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To: Members of the Executive Board
From: The Secretary
Subject: France - Selected Background Issues

The attached supplement to the paper on recent economic developments in France (SM/94/218, 8/16/94) provides additional background material to the staff report on the 1994 Article IV consultation discussions with France (SM/94/210, 8/9/94).

Mr. Bismut (ext. 34547), Mr. Levy (ext. 34158), Mr. Masson (ext. 37483), Mr. Moghadam (ext. 35333), or Mr. Ostry (ext. 37405) is available to answer technical or factual questions relating to this paper prior to the Board discussion.

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INTERNATIONAL MONETARY FUND

FRANCE

Selected Background Issues

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Approved by the European I Department

August 16, 1994

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I. Household Saving in France 1/

1. Introduction

After remaining stable for most of the 1970s, the household saving ratio in France began a steep decline at the beginning of the 1980s (see Chart 1). While a complete understanding of the factors underlying this decline is not yet available, a number of reasons have been put forward that are at least consistent with the observation of reduced saving. These include, *inter alia*, reductions in inflation, strong growth in household incomes, significant run-ups in asset prices (stock and house prices), and the process of financial deregulation and liberalization which may have permitted households that had been liquidity-constrained prior to deregulation to engage in consumer borrowing.

The negative trend in household saving that characterized most of the 1980s bottomed out by the end of 1987, by which time the household saving ratio had declined from about 19 percent of disposable income (its approximate level for most of the 1970s) to about 10 percent (Chart 1). Subsequently, the saving ratio began to increase steadily, reaching about 14 percent of disposable income by 1993. In the four-year period since 1989, the saving ratio increased by over 2 percentage points, a period during which inflation was subdued and income growth was relatively weak. Since these latter variables have tended to figure prominently in consumption/saving equations using French data 2/, the rise in household saving over the past four years is something of a puzzle. Moreover, the issue is not merely of concern to forecasters. Given the importance of household consumption in total demand, the increase in household saving during a period of weak activity is also an issue of considerable policy relevance.

A number of different hypotheses have been put forward to explain the recent behavior of household saving in France. 3/ One possibility is that the high real interest rates that have been associated with the disinflation process may have stimulated household saving. One problem with this explanation is that it has proved difficult to identify a significant and sufficiently large effect of interest rates on saving behavior using either French data or data for other OECD countries. 4/ Nevertheless, it is possible that higher real interest rates may have elicited some increase in saving, but that such effects cannot be identified by estimating standard equations using historical data. This might reflect the fact that it is only in the relatively recent period--that is after financial deregulation--

1/ Prepared by Jonathan Ostry and Joaquim Levy.

2/ See, for example, Sterdyniak (1987), Artus et. al. (1991), and Direction de la Prévision (1993).

3/ For a comprehensive summary, see Direction de la Prévision (1993).

4/ See Allard (1992) and the references therein for the French case, and Hall (1988), for example, for the United States.

that the interest elasticity of saving has turned significantly positive. 1/

A second possible explanation for the recent increase in saving might be wealth effects associated with asset price deflation. Indeed, the decline in saving during much of the 1980s was associated with a run-up in asset prices (stock and house prices), suggesting that wealth effects could have a role in explaining the more recent behavior of saving. In addition, there is some evidence that housing prices (at least in Paris) have dropped considerably since their peak in 1990, and real stock prices have also been relatively flat over this period. Thus, wealth effects may have played some role in accounting for the increase in saving over the past several years. However, an investigation of the importance of wealth effects in consumption has been hampered by a general paucity of data. While annual data on net wealth of households are available, the only wealth data available at a higher frequency appear to be stock prices. 2/

A third hypothesis that has been proposed to explain recent saving behavior relates to an increase in uncertainty which may have created a precautionary demand for saving. It has been argued that the main proximate cause of the increase in uncertainty is the sharp deterioration in labor market conditions in France. 3/ The importance of this explanation is difficult to gauge. In otherwise standard consumption equations, the unemployment rate (or rather its rate of change) has been found to have a statistically significant impact, which is consistent with the view that increases in uncertainty (proxied by the unemployment rate) lead to more saving. However, the empirical results from such regressions (see, for example, Direction de la Prévision (1993)) tend to suggest that the magnitude of the effect of this proxy for uncertainty on saving is too small to explain a sizeable proportion of the observed increase in saving in recent years.

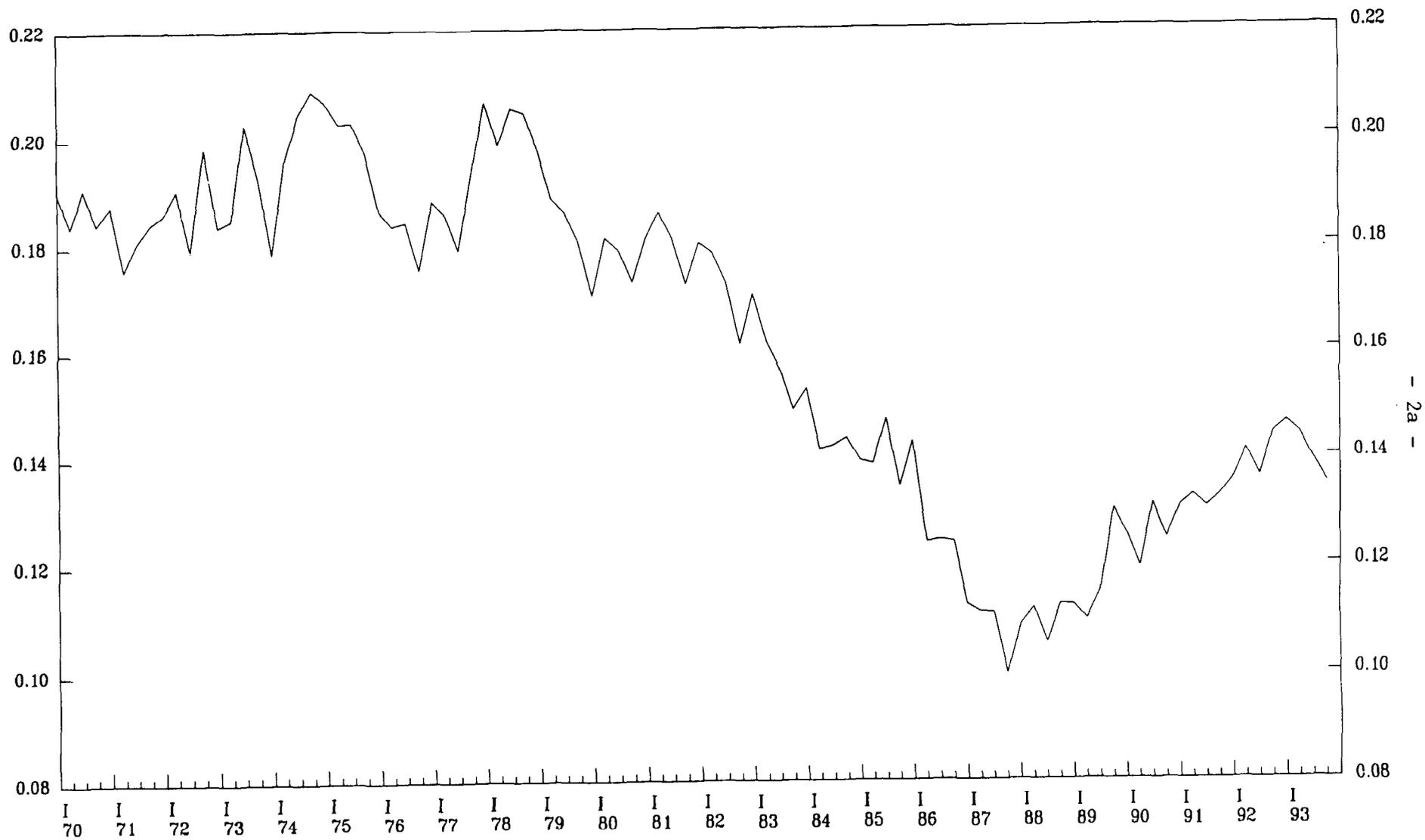
More fundamentally, in order to investigate whether uncertainty about future income prospects has been a significant, and quantitatively important, factor in accounting for saving behavior, it is obviously important to control for other relevant factors. This is especially important because unemployment--the chosen proxy in previous empirical investigations--may affect both expectations about the *variability* of future

1/ Such a view might be rationalized by a model in which, prior to deregulation, consumption growth matched income growth because consumers were liquidity constrained, but following deregulation, the share of liquidity-constrained consumers fell, increasing the sensitivity of consumption and saving to changes in the interest rate (see, for example, Campbell and Mankiw (1989)).

2/ As mentioned previously, a housing price index for Paris exists, but its reliability as a proxy for house prices in France remains in doubt.

3/ Uncertainty about whether the generosity of public pensions would be reduced may also have contributed to a precautionary demand for saving.

Chart 1. France: Household saving ratio





income (which determines the precautionary demand for saving) as well as expectations about the future level (or growth rate) of income. Controlling for expected future income growth is thus of primary importance in judging the importance of precautionary saving.

In this study, a simple model of saving behavior is proposed which allows one to measure households' expectations about future income growth. The basic idea of the model is that forward-looking agents save whenever they expect their income to decline (or not grow as quickly) in the future. In other words, households save for a rainy day. If income tomorrow is expected to be much lower than today (say, because, there exists a significant probability of becoming unemployed), then saving rises today in order to maintain consumption when income drops.

An issue that is central to testing the validity of the "saving for a rainy day" hypothesis is how to capture households' expectations about future income growth. In general, it is not enough to simply project current income growth on its past values and use the resulting coefficients to forecast the future course of income. This is because households will generally have more information about the future behavior of their incomes than is contained in its own past behavior, say because they have specific information about their future employment or income prospects.

Campbell (1987) has proposed a simple way to extract a measure of the future income growth expected by households based on the notion that households save for a rainy day. Applying this methodology to French data, it is possible to recover an actual time series of expected future income growth, which can then be compared with actual data on household saving. Plotting this expectations variable over time, one can get some idea of how well it tracks actual saving behavior. In addition, one can see how correlated the two time series (actual saving on the one hand and expected future income growth on the other) are.

The results suggest that actual saving in France over the period 1970-93 has moved very closely with the expected future income growth variable generated by the model. Over the entire sample, the correlation between saving and expected future income growth is about 0.99. Moreover, a simple time-series plot of the two variables shows that the expectations variable tracks saving well even in the more recent period (since 1989), a period during which alternative models appear to have gone off track.

One problem with the approach advocated by Campbell and others is that it assumes certainty equivalence. This means that expectations about unemployment, for example, will affect saving only by changing the expected time profile of incomes, but not by changing the expected variability of incomes. It is changes in this expected variance that generate a precautionary demand for saving. This demand arises because risk averse individuals who expect greater variance in their income streams wish to accumulate assets (save) as a means of insuring their consumption against adverse shocks (for example, becoming unemployed).

To allow for this possibility, the model proposed below considers effects on saving coming both from expectations about the level (or growth rate) of future income, and expectations about the future variability of income. The results suggest that while increases in this expected variance have generated some increase in saving over the past few years, the increase in precautionary saving has been small. 1/ For example, taking the last four years of our sample (the period during which questions have been raised as to the reasons for the increase in saving), about 95 percent of the change in saving accounted for by the model is explained by changes in the expected growth rate of income, with only 5 percent being accounted for by expected changes in the variability of income.

The remainder of this study is organized as follows. In the next section, a simple model of household saving behavior based on utility maximization under uncertainty is presented, and the testable implications of the model are spelled out. Empirical results applying this approach (referred to below as the "augmented" Campbell model--augmented to include the effects of precautionary saving) to French household saving data are given in Section 3. In view of the restrictiveness of the augmented Campbell model--according to which only the properties of the stochastic process followed by household labor income determine saving behavior, we consider in Section 4 more conventional saving equations where the explanatory variables include income, proxies for household wealth, real interest rates, inflation, etc. In presenting these results, effects of financial deregulation--which may have altered saving behavior in France over the past 10-15 years--are also considered. It is found that deregulation of financial markets has increased the sensitivity of household saving to changes in real interest rates. In the future, therefore, reductions in real interest rates are likely to elicit larger declines in the saving rate than they would have in the past, and vice-versa.

The main conclusions of this study are presented in Section 5. The technical aspects of the discussion are included in the Technical Appendix. Data sources are provided in the Data Appendix.

2. Analytical framework

The assumed framework involves a representative household which maximizes the discounted sum of current and expected future utilities over an infinite horizon subject to a sequence of budget constraints (one corresponding to each time period) and a transversality condition which rules out Ponzi-type schemes. Under certainty equivalence, consumption is proportional to permanent income. Saving, in such a world, will equal the expected present value of future declines in labor income. A shock that is expected to lower future income relative to current income raises saving, and vice-versa.

1/ Statistically, the effect is insignificant.

When the assumption of certainty equivalence is abandoned, the *riskiness* of future income has an additional and distinct effect on saving over and above the effect of shocks to the *level* of future income. To see this, recall that from Hall (1978), who assumed certainty equivalence, consumption follows a process such that its first difference equals the innovation to lifetime income, ξ , given by

$$(1) \quad \xi_t = \frac{r}{(1+r)} \sum_{j=0}^{\infty} \frac{1}{(1+r)^j} (E_t y_{t+j} - E_{t-1} y_{t+j}),$$

where y denotes real household labor income, r is the real interest rate (assumed fixed and known), and E_t denotes the expectations operator conditional on information at time t . With precautionary saving, however, the first difference of consumption will also depend on the variance of ξ_t , denoted $\sigma_{\xi_t}^2$. Specifically, an increase in the variance of the innovation in lifetime income creates a precautionary demand for saving. This reflects the fact that households wish to accumulate assets as a means of insuring their consumption streams against potentially large adverse shocks. As shown in the appendix, the solution for the saving function under the assumption of a constant-absolute-risk-aversion (CARA) utility function is:

$$(2) \quad s_t^* = - \sum_{j=1}^{\infty} \frac{1}{(1+r)^j} (E_t \Delta y_{t+j}) + \frac{\alpha \rho \sigma_{\xi_t}^2}{2[r+(1-\rho)]}$$

where s_t^* denotes real household saving at time t ; Δ denotes the (backward) difference operator; α denotes the degree of risk aversion; and ρ denotes the degree of persistence of the shocks to the variance of lifetime labor income.

The first term in equation (2) is the certainty-equivalent portion of saving, which is equal to the expected present value of future declines in labor income. Intuitively, if some shock causes expected future income to decline (relative to its current level), then saving increases today so that consumption can be maintained in the future. The second term in equation (2), which is absent from models which impose certainty equivalence, captures the precautionary saving motive. When there is a shock to the variance of ξ , precautionary saving increases in line with both the degree of risk aversion (α) and the persistence of the shock (summarized in the parameter ρ). 1/ The intuition is that an increase in the variability of income creates a demand by risk averse consumers to accumulate assets as a means of insuring themselves against potentially adverse shocks in the future.

To implement the model empirically, it is necessary to estimate the expected present value of future declines in labor income (the first term in equation (2), which is denoted by pdv_t below) as well as the variance of the

1/ Innovations to the variance process that die out quickly (low value of ρ) will have little effect on precautionary saving, while shocks to the variance that are permanent (as in the random walk case of $\rho = 1$) will have larger effects on saving.

innovation in lifetime income, denoted $\sigma_{\xi_t}^2$. One way of doing this would be to estimate a univariate process for labor income and obtain pdv_t and $\sigma_{\xi_t}^2$ from the resulting parameters. One problem with such an approach is that it ignores information that households may use in forecasting the future behavior of income, other than its own past history. 1/ In particular, as Campbell (1987) showed, saving itself should be a useful predictor of the future course of income if individuals in fact "save for a rainy day."

In line with Campbell's work, the procedure followed here is to estimate a first order bivariate vector autoregression (VAR) in the first difference of labor income and the level of saving: 2/

$$(3) \quad \begin{bmatrix} \Delta y_t \\ s_t \end{bmatrix} = \begin{bmatrix} \psi_{11} & \psi_{12} \\ \psi_{21} & \psi_{22} \end{bmatrix} \begin{bmatrix} \Delta y_{t-1} \\ s_{t-1} \end{bmatrix} + \varepsilon_t$$

In equation (3), a deterministic (linear) trend is removed from the saving data to allow for "consumption-tilting" behavior in response to differences between the rate of interest and the rate of time preference. 3/ The parameter estimates from the VAR allow us to retrieve an estimate of the present discounted value of future declines in labor income (the first term in equation (2)). In addition, an estimate of the variance of the innovation to lifetime labor income (second term in equation (2)) can be obtained from the VAR residuals.

3. Empirical results for the augmented Campbell model

This section considers the role of expected future income growth in accounting for household saving behavior in France, abstracting in the first instance from the precautionary saving motive. A second part considers the empirical results for the full augmented model which includes precautionary saving.

1/ One consequence of this would be that the extent of uncertainty (captured by $\sigma_{\xi_t}^2$) would tend to be overestimated relative to the case in which forecasts were based on the complete information set of households.

2/ The Schwartz-Bayes Information Criterion (SBIC) was used to determine the order of the VAR.

3/ As pointed out by Caballero (1990), any divergence between the interest rate and the subjective rate of time preference will introduce a trend into the saving function. This deterministic trend in saving is removed prior to estimation of the VAR. Although the model identifies the trend in saving with consumption tilting dynamics related to divergences between the interest and time preference rates, more generally it could capture other deterministic factors as well.

a. Saving and expected future income

Abstracting from the precautionary motive, equation (2) shows that saving should be equal to the expected present value of future declines in labor income, which is denoted by pdv_t . Since by definition,

$$(4) \quad pdv_t = - \sum_{j=1}^{\infty} \frac{1}{(1+r)^j} (E_t \Delta y_{t+j}),$$

the parameters of the VAR defined by equation (3) may be used to obtain an estimate of pdv_t . Specifically, denoting the matrix of coefficients in (3) by Ψ , and defining the vector $\mathbf{x}_t = [\Delta y_t, s_t]$, the matrix equation (3) may be written more compactly as

$$\mathbf{x}_t = \Psi \mathbf{x}_{t-1} + \varepsilon_t.$$

The k -step ahead expectation is simply

$$E_t \mathbf{x}_{t+k} = \Psi^k \mathbf{x}_t$$

so that

$$(5) \quad pdv_t = -[1 \ 0][\Psi/(1+r)][I - \Psi/(1+r)]^{-1} \mathbf{x}_t = \Gamma \mathbf{x}_t,$$

where Γ is thus a (nonlinear) function of the VAR parameters. 1/ The time series of pdv_t obtained in this manner can then be compared to actual data on saving to determine whether expectations of future income growth are indeed an important determinant of household saving behavior, as implied by the model.

Table 1 presents the coefficient estimates for the VAR. The main coefficient of interest in this table is the effect on (the first difference of) labor income of lagged saving. 2/ As long as households have more information about the future course of income than is contained in its past history, this coefficient should be negative and statistically significant. In other words, saving should anticipate future declines in labor income. As can be seen, the coefficient is estimated at -0.046, and thus has the sign predicted by theory. Moreover, at the 10 percent level, the coefficient is significantly different from zero. Thus, saving indeed appears to Granger-cause subsequent declines in household labor income.

1/ Γ also depends on the interest rate, r . In all calculations, an annual real interest rate of 4 percent was assumed. The results are insensitive to annual interest rates in the range 2-6 percent.

2/ As described in the Data Appendix, the saving data used in this study are calculated as household disposable income minus household consumption. Labor income, however, is only available on a gross basis. See Bloch and Maurel (1991) for previous estimation of Campbell's model using similar data.

Using the formula given in equation (5), one can compute the entire time series of pdv_t . Chart 2 plots both the time series of the expected present value of future declines in labor income (pdv_t) and the detrended level of saving over the period 1970:1-1993:2. ^{1/} As can be seen, overall

Table 1. VAR Parameters and Implications for Γ Vector

a. VAR Parameters

(Row variable regressed on column variable)

	Δy_{t-1}	SE	s_{t-1}	SE
Δy_t	0.17	0.10	-0.046*	-0.025
s_t	0.07	0.17	0.91**	0.04

b. Implications for Γ Vector

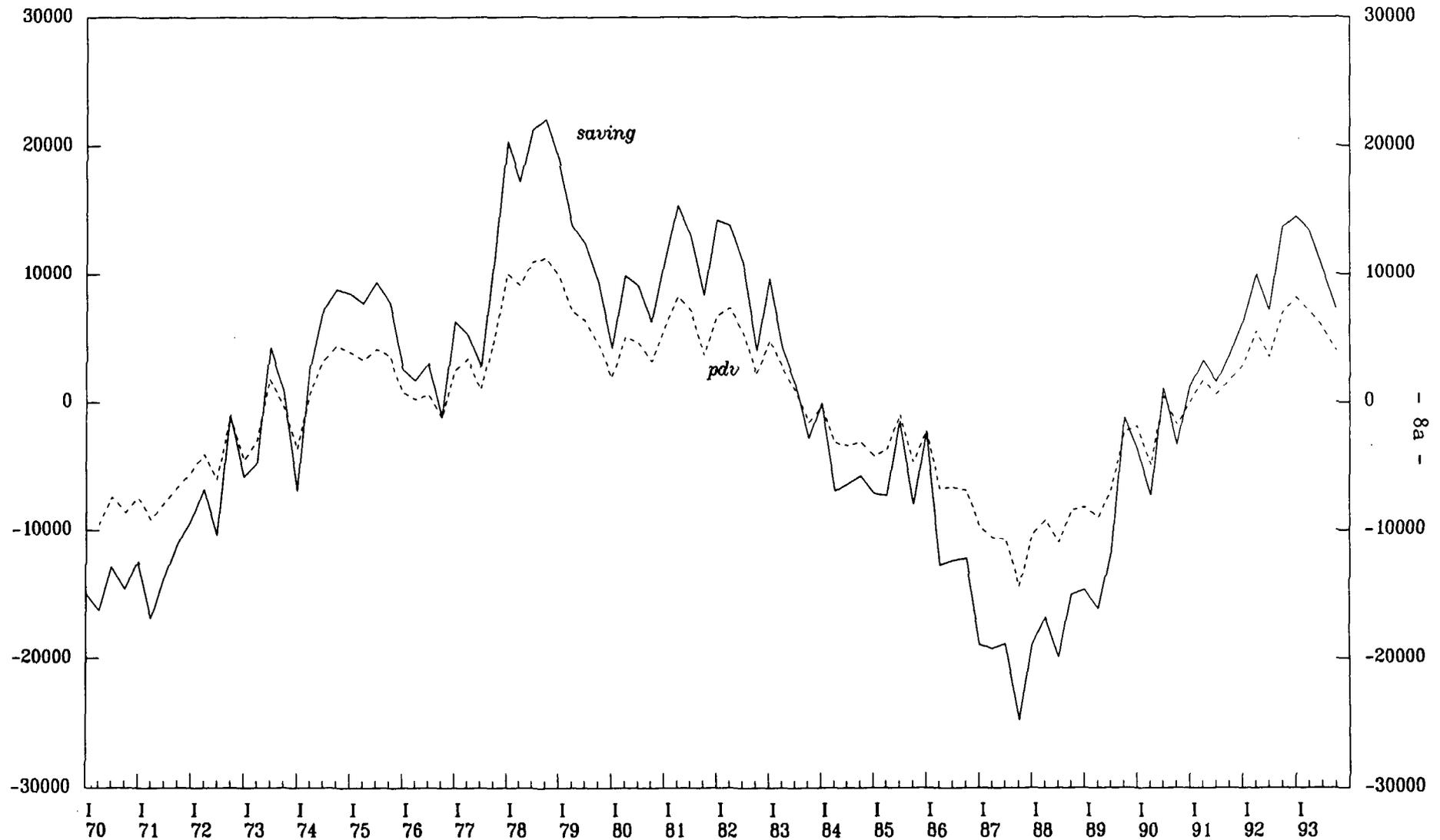
	Γ_y	SE(Γ_y)	Γ_s	SE(Γ_s)
	-0.15**	0.075	0.53**	0.20

Notes: Sample: 1970:3-1993:4; * (**) denotes significance of the coefficient at the 10 percent (5 percent) level.

the series labelled pdv tracks household saving reasonably well throughout the period. Indeed, the correlation between the two time series--at about 0.99--is very high, suggesting that even this simple model provides a reasonable starting point for describing household saving behavior in France. Perhaps more interesting is the fact that the expected present

^{1/} The time series on pdv is obtained according to the formula given in equation (4) above. The results for the Γ vector are presented in Table 1b.

Chart 2. Detrended household saving^{1/} and the expected present value of future declines in labor income (pdv).



1/ Household saving with a linear trend removed (see text).



value term picks up the increase in saving since 1987, and tracks the actual variable very well during the last few years, a period during which traditional saving regressions have apparently performed poorly. 1/

b. Incorporating precautionary saving: the augmented model

The above discussion suggested that expected future income appears to have been an important determinant of household saving behavior in France, including in the more recent period in which the increase in saving until 1993:1 has been associated with reductions in expected future income growth, and the subsequent reduction in saving in the course of 1993 has occurred alongside improved household expectations of future income and hence a reduction in "rainy-day" saving (Chart 2). 2/ These changes in expectations may reflect a number of different factors, including perceived changes in labor market conditions, or perhaps a changing assessment of productivity growth over the medium term.

In addition to the expected level of future income, it is possible that income's future variance played some role in the recent behavior of saving, along the lines of the precautionary saving hypothesis. Recalling the definition of the innovation to lifetime income (ξ_t) given previously in equation (1), we have

$$\begin{aligned}
 (6) \quad \xi_t &= \frac{r}{(1+r)} \sum_{j=0}^{\infty} \frac{1}{(1+r)^j} (E_t y_{t+j} - E_{t-1} y_{t+j}) \\
 &= \frac{r}{(1+r)} \sum_{j=0}^{\infty} \frac{1}{(1+r)^j} [1 \ 0] \sum_{i=0}^j \Psi^i \varepsilon_{t-i} \\
 &= [1 \ 0] [I - \Psi/(1+r)]^{-1} \varepsilon_t
 \end{aligned}$$

where the second equality follows from the VAR. Given ξ , its instantaneous variance, period by period, may be calculated by simply squaring the

1/ Saving began to turn down in the second quarter of 1993. This turning point is also captured by the model, and suggests that part of the reason for reduced household saving is related to an improvement in the outlook for future income, and thus to a reduction in the extent to which households are saving for a rainy day.

2/ It should be noted that an increase in pdv implies that households have reduced their forecast of the expected future growth of labor income, which causes them to increase their saving. Conversely, in the last few quarters of the sample, an improved outlook for the future course of labor income may have contributed to a reduction in household saving.

expression in (6), yielding a time series $\sigma_{\xi_t}^2$. 1/ Once this is done, one can run (following equation (2)) a regression of the form

$$(7) \quad s_t = a_0 + a_1 pdv_t + a_2 \sigma_{\xi_t}^2 + u_t,$$

where, under the null, $a_1 = 1$ and $a_2 = \frac{\alpha\rho}{2[r+(1-\rho)]} > 0$. 2/ Thus, saving

should be equal to a term which depends on expected future income growth, and a term which depends on the variability of the innovation to lifetime income, where the importance of the latter depends on the degree of risk aversion and on the persistence of the shocks to the variance.

In equation (7), the pdv variable will be correlated with the error term u_t , indicating that Ordinary Least Squares is inappropriate. To overcome this problem, an instrumental variables procedure is used, where the instruments consist of two lags each of saving and the variance, as well as the first difference of income. The following results were obtained:

$$(8) \quad s_t = 118.82 + 1.85 pdv_t + 0.000071 \sigma_{\xi_t}^2$$

(524.76) (0.023*) (0.000047)

$$R^2 = 0.98 \quad SER = 1320.94 \quad \text{Sample: 1970:3-1993:4}$$

where the numbers below the coefficient estimates are the heteroscedastic-consistent (White) standard errors, and * denotes significance of the coefficient at the 5 percent level.

As can be seen, both coefficients have their theoretically predicted signs, although only the pdv variable is significantly different from zero. 3/ Nevertheless, the explanatory power of the regression is high, with the regressors explaining about 98 percent of the variance in saving. It is also clear that the coefficient on pdv is significantly above unity (its value under the null), suggesting that there is some excess sensitivity

1/ An alternative way of obtaining $\sigma_{\xi_t}^2$ would have been to estimate the VAR using an ARCH procedure. The problem with implementing this approach was that the numerical algorithm used to calculate the time-varying component of the variance did not converge. For a previous attempt at using the method proposed here to estimate the variance, see Ghosh and Ostry (1994); see also de Grauwe (1987).

2/ The constructed regressor, $\sigma_{\xi_t}^2$, depends on the coefficient estimates obtained from the VAR, which are consistently estimated even in the presence of heteroscedasticity.

3/ The interpretation would be that the role of our proxy for time-varying uncertainty in generating a precautionary demand for saving is small, possibly reflecting low persistence of variance shocks. In contrast, the role of the saving for a rainy day term--captured by pdv--is highly significant.

of household saving to movements in expected changes in labor income. 1/
In contrast, the coefficient on the variability of income, although
correctly signed, is small. 2/

To get some indication of the relative importance of the two variables,
one can decompose the movement in saving into a proportion due to changes in
the pdv variable and another due to changes in the variance. Considering
the last four years of the sample as the period to be explained, 3/
equation (9) reveals that about 5 percent of the explained change is
accounted for by the precautionary saving term, and the balance (95 percent)
is accounted for by changes in the expected growth of household income (the
pdv term in equation (8)).

4. Other determinants of saving behavior

The previous section has sought to address the importance of expected
income growth and variability within the context of an augmented permanent
income model of consumption and saving. In such a model, saving depends
exclusively on the stochastic properties of the underlying process for labor
income. In alternative models, however, there is room for other variables
to affect consumption and saving behavior. In this section, the effects on
saving of some of these other variables are considered.

For one thing, the model of the previous section assumed an infinite
horizon, in line with permanent income theory. In a life-cycle, overlapping
generations (OLG) model, however, saving, in addition to its dependence on
income growth and wealth, may be related to demographic factors. Further,
the model of Section 3 assumed a constant real interest rate. This
assumption was necessary in order to obtain a closed-form solution for the
saving function (see Caballero (1990)). More generally, however, one may
wish to allow for an effect of interest rate changes on saving, although the
sign of this effect is ambiguous *a priori* since it depends on the

1/ The excessive variability of saving (excessive, that is, in light of
actual shocks to pdv) may reflect an omitted variable. It is possible, for
example, that, in addition to the stochastic process for labor income,
saving behavior in France may have been influenced by a number of different
factors, including institutional changes relating to the deregulation of the
financial sector, which cannot easily be accommodated within the formal
permanent income model developed in this section. This issue is
investigated below in Section 4.

2/ To the extent that time-varying uncertainty has played only a limited
role in saving behavior in France, the relevant model would be Campbell's
unaugmented version, as reported in Table 1. It may be noted that the χ^2
test for the strong implications of the model (essentially the restrictions
on the Γ vector reported in Table 1b) is equal to 8.23, which does not
reject the model at the 1 percent level.

3/ All changes are relative to the average value of the variables during
the entire sample excluding the last four years.

interaction between an income and a substitution effect. Finally, inflation is often thought to be an important determinant of household saving because households need to put aside part of their income to maintain the real value of imperfectly indexed financial assets whenever there are price increases.

In addition to income growth, wealth, the real interest rate, inflation, and demographic factors, it is plausible to argue that the behavior of saving has been influenced by the process of financial deregulation that many industrial countries undertook during the 1980s. According to one view, financial deregulation may have reduced the incidence of liquidity constraints in the economy, and hence may have contributed to an autonomous reduction in saving as previously liquidity-constrained households were able to borrow against their future labor income. In addition, as the proportion of liquidity-constrained households declines, one might expect to see an increase in the sensitivity of aggregate saving to changes in the real interest rate, since a greater proportion of households would be in a position to optimize intertemporally. 1/

Indeed, during the 1980s, France, like some other industrialized countries, undertook a number of significant reforms of its financial sector. Liberalization took place along three main tracks. The first involved the establishment and regulation of markets for new products such as futures, options, and commercial paper, the overhaul of stock exchange regulations, and the progressive liberalization of foreign exchange markets. The second track sought to modernize public debt management in order to increase the liquidity of government paper and foster the expansion of financial markets. The final track--which is perhaps the most relevant for the purpose of this study--was aimed at households and involved the regulation of mutual funds and other saving instruments, as well as the liberalization of banking credit. 2/ 3/

In line with other life-cycle OLG models, therefore, the specification proposed in what follows allows for the traditional effects of income

1/ For a justification of this view, see, for example, Campbell and Mankiw (1989).

2/ Changes in public debt management--particularly the practice (adopted after 1985) of auctioning public debt--also affected household saving behavior by contributing to the market-determination of interest rates.

3/ The growth of mutual funds in France dates from the early 1980s and was initially due to interest rate ceilings imposed in 1981, being strengthened over the past decade by a series of fiscal incentives (Zerah (1993)). As regards liberalization of banking, the Banking Law of 1984 removed most of the distinctions between commercial and merchant banks and was followed by the abandonment of direct credit controls (encadrement) in 1986. This liberalization had a particularly strong effect on consumer credit (crédit de trésorerie), the stock of which doubled between 1986 and 1989. For details of the financial deregulation process in France, see Pilverdier-Latreyte (1988), Vincent (1993), and Zerah (1993).

growth, wealth, interest and inflation rates, and demographic factors, as well as the less standard--but potentially no less important-- effects coming from the financial deregulation side. 1/ Following a number of authors (see, for example, Jappelli and Pagano (1994)), the proxy for financial deregulation used here is the outstanding stock of consumer credit. The hypothesis is that increases in this proxy for deregulation should be associated with decreases in saving. In addition, the possibility that financial deregulation increases the sensitivity of saving to changes in the real interest rate is also allowed for in the specification.

The proposed saving model may be written as follows:

$$(9) \text{ sratio}_t = \beta_0 + \beta_1 \hat{y}_t + \beta_2 \text{dem}_t + \beta_3 \text{ap}_t + \beta_4 r_t + \beta_5 \hat{p}_t + \beta_6 d_t + \beta_7 d_t * r_t + u_t$$

where sratio is the household saving ratio; 2/ \hat{y} denotes the growth of real household disposable income; dem are demographic factors measured as the sum of the population aged under 20 and aged over 60 to the total population; ap represent asset prices which are proxied by the stock index divided by the consumption deflator; 3/ r is the real (short-term) interest rate; \hat{p} is the inflation rate; d is the proxy for financial deregulation: it is equal to the ratio of the outstanding stock of consumer credit to GDP rescaled to vary between zero and unity; 4/ and u is a stochastic disturbance.

Given the previous discussion, our priors are that $\beta_1, \beta_5, \beta_7 > 0$, and $\beta_2, \beta_3, \beta_6 < 0$. The sign of β_4 depends on the interaction between an income and a substitution effect, and is therefore unknown a priori. Because a number of the variables on the right hand side of equation (9) are likely to be endogenous, it is necessary to use an instrumental variables procedure.

1/ For a nice exposition of the life-cycle OLG model, see Modigliani (1986).

2/ The dependent variable in the model of Section 3 was the level of saving, rather than the saving ratio. This reflected mainly analytical tractability since, in the model of Section 3, saving (rather than the saving ratio) could be shown to be a function of the expected present value of future declines in labor income. The solution for the saving ratio in the permanent income model as a function of the expected present value of future declines in the *log* of labor income is only an approximation (see Campbell and Deaton (1989)).

3/ Asset prices are included here as a proxy for household wealth. For a previous use of this proxy in a saving equation for the United Kingdom, see Bayoumi (1993).

4/ The value of the proxy for deregulation peaks in 1990:4. It is assumed to be equal to its maximum value (unity) in the remaining two years of the estimation. This assumption has no significant effect on any of the results reported below. Finally, an alternative proxy for financial deregulation would be the ratio of consumer credit to total bank credit. Using this alternative proxy produced results that are virtually identical to those reported below.

be endogenous, it is necessary to use an instrumental variables procedure. The instrument set consisted of a constant, the demographic variable (assumed exogenous), the lagged stock price index, the lagged value of the proxy for financial deregulation (the rescaled consumer credit to GDP ratio), and six lags each of income growth, inflation, and the proxy for financial deregulation times the real interest rate (the interactive dummy variable appearing as the last argument in equation (9)). 1/ The following results were obtained: 2/

$$(10) \quad \text{sratio}_t = 0.29 + 0.15\hat{y}_t - 0.20\text{dem}_t - 0.00040\text{ap}_t - 0.76r_t \\ (0.21) (0.08^*) (0.42) (0.00016^*) (0.21^{**}) \\ + 0.19\hat{p}_t - 0.13d_t + 2.21d_t * r_t \\ (0.09^*) (0.031^{**}) (0.39^{**})$$

$$R^2 = 0.80 \quad \text{SER} = 0.017 \quad \text{Sample: 1971:4-1993:3}$$

$$\chi^2(\text{instruments}) = 6.56 - \chi^2(14) \quad \chi^2(\text{auto}) = 3.29 - \chi^2(4)$$

where standard errors (in parentheses below the corresponding coefficients) are (White) heteroscedastic-consistent, and * (**) denotes significance of the coefficient at the 5 percent (1 percent) level. As can be seen, all of the parameter estimates have their theoretical signs. In particular, an increase in the growth rate of real household disposable income, an increase in the ratio of the active to the total population, a decrease in asset prices and an increase in inflation all contribute to an increase in the saving ratio. Moreover, with the exception of the demographic variable, all the effects are statistically significant at standard levels. 3/ Further, the data suggest that an increase in the real interest rate in the period before deregulation lowers saving, i.e., that the income effect outweighs the substitution effect, a finding that is at least consistent with other studies using French data. 4/

The regression results also shed light on the impact of financial deregulation on saving. First, as financial deregulation (proxied by the consumer credit to GDP ratio) progressed, the autonomous component of saving fell, as shown by the negative coefficient on d_t in equation (10). In

1/ The adequacy of the instrument set is discussed below.

2/ Although the estimation was conducted using quarterly data, the magnitude of the coefficients on income growth, inflation, and the real interest rate reflects the fact that these variables were expressed at annual rates.

3/ The insignificance of the demographic variable was not altered by introducing as separate regressors its two components.

4/ See, for example, Bloch and Maurel (1991), who report results for the effects of interest rate changes on saving in a model which abstracts from the effects of financial deregulation.

addition, financial deregulation also appears to have increased the interest sensitivity of saving. This can be seen by the fact that β_7 in equation (10) is significantly positive. Specifically, by the early 1990s, when the proxy for financial deregulation reaches its maximum value (unity), the interest (semi-) elasticity of saving rises to 1.45 (= 2.21-0.76). One possible interpretation is that financial deregulation reduced the prevalence of liquidity constraints among French households, which resulted in an increase in the responsiveness of saving to interest rate changes. 1/

Together, the determinants of saving captured in equation (10) account for about 80 percent of the variation in the dependent variable over the sample. Furthermore, a χ^2 test for (up to) fourth order serial correlation fails to reject the null of serially uncorrelated residuals. In addition, a Sargan test for the adequacy of the instruments (referred to above as χ^2 (instruments)) does not reject the null that the chosen instruments are indeed independent of the structural error term. Both of these results indicate that the simple *static* specification adopted in (10) is indeed sufficient to account for saving behavior over the sample.

Using the coefficient estimates, it is possible to give an indication of the relative importance of the various independent variables in accounting for changes in the saving ratio. The equation should be particularly useful in quantifying the effects of financial deregulation, which have been emphasized in explanations of developments during the 1980s. To take an example, during the 1980s, the household saving ratio fell by about 6 percentage points, from about 17 1/2 percent in 1980 to about 11 1/2 percent in 1989. Decomposing this change into its various components reveals that demographic changes contributed virtually nothing to the change in saving over this period. Much more important were wealth effects--there was a substantial run-up in stock and other asset prices--which contributed about 3 percentage points of the observed decline in saving, and the decline in inflation (which contributed about 1 1/2 percentage points of the observed decline). In addition, there was a small effect, in the opposite direction, of income growth, which contributed *positively* to saving over the period, increasing the saving ratio by about 1/2 percentage point. The remainder of the change in the saving ratio was captured by increases in real interest rates and the financial deregulation variable, both directly and via its effect in boosting the interest sensitivity of saving. 2/

1/ Bayoumi (1993) also finds that financial deregulation in the United Kingdom raised the interest sensitivity of saving. His results suggest an interest semi-elasticity of saving above 4.0 in the period after deregulation.

2/ Recall that once the effect of financial deregulation on the interest sensitivity of saving is allowed for, the estimated effect of an increase in the real interest rate on saving is positive.

Together, the interest rate and financial deregulation variables explain about 3 percentage points of the decline in the saving ratio. 1/

5. Conclusions

This study has attempted to assess the relative importance of a number of factors in the recent behavior of household saving in France. In the first part, an attempt was made to determine how household expectations about the future course of income--both its level and its variability--have influenced consumption/saving decisions. Under the permanent income theory modified to include the effects of precautionary saving, it was argued that saving should depend negatively on the expected future growth rate of labor income--the "saving for a rainy day" hypothesis--and positively on the variance of the innovation to lifetime income--the precautionary saving motive. Thus saving should increase whenever households receive information which causes them to revise downwards their view of future income growth, or when they perceive an increase in uncertainty about their future income prospects.

The resulting model of household saving was estimated using quarterly data over the period 1970-1993 and was found to fit the data reasonably well. In particular, the role of expected future income growth was emphasized, as it was shown to be highly correlated with actual saving developments over the entire sample. Thus, the model suggested that the increase in saving observed over the past few years may be due to a less optimistic outlook for expected future income, which in turn may be related to developments in the labor market. As the outlook improves, "rainy-day" saving should begin to decline, something which already appears to be occurring according to the most recent saving data for the second half of 1993. Finally, although the variability of future income (the precautionary saving effect) was found to enter the augmented saving model with the correct sign, it was not statistically significant, suggesting perhaps that the standard (unaugmented) permanent-income model may be just as good as the augmented model in accounting for saving behavior in the French case. 2/

Although permanent-income (PI) models of consumption emphasize the role of the stochastic process for labor income in saving determination, it may be unduly restrictive to ignore the effects of institutional changes--including the important effects of financial deregulation--which are difficult to accommodate within the formal PI approach. In the second part of this study, therefore, the role of a number of additional variables was

1/ As can be seen, the sum of these changes exceeds (by about one percentage point) the actual decline in saving observed over the period. Obviously, this reflects the fact that the fit of the regression is not perfect, so that the predicted decline in saving was larger than the actual decline.

2/ For an empirical evaluation of the augmented Campbell model for a number of industrial countries, see Ghosh and Ostry (1992).

investigated. Perhaps the most significant finding to emerge from this analysis is the important role of financial deregulation in household saving, particularly during the 1980s. It would appear that such deregulation not only directly encouraged pro-borrowing activity by French households, but also increased the sensitivity of household saving to interest rate changes, perhaps reflecting the reduced incidence of liquidity constraints in the general population. Thus, while the consensus from previous studies using historical data has been that an increase in interest rates will have a negligible--or even perverse 1/--effect on saving, the results here suggest that these studies may have been flawed to the extent that they ignored the potential effects of financial deregulation. The decline in real interest rates that has occurred since early 1993 may therefore help to explain the fall in the saving rate that has recently occurred. In the future, reductions (increases) in real interest rates are likely to bring forth a larger drop (rise) in the saving rate than they would have in the past.

1/ That is, the income effect outweighs the substitution effect.

Technical Appendix

The analytical framework on which the discussion in Sections 2 and 3 is based assumes a representative agent who maximizes the expected value of the discounted sum of current and future utilities subject to a series of dynamic budget constraints and a transversality condition which rules out Ponzi-type schemes. Thus, the agent maximizes:

$$(A1) \quad \sum_{t=0}^{\infty} \beta^t E\{u(c_t)\},$$

where β is the subjective discount factor, $u(\cdot)$ is the instantaneous utility function, and c_t denotes consumption. In addition to the transversality condition, consumers' decisions must satisfy their dynamic budget constraints, which hold that in any period t :

$$(A2) \quad b_{t+1} = (1+r)b_t + y_t - c_t,$$

where b_t denotes financial assets at time t , y_t denotes real labor income, and r denotes the exogenous real interest rate. For the purpose of empirical implementation, a constant-absolute-risk-aversion (CARA) form of the instantaneous utility function is adopted:

$$(A3) \quad u(c_t) = -(1/\alpha)e^{-\alpha c_t},$$

where $\alpha > 0$ denotes the Arrow-Pratt measure of (absolute) risk aversion.

Under the simplifying assumption that the interest rate is equal to the rate of time preference, 1/ the first order necessary condition is given by:

$$(A4) \quad e^{-\alpha c_t} = E_t e^{-\alpha c_{t+1}}.$$

This condition states that the marginal utility cost of giving up one unit of consumption at time t should be equated to the expected utility gain from consuming one more unit at $t+1$. Alternatively, dividing the left hand side of (A4) by the right hand side, the condition states that the intertemporal marginal rate of substitution should equal the ratio of the prices of present and future consumption, which is unity here.

1/ This assumption is not restrictive since, as indicated in the text, the effect of any difference between the rate of interest and the rate of time preference is taken into account in the estimation. Specifically, as explained in Caballero (1990), if the interest rate differs from the rate of time preference, there will be a deterministic trend in the saving function. Such a trend is taken into account in the empirical work by removing a deterministic (linear) trend from the saving data prior to estimation of the VAR.

It is assumed that the variance referred to in equation (1) follows an AR(1) process with parameter ρ . 1/ To solve for the consumption function, a "guess and verify" method is used. Our guess for the consumption process is:

$$(A5) \quad c_t - c_{t-1} = \xi_t + \Lambda_{t-1} - w_t/[r+(1-\rho)]$$

where ξ_t is the innovation in life-time labor income,

$$(A6) \quad \xi_t = \frac{r}{(1+r)} \sum_{j=0}^{\infty} \frac{1}{(1+r)^j} (E_t y_{t+j} - E_{t-1} y_{t+j}),$$

Λ_{t-1} is the stochastic slope of the consumption path between periods $t-1$ and t , which depends on the variance of ξ_{t-1} , denoted $\sigma_{\xi_{t-1}}^2$; and w_t is the innovation to Λ_t . 2/ Intuitively, under certainty equivalence, the first difference of consumption would just be equal to ξ_t . When certainty equivalence is not imposed, however, there are two additional terms, which reflect precautionary saving behavior. A high value of the variance last period raises Λ_{t-1} , which increases the growth rate of consumption (lowers c_{t-1}), in line with the precautionary saving hypothesis. A positive innovation to the variance today--which implies a positive drawing for the shock w_t --lowers consumption today c_t , thereby reducing the growth rate of consumption. If $\rho = 1$, so that the innovation to today's variance is permanent, agents revise upward their estimate of the future variance by the full amount of the shock and, therefore, the effect on consumption growth is equal to the annuity value of the innovation w_t/r . If $\rho < 1$, the shock gets reversed in the future, and the effect of the innovation on consumption is accordingly smaller.

Substituting (A5) into (A4) yields: 3/

$$(A7) \quad \Lambda_t = (1/\alpha) [\log(E_t e^{-\alpha \xi_{t+1}}) + \log(E_t e^{(\alpha/[r+(1-\rho)]) w_{t+1}})]$$

If the innovations to labor income have a normal distribution (with mean zero), then so will ξ . If, moreover, the innovations to the variance process follow a normal distribution, then the expectations in (A7) can be evaluated to yield:

$$(A8) \quad \Lambda_t = \frac{\alpha \rho \sigma_{\xi_t}^2}{2} + \frac{\alpha \sigma_w^2}{2[r+(1-\rho)]^2},$$

1/ The variance at time t is assumed to be in the time- t information set of the representative household.

2/ It is straightforward to verify that the innovation to the Λ process, w_t , is proportional to the innovation to the variance process. Also, it is clear that if the variance process is an AR(1) with parameter ρ , then the Λ process will also be an AR(1) with parameter ρ ; see Caballero (1990).

3/ We assume that ξ and w are independent stochastic processes.

where σ_w^2 is the (known and constant) variance of w . Clearly, with Λ_t as defined in (A8), the guess for the consumption process in (A5) satisfies the first order condition in (A4).

Once Λ_t has been obtained, a final form of the consumption function may be guessed as follows:

$$(A9) \quad c_t^* = \frac{r}{(1+r)} \sum_{j=0}^{\infty} \frac{1}{(1+r)^j} \{E_t y_{t+j}\} + r b_t - \Lambda_t / [r + (1-\rho)].$$

Thus, according to (A9), consumption in any period is equal to permanent income *minus* a term in the variance of labor income. To check the guess for the consumption function, it must be shown that (A9) satisfies (A5). 1/ Note from (A9):

$$(A10) \quad \begin{aligned} c_t^* - c_{t-1}^* &= c_t^* - (1+r)c_{t-1}^* + r c_{t-1}^* \\ &= \frac{r}{(1+r)} \sum_{j=0}^{\infty} \frac{1}{(1+r)^j} \{E_t(y_{t+j}) - E_{t-1}(y_{t+j})\} \\ &\quad + r[b_t - (1+r)b_{t-1} + c_{t-1}^* - y_{t-1}] - \frac{\Lambda_t + (1+r)\Lambda_{t-1}}{[r + (1-\rho)]} \end{aligned}$$

But from the budget constraint (A2):

$$(A11) \quad b_t - (1+r)b_{t-1} + c_{t-1}^* - y_{t-1} = 0$$

Substituting the process for Λ_t gives:

$$(A12) \quad c_t^* - c_{t-1}^* = \xi_t + \Lambda_{t-1} - w_t / [r + (1-\rho)]$$

which is (A5), as was to be verified.

By definition, saving is equal to the change in financial assets. Using the budget constraint (A2) together with the solution for the consumption function given in (A9) gives a simple expression for saving as the present value of expected *changes* in labor income *plus* a term in the variance of the innovations to labor income:

$$(A13) \quad s_t^* = - \sum_{j=1}^{\infty} \frac{1}{(1+r)^j} \{E_t \Delta y_{t+j}\} + \frac{\alpha \rho \sigma_w^2}{2[r + (1-\rho)]} + \text{constant}$$

where Δ is the (backward) difference operator, $\Delta x_t = x_t - x_{t-1}$, and where, from (A8), the constant depends on the (known) variance of the shocks to the Λ process. Equation (A13) clearly illustrates the implications of precautionary saving for saving behavior, revealing that both risk aversion (α) and the persistence of the shocks to the variance process (ρ) magnify the effect of the precautionary saving motive on saving.

1/ Recall that (A5) itself satisfies the Euler condition (A4), given (A7).

Data Appendix

The main sources of data were INSEE and Wharton Econometrics (WEFA). A deflator for all nominal variables was obtained by dividing INSEE's measure of nominal household consumption by household consumption at 1980 prices. Other series obtained from INSEE were: labor income, household disposable income and saving, the latter being the difference between household disposable income and consumption. The saving ratio is household saving divided by household disposable income. Population data were obtained from several issues of l'Annuaire Statistique de la France, table B-01-1. Three month bank deposit rates and stock prices were obtained from WEFA. Data on the stock of consumer credit were provided by the French authorities and prices of apartments in Paris were taken from Taffin (1993).

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II. Aspects of Monetary Policy Credibility ^{1/}

The environment in which France's monetary policy has operated has changed radically over the past two years. The approval of the Maastricht Treaty focussed attention on the creation of a truly European monetary policy, while the crises in the ERM have severely shaken the credibility of that objective. The widening of the ERM bands in August 1993 eliminated the immediate need for exchange market intervention and created considerable uncertainty concerning the extent to which other ERM countries would try to exploit the larger fluctuation bands to operate monetary policies more independently of Germany. More recently, the Bank of France has been made independent of the government in formulating monetary policy, which is now decided by the Monetary Policy Council. At these various stages, the issue of credibility has been important, as the Bank of France has had to signal its intentions and establish its commitment to its stated objectives. Analyzing credibility is therefore an important topic, even if subject to shifting considerations.

This study attempts to measure the degree of credibility attached to French monetary policy. It focuses on interest rate differentials relative to Germany as measures of credibility of the commitment to a fixed parity of the franc with respect to the deutsche mark, and of differentials of forward interest rates as market assessments of the commitment to low inflation in France (on the assumption that the credibility of such a commitment in Germany has already been established). These two aspects of credibility are certainly not independent of each other; however, they can in principle be distinguished. For instance, expectations of exchange rates may depend on views concerning the horizon for monetary union, decisions on which are not solely the responsibility of France.

The plan of the paper is as follows. The first section defines and discusses credibility as applied to the exchange rate and to inflation, and possible empirical measures. A second section presents data on interest differentials and forward rate differentials to analyze recent episodes. The third section uses historical data, for a number of EMS countries, to identify factors that seem to have been important for monetary policy credibility. Finally, its relevance for the current operation of French monetary policy is discussed.

1. Defining and measuring credibility

Policy credibility can perhaps be best defined as the strength of belief of the private sector that the authorities will actually do what they say, that is successfully carry out announced policy. Credibility thus includes a judgement that they are truthful in their policy announcements, for instance when they commit themselves not to devalue the currency or keep the inflation rate below 2 percent. It is important to note, however, that such a concept is not limited to the intentions of the policymakers; it also

^{1/} Prepared by P. Masson and R. Moghadam.

depends on their ability to achieve what they have set out to do. Thus, the commitment to a fixed parity may be widely believed, but it could be, given the fundamentals of the economy and the strength of international capital flows, that private investors do not think that the parity can successfully be defended. A related aspect of the question is whether commitments are ever unconditional. For instance, there may be two types of policymakers, with a different tolerance for inflation; credibility is enhanced by proving that current policymakers are less tolerant of inflation. To some extent, this is achieved by indicating that the authorities are willing to accept an increase in unemployment in order to bring down inflation. However, there is likely to be some cost in terms of unemployment and output losses that is too high, even for such policymakers. Therefore, the public's assessment of credibility will take into account the likelihood that such a level of unemployment will be reached, and high unemployment, especially if it is persistent, will eventually detract from credibility. 1/

Achieving credibility is important for policymakers because it is likely to increase the likelihood of attaining primary objectives like inflation reduction while minimizing output losses. A high degree of policy credibility may also prevent sudden speculative attacks on the currency, which may be undesirable because of costs of exchange rate volatility or because depreciation adds to inflationary pressures. Therefore, enhancing credibility may also be an intermediate objective of policy. The question then arises about how to measure credibility, namely whether there are observable variables that can serve as proxies or indicators of policy credibility.

a. Exchange rate credibility

In the context of a commitment to a fixed exchange rate, a simple measure is the interest differential with respect to the currency which serves as anchor. If, as in the case of the EMS in the 1980s, the deutsche mark is presumed never to be subject to a downward realignment (i.e., a devaluation) with respect to other ERM currencies, then other countries should have interest rates above German rates to an extent that their currencies are expected to depreciate against the deutsche mark. If a currency is currently at its ERM central parity, therefore, a zero differential would indicate full credibility of the peg to the DM at that parity.

It is necessary to take into account several complications. First, since the ERM consists not of fixed exchange rates but rather bands around central parities, movements within the bands can occur without necessarily

1/ This idea is developed in Drazen and Masson (1993), in which some empirical support is marshalled in favor of the hypothesis that high unemployment has hurt the credibility of the franc/DM central parity since 1987. See also Obstfeld (1994).

throwing into question the commitment to the central parities. 1/ It becomes important therefore in using interest rates as measures of credibility to adjust for expected movements within the bands; Svensson (1991) proposes a method for doing so. Since expected changes within a fixed band become a smaller part of expected annual returns the longer the horizon, long-term interest rates are less subject to this problem. Second, interest rates may not only reflect expected exchange rate changes, they may also reflect risk--that is, uncovered interest parity may not hold. One factor contributing to risk is public debt--increasing indebtedness may for instance raise questions concerning the sustainability of fiscal policy and the ability of the authorities to service their debt. 2/ Third, as pointed out by Moutot (1994) in discussing the 1992-93 exchange crises, interest differentials may at times reflect inaccurate expectations concerning the intentions of the authorities. As a result of this, actual (or implicit) forward rates are not very good at predicting future spot rates. One should not therefore assume that empirical measures of credibility reflect nothing but economic fundamentals.

Nevertheless, exchange rate credibility is especially relevant in the current European context, since the Maastricht Treaty provides for monetary union, possibly as early as January 1, 1997, or on January 1, 1999, if a date for EMU has not been fixed by then. The French authorities maintained throughout the exchange rate crises of September 1992 and July 1993 that the central parity with the DM was fully justified by fundamentals, and they have not since then suggested any reason why the franc should be below its central parity. Though of course monetary union could occur at a rate different from its current central parity, this would be inconsistent with the whole philosophy behind the defense of the parity since 1987. Long-term interest rates with 1997 or 1999 maturity dates should therefore reflect the credibility of that commitment, conditional on France being one of the countries participating in stage 3 of EMU on either of those dates. 3/ Since exchange rates will be irrevocably fixed at the beginning of stage 3, then to the extent that the franc is currently weaker than its central parity, with perfect credibility France's long rates should be below German rates, and conversely if the franc were to go above its central parity.

1/ This would explain, for instance, interest rates below German rates, as currently prevail (in the case of short rates) in the Netherlands.

2/ Svensson (1994) however argues that risk premia are likely to be small for reasonable levels of risk aversion, and his empirical results tend to confirm this.

3/ A longer horizon may also be relevant. EMS countries could decide before 1999 to proceed to monetary union at a later date. Uncertainty about the exact date of EMU might therefore explain the existence of a positive interest differential for the earlier dates. However, the approach of EMU should in any case produce a convergence of short-term interest rates, if parity changes are ruled out, so the effect on current long rates of uncertainty about the date should be small.

Algebraically, suppose that the two interest rates are R (for France) and r (for Germany), that the exchange rate in DM/F is E , its central parity is P , and n is the number of years remaining before 1997 or 1999. Then the greater the lack of credibility, the larger will be the differential D , defined as

$$D = R - r + 100 \log(P/E)/n$$

For instance, with a 3 year horizon and the franc 3 percent below its central parity, French 3-year interest rates should be about 100 basis points below German ones, if monetary union at the central parity is expected for that date. In what follows, this measure will be termed "central parity credibility," and it applies in the restricted sense of a view as to the likelihood of going to monetary union (or a fixed exchange rate) on a particular date at that central parity.

b. Inflation credibility

More generally, the issue of credibility concerns the ability of the central bank to deliver low inflation. This, after all, is the fundamental target variable that the central bank can influence in the long run, assuming that some form of monetary neutrality holds with respect to real variables. When exchange rates are not pegged--because they are allowed to float freely--then central parity credibility is in any case not directly relevant, but inflation credibility should be reflected in long-term rates. ^{1/} Calculating interest differentials relative to a country with undisputed inflation credibility would help to adjust for fluctuations in real interest rates that occur because of the demand for savings on a global level, since both rates should be equally affected by them. With integrated capital markets there are forces tending to equalize real interest rates (at least in the long run), so that national interest rates may differ mainly because of differences in expected inflation. The large degree of co-movement of interest rates in recent years tends to support this view.

Instead of market interest rates themselves, Svensson (1993) suggests analyzing inflation credibility using forward rates, which allow separation of short-, medium, and long-term considerations. Forward rates have an advantage over long-term rates of similar maturity because the latter are averages of short rates over the relevant horizon. Current short rates are heavily influenced by policy actions of the monetary authorities, and hence are not so relevant for inflation credibility. Tightening monetary policy may be expected to raise short rates, and through this effect, may also raise medium-term bond rates. Of more interest is whether forward rates with that horizon rise or fall.

^{1/} If rates are pegged (or if monetary union is expected to occur in the meantime), then in the absence of risk premia forward rates should be equal. However, our measure of "central parity credibility," i.e., monetary union at the current central parity--need not be zero.

Algebraically, if F is France's forward rate (say, an overnight rate) applicable for a period sufficiently far in the future that the term structure of forward rates has flattened out, f is the corresponding German forward rate, and DP^e and Dp^e are French and German inflation rates expected to prevail at the same horizon, then the measure of inflation credibility is simply

$$C = F - f$$

In order to show the relevance of this measure for inflation credibility, first note that with uncovered interest parity, the difference in forward rates will equal the expected overnight exchange rate depreciation for the relevant date, where $e = \log(E)$, and D indicates the change in a variable:

$$F - f = -De^e$$

Now, as long as the expected real depreciation is zero, i.e.

$$De^e + DP^e - Dp^e = 0,$$

then the forward differential equals the difference in expected inflation:

$$F - f = DP^e - Dp^e.$$

Alternatively, if we decompose the forward rates into their real (R, r) and nominal components,

$$F = R + DP^e$$

$$f = r + Dp^e$$

and assume that real rates are equal in the two countries, then

$$\begin{aligned} F - f &= R - r + DP^e - Dp^e \\ &= DP^e - Dp^e. \end{aligned}$$

It is important to realize the difference between what we have called central parity credibility and inflation credibility. The former, as measured by long-term differentials, corrected by the deviation of the DM/F exchange rate from its central parity, captures the credibility of a commitment to a particular nominal anchor, that is to a particular level for a nominal variable, the ERM central parity. In contrast, inflation credibility concerns the medium-term outlook for inflation, the rate of change of the price level. It has no implications for the price level itself, since it does not constrain the path for inflation in the meantime. Correspondingly, central parity credibility is measured by an adjusted long-term interest differential, which is conceptually the average of all the expected short-term interest differentials between now and the maturity of the bond, plus the deviation from the central parity. In contrast, inflation credibility is measured by the expected short-term differential at

some point in the future, that is, the relevant forward rate differential. The latter is in principle consistent with any number of paths for short rates between now and then. ^{1/} Another way of putting it (see the discussion of the calculation of the forward rate curves in Appendix I), is that the (overnight) forward rates are related to the slope of the yield curve at a particular horizon, and that long rates are the average of the whole path for forward rates.

c. Effects of the widening of the bands

Thus, exchange rate credibility and inflation credibility are two quite different concepts which are measured differently. Which is more relevant depends on the context. During the period when the narrow bands were in force, it was quite clear that monetary policy needed to be focussed on preventing the exchange rate from diverging from its central parity, and that market views concerning a commitment to the central parity had strong implications for interest rates. With the widening of the bands, much larger interest differentials are consistent with retaining the central parity. Furthermore, the wider bands allow greater attention to be paid to other objectives, in particular to inflation. The letter accompanying the 1993 Annual Report of the Bank of France from the Governor to the President of the Republic stresses that the Monetary Policy Council is aiming at a target of price stability for 1994 and for the medium term. This reinforces the relevance of a discussion of inflation credibility.

Nevertheless, the timetable of Maastricht makes exchange rate credibility of continuing importance. Though stage 3 of monetary union could begin with the exchange rate fixed at a level that differs from the present central parity against the DM, this would be inconsistent with previous commitments of the French monetary authorities. The credibility of that commitment can be evaluated as discussed above, using interest rates and current deviations from the central parity.

The relative importance to be given to the two measures of credibility in the French context depends on the objectives of policy. To the extent that exchange rate bands do not have to be defended (since the F/DM rate has never approached the 15 percent bands), or there is not a firm view about the rate for entering monetary union, lack of "central parity credibility" need not be of primary concern. Incomplete exchange rate credibility may in any case relate to factors beyond France's control; in particular, it may derive from uncertainty concerning the political will of partner countries to proceed to stage 3. Since limiting inflation should be a primary objective of monetary policy whatever the policy regime, and one which in the current environment is largely under the control of the authorities in the medium term, this aspect of credibility may therefore be more fundamental in considering the appropriate stance for monetary policy.

^{1/} Of course, in practice the path for short rates--and also inflation and exchange rate changes--will influence more distant expectations of inflation.

2. Empirical measures of credibility

It is of interest to evaluate the recent behavior of the measures of credibility discussed above. In what follows, the response of forward rate curves to various episodes since the widening of the ERM bands is discussed. Then the two measures of credibility discussed above are calculated: long-term interest differentials with respect to Germany, corrected for the position of the exchange rate in the band with the aim of assessing the credibility of monetary union at the central parity, and forward rate differentials as a measure of inflation credibility.

a. Estimation of forward rates for France and Germany

In this section forward rates are used as an indicator of market expectations of the future path of interest rates in France and Germany. The use of forward rates is advocated by Svensson (1993, 1994) who argues that they are a better means of separating market expectations for the short, medium and long-term than the standard yield curve. Here the methodology put forward by Svensson is used to fit yield curves to a sample of bond rate data and to estimate forward rates for both France and Germany (see Appendix I for details). ^{1/}

The analysis of forward rates enables achievement of three aims: (i) to evaluate the anti-inflation credibility of monetary policy in France relative to Germany at a particular time; (ii) to investigate the impact of policy actions, such as changes in interest rates, on credibility; and (iii) to examine the impact of economic developments, for instance the release of monetary data, on the formation of expectations in the financial markets with regard to the future path of interest rates and hence on perceived policy credibility.

Forward rates and yield curves were estimated for about 50 dates using weekly bond data for France and Germany from mid-June 1993 to end-June 1994 (a sample of the data is given in Appendix II). Here only a few of the forward rate curves are discussed, for dates that preceded or followed key events in 1993 and 1994.

Chart 1 depicts the forward rates for France and Germany in mid-July 1993, just before the exchange rate crisis of that month and the subsequent widening of the ERM bands. At the time, the markets expected that interest rates in France would be eased in line with those in Germany to reach a trough of about 5.5 percent ^{2/} by the end of 1994. For long maturities, forward rates in France were expected to be about 8 percent, just slightly above those in Germany but not significantly so.

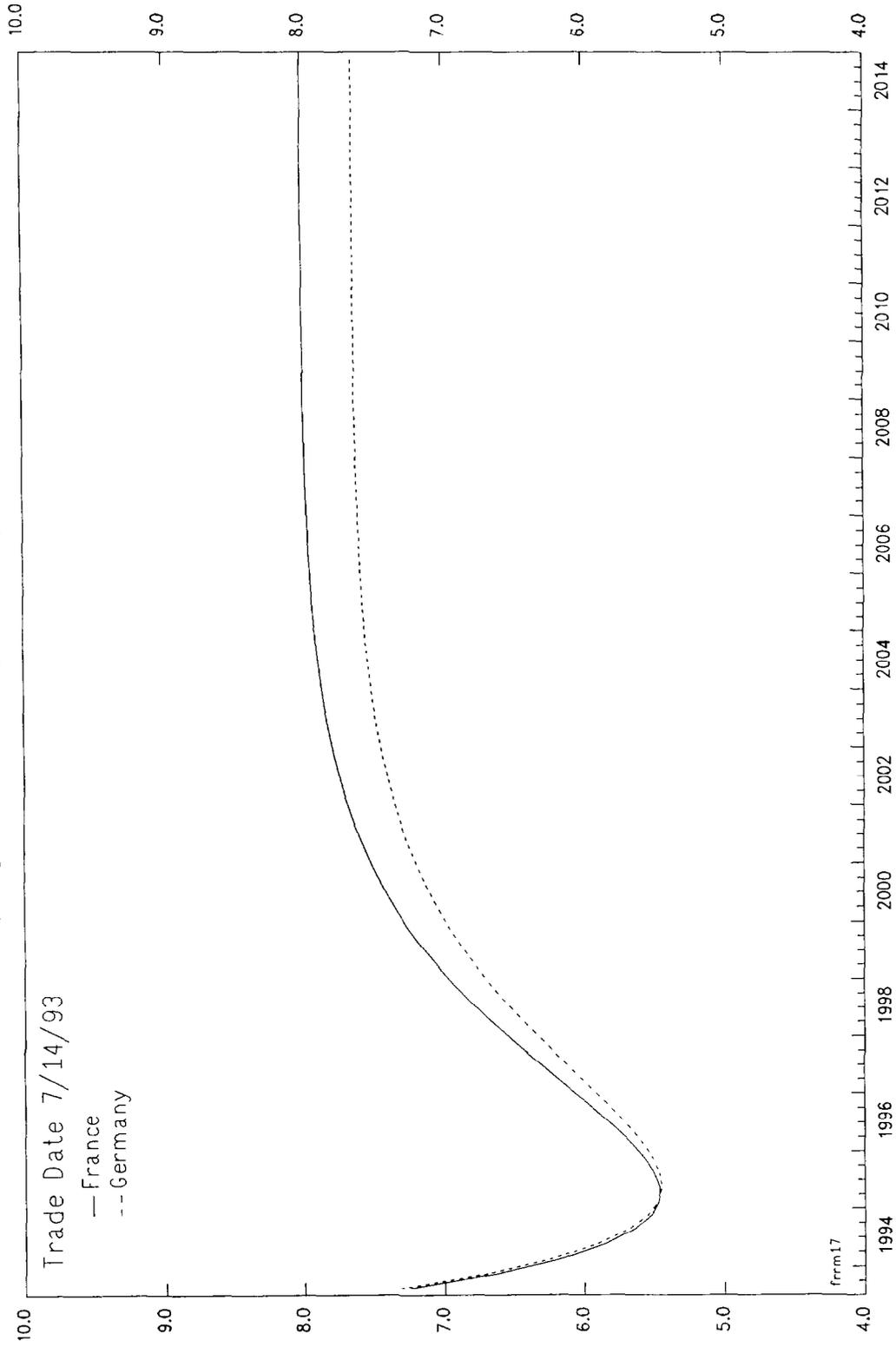
^{1/} We are grateful to Lars Svensson for allowing us to use his programs. The estimation is done in Gauss 3.1.

^{2/} That is, the overnight rate was expected to be 5.5 percent at that date.

CHART 1
FRANCE

Forward Rates

(Compounded Annually, Percent per Year)



Source: Staff calculations.

Immediately following the introduction of the wider ERM bands, market expectations of interest rates changed radically, particularly in France (Chart 2). In mid-August, markets expected French interest rates to decline sharply, to as low as 4 percent by mid-1994, well below German rates, which were expected to be about 5.5 percent. However, this was not thought to damage the long-term inflation credibility of the franc: at the long end, German and French rates were perceived to be identical. In fact, both German and French forward rates after the year 2000 were expected to be about 7 percent, below their expected levels prior to the widening of the band. However, the room for maneuver for reducing French short-term rates implied by these forward rates was not used, and the expectations of rapid declines in interest rates in France were not fulfilled. France adopted a cautious policy towards reducing interest rates and, by mid-September, markets had revised their expectations (Chart 3). French interest rates were now predicted to decline only in line with German ones, to reach a trough of just over 5 percent by end-1994. In the long-run, French interest rates were expected to be 7 percent, about half a percentage point above those in Germany. This relationship between forward rates in France and Germany was maintained for the rest of 1993.

During 1993, the French Parliament finalized legislation to make the Bank of France independent in the conduct of monetary policy. On January 5, 1994, the very day that the Bank of France became independent, the forward rates curves for France and Germany were virtually indistinguishable (Chart 4). Interest rates in France and Germany were expected to decline to just under 4.5 percent by mid-1995, and the long-run asymptotes were identical at just over 6.5 percent. Judging by these forward rates, monetary policy in France was considered inflation-credible at the inception of the independent Bank of France.

The forward rates curves for France and Germany remained almost identical for the next three months. However, three important events took place between the beginning of January and mid-March 1994 (see Appendix III for details): (i) the U.S. Federal Reserve started tightening monetary policy on February 4 and, subsequently, long-term bond yields in both the United States and Europe rose sharply; (ii) the Bank of France remained very cautious in reducing interest rates, and the intervention rate was lowered only once between the beginning of January and mid-March; 1/ and (iii) the high rate of growth of M3 kindled inflationary fears in Germany and led the financial markets to deduce that the Bundesbank would not reduce interest rates rapidly. By mid-March (Chart 5), both the trough and the long-run asymptotes of the French and German forward rates curves had shifted up. However, the two curves remained close to each other at a long horizon, 2/ suggesting that the anti-inflation credibility of the Bank of France remained intact.

1/ By 10 basis points on February 24.

2/ Indeed, France's forward rates were slightly below Germany's.

In the last two weeks of March, events in France took a dramatic turn. The government's proposal for a youth training scheme with remuneration below the minimum wage (CIP) encountered stiff opposition. In the face of large and persistent demonstrations, the government withdrew the CIP on March 30. At the time, the forward rates curves for France and Germany diverged significantly for the first time since August 1993 (Chart 6). France was seen as not being able to reduce its rates as much as Germany-- the trough of the French forward rates curve had shifted up--and the interest rate differential with Germany at long maturities increased to over 50 basis points.

The credibility gap did not last long and was helped by a surprise cut of 10 basis points in the intervention rate by the Bank of France on March 31, 1994. This was the first rate cut on a day other than one on which the monetary council met. From then onwards, the French and German forward rates curves again assumed a nearly identical shape and long-term level. By the end of April (Chart 7) they were nearly indistinguishable. However, two changes could be observed in the overall shape of the curves: (i) the markets were much more pessimistic about the prospects for lower interest rates in the short-run--the trough of both curves had shifted up to over 5.5 percent; and (ii) the rates for long maturities had shifted up, to about 7.75 percent. Again the inflation credibility of France relative to Germany is evident.

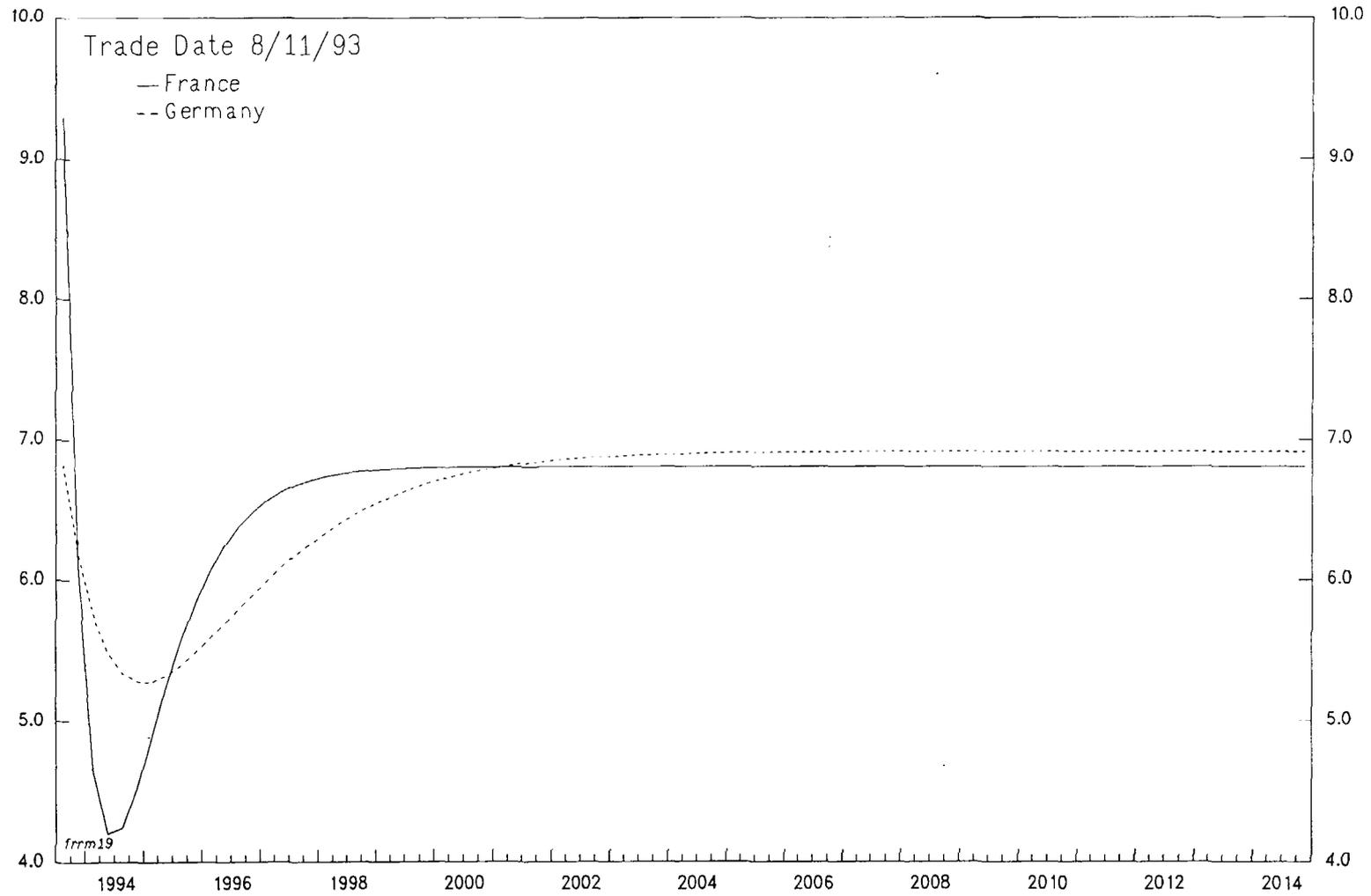
At the end of April and during the first half of May interest rates in both France and Germany declined repeatedly. The Bank of France cut its intervention rate four times between April 28 and May 19 (see Appendix III for details). This increased market expectations of further short-term interest rate declines, and the trough of both German and French forward rates declined once again (Chart 8). The long-term inflation credibility of France vis-à-vis Germany, however, remained intact.

During June 1994, long term bond rates in both France and Germany soared and reached their peak in the week starting Monday June 20. This was reflected not only in higher forward rates but also in a higher long-term differential in France relative to Germany (Chart 9). In addition, the markets believed that the French short-term rates had reached their trough while those in Germany were likely to decline further. By mid-July, however, the gap between the French and German long-term rates had narrowed again (Chart 10).

b. Behavior of measures of credibility

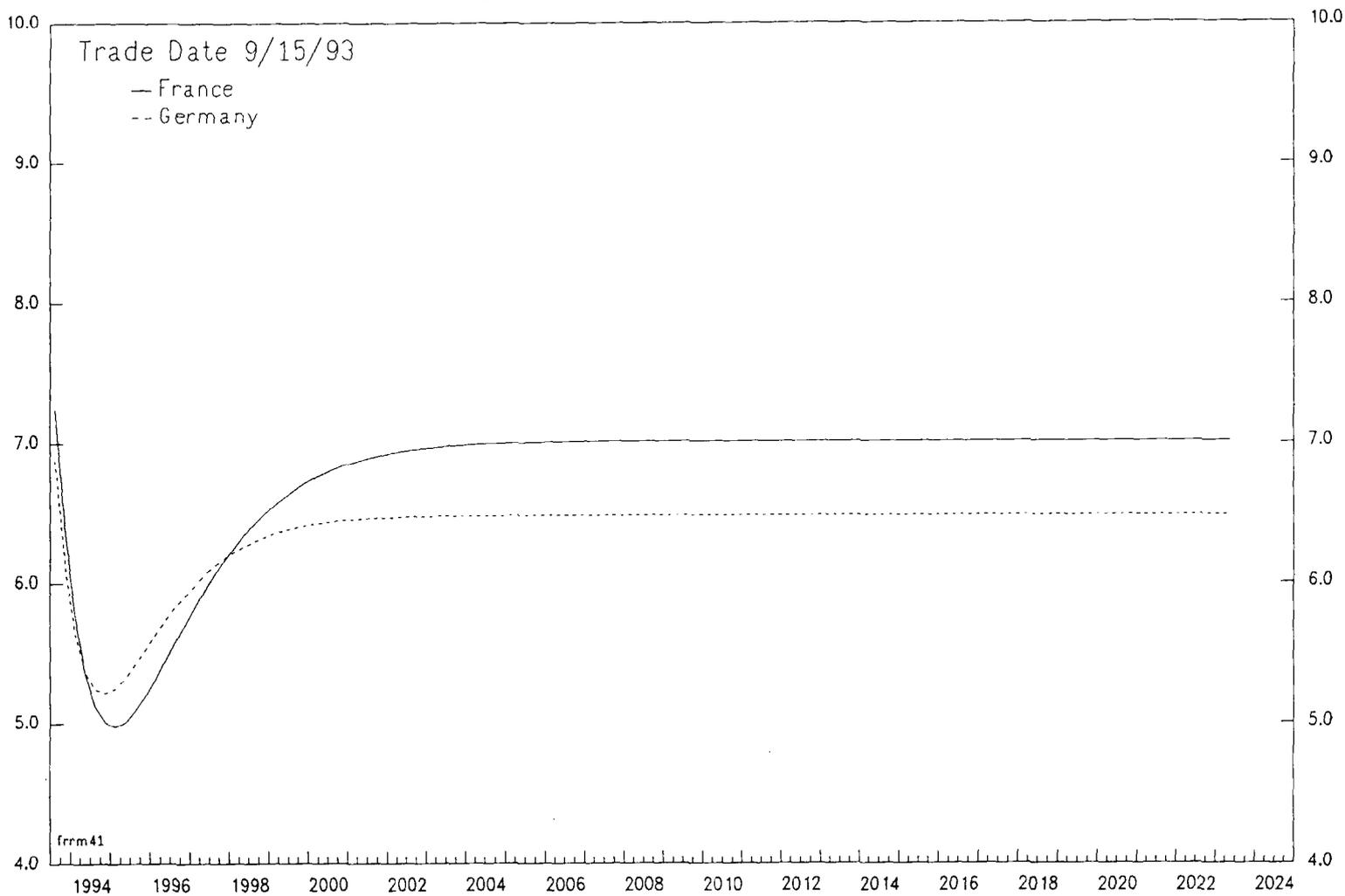
It was suggested in Section 1 that it is useful to separate monetary policy credibility into two concepts (which are not, however, completely independent): exchange rate and inflation credibility. The top panel of Chart 11 plots the measures of credibility while the bottom panel gives data for the exchange rate against the deutsche mark, starting in June 1993, just before the exchange crisis leading to the widening of the bands. It is interesting to note that the measures of lack of central parity credibility in the context of EMU widen sharply in August 1993, and remain high until

CHART 2
FRANCE
Forward Rates
(Compounded Annually, Percent per Year)



Source: Staff calculations.

CHART 3
FRANCE
Forward Rates
(Compounded Annually, Percent per Year)

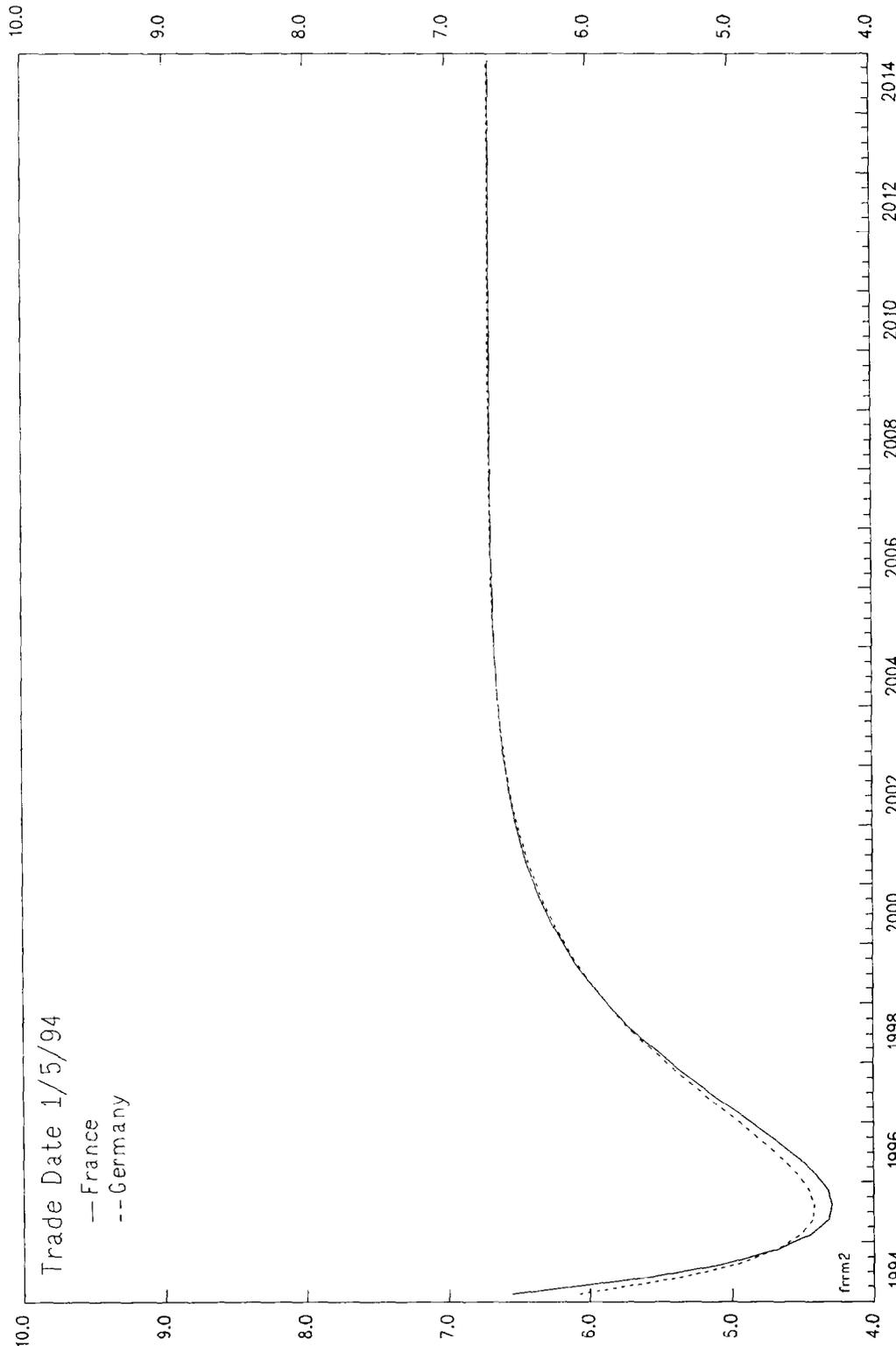


Source: Staff calculations.

CHART 4
FRANCE

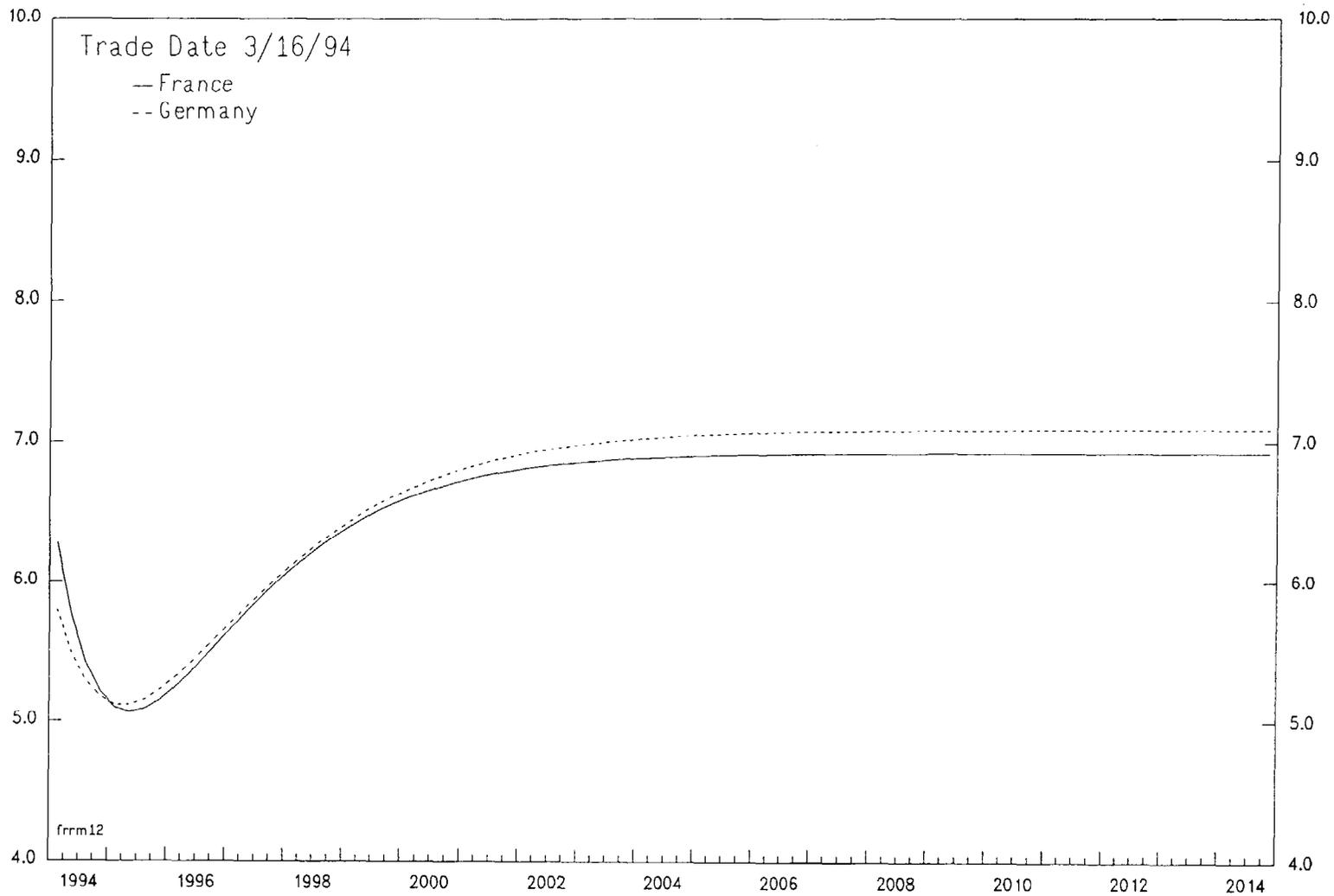
Forward Rates

(Compounded Annually, Percent per Year)



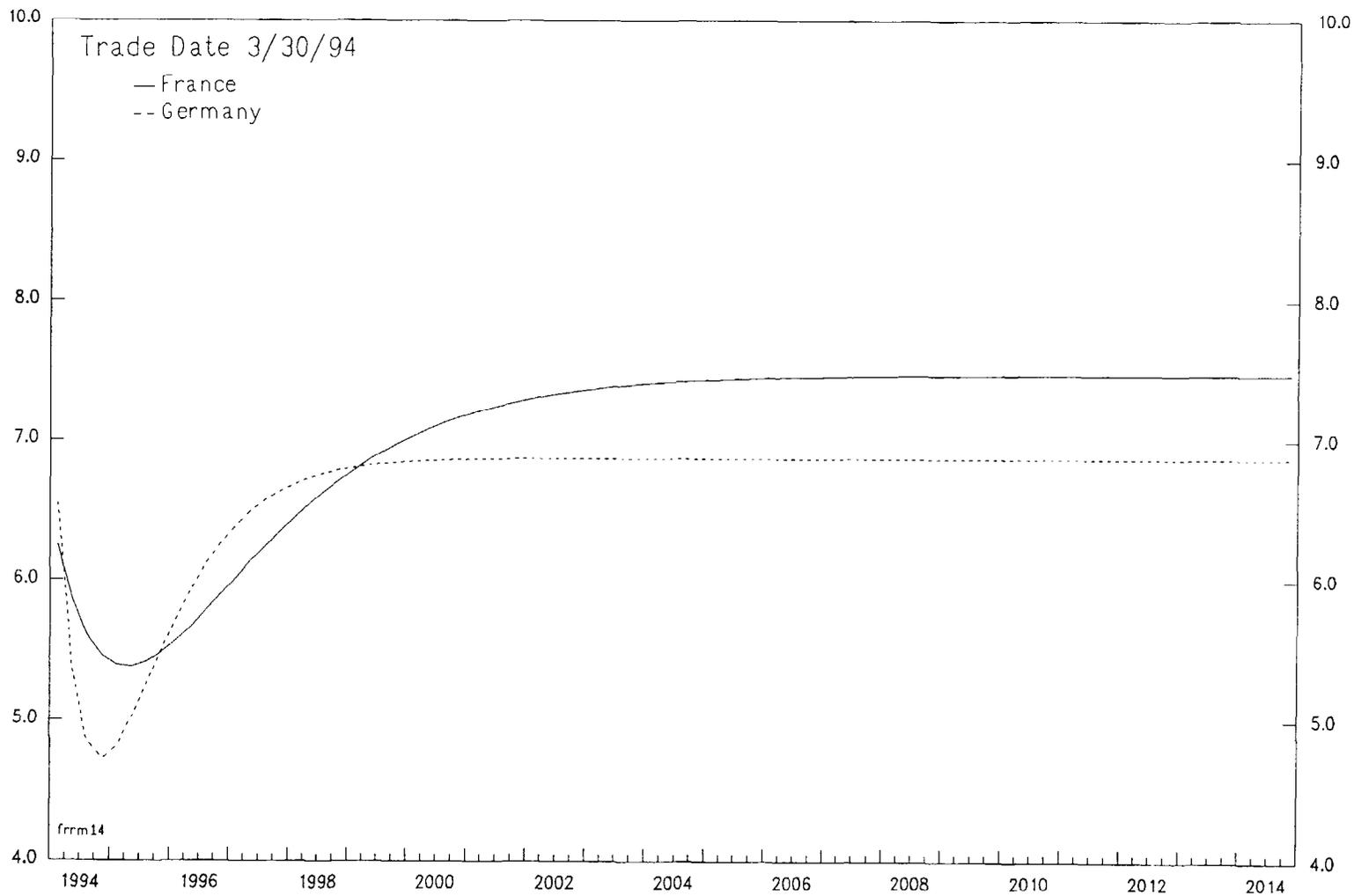
Source: Staff calculations.

CHART 5
FRANCE
Forward Rates
(Compounded Annually, Percent per Year)



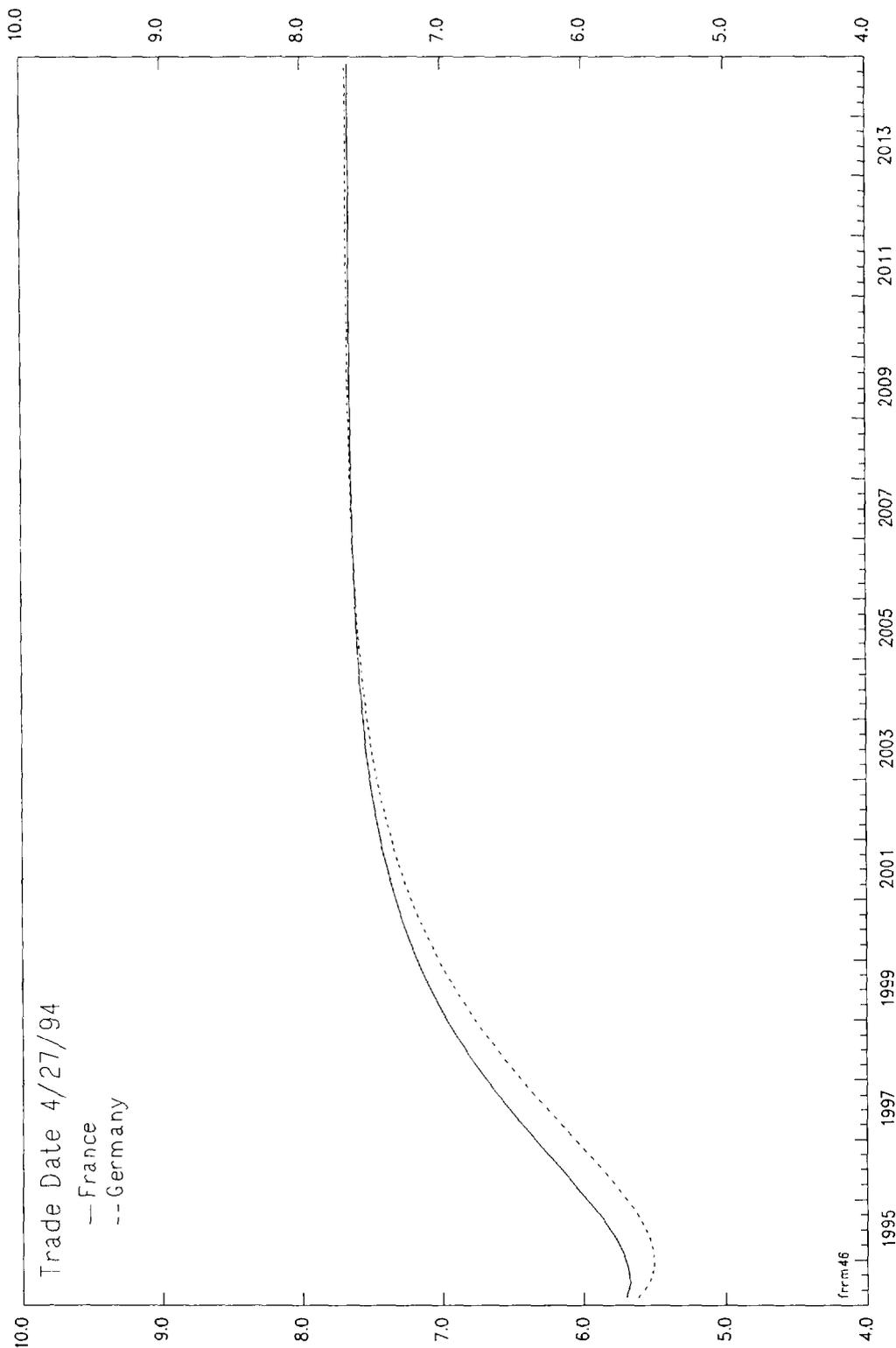
Source: Staff calculations.

CHART 6
FRANCE
Forward Rates
(Compounded Annually, Percent per Year)



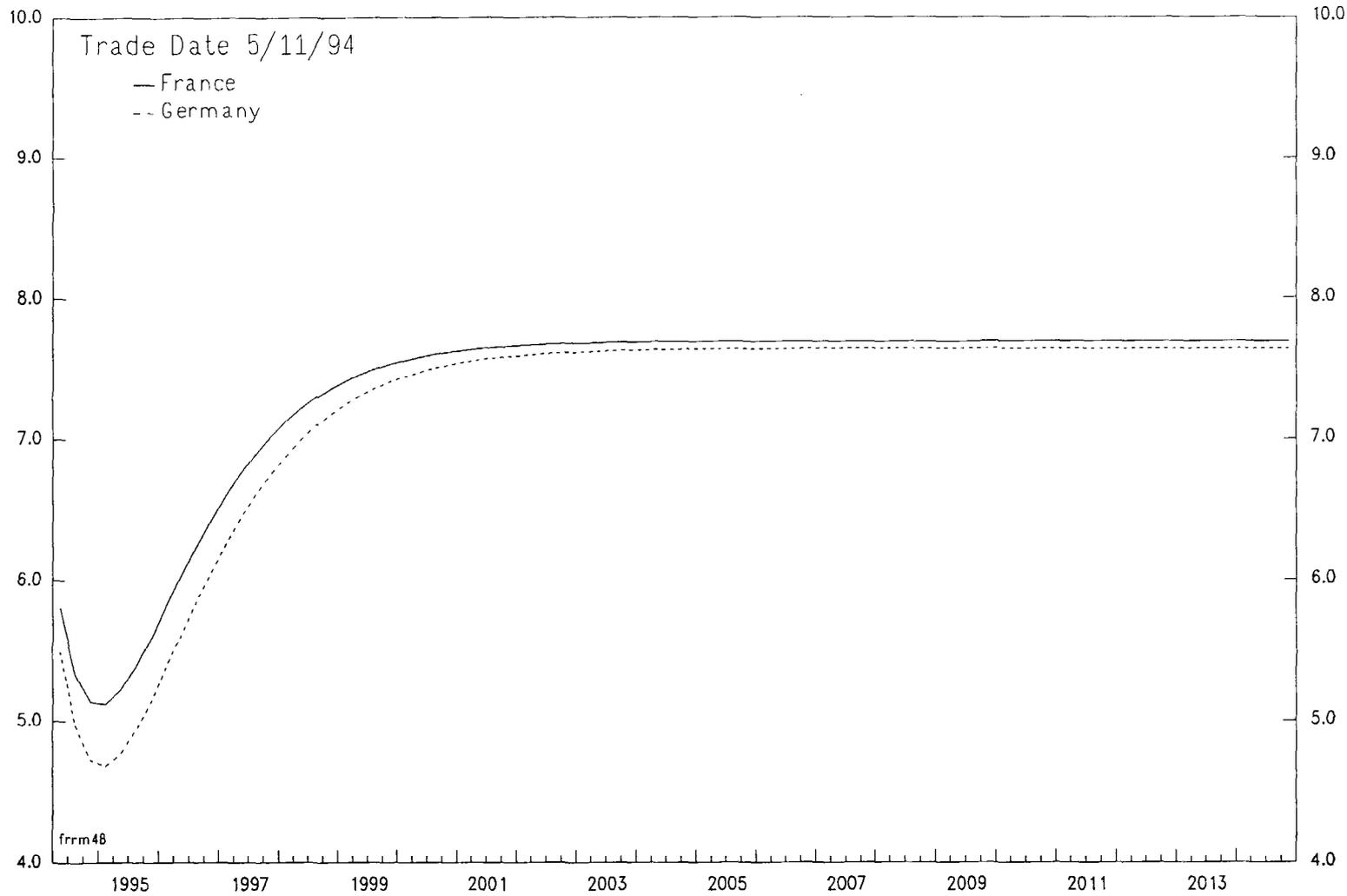
Source: Staff calculations.

CHART 7
FRANCE
Forward Rates
(Compounded Annually, Percent per Year)



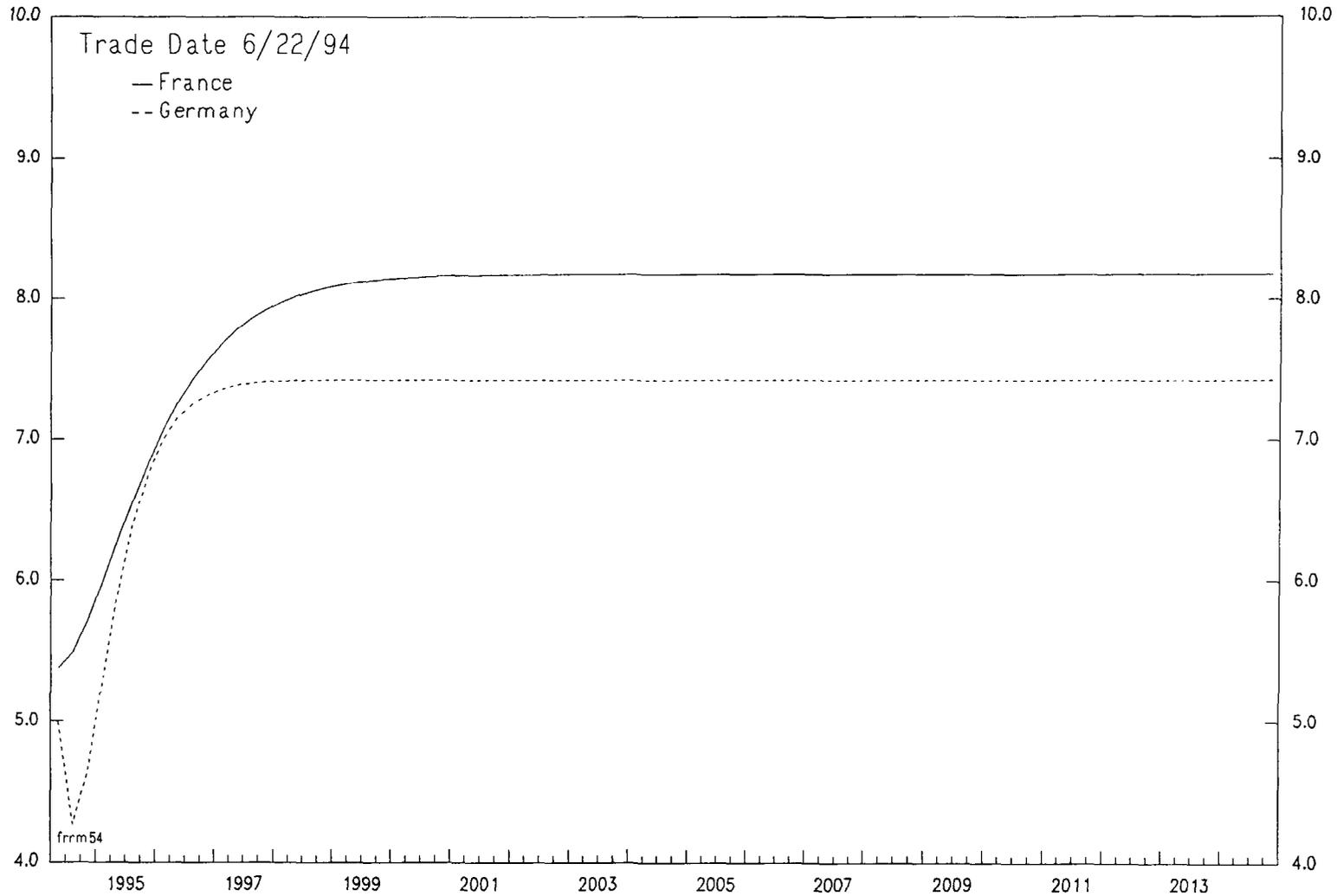
Source: Staff calculations.

CHART 8
FRANCE
Forward Rates
(Compounded Annually, Percent per Year)



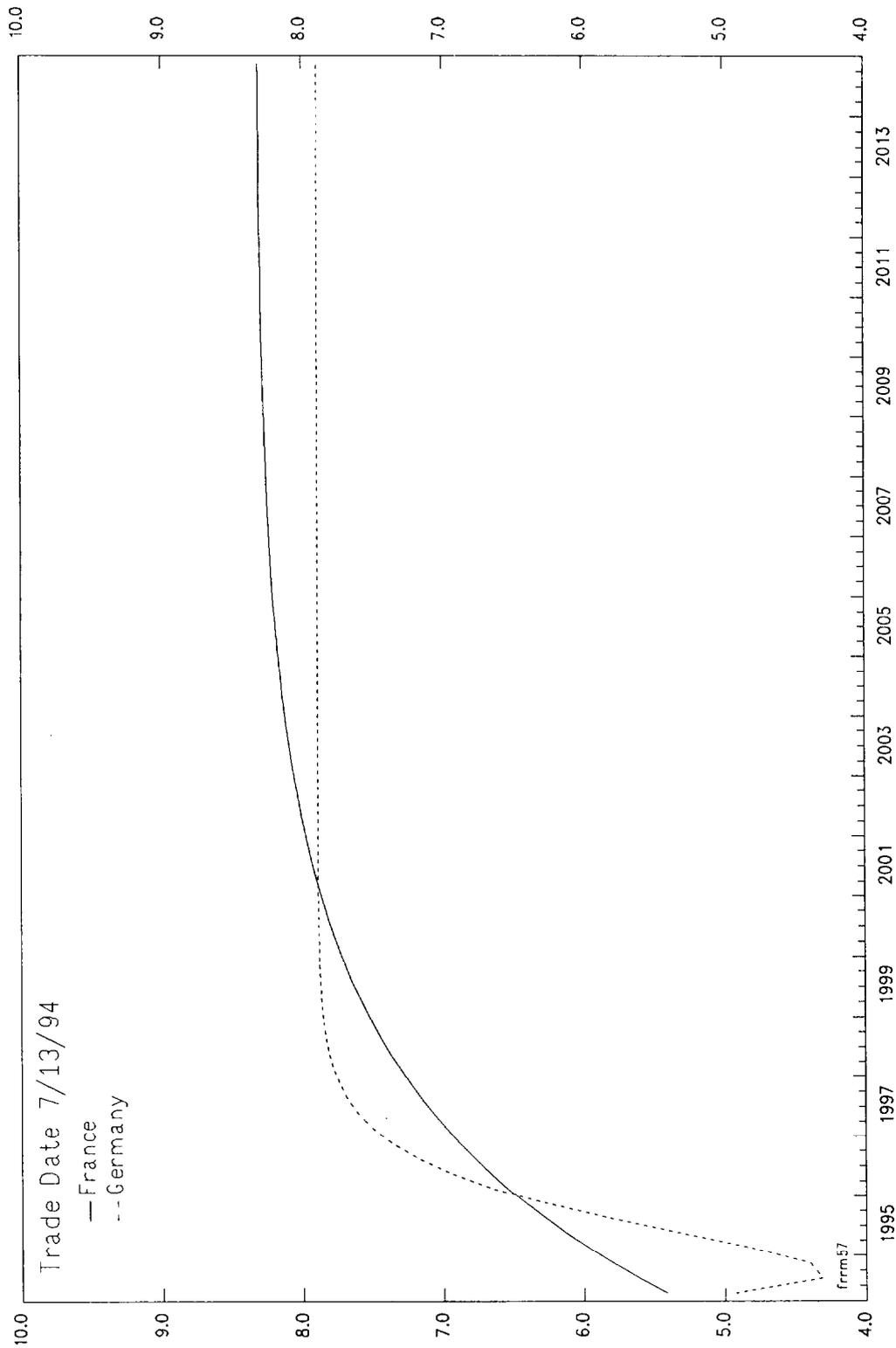
Source: Staff calculations.

CHART 9
FRANCE
Forward Rates
(Compounded Annually, Percent per Year)



Source: Staff calculations.

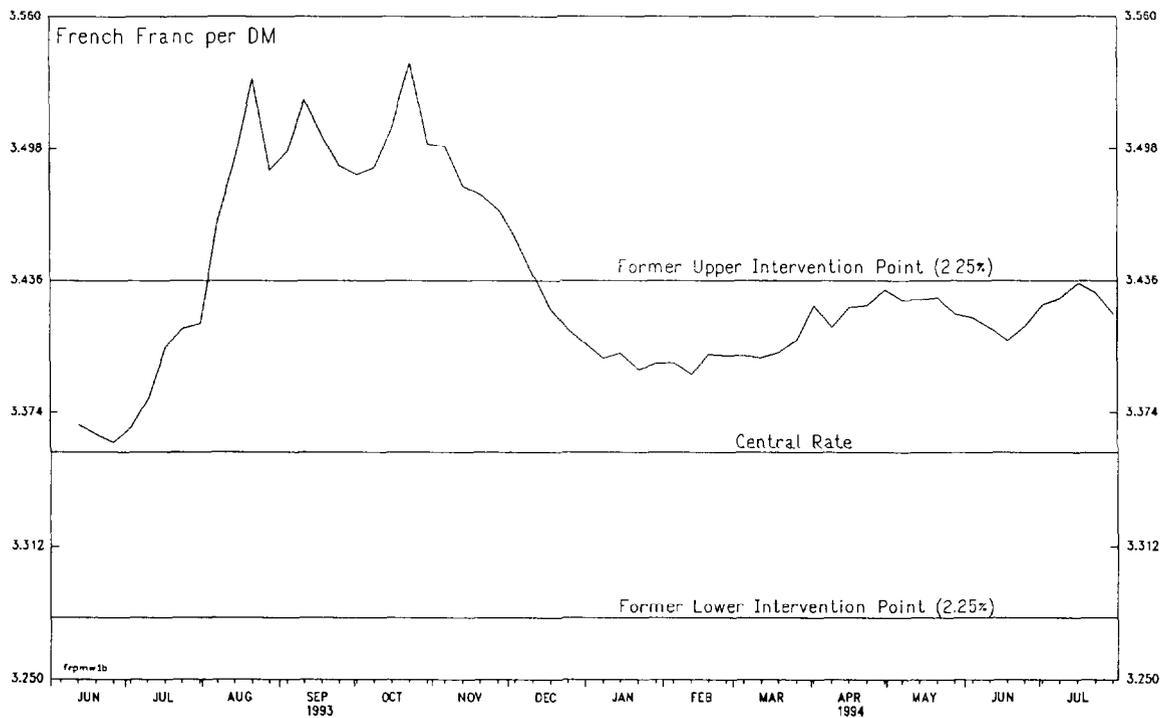
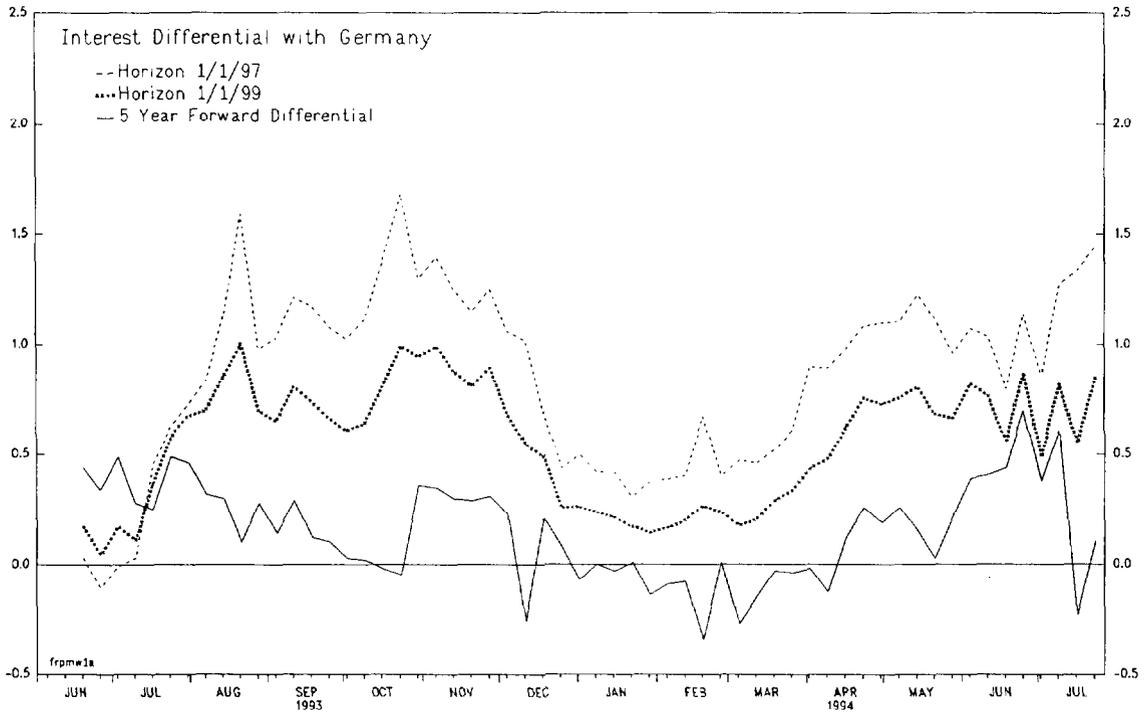
CHART 10
FRANCE
Forward Rates
(Compounded Annually, Percent per Year)



Source: Staff calculations.



Measures of Credibility and the Exchange Rate



Source: IMF, Treasurer's Department and staff calculations.

December 1993. Not surprisingly, the 1999 horizon for EMU seems somewhat more credible than the 1997 one, the two curves differing by some 20-30 basis points from early August 1993 onward, in large part because of the purely arithmetical effect of the longer horizon on the annualized gap between the exchange rate and its central parity. 1/ In contrast, the five-year forward differential 2/ fluctuated around zero, giving no indication of substantial inflation fears in France (relative to Germany).

The central parity credibility variables have deteriorated since March 1994 and imply a 90-120 basis points return differential relative to Germany for 1997-99 maturity dates. However, inflation credibility changed only slightly in April 1994 and improved once again in early May. During June the five year forward horizon widened to some 50 basis points, reflecting the crisis in global bond markets somewhat more acutely in France than in Germany. However, this differential fell sharply as bond prices rose and yields fell in July 1994.

3. Determinants of credibility: a panel estimation approach

There is already a considerable literature on using interest rate data to test the credibility of exchange rate parities within the EMS. Recent work includes tests for Belgium (Koen, 1991; Halikias, 1993) and France (Caramazza, 1993; Drazen and Masson, 1993), the United Kingdom (Masson, 1993), and Italy (Chen and Giovannini, 1992), among others. What Svensson terms "the simplest test of target zone credibility" (Svensson, 1991), is just to see whether interest rate differentials remain within a zone that is consistent with the width of the band. More structural tests involve using regressions to explain the determinants of credibility. If realignments are used to correct problems of competitiveness, as was done periodically in the early years of the EMS, then relative prices may serve as an explanatory variable for (lack of) credibility. A further variable which it is argued in Drazen and Masson (1993) should be important is the unemployment rate, for two reasons. First, willingness to tolerate unemployment, when policymakers' intentions are in doubt, may signal toughness and hence enhance credibility. Second, however, the persistence of a high level of unemployment may eventually lead even a tough government to conclude that the costs of maintaining an exchange rate peg are too high. Empirical evidence of the second effect, which is harmful for credibility, is confirmed empirically for France by Drazen and Masson (1993) and Caramazza (1993). Finally, government deficits and debt are shown to have an important effect on credibility of the Belgian franc relative to the deutsche mark (Halikias, 1993).

In this section the significance and impact of a number of economic variables on monetary policy credibility, as measured by long rate

1/ An even longer horizon would therefore approximate more closely the unadjusted interest differential.

2/ Five years is a sufficiently long horizon for the forward rate curves generally to approach their asymptotes (see Charts 1-8).

differentials, are tested using a panel data set for the EMS countries. The two different aspects of credibility discussed above are not distinguished; however, the context of the ERM narrow bands makes the issue of credibility of central parities most relevant over this period, at least for most countries. Two specific issues to be explored are the potential impacts of unemployment and government deficits on the perceived credibility of monetary policy. High unemployment and large government deficits may be viewed as unsustainable in the long-run and as capable of undermining the anti-inflationary stance of monetary policy. A panel data set enables us to test these hypotheses directly by using the variation of these two variables across countries and through time.

Table 1 summarizes the panel results, using annual data. Long-term interest rate differentials between each country and Germany are regressed on the general government balance relative to Germany; a measure of relative competitiveness (the Consumer Price Index for each country relative to Germany); and the unemployment rate relative to Germany. 1/

All the variables are significant and have the expected signs. The general government deficit relative to Germany has a significant negative impact on credibility. The higher prices are relative to Germany, the higher the long-term interest rate differential with Germany will be and the lower the perceived credibility of monetary policy. Finally, unemployment relative to Germany seems to have a significant and positive impact on long-term interest rate differentials, suggesting that higher relative unemployment increases the perceived probability of realignment.

Table 2 adds time dummies to the regression presented in Table 1. The time dummies (which capture credibility relative to the sample mean) are jointly significant and imply an interesting chronological development in the history of the EMS. The dummies suggest that the EMS went from a phase of low credibility in its early years to one of higher credibility from 1987 onwards. For the period 1979-82, there seems to have been no significant reduction in long-term interest rate differentials relative to the pre-EMS period of 1978 (the coefficient on the 1979-82 dummy is not significantly different from that of the 1978 dummy). Interest rate differentials decline during the period 1983-86 and fall even further during the 1987-93 phase as policies converged and realignments became infrequent. 2/

To explore the robustness of the above results we experimented with a number of other specifications using, for example, multiplicative country dummies. We discovered that, almost universally, the relative fiscal deficit was a significant variable in explaining the interest rate differential with Germany. However, relative unemployment was not

1/ The panel data set contains variables for 10 EMS countries (all except Greece) for the period 1978-1993. This provides 160 observations.

2/ Restricting the time dummies to the EMS phases mentioned above (rather than including one for each year) was easily accepted by the data.

Table 1. Determinants of Long-Term Interest Rate Differentials
in EMS Countries (1978-1993)

Variable <u>1</u> /	Coefficient	t statistics
Relative general government deficit <u>2</u> /	19.47	(4.4)
Relative prices <u>3</u> /	3.29	(6.0)
Relative unemployment <u>3</u> /	0.87	(2.8)
Constant	2.17	(7.6)

$R^2 = 0.37$ S.E.E. = 2.47 Mean of dependant variable = 4.07
N = 160

1/ The variables are relative to Germany.

2/ Ratio to GDP.

3/ In logs.

Table 2. Determinants of Long-Term Interest Rate Differentials
Panel of EMS Countries (1978-93)

Variable <u>1/</u>	Coefficient	t statistics
Relative general government deficit <u>2/</u>	13.97	(3.7)
Relative prices <u>3/</u>	5.64	(10.8)
Relative unemployment <u>3/</u>	0.51	(1.98)
Time dummies		
1978	4.00	(6.2)
1979-82	3.51	(10.3)
1983-86	2.06	(5.7)
1987-93	-0.44	(1.2)
Test for deletion of time dummies:		
Lagrange Multiplier Statistic X^2 (4) = 84.5		
F - Statistic F(4,153) = 402.9		
<hr/>		
R ² = 0.60 S.E.E. = 2.01 Mean of dependent variable = 4.07		
N = 160		
<hr/>		

1/ The first three variables are relative to Germany.

2/ Ratio to GDP.

3/ In logs.

necessarily significant in all countries. For example, we did not find a significant and positive impact of relative unemployment on credibility in Belgium, the Netherlands and Ireland.

To investigate the effect of entry into and exit from the ERM on the credibility of each country, a quarterly panel for the period 1978:1-1993:4 was constructed from the annual data. 1/ It would have been difficult to explore this issue using annual data because entry and exit occur at very specific times during the year. Spain, the United Kingdom and Portugal joined the ERM in June 1989, October 1990 and April 1992 respectively. The United Kingdom and Italy left the ERM in September 1992 following the exchange rate crisis of that month.

The regression presented in Table 3 explores the impact of ERM membership on credibility using a quarterly panel. This regression includes country-specific dummies for the quarters that these countries were members of the ERM. In addition, a dummy is added for France for the period 1987-93 to examine the impact of its competitive disinflation policy on credibility.

The three key variables--namely, the general government balance, the unemployment rate, and relative prices--are highly significant in the quarterly panel and have the same sign as in the annual panel and, therefore, the same interpretation. Furthermore, the results suggest that the membership of ERM enhanced the credibility of all the countries mentioned above. All the membership coefficients are significant and the absolute value of the coefficient on the country dummies is highest for the United Kingdom and lowest for Spain. 2/ For France, the dummy for the post-1987 period is highly significant, suggesting that the economic policy pursued over that period has enhanced the credibility of monetary policy. However, both fiscal deficits and unemployment increased during the 1991-93 period in France as well as in other EMS countries. In France, for example, unemployment rose from an average of 8.8 percent in 1990 to 11.7 percent in 1993, and the general government deficit increased from 1.5 percent of GDP in 1990 to 5.8 percent in 1993. The panel regressions do suggest that the increase in the deficit and unemployment have had an adverse impact on the credibility of monetary policy in France and in other EMS countries. The significance of these variables in the panel regressions highlights the importance of introducing structural measures to help reduce unemployment and contain budget deficits (which are in any case required), otherwise the credibility of monetary policy could be jeopardized.

1/ Since quarterly data on general government deficit do not exist, these data were interpolated from the annual series.

2/ The dummy for Italy is for the period following the adoption of the narrow band in January 1990. We could not find a positive impact of ERM membership for Italy prior to this date.

Table 3. Determinants of Long-Term Interest Rate Differentials
in EMS Countries (1978:1-1993:4)

Variable <u>1</u> /	Coefficient	t statistics
General government deficit <u>2</u> /	9.04	(3.7)
Relative prices <u>3</u> /	3.71	(11.7)
Unemployment <u>3</u> /	1.24	(7.3)
Country dummies		
Portugal	-2.75	(3.3)
U.K.	-3.36	(3.3)
Italy	-2.54	(3.6)
Spain	-2.42	(3.7)
France	-3.38	(5.5)
Constant	2.41	(14.8)

$R^2 = 0.34$ S.E.E. = 2.68 Mean of dependent variable = 4.22

N = 640

1/ The first three variables are relative to Germany.

2/ Ratio to GDP.

3/ In logs.

4. Conclusions

This study has attempted to identify aspects of monetary policy credibility and has explored its determinants. Though the focus has mainly been on the conduct of French monetary policy since the widening of the bands at the beginning of August 1993, data for France together with other EMS countries since 1979 have also been used. Several conclusions--though necessarily tentative--emerge from the study.

First, if one accepts that a distinction between exchange rate credibility and inflation credibility is a useful one, the data suggest that the inflation credibility of the Bank of France seems to have been established, and it does not seem currently to be questioned by the financial markets. Forward interest rate differentials with Germany, with a medium or long-term horizon, are close to zero. However, the Bank of France has been cautious in lowering short rates, which have remained consistently above those in Germany.

Second, what is termed here "central parity credibility," namely expectations that France will proceed to monetary union at the current central parity of the French franc against the deutsche mark, does not seem to have been completely established. To some extent, this may be due to circumstances beyond France's control, in particular doubts that monetary union will occur in 1997 or 1999. If investors were confident that EMU would proceed, and believed that it would occur at the current central parity against the deutsche mark, then bonds with 1997 or 1999 maturity should yield less in France than in Germany, reflecting the fact that the franc is below its central parity. However, that is not the case.

Third, some conclusions concerning the factors influencing credibility emerge when looking at a longer sample of data and including other countries. Long-term interest rates seem to be strongly affected by relative prices, by the size of the fiscal deficit relative to GDP, and by the unemployment rate. This suggests that measures to support monetary policy are needed to reinforce its credibility--namely a sustainable fiscal position and structural labor market policies.

Finally, and somewhat surprisingly, the 1992 and 1993 crises and the widening of the bands do not seem to have induced a noticeable decline in credibility as measured by long-term interest rates. Instead, what continues to be important is the convergence of macroeconomic fundamentals on the factors mentioned above, namely competitive price levels, low deficits, and low unemployment.

Estimation of Forward Rate Curves

Svensson (1994) estimates an extended form of Nelson and Siegel's (1987) forward rate function:

$$f(m;b) = \beta_1 + \beta_2 \exp\left(-\frac{m}{\beta_4}\right) + \beta_3 \frac{m}{\beta_4} \exp\left(-\frac{m}{\beta_4}\right), \quad (1)$$

where $f(m)$ denotes the instantaneous forward rate $f(t, t+m)$ with time to settlement m , for a given trade date t .

The spot rate can be derived by integrating the forward rate according to (1):

$$i(m;b) = \beta_1 + \beta_2 \left(\frac{1 - \exp\left(-\frac{m}{\beta_4}\right)}{\frac{m}{\beta_4}} \right) + \beta_3 \left(\frac{1 - \exp\left(-\frac{m}{\beta_4}\right)}{\frac{m}{\beta_4}} - \exp\left(-\frac{m}{\beta_4}\right) \right) \quad (2)$$

where $i(m)$ denotes the spot rate $i(t, t+m)$ with time to maturity m , for a given trade date t .

A maximum likelihood method is used to estimate the parameters of (1) and (2) by minimizing yield errors using data on quoted yields to maturity, coupon rates and times to maturity (see Svensson (1994) for details).

In most cases the original Nelson and Siegel model gives a satisfactory fit. In some case, however, when the term structure is more complex, Svensson's extended Nelson and Siegel provided a better fit.

Sample of French and German Bond Data for May 4, 1994

Country	Maturity	Name	Coupon	Maturity Date	Yield
France	3 month	T-Bill			5.65
	6 month	T-Bill			5.52
	1 year	T-Bill			5.52
	2 year	BTNS	4 1/2	5/12/96	5.85
	3 year	BTNS	8 1/2	3/12/97	6.05
	4 year	BTNS	8	5/12/98	6.32
	5 year	BTNS	4 3/4	4/12/99	6.42
	6 year	FRTR	8 1/2	3/28/00	6.65
	7 year	FRTR	9 1/2	1/25/01	6.80
	8 year	FRTR	8 1/2	11/25/02	6.96
	9 year	FRTR	6 3/4	10/25/03	7.01
	10 year	FRTR	5 1/2	4/25/04	7.04
	15 year	FRTR	8 1/2	10/25/08	7.27
	20 year	FRTR	8 1/2	12/26/12	7.53
	30 year	FRTR	8 1/2	4/25/23	7.68
Germany	3 month	T-Bill			5.16
	6 month	T-Bill			4.99
	1 year	OBL	8 3/4	7/20/95	5.35
	2 year	OBL	8 5/8	2/20/96	5.51
	3 year	OBL	8 3/8	1/20/97	5.73
	4 year	OBL	6	2/20/98	5.90
	5 year	TOBL	5	1/14/99	5.84
	6 year	DBR	8 3/4	5/22/00	6.40
	7 year	DBR	8 3/8	5/21/01	6.67
	8 year	DBR	8	7/22/02	6.88
	9 year	DBR	6 1/2	7/15/03	6.74
	10 year	THA	6 1/4	3/4/04	6.68
	20 year	DBR	6	6/20/16	7.34
30 year	DBR	6 1/4	1/04/24	7.37	

Source: Bloomberg database.

Monetary Policy Chronology for France and Germany, January-July 1994

1. Wednesday, January 5

Bank of France becomes independent. Monetary policy council is charged with determining monetary policy with the aim of achieving price stability.

2. Friday Feb. 4

U.S. raises Fed Funds rate from 3 to 3.25. Bond yields rise in U.S. and in Europe (Feb. 7)

3. Thursday Feb 17

Bundesbank (BB) lowers discount rate by 50 bp to 5.25, but doesn't subsequently change repo rate significantly.

4. Thursday, Feb. 24/Friday Feb. 25

Bank of France (BoF), in the first decision of the Monetary Policy Council, lowers its intervention rate by only 10 basis points on Feb. 24, to 6.1 percent. Stock and bond markets react badly.

5. Tuesday Mar. 1-Thursday Mar. 3

Bundesbank reduces repo rate by only 3 bp, to 5.97 percent. Also, U.S. 4q 1993 GDP data indicate 7.5 percent growth, revised upward, which increases bond yields.

BB announces Mar. 2 that M3 grew by 21 percent in January, and leaves unchanged intervention rates. Markets react negatively on Mar. 2 and 3.

6. Wednesday, Mar. 9-Friday Mar. 11

BoF decides not to change intervention rates on Mar. 10, even though the BB lowers repo rate on Mar. 9 by 3 bp to 5.94 percent. French decision poorly received by markets.

On Mar. 10, rumors of serious involvement of Clinton in Whitewater scandal leads to a plunge in U.S. bond prices (30-year treasury yields rise from 6.84 to 6.97 percent), also reflected in European markets Mar. 11.

7. Friday, March 11

BoF monetary policy council leaves interest rates unchanged.

8. Monday, March 14

January M3 data shows a decline of 0.6 percent relative to December. Markets see this as an indication that monetary policy should be eased.

9. Wednesday/Thursday, March 16/17

BB reduces repo rate from 5.94 to 5.88 percent.

10. Wednesday, March 23

U.S. raises Fed Funds rate from 3.25 to 3.50 and BB lowers repo rate from 5.88 to 5.80.

11. Thursday, March 24

German M3 data shows a rise of 17.6 percent in February. The monetary policy council of BoF cuts the intervention rate from 6.10 to 6.0 percent; this is seen as insufficient by the markets, and the CAC-40 declines by 2.16 percent.

12. Wednesday, March 30

French government scraps CIP.

BB cuts repo rate from 5.80 to 5.76.

13. Thursday, March 31

In France, a surprise 0.1 cut in intervention rate to 5.90 is welcomed by the market. This is the first time BoF cuts rates on a day other than one on which the monetary policy council met. Bond markets react positively.

14. Wednesday, April 6

BB cuts repo rate from 5.76 to 5.73.

15. Wednesday, April 13

BB cuts repo rate from 5.73 to 5.70.

16. Thursday, April 14

BB cuts discount rate from 5.25 to 5 and Lombard rate from 6.75 to 6.5.

17. Monday, April 18

The Fed raises its Federal funds rate by a quarter of a point to 3.75.

18. Wednesday, April 20

BB allows the repo rate to fall from 5.70 to 5.58.

19. Thursday, April 21

BoF cuts its intervention rate by 10 basis points to 5.8 and the five-to-ten-day rate by 25 points to 6.75. The franc appreciates from 3.4305 per mark to around 3.4260.

20. Tuesday, April 26

German March M3 data shows an expansion of 15.2 percent at a seasonally adjusted annual rate compared to 17.5 percent in February. BB indicates that there is scope for further easing in spite of both the M3 figures and the rise in long-term rates.

21. Wednesday, April 27

BB cuts repo rate by 11 basis points to 5.47.

22. Thursday, April 28

BoF cuts its intervention rate by 10 basis points to 5.7. This was the second time that BoF cut rates on a day other than one on which the monetary council met. The franc strengthens slightly.

23. Wednesday, May 4

BB lowers repo rate by 0.06 to 5.41.

24. Thursday, May 5

BoF cuts its intervention rate by 10 basis points to 5.6; French franc remains unchanged.

25. Tuesday, May 10

BB lowers repo rate by 6 basis points to 5.35.

26. Wednesday, May 11

BB cuts discount rate to 4.5 from 5.0 and Lombard rate to 6.0 from 6.5.

BoF reduces its intervention rate by 10 basis points to 5.5. Markets interpret this as evidence that BoF is following the German repo rate.

27. Tuesday, May 17

The Fed increases its target for the Federal Funds rate from 3.75 to 4.25 and announces the first increase in discount rate in five years, from 3 to 3.5 percent.

28. Wednesday, May 18

BB lowers repo rate by 12 basis points to 5.23.

29. Thursday, May 19

BoF cuts intervention rate by 10 basis points to 5.40, leading to a quarter point cut in commercial banks' base rates to 7.70.

30. Tuesday, May 24 - Wednesday, May 25

M3 growth in Germany rises from 15.4 percent a month in March to 15.8 percent in April.

BB lowers the repo rate by 3 basis points to 5.20.

31. Thursday, June 2

BoF cuts intervention rate to 5.30 percent.

32. Wednesday, June 8

BB accepts repo auction bids at 5.10 percent.

33. Wednesday, June 15 - Thursday, June 16

BB cuts repo rate by 5 basis points to 5.05.

BoF cuts intervention rate to 5.20 percent.

34. Monday, June 20

French and German ten year bond rates peak at 7.86 and 7.46 percent, respectively, their highest level in over a year.

35. Tuesday, June 21 - Wednesday, June 22

Germany's M3 growth slows to an annualized rate of 13.7 in May.

BB cuts repo rate to 5 percent.

36. Wednesday, June 29 - Thursday, June 30

BB reduces repo rate to by 4 basis points to 4.96.

BoF cuts its intervention rate to 5.10.

37. Wednesday, July 6

BB cuts the repo rate to 4.93.

38. Tuesday, July 19

Annual growth in German M3 contracts to 11.3 percent in June.

39. Wednesday, July 27 - Thursday, July 28

BB allows the repo rate to decline to 4.85 percent.

BoF cuts its intervention rate by 10 basis point to 5 percent.

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III. Some Considerations Relevant to Pre-Funded Pensions in France ^{1/}

Pension schemes in France have provided increasing coverage and benefits during the last 30 years, but their liabilities are essentially unfunded and the aging of population has cast doubts on the long run viability of such a pay-as-you-go system. This uncertainty has been acknowledged, but proposals made in the study published by the French authorities in 1991 (Livre Blanc sur les Retraites) were limited to changes in some parameters ruling the current system and did not include the implementation of pre-funded pension schemes (actual pension funds). This choice was justified by concerns about the guarantees pension funds could ultimately provide to pensioners, income distribution, and the cost of financing a transition from the current system, but apparently did not consider the often salutary effects on capital markets and savings brought about by institutional investors such as pension funds. Therefore, in contrast to the situation in several other developed countries, where private pension funds play an important role in providing income for retired workers, large scale adoption of pre-funded pensions in France is not certain yet. Despite that, a significant number of French workers and households has shown growing interest in financial instruments that share several features with pension funds: they have increasingly purchased life insurance and annuities and participated in company-sponsored savings funds. Such an interest is an indication that markets may be ready for a gradual implementation of pension funds, and since recent research has shown that a transition from a pay-as-you-go system towards pre-funded schemes can be achieved without hurting any generation while benefiting some, a choice in this direction may be warranted. The paper provides background material on current and forecasted conditions of the pension system in France (Section 1); the expansion of life insurance and other contractual savings in recent years (Section 2); and aspects of a transition towards pension funds (drawing on the experience with funds in other OECD countries), including effects of pension funds on capital markets, and suggestions on how to shift some of the liabilities of the currently unfunded schemes to funded pension funds (Section 3).

1. The pension system in France

a. Features of the pension system

In France, the average standard of living of retirees improved significantly during the 1970s and 1980s, and it is equivalent to that of most working persons. Generous revaluations of benefits (30 percent in real terms since 1970), decreases in the minimum retirement age (to 60 years in most cases), as well as the possibility of cumulating pensions from different sources, removed retirees from the poorest segments of the population. In fact, statistics indicate that, in France, adjusted individual income peaks at age 66-70, when it is 25 percent higher than at age 31-40, and that around 80 percent of retirees' income is provided by

^{1/} Prepared by Joaquim Levy.

pensions, including old age benefits (minimum vieillesse). In addition to having a relatively high income, the majority (70 percent) of those aged in the 60-70 year bracket own at least one house, in contrast to those below 40 years, who in most cases (51 percent) do not own the place where they live. This affluence does not fully extend to those beyond seventy, who often have lower pensions, but it suggests that during coming years the number of relatively well-off retirees will increase. This bright scenario, however, may be difficult to achieve, given the current modus operandi of the pension system in France.

The pension system in France comprises a large number of unfunded schemes, which grew up along occupational lines. These schemes can be broadly divided among those for private sector employees and the self-employed, and those for public sector employees and workers in "special categories", such as railways, the merchant navy, etc. Schemes in the first group usually comprise two levels: the basic level (régime général) and the supplementary level (régimes complémentaires), grouped around AGIRC (for employed professionals) and ARRCO (other categories). 1/ Contributions to both levels are compulsory, and subjected to ceilings (except for the additional 1.6 percent contribution paid by employers (Table 1). 2/ All commercial and industrial enterprises are required to participate in an industry or assimilated scheme.

Benefits from the régime général are determined by the number of years the beneficiary contributed, as well as by the average wage earned over a certain number of years, indexed by either changes in price levels, or average wage increases. 3/ Benefits from the régimes complémentaires are proportional to the number of "points" the individual accumulated before retiring. These points are (usually) purchased; the ratio between the annual pension each point secures and its cost is known as the "return ratio" (rendement) of contributions. Cumulation of pensions from different sources is allowed and most persons receive more than one pension: the Livre Blanc indicates that retirees receive pensions from an average of 1.5 basic schemes and 1.3 complementary schemes.

1/ In some cases, voluntary supplementary schemes are also available. These schemes in some large companies (especially in the oil sector), parallel funded defined benefit schemes available in the United States and the United Kingdom. Schemes for the public sector usually have only one level.

2/ The ceiling wage for contributions to Social Security corresponded in June 1994 to an annual salary of F 152 160; ARRCO operates under the same ceiling; Contributions to AGIRC are computed based on wages between the Social Security ceiling and 4 times that ceiling for the so-called schedule B, and between 4 and 8 times that ceiling for (optional) schedule C.

3/ Pensions for public servants depend on the length of the contribution period and on wages of the last few months before retirement. Contributions to public servant pensions correspond to about 40 percent of net salaries, with 3/4 of them being financed by the State and the rest by employees.

Contributions have risen during the last decade, and currently they average about 20 percent of total gross labor income. The régimes complémentaires were able to combine the increase in contributions with a fall in the effective return ratio. 1/ Despite these increases in contributions and--in the case of the régime complémentaires--some adjustment by both workers and retirees, the cost of financing an increasing number of retirees for a longer period of time (due to an increase in life expectancy and decreases in retirement age) has strained the pension system in the last few years. For society as a whole, the increasing cost of pensions was reflected in the growth of pension payments, which during the last ten years swelled in real terms at an annual average rate of 4.5 percent, while the economy grew at only a 2.2 percent rate. These effects have been aggravated since 1991 by the slowdown of the economy.

Table 1. Contribution Rates to Pension Schemes
(In percentage of wages, 1991)

Contribution Rate	Overall	Employer	Employee
General pension scheme	16.35	8.20 1.60 <u>1/</u>	6.55
AGIRC	14.04	9.36 7.02 <u>2/</u>	4.68 2.34 <u>2/</u>
ARRCO	5.00	3.00	2.00

Source: Ministère des Affaires Sociales, de la Santé et de la Ville.

1/ Additional paid by employer, not subject to a ceiling.

2/ Supplementary pension (schedule C).

b. Medium- and long-term perspectives

Simulations published in the Livre Blanc show that by 2040 there would be between 1.3 and 1.7 workers for each retiree, compared to a ratio of 2.15 existing in the early 1990s, and that contributions would have to increase

1/ The effective return ratio is defined $V/(p a)$, where V is the value of the point, p its price and a is the call up rate (taux d'appel), which is a surcharge on the price of the point. Not only the price of the point has increased more than its value--which has been loosely indexed to the CPI, instead of to average real wages--but the call up rate has also increased. A fall (in real terms) of the numerator is borne by retirees, while an increase in the denominator by the active population.

accordingly if pension benefits were to keep growing in line with wages. 1/ A high fertility rate and a high activity rate would each reduce the dependency ratio (the ratio of retirees per worker) by 10 points, while lower unemployment would have only a marginal impact on it. Changes in dependency ratios were expected to require increases in contributions in a range between 66 and 127 percent, implying a contribution to wage ratio of up to 41 percent (Table 2). 2/

Table 2. Forecasts of Dependency Ratios and Contribution Rates in the French Pension System in 2040

<u>Dependency Ratio</u>			
Low Unemployment			
	Low Participation		High Participation
Low Fertility	0.75		0.66
High Fertility	0.66		0.58
High Unemployment			
	Low Participation		High Participation
Low Fertility	0.78		0.68
High Fertility	0.68		0.60
<u>Contribution Rates</u>			
(in percent)			
Low Unemployment			
	Low Participation		High Participation
Low Fertility	40.5 (25.1) <u>1/</u>		35.1 (24.4)
High Fertility	35.4 (25.0)		30.9 (24.3)
High Unemployment			
	Low Participation		High Participation
Low Fertility	41.9 (26.2)		36.3 (25.5)
High Fertility	36.7 (26.0)		32.0 (25.3)

Source: Livre Blanc sur les Retraites.

1/ 2010 figures in parentheses.

1/ Simulations comprised eight scenarios, reflecting two hypotheses about fertility, labor force participation and unemployment rates. They indicate that the dependency ratio (beneficiaries/contributors) will increase sharply after the "baby boom" generation starts to retire in 2005.

2/ These scenarios retained the demographic hypotheses described above and a 2 percent rate of growth of real wages.

In the absence of either increases in contributions or decreases in benefits, large financial shortfalls would develop before 2010, reaching some 370 billion of 1990 francs (about 4 percent of GDP) by that date, and worsening thereafter. These shortfalls are to be compared with a shortfall equivalent to 1.1 percent of GDP in 1990, and are concentrated mostly in the basic system.

The Livre Blanc suggested three main changes in social security in order to balance the system by 2010: lengthening the contribution period required to obtain a full pension, lengthening the period taken into consideration when computing benefits, and indexing benefits to the consumer price level (CPI), instead of to the average wage level. These three measures would achieve a surplus by the year 2000, which would be maintained until 2010. 1/

The main suggestions in the Livre Blanc were adopted in 1993. 2/ However, the problems after "baby boomers" start to retire have not been solved, and maintaining a pay-as-you-go system in the long run would still require contributions above 30 percent of gross wages, which may be infeasible. In fact, it is possible that workers and households have anticipated that and, taking advantage of capital market liberalization and low inflation (which increased the supply of financial instruments and reduced the risk of inflationary depreciation of returns), looked for options in the private sector even in the absence of private pension funds as they exist in other countries. 3/ The next section provides an overview of the savings institutions recently favored by workers and households in general. This analysis is followed by a discussion of aspects of a transition to pre-funded pensions.

2. Company-sponsored funds and life insurance in France

In discussing the possible effects of pension funds it is important to emphasize that there have been profound changes in French capital markets in the last few years. 4/ Among the changes discussed in this section are the growth of life insurance and company-sponsored savings plans (FCPEs,

1/ The Livre Blanc focused its attention on the basic system of social security (régime général), leaving the régimes spéciaux (including that for public servants) and the régimes complémentaires in the background, in part because some in the first group will be absorbed by the basic system in the long run, and those in the second group are managed by autonomous bodies (ARRCO and AGIRC).

2/ They comprise the indexation of pensions to CPI instead of wage growth, the gradual increase in the contribution period for a full pension from 37.5 to 40 years (over the next 10 years) and in the period used for the computation of the average wage from the best 10 years to the best 25 years (over the next 15 years).

3/ In 1992, for instance, households directed almost half of their net saving towards the purchase of life insurance and annuities.

4/ See Zerah (1993) for an account of the liberalization process.

fonds communs de placement d'entreprise--a sort of closed-end mutual fund-- and PEEs, plans d'épargne d'entreprise). Because some of their features are similar to those of pension funds, and because they are provided by the private sector, both instruments are often considered attractive starting points for the establishment of a widespread system of pension funds in France. ^{1/} Their growth in recent years has been strong, and their assets correspond to about 20 percent of GDP (Table 3).

Table 3. Stock of Financial Assets
(End of period, in billions of francs)

	1991	1992	1993
Life insurance	778	942	1 151
Annuities	248	273	298
FCPEs	80	92	117
Memorandum items:			
M3	5 160	5 429	5 350
Listed shares	1 635	1 619	2 120

Source: Banque de France.

a. The life insurance sector

Life insurance policies and annuities absorbed about 60 percent of household saving in 1993, reflecting the growth of the sector in recent years, which can be attributed to three main factors: financial liberalization in the 1980s, tax advantages, and a new perception of the longer-term needs of workers. Life insurance accounts for about 15 percent of household financial savings, permitting more than 40 percent of households to have some coverage and putting France among those EU countries, including the United Kingdom and the Netherlands, with the highest per capita premiums (Ministry of the Budget, 1993). Growth has been

^{1/} The popularity of both PEEs and life insurance also indicates public trust in financial markets and, in particular, in basic mechanisms of defined contribution pension funds, including protection from inflation. As in the United States, life-insurance policies in France can be liquidated during the lifetime of the policy holder, and hence are mainly viewed as a savings instrument, not necessarily related to a bequest motive.

steady but strong, with annual contributions increasing 10 fold between 1980 and 1992, reaching almost 300 million francs at the later date. 1/

The first factor leading to growth in the life insurance industry was the permission granted in 1985 to banks and other financial institutions to sell insurance policies through their insurance subsidiaries (and the liberalization of the type of product that could be offered). Currently, these subsidiaries represent about half of the market. Competition has not only increased the volume of retail outlets, but also the yield provided by the average policy, which passed along the high interest rates available in recent years. The second factor comprises an income-tax deduction (prime) proportional to the amount invested and the income-tax exemption of capital gains on savings held for at least 8 years, as well as favorable treatment of bequests. 2/ The fiscal expenditure implied by tax-exempting returns on long-term savings can be roughly estimated to be around F 10 billion a year; the budgetary cost of tax reductions (primes) is probably of the same order of magnitude. 3/ Together, they correspond to about 5 percent of the revenues generated by the income tax. The third factor reflects the concern of economic agents about their future income, and the desire of those already owning a house to diversify their assets.

Recent changes in life-insurance regulations are expected to increase the length of contracts and the demand for life insurance in coming years, without adding fiscal incentives. A "fidelity clause" allowing insurers to offer special rates for customers who keep their policies active for many years is expected to extend the length of contracts beyond the 8 year tax exemption period and reduce the risk insurers face of large withdrawals. However, at this stage, the absence of formal estimates hampers a precise evaluation of the effectiveness of that clause. Flexible distribution of surpluses and new disclosure rules are expected to increase the demand for

1/ The growth in life insurance and annuities has been shared by another long-term saving instrument, the so-called "popular savings" (épargne populaire-PEP), which has accumulated deposits of about F 350 billion. This instrument replaced the "retirement savings" (épargne de retraite-PER), introduced in 1986, and benefits from tax advantages similar to those granted to life insurance.

2/ The tax deduction, corresponding to 25 percent of investments, is limited to F 4 000 a year per household, with additional F 1 000 per child. In the case of death of the policy holder before 70 years of age, there are no transmission taxes. In the case of death after 70, a reduction of the taxable amount, up to 200,000 francs, is granted.

3/ Fiscal expenditures correspond to revenues forfeited as result of tax breaks. The estimation above is based on a withholding tax rate (prélèvement libératoire) of 15 percent and nominal returns of 5 percent on the stock of around F 1 500 billion invested in PEPs and life-insurance. The cost of the tax deduction (prime) can be roughly estimated by assuming that, of the 13 million households who pay income taxes (Legendre, 1993), half invests in life insurance, and by considering the F 4 000 ceiling, implying an upper bound of around F 25 billion.

insurance, while the recent update of the technical bases for computing annuities and premiums should favor supply. Such a flexible distribution of surpluses makes life insurance similar to defined contribution pensions in the sense that it permits insurers to offer part of the upside of total returns, i.e., to shift part of the risk (and expected returns) to investors. 1/

b. Features of company-sponsored savings

In contrast to life-insurance policies, purchased by households on an individual basis, company-sponsored savings programs operate under the framework provided by regulations issued in 1967, requiring firms with more than 100 employees to share part of their profits with the workforce. 2/ This legislation mandates that the share belonging to employees (participation) be frozen for a period of 5 years. During this period, resources can be held in bank accounts or in company-sponsored mutual funds (FCPEs). 3/ In early 1993, these resources amounted to about 80 billion francs, half invested in funds. 4/

Workers' share of profit is not the only source of funds to FCPEs and, firms--on their own initiative, or as result of an agreement between labor and management--can create special funds to collect the participation and other participatory benefits. These funds--the PEEs--enjoy several tax advantages, again reflecting the policy of granting fiscal incentives for long-term savings (see SM/93/197, Chapter IV). Since 1959, workers can receive incentive payments tied to productivity measures (intéressement), which can also be deposited in tax favored investment instruments. 5/ By 1990, around 2 million employees (about 10 percent of the labor force) had signed agreements to receive incentive payments. Employers' voluntary

1/ Defined benefit schemes are those where retirement income depends on years of work and/or salary, while defined contribution schemes are those where pensions vary with the return on assets invested.

2/ In 1986, the requirement was extended to firms with more than 50 employees, effective in 1991.

3/ For details on holding restrictions and tax regimes, see Lefebvre, 1993. Blocked accounts are usually used as collateral for investment loans to the firm and remunerated at market rates.

4/ In 1994, the government included, among the measures adopted to stimulate the economy, provisions allowing workers to withdraw up to F 20,000 from their personal frozen funds in order to buy a car or finance home improvements.

5/ These payments can reach up to 10 percent of the wage bill of each firm (except in special cases, when they can reach up to 15 percent), and, at the individual level, up to half of the reference maximum wage for social security contributions. Because PEEs are not mandatory, only 33 percent of companies paying intéressement have one (52 percent in the case of state-controlled institutions and firms), most firms simply sponsoring a mutual fund (FCPE).

contributions (abonnements) and voluntary worker deposits are also an important source of financing of PEEs, as reported in Table 4. 1/

Table 4. Sources of Funds for PEEs in 1989

(In percent)

Profit sharing	Incentive payments and workers' voluntary deposits	Employers' deposits
53	38	9

Source: Exchange Commission (COB).

The main tax advantages of PEEs are the following. Employers' voluntary contributions are not included in employees' taxable income, and are not added to the wage bill for the purpose of computing social security contributions, if blocked for a period of time. In addition, they are deducted from the firm's taxable income. Workers' profit shares deposited in PEEs are not taxable for a period of 5 years; and investments made by PEEs maintain the tax exemptions intrinsic to financial instruments in which the investments are made. The tax deduction of contributions to PEEs and the tax exemption of reinvested returns are common to pension funds in many countries and reflect the benefits granted to mandatory contributions to pension schemes in France. 2/

PEEs enjoy great freedom in choosing their investment policies, while--because they are institutions handling contractual savings (as are pension funds)--they are overseen by representatives of employees. 3/ Funds

1/ Employers' contributions are limited to 10,000 francs per employee annually, except if they comprise stock issued by the firm itself, in which case they can reach up to 15,000 francs. Voluntary worker deposits can amount to as much as one fourth of worker's gross wages. Workers can also participate in stock option programs and sometimes they may be subjected to mandatory contributions to PEEs, but stock options have experienced limited success and mandatory contributions are small, being limited to a maximum of a thousand francs per year.

2/ Tax deferral of pension contributions is consistent with a consumption based tax system. In this case, income is taxed after retirement. An additional advantage of only taxing pensions--along the income tax schedule for labor income--is that the distortionary effect of taxing nominal returns on savings is avoided.

3/ The type of savings instrument, management criteria, as well as restrictions on withdrawals, are set in the internal statutes of the PEEs, which have to be registered with the Exchange Commission (COB).

deposited in a PEE can be invested in individual accounts, or in many types of closed-end mutual funds. The vast majority of FCPEs (including those linked to PEEs) are managed by financial institutions outside the sponsoring company, mainly banks and insurance companies, under the supervision of a Board which has a majority of representatives of employees. 1/ Competition among financial institutions for managing these increasingly large funds (Table 5) has led them to supply a variety of savings instruments, allowing companies to offer funds tailored to workers' demands. It has also led financial institutions to charge relatively low management fees. 2/

Table 5. Total Assets in Mutual Funds of Enterprises (FCPEs)

(In billion of francs)

Year	1986	1988	1990	1992	1993
Value	38	48	67	92	117

Source: COB.

c. Portfolios of life insurance companies and FCPEs

The aggregate portfolios of life insurance companies and PEEs indicate how contractual savings are invested in France. Their distributions of assets differ, in part because the former offer a more standard product, while the latter offer tailored products which are sometimes a source of financing for the sponsoring firm. A brief analysis of the portfolio of life insurance suggests that the current distribution of assets is close to the efficient portfolio frontier, defined as the minimum variance portfolio for a given rate of return.

The portfolio of the insurance industry is mostly composed of fixed income assets, including both government and private paper (Table 6). This is explained by the liquidity and relatively high returns of those assets in recent years--not because of binding regulations. In fact, since 1990, the

1/ More than 50 financial institutions manage the 4000 plus existing FCPEs, with the biggest 10 institutions managing about 70 percent of the total funds. In the case of state owned companies, around 80 percent of the resources in FCPEs are managed by professionals (Pastre and Moscovici, 1991).

2/ Annual fees have been estimated to be around 0.5 percent of the value of portfolios managed by institutions, thus comparing favorably with the management cost of pension funds in regulated countries such as Germany and Japan, but less favorably with those in countries such as the United States (0.4 percent) and the United Kingdom (0.2 percent) (Davis, 1993).

obligation to invest at least 34 percent of the portfolio in bonds and notes has been eliminated, and only maximum limits on the other types of assets currently exist. The proportions of real estate and loans have markedly decreased over the years as financial markets developed and low inflation endured, and are well below their respective maxima of 40 and 10 percent. The proportion of stocks is also below the allowed ceiling of 65 percent. Chart 1 suggests that, although conservative, the portfolio of the life insurance sector is efficient, i.e., for the level of expected return chosen, the variance is virtually minimized. Chart 1 shows the efficient portfolio frontier generated by holdings of bonds, real estate and a diversified portfolio of stocks, considering annualized returns for the period 1979-93. It also shows the position of the aggregate portfolio held by insurance companies. ^{1/}

Table 6. Distribution of Life Insurance Portfolios

(In percent)

	1982	1992
Fixed income	52.7	61.3
Stock	...	14.8
Real Estate	19.5	10.7
Negotiable debt	...	10.3
Loans	7.1	2.1

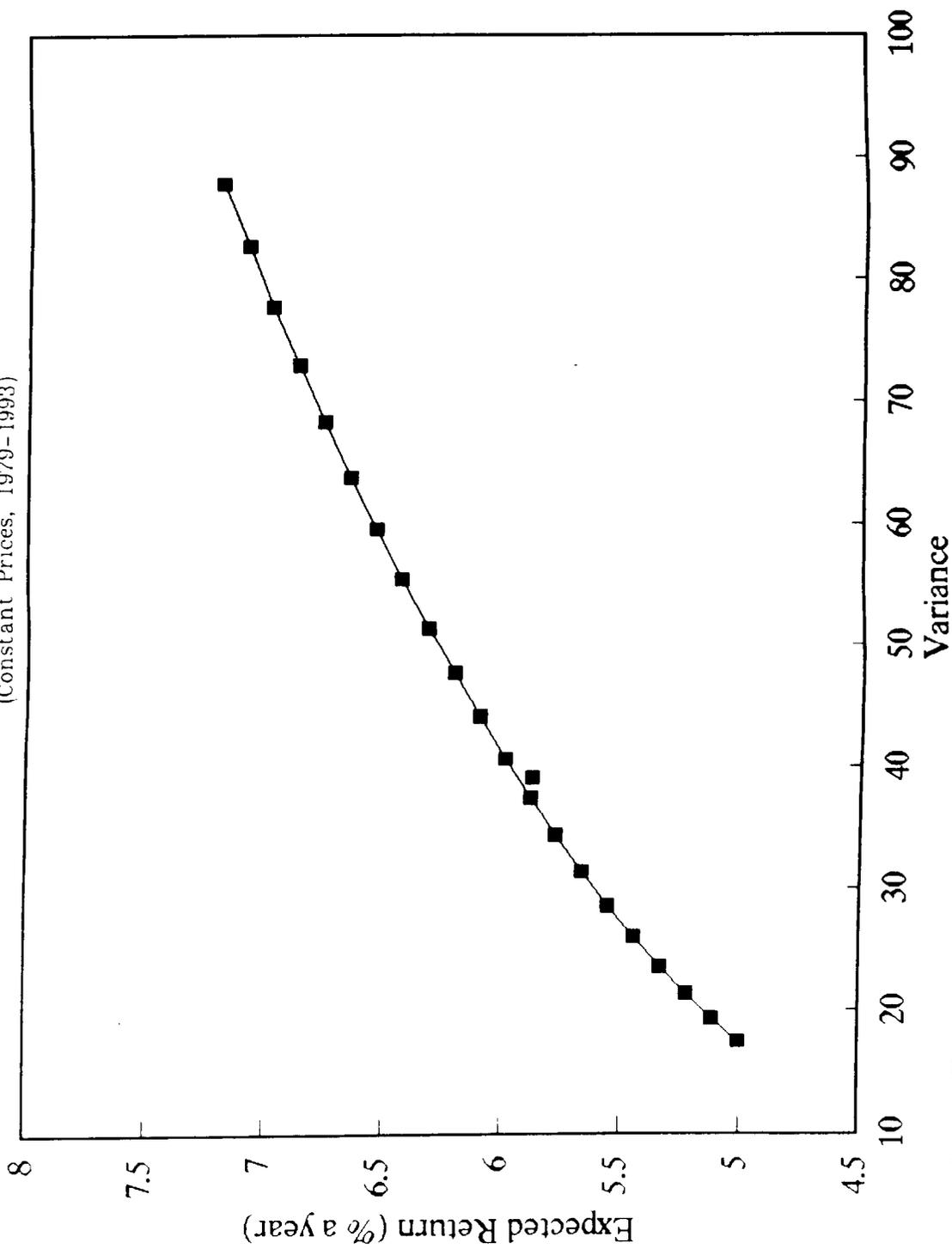
Source: Ministry of Finance.

An increase in the proportion of stocks would be desirable as a way to improve the protection of the portfolio against inflation, especially if the average holding period of policies is to be stretched beyond 10 years. Recent changes in regulations concerning the distribution of surpluses (see above) are expected to work in this direction, by increasing the attractiveness of real assets at the expense of guaranteed returns. An increase of 5 percentage points in the proportion of stocks--along the portfolio frontier--would permit an increase in expected returns of 0.6 percentage points, while increasing the volatility of the portfolio by about 40 percent. Such a portfolio adjustment would create a demand for about F 70 billion in equity--the equivalent to all privatizations carried out since 1993.

The aggregate portfolio of FCPEs already includes a significant proportion of stocks (Table 7). As noted before, there are almost no restrictions on the type of financial assets held by PEEs, allowing them to

^{1/} See Huang and Litzenberger (1990) for the properties of the efficient frontier.

CHART 1
FRANCE
The Portfolio Frontier
(Constant Prices, 1979-1993)



Sources: WEFA, COB, and Staff Calculations

take advantage of the relatively long-term nature of deposits benefiting from tax incentives and hence investing a significant proportion of their assets in stocks. The average period of a deposit in a PEE oscillates between 7 and 7 1/2 years, hence actually exceeding the 5 years "blocking" period determined by the legislation. Although the legislation does not impose a cap in the share of PEEs' portfolio invested in stock issued by the sponsoring company, on average this proportion is below 20 percent.

Table 7. Asset Composition of FCPEs

(In billion of francs)

	1986	1990	1993	1993 share (in percent)
Mutual funds	8.8	18.7	27.4	23.2
Stocks	18.1	25.5	55.2	46.8
Of which issued by the company	5.9	11.8	23.6	20.0
Fixed income	10.4	19.6	34.2	29.0
Of which issued by the company	1.8	3.1	8.8	7.5
Cash	0.9	1.1	0.9	0.8

Source: COB.

The analysis of the portfolio of PEEs and life insurance suggests that the expansion of contractual savings (e.g., pension funds) could lead to more financing to firms (taking into account the importance of equity in the portfolio distribution of FCPEs, as well as the size of the portfolio of life insurance companies) and that management fees and transactions costs could further decrease as the volume of savings increases and competition to manage these portfolios develops. The effects of pension funds on the capital markets of other developed countries is one of the topics discussed in the following section, together with the macro implications of a greater reliance on savings instruments as sources of income to retirees, and how this income might be protected against inflation.

3. Aspects of a transition towards pre-funded pensions

This section attempts to address the main concerns usually expressed about the adoption of pre-funded pension schemes (i.e., the inter-generational cost of a transition, how effective a protection against

inflation such funds can provide, and the relative advantages of defined benefit and defined contribution schemes), discusses expected effects on capital markets, and examines some implications of supporting pre-funded pensions by ways other than simply creating yet another tax-favored savings instrument.

a. Intergenerational cost

It is well known that when total labor compensation is growing fast-- because of either (1) a high population rate of growth or (2) technical progress reflected in sustained increases in real wages--a pay-as-you-go system may be more efficient than a pre-funded system. 1/ However, given the population growth projected for Europe in the coming decades, the above conditions do not seem to apply. It has also been highlighted that contributions to social security most often act as a tax on labor, distorting and reducing labor supply. 2/ On the other hand, because savings are the result of an intertemporal decision about consumption, and not labor supply, contributions to pre-funded pension plans are thought to be neutral in relation to the latter. Taking these elements into account, overlapping generation models with endogenous labor supply indicate that pre-funded pensions can be more efficient than a pay-as-you-go system (when population growth is modest), permitting in some cases a switch from the latter to a funded system in a way that does not hurt any generation, i.e., permitting a Pareto improving switch. 3/

1/ This will be the case when the combined rate of growth of the population and the real wage exceeds the interest rate in steady state; i.e., the capital/labor ratio is higher than the so-called golden rule level. See, for instance, Artus (1993).

2/ The rationale for the CSG (contribution sociale généralisée)--a tax used to finance the French social security system (and in particular, pensions) and levied on all sorts of incomes--was to shift part of the burden from labor.

3/ Homburg (1990) and Breyer and Straub (1993) prove the existence of transition paths, from a steady state, that are Pareto improving. This contrasts with results using models that do not consider the utility of leisure, such as Diamond (1965) and Blanchet (1993), where such switch will always hurt at least one generation. Simulations in Raffelhüschen (1993) confirm the results in Breyer and Straub for the case of Germany. On the other hand, Chauveau and Loufir (1994) present a simulation in which pre-funded pensions would lead to a decrease in output in the medium-term and unattractive results in the long term. This result is due in part to the way pre-funded pensions were treated. Because the authors assumed that contributions to pre-funded pensions were invested in a "superfund" whose returns were not necessarily associated to individual contributions, contributions were treated as an additional tax on labor. This result contrasts with those of a similar model presented in Cazes, Chauveau, Le Cacheux and Loufir (1992), where contributions are treated as (contractual) savings.

Implementing such a transition (which would not hurt any generation and hence addresses the concerns raised in the Livre Blanc, on page 134, for instance) would probably require a transitory increase in public debt. Homburg (1990) suggested a *capital reserve system cum government debt* (to effect intergenerational transfers), similarly to Raffelhüschen (1993) who also suggests the introduction of credit instruments. The increase in public debt (which simply reflects the implied liabilities of the pension system) would not offset the increase in savings, hence permitting an increase in capital accumulation. Because in France the implied liability of social security exceeds annual GDP (Kuné, et al., 1993), a full transition to pre-funded pensions without hurting any generation may be infeasible. However, as Raffelhüschen simulation shows, the effects of a transition are not linear, i.e., much can be achieved with a partial reduction of contributions to unfunded schemes and the establishment of pension funds. This cautious approach can also minimize distributional effects due to macro and financial uncertainty, not captured in the above models.

b. Protection against inflation

The opposition to funded pension schemes in France results to some extent from the failure, during the 1930s and early 1940s, of several pre-funded pension systems to provide adequate income to their members. 1/ This failure contributed to the choice, made in 1945, of financing the national social security system through the pay-as-you-go method. Nowadays, the increasing sophistication of financial markets and a lasting decrease in inflation may have reduced the magnitude of the inflationary threat, but it is useful to review how pre-funded pensions in other countries have performed in this area.

The protection against inflation afforded by defined benefit schemes varies according to the way sponsoring firms compute pensions. In most countries, defined benefit schemes offer discretionary increases in benefits after retirement and some indexation before that. 2/ Notably, in the Netherlands, negotiated increases are the norm and in Germany indexation is mandatory. However, the ability to deliver inflation protection ultimately depends on the return of portfolios and on the existence of assets whose real returns are not systematically eroded by inflation (e.g., stocks and indexed bonds). 3/ Indications are that during the last 25 years,

1/ In particular, due to the depreciation of government debt caused by the war.

2/ See Table 11 for a comparison of indexation rules in selected countries.

3/ Low returns could limit the effectiveness of the protection against inflation provided by defined benefit schemes, because they might require those companies offering fully indexed pensions to inject additional resources (from, say, operational reserves), possibly impacting the firm's financial health and its future existence. Funding requirements are discussed in more detail in the appendix.

protection against inflation has been effective, as in most developed countries the average return of pension funds' portfolios seems to have exceeded inflation. ^{1/} In addition, it has also exceeded increases in real average earnings (wages) in several countries (Table 8).

Table 8. Real Returns of Pension Funds and other Financial Assets and the Rate of Growth of Average Earnings (1967-90)

	Real returns			Equities	Growth of average earnings
	Pension funds	Government bonds	Market paper		
United Kingdom	5.8	0.8	1.7	8.1	2.6
United States	2.2	0.6	2.0	4.7	0.2
Canada	1.6	0.0	2.5	4.5	1.7
Netherlands	4.0	1.0	1.6	7.9	2.4
Sweden	0.2	-0.9	1.3	8.4	1.5
Germany	5.1	2.7	3.1	9.5	4.0

Source: Davis (1993).

Returns depend on the distribution of assets held by pension funds, and this distribution varies from country to country, depending on three factors: the extent of indexation of pensions (especially to wages), minimum funding requirements, and the supply of government bonds. In most countries, the proportion held in the form of equities is significant (Table 9). ^{2/} The first factor favors stocks, whose returns reflect the growth of the real economy. In countries where indexation is not common (as in Canada), the share of bonds tends to be higher.

The second factor--high funding requirements--usually induces funds to invest in low volatility assets, hence potentially decreasing the share of

^{1/} Of course, the protection afforded by funded pensions against inflation depends to a certain extent on macroeconomic conditions. A war or a continued deterioration of the economy would reflect on the assets held by pension funds and impact future pensions. Diversification into international markets can, however, be a way to hedge pension funds' portfolios against real shocks to the domestic economy.

^{2/} The paucity of data on funded pension schemes in France limits a discussion of pension funds' investment policies. However, a comparison with the portfolios of FCPEs confirms the important role of stocks in these long-term portfolios.

stocks and long maturity bonds. 1/ In countries such as the United Kingdom, where required funding is limited, stocks are an attractive investment and do not require sophisticated investment strategies; in the United States, higher funding requirements may have discouraged a larger holding of stocks, despite the availability of financial derivatives, which can hedge the portfolio against stock price falls. 2/ The final factor, supply of public debt, works in two ways to make bonds more attractive to pension funds: a higher supply will tend to increase the liquidity and the coupon rates paid by government paper. However, the effect on protection against inflation is not clear.

Table 9. Asset Composition of Pension Funds' Portfolios

(As percentage of assets, 1990)

	Short term assets	Equity	Bonds		Loans	Property
			Gov.	Priv.		
United Kingdom	7	63	11	3	0	9
United States	9	46	20	16	-	-
Canada	11	29	39	8	0	3
Netherlands	3	20	14	4	39	11
Sweden	3	1	22	63	10	1
Germany	2	18	17	8	36	6

Source: National Flow-of-Funds Data, in Davis (1993).

Several factors suggest that pension funds will continue to provide effective protection against inflation, even in the absence of indexed bonds. They include the proportion of stock holdings evidenced in the table above, the current yield curve in Europe, which does not predict a surge in inflation, and financial innovations, such as portfolio "immunization" (i.e. the reduction of portfolios' sensitivity to interest

1/ Funding requirements may require a company sponsoring a defined benefit scheme to immediately top up the fund with new resources whenever assets fall below projected liabilities. This automatic reaction is what discourages holding a high volatility portfolio.

2/ The proportion of pension funds' assets invested in derivatives is still difficult to measure, because in most cases such investments are off-book items.

rate changes). 1/ In France, financial instruments offering guaranteed returns are already a common product and could be extended to cover inflation indexation. 2/ Moreover, the development of new financial instruments is often associated with the introduction of private pension funds.

c. Effects on capital markets

International experience shows that pension funds have fostered the development of capital markets mainly because of the scale of their operations, the nature of their liabilities, and their need and ability to use sophisticated financial instruments. It also suggests that these effects are strengthened if funds are under outside management; effects on aggregate saving and on firms' governance are considered positive, but difficult to measure.

Because pension funds have long-term liabilities, they can provide long-term company financing; and because funds seek to be able to trade a large volume of assets without affecting prices, they create incentives for the expansion of active markets for bonds and stocks. Indeed, countries whose pension funds are large in aggregate tend to have stock exchanges with large capitalizations (Table 10) and generally low transaction costs (Hepp, 1992). Funds also create a demand for derivatives--used as a way to avoid having to trade illiquid assets (e.g., futures on an asset can be more liquid than the asset itself) or, as noted above, for hedging their portfolios against increases in interest rates.

The influence of pension funds on household saving is likely to be positive, but not one-for-one in relation to the increase of assets held by funds. The main studies in this area are Feldstein (1978), which shows that in the United States saving decreased when unfunded pensions were adopted, and Munnell (1976), which suggests that although holding private (funded) pensions decreases other personal saving, the introduction of funded pensions may increase the pool of capital. 3/ An illustration of the importance of pension funds as savings institutions in the United States, the United Kingdom, Canada, and the Netherlands is the size of their assets as a ratio to GDP (Table 10). In the United Kingdom and in the Netherlands,

1/ Immunization can be used as a hedge against inflation, because it protects the value of the portfolio against a fall in the price of long-term debt when nominal interest rates increase. This is achieved by reducing the maturity of the portfolio of bonds through the use of derivatives or short-sales of longer-term bonds.

2/ There are many mutual funds that guarantee a minimum (nominal) return and a fraction of, say, the increase in the main stock exchange index (CAC 40).

3/ Results in Diamond and Hausman (1980) and Avery, Elliehausen and Gustafson (1986) suggest that each dollar invested in pensions is associated with an increase in total saving of up to 40 cents (see Bodie and Munnell, 1992).

claims on pension funds also represent an important share of personal sector assets: about 40 and 30 percent respectively.

Table 10. Assets as Percentage of GDP

	Pension fund assets			Life insurance assets			Stock exchange capitalization <u>1/</u>
	1970	1980	1990	1970	1980	1990	1991
United Kingdom	17	23	55	26	23	42	97
Unites States	17	24	35	24	18	24	63
Canada	13	17	28	18	14	11	100 <u>2/</u>
Netherlands	29	46	77	16	17	30	40
Sweden	22	30	28	20	21	36	40
Germany	2	2	3	8	12	18	24
France	--	--	--	2	6	13	29

Source: National Flow-of-Funds Data (in Davis, 1993), COB and OECD Financial Statistics, and staff estimates.

1/ Domestic shares.

2/ Includes foreign shares.

Pension funds can also play a role in privatization by providing a group of large, and potentially stable, investors. 1/ In France, the current level of privatizations (around 50 billion francs a year) could easily be absorbed by pension funds, even if they were to invest the equivalent of only a fraction of contributions currently paid to mandatory supplementary schemes.

Pension funds, like other institutional investors, create incentives for bank disintermediation, i.e., because funds create a large demand for securities, they may encourage firms to issue stock or bonds, instead of seeking loans from banks. 2/ This may increase the "transparency" of financial markets, but have only indirect effects on the financing of small enterprises. Institutional investors tend to require firms to make public more information, because they are usually less likely to get directly

1/ Pension funds were among the major players in the privatization process in the United Kingdom, Chile and Brazil.

2/ Securitization in France has expanded throughout the 1980s. Lahidji (1994) reports that the reliance on banks for credit (taux d'intermédiation) decreased from 70 percent to 40 percent in 1991 and to less than 20 percent in 1992.

involved in management of firms than banks are. In general, more information should lead to better investment allocation. However, the dislike of institutional investors for less liquid assets puts small companies at a disadvantage in relation to large companies and may force them to continue to rely mainly on banking credit. 1/ This may make the cost of funds to these firms higher than for larger firms, but a larger savings pool and competition in financial markets should lower the absolute cost of funds and hence the overall effect of pension funds could also be favorable to small firms.

The above discussion suggests that effects of pension funds on French capital markets would be positive. These effects would of course depend on the regulations adopted and on the supervisory authority established. If a system based on defined contribution schemes, where workers have the right to chose the manager of their savings, were adopted (see next part), an industry along the lines of that currently managing mutual funds could be expected to develop (this industry includes "boutique" funds, but has a large participation of banks and insurance companies that benefit from their strong reputation). 2/ In this case, portfolio regulations paralleling those applied to insurance companies could be appropriate. In any case, a cap on self-investment and on investment in non-listed securities would be desirable. 3/ The supervision of funds should be under one authority, in order to enhance the protection against fraud and the development of guidelines concerning financial disclosure. Therefore, it would be useful to have clarified whether pension funds are to be considered to belong to the insurance industry, or to be under the control of the Exchange Commission (COB), which already regulates mutual funds.

d. The choice between defined benefit and defined contribution schemes

Private pension funds in developed countries comprise mainly defined benefit schemes, although defined contribution pensions (e.g., personal pensions) are increasingly popular. 4/ The main advantages of defined benefit pensions are that firms bear most of the risk of providing pensions (including, sometimes, inflationary risk), and that they offer the possibility of achieving some income redistribution; the main advantages of defined contribution schemes are their portability and transparency. These

1/ Instruments devised to attract so-called "sophisticated" investors (such as private placements in the U.S.), which could help small companies, have had limited success with pension funds because they are often viewed as risky and difficult to monitor.

2/ As noted in section 2, about 50 companies manage most of the FCPEs.

3/ In France, cross ownership of (non-listed) stock among firms is quite usual (Szpiro, 1992) and if pension funds (in particular, defined benefit schemes) are not required to hold listed stock, firms could simply expand this practice, increasing the risk borne by eventual pensioners.

4/ See Table 11 for a comparison of main features of pension funds in selected countries.

advantages, as well as issues raised by defined benefit schemes, are discussed in the appendix. In the United States, most of the increase in coverage in the last 20 years has been achieved through the setting up of defined contribution schemes, which nowadays cover as many workers as defined benefit schemes. Personal pensions were introduced in the United States during the 1970s in the form of individual retirement accounts (IRAs), and in the United Kingdom during the 1980s.

The analysis in the appendix suggests that a system based on defined contribution schemes may be easier to implement because such pensions are similar to savings instruments which most workers are acquainted with, and because they are fully portable. In addition, it suggests that defined contribution schemes (i) may provide more security to investors than defined benefit schemes, whose pensions depend on the fate of the sponsoring company, (ii) can be hedged against inflation, as long as there are no undue restrictions on pension funds' investment in stocks, and (iii) should be subjected to restrictions on early withdrawals in order to ensure a minimum amount of savings upon retirement (e.g., when changing jobs, pensioners should not be able to cash in their savings).

e. Contracting out to pre-funded schemes: a scenario

Fostering private pension funds is one among different ways to accumulate enough savings to finance pensions after 2010. 1/ Another way would be to increase the current reserves of the régimes complémentaires, by setting aside contributions to accumulate assets. The current reserve, which corresponds to about one year of benefits, generates 5 percent of the income of the system, illustrating the scope for such an approach. 2/ Technically, the setting aside could be achieved without an increase in contributions, by increasing the numerator of the return ratio less than its denominator. 3/ The adjustment of contributions and benefits is not new to the system. During the 1950s, AGIRC lowered call-up rates, when it wanted to decumulate an incipient reserve caused by the rapid increase in contributing participants (Lynes, 1985).

Private pensions would decentralize the process of accumulation, and could be introduced by permitting a partial contracting out of the system in exchange of a freezing of the contribution rate. In this case, a decrease in future liabilities of the system would be achieved, because workers would have part of their contributions deposited in defined contribution funds of their choice, instead of having them used to finance current pensions. This

1/ Another approach would be to rely on foreign savings during the period of 2015-55, which has the drawback that other European countries face the same demographic trend.

2/ For the last 6 years, the annual return on ARRCO's reserves (of F 70 billion in 1992) was above 10 percent (compared to an inflation rate of 3.2 percent).

3/ A decrease in the numerator would imply lower growth in the value of pensions, other things equal.

switch might increase (contractual) savings, which, as noted above, are usually not perceived as distortionary taxes on labor. However, by reducing the inflows into the pay-as-you-go system, it would require decreases in benefits for those already drawing pensions relative to a system without contracting out.

The hoarding of a fraction of labor income in savings instruments should be particularly attractive to younger workers, who would benefit the most from the compounding of returns on financial assets. Chart 2 shows how pension benefits (in constant prices) would increase with the number of contribution years to defined contribution funds, for a given real return, and to pay-as-you-go systems, for a given "return ratio" (the values are standardized relative to the pension earned after contributing ten years to a defined contribution yielding 2.75 percent a year in real terms). ^{1/} It illustrates that even for the generous return ratio of 11.5 percent, long-term users of funded pensions may be better off.

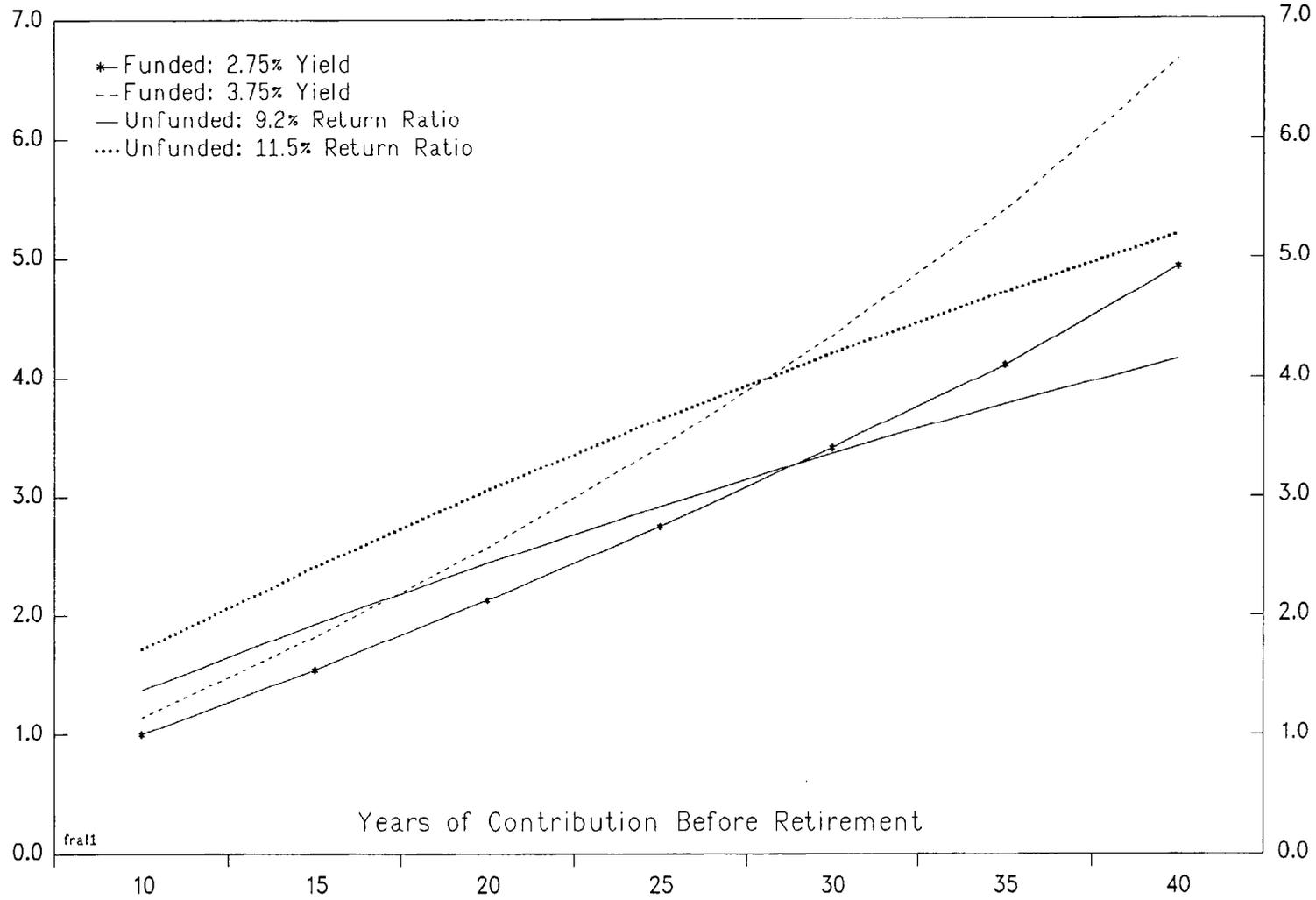
The contracting out scenario is one among several that could be adopted (including making pre-funded pensions mandatory, as is done in Switzerland) and complements the gradual increase in the retirement age that will take place as a consequence of extending to 40 the number of years needed to qualify for a full social security pension. It has the advantage of not requiring increasing fiscal exemptions that would probably be necessary to make contributions to funded pensions attractive at a time of rising contributions to mandatory schemes. The approach would also keep the basic pay-as-you-go principle (répartition), focusing it on the basic social security pension, while spreading the cost of pensions across generations and favoring the development of capital markets.

4. Conclusions

The growth of the life insurance sector and of company-sponsored savings plans indicates that individuals in France have increasing confidence in financial markets and the desire to use them to guarantee future income, suggesting a favorable environment for the expansion of pre-funded pension schemes. The fact that French workers have increasingly included PEEs (which share features with defined contribution schemes) in their collective agreements indicate a perception that such sources of deferred income can be part of labor compensation, which is a common feature in the United States and other countries that have funded pensions.

^{1/} The exercise in Chart 2 assumes that wages increase by 1.5 percent a year over the working life and that pensions are on average paid for 20 years--20 percent longer than they are currently paid. The yields adopted (2.75 and 3.75 percent a year in real terms) are conservative when compared with the returns of recent years. The "return ratios" reflect the evolution of ARRCO ratios, which have been reduced over time. Return ratios are not directly comparable with the yield of a bond (see Section 1 for a definition).

CHART 2
FRANCE
Standardized Value of Pensions
(For Similar Patterns of Contributions)



Source: Staff Calculations.

Their growth also suggests that financial markets are responsive to changes in demand and that the positive effects on capital markets associated with pension funds in other countries could take place in France. In the case of both PEEs and life insurance, a very dynamic market has developed, suggesting that insurance companies are probably ready to manage large pension funds. In fact, since the deregulation in the 1980s, insurance companies have managed large financial portfolios not only for themselves, but for third parties. The size of the insurance market can be gauged by the amount paid in premiums, which corresponded in 1993 roughly to half of social security contributions.

Pension funds in other developed countries, according to the elements presented in this study, have had a positive effect on capital markets, mainly due to the size of their operations, the information they require from firms, and the financial innovations they foster (to some extent, pension funds also tend to help to increase the household savings rate). The effect of institutional investors on French capital markets in recent years suggests that similar developments could be expected in France following an expansion of pre-funded pension schemes for French workers.

The fact that most resources in FCPEs come from participatory benefits does not constitute a significant difference in relation to the financing of pension funds in other countries. Mandatory contributions to funds are present in some countries where the basic social security pension is small and, in France, mandatory contributions could be tied to a sort of rebate (or freeze of contribution rates) linked to the relinquishing of future rights on supplementary pensions. Tax benefits applied to PEEs are not essentially different from those granted to most pension funds either. But if these incentives were to be extended to pensions, it might be advisable to do so through a coherent system of taxation of capital gains, in order to avoid unnecessary tax expenditure.

If the above indications are taken as pointing to the establishment in France of a pension system based also on private pre-funded schemes, questions arise about the social cost of a transition and the guarantees offered by such systems. The preliminary answer to the first question is that a Pareto improving transition, associated with increased employment, can in principle be achieved. A possible way to initiate a transition would be to permit workers to contract out from the mandatory supplementary pension system, in order to participate in a defined contribution plan.

The second question can also be partially answered by looking at the regulations adopted in other countries, as well as by drawing on current regulations covering the French life insurance industry and on the practice among PEEs. The experience in foreign countries, and the fact that regulations on French insurance companies have recently been liberalized, suggest that few restrictions on portfolio distribution would be desirable. Among them, however, would be limits on investment in stocks, in debt issued by the company sponsoring the pension fund, and in non-quoted securities. In addition, the participation of workers in supervisory boards, their right to change fund managers, and broad disclosure rules would tend to protect

the assets accumulated and to increase returns. International experience also suggests that defined contribution schemes may provide more transparency and be easier to introduce. Because portability of benefits, as well as vesting, add some complexity to the management of defined benefit schemes, these may be more difficult to implement nationwide. It also suggests that having a unified statutory authority responsible for supervising all pension schemes and regulations, possibly along the lines of that in place in the Netherlands, would increase confidence in the system, hence facilitating its introduction.

Features of Defined Benefit and Defined Contribution Schemes

Defined benefit schemes raise three issues: minimum funding levels, the ownership of surpluses, and portability.

Minimum funding levels are actuarial concepts that are applied diversely in different countries, all of them having the objective of guaranteeing that the firm has actually set aside enough resources to fund pension liabilities. Minimum funding levels can work towards protecting the value of pension funds in conjunction with, or as a substitute for, restrictions on portfolio composition: any time funding goes below the minimum, the fund has to be topped up; certain assets, especially those that are more volatile, cannot be held by funds. In the United States, the United Kingdom, and the Netherlands, there are mandatory minimum funding levels but no specific regulations on portfolio distributions; in Switzerland there are both (see Table 11 for features of funds in selected countries). 1/ The ownership of surpluses is generally given to the sponsoring firm, because it is understood that since the firm is committed to complement any shortfall of pensions, it should also be entitled to surpluses. In the United Kingdom and the United States the firm can either withdraw the surpluses (paying taxes) or adopt a contribution holiday. It can also assume the surpluses when a fund is liquidated. 2/ In some countries (e.g., the Netherlands), the policy is closer to that followed by insurance companies in France: surpluses are distributed to workers.

Portability of benefits and vesting (the right to receive some benefit after a minimum number of years of work) not only remove disincentives to labor mobility, but also protect workers against abuses. Portability, i.e., the transfer of benefits when leaving the firm, is usually easier to achieve when benefits are based on average wages and not final wages, but in any case an element of arbitrariness is unavoidable (depending on the formulas used) and full neutrality cannot be guaranteed. 3/ These difficulties have often prevented the extension of coverage of defined benefit schemes to workers with less stable careers. Regulations on vesting aim at preventing firms from evading the payment of pensions to workers who leave before retirement age, by, for instance, returning contributions without paying interest. Both in the United States and in most European countries, maximum periods before vesting have been imposed, varying from 10 years in Germany to one year in the Netherlands (where a more homogeneous system exists).

The main concerns about defined contribution schemes, and especially personal pensions, are the cost of managing these accounts and doubts about

1/ In the United Kingdom, mandatory funding covers only the relatively small guaranteed minimum pensions (GMPs).

2/ In the United States, this led, during the 1980s, to several company takeovers aimed at liquidating funds with surpluses, until legislation curbed such a behavior, by imposing penalties on companies liquidating their funds.

3/ See Young (1991) for simulations for different working profiles.

the ability of workers to save enough and to chose appropriate savings instruments. The experience with personal pensions in the United States and United Kingdom is viewed among some institutional investors as evidence that workers tend to chose the "wrong" savings instrument--responding more to advertisements than to considerations about long-term returns (Institutional Investor, 1993)--but evidence supporting such a judgement is scant and Diamond (1993), among others, has noted that freedom of choice is welfare improving. 1/ In addition, Lakonishok et al. (1992) noted that returns from stock portfolios held by American defined benefit pension funds are lower than those of the SP500 index, contrasting to returns of either mutual funds or accounts managed by insurance companies. The authors suggest that even if management costs are lower for defined benefit schemes, agency problems may imply that total returns to employees are not higher than for defined contribution schemes. Concerns about the amount saved by workers, which is often seen as too low, and the "excessive" risk borne by employees can be addressed by imposing minimum contribution levels, limiting early withdrawals, providing mandatory education about the savings instruments available to workers, and requiring full disclosure of characteristics of these instruments. Of these, limiting early withdrawals as is done in the United Kingdom and was recently initiated in the United States (by imposing a 20 percent tax on withdrawals) is probably the most important measure. 2/

1/ In France, PEEs often offer several different funds. See Section 2.

2/ In the United States, employers are not mandated to contribute and, moreover, employees can cash in their personal pensions when they move jobs: before the adoption of the 20 percent tax, only 30 percent of the IRA accounts were rolled over after a job change.

Table 11. Features of Pension Systems and Pension Funds
in Selected Countries

	United Kingdom	United States	Canada
SOCIAL SECURITY			
Retirement Age (men/women)	65/60	65/65	65/65
Coverage	All residents	All workers	All residents
Replacement Ratio	Flat pension	.40	.35
SUPPLEMENTARY PENSIONS			
Financing	Funded (private) PAYG (SERPS)	Funded	Funded
Coverage	Voluntary .70	Voluntary .55	Voluntary .45
Indexation after retirement	Discretionary, but common.	Discretionary, but common.	Not common.
Predominant Type DB, Defined benefit DC, Defined contribution	DB(SERPS and Occupational) DC (Priv. Pens.)	DB (occup.) DC (IRA)	DB
Fiscal Incentives			
Benefits	Taxed	Taxed	Taxed <u>1/</u>
Employer Contributions	Deductible	Deductible <u>2/</u>	Deductible <u>2/</u>
Worker Contribution	Deductible	Deductible <u>2/</u>	Deductible <u>2/</u>
Regulation of Portfolios	Prudent man concept; 5 % self investment limit; concentration limit for DC schemes.	Prudent man concept; 10% self investment limit for DB plans.	Prudent man concept; 7% limit on real estate, tax on foreign investment above 10%.
Funding	Obligatory only for contracted out part.	Higher insurance premiums if underfunded (ABO)	Obligatory
Vesting	2 years. Index. of acc. benefits.	5 years. No index of acc.	2 years. Little index. of acc.

ABO, accumulate benefit obligations; PBO, projected benefit obligations;
IBO, indexed benefit obligations.

Table 11. Features of Pension Systems and Pension Funds
in Selected Countries (concluded)

	Netherlands	Sweden	Switzerland
SOCIAL SECURITY			
Retirement Age (men/women)	65/65	65/65	65/62
Coverage	All residents	All workers	All workers
Replacement Ratio	.35	.60	.60
SUPPLEMENTARY PENSIONS			
Financing	Funded	Funded	Funded
Coverage	Voluntary .50	Voluntary .55	Voluntary .45
Indexation	Almost universal	Mandatory	Almost universal
Predominant Type DB, Defined Benefit DC, Defined Contribution	DB	DB	DC (60%) DB (40%)
Fiscal Incentives			
Benefits	Taxed	Taxed <u>1/</u>	Taxed
Employer Contributions	Deductible	Deductible <u>2/</u>	Deductible
Worker Contribution	Deductible	Deductible <u>2/</u>	Deductible
Regulation of Portfolios	Prudent man; 5% self investment limit; 5 % foreign inv. for public pensions.	Majority to be in listed bonds and loans to contributors.	30% limit on domestic shares, 50% dom. real estate, 20% foreign currency assets, 10% forg. shares.
Funding	Obligatory for IBO or PBO	IBO, with contrib. adjusted every 5 years.	Obligatory for IBO or PBO
Vesting	1 year. Indx. of accrued benefits.	Immediate, national scheme.	Graded vesting between 5-30 years.

Sources: Davis (1993), Pestieau (1991).

1/ Taxed at lower rate.2/ Deductible up to a ceiling.

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IV. The Medium-Term Fiscal Strategy

The setting out of a medium-term fiscal strategy aimed at achieving fiscal adjustment in the context of transition to EMU has been one of the most prominent steps toward a re-design of French fiscal policy initiated by the current government. This renewed concern for the medium term, implied by the convergence program in EU countries, is also shared by most non EU countries (see OECD 1994) and reflects the need to stabilize the debt to GDP ratio. As for France, the crucial feature of this strategy is that it provides guidelines for the government sector as a whole, not only the central government. However, the success of the medium-term fiscal strategy is not granted. First, the government is faced with an adverse economic situation with high unemployment and could be tempted or forced to delay fiscal adjustment. Second, though the government has the power to influence directly central government accounts through the budget law, it only has an indirect control over the social security sector where changes must be negotiated with social partners and depend on structural reforms. It also has a limited influence on the local authorities which have recently received a large degree of financial autonomy. In Section 1 of the paper the implementation of the medium-term strategy, which so far is in its early stages, is discussed.

In order to assess the medium-term strategy, three scenarios are discussed in Section 2, assuming that central government targets are achieved and focussing on the social security accounts. Since the high current level of compulsory levies leaves no room for maneuver on revenues, the scenarios mainly differ on the expenditure side and on macroeconomic assumptions. The likely impact of the measures is assessed in a baseline scenario, taking as starting point the macroeconomic environment of the current WEO forecast. The main finding is that balancing the social security accounts may prove difficult, even in a relatively favorable macroeconomic environment, and would require further reduction in social security expenditures, as described in a second scenario. In a less favorable macroeconomic environment with higher interest rates and lower output, as assumed in a third scenario, the achievement of the targets of the convergence plan will prove even more difficult.

1. The implementation of the medium-term strategy

The convergence plan, jointly presented with Germany to the European Council in November 1993, sets out a medium-term strategy of the French Government to meet the Maastricht criteria for EMU and to insure convergence. This plan contains two scenarios and sets explicit annual targets for the general government deficit over the period 1993 to 1997 (Table 1). The two scenarios are identical for 1994 when real GDP is assumed to grow at 1.4 percent, but differ in the following years. On average over 1995 to 1997, real GDP is assumed to grow at 2.8 percent in a "conservative" main scenario, and at 3.5 percent in an alternative "optimistic" scenario. According to the French authorities, the general government deficit will return to 2.0 percent of GDP in 1997 under the less

Table 1. Scenarios of the Convergence Plan

(In billions of francs)

	1993	1994	1995	1996	1997
I. <u>Conservative Scenario (main)</u>					
Rate of growth of real GDP	-0.7	1.4	2.8	2.8	2.8
Inflation rate		2	2	2	2
General government					
Net financing capacity	-393	-377	-321	-243	-171
(in percent of GDP)	-5.5	-5.1	-4.2	-3	-2
Debt	3125	3452	3774	4017	4187
(in percent of GDP)	44.1	47.1	49	49.6	49.1
Central government					
Revenue	1114	1148	1205	1264	1324
(rate of growth)		3.1	5	5	4.7
Expenditure	1432	1448	1477	1507	1537
(rate of growth)		1.1	2	2	2
Non-interest expenditure	1250	1263	1280	1301	1323
(rate of growth)		1.0	1.3	1.6	1.7
Interest charges	176	185	197	206	213
Central government balance	-318	-300	-272	-243	-213
(in percent of GDP)	-4.5	-4.1	-3.5	-3	-2.5
Balance of the rest of the government sector	-75	-77	-49	--	42
(in percent of GDP)	-1.1	-1.1	-0.6	--	0.5
II. <u>Optimistic scenario (alternative)</u>					
Rate of growth of real GDP	0.7	1.4	3.5	3.5	3.5
General government					
Net financing capacity	-393	-377	-316	-214	-102
(in percent of GDP)	-5.5	-5.1	-4.1	-2.6	-1.2
Debt	3125	3452	3768	3982	4084
(in percent of GDP)	44.1	47.1	48.8	48.6	48.6

optimistic assumption, while the debt to GDP ratio will be maintained in any case below 50 percent, and will be decreasing from 1997 onward.

a. The central government budget

The convergence plan was translated into a law, the loi d'orientation quinquennale, ^{1/} which defines medium-term guidelines for the central government budget. This law provides that (i) the central government deficit should not exceed 2.5 percent in 1997, and (ii) in order to achieve this target, central government expenditure should not grow faster than the general price level. The macroeconomic scenario underlying these fiscal targets is the conservative scenario of the convergence plan. It would imply a reduction of the central government deficit by half a percentage point each year from 1994 to 1997. The rest of the government sector would be balanced in 1996, which implicitly means that social security would have returned to surplus in 1996, given the slight but permanent deficit of the local authorities.

The 1994 budget conforms with the loi d'orientation quinquennale, and its achievement will be the first real test of the credibility of the medium-term strategy. The government has emphasized the achievement of the announced budget deficit target in the 1993 supplementary law as a proof of its credibility, but this target resulted from a dramatic revision of the initial 1993 budget law introduced by the previous government. These exceptional circumstances will not recur this year where the initial budget deficit target of 4.1 percent of GDP has been maintained unchanged. Risks of deficit overruns still remain, given the high rate of unemployment and calls for subsidies in various sectors such as fishery, agriculture, transportation or hospitals. Recent interventions and measures to stimulate consumption, the cost of which amounted to F 2.2 billion, were offset by equivalent expenditure freezes. After the withdrawal of the CIP, additional measures were taken to subsidize employment, the cost of which is estimated at F 6 billion. Offsetting cuts in current expenditure have been authorized up to 7 billion, but difficult decisions on precise items remain to be made. The recent decision to renew the tripling of the back-to-school allowance for the coming academic year will add another F 6 billion on the expenditure side of the budget for which no resource has been found so far. ^{2/}

Some other decisions already made or currently under discussion will have budgetary implications not only in 1994 but also over subsequent years. The decision to increase financial support to the private education system will cost F 2.5 billion over 5 years. Continuation of the privatization

^{1/} Journal officiel of January 24, 1994. This law was discussed in December 1993 together with the 1994 initial finance act.

^{2/} In 1993 the same measure was financed by the "Caisse Nationale d'Allocation Familiale," a branch of the security system, which received an equivalent transfer from the central government. It is assumed that the measure will be renewed in the same conditions, otherwise the burden would be borne by the social security system, not by the central government.

program will require some companies to be recapitalized. Bull is to receive F 8.6 billion and Air France F 20 billion. As for Crédit Lyonnais, the government has agreed on a capital allowance of F 3.5 billion but has also accepted to guarantee F 18.4 billion out of F 40 billion in bad property loans. A new military budget law currently under discussion at the Parliament would provide an increase of 0.5 percent in volume up to 1997.

It is clear that there are strong pressures to exceed the spending targets. Nevertheless, even if the adjustment will be difficult, the government has the instruments to achieve its objective for the central government deficit. In contrast, achieving balance in the accounts of the other components of general government is not so straightforward.

b. The present problem of the social security system

The success of the convergence plan crucially depends on the adjustment of the social security system, over which the government has a limited and indirect control. Rebalancing the social security accounts is not only a matter of law and current fiscal policy but also involves the social partners. The government can fix unilaterally the levels of benefits and contribution rates; however, it has often preferred to limit its role to the validation of agreements reached between the social partners in order to promote social consensus. This line has shown its limits because of increasing interaction between government policy and the social security system. First, certain decisions of the government in the social or economic areas affect the balance of social security accounts. For example, the decision taken in 1983 to reduce the retirement age from 65 to 60 had long-term effects on the balance of the pension system, and the social partners naturally called for offsetting transfers to pension schemes. The reduction of employers' contributions for family allowances decided in 1993 was offset by the transfer of CSG receipts (see SM/93/233). Conversely, exemptions from social contributions associated with some labor market programs like the Contrats Emploi-Solidarité are not made up by increased government transfers to the social security fund. Second, the government cannot ignore the deterioration of the social security accounts since it will ultimately incur political and economic costs in case of default. If no agreement can be reached on how to cover a deficit, the government is practically obliged to intervene. It did so recently and borrowed on capital markets to bail out health and unemployment insurance. 1/

On many occasions, including in the convergence plan itself, the authorities have provided indications on how the social security accounts will be balanced, but implementation may require a prolonged effort and difficult choices. As for pensions, the 1993 reform of the régime général

1/ From the authorities' point of view, this action was a once-and-for-all intervention to make the social security solvent. The loi d'orientation quinquennale does not include a no bail-out clause although the report attached to the law recommends that new transfers to the social security should be excluded.

(see SM/94/218) goes in the right direction since it aims at reducing the growth of benefits, but it will have no immediate impact and will produce its full effect, about F 126 billion a year in 1993 prices, only in year 2008 (see Table 2). Moreover, this reform concerns the basic scheme of the régime général (only 37 percent of the pensions paid), not the supplementary schemes of the private sector and the special schemes for civil servants and specific professions. Faced with the common problem of an ageing population, the social partners recently decided to raise contribution rates in order to maintain benefits of the supplementary pension schemes, transferring the burden onto future generations (see SM/94/218).

Table 2. Long-Term Impact of the Pension Reform of the Régime Général

(In billions of francs)

Forecast benefits	1/	1995	2000	2005	2010
Before the reform		290	359	436	558
After the reform		283	325	367	432
Savings		7	34	69	126

Source: Caisse Nationale d'Assurance Vieillesse, quoted in R. Ruellan (1993)

1/ Assuming annual rates of growth of 1 percent for employment and 1.5 percent for real wages.

As for health insurance, the reforms initiated by the current government correctly rejected any increase in contribution rates, and addressed the problem of the deficit of health insurance by reducing costs and/or benefits rather than increasing contributions. Last year, the most effective measure was the reduction in the coverage rate, but in 1994, health care expenditures have so far reacted strongly to self restraint measures negotiated with providers of care, including a norm of 3.4 percent growth for ambulatory care costs. However, in the absence of a more comprehensive structural reform, these gains may prove only temporary. Such a reform is underway and will closely involve the medical professions, but it is likely to prove very difficult to design and implement since it will inevitably hurt vested interests.

The case of unemployment insurance was treated with a mix of lower benefits and higher contributions and transfers. In July 1992, an important reform introduced a new system of declining benefits, "l'allocation unique dégressive," which increased incentives for active job search while reducing the total amount of unemployment benefits. Although significant, this reform turned out to be insufficient to eliminate the deficit of UNEDIC, the unemployment insurance fund. In July 1993, in a context of increasing

unemployment, a difficult compromise was reached which meant lower benefits for the unemployed, increasing costs for employers and employees, and a government contribution of up to F 10 billion per year during 10 years.

Two recent reforms are promising ways of addressing the problem of accountability in the management of the social security system. According to the first one, the four branches of the régime général (health care, pensions, accidents and family allowances) will be allowed to keep their current surpluses and accumulate reserves. By introducing a hard budget constraint, the reform will reintroduce correct incentives and will prevent social security managers and social partners from hiding behind the principle of solidarity between the four branches in order to excuse mismanagement. The second reform is an attempt to progressively involve the parliament by introducing an annual debate and a vote to approve a global spending objective for the public social security system.

Though the central government seems, so far, to be adjusting along the lines of the convergence plan, recent overruns observed in social security accounts point to this sector as the major problem (see SM/94/218). The 1994 deficit of the régime général, which was predicted in December 1993 to decline to F 43 billion, has recently been revised up to F 56.6 billion, almost the same figure as in 1993. ^{1/} The staff estimates that the deficit of the social security sector (the national accounts definition) will exceed F 70 billion in 1994 (1 percent of GDP). By requiring a sharper adjustment, the 1994 overrun makes the achievement of the convergence plan even more difficult.

In order to assess the chances of a successful adjustment, it would be useful to know to what extent the deficit of the social security system is cyclical and is likely to decline as the economy gathers pace. Giving a comprehensive answer to this question would be quite difficult. In order to obtain a rough global estimate, the Fund's methodology used for calculating the general government structural balances was applied. According to this calculation, in 1993 F 40 billion out of a social security deficit of F 92 billion could be considered as structural, which confirms the importance of the adjustment required. However, the various sectors of the social security system may be unequally sensitive to the cycle. Unemployment insurance is likely to be highly cyclically sensitive since it is affected on both contribution and benefit sides. The balance of unemployment insurance will likely return to surplus during the upswing. ^{2/} Based on the latest WEO forecast with unemployment declining to 8.5 percent, the unemployment insurance system will run a surplus of F 15 to F 20 billion by the end of the century. In contrast, pension benefits are influenced by demographic factors and the balance of pension schemes is affected by the cycle mainly through receipts.

^{1/} Rapport sur les comptes de la sécurité sociale, July 1994.

^{2/} The recent improvement of the balance of UNEDIC is not only due to cyclical factors, but also to the consequences of the recent reforms of unemployment insurance.

c. Breaking the trends

A way of assessing the likelihood of achieving fiscal targets is to ask how radical is the reorientation required with regard to past trends. Historical data show that, abstracting from the cycle, there exists a strong tendency for an increase in the share of the public sector, notably on the expenditure side (Chart 1). Statistical tests give strong evidence that the long-term elasticity of expenditure to GDP is larger than one (see Appendix I). The main indication which comes up from these tests is that a policy which significantly redirects the path of expenditure would have to break quite a strong relationship. Such a change could only be achieved through major reforms. As for social security, it is helpful to estimate the gap between the objectives of the convergence plan and a trend path. A rough calculation assuming revenues constant in percent of GDP and expenditure growing in line with that observed over the past ten years gives the following results for the régime général:

Table 3. Adjustment of the Régime Général Implied by the Convergence Plan

(In billions of francs)

Surplus (+) or Deficit (-)	1993	1994	1995	1996	1997
Convergence plan	-56	-60	-34	1	35
Continuation of past trend	-56	-88	-89	-92	-98
Adjustment required	0	-28	-65	-92	-133

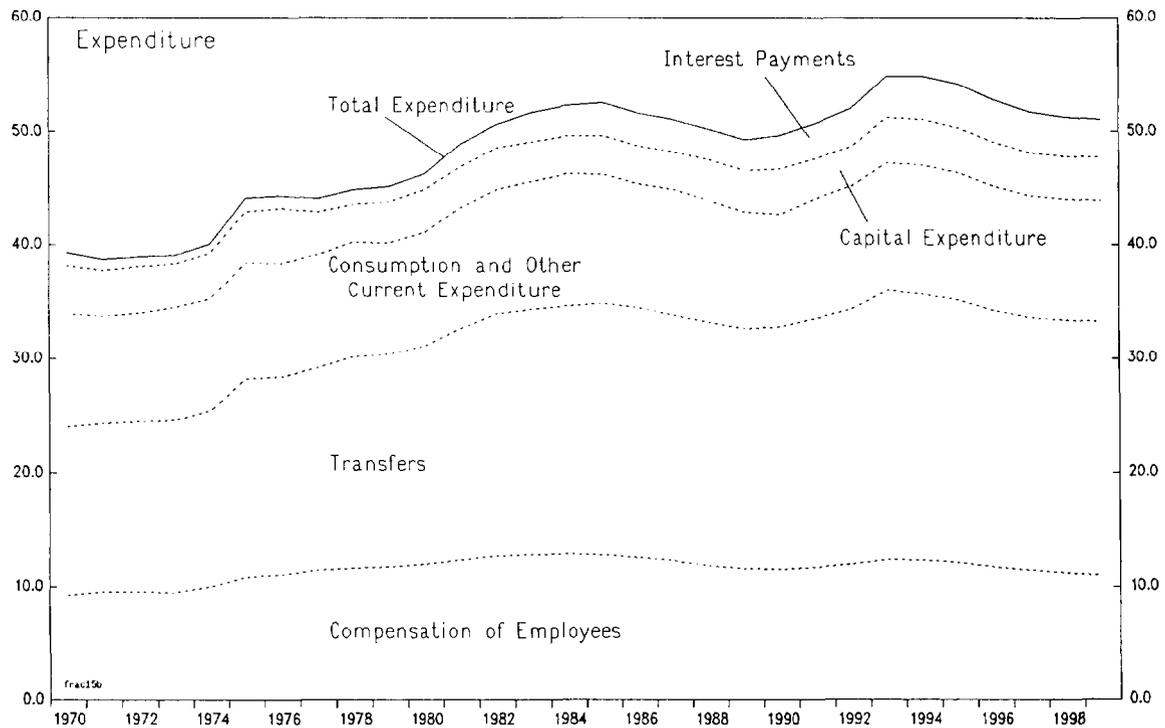
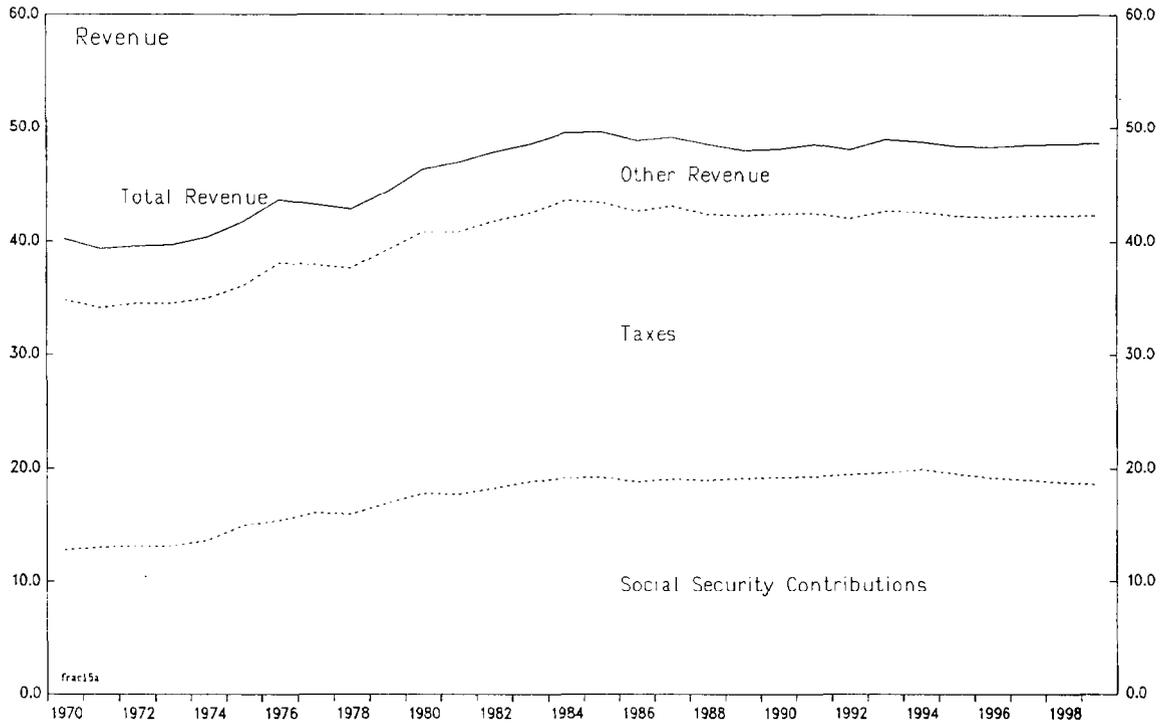
Source: Staff estimates.

In terms of saved expenditure (as a measure of the effort required to achieve the target of the convergence plan) this would require expenditure cuts of roughly FF 28 billion in 1994 and FF 65 billion in 1995 for the régime général. To investigate such breaks in long-term trends a scenario approach is appropriate.

2. Medium-term scenarios

To discuss the medium-term fiscal strategy, a simplified model of the central government and of the social security system is used. Local authorities are treated as exogenous. Assuming no change in tax and contribution rates, government revenue is determined by the path of nominal GDP. Central government expenditure is separated into non-interest expenditure which is directly controlled, and interest charges which depend on interest rates and past deficits. This model is used, together with macroeconomic assumptions, to build three scenarios.

General Government
(In Percent of GDP)



Source: INSEE, National Accounts; and staff calculations.

In all scenarios, the path of central government expenditures is determined according to the rules of the convergence plan. The macroeconomic assumptions of the baseline scenario, essentially on interest rates and output, are taken from the 1994 Summer WEO forecast. Alternative macroeconomic assumption including higher interest rates and, as a consequence, lower output were also considered. In this case, deviations from the WEO baseline were generated by MULTIMOD's model for France (see SM/94/210). Measures taken during or before 1994 that are likely to have an impact in subsequent years were taken into account, such as the salary agreement with civil servants and the reform of pensions.

a. A simplified model of the government sector 1/

(1) The revenue side

An explicit treatment of the revenue side would require a disaggregated model of the flows of receipts, including detailed characteristics of the tax and contribution system. This goes beyond the scope of the present study. The elasticity approach, which simply relates government receipts (Z) to nominal GDP (Y), was used and somewhat extended by introducing a simple but flexible dynamic pattern which allowed taking into account possible lags and/or overreaction. For revenue item i:

$$Z_i = f_i (v_i, Y, Y_{-1}, Y_{-2}, \dots),$$

where v_i denotes other explanatory variables such as tax and contribution rates. Reasonable estimates of long-term elasticities for tax revenues were obtained using Ordinary Least Squares on error correction models derived from the above equation, but the method failed to give acceptable results on social security contributions (See details in Appendix II). For this reason the elasticity of social contributions was constrained to 0.8, 2/ a value consistent with recent data. This leads to an aggregate long-run elasticity close to unity for all taxes and contributions. Thus, in the long term, the simulated ratio of government revenue to nominal GDP stabilizes around 48.5 percent, although the share of taxes in total receipts keeps growing, offsetting the decline in the share of social security contributions (see Chart 1). This is consistent with the belief that social security contributions will have to decrease as a percent of GDP. In the short term, government receipts may react with a lag or overreact to changes in nominal GDP. Estimates confirm overreaction of tax receipts in most of the cases (see Appendix II).

1/ The reader who is not interested in technical details may jump directly to Section 2.b.

2/ Chouraqui, Hagemann, and Sartor (1990) retained a value of 0.5. Indications provided by the Direction de la Prévision confirmed that this figure is quite low and that 0.8 is more likely.

The breakdown of government revenue Z between central government Z^C , and the rest of the government Z^R is made assuming fixed distribution coefficients. At a disaggregated level, this is a good approximation because the destination of revenue is unambiguous in most cases. Value added, corporate income, and personal income taxes go to the central government, social security contributions go to social security (Table 4). For revenue item i :

$$Z^C_i = a_i Z_i \quad \text{and} \quad Z^R_i = (1-a_i) Z_i$$

The general assumption is that there will be no substantial modifications in tax and social contribution rates as well as in their tax bases, which implies that revenue depends only on nominal GDP. The reason is not a purely technical one. The level of compulsory levies reached in 1994 is already quite high, especially for social contributions, and could not be exceeded without seriously damaging France's economic performance. This has been acknowledged by the current government which introduced a reform of income taxation reducing personal income taxes by F 19 billion in 1994. The government has promised to go further as soon as economic conditions make it possible. Nevertheless, in order to avoid arbitrary assumptions, tax rates are assumed to remain constant at their level of 1994. Similarly, although the current government is committed to reducing it as soon as possible, the CSG tax rate was maintained unchanged in the scenarios. No change in VAT rates is assumed. As for social contributions, it is assumed that contribution rates will also remain constant at their current levels, in particular for unemployment and health insurance.

(2) The expenditure side

The key idea is that while some expenditure items are directly under the control of the government, some others are indirectly controlled but still have some feedbacks on the central government balance. The central government is assumed to be able to control its non-interest expenditure, which grows at a rate x_C . For the rest of the public sector, all items other than wages are not directly influenced by the government and grow at a rate x_R . Compensation of employees remains under the control of the authorities for the whole government sector, and is thus supposed to grow at a rate x_C . As a result, the growth rate of a given general government (non-interest) expenditure item i will be a weighted average of the two rates x_C and x_R :

$$x_i = b_i x_C + (1-b_i) x_R$$

where b_i denotes the share of general government expenditure directly controlled by the central government (Table 4).

Table 4

The Central Government's Share of General
Government Revenue

	a(i)
Value added taxes	1.000
Other production taxes	0.596
Corporate taxes	1.000
Personal income taxes	1.000
Other income and wealth taxes	0.302
Other revenue	0.781

The Share of General Government Expenditure
Controlled by the Central Government

	b(i)
Compensation of employees	1
Consumption	0.405
Social transfers	0.05
Subsidies	0.776
Other current expenditure	0.4
Capital expenditure	0.163

(3) Interest payments and debt

Interest payments R are calculated assuming a constant debt maturity of 7 years and a constant proportion of short term debt in the total of 40 percent, for the general as well as the central government. The change in the stock of debt D of the general government is equal to the primary deficit - (Z - X) plus interest payments.

$$D - D_{-1} = - (Z - X - R)$$

The recent deficits of the social security system have given rise to a sizable debt accumulation toward the Caisse des Dépôts et Consignations. This debt was passed on to the central government and rescheduled. In the simulations presented here, central government debt D^C is calculated by summing up the past deficits of the central government and the social security system, which means that the central government is supposed to systematically borrow to finance the social security system in case of deficit and reduce its debt in case of surplus.

$$D^C - D^C_{-1} = - [(Z^C - X^C - R^C) + (Z^F - X^F)]$$

Thus central government interest payments depend not only on past central government deficits, but also on past deficits of the social security accounts.

b. Scenarios

The baseline scenario (scenario 1) assesses the implications of the measures that were taken (or credibly announced) in order to achieve fiscal consolidation. The 1994 summer WEO forecast provides the macroeconomic inputs of the scenario. More specifically, real GDP growth is assumed to equal 1.7 percent in 1994 and 3 percent in 1995, peak in 1996, and then steadily return to potential output growth in 1999. Inflation keeps declining in 1994 and 1995, then stabilizes at 2 percent, the announced objective of the Bank of France. Short-term and long-term interest rates stabilize respectively at 5 and 6.5 percent. 1/ In conformity with the loi d'orientation quinquennale, central government expenditure remains constant in real terms. Most of the measures taken to reduce the deficit of the social security accounts (listed in Table 5) are maintained during the forecast period.

In scenario 1 the general government deficit slightly declines from 5.8 percent in 1993 to 5.6 percent in 1994, then declines further to reach 2.7 percent in 1997 (Table 6 and detailed results in Table 7). As a result the debt increases to a peak of 51.9 percent of GDP, then stabilizes. The simulated path of the central government deficit turns out to be very close

1/ It is noteworthy that the macroeconomic environment in the WEO forecast is somewhat more favorable than in the government's conservative scenario on which the convergence plan was based (see Table 1).

Table 5. Effect on General Government Balance of
Specific Measures Taken in 1993 and 1994 and
Assumptions for 1995-1999

(In billion of francs in 1993 constant prices)

	1993	1994	1995	1996	1997	1998	1999
Reform of personal income taxation	0	-19		maintained			
Increase in CSG	18	50		maintained			
Pensions							
Reform of the <u>régime général</u>	0	0.8	1.9	3.3	5.1	7.7	11.3
Supplementary schemes	0	9.6		maintained			
Health							
Benefit reductions	0	10.8		maintained			
Cost reductions	0	10.7		maintained			
Hospital restructuration	0	3.8		maintained			
Various measures	3.9	3.9		maintained			
Family allowances							
Reduction of employers' contributions	-3	-9		maintained			
Back to school allowance	-6	-6		not maintained			
Unemployment							
Governments' contribution	0	10		maintained			
Benefit reductions	1.5	4.6		maintained			
Increase in employers' contributions		9.3		maintained			
	8.7						
Increase in employees' contributions		6.1		maintained			

Table 6. Three Medium-Term Fiscal Scenarios

(In percent)

	1993	1994	1995	1996	1997	1998	1999
1. Baseline scenario							
Assumptions							
GDP rate of growth, constant prices	-1.0	1.7	3.0	3.2	3.2	2.9	2.8
Rate of growth of GDP deflator	2.3	1.8	1.7	1.9	2.0	2.0	1.9
Short-term interest rate	7.8	5.4	4.5	5.0	5.0	5.0	5.0
Long-term interest rate	7.0	6.8	6.5	6.5	6.5	6.5	6.5
Growth of central gov. expenditure	0.7	1.2	1.7	2.1	2.3	3.4	4.0
Main results							
Net fin. capacity (gen. gov.) <u>1/</u>	-5.8	-5.6	-4.5	-3.5	-2.7	-2.3	-2.1
General government debt/GDP <u>1/</u>	44.4	49.4	51.2	51.9	51.8	51.8	51.6
General government structural balance <u>1/</u>	-4.0	-3.4	-2.8	-2.4	-2.0	-2.0	-2.0
Budget balance (central gov.) <u>1/</u>	-4.5	-4.1	-3.5	-3.1	-2.5	-2.3	-2.1
Growth of centr. gov. prim. expenditure	-0.3	-0.6	0.8	1.8	2.2	3.5	4.2
Growth of social transfers, constant prices	4.5	1.1	0.9	1.8	2.8	3.0	2.3
2. Convergence plan							
Assumptions							
GDP rate of growth, constant prices	-1.0	1.7	3.0	3.2	3.2	2.9	2.8
Rate of growth of GDP deflator	2.3	1.8	1.7	1.9	2.0	2.0	1.9
Short-term interest rate	7.8	5.4	4.5	5.0	5.0	5.0	5.0
Long-term interest rate	7.0	6.8	6.5	6.5	6.5	6.5	6.5
Growth of central gov. expenditure	0.7	10.2	1.7	1.9	2.0	3.2	3.7
Main results							
Net fin. capacity (gen. gov.) <u>1/</u>	-5.8	-5.6	-4.4	-3.2	-2.1	-1.6	-1.2
General government debt/GDP <u>1/</u>	44.4	49.4	51.2	51.6	50.9	50.2	49.2
General government structural balance <u>1/</u>	-4.0	-3.4	-2.7	-2.1	-1.5	-1.3	-1.1
Budget balance (central gov.) <u>1/</u>	-4.5	-4.1	-3.5	-3.1	-2.5	-2.2	-1.9
Growth of centr. gov. prim. expenditure	-0.3	-0.6	0.8	1.8	2.0	3.5	4.2
Growth of social transfers, constant prices	4.5	1.1	0.6	1.4	2.3	2.4	2.3
3. Higher interest rates/lower growth							
Assumptions							
GDP rate of growth, constant prices	-1.0	1.7	2.8	2.6	3.0	2.9	3.0
Rate of growth of GDP deflator	2.3	1.8	1.0	1.0	1.2	1.3	1.4
Short-term interest rate	7.8	5.7	5.7	5.7	5.7	5.7	5.7
Long-term interest rate	7.0	7.3	7.6	7.6	7.6	7.6	7.6
Growth of central gov. expenditure	0.7	1.4	1.7	1.8	2.3	3.4	4.0
Main results							
Net fin. capacity (gen. gov.) <u>1/</u>	-5.8	-5.6	-4.7	-4.3	-3.9	-3.7	-3.5
General government debt/GDP <u>1/</u>	44.4	49.4	52.0	54.1	55.7	57.3	58.4
General government structural balance <u>1/</u>	-4.0	-3.5	-2.9	-2.7	-2.8	-2.9	-3.0
Budget balance (central gov.) <u>1/</u>	-4.5	-4.1	-3.7	-3.7	-3.4	-3.4	-3.2
Growth of centr. gov. prim. expenditure	-0.3	-0.6	0.7	1.8	2.4	3.5	4.2
Growth of social transfers, constant prices	4.5	1.1	0.9	1.8	2.9	3.1	3.0

1/ In percent of GDP.

Table 7. Scenario 1: Baseline Scenario

(In billions of francs or percent)

	1993	1994	1995	1996	1997	1998	1999
Assumptions							
GDP rate of growth, constant prices	-1.0	1.7	3.0	3.2	3.2	2.9	2.8
Rate of growth of GDP deflator	2.3	1.8	1.7	1.9	2.0	2.0	1.9
Short-term interest rate	7.8	5.4	4.5	5.0	5.0	5.0	5.0
Long-term interest rate	7.0	6.8	6.5	6.5	6.5	6.5	6.5
Growth of central gov. expenditure	0.7	1.2	1.7	2.1	2.3	3.4	4.0
General government							
Revenue	3473.0	3569.1	3723.0	3915.4	4125.8	4333.9	4539.6
Growth rate	3.2	2.8	4.3	5.2	5.4	5.0	4.7
Revenue/GDP	49.0	48.6	48.4	48.4	48.5	48.5	48.4
Expenditure	3885.1	3977.6	4066.3	4196.5	4352.2	4541.3	4738.1
Growth rate	6.7	2.4	2.2	3.2	3.7	4.3	4.3
Growth rate of primary expenditure	6.5	1.8	2.1	3.3	3.9	4.5	4.5
Expenditure/GDP	54.8	54.2	52.9	51.9	51.1	50.8	50.6
Net financial capacity	-412.1	-408.5	-343.4	-281.1	-226.4	-207.4	-198.5
In percent of GDP							
Total	-5.8	-5.6	-4.5	-3.5	-2.7	-2.3	-2.1
Structural	-4.0	-3.4	-2.8	-2.4	-2.0	-2.0	-2.0
Cyclical	-1.9	-2.1	-1.7	-1.1	-0.6	-0.3	-0.1
Central government	-4.5	-4.5	-3.7	-3.2	-2.5	-2.0	-1.7
Rest of the public sector	-1.3	-1.1	-0.8	-0.3	-0.1	-0.3	-0.4
Primary balance	-2.2	-1.7	-0.6	0.3	1.0	1.2	1.3
Debt (Maastricht definition)	3148.1	3622.7	3937.7	4196.5	4406.7	4625.7	4836.6
In percent of GDP	44.4	49.4	51.2	51.9	51.8	51.8	51.6
Central government							
Net financial capacity	-317.2	-327.3	-281.2	-258.6	-214.3	-180.3	-163.4
In percent of GDP	-4.5	-4.5	-3.7	-3.2	-2.5	-2.0	-1.7
- ODAC	16.8	18.0	18.0	18.0	18.0	18.0	18.0
+ Balance on financial operations	18.4	43.9	28.4	22.2	16.2	-11.6	-12.4
= Budget surplus	-315.7	-301.4	-270.8	-254.4	-216.1	-209.9	-193.8
(In percent of GDP)	-4.5	-4.1	-3.5	-3.1	-2.5	-2.3	-2.1
Social Security							
Balance	-91.8	-74.2	-55.1	-15.5	-5.2	-20.1	-28.1
(In percent of GDP)	-1.3	-1.0	-0.7	-0.2	-0.1	-0.2	-0.3
Real growth of social transfers	4.5	1.1	0.9	1.8	2.8	3.0	2.3

Table 9. Scenario 3: Higher Interest Rates/Lower Growth

(In billions of francs or percent)

Scenario: Higher interest rates	1993	1994	1995	1996	1997	1998	1999
Assumptions							
GDP rate of growth, constant prices	-1.0	1.7	2.8	2.6	3.0	2.9	3.0
Rate of growth of GDP deflator	2.3	1.8	1.0	1.0	1.2	1.3	1.4
Short-term interest rate	7.8	5.7	5.7	5.7	5.7	5.7	5.7
Long-term interest rate	7.0	7.3	7.6	7.6	7.6	7.6	7.6
Growth of central gov. expenditure	0.7	1.4	1.7	1.8	2.3	3.4	4.0
General government							
Revenue	3473.0	3569.1	3694.8	3821.4	3972.4	4143.0	4327.2
Growth rate	3.2	2.8	3.5	3.4	4.0	4.3	4.4
Revenue/GDP	49.0	48.6	48.5	48.4	48.3	48.3	48.3
Expenditure	3885.1	3980.6	4055.3	4160.0	4294.8	4461.8	4641.8
Growth rate	6.7	2.5	1.9	2.6	3.2	3.9	4.0
Growth rate of primary expenditure	6.5	1.8	1.5	2.3	3.1	3.8	4.0
Expenditure/GDP	54.8	54.2	53.2	52.7	52.2	52.0	51.8
Net financial capacity	-412.1	-411.4	-360.4	-338.6	-322.4	-318.9	-314.5
In percent of GDP							
Total	-5.8	-5.6	-4.7	-4.3	-3.9	-3.7	-3.5
Structural	-4.0	-3.5	-2.9	-2.7	-2.8	-2.9	-3.0
Cyclical	-1.9	-2.1	-1.8	-1.6	-1.2	-0.8	-0.5
Central government	-4.5	-4.5	-3.9	-3.8	-3.4	-3.0	-2.8
Rest of the public sector	-1.3	-1.1	-0.8	-0.5	-0.5	-0.7	-0.7
Primary balance	-2.2	-1.7	-0.7	-0.2	0.2	0.4	0.6
Debt (Maastricht definition)	3148.1	3625.7	3957.5	4273.6	4579.3	4909.0	5235.2
In percent of GDP	44.4	49.4	52.0	54.1	55.7	57.3	58.4
Central government							
Net financial capacity	-317.2	-329.8	-295.9	-298.3	-279.9	-260.9	-253.7
In percent of GDP	-4.5	-4.5	-3.9	-3.8	-3.4	-3.0	-2.8
- ODAC	16.8	18.0	18.0	18.0	18.0	18.0	18.0
+ Balance on financial operations	18.4	43.9	28.6	22.5	16.7	-10.9	-11.6
= Budget surplus	-315.7	-304.0	-285.4	-293.8	-281.2	-289.8	-283.3
(In percent of GDP)	-4.5	-4.1	-3.7	-3.7	-3.4	-3.4	-3.2
Social Security							
Balance	-91.8	-74.6	-57.5	-33.3	-35.5	-50.9	-53.8
(In percent of GDP)	-1.3	-1.0	-0.8	-0.4	-0.4	-0.6	-0.6
Real growth of social transfers	4.5	1.1	0.9	1.8	2.9	3.1	3.0

in which cuts should be made. On pensions, a reform has just been adopted which will have a significant impact in the long term, hence it is probably not possible nor desirable to change the rules again. Expenditure will keep increasing at about 3 percent annually. Family allowances grow slowly and this branch of the social security system does not show any structural imbalance. Unemployment insurance will probably return to surplus as the economy recovers. Clearly, the only room for maneuver is on health care, a sector in which it is possible and may be also desirable to curb expenditures. If the adjustment occurred only on health, health care expenditure would show no real increase on average over three years. Growth could resume from 1997 onward, although at only a moderate pace.

3. Conclusion

Fiscal adjustment of the government sector may prove even more difficult for social security than it is for the central government. The convergence plan implies that budgetary expenditures must remain constant in real terms. But similar rules cannot be contemplated for social security, since the government does not exert direct control over it.

Since there is no room for further increase in social security contributions, social security expenditures must decelerate. This cannot be achieved in the medium term without implementing structural reforms. Nevertheless, expenditure cuts are required in the short term. Some of these reforms have already been decided, in particular on pensions, but health care costs are still to be controlled.

Under the macroeconomic assumptions of the 1994 Summer WEO, balancing the social security accounts would require a sharp deceleration of social security expenditures. Real social security expenditures would have to increase by no more than one percent on average from 1994 to 1996 to achieve the objectives of the convergence plan. If macroeconomic conditions are less favorable, achieving the target of the convergence plan will prove even more difficult.

The Long-Term Relation Between Public Expenditures and GDP

In this appendix cointegration tests are used to detect whether there exists between expenditure (X) and GDP (Y) a long-term relation such as

$$\text{Log}(X) = \gamma \log(Y) + \epsilon$$

where ϵ is assumed stationary, a relation which could account for a trend in the ratio of expenditure to GDP since GDP itself is trended. The Johansen procedure was used. Since ADF tests do not reject stationarity for output gap, this variable was included as an additional I(0) variable in the associated VAR model. The test (Table 10) suggests that there is at least one and perhaps two cointegrating vectors. The first cointegrating vector (-1, 1.1) (normalized on $\log(X)$) suggests a long-term elasticity of 1.1 of expenditure to GDP. The null hypothesis that the sum of the components of the cointegrating vector is zero is rejected at a significance level of 1/1000.

To be complete, the symmetric test was also applied to government revenue (Z) and GDP. Only one cointegrating vector was found, subject to some doubt since the calculated value of the LR test was close to its critical value at 95 percent. The null hypothesis that the sum of the components of the cointegrating vector is zero was rejected at a confidence level of 90 percent but not at 95 percent.

Table 10. Cointegration Tests Between Public Expenditure and GDP

Johansen Maximum Likelihood Procedure
 91 observations from 1971Q1 to 1993Q3.
 Maximum lag in VAR = 4.
 Additional I(0) variable in VAR: GAP

I. Expenditure Variables included in the cointegrating vector: Log(X), Log(Y)

1. Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix.
 List of eigenvalues in descending order: 0.330 0.062

Null	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r = 1	36.4	14.1	12.1
r <= 1	r = 2	5.7	3.8	2.7

2. Cointegration LR Test Based on Trace of the Stochastic Matrix
 List of eigenvalues in descending order: .330 0.062

Null	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r >= 1	42.3	15.4	13.3
r <= 1	r = 2	5.7	3.8	2.7

3. Estimated normalized Cointegrating Vectors

Vector 1 (-1 , 1.10): Vector 2 (-1 , -0.06)

LR Test of the restriction Vector 1 = (-1 , 1) CHI 2 (1) = 25.08 [.000]

II. Revenue Variables included in the cointegrating vector: Log(Z), Log(Y)

1. Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix.
 List of eigenvalues in descending order: .133 .072

Null	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r = 1	12.1	14.1	12.1
r <= 1	r = 2	6.8	3.8	2.7

2. Cointegration LR Test Based on Trace of the Stochastic Matrix

List of eigenvalues in descending order: .131 .072

Null	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r >= 1	19.8	15.4	13.3
r <= 1	r = 2	6.8	3.8	2.7

3. Estimated normalized Cointegrating Vectors

Vector 1 (-1 , 1.12)

LR Test of the restriction: Vector 1 = (-1 , 1), CHI 2 (1) = 3.89 [.051]

Income Elasticities of Government Revenue for France

Simulations of fiscal deficits require assumptions on how government receipts behave during the cycle. Thus, in order to discuss medium term fiscal scenarios, simple and fairly unconstrained reduced form equations were estimated combining long-run elasticities with an error correcting process,

$$(1) \quad \Delta z = \alpha (b \Delta y + (1-b) \Delta y_{-1}) + \lambda (\gamma y_{-1} + \beta x + c - z_{-1}),$$

where z is the log of a particular category of government revenue, y is the log of nominal GDP, x is a variable (or a vector of variables) which characterizes changes in the tax environment (typically tax and contribution rates), and c is a constant.

The results of the estimation of equation (1) for seven revenue categories are reported in Table 11. Attempts to introduce additional explanatory variables x gave mixed results due to unavailability of adequate data. In particular, introduction of the corporate income tax rate in a simple way proved unsuccessful and was dropped given the small share of corporate taxes in government revenue. Conversely, introduction of the highest VAT rate turned out to be essential to obtain a reasonable estimate of the long term elasticity. These results were acceptable by usual statistical standards. In particular the long-term elasticities (γ) which are of crucial importance in the calculation of the structural deficit are measured with reasonable precision.

Some of the elasticities used in the Fund evaluation of the structural balance are those estimated by OECD (see Hagemann, Chouraqui and Sartor (1990)). Although not inconsistent with the OECD figures, the new estimated elasticities differed somewhat from the latter (Table 12). The elasticities obtained for VAT and other taxes, on production are closer to their theoretical value of one. As for income taxes, the estimates were below OECD estimates which are themselves lower than estimates obtained by simulations on micro data (about 2.2 for personal income taxes). One should note, however, that receipts in this category of taxes typically over-react in the short term as short-term elasticity estimates clearly indicate (see Table 11). This may explain an upward bias if the time pattern is incorrectly specified. The widely accepted result of an elasticity larger than one for personal income taxes was found.

On the contrary, the high elasticity obtained for social security contributions appeared implausible. The introduction of variables describing the continuous drift in contribution rates proved necessary to obtain a more reasonable estimate. In particular, the long-term elasticity γ was constrained to 0.8 and a linear time trend was introduced in (1) as variable x . Then the remaining parameters were estimated by OLS over the period 1983 to 1992 as a simple way of calibrating parameters. The following equation was obtained:

Table 11. Relation Between Government Receipts and GDP

Equation: (1) $\Delta z = \alpha (b \Delta y + (1-b) \Delta y_{-1}) + \lambda (\gamma y_{-1} + \beta x + c - z_{-1}) \frac{1}{\lambda}$

	Coefficient estimates						Short-term elasticity	R ² /DW
	α	λ	γ	β	b	c		
Value added taxes	1.4283 (0.4904)	0.76177 (0.2421)	0.97581 (0.0319)	0.27692 (0.1091)	1	-2.7936 (0.4437)	1.4283	0.75 2.19
Other production taxes	0.53965 (0.4107)	0.98265 (0.2290)	1.0818 (0.0226)		1	-3.9356 (0.2347)	0.53965	0.69 1.98
Corporate taxes	2.9021 (1.8157)	0.75053 (0.2169)	1.0371 (0.1191)		1	-4.7404 (1.9825)	2.9021	0.78 2.05
Personal income taxes	1.7755 (0.7100)	0.59612 (0.2169)	1.1861 (0.0555)		0	-6.6183 (0.9924)	2.4826	0.49 2.32
Other income and wealth taxes	2.1186 (1.0262)	1	1.3938 (0.10687)		0.60908 (1.0704)	-9.8058 (1.7623)	1.2904	0.56 2.22
Social security contributions	2.0104 (0.2722)	0.44181 (0.1371)	1.2587 (0.0244)		0.49398 (0.1143)	-5.8125 (0.3990)	0.9931	0.92 2.06
Other revenue	1.3449 (0.1730)	0.4523 (0.1730)	1.1128 (0.0272)		0.84887 (0.4113)	-4.6067 (4.8662)	1.1417	0.61 1.49

1/ Standard errors between brackets. Constrained estimates appear with no standard error.

Table 12. Long-Term Elasticities of Government Receipts to Nominal GDP

	New estim.	WEO assumpt.	OECD estim.	1993 Weight
Value added taxes	0.98	0.60	0.90	13.7
Other production taxes	1.08	1.60	0.90	14.5
Corporate taxes	1.04	1.40	1.60	2.8
Personal income taxes	1.19	1.40	1.40	10.8
Other income and wealth taxes	1.39	1.50	1.00	5.3
Social security contributions	0.80	0.60	0.50	40.1
Other revenue	1.10	1.00	1.00	12.8
Average 1/	0.99	0.87	0.83	

1/ Calculated with 1993 weights.

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