$

Note that /7/ still holds when $\tau_t < \tau^*_t$; in this case, the fund is being pumped out.

The **PAYG pension schemes are described in box 3.**

BOX 3 : DESCRIPTION OF PAYG PENSION SCHEMES

Retirement schemes: generalities

The Private sector pension system relies on two pillars: the social security scheme (CNAV) who serves benefits under the Social Security ceiling (2432 Euros per month at the beginning of 2005) and the complementary schemes: AGIRC for executives and only for the share of their wages over the Social Security ceiling and ARRCO for others workers and executives' wages below the ceiling.

The actual reform (approved on 24th of July 2003 by the parliament) holds for CNAV: the full rate contributing period (today 40 years) will increase according to gains in life expectancy (1 quarter a year between 2008 and 2012, half a quarter a year between 2012 and 2020); the discount rate which is today 0.10 will decrease in order to reach 0.05 in 2013 step by step; the reference career length (37.5 years) will increase 2 quarters a year in order to reach 40 years in 2008 and to take into account the increase in the full rate contributing period. If we note by T' the corresponding reference period, equal to the full rate contributing period after 2008, the formula can be written:

$$CNAVpension = w * \alpha * \text{Min}[1, (T / T')]$$

$\alpha = 0.50 * [1 - 0.05 * \text{Min}[T' - T; 65 - A)]$, where A is the retirement age of the considered person.

Complementary pension schemes: AGIRC and ARRCO are fully contributive schemes and pensions are computed according to a system of points which are the pension basic units of calculation.

*Annual gross pension = accrued points * current value of a point*

with:
*Flow of points accrued during the period t = share of the gross wage subject to contribution * mandatory contribution rate/purchase price of one point in t*

If α differs from 50% (Social security pension) then the complementary pension schemes apply actuarial adjustments.

Modelisation

When individuals' wage profiles are not available, the amount of rights vested by the forthcoming retirees generations are computed with the help of activity rates by generation. Consider for instance the males of a given generation in a PAYG scheme. If the share of active males at the time t is μ%, one can consider that each man of this generation has contributed in μ% of the year t in the regime (Malabouche 1987).
The activity rates are then cumulated on the whole active life of a generation; providing the average contribution period of a given individual.
It is then possible to estimate, for each generation, the vested rights in a given scheme. To compute the forthcoming generation rights, it is necessary to forecast their unemployment and activity rates. The former ones are endogenous (box 1) but the latest ones are exogenous.
The pensions are computed with reference to the wage rates. According to the French rules, wages are cut in two parts: under and above the social security ceiling. The pensions computation rules are different according to whether the wage earner is under or above this ceiling. Because of the lack of individual career profiles, it is necessary to determine which part of the wages are – or not – above the ceiling. We decided to consider that the wage variable (w) has a log-normal distribution, then knowing the schemes contributions distribution, we estimate the log-normal law parameters (mean and standard deviation) for each cohort.
For the forecasts, when the population is ageing, we assume that this distribution remains constant around a computed average wage (equations /3/ et /5/). The wage profiles are consistent with the observations (they have been estimated by (Colin, Legros et Mahieu 2000).When the wages' levels, profiles and distribution are known it becomes easy to compute the schemes' charges.

Schemes by annuities (CNAV)

The different steps to compute pensions are the following:
1- Average replacement rate when individual are quitting their job:
*Replacement rate = Min [∑ Activity rates ; contributing period for a full rate pension] * annuity rate*

2- Average pension for a given generation:

*Generation's pension = Replacement rate * Reference wage * [Real wages growth rate]* $^{\theta}$

θ : indexation degree between pension and real wages (0 since 1993)

Reference wage = 10 best years until 1993, 25 since 1993 (+ 1 year per year).

3- Expenditures:

*Expenditures = ∑ [average pensions by cohort * cohort size adjusted by its activity rate]*

Schemes by points (AGIRC and ARRCO)

As we have contractual contribution rates, points prices historical series, we are able to compute – together with wages and activity rates – the number of points that a given generation have cumulated.

*Number of Points = ∑ of the activity rates by cohort * [contributing wages *rate of contribution]/price of a point*

This provides the pension schemes resources for each period.

Note: the retirement age is exogenous (the authorities change it) but we assume a dispersion of the effective retirement ages around the legal age, we assume that dispersion to follow a Weibull law.

2 - Reserve fund and increase in the contributing periods with two economic growth hypotheses

In this paragraph, we intend first to measure the consequences of the reform voted in 2003 which both increases the pensionable age and creates a reserve fund and, second, to focus on the specific role of the reserve fund. Because this reserve fund is supposed to be a major capitalisation vector, it is interesting to state about its role in the economic growth and its conditions using alternatively two production functions: a CES and an endogenous growth one.

Before the reform: reference scenario

This first analysis only recalls the nature and the size of disequilibrium faced by the PAYG pension schemes; these forecasts will take place in a standard demo economic trend. The economic hypotheses are summarized in table 1; they are consistent with the standard scenarii.

Table 1:
DEMO ECONOMIC SURROUNDING HYPOTHESIS FOR THE 2000-2040 PERIOD

Trend scenario	
Economy	
Technical change	1.9%
Rate of unemployment (long run)	5,0%
Share of wages in the value added	70%
Demography	
Mortality	INSEE trend
Fertility rate (source: INED)*	1,9 children/woman
Net migration flows (source: INSEE)	100000/year

*National demographic studies institute

**National statistic and economic studies institute

We note that the reference scenario provides the same results with both production functions (Solow or endogenous growth type) because the initial parameters g and ϕ of the endogenous growth production function,

$Y = K^{\alpha} * (BgK^{\phi}L)^{(1-\alpha)}$, have been initialised in order to give the same dynamic than with an exogenous technical progress; the economic growth trend is then 1.9% in the steady state[1].

Demo economic surrounding

The forecasted active population increases until 2005 (there will be around 27.5 millions of active individuals) and then decreases to 24.5 millions in 2040.

The occupied active population grows until 2010 while the unemployment rate is decreasing; since that year, the variable follows the active population trend according to the constant rate of unemployment - 5% of the active population - (chart1).

The main macro economic variables follow a two steps walk. Between 2000 and 2015, the production growth rate is over 2.5% while the wages' growth is increasing from 1.6% to 2.1% by year. After, the shortage of active population decreases the economic growth until 2015; after 2015, there is a stabilisation around 1.6% (chart 2). Until 2010, the situation is a under accumulation situation and this lack of capital is translated by an increase in the interest rate (net return of capital). After 2010, the capital stock follows the active population decrease.

Private sector wage earners' pension schemes

To face the forecasted demographic shift, the private sector pension schemes rules had been changed in 1993, ten years before the last reform (2003). The reform[2] induced a progressive decrease in the ratio of pensions related to wages. This ratio is represented for some selected cohorts on chart 3. For instance, the wage earners born in 1937 had, in 1996, a net retirement pension representing 57% of the average net wage. This replacement rate decreases each year by two mechanisms: first, pensions are indexed on CPI instead of net wages; second, the 25 best wages that are used to compute the reference wage are discounted by CPI. For the youngest generations, the impact of the reform will be greater because the initial replacement rate (when they quit their job) is lower. If this legislation remains unchanged, the wage earners of the 1966 cohort will perceive, in average, a pension which is equivalent to 43% of the average wage.

Despite this degradation, the pension scheme is still financially unbalanced. After 2005, when the baby-boomers quit the labour market, the gap between the scheme's expenditures and resources increases (Chart 4).
The private sector deficit reaches 4 points of contribution rate in 2020 (around 21 billions euros). In 2040, our forecasts horizon, the deficit raises to 7 contribution rate points (52 billions constant euros).

Chart 1

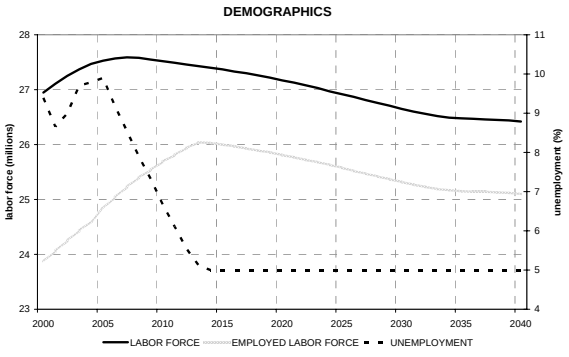
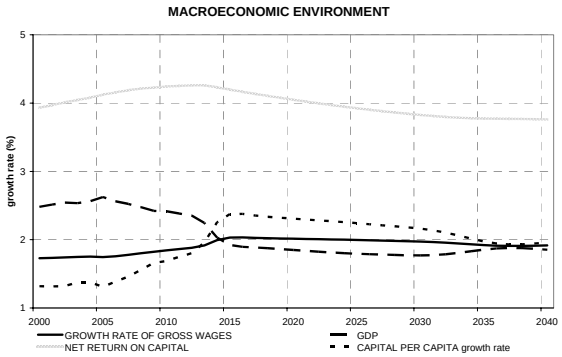


Chart 2



[1] g=0.95 et ϕ = 0.5, the GNP growth rate is then converging towards 1/(0.5) = 0.9%; this growth rate is identical to the technological growth rate in the Solow type function.
[2] *Grosso modo*, the 1993 pension reform leads to an indexation of pensions on IPC (and not on the wages). In addition the minimum contributing period has been lengthened from 37.5 years to 40 and the reference wage for the computation of the first pension is now an average of the 25 best years of the career (instead of the previous 10 years). The application of the reform will last from 1994 until 2008.

Chart 3

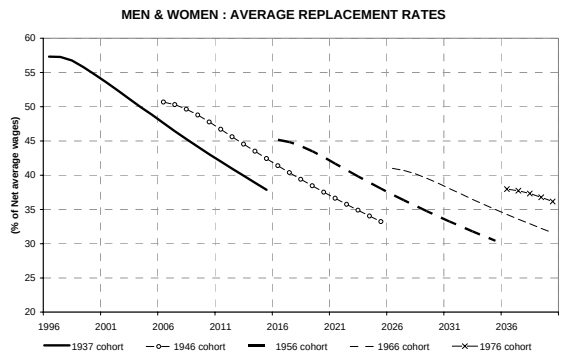
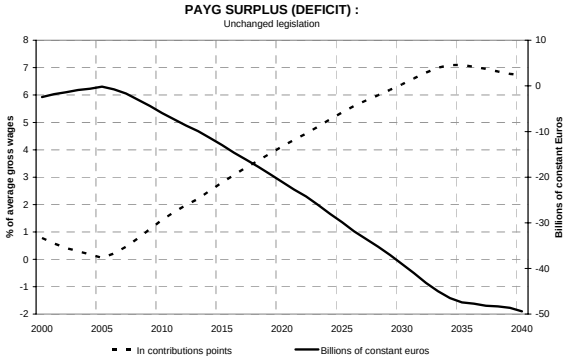


Chart 4

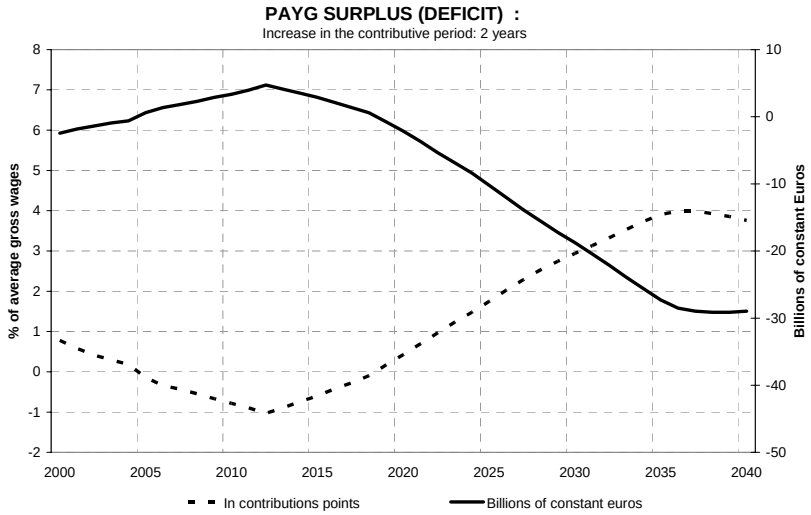


The impact of an increase in the retirement age

The simulations hold on an increase in the contributive period of 2 years, according to the 2003 reform. According to the reform, the increase step is one quarter *per* year. It begins in 2004, year in which the transitory period of the previous reform is finished. In order to forecast the impact of such a policy, we assume that people change their behaviour in order to quit the labour market when their pension is maximum (full rate). The empirical analysis defends such an assumption [Pelé-Ralle, 1999][3].

The increase in the contribution period obviously changes the dependency ratio which reaches 0.9 in 2040 instead of 0.8 in the reference simulation and 1.6 today. Despite the increase in the retirement age, the active population is still decreasing; this leads to confirm the assumption along which the early retirement devices should progressively disappear.
The retirement scheme financial balance differs from the reference simulation (chart 5): the deficit is – at first – reduced. In a second time, a surplus appears (5 billions euros in 2010); in a third period, a deficit appears and grows (30 billions euros in 2040, i.e. 4 contribution points)

Chart 5



[3] In fact, the reform introduces a system of accrual and decrual around the full pension age (65) or period (40 and progressively 42 according to the reform). The result of such a device is highly questionable (see Guerin and Legros 2002). It is why we consider that this assumption still holds.

Increasing in the pensionable age and settlement of a reserve fund

In order to smooth the consumption between the generations, trust funds (United States), provident funds (Singapore), buffer funds (Sweden) or reserve funds (France; Ireland, Norway, Spain) have been created (table 2). They are generally run by governments, mobilise various forms of resources such as public assets, additional contributions, pension schemes surpluses, etc. and practice various asset allocations.

Table 2
Characteristics of selected reserve funds

Fund	Begins in…	Net wealth (€ bn)	Asset allocation (%)	
			Bonds	Equities
Norwegian petroleum government fund	1990	100	40	60
Swedish AP-Fonden (average of 4 buffer funds)	1999	16	58	38.5
Irish national pensions reserve fund	2001	10.6	74	13
French FRR	2003	16*	55	45
Spanish reserve fund	2001		100 (spanish government bonds)	0

*In the simulations, the FRR net wealth is supposed to be up to 21 bn euros in 2005.

We study the impact of the reserve fund on the economy surrounding. First, we use a simple Solow type model then we switch for an endogenous growth type production function. The idea is that the reserve fund – by its size – is able to create positive externalities.

The reserve fund results from the surplus of the PAYG regime, i.e. from the gap between the effective contribution rate (stated by the law or the schemes boards) and the equilibrium rate (resulting of the balance between contributions and pensions). When the equilibrium contribution rate decreases (with the increase in the contributions resulting from the increase in the active population), if the effective contribution rate remains stable (which is the case), a surplus appears.
In fact, the fund is supposed to be filled by 4 different means:
- Surpluses of the social security pension scheme;
- Products from privatisations;
- Various endowments;
- Various shares of social contributions and taxes;

to which are added the financial products of the investments. However, taking into account the last sources meets two major difficulties: first, it means to introduce the government in our model (products of privatisation and taxes are receipts of the government); second, according to the Ricardian equivalence principle, allocating those sums to the pension reserve fund implies forthcoming balancing taxations, whose discounted sum is theoretically exactly equal to the amount of the allocated funds.

With both production functions, the PAYG surplus accumulation leads to a reserve fund and limits the deficit. The comparison of the two models (charts 6 and 7) shows that the pension is balanced until two different horizons: 2032 for the Solow-type model, 2040 –and further- for the endogenous growth model. The economic growth lasts more in the case of endogenous growth, in the line which what the intuition tells us, it goes together with a better dynamic in wages and in capital yield (charts 8, 9, 10).

Nevertheless, compared to the reference simulation, the fund has a positive impact on the production during around 12 years in the Solow-type model and during 30 years in the endogenous growth model.
In the long-run, the macro-economic impact of the funded scheme disappears. The dominant effects are due to the production function: with endogenous growth, the effects last more. A typical eviction effect appears in this type of models: when the demographic structure is constant, funded schemes (saving schemes) are mature; the structural capital is the only source of increase in capital. The same phenomenon is reproduced here because the reserve fund collapses (by definition).

The factors' returns are higher than reached without the buffer fund but this superiority is due to the first period (2000-20105) during which the reserve fund is growing. At the end of the forecasting horizon, the GDP and wages' growth rates provided by the endogenous growth model are weaker than in the Solow model while the capital yield is parallel to the yield provided by the Solow model. The intuition is the following: in the endogenous model, the capital stock role is strengthened compared to its role in the simple neo-classical model; that implies that, as soon as the capital stock is stable, the effect is strengthened as well. Anyway, according to the lack of capital hypothesis, in both cases, the return on capital is higher than the instantaneous yield of the PAYG scheme which depends upon the demographics and the labour productivity.

Chart 6

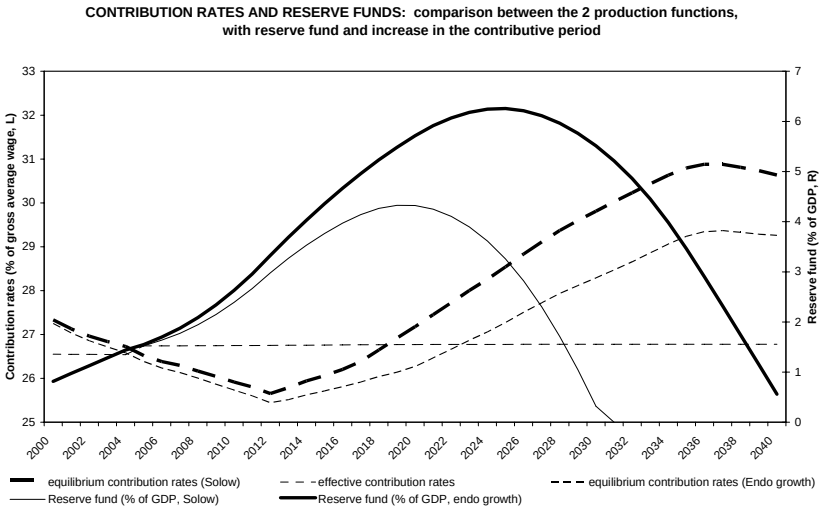


Chart 7

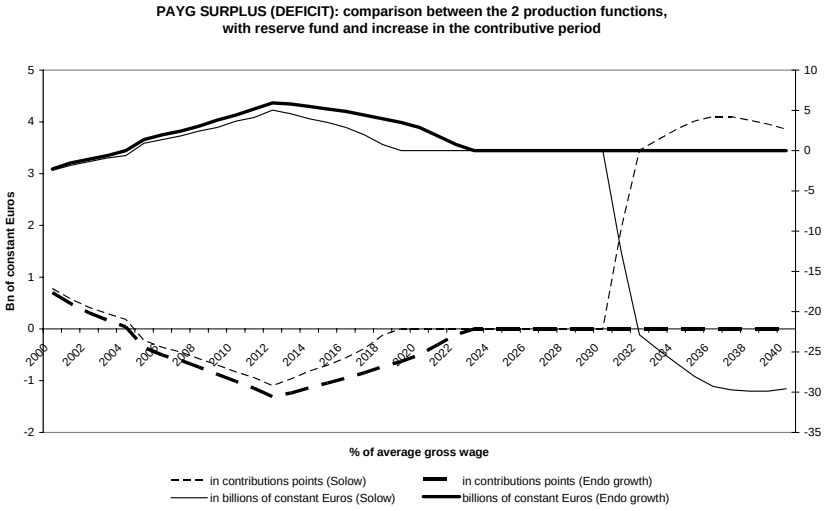


Chart 8

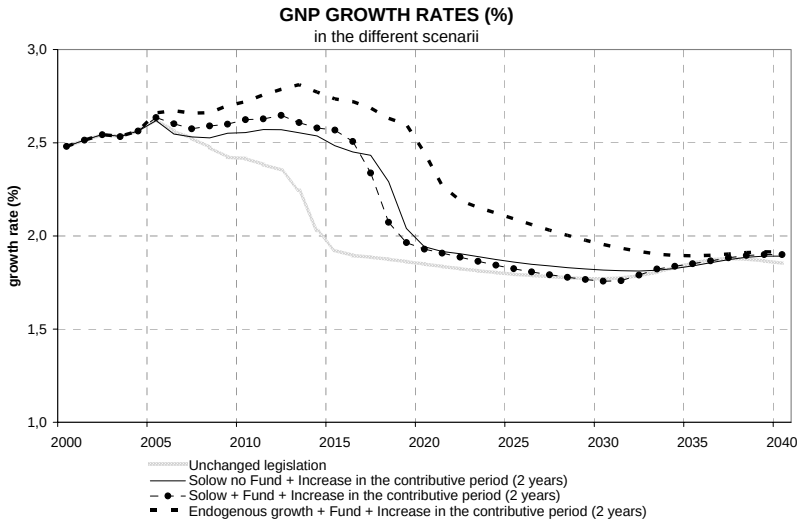
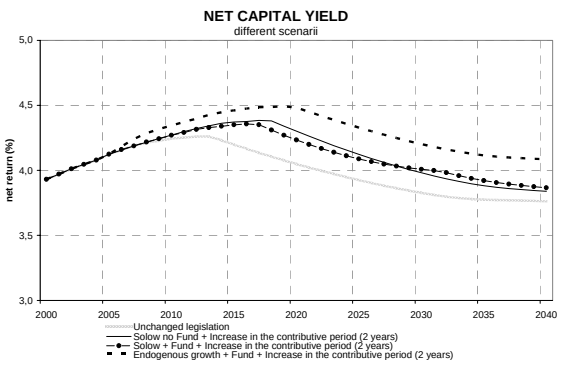


Chart 9

Chart 10

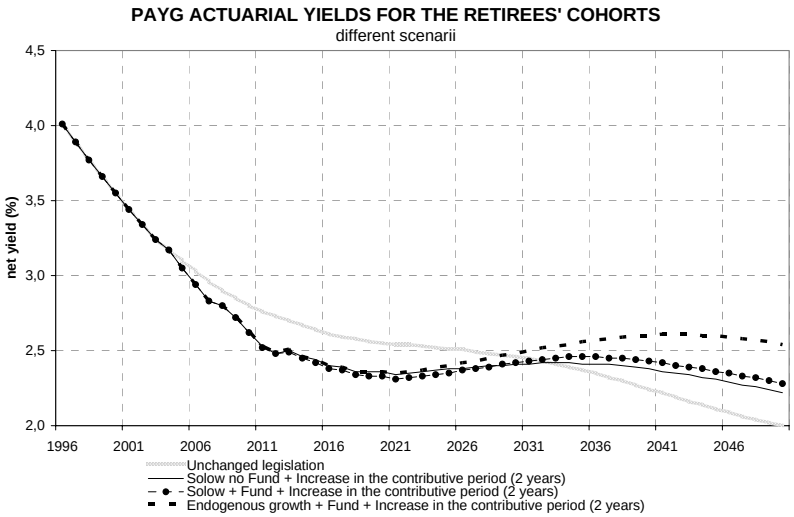


An intergenerational balance

Of course, with no individuals' preferences in the model, it is rather risky to draw conclusions about individual's intergenerational welfare. We suggest to estimate the differences between generations' welfares from the PAYG yields. This includes various characteristics such as the income drawn from the pension scheme, the contributive effort during the all working period and the ratio of retirement to active period. This exercise provides a useful measure of the intergenerational transfers due to the pension scheme; this computation would not have any signification if we had considered that the reserve fund was created from public assets because it would have implied future payments from future generations.

Chart 11 shows the huge deterioration of the PAYG yield while the contributing period is increasing. This shows role of the ratio of the retirement period in proportion of the active period. Since 2032, the yields hierarchy is reversed: the "after reform actuarial rates of return" are greater than the actuarial rates of return drawn from the reference situation. This is due to the weakest contribution rates in case of reform.
Of course, using the PAYG surplus in order to feed a reserve fund provides even higher actuarial yields and the gain is maximum with the endogenous growth model.
In case of increased pensionable age with no fund, the generations' welfare is higher during a transitory period; this is due to the fact that, in this case, the equilibrium contribution rate is equal to the effective contribution rate and, by the way, lower than in the "no fund" cases.

Chart 11



Conclusion

The effects of a reserve fund are transitory but positive and even more in an endogenous type model because the usual dilution effects, due to the changes in the *per capita* capital ratio, are smoother in such a model. The relationship between funding, production and factors' remuneration is stronger and longer; this means that the economy offers a better resistance in front of the demographic cycle and this explains the longer life of the reserve fund. Of course factors' yields are impacted by the demographic cycle and the changes are consistent with the theoretical findings (Artus and Legros 1999) but the impact is much stronger with an exogenous type production function than with the endogenous growth model.

Increasing the contributing periods and creating a reserve fund from the surpluses is an elegant solution from the pension schemes point of view. It is more attractive in a period when life expectancies are still increasing while the unemployment is decreasing, particularly because the firms will have to draw labour force in the old workers' segment. The main problem is a policy implementation problem: the measure appears to be profitable in the long run but difficult to sell in the short run. The strong resistance against an increase of the pensionable age (France, Germany, Belgium, etc.) can be explained by the strong immediate welfare cut that would result from the higher retirement age. According to Casamatta *et alii* (2000) or to Casamatta (2000), this can be due to the old workers' and retirees' huge political weight in a political environment where the public pensions parameters are set by the median voter's choices. This can be also attributed to the non altruistic behaviour of the eldest voters. If they were altruistic they would, of course, favour an increase of the retirement age that would push up the economic growth and the future generations' pensions yields (Artus and Legros 1997).

References

Artus, P., Legros, F., (1997) "Vieillissement de la population, pouvoir électoral, système de retraite et croissance, *Revue économique*, Vol. 48 (4), 899-920.
Artus, P., Legros, F. (1999) *Le choix du système de retraite : analyser les mécanismes pertinents*, Economica.
Blanchet, D. (1992) « Retraites et croissance à long-terme : un essai de simulation », *Economie et prévision*, n°105.
Casamatta, G., (2000), "Retraites par répartition et pouvoir électoral des retraités", *Revue Economique*; 51(0), Special Issue Feb., pp. 133-42.
Casamatta, G., Cremer, H., Pestieau, P. (2000), "Political Sustainability and the Design of Social Insurance", *Journal of Public Economics*; 75(3), March, pages 341-64.
Disney, R. (1996), Can we afford to grow older? A perspective on the economics of aging, Cambridge and London, MIT Press.
Guérin, J.-L., Legros, F. (2002), « Neutralité actuarielle : Un concept élégant mais délicat à mettre en œuvre » *Revue d'Economie Financière*, 2002, v. 0, iss. 68, pp. 79-90

Kessler D., Masson A., Pestieau P. (1991) « Trois vues sur l'héritage : la famille, la propriété, l'Etat », *Economie et Prévision*, n°100-101.
Malabouche, G. (1987), *Retraites : les périls de l'an 2030* . Commissariat général au plan. Etudes et recherches, n°5 april.
Pelé L.-P., Ralle P. (1999), « Les choix de l'âge de la retraite : aspects incitatifs des règles du régime général et effets de la réforme de 1993 », *Economie et prévision*, n° 138-139 ; april-september
Colin, C., Legros, F., Mahieu, R. (2000), « Des spécificités de carrière aux spécificités institutionnelles des régimes de retraite : une simulation sur le secteur privé et la fonction publique », *Revue économique*, Special issue Feb., v. 51, pp. 97-114.