ECOLE POLYTECHNIQUE

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

Effect on potential growth of non-sustainable public debt dynamics: an application to France

Frédéric Gonand

May 2005

Cahier n° 2005-010

LABORATOIRE D'ECONOMETRIE

1rue Descartes F-75005 Paris

(33) 1 55558215

http://ceco.polytechnique.fr/

mailto:labecox@poly.polytechnique.fr

Effect on potential growth of non-sustainable public debt dynamics: an application to France

Frédéric Gonand

May 2005

Cahier n° 2005-010

Résumé: Cet article évalue l'impact sur la croissance potentielle à l'horizon 2020 de différentes trajectoires de dette publique française, sous l'hypothèse d'une accélération des dépenses de retraite entièrement financée par endettement. Un modèle analytique avec fonction de production et impôts proportionnels est calibré sur données de comptabilité nationale. Il suggère que l'accumulation de dette publique se traduit par un effet d'éviction significatif sur le capital productif. Des simulations suggèrent qu'à politique inchangée le ratio (dette publique/PIB) corrigé de cet effet d'éviction se redresserait significativement pour atteindre 97% en 2020. Il ne se stabiliserait aux alentours de 60% qu'en cas de surplus primaires importants (hors dépenses de retraite nouvelles), de l'ordre de 1.25% PIB en moyenne. Néanmoins l'impact défavorable sur la croissance potentielle resterait contenu, de l'ordre de -0.1% par an en moyenne.

Abstract: This paper assesses the impact on potential growth up to 2020 of possible future budget deficit dynamics in France, with new ageing-related expenditures financed exclusively by debt. The methodology calibrates a standard analytical model with production function and proportional taxes using national accounts. It documents the intuition according to which debt-building significantly crowds out productive capital accumulation. Simulations suggest that a crowding-out adjusted (public debt/GDP) ratio should keep increasing significantly, reaching 97% in 2020 at unchanged policies. It would stabilize around 60% only if sizeable primary surpluses (excluding new ageing-related expenditures) of 1.25% GDP were achieved on average. Yet the detrimental impact on potential growth of loose budget policies combined with new ageing-related expenditures financed only by debt would remain limited: around -0.1% GDP per year on average.

Mots clés : Soutenabilité - Dette publique - Effet d'éviction - Dépenses de retraite

Key Words : Sustainability - Debt policy - Crowding out effect - Ageing-related public expenditures

Classification JEL: E62, G18, H55, H62, H63

For the last three years, the European Commission has been publishing public debt scenarios up to 2050 for Euro-zone countries (see for instance European Commission, 2003). These scenarios suggest that the lack of fiscal consolidation from 2007 onwards and the choice of financing only by debt the future increase in ageing-related public expenditures could translate into a the (debt/GDP) ratio around 100% of GDP in France in 2030[1]. This level is well above the 60% of GDP Maastricht threshold, pointing to a sustainability problem in view of EC criterias.

The empirical scope of this thought experiment could still be improved. Accumulating public debt has a detrimental crowding-out effect on private capital and potential growth, bolstering in turn (debt/GDP) ratio.

This article presents a methodology assessing the impact of potential growth up to 2020 of deficit-friendly policies and the option of financing exclusively by debt the foreseeable increase in ageing-related public expenditures. This method calibrates a standard analytical model using French national accounts. It allows for computing a robust order of magnitude of the impact on potential growth of loose budget policies and uncontrolled social expenditures dynamics financed by debt.

1. Whereas economic analysis suggests public debt accumulation to be a drag on potential growth, few empirical estimations using analytical models parameterised on national accounts are available.

A few years ago, the French (public debt/GDP) ratio experienced a sharp decline, reaching 56.8% of GDP in 2001. Yet it peaked at 58.8% of GDP in 2002 and 63.7% in 2003. Figure 1 suggests that this evolution is closely related to an increase in budget deficit, which has been below the stabilising deficit from 2002 onwards.

This debt dynamics raises about worrying problems. Public finances will be experiencing from now on accelerating age-related expenditures, especially as concerns Social Security and, to a lesser extent, health and long-term care. Insofar as increasing social contributions or cracking down on social expenditures may entail sizeable political costs, government may consider debt-building as an appealing solution. Yet such a choice would have detrimental side-effects on productive capital accumulation and potential growth. As is well known, the neo-ricardian equivalence argument

[1] All debt levels quoted in this article abide by Maastricht accounting rules.

stems from assumptions which hardly fit with reality:

- the structure of households' population is not constant over time and tax transfers between generations are possible. Current cohorts may cash in on increasing public expenditures, the future cost of which (in terms of taxes) will burden upon future generations. Overlapping generations' models (Blanchard, 1985) confirm that productive capital accumulation and potential growth are modified by the choice of financing spendings either by taxes or debt.
- taking uncertainty into account also yields to results in contradiction with the neo-ricardian equivalence. The way of financing public expenditures can modify consumption by changing household's perception of uncertainty. In Barsky, Mankiw and Zeldes' (1986) model, tax cuts followed by future tax increases do not modify permanent income but lowers uncertainty as for future earnings. Thus it depresses current precautionary saving and bolsters current consumption.

Unfortunately, these models do not allow for an easy parameterization on national accounts. Evans (1991) parameterized Blanchard's (1985) model but results are very sensitive to a difficult-to-estimate myopy coefficient. On the other hand, microeconomic models in uncertainty can not be parameterized on national accounts and thus do not allow for assessing the impact on potential growth of non-sustainable debt dynamics.

Overall, a simple empirical assessment of the impact on potential growth of non-sustainable debt dynamics, using an analytical model calibrated on national accounts, does not seem straightforward given the existing literature.

2. A standard analytical model parameterized on national accounts suggests public debt crowding-out effect on productive capital may be significant.

A fruitful methodology in this context consists in parameterizing a Ramsey-type model with taxes proportional to GDP. This assumption is in line with the long-term setting suggested by Mankiw and Elmensdorf (1999), Mankiw (2000a) and Mankiw (2000b). Solving such a model yields to an equilibrium relation which allows for computing the impact on potential growth of different future debt dynamics.

GDP stems from a Cobb-Douglas production function with Harrod-neutral technological progress: $Y_t = F(L_t, K_t) = (A_t L_t)^{1-\sigma_t} K_t^{\sigma_t}$ which becomes in intensive form:

$$y_t = f(k_t) = k_t^{\sigma_t} \tag{1}$$

where σ_t stands for capital income in total value added (i.e. GDP). Inputs prices are equal to their marginal productivity: for labour $w_t = f(k_t) - k_t f'(k_t)$ where w_t is the real wage per unit of efficient labour, gross of social contributions and taxes. For capital, the interest rate r_t is equal to:[2]

$$r_t = f'(k_t) = \sigma_t k_t^{\sigma_t - 1} \tag{2}$$

When the economy is at its steady-state, efficient labour units increase at rate $(n_t + \gamma)$ where n_t is the labour force growth rate and γ stands for annual total factor productivity (TFP) gains.

Labour force L_t is composed of H households which consume C_t. Each household maximizes a time-additive, separable, with constant relative risk aversion (CRRA) utility function: $U_t = \int_{t=0}^{\infty} e^{-\rho t} \frac{C_t^{1-\theta}}{1-\theta} \frac{L_t}{H}.dt$ where ρ stands for the psychological discount rate and $\theta \in [0;1]$ is the relative risk aversion coefficient. Consumption per unit of efficient labour is $c_t = C_t/A_t$. Using Solow's long-term equilibrium properties, utility function can be rewritten as $U_t = \Omega \int_{t=0}^{\infty} e^{-\mu t} \frac{c_t^{1-\theta}}{1-\theta}.dt$ where $\Omega = A_0^{1-\theta} \frac{L_0}{H}$ and $\mu = \rho - \gamma(1-\theta) - n_t$.

Households' intertemporal budget constraint is:

$$\begin{aligned} \int_{t=0}^{\infty} e^{-r_t(1-\tau_t)t} C_t \frac{L_t}{H}.dt &= \int_{t=0}^{\infty} e^{-r_t(1-\tau_t)t} A_t (1-\tau_t)(w_t + r_t b_t) \frac{L_t}{H}.dt \\ \Leftrightarrow \int_{t=0}^{\infty} e^{-r_t(1-\tau_t)t} e^{(n_t+\gamma)t} c_t.dt &= \int_{t=0}^{\infty} e^{-r_t(1-\tau_t)t} e^{(n_t+\gamma)t} (w_t - v_t - g_t).dt \end{aligned}$$

The first order condition of this program is $\Omega e^{-\mu t} c_t^{\theta} = \lambda_t e^{-r_t(1-\tau_t)t} e^{(n_t+\gamma)t}$ where λ_t is the Lagrangian. Log-linearizing yields $-\mu - \theta c_t = \ln \lambda_t - r_t(1-\tau_t)t + (n_t+\gamma)t$. Differentiating yields the Euler equation for households: $\frac{\partial c_t}{\partial t} = \frac{r_t(1-\tau_t) - \rho - \gamma\theta}{\theta}$. In the long-run equilibrium, consumption per unit of efficient labour is constant thus:

$$r_t(1-\tau_t) = \rho + \gamma\theta \tag{3}$$

Variables related to government are g_t, v_t and $\tilde{t}_t$ which respectively stand for public consumption

[2] There is no depreciation of capital in the model. Projections in section 3. model a net of depreciation stock of productive capital.

per unit of efficient labour, transfers per unit of efficient labour and taxes per unit of efficient labour. Taxes are assumed proportional to GDP with a proportionality rate τ_t. Debt service is $r_t b_t$, where b_t stands for the stock of public debt per unit of efficient labour. Government intertemporal budget constraint is $\int_{t=0}^{\infty} e^{-r_t t} e^{(n_t+\gamma)t}(v_t + r_t b_t + g_t).dt = \int_{t=0}^{\infty} e^{-r_t t} e^{(n_t+\gamma)t} \tau_t (k_t^{\sigma_t} + r_t b_t).dt$, i.e. - up to a constant -:

$$v_t + r_t b_t + g_t = \tau_t k_t^{\sigma_t} + \tau_t r_t b_t \tag{4}$$

Fully differentiating equations (1), (2), (3) and (4) yields the derivative of the stock of productive capital k_t relatively to public debt b_t: [3]

$$\frac{\partial k_t}{\partial b_t} = \left[\frac{\tau_t}{1-\tau_t} - ff''(f')^{-2}\right]^{-1}$$

Using Cobb Douglas characteristics one eventually gets:

$$\frac{\partial k_t}{\partial b_t} = \left[\frac{\tau_t}{1-\tau_t} + \frac{1-\sigma_t}{\sigma_t}\right]^{-1} (\neq 0) \tag{5}$$

Expression (5) is easy to calibrate on national accounts. Note that it does not involve the psychological discount rate nor the relative risk aversion coefficient. τ_t is computed as the (total government revenues/total value added) ratio. σ_t is computed as the (total business profits net of capital depreciation/total value added) ratio.

Figure 2 present the results. They suggest that public debt building during the 1990's had significant crowding-out effects on the accumulation of productive capital. $\partial k_t/\partial b_t$ would be around -0.5.

Sensitivity analysis is carried out as for τ_t and σ_t. Figure 3 suggests that these results are reasonably robust for a wide spectrum of values for τ_t and σ_t.

[3]Noting as a preliminary step that $\partial\tau_t/\partial k_t = f''(k_t)(\rho+\gamma\theta)(f'(k_t))^{-2}$, the detailed calculus is $\frac{\partial k_t}{\partial b_t} = \left[\partial\left(\frac{\tau_t f - v_t - g_t}{f'.(1-\tau_t)}\right)/\partial k_t\right]^{-1} = \left[\frac{\tau_t f' + ff''(f')^{-2}(\rho+\gamma\theta)f'(1-\tau_t) - \left[(\tau_t f - v_t - g_t)\left[(1-\tau_t)f'' - (f')^{-1}f''(\rho+\gamma\theta)\right]\right]}{(f')^2(1-\tau_t)^2}\right]^{-1}$
$= \left[\frac{\tau_t(1-\tau_t)(f')^2 + ff''(f')^{-1}(1-\tau_t)(\rho+\gamma\theta) - b_t(1-\tau_t)^2 f'f'' + b_t(1-\tau_t)f''(\rho+\gamma\theta)}{(f')^2(1-\tau_t)^2}\right]^{-1} = \left[\frac{\tau_t}{1-\tau_t} - ff''(f')^{-2}\right]^{-1}$

3. The detrimental impact of a budget policy kept loose and new ageing-related expenditures financed by debt would maintain a crowding-out effect adjusted (debt/GDP) ratio far above the 60% threshold until 2020, yet without depressing much French potential growth.

Using production function (1) and taking into account crowding-out effects enshrined in (5), the impact on potential growth of different public deficit and debt dynamics up to 2020 can be computed.

3.1. Computing a crowding-out effect adjusted (public debt/GDP) ratio

This sub-section presents the assumptions used for projecting a crowding-out effect adjusted (public debt/GDP) ratio. The projection period is 2002-2020. (Total government revenues/total value added) ratio is kept constant in projection at its average value between 1992-2002, i.e. $\overline{\tau} = 49\%$. (Total business profits net of capital depreciation/total value added) ratio (σ_t) is assumed to converge linearly from 2002 to 2010 to its average value over 1992-2002, i.e. 24.5%, and remains constant at this level thereafter. Labour-augmenting annual TFP gains (γ) are assumed equal to 1.5%. Ageing-related public expenditures are supposed to be 1% GDP higher in 2020 than in 2002, an order of magnitude in line with European Commission estimate.[4]

Projected labour population relies on two assumptions: participation rates by age-groups are frozen at their levels in 2000 and the average effective age of retirement remains constant at 59 years.[5] Population data are from OECD database but stem from national sources. Raw national demographic projections were transformed from five-year periods (2005, 2010, ..., 2050) by age groups (20-24 years, 25-29 years...) to annual data (20, 21, ... , years in 2000, 2001, ... 2050) using a linear interpolation of the five-year intervals into annual data. Implicit annual survival probabilities obtained are close to UN projections (United Nations, 2002). This method is used by Oliveira Martins, Gonand, Antolin, de la Maisonneuve and Yoo (2005). With these assumptions,

[4] European Commission forecasts an increase of 2.1% GDP up to 2050.

[5] Year 2000 is associated with an output gap close to zero in France, so participation rates by age-groups at that year can reasonably be assumed equal to their long-run average value, at unchanged policies.

Freezing average effective age of retirement does not appear to be too strong an assumption in a French context. Recent reform passed in 2003 may not materialize in a strong upswing of this parameter given the impact of some arrangements as concerns actuarial neutrality in the "Régime Général" ("décote").

labour force declines on average by 0.2% per year from 2002 to 2020, in line with the retirement of large cohorts born during the baby-boom.

Nominal interest rate paid on public debt is held constant and equal to its average value over 1992-2003. This value is obtained from national accounts. In real terms and assuming that inflation will remain at 2% per year, this yields $\bar{r} = 4.2\%$.

Freezing the interest rate in projection - in line with Mankiw's methodology - may require some further justification. As apparent in previous developments, expression (5) relies on the assumption that the economy is at its long-run equilibrium, with constant consumption per unit of efficient labour c_t and constant interest rate r_t. Yet with productive capital *per capita* experiencing detrimental crowding-out effects, k_t is not constant in the model and thus expression (2) states that the interest rate r_t should not be constant either. Mankiw does not point out this methodological drawback very clearly. Overcoming it would require developing a general equilibrium model with overlapping generations, with a carefully modeled transition phase. This could be achieved for instance by modifying Oliveira et al. (2005) model, yet involving a much heavier modeling and setting the value of around ten technical parameters. Leaving aside this possibility, the issue here is to determine whether the long-run equilibrium approximation may bias significantly the results.

Several empirical considerations suggest that this assumption of freezing the interest rate over the projection period may only have very small effects on our results. Most importantly, sensitivity analysis presented below shows that results would not be significantly different for values of $\bar{r}$ comprised between a wide spectrum of $[3\%; 5\%]$. Additionally, Oliveira et al. (2005) general equilibrium setting suggests that ageing would not influence much equilibrium interest rates up to 2020 - the order of magnitude being at most of some base points. Eventually, Laubach (2003), among other studies on this issue, shows that public debt-building has very small effects on interest rates. Overall, we freeze future interest rate at its average value over 1992-2003, i.e. $\bar{r} = 4.2\%$.

With the economy at its steady-state, productive capital stock annual growth rate (net of depreciation) is equal to $(n_t + \gamma)$. From this set of assumptions, it is easy to derive Y_t, the non-crowding-out adjusted potential GDP at year t.[6]

Primary deficit, excluding new ageing-related expenditures increases, is kept constant in potential GDP percentage: $PD_t = d.Y_t$. Debt service is equal to $\bar{r}B_{t-1}$. New ageing-related expen-

[6] In what follows $t \in [2002; 2020]$.

ditures are assumed to increase linearly from 0 in 2002 to $P_{2020} = p * Y_{2020}$ in 2020, such that $P_t = \frac{pY_{2020}}{18}(t - 2002)$ with $p = 1\%$ as a baseline value. Thus total deficit is $D_t = PD_t - \bar{r}B_{t-1} - P_t$.

As Figure 1 shows, contribution of total deficit to the annual variation of the (debt/non-crowding-out adjusted GDP) ratio is equal to (D_t/Y_t). Contribution of net debt flows (F) is assumed constant in projection (see sensitivity analysis below). Contribution of GDP growth to the variation of the (debt/GDP) ratio is simply the GDP growth rate. Having computed these three contributions, one can derive respectively the variation of B_t/Y_t, then B_t/Y_t, B_t and eventually $B_t/K_t = b_t/k_t$. Then from b_t/k_t, $\bar{r}$ and σ_t one gets $\partial k_t/\partial b_t$ using expression (5), and $K_{t,red}$, the crowding-out-adjusted stock of capital: $K_{t,red} = K_{t-1,red}(1 + n_t)(1 + \gamma) - \partial k_t/\partial b_t(B_t - B_{t-1})$. Once obtained projected values for L_t and $K_{t,red}$, crowding-out adjusted potential GDP ($Y_{t,red}$) is derived and the crowding-out adjusted (public debt/GDP) ratio ($B_t/Y_{t,red}$) is eventually obtained. The debt-building-driven detrimental impact on average potential growth over 2002-2020 is $(Y_{2020,red}/Y_{2020})^{1/18} - 1$.

Two variables in the model are harder to forecast, namely the average real interest rate paid on public debt ($\bar{r}$) and the average contribution of net debt flows to the variation of the (debt/GDP) ratio (F). I select average values for these two parameters and check whether results would be substantially modified using extreme values for both of them. Baseline values are $\bar{r} = 4.2\%$ and $F = 0.44\%$, the latter being the average value of F obtained using national accounts over 1992-2003.[7]

Figure 4 presents results of a joint sensitivity analysis carried out with $\bar{r} \in [3\%; 5\%]$, $F \in [0\%; 0.75\%]$ and $PD_t = 0$. It suggests that even using extreme values for $\bar{r}$ and F, impacts on projected annual potential growth are within a limited range of $\pm 0.05\%$ around baseline results, a very acceptable order of magnitude. This confirms the possibility of freezing the interest rate ($\bar{r}$) and the contribution of net debt flows (F) in projection without biasing results.

Eventually, joint sensitivity analysis is carried out with $\bar{r}$ and different values of p which stands for new ageing-related expenditures in 2020 as a percentage of GDP. We used $p = 1\%$ as a baseline following European Commission (2003), yet Dang *et al.* (2001) suggest higher orders of magnitude (around 2% in 2020). Figure 5 presents the results and suggests that projecting a stronger acceleration of ageing-related expenditures up to 2020 would only marginally modify impacts on potential

[7] The 1992-2003 is a period during which the (debt/GDP) ratio rose by 20 percentage points, an order of magnitude close to the ones obtained in the simulation below. Thus $F = 0.44\%$ seems reasonable as a baseline.

growth of non-sustainable public debt dynamics computed below.

3.2. Projecting crowding-out effect adjusted (public debt/GDP) ratio and potential growth up to 2020 for France

In this parameterisation framework, future public debt dynamics flows from primary deficit excluding new ageing-related expenditures (i.e. PD_t). Figure 6 presents projections of crowding-out adjusted (public debt/GDP) ratio and potential growth up to 2020, depending on the average value of PD_t. It suggests that:

- *crowding-out adjusted (public debt/GDP) ratio should keep increasing significantly. At unchanged policies, it would reach 97% in 2020. It would stabilize around 60% only if average primary surpluses (excluding new ageing-related expenditures) of 1.25% GDP were achieved. This order of magnitude was encountered in France only during the cyclical peak of the late 1990's.*
- *the detrimental impact on potential growth of this combination of budget policy kept loose and new ageing-related expenditures financed only by debt until 2020 would be significant yet not sizeable, around 0.10% GDP per year on average.*

Conclusion

These results suggest that a lack of control over budget combined with new ageing-related social expenditures financed exclusively by debt would have lasting detrimental effects on a crowding-out adjusted (debt/GDP) ratio. Yet it would not strongly depress French potential growth up to 2020. This result was obtained calibrating a standard analytical model on national accounts, and proven reasonably robust to changes in its parameterisation.

References

[1] Barsky, R., N.Mankiw, S.Zeldes (1986), "Ricardian consumers with keynesian propensities", *American Economic Review*, 76.

[2] Blanchard, O. (1985), "Debt, deficits, and finite horizons", *Journal of political economy*, 93.

[3] Elmendorf, D., and N. Mankiw (1999), "Government Debt", Chapter 25 in John B. Taylor and Michael Woodford (eds.), *Handbook of Macroeconomics*, Vol. 1, Amsterdam, Elsevier Science.

[4] European Commission (2003), "The sustainability of public finances based on the 2003 updates of stability and convergence programmes", *Public Finances in EMU.*

[5] Evans, P. (1991), "Is ricardian equivalence a good approximation?", *Economic Inquiry*, 29.

[6] Laubach, T. (2003), "New evidence on the interest rate effects of budget deficits and debt", *Finance and Economics Discussion Paper of the Board of Governors of the Federal Reserve System*, 2003-12.

[7] Mankiw, N. (2000a), "The savers-spenders theory of fiscal policy", *American Economic Review*, 90(2).

[8] Mankiw, N. (2000b), "The savers-spenders theory of fiscal policy: a correction", *mimeo*, (on his personal web-page).

[9] Oliveira Martins J., F.Gonand, P.Antolin, C.de la Maisonneuve and K.Yoo (2005), The impact of ageing on demand, factor markets and growth, *OECD Economics Department Working Paper*, 420.

[10] Dang Thai Than, P.Antolin and H.Oxley (2001), "Fiscal implications of ageing: projections of age-related spendings", *OECD Economics Department Working Paper*, 305.

[11] United Nations (2002), "World Population Prospects: the 2002 Revision", Department of Economic and Social Affairs.

(per cent, unless specified)	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Public deficit (% GDP)	-6.0	-5.5	-5.5	-4.1	-3.0	-2.7	-1.8	-1.4	-1.5	-3.3	-4.1
Stock of public debt (millions Euros)	498 907	552 970	645 308	691 804	741 607	777 266	792 078	812 116	838 707	897 473	992 081
Debt ratio (% GDP)	**45.3**	**48.4**	**54.6**	**57.1**	**59.3**	**59.5**	**58.5**	**57.2**	**56.8**	**58.8**	**63.7**
Variation of the debt ratio	**5.7**	**3.1**	**6.2**	**2.5**	**2.2**	**0.2**	**-1.1**	**-1.3**	**-0.3**	**1.9**	**4.9**
Contribution of public deficit	6.1	5.7	5.7	4.2	3.1	2.8	1.8	1.5	1.6	3.4	4.2
Contribution of net debt flows	0.3	-0.8	2.4	-0.2	1.0	0.1	-0.7	0.0	0.3	0.6	2.0
Contribution of GDP growth	-0.6	-1.8	-1.8	-1.5	-1.9	-2.6	-2.2	-2.7	-2.2	-2.0	-1.3
Changes in interests paid by governmen	**10.5**	**5.0**	**9.0**	**7.7**	**-3.0**	**1.1**	**-3.8**	**1.4**	**4.1**	**1.2**	**-1.6**
Contribution of the stock of public debt	16.1	10.8	16.7	7.2	7.2	4.8	1.9	2.5	3.3	7.0	10.5
Contribution of interests rate movement	-5.6	-5.9	-7.7	0.5	-10.2	-3.8	-5.7	-1.2	0.8	-5.8	-12.2
Average interest rate of public debt	7.8	7.4	6.9	6.9	6.2	6.0	5.7	5.6	5.7	5.4	4.8
GDP growth rate	1.4	3.8	3.4	2.6	3.2	4.4	3.8	4.8	3.9	3.5	2.0
Difference	6.3	3.4	3.4	4.2	2.9	1.6	1.8	0.8	1.7	1.8	2.7
Primary deficit (% GDP)	-2.5	-2.0	-1.8	-0.1	0.7	0.9	1.6	1.8	1.7	-0.1	-1.1
Primary stabilizing deficit (% GDP)	2.5	1.6	1.6	2.3	1.7	0.9	1.1	0.5	1.0	1.0	1.6
Stabilizing deficit (% GDP)	-1.0	-2.0	-2.1	-1.6	-2.0	-2.6	-2.2	-2.8	-2.3	-2.1	-1.4

Source: Insee (national accounts, 2003), author's calculations.

Figure 1: French public finances indicators

(per cent)	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Average
Total government revenues / total value added	46.3	46.8	47.6	48.1	49.8	50.2	50.2	51.0	50.2	49.8	48.9	**49.0**
Public debt / total stock of productive capital (net of depreciation)	13.8	15.7	17.1	19.4	20.2	21.1	21.5	21.3	20.6	20.5	21.2	**19.3**
Total business profits net of capital depreciation / total value added	25.2	24.8	25.3	24.9	24.2	24.2	24.7	24.3	24.2	23.8	23.8	**24.5**
Impact on the stock of productive capital of a marginal variation of the stock of public debt	**-0.47**	**-0.46**	**-0.49**	**-0.48**	**-0.47**	**-0.47**	**-0.49**	**-0.48**	**-0.47**	**-0.45**	**-0.44**	**-0.47**

Source: Insee (national accounts, 2003), author's calculations.

Figure 2: Impact on total stock of productive capital of a marginal variation of the stock of public debt

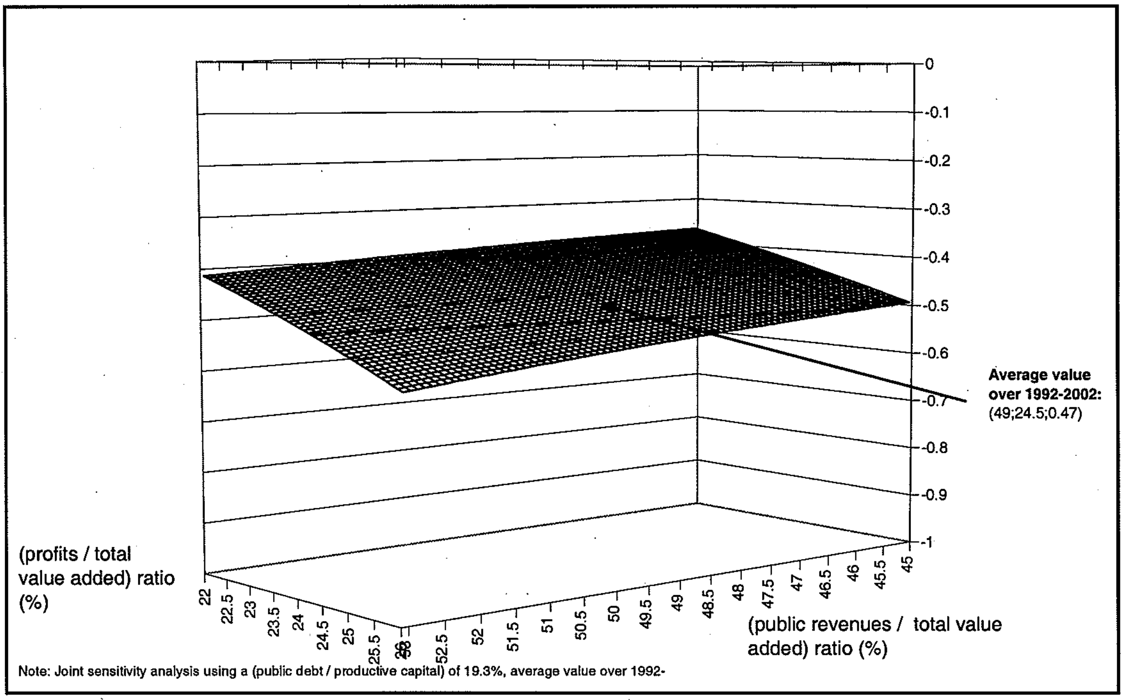
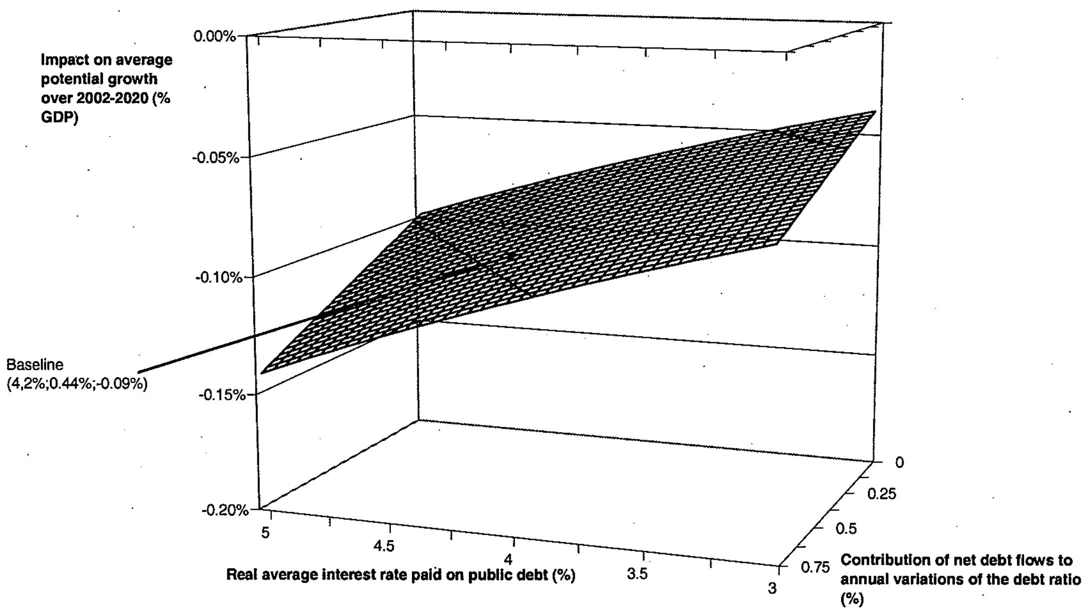


Figure 3: Joint sensitivity analysis on the derivative of productive capital with respect to public debt



Note: Joint sensitivity analysis carried out using a primary deficit/surplus equal to zero (excluding new ageing-related social expenditures).

Figure 4: Joint sensitivity analysis: impact on projected average potential growth of extreme values for (r) and (F)

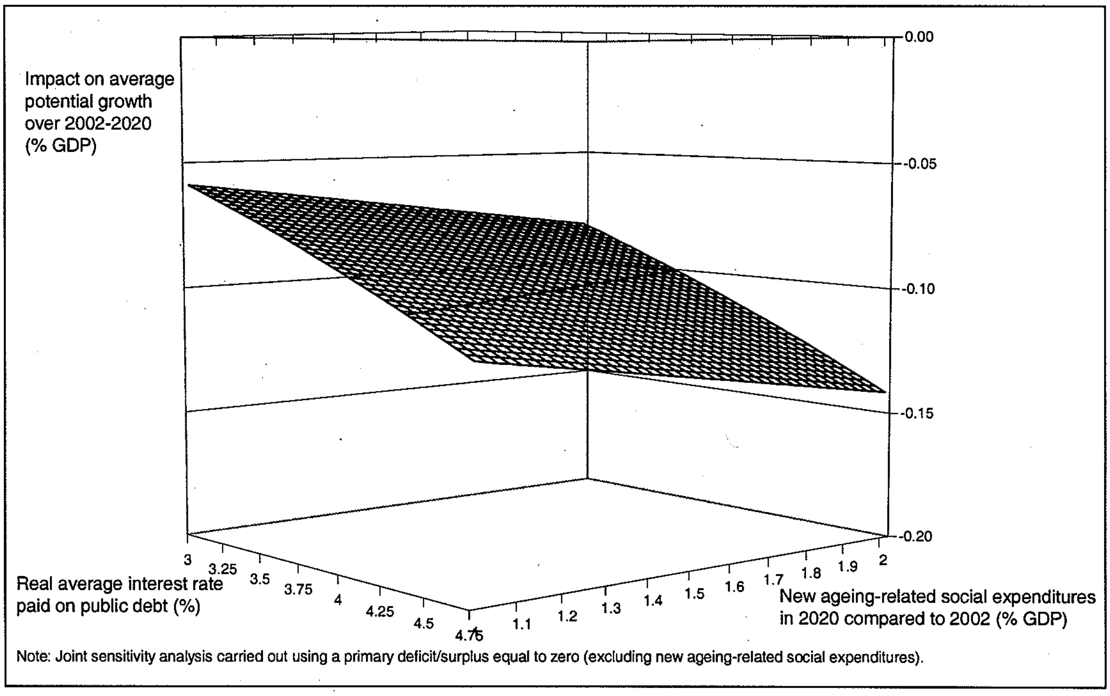


Figure 5: Joint sensitivity analysis: impact on potential growth of different assumptions as concerns new ageing-related social expenditures in 2020 and interest rate

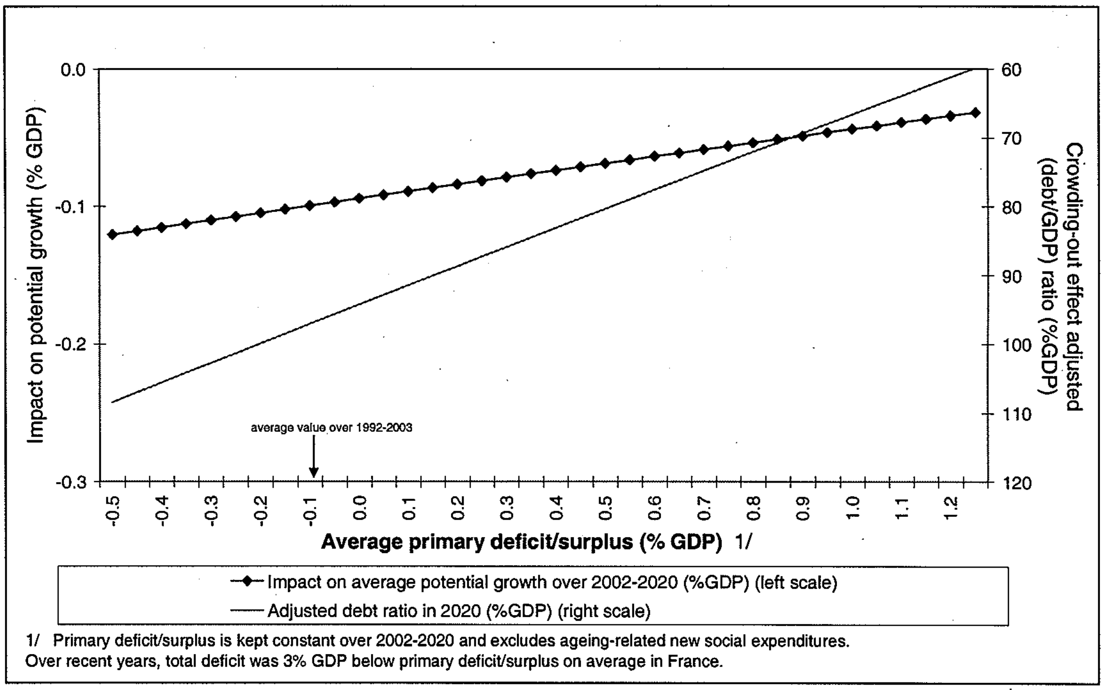


Figure 6: Impact on potential growth and crowding-out effect adjusted debt ratio of different future budget policies