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France: Financial Sector Assessment Program—Technical Notes—Stress Testing Methodology and Results; Integration into Global Financial Markets; and Public Intervention in Financial Markets—Obstacles to Monetary Transmission

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FINANCIAL SECTOR ASSESSMENT PROGRAM

FRANCE

TECHNICAL NOTES: STRESS TESTING METHODOLOGY AND RESULTS, INTEGRATION INTO GLOBAL FINANCIAL MARKETS, AND PUBLIC INTERVENTION IN FINANCIAL MARKETS: OBSTACLES TO MONETARY TRANSMISSION

FEBRUARY 2005

INTERNATIONAL MONETARY FUND
MONETARY AND FINANCIAL SYSTEMS DEPARTMENT

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I. Stress Testing Methodology and Results[1]

A. Introduction

1. Stress tests were undertaken as part of the France FSAP in order to assess the resilience of the financial system to a variety of potential strains. They complement other approaches to assessment, for example, through evaluation of the degree of observance of prudential standards, analysis of financial soundness indicators, and a decomposition of financial ratios. The value of stress testing is that it yields quantitative results that relate to quite specific aspects of financial sector exposures, such as exposure to various forms of market risk or credit risk. Hence, results can be broadly comparable across risk factors and, to some extent, even across countries. Stress testing is also more forward looking and more adaptable than an analysis of financial soundness indicators. However, stress testing is limited in several regards, most importantly in that it focuses on impact effects and ignores feedback effects through changes behavior. A stress test does not involve estimation of effects in general equilibrium where financial institutions react over time by adjusting their portfolio and other aspects of their operations. Hence, stress tests cannot provide estimates of how a financial system would respond over the medium term to large disturbances, especially those that do not correspond closely to historical experience.

2. The stress tests for the France FSAP were designed to yield as comprehensive and detailed a picture as possible within the constraints of the approach. To this end, the procedures for conducting the tests exploited to the full extent possible the stress testing capacity available at financial institutions and supervisory authorities. In particular, stress tests were performed both by individual institutions based on the parameters and scenarios agreed between the authorities and Fund staff, and, at an aggregate level and in many instances, by the authorities themselves; results could then be checked for consistency. The results were reported in sufficient detail to illuminate the behavior of the respective sector as whole as well as the dispersion of results across institutions. Furthermore, several relevant variables (for example, the change in the value of NPLs and the change in provisioning), were reported for each test to aid in interpretation.

3. It was decided to cover both the banking and the insurance sectors; both are of systemic and international importance and conduct stress testing regularly. As far as possible and relevant, parallel tests were conducted for the two sectors. Account was taken of the effects of one sector on the other, and specifically the possibility that banks may have to recapitalize their insurance subsidiaries. However, because of differences in the business of the two sectors and in the regulatory and accounting framework under which they operate, testing procedures and the presentation of results must differ. Since the system is relatively concentrated, a high degree of coverage was achieved.

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[1] Prepared by Daniel Hardy, Andrea Maechler, and Rodolfo Maino (MFD).

4. The tests fall into two broad categories: shocks to one or more risk factors, and macroeconomic scenarios. The risk factor tests assume that some relevant variable such as the exchange rate shifts suddenly, while all else remains the same. The magnitude of effects is estimated by revaluing items in the balance sheet. The starting point for all tests was the institutions' financial positions at end-2003, even if data were preliminary at the time the tests were undertaken. One may also consider multiple-factor tests, where several variables shift at once. Although the methodology is similar to that used in single factor tests, the effect need not be the same as the sum of effects when individual factors shift because institutions engage in hedging, for example, through use of derivatives, which introduce complex offsetting influences and nonlinearities.

5. The macroeconomic scenarios are based on assumptions about movements in certain exogenous variables that then influence projections of the path of major macroeconomic variables, which in turn affect financial sector performance. For example, a movement in world demand or oil prices will affect such variables as consumption, investment, and interest rate levels, driving them away from the baseline projections, which in turn affect loan quality, credit demand, and interest margins. Thus, in contrast to the factor tests, they are based on a "story" and involve multiple channels of influence. Furthermore, they have a time dimension: for the France FSAP, projections were made over two years. Furthermore, over that time horizon, account needs to be taken of certain trends and in particular the accrual of profits, even if financial institutions' reactions are not modeled.

6. The remainder of this note explains the stress testing methodology and results in more detail. The next section looks at the banking sector stress tests, and defines the sample of banks, the selection and calibration of the tests, the various metrics used to interpret results, and the details of the results themselves. The following section looks at the insurance sector test; the added complications relevant for insurance (especially life insurance) relative to banking stress tests are explained.

B. Banking Sector

Sample

7. The domination of the French banking market by a number of large groups facilitated the attainment of high sectoral coverage in the stress testing exercise, and the achievement of a high level of technical sophistication, as the banks' own estimates were prepared by the central units responsible for overall risk management. Specifically, the participants in the exercise comprised 7 banking groups, which together generated 60 percent of banking sector revenue and held 80 percent of total assets in 2003. The groups were:

- Banques Populaires
- BNP-Paribas
- Caisses d'Epargne
- Crédit Agricole-Crédit Lyonnais
- Crédit Mutuel-Crédit Industriel et Commercial

- HSBC-Crédit Commercial de France
- Société Générale

8. It will be noticed that four groups are mutuals and two are incorporated French commercial banks. HSBC-Crédit Commercial de France is much smaller than the others, but is included to represent a foreign-owned bank and a medium-sized bank.

Definition of tests

Single and multiple factor tests

Procedures and estimation

9. Risk factor tests provide estimates of the impact of a sudden change in one or more variables. The impact was estimated by calculating the effect on end-2003 positions. For changes in market prices or yields, relevant assets and liabilities are revalued and the changes netted. For changes in asset quality, the impact is estimated as the change in provisions required by the change in rating.

10. These tests were all performed by the banks themselves based on the specifications provided to them by the authorities. This approach makes it possible to include effects on off-balance sheet items such as positions in derivatives. Banks also took into account any effect on themselves from losses accruing to their insurance subsidiaries: under the (extreme) assumption that policies are cashed in and asset prices fall very sharply, some insurers would be unable to meet all claims of policyholders and therefore require additional capital from their parent banks. Results from banks were checked by the authorities for plausibility; in a small number of instances, one or other bank was dropped from the sample when its estimates appeared unreliable and in particularly when results were too favorable.

11. The impacts of the shocks are estimated as an absolute amount in euros, but for purposes of interpretation, results are presented relative to several metrics. For the factor tests, the three metrics were (i) the after-tax impact relative to 2003 after-tax profits; (ii) the percentage change in the end-2003 own funds that would be implied by the before-tax impact;[2] and (iii) the change in the end-2003 risk-weighted capital adequacy ratio that would be implied by the before-tax impact. The former measures the ability of banks to absorb a shock out of current income, without capitalization being affected. The tax rate applied to the

[2] In this approach, the before-tax impact is considered, because in times of stress, there are not necessarily profits from which taxes can be deducted, and because the objective is to estimate the capacity of banks to cope with instantaneous shocks, without help from profits or tax credits.

impact is 33 percent, which is the marginal tax rate on bank profits.[3] The latter measures the impact on capitalization itself. It does not rely on assumptions about profitability and tax rates, and is important in assessing whether any bank becomes under-capitalized even temporarily. The impact relative to the capital ratio is also a useful measure in making international comparisons.

12. Because of the small number of banks in the sample and the legal requirement to preserve the confidentiality of data on individual institutions, the authorities provided the FSAP team only with the mean effect, and the largest and smallest (i.e., the most favorable) effects. However, they provided results in terms of both metrics and other relevant variables, such as NPL ratios.

Definition and calibration of tests

13. The individual tests were defined to cover major sources of risk and were calibrated to correspond to the very largest shocks experienced in the relevant historical period. For market risks (interest rates, equity prices, etc.), the benchmark was the largest shift experienced in any period of 20 working days (which corresponds to four calendar weeks) over the past two decades. The magnitudes of the shocks are comparable to those employed in the stress testing exercises undertaken as part of the FSAPs for other major European countries.

14. The tests are defined as follows:

F1: Flattening and upward shift in the yield curve, such that overnight rates rise by 150 basis points, the 10-year bond yield increase by 50 basis points, and intermediate rates rise by smoothly interpolated amounts. Such a shift is larger than that ever seen in the period since the start of the EMU; a shift in one month of 50 basis points at the very long end would be extreme even for the pre-EMU period.[4]

F2: a steepening of the yield curve, such that overnight rates fall by 50 basis points, the 10-year bond yield is unchanged, and intermediate rates are smoothly interpolated. A

[3] The ex post average tax rate is closer to 20 percent, but banks seek to book losses at the highest possible tax rate. No account is taken of other profit-related charges, such as the payment of profit-related bonuses, which would tend to diminish effects.

[4] Before EMU, French short-term interest rates sometimes rose very sharply in order to defend the franc in the ERM, but this experience is no longer relevant.

50 basis point change in short rates is large by historical standards, and, given the current low level of rates, is at the upper end of the range of plausible changes.[5]

F3a: a sustained increase in all rates of 300 basis points over two years. For the banking system, it is implausible that banks' balance sheets will remain unchanged, and therefore the direct effect on banks under this scenario was not included in the factor test results reported in the FSSA (but see Box 1). However, such a shock could have a substantial effect on insurance companies, which are unable to change their positions rapidly. The FSSA reports the effects on banks of losses incurred by their life insurance subsidiaries, under the extreme assumption that all life policies are cashed in and hence all unrealized losses must be realized immediately.

F4: a deterioration in the quality of loans to the domestic nongovernment sector by one rating grade, and of two rating grades to the volatile energy, commercial real estate, telecommunications, and transportation sectors.[6] The rating downgrade prompts an increase in expected losses and therefore of provisioning. The hypothesis that this change occurs suddenly may be interpreted as an instance of "flight to quality" reflecting a shift in market sentiment, rather than the accumulation of evidence of a deterioration in loan quality. However, this test may also be interpreted as a simplified version of a macroeconomic scenario involving a prolonged recession.

F5: a fall in equity prices in the European, American, and Japanese markets by 30 percent. A one-month fall in equity prices of this magnitude is roughly equal to the maximum seen in recent decades. Account is taken of the impact on banks of losses from their insurance subsidiaries.

F6: a 15 percent appreciation (F6a) or depreciation (F6b) of the euro against the U.S. dollar and the Japanese yen.

F7: a two-notch downgrade in the credit rating of banks' largest claims on emerging market countries, which together represent 50 percent of banks' total exposure to emerging markets, and a one notch downgrade applied to the remainder. Again, this test can be interpreted as a "flight to quality."[7]

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[5] The effects of changes in rates are approximately linear. Thus, the effect of an upward shift in all rates by 50 basis points can be roughly estimated as a combination of effects under F1 and twice the effects under F2.

[6] The test ignores the effect of a rating downgrade on domestic corporate bonds, but banks' holdings of these instruments are small.

[7] Banks' larger exposures are mostly to investment grade countries. Since the rating grades are more finely differentiated at higher grades, the effect on provisioning requirements of a

(continued)

F8: a 30 percent increase in the implied volatility of all financial market prices. This applies mostly to banks' positions in derivatives. Again, such an increase is large by historical standards.

F9: a combination of F1 and F5. Note that this especially severe test does not correspond to historical experience from recent decades, during which central banks have reacted to large equity price falls by lowering rates.

Macroeconomic scenario tests

15. Macroeconomic scenario stress tests allow one to consider a richer, yet consistent and economically meaningful array of disturbances. They also account for some effects that become apparent only over time. In the case of the French FSAP, effects of macroeconomic shocks were estimated both by individual banks and (in aggregate) by the authorities, which serve as a consistency check. However, the tests cannot incorporate banks' reactions. While this is a conservative assumption (banks' reactions would presumably mitigate some of the negative effects), it becomes increasingly implausible at longer horizons. In addition, the macroeconomic scenarios must be defined as deviations from a baseline projection due to plausible changes in exogenous variables; even these scenarios cannot illustrate how the banking system would perform if very different circumstances persisted for a prolonged period.[8]

Procedures and estimation

16. The starting point for the macroeconomic scenarios was the authorities' own projections for major economic variables obtained from their large econometric models. The assumed paths of exogenous variables are changed according to the scenario, the model rerun, and new projections obtained. In all cases, the projection period is two years starting at end-2003.

17. These various sets of new projections were provided to the commercial banks. Banks could supplement the authorities' projections with their own projections consistent with the scenarios as needed to estimate effects; only one bank chose to do so. Banks then estimated the effects using their internal models.

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two notch downgrade for investment grade exposures is similar to the effect of a one notch downgrade of a more speculative exposure.

[8] For example, one could construct a hypothetical situation of a prolonged lending boom followed by a bust, which in many countries would be associated with a deterioration in loan quality. However, such a situation is remote from current circumstances, so it would not be meaningful to construct a stress test around it.

Box 1. Supplemental Banking Sector Tests: Residential Mortgages and Sustained Increase in Interest Rates

The authorities undertook stress tests to estimate the possible effect on banks of a large deterioration in the quality of residential mortgages and of a sustained increase in interest rates. The results are suggestive, but were not included in the FSSA because under these scenarios, the assumption that banks do not alter their portfolios is not plausible.

Residential real estate

Residential real estate lending has been rising relatively quickly in recent years, reaching 36.2 percent of bank lending by end-2003 (from 31.1 percent in 2000). However, credit risk has traditionally been low because (i) the overwhelming majority of housing loans are at fixed rates; (ii) the initial value ratio is rarely above 80 percent; (iii) borrowers normally take out unemployment insurance; and (iv) home equity loans are unavailable. Nonetheless, the authorities used a Basel II-type internal ratings based approach, calibrated on historical experience, to estimate the effect as follows:

	Increase in risk-weighted housing loans (percent)	Change in Basel-II type CAR 1/ (percentage points)
An 0.2 percent increase in the probability of default in each "risk bucket"	18	-0.30
Shift in the distribution of default toward riskier "buckets" such that the average rises 0.2 percent	6	-0.10
Downgrade in all credit risk ratings of one notch	27	-0.45

Source: Commission Bancaire.

1/ Initial average CAR was 11.34 percent at end-2003. Estimates ignore effect of trend growth and profit accumulation.

Interest rate rise

The authorities employed the Mascotte model to simulate the effects of a 150 basis point rise in all interest rates in the first year, and another 150 basis point rise in the second. The model projects that this would reduce real GDP growth by 0.4 percentage points, and cause a decline in growth in credit to enterprises from a projected 7.1 percent to only 1.7 percent. Similar effects through 2005 were estimated by the commercial banks and the Commission Bancaire:

	Effect on profits (percent of 2003 profits)	Effect on CAR (percentage points change)
Aggregated banks' estimates	-9.2	-1.19
Commission Bancaire's estimates	-13.0	-1.22

Source: Commission Bancaire.

18. The projections under the scenarios were used also in the authorities' own models of bank profitability, sector by sector loan quality, and provisioning to generate estimates for the banking sector-wide effects. These models include linear econometric models (e.g., of bank profitability, total NPLs and margins on lending), nonlinear models of loan quality and the transition between credit ratings categories, and an "intelligent system" model of corporate finances (known as SAABA). Besides aggregate data, use was made of information obtained in the course of the Quantitative Impact Studies undertaken as part of the preparation of the Basel II capital accord, and the *Banque de France's* detailed data on corporate finances and credit ratings.

19. The wealth of data allow the results to be presented according to three metrics: (i) after-tax 2003 profits, as before; (ii) the risk-weighted capital adequacy ratio, calculated according to current regulations and allowing for both projected growth in credits under the various scenarios and the accumulation of after-tax profits;[9] and (iii) the risk-weighted capital adequacy ratio calculated according to Basel II-type rules.[10] The last allows not only for changes in the stock of credit and accumulated profits, but also for changes in risk weights that are generated under the scenarios: certain shocks may not only shift the mean of the distribution of net returns on credits, but also increase the variance (there is a longer "tail" of bad outcomes), which increases the "unexpected loss" and therefore the risk weighting.[11,12] The change in the Basel II-type capital adequacy ratio is likely to be an especially severe test.

Scenarios

20. Four macroeconomic scenarios were defined relative to the baseline to capture some of the main risks currently faced by the French economy. The paths of major macroeconomic variables under the baseline scenario and the four stressed scenarios are shown in Table 1. The scenarios were:

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[9] The implicit assumption that all profits are retained does not affect the comparisons across scenarios. The assumption is not implausible when banks face difficult circumstances.

[10] Basel II was not yet in effect at the time of the mission, but a decision was taken to use it for the scenario testing because the authorities were ready to do so and because the impact of shocks under Basel II should be larger than under Basel I.

[11] In Basel II terminology, the distribution of losses is divided between the "expected loss" between zero and the mean of the distribution, and the "unexpected loss" between the mean and an upper cut-off point.

[12] Based on the QIS results, the authorities expect that the implementation of the Basel II accord will reduce capital requirements somewhat, especially in banks with a strong focus on retail lending. However, this effect is ignored here.

M1: a cumulative fall of 20 percent in world demand for French exports, corresponding to a global recession. This leads to a deterioration in the trade balance and weaker output. The economy suffers a mild contraction for two years. This output path is comparable to that during the recession of 1993-94, but real interest rates are lower (and the recession is not preceded by a boom in lending to commercial real estate).

M2: a sustained 50 percent increase in oil prices. Starting from the end-2003 oil price level, this implies a rise to US$40 per barrel. The effect on real GDP growth is on the order of 0.2 percentage points, and inflation rises as well.

M3: a sustained 50 percent increase in oil prices with an anti-inflationary policy response. Based on the ECB's policy stance, an oil price rise would provoke an increase in interest rates, which returns inflation to its previous path. The main transmission mechanism is through the exchange rate.[13] The output loss is now on the order of 0.3 percentage points.

M4: a sustained depreciation of the U.S. dollar against the euro of 32 percent. Again it is the tradables sector that bears the brunt of the effect. Real GDP is reduced by about 0.9 percentage points each year, and inflation is also lower.

Table 1. France: Summary of Macroeconomic Stress Testing Scenarios
(Annual percentage rates except where indicated)

	Baseline scenario		Scenario M1		Scenario M2		Scenario M3		Scenario M4	
	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
Real GDP growth	1.7	2.4	-0.5	-0.2	1.5	2.2	1.4	2.1	0.8	1.5
Real growth in household consumption	1.6	2.2	1.3	1.2	1.3	2.0	1.3	2.0	1.7	1.9
World demand for French products	6.4	7.8	-7.4	-12.2	5.5	7.8	5.1	6.9	-0.5	5.9
Short-term interest rate	2.0	2.2	2.0	2.2	2.0	2.2	3.0	1.4	2.0	2.2
Long-term interest rate	4.6	5.1	4.6	5.1	4.6	5.1	5.4	4.7	4.6	5.1
Consumer price inflation	1.4	0.9	1.3	0.8	2.1	1.1	2.1	1.1	0.7	-0.2
Oil price (US$ per barrel)	27.0	27.0	27.0	27.0	40.0	40.0	40.0	40.0	27.0	27.0
Growth in credit	4.4	7.2	3.0	1.6	4.4	6.3	4.7	6.7	2.9	4.4

Source: French authorities.

[13] It was technically difficult to model the possible policy reaction outside the Eurozone. If the U.S. had also reacted with higher interest rates, the exchange rate channel would have been blocked, and the euro interest rates would have had to rise further to achieve the same inflation path.

Liquidity test

21. Rather than construct a *de novo* liquidity test, it was decided to make use of the authorities' liquidity requirement. Banks are required to report monthly data on their global liquid assets and liabilities, which includes cash positions, claims including repo-related claims with at most one month remaining maturity, negotiable securities, and off balance sheet commitments and available liquidity lines. On this basis the ratio of liquid assets to liquid liabilities is constructed, where the items are weighted to reflect estimated probabilities of being rolled over or being available in event of a liquidity squeeze. In particular, it is assumed that some normally liquid assets can be realized only slowly. This ratio is to be maintained above 100 percent at all times. Data were available on the distribution of this ratio by year, so that it was possible to record the number of banks with liquidity ratios below 100 percent or close to 100 percent, and their market share. However, account had to be taken of the fact that during some periods, the ratio for certain banks was distorted by exceptional circumstances. In particular, merger activity sometimes depresses the ratio below 100 percent for transitory, technical reasons.

Results

22. The results corroborate the impression from other sources that the French banking system is well placed to cope with likely shocks over the short to medium term (Table 2 through Table 6). Under no test does the CAR of any bank fall below the minimum 8 percent level, and the impact of the assumed shocks can be absorbed out of one year's profits.

23. As is common in stress testing, credit risk potentially has the largest and most widespread impact on banks. The relevant single factor test (F4) yields results qualitatively similar to those from the macroeconomic scenario of a prolonged recession (M1), which is plausible. No one sector dominates, but risk in lending to the transportation and commercial real estate sectors is relatively important. A combination of factors can have an effect larger than the sum of effects under single-factor tests (compare F9 with F1 and F5).

24. Other risk factors are important for individual banks. For example, a large drop in equity prices would primarily affect one bank (F5). Some events, such as an exchange rate movements (F6a and F6b) or a flattening of the yield curve (F1) benefit some banks and are costly for others. Credit risk is also unevenly distributed; the bank with the lowest NPLs in its exposure to the energy or the transportation sector is the one that would be worst affected by a deterioration in credit quality.

25. Looking at the macroeconomic scenarios, a dollar depreciation has an effect similar to that of a large decline in external demand, but it is milder. The two scenarios involving an oil price rise yielded very small or even positive effects on banks. One contributing factor is the tendency for bank profitability to be positively correlated with movements in interest rates, because deposit rates are "stickier" than lending rates. In addition, the policy reaction has the effect of steepening the yield curve in the second year, which is favorable to banks.

Negative effects on NPLs become more prominent only after the projection period of two years. It is worth noting that these results cannot simply be extended to a case with a larger oil price shock with a larger effect on output, combined with a larger policy reaction, which might have a disproportionate and nonlinear impact.[14]

26. The results of the macroeconomic scenario tests are predicated on the quality of the projections for bank profitability, NPLs, etc., which do indeed appear reasonable, as do the underlying estimated coefficients (in terms of magnitudes, standard errors, R2 statistic, etc.).[15] In this connection, it is worth noting that the starting point for the projections was the 2003 outcome, which was well within the range of what has been typical for French banks in the recent past.

27. The effects estimated by individual banks broadly correspond to those obtained by the Commission Bancaire based on aggregate data, but bank estimates tend to show more moderate effects (Tables 4 and 5). The effects of a deterioration in the quality of loans to the commercial real estate sector estimated by the banks are much smaller than those estimated by the Commission Bancaire, but their estimates of effects for other sectors are larger.[16]

28. The estimation of the effect on Basel II-type CAR shows that banks remain resilient even according to this more severe measure. It is interesting to note that changes in the Basel II-type CAR reflect both changes in capital and important changes in risk-weighted assets. Not only does the stock of assets grow over time, but the risk weightings vary across scenarios. The latter effect can be quite large (Table 6).

29. The impact on banks of losses in their life insurance subsidiaries is sometimes significant, at least for individual institutions. However, the losses are estimated under the extreme assumption that insurance contracts are cashed in and, therefore, large capital losses must be realized immediately and in full. Under more moderate assumptions, the banks would not have to provide any additional capital for their insurance subsidiaries.

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[14] The scenario F3 envisages a policy reaction by the ECB, which is able to curb inflation by a small and temporary increase in interest rates, which leads to euro appreciation. The exchange rate channel would be unavailable if all countries reacted similarly, and therefore the necessary interest rate adjustment would have to be much greater.

[15] The estimation of the NPL equation was econometrically most problematic because during the 1990s banks worked off a large stock of NPLs acquired during the 1993-94 crisis. Therefore, the aggregate series displays a distinct downward trend, which seems to have leveled off in the most recent years. However, these estimates were performed mainly for illustrative purposes; stress test estimates were obtained using the more detailed and robust models available to the authorities.

[16] One explanation could be that the banks may use a different sectoral classification than does the Commission Bancaire.

30. The liquidity test shows that banks have rarely failed to observe the required minimum ratio of liquid assets to liquid liabilities. Those that do suffer occasional liquidity shortfalls are disproportionately small banks

Table 2. France: Results of Factor Stress Tests for the Banking Sector
(In percent)

	Relative to 2003 after-tax profits 1/			Relative to end-2003 own funds 2/			Relative to end-2003 CAR 3/	
	Best	Average	Worst	Best	Average	Worst	Average	Worst
Risk factor tests								
Bank estimates (except F3a)								
F1	0.8	-3.8	-20.2	0.06	-0.45	-4.88	-0.05	-0.48
of which: due to insurance subsidiaries	...	-0.6	-7.2	...	-0.05	...	-0.01	-0.13
F2	1.4	0.6	-2.9	0.38	0.08	-0.31	0.01	-0.04
F3a	...	-35.7	-54.7	-2.58	-2.99	-10.01	-0.34	-0.98
F4	...	-44.5	-71.8	-1.83	-5.58	-9.01	-0.56	-1.06
F5	2.5	-21.4	-84.8	0.66	-2.63	-13.87	-0.30	-1.62
of which: due to insurance subsidiaries	...	-0.6	-5.5	...	-0.05	...	-0.01	-0.04
F6a	1.6	--	-1.1	0.12	--	-0.18	--	-0.02
F6b	5.8	1.6	-0.4	0.49	0.20	-0.12	0.02	-0.01
F7	-3.8	-7.1	-22.2	-0.45	-1.04	-2.78	-0.10	-0.19
F8	3.9	2.0	-1.2	0.59	0.25	-0.20	0.03	-0.02
F9	-5.3	-30.1	-87.0	-0.46	-3.57	-14.24	-0.40	-1.66
of which: due to insurance subsidiaries	...	-5.0	...	...	-0.42	...	-0.05	-0.13

Source: French authorities, and staff estimates.

1/ After-tax impact as percent of 2003 after-tax profits.
2/ Before tax impact relative to end-2003 own funds, in percentage points.
3/ Before tax impact relative to end-2003 risk-weighted capital adequacy ratio, in percentage points.

Table 3. France: Results of Macroeconomic Scenario and Liquidity Stress Tests for the Banking Sector
(In percent)

	Relative to 2003 after-tax profits 1/			Relative to end-2003 CAR 2/		Relative to Basel II-type CAR 3/		
	Best	Average	Worst	Average	Worst	Best	Average	Worst
Macroeconomic scenario tests								
Bank estimates								
M1	-1.17	-23.6	-46.9	-1.06	-1.42	-1.40	-2.10	-2.25
M2	25.2	2.0	-10.4	-0.83	-0.97	1.15	-0.15	-0.42
M3	34.6	8.7	-6.5	-0.84	-0.96	1.30	-0.10	-0.42
M4	13.8	-4.4	-20.1	-0.77	-1.06	-0.11	-0.80	-0.98
Commission Bancaire estimates								
M1	...	-26.0	...	-1.09	...	...	-2.10	...
M2	...	7.0	...	-0.79	...	...	-0.11	...
M3	...	13.2	...	-0.80	...	...	-0.05	...
M4	...	-9.2	...	-0.73	...	...	-0.83	...

Liquidity test (Percent, 1999-2003)

	Liquidity ratio below 100 percent of requirement		Liquidity ratio between 100 and 120 percent of requirement	
	Average	Standard error	Average	Standard error
Share of number of banks	1.4	0.7	7.9	0.8
Share of total bank assets 4/	1.0	1.2	32.3	8.1

Source: French authorities, and staff estimates.

1/ After-tax impact as percent of 2003 after-tax profits.
2/ Before tax impact relative to end-2003 risk-weighted capital adequacy ratio, in percentage points.
3/ Impact on risk-weighted capital adequacy ratio, allowing for accumulated after-tax profits, credit growth, and change in risk weights, in percentage points.
4/ Excluding effect of one large merger in 2000.

Table 4. France: Details of Credit Risk Factor Test
(In percent)

	Banks' estimates									Commission Bancaire's estimates		
	NPL ratio						Additional provisioning need (percent of 2003 after-tax profits)			Additional provisioning need (percent of 2003 after-tax profits)		
	end-2003 level			After-shock level								
	Best	Average	Worst	Best	Average	Worst	Best	Average	Worst	Best	Average	Worst
Overall	...	...	...	...	...	...	21.89	66.74	107.71	67.02	84.85	94.19
Energy	2.16	1.91	0.43	3.87	4.58	3.30	...	3.20	...	0.26	0.79	0.00
Transport	2.26	4.15	0.29	2.70	7.87	2.57	...	5.07	...	4.68	3.97	2.85
Telecommunications	0.80	3.10	0.60	1.14	5.98	3.01	...	3.68	...	0.59	0.69	0.43
Commercial real estate	1.16	3.54	1.08	1.23	7.18	7.11	...	3.30	...	27.83	35.41	41.48
Other	1.35	2.99	4.68	1.61	3.51	5.44	...	51.49	...	43.99	33.66	49.42

Source: Commission bancaire.

Table 5. France: Details of Macroeconomic Scenario Tests
(Projected cumulative percentage change from 2003 level)

	Banks' estimates						Commission Bancaire's estimates				
	Net profits						Net profits		NPL ratio		
	Year 1			Year 2			Year 1	Year 2	Year 1	Year 2	Year 3
	Best	Average	Worst	Best	Average	Worst					
Baseline	...	...	...	...	...	...	-1.58	12.52	5.96	8.34	8.24
M1	-3.70	-9.02	-19.95	-1.17	-23.60	-49.93	-6.02	-26.02	5.96	16.56	21.22
M2	23.44	1.01	-3.96	25.20	1.95	-10.37	-2.07	6.96	5.96	9.16	9.38
M3	9.73	-5.41	-6.90	34.61	8.71	-6.45	-0.69	13.25	5.96	7.39	11.16
M4	0.23	-1.47	6.06	13.83	-4.37	-20.10	-10.67	-9.21	5.96	10.60	11.25

Source: Commission bancaire.

Table 6. France: Risk-Weighted Assets Projections 1/
(Projected cumulative percentage change from 2003 level)

	Without volume effect		With volume effect	
	Year 1	Year 2	Year 1	Year 2
Baseline	0.0	0.0	6.8	8.7
M1	25.6	20.2	34.1	30.7
M2	1.6	1.6	8.5	10.4
M3	4.8	1.6	11.9	10.4
M4	7.5	6.4	14.7	15.7

Source: Commission bancaire.

1/ Projected increase in risk-weighted assets under Basel II-type rules.

C. Insurance Sector

31. The insurance sector stress tests are structured as far as possible like the banking sector tests. The sample covers about the same proportion of the industry, the tests are defined and calibrated similarly, and results are presented relative to metrics that capture both flow and stock concepts.

32. Nonetheless, the nature of insurance and the regulatory regime under which the sector operates necessitates a number of adjustments. First, certain shocks (such as floods) may be important for insurance that are not significant for banks, and vice versa. Second, insurance is essentially a longer-term business where the structure of assets and liabilities may not change rapidly. Third, regulations and the specification of insurance contracts makes the estimation of the impact of any stress contingent on assumptions about the behavior of insurance companies and their policyholders because the latter bear much of the risk, and there are several degrees of freedom in the allocation of risk. The regulations differentiate between life and nonlife business, and different sorts of shocks.

Sample

33. The sample of insurance companies that participated in the stress testing exercise represents the overwhelming majority of the sector. For life insurance, 26 companies holding 79 percent of total sectoral insurance liabilities (approximately €766 billion) were included. These 26 companies were made up of 20 subsidiaries of the 7 bank groups included in the banking sector stress tests (with 45 percent of sectoral liabilities); one state-controlled company (with 10 percent of liabilities); and the five individual companies that each hold at least 2 percent of total liabilities. Of these last five, three are subsidiaries of large foreign

insurers. For bank subsidiaries, stress tests have been conducted on a group basis, while the rest were done on an individual basis.

34. For nonlife companies, the stress tests were applied to groups or entities representing 75 percent of nonlife insurance liabilities. The latter includes 52 companies forming the 11 nonlife insurance groups or single companies that had insurance liabilities greater than 1.5 percent of total nonlife liabilities. None is owned by a bank. As in the case of life insurance, stress tests were conducted on end-2003 data.

Definition of tests

Procedures and estimation

35. The tests were run by the insurance supervisory agency, the CCAMIP. The test procedures and definitions of shocks were broadly similar for life and nonlife companies, but, as explained below, certain regulatory complications apply to life companies. The starting point for all estimates was the financial situation of companies at end-2003. A shock can have two effects on the solvency position of an insurance company: an instantaneous change in the value of the company's assets (i.e., a stock effect represented by capital gains or losses) and a progressive change in the return on the company's assets (i.e., a flow effect represented by asset income level changes.[17, 18]

36. To facilitate the interpretation of the stress tests, the effects of the assumed shocks are presented in three different ways: (i) as changes to companies' solvency margin, that is, the ratio of net admissible asset value (actual capital and unrealized capital gains) to total main liabilities; [19] (ii) as the pre- and post-shock solvency ratio, that is, the actual solvency margin

[17] The related changes in asset valuation and asset income level translate into capital and profit changes only if shareholders are the only risk bearers and accounting is based on market value. In practice, however, regulations and market practices ensure that insurance companies maintain some "buffers" so that a shock may not necessarily have a one-to-one impact on a company's solvency position.

[18] The flow effect on profitability was cumulated over two years. In the tests with actual data, the stock effect was much more important than the flow effect.

[19] The main insurance liabilities to policyholders are also referred to as "technical provisions." In the case of non-life insurance companies, main insurance liabilities are equal to total provisions. In the case of life insurance companies, main insurance liabilities are equal to the provisions for contracts with a guarantee, that is, excluding unit-linked contracts where the risks are borne by policy-owners).

relative to the required solvency margin;[20] and (iii) as the pre- and post-shock policy yields. When a company is so badly affected by a shock that it cannot meet all its regulatory and contractual obligations from immediately available resources (i.e., by drawing down solvency position and/or reducing policy yields within regulatory limits), the resource shortfall is reported as a share of the company's main insurance liabilities.

37. Confidentiality considerations required that the authorities report only the average outcome, and the best and worst individual outcomes, without identifying individual institutions. They also reported the number of institutions that would fail one or other prudential requirement in the event that some shock is realized, and the magnitude of the shortfall in such cases.

38. The authorities also estimated results including reinsurance reimbursables, that is, the amount that insurance companies could recover from their reinsurers in case a shock is realized. However, most results exclude this effect, mainly in order to make the tests more conservative. Moreover, in the event of a very large, world-wide shock, there may be some doubt as to the rapid realizability of all reinsurance coverage; reinsurers collect risk, and so they may be especially vulnerable to very large, very low probability events. However, the results for the test involving a large natural disaster are presented with and without the reinsurance effect.

Life insurance

39. The relevant French regulations and contract provisions that set the framework for the stress tests are as follows:

- **Solvency ratio**. Insurance companies are required to maintain a solvency margin (capital and unrealized gains, also referred to as "net admissible assets") above the minimum required solvency margin, which is computed essentially relative to main insurance liabilities. The solvency ratio is the ratio of the actual solvency margin to the minimum required solvency margin;

- **Guaranteed rate of return**. A high proportion of life contracts include a guaranteed rate of return. At end-2002, the industry average guaranteed rate was 2.6 percent, with considerable variation between companies. This guaranteed has been falling progressively over the last decade (it was 3.7 percent at end-1995) and is much lower than actual policy yields;

[20] The solvency margin plays a role in the regulation of the insurance sector comparable to the risk-weighted capital ratio in banking. The required solvency margin is analogous to the minimum required capital adequacy ratio.

- **The 85 percent mandatory pay-out policy rule (henceforth referred to as the 85 percent return rule).** Insurance companies are required to pay out at least 85 percent of asset income minus administrative overhead ("net income");

- **The 125 percent minimum prudence margin rule (henceforth referred to as the 125 percent income rule).** Notwithstanding the above rule, if the realized rate of return on assets falls below 125 percent of the guaranteed minimum return (the "minimum prudence margin"), insurance liabilities must be recalculated using the realized rate of return rather than the historical yield. This re-evaluation will affect the actual and required solvency ratios;

- **Deferred insurance benefit provision**. Insurance companies are allowed to distribute gains in excess of the guaranteed minimum return over an eight year period.;

- **Unrealized losses on fixed instruments (i.e., bonds) are ignored for solvency purposes.** This accounting rule is based on the concept of asset-liability matching: fixed-principal instruments assets are bought to cover similar maturity liabilities and hence can typically be held to maturity even if their market value were to fall; the company is never forced to realize losses so long as the policies are not cancelled. Unrealized gains, however, are added to capital as the insurer could sell these assets before maturity;[21]

- **Unrealized losses (gains) on other assets (e.g., equity and real estate) are (not) booked on balance sheet**.

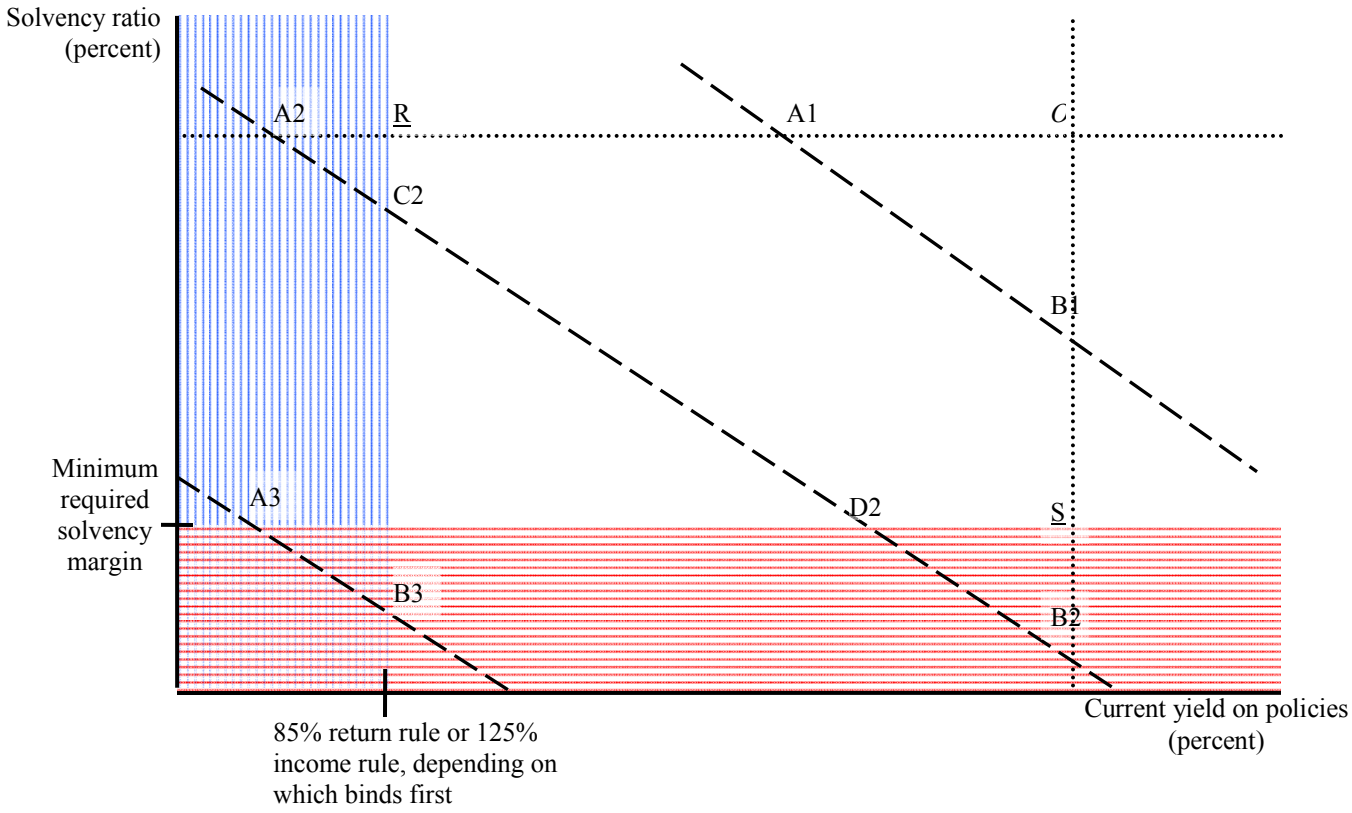
- **If policies are cashed in, gains and losses must be realized immediately**.

40. The implication of all this is that, for shocks of the magnitude considered in these stress tests and assuming that policies are not cashed in, companies have discretion in absorbing the shocks by (i) changing current or future returns on policies; and (ii) adjusting the available solvency margin. A company's choice of policy mix will depend on its business strategy, which in turn depends on the relative importance of smoothing profits versus other objectives such as retaining market share, building reserves for future contingencies, financing expansion, etc.

41. The presentation of the stress test results tries to capture this range of indeterminacy by including estimates of the maximum effect on current policy returns, and, alternatively, the maximum effect on the solvency ratio. Figure 1 illustrates the approach:

[21] Each year, a portion of the liabilities and corresponding assets are amortized, assuming that all are held to maturity.

Figure 1. Effects of Stress on Insurance Companies:
Solvency and Policy Yield



42. In the response to a negative shock, an insurance company can reduce its solvency position (and moving downward along the vertical axis) or reduce current policy yield (and move backward along the horizontal axis). The shaded areas represent combinations of outcomes for which various regulations and contract provisions would be binding, as companies have to meet the required solvency ratio on the vertical axis, and the 125 percent income rule and the 85 percent return rule on the horizontal axis.[22, 23] Thus, an insurance company must choose a policy mix that remains in the unshaded area. Assume that an insurance company starts at point *O*. A small shock might move the company to a position along the segment A1-B1, where the effect could be absorbed by reducing current yield to A1, or reducing solvency to B1, or some intermediate combination between A1 and B1. A

[22] For convenience, all constraints are depicted in the diagram as linear, but this is not necessarily the case for actual companies.

[23] Normally, either the return rule or the income rule will bind before the other.

larger shock might leave the company along A2-B2. However, regulations and contract provisions restrict the company's policy choices, so that the company has to choose a point along the unshaded section C2-D2, where the shock is absorbed by a combination of lower current returns and lower solvency.[24] It would take a very large shock to move a company to A3-B3, where all room for maneuver has been exhausted as the company would no longer meet neither the solvency requirements nor the 125 percent income rule and/or the 85 percent return rule.

43. If a shock reduces a company's solvency ratio below the required level (if the company reaches a point on the diagram such as B2), the solvency shortfall is measured relative to its main insurance liabilities (Column 8 of Table 7). If the 85 percent return rule is binding or if a company is unable to meet the 125 percent income rule (a point such as A2), the shortfall is measured relative to both its main insurance liabilities and required solvency margin (last two columns of Table 7)[25] On Figure 1, the distance S-B2 is related to the solvency shortfall, that is, the quantity of assets needed to restore solvency to a minimum acceptable level. The distance R-A2 is related to the shortfall in resources needed to pay the 85 percent required yield on policies.

44. Figure 2 illustrates these points in the space of the solvency ratio and the realized yield on investments relative to the minimum guaranteed yield.[26] The solvency ratio should be above 100 percent, and prudential provisions apply if the realized investment yield is below 125 percent of the guaranteed minimum return on policies (the "minimum prudential guideline"). A company starts in a position such as *O*. A modest shock brings the company to a situation along A1-B1, where it can choose a point on the vertical line depending on the extent to which it chooses to smooth profits, realized payouts to policyholders, etc. The length of the vertical line depends on the specific provisions of the policies and regulatory constraints.[27] A larger shock might move the company to A2-B2, where the "minimum prudence guideline" is binding; the company needs to choose a payout rate and comply with prudential requirements so that it stays above the horizontal axis, but it still has room for choice. Only a very large shock would bring the company to a section such as A3-B3, where it could not meet several prudential requirements and owners' capital would necessarily be reduced. Note that a shock to liabilities can be represented on this diagram as a shift

[24] It is possible that a shock will move a company to a situation in which only one constraint is potentially binding.

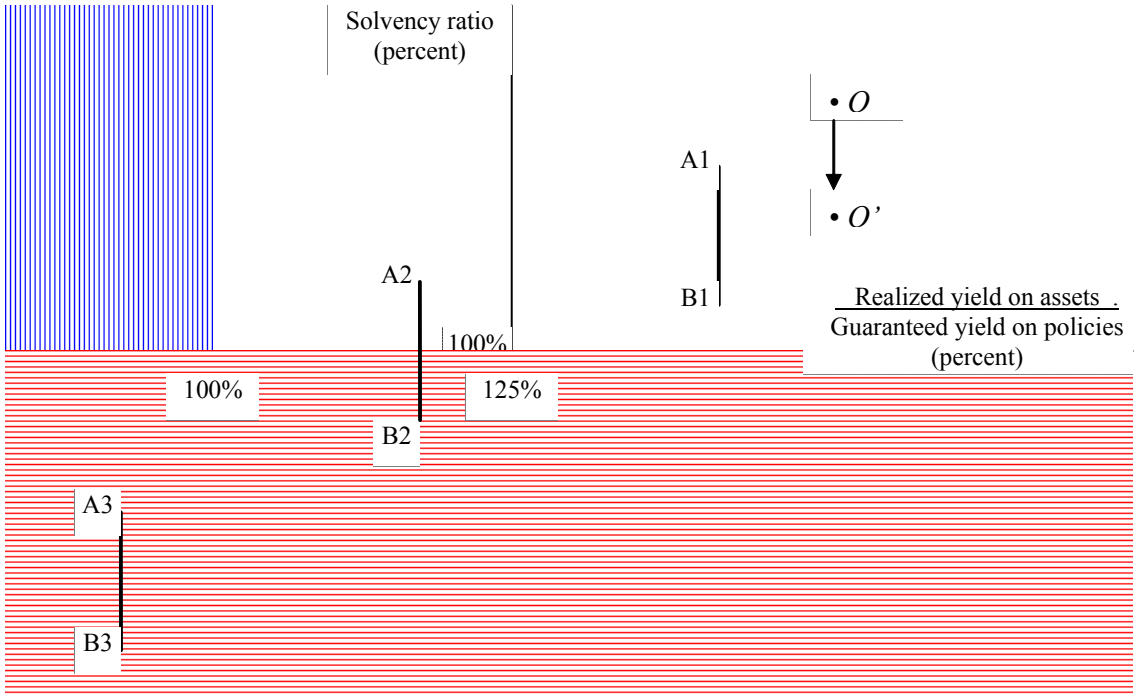
[25] Because current policy returns are relatively high, the 85 percent return rule binds before the 125 percent income rule.

[26] We thank Mr. Nigel Davies for suggesting this representation.

[27] The line is vertical because the horizontal axis represents an exogenous, realized variable, not under the control of the company.

downwards of all points, such as from *O* to *O'*. Thus, the representation in this space shows directly the link between a realized shock (including a shock to liabilities) and solvency.

Figure 2. Effect of Stress on Insurance Companies:
Solvency Ratio and Relative Yield



45. As mentioned above, many of the buffers available to life insurance companies can be vitiated if policyholders cash in early. This is unlikely to occur unless there is a large, sudden, and persistent rise in interest rates, which induces people to move their savings out of life insurance products into alternative (higher return) instruments. Nonetheless, it is worth considering the resilience of the life sector against such an extreme occurrence as a further test of its financial soundness. This test, which amounts to assuming that the sector collapses, and that all policy holders cash in their policies, evaluates the capital shortfall that some companies might suffer if they had to meet all their obligations immediately.[28]

[28] The authorities can prevent this event from occurring by mandating the suspension of repurchases of policies or a transfer of the portfolio of a distressed company.

46. Yet another approach to measuring the impact of possible shocks is based on the net worth of companies, where all assets and liabilities are measured in present value terms. This approach allows to ignore current accounting and prudential rules, including a company' ability to smooth the effect of a shock over eight years, and assumes that shocks are entirely absorbed by capital. Given the long-term nature of life insurance, this test is a better instrument to capture a (long-term) mismatch between assets and liabilities. It is thus more analogous to stress testing for banks. This approach is applicable to the life sector only. The results of this approach are presented in Table 8.

Definition and calibration of tests

47. The insurance scenarios parallel the single and multiple factor tests performed on the banking sector. The assumed shocks under tests F1, F2, F3a, and F5 are the same as in the tests for the banking sector. Tests F4, F6, F7 and F8 are not applicable because insurance companies have negligible exposure to these risk factors. Additional, insurance-specific tests are as follows:

F3b: a 100 basis point decrease in all bond yields. Such a shock is somewhat implausible given the current low level of rates, but the test is useful to illustrate certain asymmetries affecting insurance companies.

F10: a fall in French real estate prices by 30 percent.[29] Such a decline would reduce property prices in real terms to levels not seen since the 1980s.

F11: a 100 basis point increase in all interest rates combined with a 30 percent fall in equity prices. This test is severe because it implies an unlikely reaction to a large fall in equity prices.

F12: a natural disaster causing damage twice as large as the worst previous experience, which occurred in 1999. The 1999 event involved a combination of storms in northern and southern France, that is, it may be regarded as a double disaster. However, the value of property damage from storms has tended to rise over time, so this test is regarded as very severe but conceivable. The test applies only to the nonlife sector. Effects are calculated without and with taking into account reinsurance receivables (F12a and F12b, respectively).[30]

[29] Banks have negligible direct exposure to real estate.

[30] The natural disaster scenarios do not take into account possible second round effects on asset liquidity.

Results

48. All insurance companies would remain within mandated regulatory limits under all tests, although in some cases regulatory constraints would be binding, forcing insurance companies to change either their solvency position or policy yield or a combination thereof (Table 7). The largest effects are seen in tests involving increases in interest rates (F1, F3a, F11), while a fall in interest rates would benefit companies (F2, F3b). Insurance companies tend to benefit from falling interest rates because the capital gain (asset values rise with lower rates) more than offsets the negative earnings impact, which tend to be too limited over the duration of the test to significantly reduce the company's overall asset income. In the case of a rise in interest rates, however, insurance companies can be hurt, especially if they have to sell their bonds (at a loss) when policyholders want to cash in their policies to earn higher returns on alternative savings instruments. This is shown in Table 7, where two (thirteen) companies would not be able to absorb the shock induced by a permanent increase in interest rates (F3a) by reducing their solvency (policy yield).

49. It is interesting to note that the regulatory constraints on solvency are less often binding than the constraints on yield (and in particular the 85 percent return rule): in test F1, for example, only two life companies could not absorb all the shock by reducing their solvency margin, whereas six companies could not absorb the full effect by reducing yields on current policies. Even when a constraint is binding, the shortfall is small relative to main insurance liabilities.

50. Equity and real estate price falls would generate relatively minor losses. A very large natural disaster would severely affect a number of nonlife companies if reinsurance were unable to reimburse the insurer (F12). While the range of impacts on individual companies is considerable, the sign of the effect is always the same; this result contrast with that for banks, where some shocks benefit certain banks and harm others. While this may suggest that the insurance sector is more prone than the banking sector to systemic difficulties, it is important to keep in mind that the insurance sector has proven to be relatively robust to a wide range of shocks (some of which very extreme).

51. In order to assess the resilience of the sector under more stringent conditions, estimates were made of the impact of the shocks under the assumption that all life policies are cashed in immediately, that is, that the industry collapses and insurance companies have to meet all their obligations immediately. According to these estimates, all policy-holders could be reimbursed in full except in test F3a. For the sector as a whole, shareholders would lose 79 percent of their capital, but remaining assets would exceed insurance liabilities by 1.1 percent. However, 7 of the 26 companies would be unable to meet all obligations to policy-holders; these seven are mostly bank subsidiaries, which tend to hold a larger share of their portfolio in bonds. In the worst case, the shortfall would amount to 9.1 percent of main insurance liabilities. These results suggest that the financial system is resilient, at least over the time horizon over which the tests are conducted, even under some extreme assumptions, such as the collapse of the sector.

Table 7. France: Insurance Sector Stress Testing Results
(In percent)

	Impact on solvency margin 1/			Available / required solvency margin 2/					Yield on policies 3/					
	Best	Average	Worst	Best	Average	Worst	Companies with ratio<100 (Number)	Recapitalization need/liabilities 4/	Best	Average	Worst	Companies with yield shortfall (Number)	Yield shortfall/ required solvency margin 5/	Yield shortfall/ liabilities 6/
Life insurance companies														
Initial level	...	12.4	7.6	400	294	181	--	--	11.0	6.8	5.7	--	--	--
F1	-0.7	-3.9	-5.6	384	200	87	2	0.41	6.8	3.3	2.2	6	22.2	0.93
F2	3.5	2.4	1.8	...	353	242	--	--	...	6.8	5.7	--	--	--
F3a	-3.0	-10.8	-15.7	328	156	83	2	0.46	...	3.3	0.5	13	16.1	6.65
F3b	6.9	4.8	3.7	...	387	230	--	--	...	6.8	5.7	--	--	--
F5	-1.3	-3.8	-7.4	376	264	145	--	--	6.6	4.3	3.2	--	--	--
F10	-0.3	-1.3	-3.2	381	264	145	--	--	10.8	6.5	5.4	--	--	--
F11	-3.8	-7.7	-10.6	310	107	8	8	0.77	4.8	3.3	0.9	12	88.1	3.63
Non-life insurance companies														
Initial level	...	46.3	24.2	1230	568	232	--	--	...	...	...	...	...	...
F1	-1.4	-3.0	-5.1	1202	530	204	--	--	...	...	...	...	...	...
F2	18.1	1.7	0.8	1246	591	259	--	--	...	...	...	...	...	...
F3a	-4.1	-8.3	-15.4	1246	527	204	--	--	...	...	...	...	...	...
F3b	36.1	3.5	1.5	1262	802	290	--	--	...	...	...	...	...	...
F5	-6.1	-17.8	-57.2	623	336	173	--	--	...	...	...	...	...	...
F10	-2.3	-5.1	-15.1	1142	514	188	--	--	...	...	...	...	...	...
F11	-9.3	-20.8	-59.9	141	114	104	--	--	...	...	...	...	...	...
F12a	-12.8	-23.1	-66.0	530	266	46	2	1.96	...	...	...	...	...	...
F12b	-2.5	-7.5	-20.5	1074	470	142	--	--	...	...	...	...	...	...

Source: French authorities, and staff estimates.

1/ Impact on solvency margin, in percent, assuming the solvency margin absorbs risk to the limit permitted by regulations.
2/ Ratio of available solvency margin to minimum required solvency margin, in percent, assuming the solvency margin absorbs risk to the limit permitted by regulations.
3/ Current percentage yield on policies, assuming the current yield absorbs downside risk to the limit permitted by regulations.
4/ For those companies whose solvency ratio falls below 100 percent, additional capital needed as a percentage of main insurance liabilities.
5/ For those companies unable to meet minimum guaranteed yield on policies, yield shortfall relative to minimum solvency requirement, in percent.
6/ For those companies unable to meet minimum guaranteed yield on policies, yield shortfall relative to main insurance liabilities, in percent.

	Impact on solvency margin 1/	Available / required solvency margin 2/	

52. Results under the net present value approach confirm those presented above (Table 8). A large rise in interest rates would leave some companies in a relatively weak position. An equity price collapse would also have an important impact on some companies. For those companies that are left with negative estimated present value, some of the impact must be transferred to policyholders (as is possible), or they must receive a capital injection from shareholders. Nevertheless, from an industry-wide perspective, the results suggest that the long-term effects of reasonable shocks appear manageable.

Table 8. France: Stress Testing Results on the Net Worth of Life Insurance Companies
(Difference between the present value of assets and liabilities,
as a percent of main insurance liabilities)

	Levels		Change	
	Average	Worst	Average	Worst
Initial level	16.4	7.6	...	...
F1	13.2	3.0	-3.2	-4.7
F2	17.0	8.6	0.7	2.7
F3a	7.4	-5.3	-8.9	-13.7
F3b	17.7	6.5	1.3	5.4
F5	12.7	3.8	-3.7	-7.3
F10	15.0	4.8	-1.3	-3.1
F11	9.5	-0.6	-6.9	-9.6

Source: French authorities.

II. Integration of Global Financial Markets

This note reviews the international linkages of the French banking and insurance sectors, and with the integration of organized capital markets. The overall level of international integration is comparable to that of other major industrial countries. Banks undertake a large volume of business in the Europe-wide interbank market, and lend extensively, but mostly to industrialized countries. Retail banking activity abroad is undertaken mainly by a few major financial groups, and is typically more important for the recipient country than for the metropolitan parent. Retail activity by foreign banks in France is small but significant.

The insurance sector is, in important ways, more integrated internationally, with important cross-border ownership links in both directions. The market for reinsurance is very internationalized.

Equity and bond markets have been growing in importance as vehicles for international capital movements. The correlation of returns among equity markets has displayed a trend increase, as has the co-movement of volatility. The establishment of Euronext in itself does not seem to have had a major impact on correlations among returns. Correlations among bond returns have been more stable in recent years, but display occasional episodes of high correlation.

A. Introduction[31]

53. French financial institutions compete with other major financial institutions around the globe, and France represents a major international financial market.[32] Hence, international factors can influence the stability of the French financial system, both as a source of risk and as a means of diversification. Its structural development will be affected by trade in financial services across borders, foreign entry into the French market and the scope for expansion by French institutions abroad, and the search by investors for the efficient allocation of capital worldwide. Therefore, an examination of international linkages is an important part of the financial sector assessment.

54. Strong interlinkages between French and global financial institutions and markets are inevitable given the linkages that exist in the real sector. The French economy as a whole is very open, and macroeconomic developments are strongly influenced by economic conditions abroad. As a member of the EMU, monetary conditions are determined on a Euro

[31] Prepared by Daniel Hardy.

[32] The international linkages are of long standing. The precursors of many of today's major French financial institutions were important actors in the globalized economy of the nineteenth century.

area-wide basis. Economic cycles are broadly synchronized with those in major trading partners (over the past decade, the correlation of quarterly changes in industrial production with those in Germany the U.K., and the U.S. has been around 0.5, and that with Italy has been over 0.65). Exports and imports are both about 30 percent of GDP. French corporations also have large foreign operations and direct investments; in some recent prominent cases, ambitious overseas expansion caused financial distress and over-borrowing by some large conglomerates. Hence, French financial institutions have a strong incentive to follow French firms abroad, and even much of their domestic business will have an external aspect. Likewise, financial market performance will be correlated with that of markets in other countries, even if there were no cross-country portfolio holdings.

55. But cross-country portfolio stocks and flows are very large. Table 9 shows that France's gross foreign claims and obligations are large in absolute terms and relative to GDP, and they have been growing in importance; the decline in 2002 is due to the appreciation of the euro. Financial obligations are spread across a range of investment vehicles, with no one category dominant. Securities, which consist mainly of equity and government obligations, make up the largest share of France's external obligations. Among France's external assets, holdings of securities have been increasing and by 2002 matched the stock of direct investment. The gross positions of monetary financial institutions (largely banks) are also large, and sundry other items are sizeable.

56. Such connections through investment portfolios are most immediately relevant to the condition of the financial sector. In addition, the financial sector itself conducts business with the rest of the world by selling or buying financial services either directly or through subsidiaries.

57. This note concentrates on such linkages that arise within the financial sector, rather than on international linkages through the other sectors; only a part of the holdings of international obligations and claims, and the direct investment described above is intermediated through the financial sector. Attention focuses on the international operations of French financial institutions—especially banks and insurance companies—through direct exposure and through the activities of their subsidiaries; the activities of foreign institutions in providing financial services in France; and the connections between securities markets in France and elsewhere.

Table 9. France: Foreign Assets and Liabilities
(All at market values; end of period)

	1999	2000	2001	2002
		(In billions of euros)		
French claims on abroad	2,310.6	2,667.3	2,785.9	2,554.0
Direct investment	908.8	1,133.5	1,051.1	833.1
Securities	587.5	713.3	806.0	825.7
Monetary financial institutions' claims	455.6	461.8	514.2	513.5
Other	358.7	358.7	414.6	381.7
French liabilities to abroad	2,233.1	2,458.4	2,545.1	2,371.7
Direct investment	645.9	643.2	604.1	522.1
Securities	850.6	993.8	1,041.6	974.2
Monetary financial institutions' liabilities	498.5	569.9	622.1	626.2
Other	238.1	251.5	277.3	249.2
Net position	77.5	208.9	240.8	182.3
		(In percent of GDP)		
French claims on abroad	170.5	187.8	188.8	167.9
Direct investment	67.1	79.8	71.2	54.8
Securities	43.4	50.2	54.6	54.3
Monetary financial institutions' claims	33.6	32.5	34.8	33.8
Other	26.5	25.3	28.1	25.1
French liabilities to abroad	164.8	173.1	172.5	156.0
Direct investment	47.7	45.3	40.9	34.3
Securities	62.8	70.0	70.6	64.1
Monetary financial institutions' liabilities	36.8	40.1	42.2	41.2
Other	17.6	17.7	18.8	16.4
Net position	5.7	14.7	16.3	12.0
GDP (in billions of euros)	1,355.1	1,420.1	1,475.6	1,520.8

Source: *Banque de France* and staff estimates.

B. Banking Sector[33]

58. French banks play a major role in channeling cross-border financial flows. By way of illustration, their international lending is on scale comparable to that of other major industrialized countries (Figures 3 and 4). They are particularly active in lending to other industrialized countries, primarily via the EMU-wide interbank market (see below). Their lending to developing countries is less in absolute terms and also smaller relative to that of banks from some other major industrialized countries.[34] Nonetheless, the amounts are large, especially relative to the size of the recipient economies.

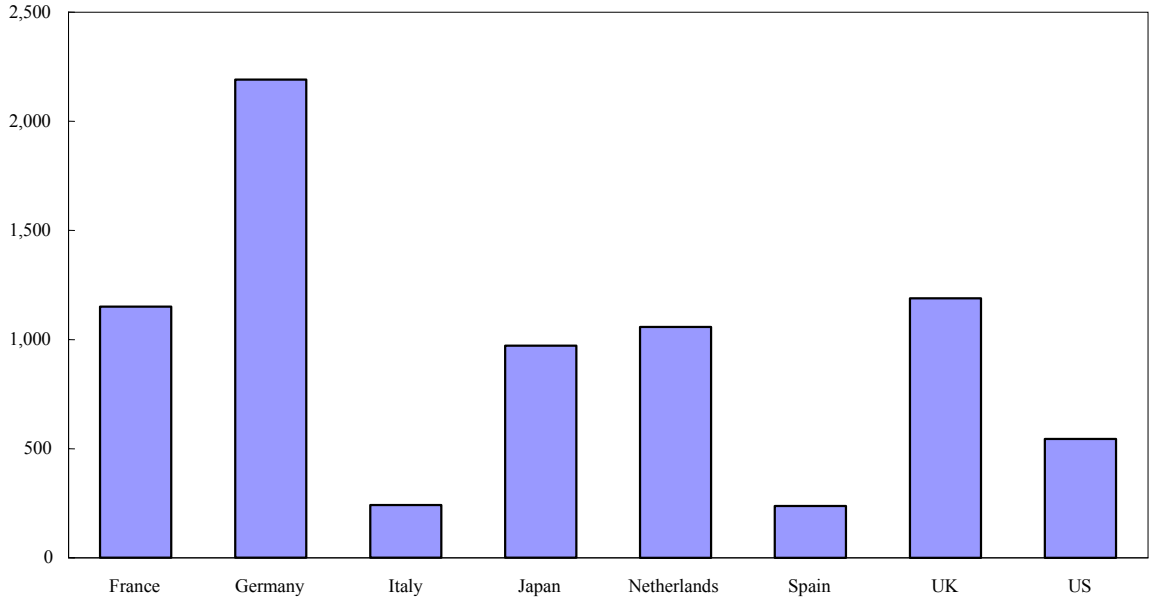
French banks' foreign exposures

59. Statistics from the Bank for International Settlements (BIS) provide information on the magnitude of French banks' consolidated claims on the rest of the world, and their geographical distribution (Table 10). The total, currently over €1,000 billion, is equivalent to about one quarter of the banking system's total assets. However, claims on other industrialized countries in Europe constitute one half of the total, and claims on the U.S. amount to more than 20 percent. The next largest exposure is to offshore financial centers, part of which may represent claims on subsidiaries of financial institutions from other industrialized countries. Claims on other countries constitute less than a tenth of the total, a share that has been declining. The absolute amounts have been roughly stable over the past five years, except for a decline in claims on Latin America and the Caribbean from 2002, which is presumably attributable to the financial crises suffered by some countries it the region.

[33] Prepared by Daniel Hardy.

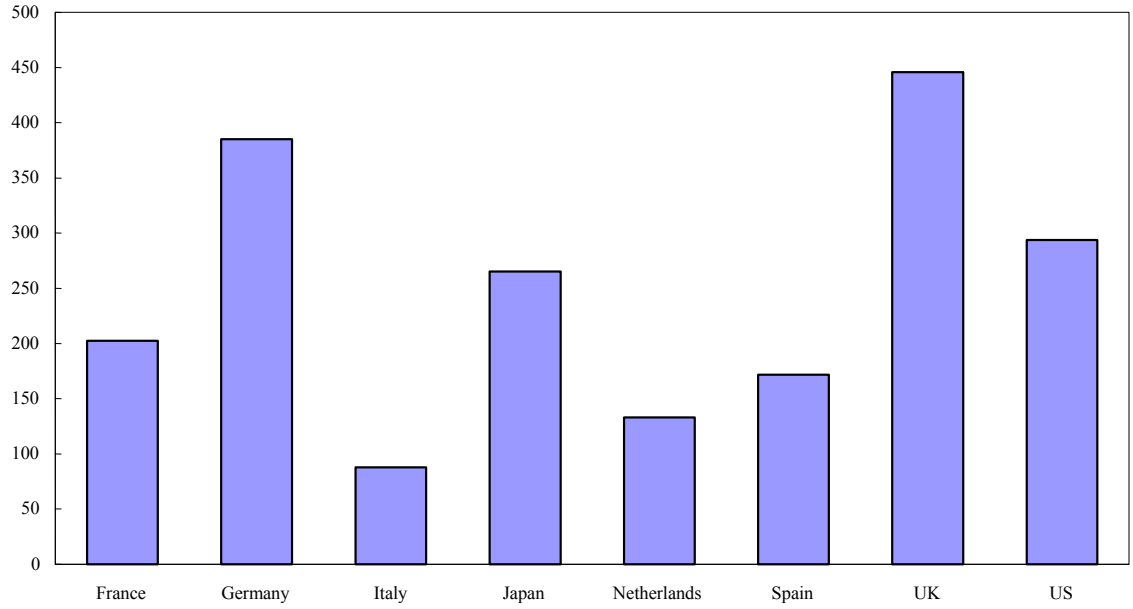
[34] Banks from countries such as Japan, Spain, and the UK have traditionally had strong presences in certain geographical areas such as East Asia and Latin America that have fewer connections to France.

Figure 3. Bank Lending to Developed Countries by Major Countries, end-2003
(In billions of U.S. dollars)



Source: BIS, and staff estimates.

Figure 4. Bank Lending to Developing Countries by Major Countries, end-2003
(In billions of U.S. dollars)



Source: BIS, and staff estimates.

Table 10. France: French Banks' Consolidated Claims on the Rest of the World
(End of period)

	Dec-99	Dec-00	Dec-01	Dec-02	Dec-03
	(In billions of euros)				
Total	835.6	848.9	929.1	994.1	1,071.6
Developed countries	660.8	682.4	752.5	832.3	911.3
Europe	453.2	428.4	459.1	486.9	530.4
United States	130.5	169.3	181.8	232.3	247.5
Offshore centers	58.8	59.4	61.3	55.6	48.0
Africa & Middle East	32.2	32.4	35.7	35.9	35.7
Asia & Pacific	35.6	32.8	29.4	27.8	29.0
Europe	15.7	14.6	21.8	20.3	28.7
Latin America/Caribbean	25.2	22.5	23.6	17.6	15.1
	(Share of total; in percent)				
Developed countries	79.1	80.4	81.0	83.7	85.0
Europe	54.2	50.5	49.4	49.0	49.5
United States	15.6	19.9	19.6	23.4	23.1
Offshore centers	7.0	7.0	6.6	5.6	4.5
Africa & Middle East	3.9	3.8	3.8	3.6	3.3
Asia & Pacific	4.3	3.9	3.2	2.8	2.7
Europe	1.9	1.7	2.4	2.0	2.7
Latin America/Caribbean	3.0	2.7	2.5	1.8	1.4

Source: Bank for International Settlements, and staff estimates.

60. More detail is provided by available information on (resident, nonconsolidated) French banks' claims on other countries (Table 11 and Figures 5–7). Total claims are less than 20 percent of total assets, and are dominated by lending. This lending goes mostly to Europe (notably the U.K.), but the U.S. and East Asia (mainly Japan, Korea and China) are also important borrowers. Other relatively large exposures are to (near) investment-grade emerging markets such as the Czech Republic, Morocco, and Poland; exposures to noninvestment grade emerging markets are relatively small and widely diversified. Holdings of foreign bonds have been growing in importance. Again, European issues predominate; in contrast to the pattern for lending, issuers from countries such as Italy and the Netherlands are relatively important. Equity holdings by banks are more modest and have been roughly stable in absolute value since end-1999. The geographical distribution is wide, with all the main markets represented. However, some of these claims represent banks' loans to or equity stakes in their own subsidiaries and joint ventures.

Table 11. France: French Banks' Claims on Nonresidents
(End of period)

	Dec-97	Dec-98	Dec-99	Dec-00	Dec-01	Dec-02	Jun-03
	(In billions of euros)						
Lending	236.9	219.5	254.4	240.4	384.7	391.5	397.7
Bonds	73.5	93.1	120.2	143.5	147.6	185.3	200.7
Shareholdings	15.1	17.4	29.8	33.0	28.6	30.7	38.8
	(Share of total assets; in percent)						
Lending	8.7	8.0	8.5	8.2	11.8	11.8	11.3
Bonds	2.7	3.4	4.0	4.9	4.5	5.6	5.7
Shareholdings	0.6	0.6	1.0	1.1	0.9	0.9	1.1

Source: French authorities, and staff estimates.

Figure 5. France: French Banks' Loans Abroad

Figure 6. France: French Banks' Holdings of Foreign Bonds

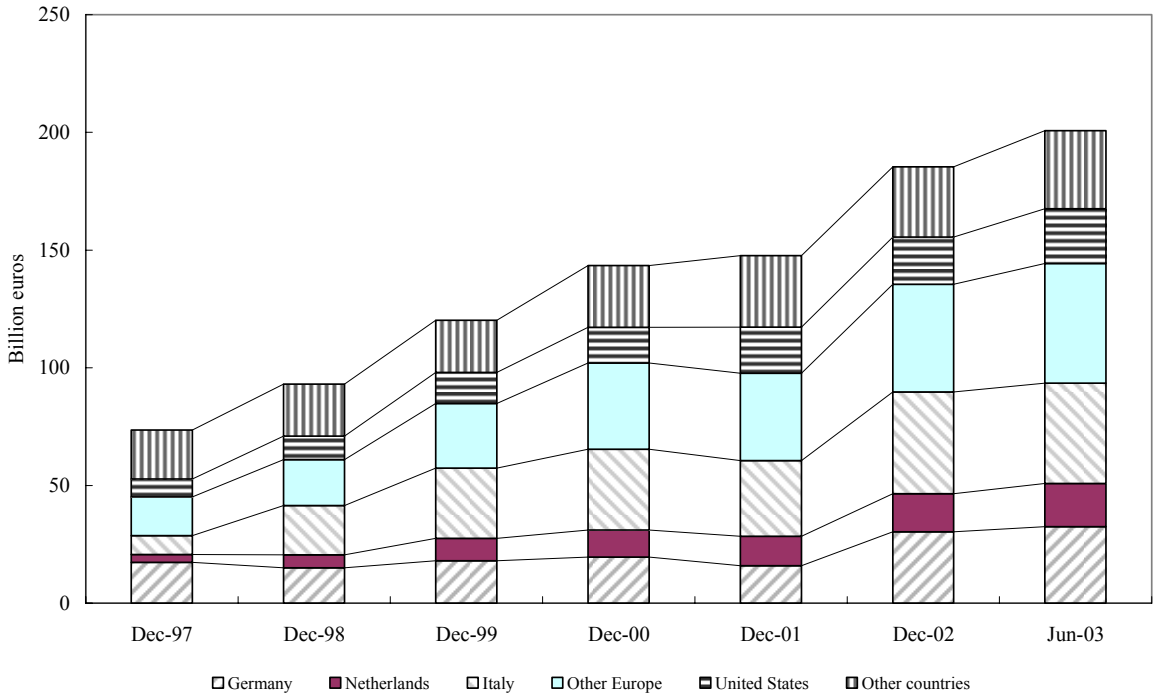
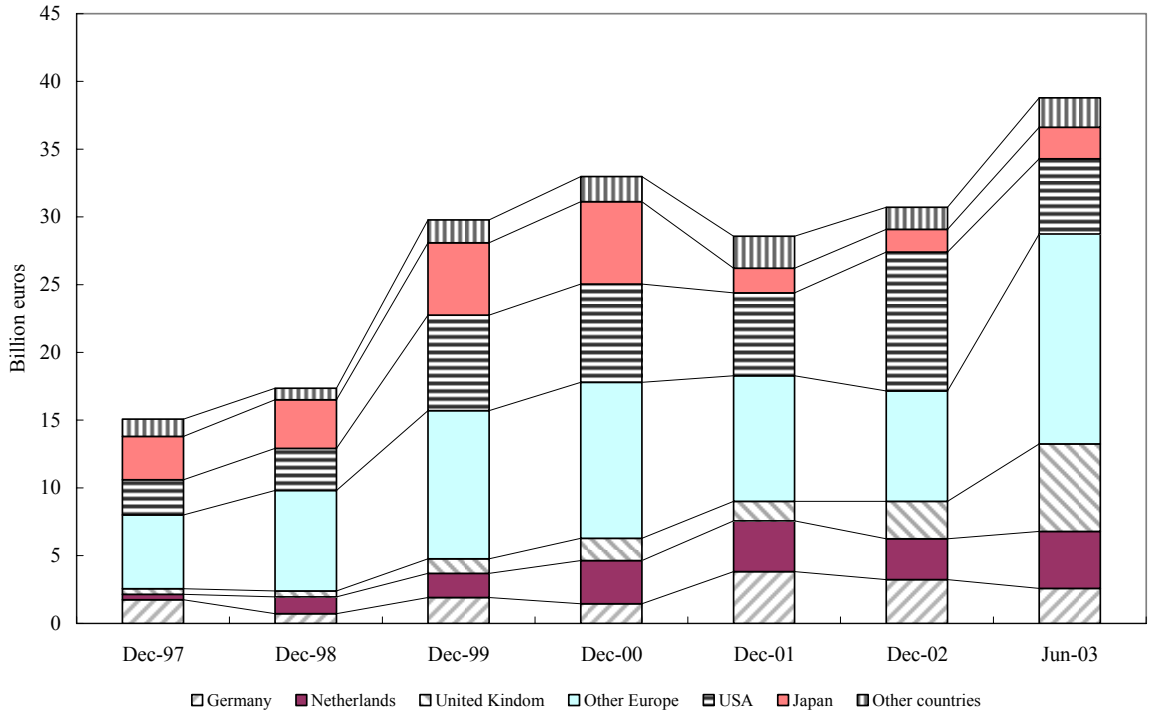


Figure 7. France: French Banks' Holdings of Foreign Shares



61. A further breakdown of French banks' claims on nonresidents shows that most are against other financial institutions (Table 12). Loans to nonresident financial institutions amount to three quarters of financial institutions' total loans to nonresidents, and about 30 percent of total loans to all financial institutions. Claims on nonfinancial nonresidents are much smaller, and represent only a small fraction of total lending. These claims only slightly exceed deposit liabilities toward nonfinancial nonresidents. This table also show that 80 to 90 percent of foreign assets and liabilities are concentrated in the commercial banks; the mutuals and other credit-granting institutions have traditionally concentrated on the domestic retail market, and so far are rather less involved in the European money markets (Box 2).

Table 12. France: Domestic Credit Institutions' Claims on and Liabilities Toward Nonresidents 1/

	Dec-97	Dec-98	Dec-99	Dec-00	Dec-01	Dec-02	Jun-03
				(In billions of euros)			
Customer deposits from nonresidents	49.1	50.2	55.3	64.9	74.3	70.9	74.9
Loans to nonfinancial nonresidents	60.1	66.8	75.2	86.6	95.6	88.1	88.4
Loans to nonresident financial institutions	302.0	267.4	277.9	275.6	330.1	314.6	292.4
				(In percent)			
Customer deposits from nonresidents/Total customer deposits	6.5	6.4	6.8	7.8	8.3	7.8	1.9
Loans to nonfinancial nonresidents/total loans to nonfinancials	6.0	6.5	6.8	7.1	7.5	6.8	19.8
Loans to nonresident financial institutions/Total loans to financial institutions	39.7	34.5	31.6	31.1	31.3	30.0	27.6
				(Share of banks in sectoral total; in percent)			
Customer deposits from nonresidents	90.5	89.3	88.4	88.2	89.6	88.6	90.0
Loans to nonfinancial nonresidents	84.0	83.1	86.0	86.1	87.7	85.4	83.8
Loans to nonresident financial institutions	79.1	82.5	85.9	88.4	85.6	90.1	89.0

Source: French authorities, and staff estimates.

1/ Includes foreign-owned banks in France.

Box 2. Foreign Operations of French Banking Institutions [1]

Major French banking institutions differ greatly in the extent and type of foreign operations that they undertake. All the large groups are engaged in the European-wide interbank market, and wholesale investment banking is an internationally integrated business. All the major banks also have strategies for developing their international business. However, only a few banks already have extensive involvement in overseas markets. In particular, the two private bank groups, and to some extent subsidiaries of the Credit Agricole, are the main internationally active French banks. Despite strong ties to some regions, notably francophone Africa, French banks are less internationally active than some of their competitors from other European countries, and were relatively late in entering growing markets in Eastern Europe and Asia.

BNP Paribas has built up a retail presence in several overseas markets: more than half its revenue and profits from retail operations are generated abroad, and only 40 percent of its lending goes to France, while a quarter goes to North America and a sixth to Western Europe. It has acquired two retail branch networks in the United States, and also has a presence in the WAMU region, the Maghreb and the Mashrak. It has a significant presence in the consumer lending markets in the U.K., Spain, Italy, and Hungary. Its operations in Asia are comparatively small and are undertaken mainly through joint ventures. About a third of its leasing activities are abroad, and it is involved in property management across Europe.

Société Générale has concentrated more on acquiring retail networks in transition countries (notably the Czech Republic and Slovenia) and some developing countries (such as Ghana and Tunisia). These have recently achieved a ROE in excess of 30 percent. It also engages in specialist financing and financial services (car and consumer loans, fleet management) in Europe, investment banking in such countries as Spain, Germany and Italy, and private banking worldwide. International operations in 2003 contributed 11 percent of group revenue and 13 percent of profits.

Crédit Agricole was traditionally a domestically-oriented bank, but acquired first **Indosuez**, a medium-sized, internationally active investment and private bank, and then **Crédit Lyonnais**, which brought with it more foreign operations. Crédit Lyonnais scaled back its European network during the 1990s, but still earns about a quarter of its revenues abroad (mainly in the Americas and Western Europe). Crédit Agricole itself has minority shareholdings in several banks abroad, most importantly in Greece, Italy, Poland, and Portugal. It wrote off its investments in Argentina and handed over its operations there to a local bank following the crisis in 2002.

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[1] The information contained in this box comes mainly from material released in the *Banque de France* Bulletin, published reports by consultants, and banks' annual reports. The consolidated accounts do not in all regards distinguish between domestic and foreign business, especially with regards to wholesale activities.

62. Much of French banks' foreign operations are undertaken by subsidiaries and therefore are not booked to the metropolitan head office. The number of subsidiaries abroad has increased as they have developed networks in foreign markets (Table 13). Direct employment abroad has tended to decrease, but year to year fluctuations are affected by individual large deals. This measure also illustrates that foreign operations are mainly undertaken by the commercial banks, and in particular the largest ones. In certain developing countries (mainly francophone ones), subsidiaries of French banks play a dominant role, but the financial magnitudes involved are small relative to business in industrialized and emerging countries.

Table 13. France: Credit Institutions' Subsidiaries, Branches and Employment Abroad 1/
(End of period)

	1997	1998	1999	2000	2001	2002
	(Number)					
Subsidiaries abroad	257	275	316	345	410	...
Branches abroad	207	221	227	208	200	...
Employees abroad	21,160	23,827	21,308	16,875	16,131	20,337
of which:						
banks	20,976	23,585	21,043	16,393	15,572	19,808
three largest credit institutions	9,018	9,921	7,647	8,967	7,642	10,629
fourth to seventh largest credit institutions	8,612	10,519	7,001	3,757	4,240	4,103
	(In percent)					
Employees abroad/total employment	5.5	6.2	5.6	4.4	4.1	5.1
of which:						
banks	10.4	11.8	10.6	8.2	7.6	9.4
three largest credit institutions	6.4	7.0	5.5	6.1	5.1	7.0
fourth to seventh largest credit institutions	18.6	22.7	10.9	6.3	6.8	6.5
Memorandum items:						
Number of domestic branches	9,204	9,269	9,109	8,495	8,493	8,745
Metropolitan employment	361,597	359,767	362,039	368,663	380,475	380,545

Source: French authorities, and staff estimates.
1/ Includes foreign-owned banks in France.

Foreign banks' operations in France

63. French banks not only compete in markets in other countries, but also face competition from foreign banks in France. The operation of the latter also links conditions in France to the performance of those institutions in other countries. An overview of this

exposure is provided by BIS data on non-French banks' claims on France (Table 14). The total rose by a third in the early years of the EMU, but has since leveled off at around €600 billion. Interbank lending within the Eurozone makes up much of the total and accounts for most of the increase. Claims on the public sector (presumably mostly in the form of government debt obligations) has shown a trend increase and now constitutes about one eighth of the total. Claims on the nonbank private sector are about double that, but has varied little since 2000, when a major British bank acquired a mid-sized French bank.

Table 14. France: Consolidated Borrowing from Foreign Banks
(In billion euros; end of period)

	Dec-99	Dec-00	Dec-01	Dec-02	Dec-03
Total claims	460	554	612	606	612
Public sector	43	59	57	64	87
Nonbank private sector	98	143	153	152	152
Net local currency claims on residents	24	44	50	42	27

Source: Bank of International Settlements, and staff estimates.

64. Foreign banks have about a ten percent market share; this level of foreign penetration is comparable to that seen in other major European countries (Table 15). Foreign banks have a higher share of lending than they do of deposit taking. The number of foreign banks active in France has been roughly constant, but the volume of their activity jumped in 2000 due to the aforementioned take-over. There has also been exit: attempts by foreign banks to enter the French market for housing loans and internet banking were not successful, and one foreign-based internet bank recently withdrew from the market.

65. While the interbank and investment banking markets are well integrated across Europe, cross-border retail business remains limited due to differences in language, customs and legal systems. Furthermore, insofar as a bank's close connections with its clients is an intrinsic aspect of its competitive advantages (and indeed a main reason why intermediaries exist), maintaining a branch network is a precondition for reaching a significant market share. Since building a new branch network involves large, up-front fixed costs, acquisition of an existing network is likely to remain the most attractive means of entry. Yet, most of the branch networks in France are under mutualist ownership, which precludes a take-over. Rather, French banks may continue to seek to acquire branch networks in other countries, or they may enter into cooperation agreements to develop joint products or exploit economies of scale in such areas as information processing.[35] Improved profitability and capitalization may

[35] One mutualist bank already has limited links with mutual banks in other countries, notably Germany, including ownership links through their apex organizations.

provide French banks with the means to take over banks elsewhere in Europe as momentum for integration builds.

Table 15. France: Foreign Bank Activity in France

	Dec-97	Dec-98	Dec-99	Dec-00	Dec-01	Dec-02	Jun-03
Number of institutions	291	320	307	328	312	287	277
of which: branches	93	89	88	90	83	93	...
Metropolitan employment	21,913	26,371	26,703	39,013	41,716	41,370	...
Share of banking sector metropolitan employment (percent)	6.1	7.3	7.4	10.6	11.0	10.9	...
	(In billions of euros)						
Total assets	305.1	295.6	373.7	509.5	495.8	472.9	459.1
Loans to nonfinancial sector	59.9	72.3	132.6	175.3	179.1	183.1	173.2
of which: to private residents	45.7	62.7	77.5	111.7	114.9	115.5	110.6
Deposits	35.6	40.1	44.2	68.9	75.2	79.0	77.2
of which: from residents	17.2	21.5	22.7	42.8	50.8	51.9	53.7
	(Share of sectoral total; percent)						
Total assets	10.1	9.7	11.0	14.8	13.1	12.5	11.5
Loans to nonfinancial sector	5.9	7.1	12.0	14.5	14.0	14.2	13.3
of which: to private residents	6.4	8.5	9.7	12.8	12.5	12.1	11.4
Deposits	4.7	5.1	5.4	8.3	8.4	8.7	8.3
of which: from residents	2.4	2.9	3.0	5.6	6.2	6.2	6.3

Source: French authorities, and staff estimates.
1/ Includes foreign-owned banks in France.

C. Insurance[36]

66. The French insurance sector is among the six largest in the world. It has extensive linkages with the insurance sectors in other countries, and with global financial markets. These linkages take the form mostly of ownership connections, reinsurance, and financial investments, rather than the writing of cross-border policies.

67. Foreign insurance companies own subsidiaries in France with a combined market share of about 20 percent in nonlife business, and rather less than that in the life sector. These

[36] Prepared by Daniel Hardy.

companies are for the most part subsidiaries of large insurance groups from Germany, Italy and the United Kingdom.

68. French insurers have important subsidiaries in other countries. In particular Axa, the largest, has extensive insurance operations in the U.S., Europe (mainly the U.K., Germany, and Belgium), Japan, Hong Kong, Singapore, and Australia, conducted through subsidiaries.[37] It also has smaller operations elsewhere, for example in Morocco, and operates a medium-sized bank in Belgium, but in 2003 it pulled out of insurance business in Argentina and Brazil. Less than a fifth of Axa's group revenue is generated in France; North America, or Germany, and the U.K. combined are equally important. In recent years, Axa has earned more net income on life business in the U.S. than in France. More generally, the diversification of its operations across countries and lines of business tends to stabilize group profits. Any one member company could presumably suffer large losses, but at least in principle Axa group's liability is limited.

69. For domestically-incorporated companies, premium revenue from abroad is relatively small. Premium income from outside France amounts to less than two percent of total premiums, and that comes overwhelmingly from within the EU. Non-French business is almost all in the nonlife sector. These statistics imply that French companies have little direct exposure to insured risks outside France.[38] Companies report that writing of policies in foreign jurisdictions is complicated by differences in legislation and legal systems—even within the EU—and therefore they prefer to work through locally-incorporated subsidiaries.

70. Data are not available on the allocation of assets by currency or country. However, prudential regulations and the companies' incentives ensure that the vast bulk of assets take the form of claims on industrialized countries, and in particular euro-denominated government bonds from OECD countries. Hence, the vulnerability of the insurance sector to country or exchange rate risk is small.[39]

71. French insurers make extensive use of foreign reinsurers, while French commercial reinsurers are comparatively small and concentrate on business in France. Thus, in 2002, total reinsurance premiums amounted to €19.3 billion (just under 15 percent of premium income), but less than half that amount went to French reinsurers. Foreign earnings of

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[37] This information is taken from Axa's published reports and presentations.

[38] They may, however, have more significant exposure to risks to French companies' assets abroad, for example, in shipping and aviation.

[39] The June 2004 issue of the *Banque de France's* Financial Stability Review contains a survey of the market for credit derivatives and similar instruments. The survey is summarized in the FSSA. The evidence presented there suggests that French insurance companies' involvement in this market, in which the counterparts are largely American financial institutions, is not yet large relative to their balance sheet size.

reinsurers in France amounted in that year to just over €1 billion, two-thirds of which was earned by French companies. The implication is that France is transferring abroad a significant portion of insured risk, while not taking on the concentration of risk that is characteristic of reinsurance. Therefore, the French financial system as a whole has little exposure to vulnerabilities of the reinsurance sector. Progressively more severe difficulties at foreign reinsurers would, however, be reflected first in higher reinsurance costs, then in the nonavailability of some types of reinsurance, and, ultimately, in the nonreimbursement of reinsured claims.

D. Equity and Bond Market Interdependence [40]

Introduction

72. The advent of new technology and the elimination of capital controls has helped France's capital markets to become closely integrated into the global marketplace over the past several decades. One indicator of the degree of integration is the role of French government bonds as a benchmark for short- to medium-term Euro-denominated interest rates, which would imply that European wide news and events would have an influence on these rates.

73. Market commentators have noted a more recent trend increase in correlations across major equity markets, including the French market.[41] They have attributed this to several factors, including the globalization of financial markets as well as the greater integration of growth cycles across major industrialized economies.[42] Another factor, which has garnered rather less attention, is the link between increase correlation and the rise in capital market volatility since the late 1990s. In the case of the French equity markets, an additional factor is the establishment of Euronext and its introduction of a common trading platform for trading French, Dutch, and Belgian stocks may have also increased equity market linkages across these jurisdictions, as investors could view them as constituting one equity market. In what follows we document the degree to which French equity and bond markets are in fact correlated to other major equity and bond markets, and assess its dependence on the above noted factors.

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[40] Prepared by Toni Gravelle.

[41] Recent work at the Bank de France looks into similar issues examined in this study (see Avouyi-Dovi and Neto (2004))

[42] See Bordo, Eichengreen, and Irwin (1999), who show that since the mid-1970s, globalization has led economies and financial markets to be more integrated. See also Chapter 3 of the September 2003 issue of the *Global Financial Stability Report* (IMF 2003) for more on the dependence of the financial market volatility and recessions.

Historical correlations: some stylized facts

Cross-country securities holdings and trading

74. The proportion of French securities held and traded by foreign investors is relatively high. In France, roughly 40 percent of the trading activity in government bonds is accounted for by foreign investors. This is a similar in scale to most large mature economies, as their bonds tend to be used as benchmarks and/or in core (risk-free) portfolio allocations for global fixed-income investors.

75. Equity holdings by non-French residents is roughly 35 percent. This seems high in comparison to the U.S., where 9 percent of domestic equity is held by foreigners. However for the more open, non-European G-7 economies, the comparison with France is less stark as 22 and 15 percent of domestic Japanese and Canadian (respectively) equity is held by foreigners. More importantly, for European economies, France's 35 percent figure is not at all uncommon, with the range for most EU countries between 25 and 38 percent. This is largely due to the large cross-European securities holdings arising out of European integration.

76. These data provide a rough indication of the potential financial linkages that exist via the strength in cross-country portfolio flows. Although these flows tend to gage the linkages that might arise due to the integration of financial systems, prices across securities markets in different countries are nonetheless also driven by news and information on (real-economy) fundamentals, which are, as mentioned in the introduction of this note, strongly linked across mature economies.

Equity and bond price dynamics: Volatilities and correlations

77. The evolution of major equity indices are plotted in Figure 6.[43] The figure highlights that, as in many industrialized counties, the recent movements in French share valuations has been associated with the rise and fall of the technology equity bubble, by the long global expansion that ended in 2000, and by a series of crises and events that periodically buffeted these markets (e.g., LTCM crisis, September 11, 2001).

78. Market returns are clearly correlated. As depicted in Figures 7 and 8, correlations between national equity markets have been rising over our sample. These figures present rolling window estimates of the bilateral correlation coefficients between French and other major equity markets, including the average of all bilateral correlations for our set of markets.[44] Also, the estimated correlation coefficients between the U.S. and a sample of these

[43] The data are described in Appendix I..

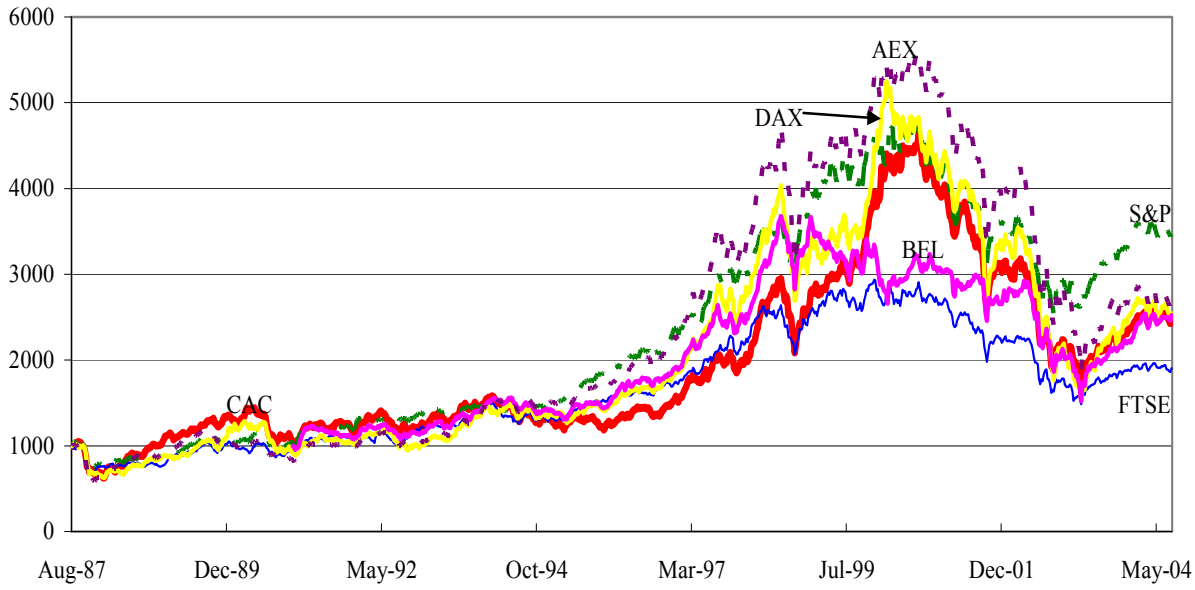
[44] Both correlation coefficient and volatility measures in this study are based on an exponentially weighted moving average of past returns, where weights decay by a factor of 0.90. These exponentially weighted measures put greater weight on more recent observations

(continued)

equity markets are presented in Figure 9. With the correlation coefficient estimates rarely declining below the 0.50 mark, French stocks appear highly integrated with other major equity market centers, essentially those in Europe. In particular, since the early 2000s, their price movements have become even more correlated with other major equity markets. A rise in the average equity market correlation is noticeable starting roughly in the early 1990s. The increase in correlations is sharper from late 1999, and reaches new highs in 2002, plateauing thereafter at around 0.70.

79. The correlation between the French equity market and the other Euronext markets in the Netherlands and Belgium increased markedly in late 2001 (Figure 8). This rise in equity price co-movements within this set of three markets roughly coincides with the implementation of the common trading platform in October of 2001. The correlation coefficient estimates before and after the move to the common trading platform in October 2001 presented in Table 16 provide supporting evidence of the upward trend.

Figure 8. Equity Market Indices



rather than, as is the case with the traditional measure, an equal weighting across all observations in the sample.

Table 16. France: Equity Market Correlations Pre and Post Move to Common Euronext Trading Platform

		CAC40	AEX	BEL20
			Before integration	
CAC40			0.75	0.59
BEL20	After	0.95		0.70
AEX	integration	0.88	0.90	

Bottom part of matrix reports the estimated correlation coefficients after the move to the common trading platform, while the top reports these estimates for the period that preceded the move.

Figure 9. French Equity Correlations

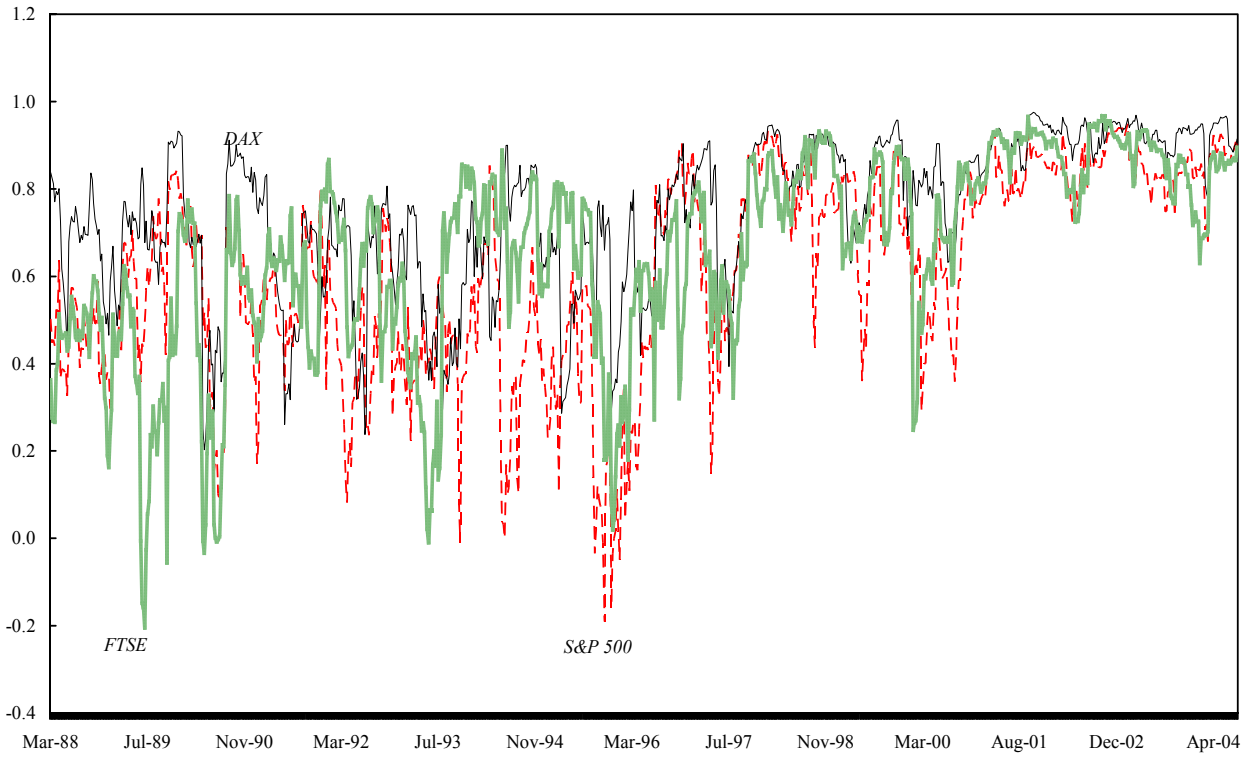
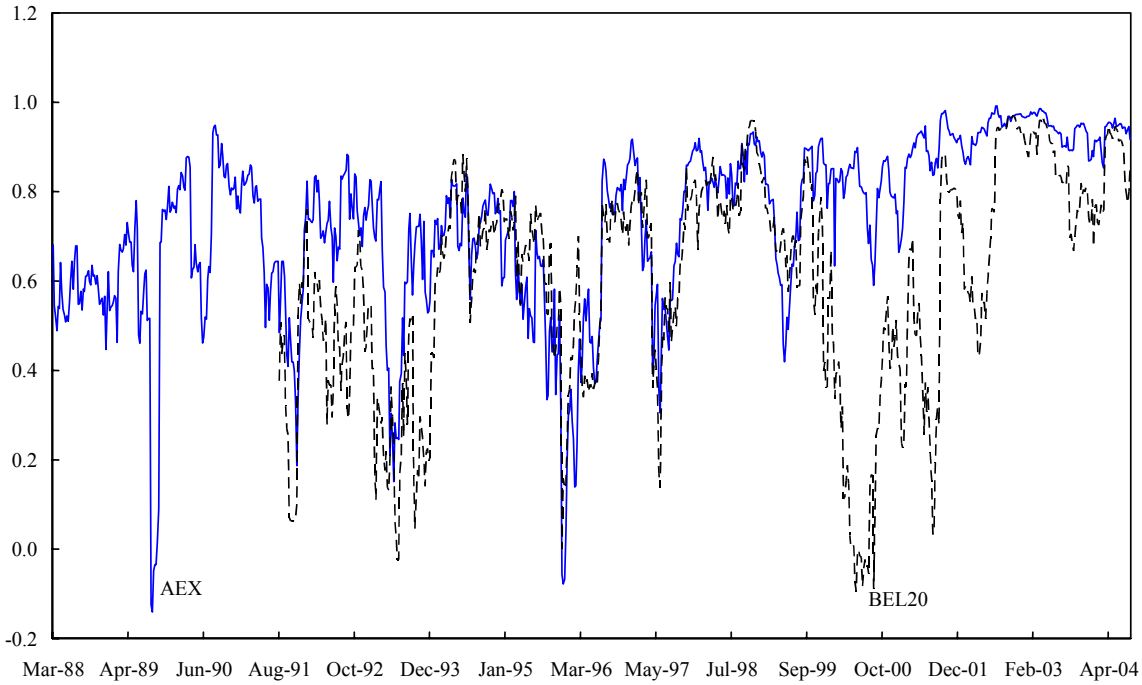


Figure 10. French Equity Correlations



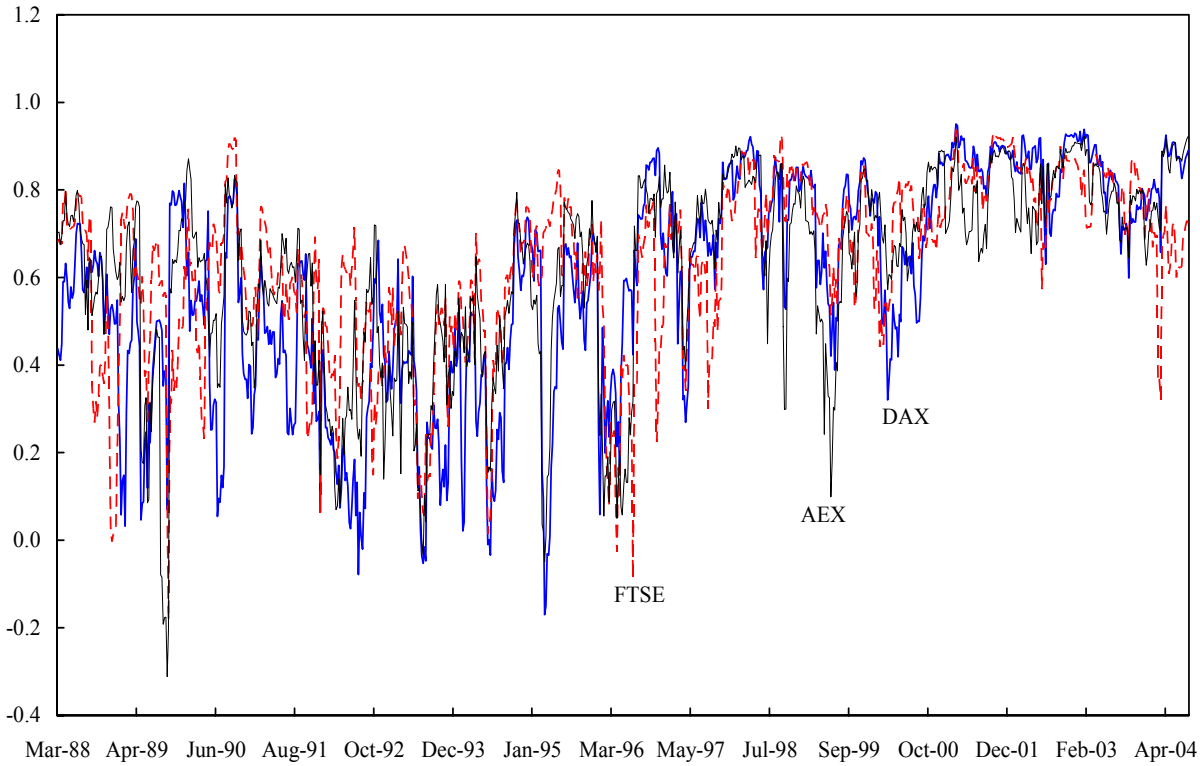
80. The French bond market also displays a high degree of integration with other industrialized bond markets. Bond index movements are presented in Figure 10, with French and U.S. bond market correlations presented in Figures 11 and 12.[45] Correlations across bond markets are generally positive, ranging on average between 0.2 and 0.8. These estimates are lower on average than those observed in equity markets. Cross-country bond return correlations between France, and Germany, the U.K. and, to a lesser extent, the U.S., have increased moderately over time, likely reflecting in part increasingly integrated fixed-income markets. However, overall, bond market correlations seem more stable than those observed across equity markets.

81. Although economic globalization and greater integration of capital markets have been put forward as driving force behind the rise in asset return correlations, the coincident rise in volatility leads to the possibility that traditional correlation measures provide a misleading indication of this increase in global market integration. Over the last few years, academic

[45] Equity and bond correlation coefficient estimates for other country pairs are available upon request.

work has shown that traditional (unconditional) correlation measures may be biased and dependent on the level of volatility observed.[46]

Figure 11. US Equity Correlations



[46] See for example Forbes and Rigobon (2002) for a discussion how volatility may bias unconditional correlation measures.

Figure 12. Bond Market Indices

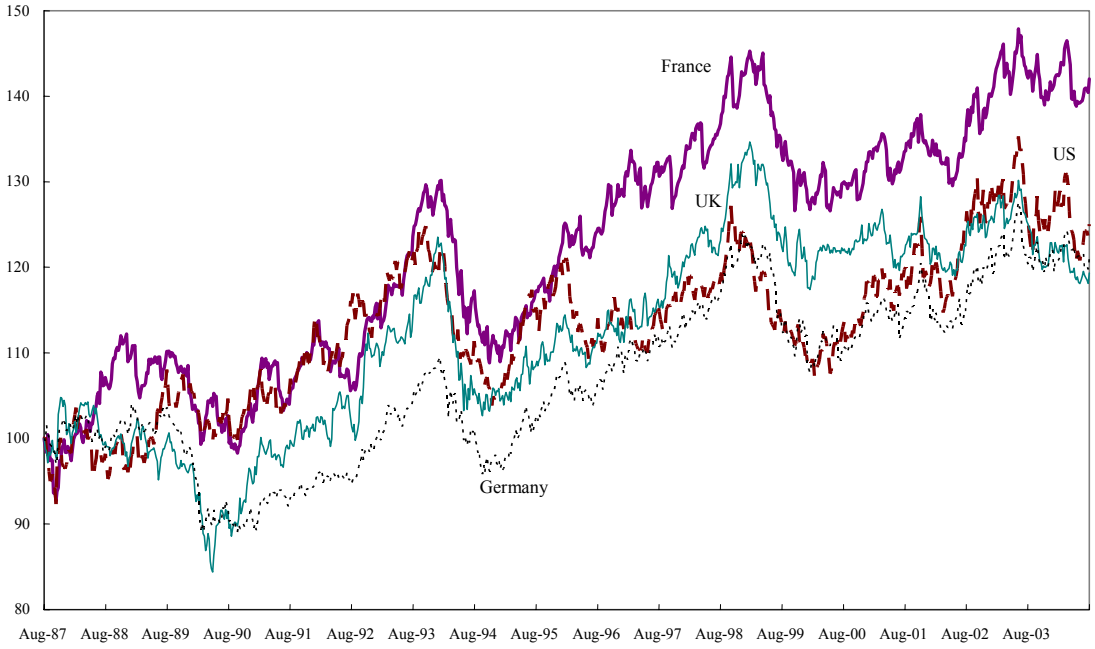


Figure 13. French Bond Correlations

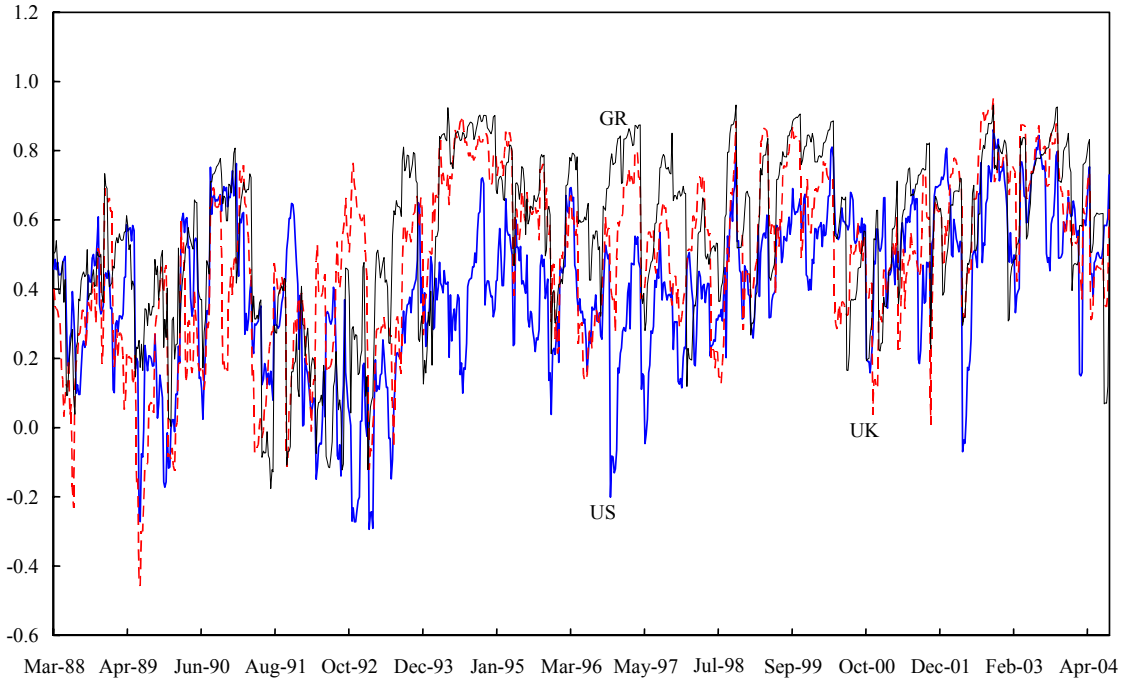
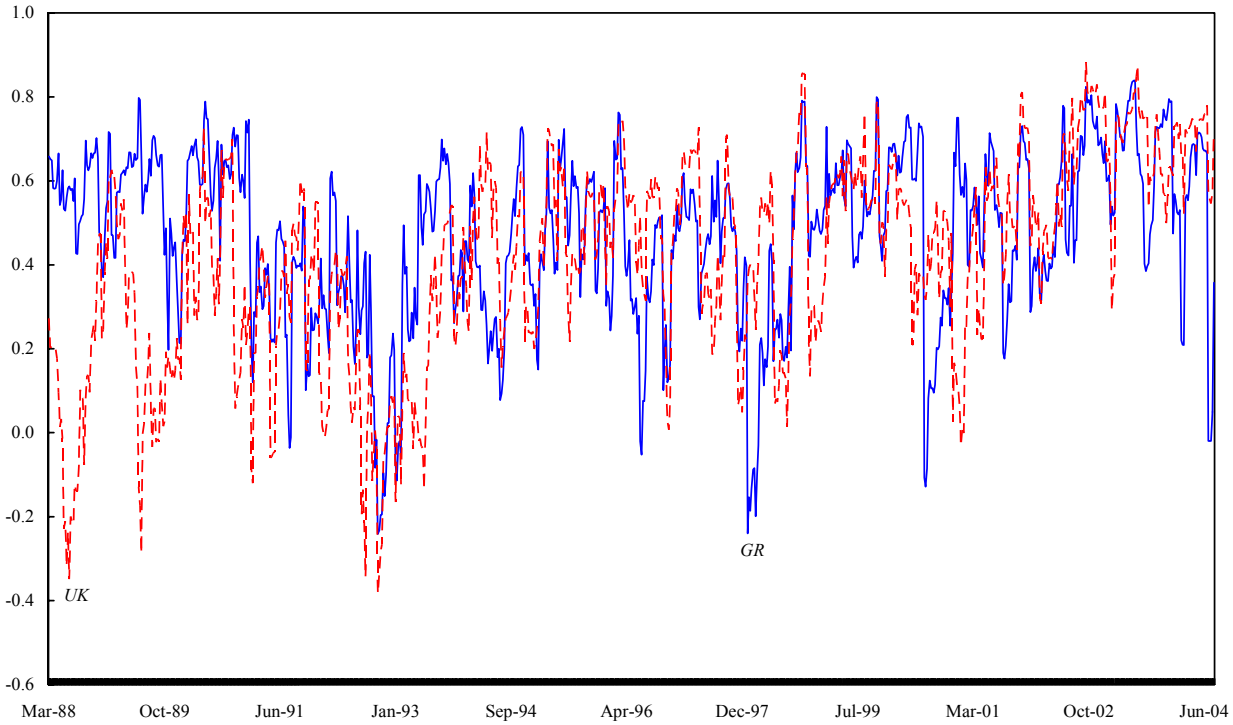


Figure 14. US Bond Correlations



82. Volatility has in fact risen across most asset markets over the second half of our sample period. Moreover, French equity and bond returns have exhibited higher volatility than those in the U.S. (Figures 15 and 16, but they are broadly in line with that observed elsewhere in Europe; the difference may largely be a reflection of the relatively heavy weight in the CAC40 of financial and technology firms. When comparing the changes in correlation, particularly in equity markets, with the periods of heightened volatility displayed in Figure 15, one can observe that correlations tended to be higher during periods of heighten volatility. This may help explain the results presented in Table 16, as the move to the common trading platform and other measures to integrate markets also coincides with an extended period of frequent and sharp volatility increases. After conditioning for changes in volatility, it is possible that the majority of the increase in correlation observed in all markets could be attributed to a rise in volatility, rather than other macroeconomic or institutional factors.

Market volatility and equity and bond return correlations

83. In order to get a more precise picture of the changes that have occurred in the level of interdependence between France's capital markets and markets in other major industrialized economies, we use a procedure that estimates return correlations, conditional on the level of market volatility (i.e., correcting the correlation measures for volatility changes). Specifically, we estimate a model in which capital market prices are driven by both a common factor and idiosyncratic shocks, where the variance of disturbances can vary over

time. This framework also allows one to test whether or not there has been any change the degree of "structural" interlinkages between these markets. The same approach is also used to test whether there was a regime change in the correlation between the French, Dutch, and Belgian equity markets following the move to a common Euronext trading platform on October 29, 2001. Details of the model, procedures and results are contained in Appendix I.

84. Our findings indicate that indeed these markets have become more integrated (while controlling for changes in volatility), thus supporting the idea that globalization, broadly defined, has influenced correlations across these markets.

85. We also examine if the Euronext driven integration of the French, Dutch and Belgian equity markets has had any direct impact on the degree of equity price co-movement across these markets. We find that for the French and the Dutch markets, there is little empirical support for the idea that a move to a unified trading platform resulted in greater cross-market correlation in equity returns. However, the Belgium stock market has become somewhat less correlated with the French and Dutch markets as a result since Euronext started, but not to an economically significant degree. This last finding may be attributable to differences in the composition of those markets; the Belgian exchange contains fewer multinational companies, and a number of major Belgian companies have been acquired by multinationals from other countries

Figure 15. Equity Market Volatility

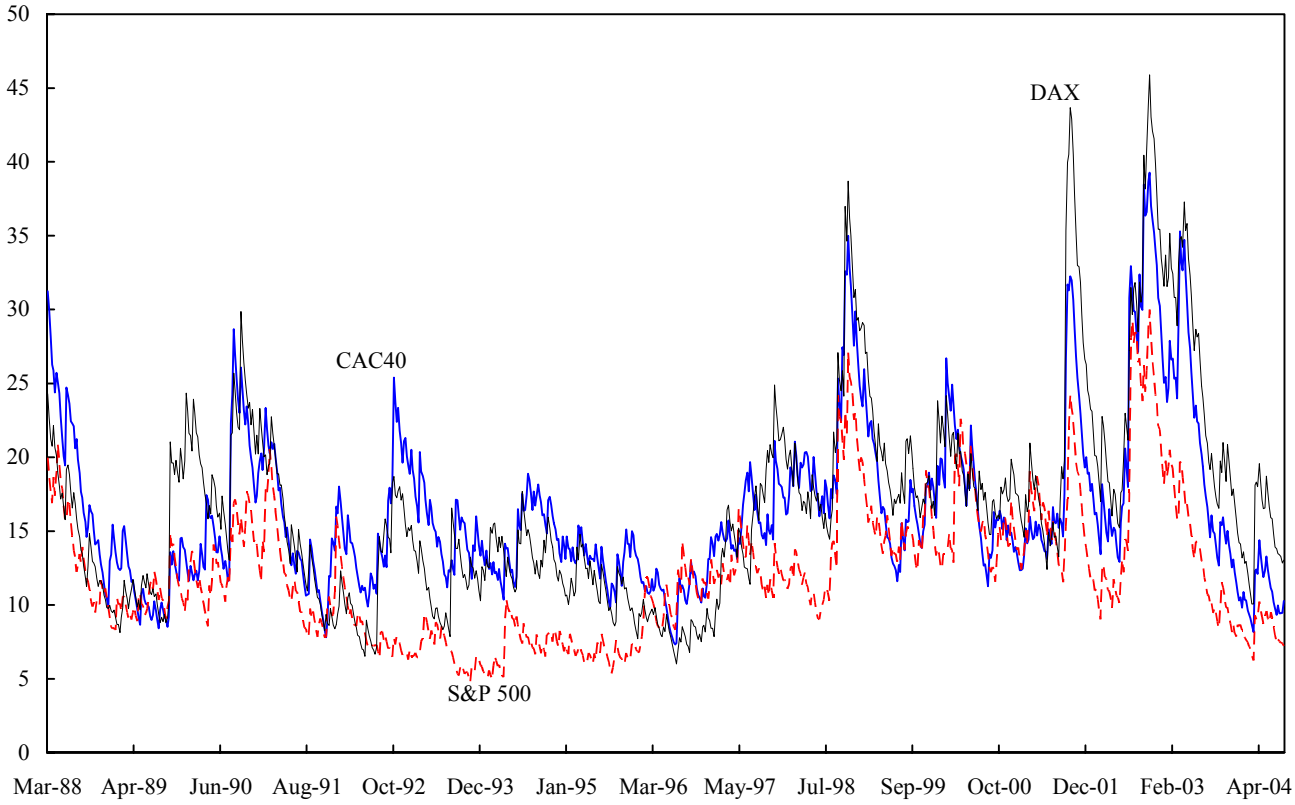
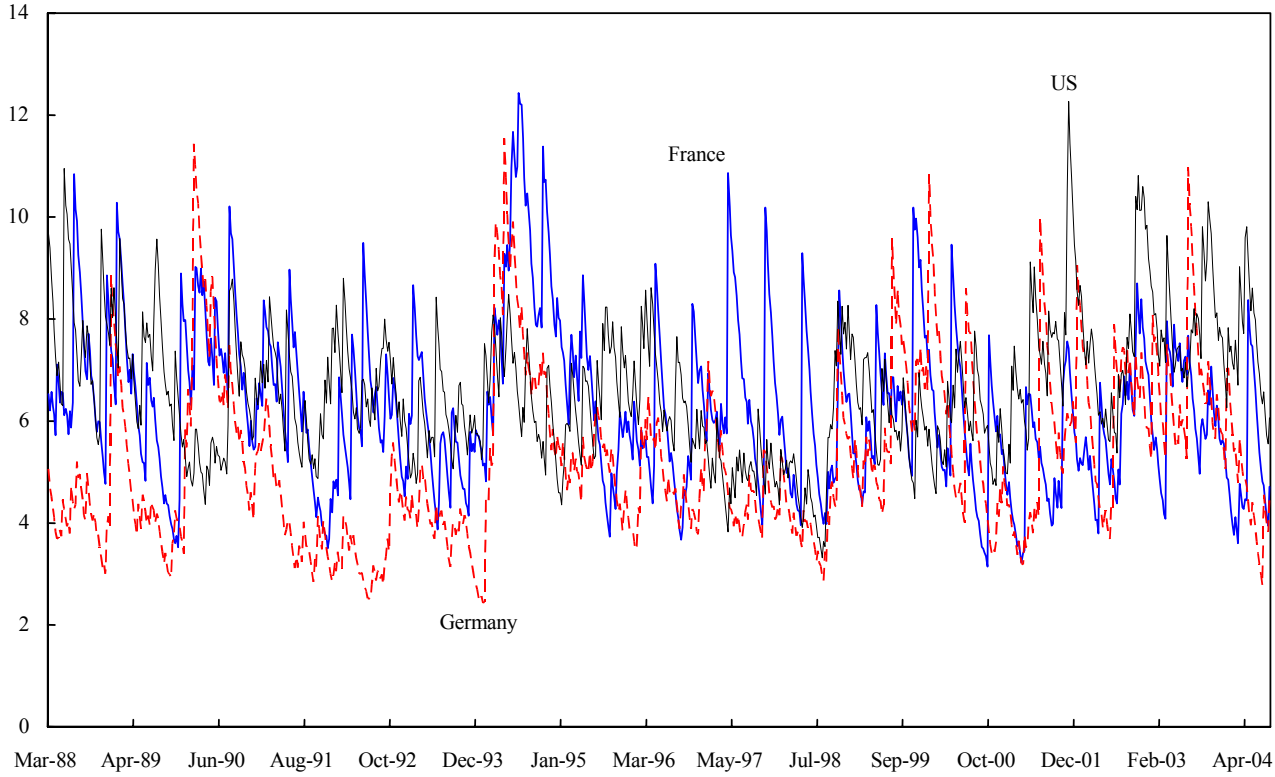


Figure 16. Bond Market Volatility



A MULTIVARIATE REGIME-SWITCHING MODEL FOR EQUITY AND BOND RETURNS

Data

86. In order to document the extent of the linkages across French equity and bond markets with other major markets, we use weekly data for the period from August 5, 1987 to August 4, 2004.[47] For equities, our analysis is based on the CAC40, DAX, S&P 500, and FTSE indices. We also include in part of our analysis the Dutch AEX and Belgian BEL20 indices. (Note, the BEL20 data spans January 1, 1991 till August 4, 2004.). For bonds, the data chosen are 7- to 10-year indices for France, Germany, the U.S. and U.K. These bond indices allow our analysis to be less affected by the durational differences that arise across sovereign benchmark bonds. Durational differences typically need to be taken into account when examining changes in the level of interests rates combined with changes in their volatilities.

Model specification

87. We postulate a multivariate model for returns that are driven by idiosyncratic and common shocks. These returns are correlated due to a common unobserved factor (i.e., the common shocks).[48] However, the common shock is drawn from two separate distributions, with different variances, which represent two different regimes or states of the world. The main advantages of implementing this multivariate regime-switching model is that it captures changes in co-movements across asset returns, and avoids the many exogenous ad hoc assumptions about the timing of these changes typically required in standard linear econometric models.

88. Let the variables r1t, r2t, … and rnt denote the returns for n assets.[49] With the assumption that each variable follows a distributed lag process, the model can be formalized as:

$$r_{it} = \alpha_i + \Phi_i(l) r_{it} + u_{it} \quad i = 1, 2, 3 \ldots n \qquad (1)$$

where α_i is the intercept term, $\Phi_i(l)$ is the lag polynomial specific to variable i, and u_{it} is the disturbance term. The latter is assumed to be correlated: $E(u_{it}u_{jt}) \neq 0$ for $i \neq j$. Moreover, as we elaborate below, the variance of the disturbance term is allowed to vary over time, taking

[47] The data sources are DataStream and Bloomberg.

[48] Using a similar methodology, other studies find significant shifts in the degree of interdependence, after controlling for volatility, in emerging market bonds and advanced countries' exchange markets (Gravelle et al. 2003).

[49] Returns are measured as the percentage log difference in price.

on a high or low value in different periods. In order to ease exposition, we restrict our discussion of the model to the case of four asset returns.[50]

89. The assumption that these variables are correlated is suggested by the analysis done in the previous section, which shows that on average returns are positively correlated for both bonds and equities. This positive correlation further suggests the existence of a common, *unobserved* factor for the shocks u_{it}, so that we can decompose the disturbance terms into common and idiosyncratic structural shocks:

$$\begin{aligned} u_{1t} &= g_c + \delta_1 z_{ct} + \sigma_1 z_{1t} \\ u_{2t} &= g_c + \delta_2 z_{ct} + \sigma_2 z_{2t} \\ u_{3t} &= g_c + \delta_3 z_{ct} + \sigma_3 z_{3t} \\ u_{4t} &= g_c + \delta_4 z_{ct} + \sigma_4 z_{4t} \end{aligned} \qquad (2)$$

where z_{ct} is the common shock, g_c the mean of the common shock, and z_{it} are the idiosyncratic shocks for variables $i = 1,2,..,4$. The idiosyncratic shocks are assumed to be uncorrelated with each other and with the common shock, and to have zero mean. In addition, their variances are normalized to one, giving their loading coefficients (δ_i's for the common shock and σ_i's for the idiosyncratic shocks) the interpretation of standard deviations.

90. We first discuss how we can examine the relationship between correlation and increases in volatility. Under the assumption that the size of equity (bonds) returns are smaller (larger) during periods of turbulent markets—corresponding to relatively low investor risk appetite—one would assume that the mean of the common shock would be smaller (larger) than the mean of the shock during more tranquil times, or indeed negative (positive).[51] Moreover, the level of correlation between the returns may also be quite different during turbulent periods, when investors show relatively little risk appetite. In order to account for this, we allow the common shocks to be drawn from two distinct regimes. Let us denote these as regime 0 and regime 1, where regime one is assumed to have a smaller mean for the shocks and, in principle, a larger variance (and higher covariance) in the case of equity returns.

---

[50] Another reason behind this limitation is due to computational constraints. The optimization routine for calculating the parameter estimates becomes increasingly time consuming and unstable, as the number of equations and in turn parameters in the common factor system (equation (2) or (3)) increases.

[51] That is, investor who become more risk averse or more uncertain about future asset fundamentals, would seek higher expected returns. This would translate into contemporaneous declines in current asset prices (i.e., negative contemporaneous returns). See Kim, Morley and Nelson (2004) for more details on this.

91. Let S_{ct} be a state variable subject to two regimes and associated with the common mean, g_c and shock z_{ct}. That is $S_{ct} = \{0, 1\}$. This allows us to rewrite the model in state dependent form:

$$\begin{aligned} u_{1t} &= g_c(S_{ct}) + \delta_1(S_{ct})z_{ct} + \sigma_1 z_{1t} \\ u_{2t} &= g_c(S_{ct}) + \delta_2(S_{ct})z_{ct} + \sigma_2 z_{2t} \\ u_{3t} &= g_c(S_{ct}) + \delta_3(S_{ct})z_{ct} + \sigma_3 z_{3t} \\ u_{4t} &= g_c(S_{ct}) + \delta_4(S_{ct})z_{ct} + \sigma_4 z_{4t} \end{aligned} \tag{3}$$

92. In this notation, the different δs, as well as the common mean (g_c), are a function of the state variable, S_{ct}. The variance-covariance matrix for this system of residuals is thus given by:

$$\Sigma_0 = \begin{bmatrix} \sigma_1^2 + \delta_{1,0}^2 & \delta_{1,0}\delta_{2,0} & \delta_{1,0}\delta_{3,0} & \delta_{1,0}\delta_{4,0} \\ \delta_{2,0}\delta_{1,0} & \sigma_2^2 + \delta_{2,0}^2 & \delta_{2,0}\delta_{3,0} & \delta_{2,0}\delta_{4,0} \\ \delta_{3,0}\delta_{1,0} & \delta_{3,0}\delta_{2,0} & \sigma_3^2 + \delta_{3,0}^2 & \delta_{3,0}\delta_{4,0} \\ \delta_{4,0}\delta_{1,0} & \delta_{4,0}\delta_{2,0} & \delta_{4,0}\delta_{3,0} & \sigma_4^2 + \delta_{4,0}^2 \end{bmatrix} \tag{4}$$

where $\delta_{i,0} = \delta_i(S_{ct} = 0)$ for $i=1, 2, 3, and\ 4$ and $\Sigma_0 = \Sigma(S_{ct} = 0)$. This implies that the variance of each variable, u_{it}, will be the summation of the idiosyncratic variance σ_i^2 and the square of the common shock loading factor $\delta_{i,0}$. The covariance (and correlation) of the residuals are defined by the cross-products of the loading factors $\delta_{i,0}$. For example the variance of u_1, is $\sigma_1^2 + \delta^2_{1,0}$ and the covariance of u_1 with u_2 is $\delta_{1,0}\,\delta_{2,0}$ in regime 0. A symmetric version of the variance-covariance matrix is given for $S_{ct} = 1$, where $\delta_{i,1}$ replaces $\delta_{i,0}$ for all i. Note that not only will the covariance of each series vary with the regime, but so will the variance itself since the common shock nonetheless has a direct additive impact of the total shock u_{it} in each regime. For example, given that the mean of the common shock for regime one is assumed to be smaller than that of regime zero: State 0 is the high mean regime, while state 1 is identified as the low mean. However, it should be made clear that we allow the common shock loadings for each individual series, i, to differ across regimes. This implies that we allow for the possibility that variance of the returns may in fact be greater during either state zero or one in any jurisdiction (i). For example, the correlation between the CAC 40 and S&P returns in the high volatility regime could in principle be positive while the correlation between the CAC40 and DAX in this same regime is negative.

93. In analyzing conditional correlations, periods of high volatility are typically designated via some ex post rule (see Favero and Giavazzi (2000)). However, in our model changes in volatility are endogenously designated within the estimation process. We need only specify how (not when) the (state) variables evolve. As such we implement a two-state

Markov-switching regime, where we assume that the two state variables change according to the transition probabilities given by:

$$Pr[S_t = 0 | S_{t-1} = 0] = q \quad \text{and} \quad Pr[S_t = 1 | S_{t-1} = 1] = p \tag{5}$$

The Markov switching probabilities are conditional on the previous state, and are able to capture the idea that high-variance states of the world are relatively persistent (at the weekly frequency).[52]

94. In order to test if the correlations among Euronext exchanges changed after the move to a common trading platform, we adjust the δs parameters, in a three equation framework, to incorporate a dummy variable that takes on the value of 0, before Euronext (October 29, 2001) and 1 thereafter. The δs take on the following configuration:

$$\delta^*_{it} = \delta_i(S_t) + \beta_i D_t \tag{6}$$

where we assume that the impact from the dummy variable is constant across states of the world. The variance-covariance matrix that is assumed under this condition is:

$$\Sigma_0 = \begin{bmatrix} \sigma_1^2 + \delta_{1,0}^2 & \delta^*_{1,0}\,\delta^*_{2,0} & \delta^*_{1,0}\,\delta^*_{3,0} \\ \delta^*_{2,0}\,\delta^*_{1,0} & \sigma_2^2 + \delta_{2,0}^2 & \delta^*_{2,0}\,\delta^*_{3,0} \\ \delta^*_{3,0}\,\delta^*_{1,0} & \delta^*_{3,0}\,\delta^*_{2,0} & \sigma_3^2 + \delta_{3,0}^2 \end{bmatrix} \tag{7}$$

where the diagonal elements are not affected by the creation of a common Euronext trading platform for the three jurisdictions. This assumes that changes in the variances are not driven by the advent of Euronext, while correlations across French, Dutch and Belgian equity markets, if estimates of β_i are significant, are influenced by it. Again, a symmetric version of this variance-covariance matrix is estimated for regime one.

Estimation Results

Equity markets

95. Having explained the econometric methodology, we now describe its application. We first examine equity returns. The returns are placed into two separate groups: 1) CAC40, FTSE, DAX and S&P 500 index returns and 2) CAC40, AEX and BEL20 index returns. As a first step we must estimate the residuals, u_{it}, which are obtained by regressing the return

[52] Hamilton's (1996) textbook offers a detailed exposition of the Markov-switching econometric approach.

series as in equation (1).[53] Estimation of the model described by equation (3) to (5) is carried out by maximization of the log likelihood. The results are presented in Table 17 for the first grouping. Estimation of the model requires 16 coefficients to be estimated.

Table 17. France: Equity Market Estimation Results

Sample Size	888	
Log Likelihood value	5966.3	
Parameters	Est. Coefficients	T-statistics
$\delta_1(1)$	4.49*	12.57
$\delta_2(1)$	3.33*	11.37
$\delta_3(1)$	3.66*	11.04
$\delta_4(1)$	4.96*	12.25
σ_1	1.23*	15.18
σ_2	1.83*	38.12
σ_3	1.50*	35.71
σ_4	1.63*	28.57
Q	0.98*	32.50
P	0.92*	121.25
$\delta_1(0)$	2.22*	11.66
$\Delta_2(0)$	0.99*	8.78
$\Delta_3(0)$	1.13*	10.38
$\Delta_4(0)$	1.87*	12.33
$g_c(0)$	0.24*	3.58
$g_c(1)$	-0.11	-0.69

* implies estimate is significance at 5% levels. Variables i = 1, 2, 3, 4 correspond to the returns calculated from CAC40, S&P 500, FTSE, and the DAX indices respectively.

96. For the sample period August 5 1987 to August 4 2004, we find all coefficients except $g_c(1)$ to be significant at the 5 percent level. Given that the factor loadings in regime, $\delta_i(1)$ are larger than those in regime zero, $\delta_i(0)$, regime one volatility is greater than that of regime zero.[54, 55] Interestingly, the common shock mean in state one, $g_c(1)$, is below that of

[53] Lagged parameter coefficient estimates from equation (1) were all insignificant. As a result, actual equity returns were used in equations (3) and (4) in the place of any residuals derived from equation (1). Idiosyncratic means were also added to equations (3) to allow for the individual equity returns to have different average means rather than a common, regime dependent mean. However these were found to be insignificant and the original specification (equation (3)) is used in the analysis.

[54] Note this need not be the case. The estimation procedure allows for the possibility that some loading factors to be smaller in state one ($\delta_i(1) < \delta_i(0)$) while for others it is the reverse.

[55] More specifically, regime one French equity volatility is, $\sigma_1^2 + \delta^2_{1,1} = 20.25$ is greater than in regime zero $\sigma_1^2 + \delta^2_{1,0} = 6.44$. The equity market return volatilities display a similar pattern.

the mean from state zero, implying below-average returns when the common shocks are drawn from this regime. In other words, the high-volatility regime is characterized by small or negative movements in stock prices, which is consistent with the notion that periods of market turbulence are those in which equity values fall sharply.

97. The correlation across equity markets is also higher in regime one. That is, the estimated covariance terms in the variance-covariance matrix or regime one, Σ_1, are larger than those estimated for Σ_0. For example, the covariance estimate between the CAC 40 and the S&P 500 in regime one, $\delta_1(1)\delta_2(1) = 14.52$, is greater than the covariance in regime zero, $\delta_1(0)\delta_2(0) = 2.18$. (The corresponding correlation coefficients are 0.85 for regime one and 0.42 for regime zero.) The regime dependent covariance estimates for the other equity return pairings display the same characteristics.

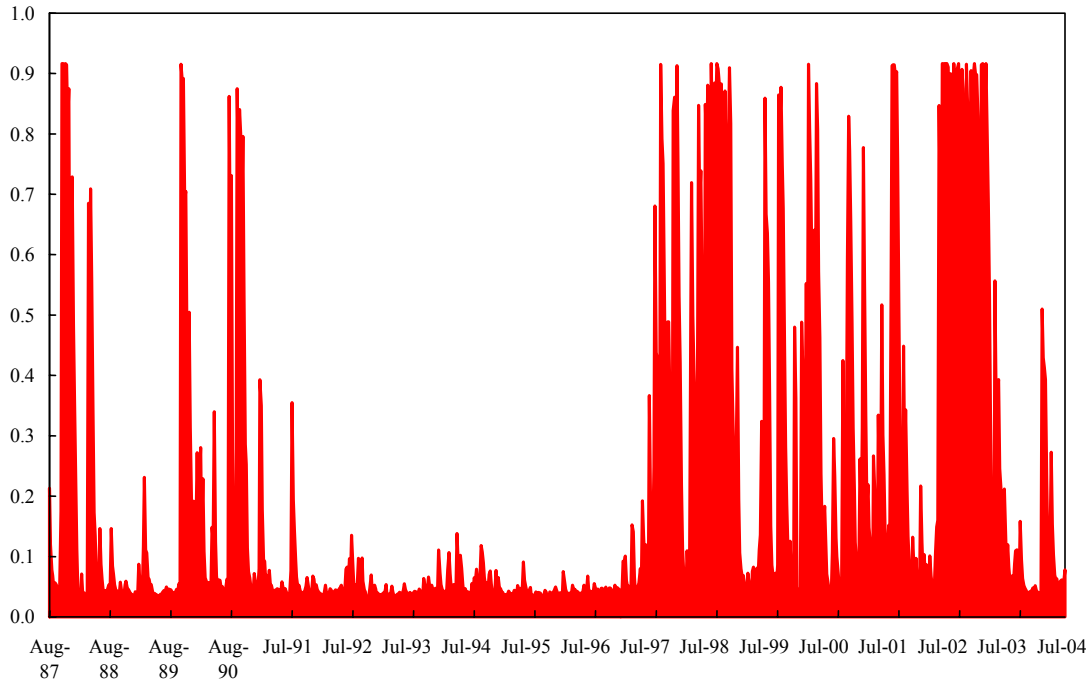
98. The estimated probabilities of being in regime one—the high volatility regime (or 'low' return time periods)— are presented in Figure 17. These probabilities depict the timing of shifts in (and out) of each regime.[56] We can see from the figure that the occurrence of this regime is more frequent (and persistent) in the latter part of the sample, which is also a period where equity markets were depicted as more volatile using the traditional annualized standard deviation measure (presented in Figure 15).

99. More importantly, these results indicate that equity returns, including those for France, tend to co-move more strongly during periods of high volatility. That is, the results indicate that much of the increase in unconditional correlation measures between French and other major equity markets observed since the mid-1990s is attributable to the higher level of volatility observed during this same period, and only a part if attributable to changes in the fundamental linkages across these markets.[57]

[56] Researchers typically define a regime switch as having occurred if the probability of being in the new state is greater than 0.5.

[57] A further question, which goes beyond the scope of this note, is what causes periods of heightened volatility, and whether such episodes are themselves linked to globalization.

Figure 17. Estimated Regime 1 Probability (CAC40, S&P500, FTSE, DAX)



100. To what extent is the increase in correlation in the later half of the 1990s and early 21'st century driven by the greater preponderance of volatile periods rather the effects of globalization per se? As shown by Gravelle et al (2003), a test that controls for changes in volatility, in which the null is that there is no change in degree of interlinkages between markets, can be formulated from our regime switching model. The Likelihood-Ratio test statistics is asymptotically distributed as a chi-squared with three degrees of freedom and is calculated to be 39. This exceeds by a wide margin chi-squared critical values for standard confidence levels. The results suggest that the degree of interdependence between the four equity markets has in fact increased over time, even after accounting for the affects of changes in volatility observed across these markets, which have increased unconditional correlations.

101. In Table 18, the estimation of the model which incorporates a dummy variable representing the inception of trading on Euronext on October 29, 2001, are presented. The results reveal that Belgian equity markets became moderately less correlated with the Dutch and the French markets since shares in these countries began trading on the Euronext platform. This is contrary to the notion that trading of French, Dutch and Belgian shares on a common platform would make it easier for investors to view these markets as constituting one market, and thus potentially increasing their interdependence (and correlation) over time.

102. Table 18 presents the results of the estimation of a three variable system that comprises the returns from French, Dutch and Belgian equity market indices as well as the

common factor loadings that include a dummy variable (equation (6) and (7)) that takes on the value of 1 after October 29, 2001.

103. It is only the Belgian dummy parameter estimate, β3, that is found to be statistically significant. The dummy parameter is negative, implying that since the inception of Euronext trading, the Belgian equity market is in fact somewhat less correlated with French and Dutch markets than it would otherwise would be. However, the size of the effect measured by the dummy variable is not economically important and could reflect other unobserved factors that roughly coincide with the timing of the consolidation of trading on Euronext. In particular one explanation is that the Belgian equity market is very different in nature to the French and Dutch stock markets. These differences have increased, more as a result of changes brought by EMU than because of the creation of the Euronext platform. The Dutch and French markets are both very internationalized, and home to many large multinational firms. By contrast, the number of companies listed on the Belgian exchange, and its liquidity, started to decline soon after the launch of the euro. Indeed, as a result of merger and acquisition activity, a lot of initially Belgian companies are now part of larger European groups listed in Paris or Amsterdam. Hence, the Belgian market has become more local than Paris and Amsterdam, and this may account for the identified decline in correlation.

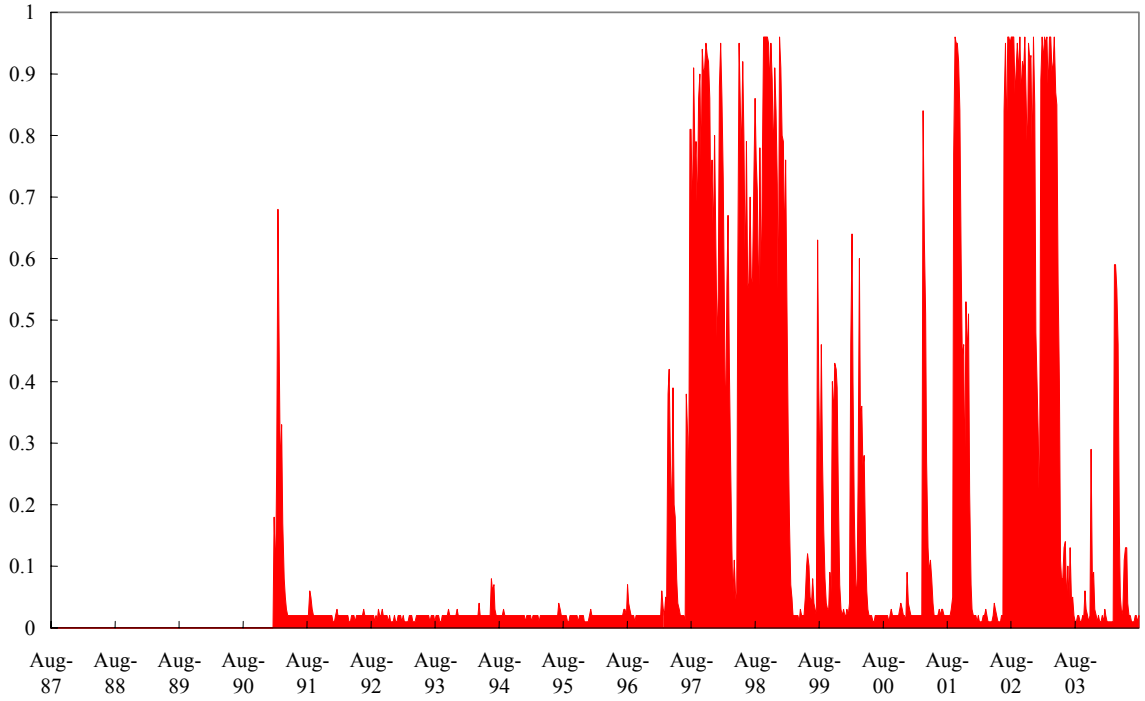
Table 18. France: Euronext Test Estimation Results

Sample Size	706	
Likelihood value	3792.2	
Parameters	Est. Coefficients	T-statistics
$\delta_1(1)$	4.47*	13.75
$\delta_2(1)$	4.12*	12.87
$\delta_3(1)$	5.53*	14.10
σ_1	1.51*	25.00
σ_2	1.63*	32.00
σ_3	0.93*	12.85
Q	0.99*	99.02
P	0.96*	32.01
$\delta_1(0)$	2.22*	11.50
$\delta_2(0)$	0.99*	9.66
$\delta_3(0)$	1.13*	11.33
$g_c(0)$	0.17	1.02
$g_c(1)$	0.23*	2.87
B_1	-0.01	0.11
B_2	0.13	1.44
B_3	-0.30*	5.10

*shows significance at 5% levels. Variables i = 1, 2, 3 correspond to the returns calculated from the CAC40, AEX, and BEL20 indices respectively.

104. Estimation results indicate that, in periods of either high or low volatility, the French equity market is positively correlated (on average) with its Dutch and Belgian counterparts, indicating a persistent degree of interdependence. In addition, Figure 18 shows that the timing of high volatility (and high correlation) periods generally overlaps with those estimated for the four equity markets displayed in Figure 17. The test for no change in the degree of interdependence is strongly rejected, indicating that, after controlling for changes in volatility, the French equity market's linkages to the Dutch and Belgian markets has grown overtime.

Figure 18. Estimated Regime 1 Probabilities (CAC 40, AEX, BEL20)



Bond markets

105. Estimation of the multivariate Markov-switching model was also undertaken for bond returns across France, Germany, the U.S. and U.K.

106. In estimating the independent-switching model, we followed the same steps as that for equity returns, except that the specification for the transition probabilities is the following:[58]

[58] Again, lagged parameter coefficient estimates estimated from equation (1) were all insignificant. As was the case for equity returns, actual bond returns were used in equations

(continued)

$$P_0 = Pr[S_t = 0] \quad \text{and} \quad P_1 = Pr[S_t = 1] = 1\text{-}Pc. \tag{8}$$

These probabilities are unconditional and capture the idea that the high-variance shocks are unpredictable (and not very persistent in this case). The estimation results are presented in Table 19.

Table 19. France: Bond Market Estimation Results

Sample Size	887	
Likelihood value	2408.6	
Parameters	Est. Coefficients	T-statistics
$\delta_1(1)$	0.64*	19.84
$\delta_2(1)$	0.56*	16.32
$\delta_3(1)$	0.61*	19.06
$\delta_4(1)$	0.58*	27.38
σ_1	0.67*	35.42
σ_2	0.79*	39.40
σ_3	0.71*	37.11
σ_4	0.26*	8.35
P_0	0.92*	43.81
$\delta_1(0)$	0.38*	3.32
$\delta_2(0)$	0.26*	2.14
$\delta_3(0)$	0.42*	3.43
$\delta_4(0)$	1.58*	7.21
$g_c(1)$	0.08*	3.26
$g_c(0)$	-0.05	0.54

*shows significance at 5 percent levels. Variables i = 1, 2, 3, 4 correspond to the returns from French, U.S., U.K., and German bond indices respectively.

107. As was the case for equity markets, regime one is, except for Germany, the high-variance regime. For German bond returns, the loading factor for the common shock is found to be 1.58 in regime zero, which is greater than the regime one loading factor. This means that for German bond returns, the more volatile in regime is regime zero rather than one. Moreover, German bond returns are in general more correlated to other bond returns in regime zero than in one. For example, the German bond market covariance with the French market in regime zero is estimated to be 0.60, while it is 0.37 in regime one. However, the pair-wise correlation estimates across the U.S. French and UK bond markets are higher in regime one.

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(3) and (4) in the place of the residuals derived from equation (1). Idiosyncratic means were also added to equations (3) to allow for the individual returns to have different average returns. But these were found to be insignificant and the original specification is used in the analysis.

108. The results reveal a lack of regime dependency over the sample period. That is, as indicated in Figure 19, the estimated probabilities of being in regime zero (the low volatility regime) at time *t* never climbs above 0.5, which implies that the volatility and correlation estimates do not jump from one level to another (or are not drawn from two statistical distribution. However, the estimation of an independent-regime switching specification of the model shows that there are brief, transitory periods in which bond returns are characterized as being in a low volatility and correspondingly low correlation regime (see Figure 20).[59]

109. The test in which the null is no change in "economic" interdependence across bond returns yields a test statistic of 144.2 indicating the null can be rejected. As was the case for equity markets, this suggests that the degree of interdependence between the four bond markets has in fact changed over time, even after accounting for the affects of changes in volatility. This supports the hypothesis that bond markets, including the French bond market, have become more highly integrated as globalization effects have taken hold in the late part of the 1990s.

[59] Technically, hypothesis testing should be carried out to ascertain the correct number of regimes (one versus two) and/or the correct type of switching process (Markov-switching versus independent-switching). However, this would require the calculation of bootstrapping or Monte Carlo methods and lies outside of the scope of this study.

Figure 19. Estimated Markov-Switching Regime 0 Probabilities (Bonds)

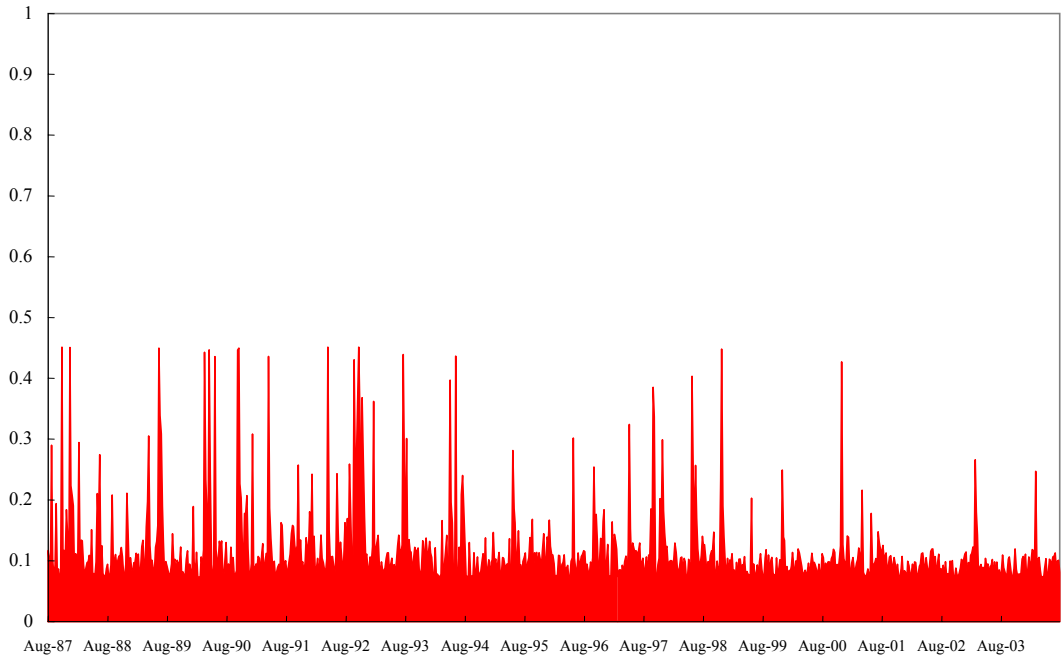
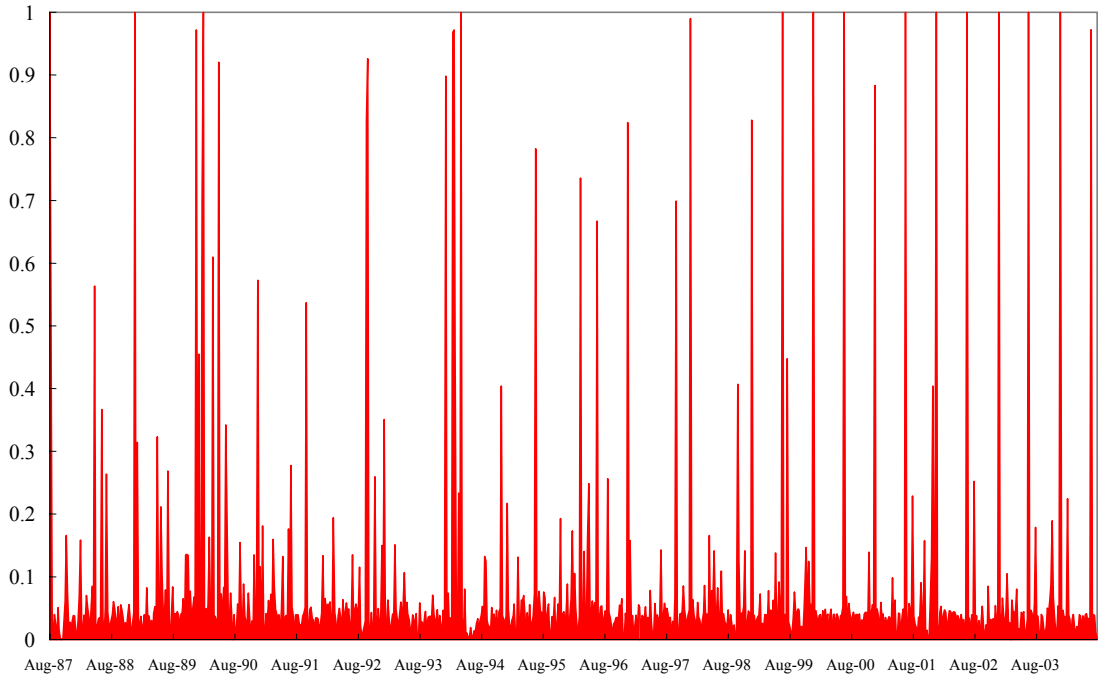


Figure 20. Estimated Independent-Switching Regime 0 Probabilities (Bonds)



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III. Public Intervention in Financial Markets: Obstacles to Monetary Transmission

A. Introduction[60]

110. The liberalization of France's financial sector since the second half of the 1980s should have improved the transmission of monetary policy to the real economy. However, the financial landscape in France remains characterized by a large number of idiosyncrasies—many of which caused by government policies—that affect monetary transmission. This paper aims at providing a comprehensive overview of these idiosyncrasies and their likely or potential impact on the transmission of monetary policy. It is not exhaustive, however, as the investigation of a wide range of specific features necessarily limits the set of available analytical tools. A general equilibrium analysis, for example, did not seem feasible.

111. The empirical analysis focuses on two particular aspects of monetary transmission: the transmission from policy interest rates to the interest rates faced by economic agents and an analysis of the interest rate sensitivity of household consumption. The first aspect was chosen because government interventions play a direct role in this crucial link in the transmission mechanism, the second because the literature suggests that French consumption is relatively insensitive to monetary policy. Although government interventions in financial intermediation impact resource allocation in ways that are often closely interrelated with the transmission of monetary policy, the focus here is on aspects of the latter.

112. Section II anchors the paper in the literature on cross-country heterogeneity of monetary transmission in the euro-area with a view to assessing, at the aggregate level, the relative strength and functioning of the transmission channels in France. Section III reviews the relevant French idiosyncrasies that we were able to identify, and discusses their potential effects on monetary transmission, following a deductive approach. Section IV econometrically quantifies the interest rate transmission and the effect of interest rates on private consumption. Section V concludes and discusses options for reform.

B. Literature Overview

113. The literature usually identifies four main channels in the transmission mechanism of monetary policy (for example, Mishkin (1995); Kamin, Turner and Van't Dack (1998); and Kuttner and Mosser (2002)): the interest rate channel, the exchange rate channel, the asset price channel, and the credit channel (Table 20).

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[60] Prepared by Céline Allard (EUR) and Wim Fonteyne (MFD). This paper was issued as a selected issues paper for the 2004 Article IV Consultation. See IMF Country Report No. 04/346.

Table 20. France: Theoretical Monetary Policy Mechanisms—Illustration in the Case of Monetary Policy Loosening

	Households (consumption, housing investment)	Firms (investment, exports)	Conditions of Application
Interest rate channel			
Substitution effect	↑	↑	No liquidity constraints
Income effect	↑/↓	↑/↓	Depending on the net financial position
Exchange rate channel	–	↑	Flexible exchange rate and large foreign exposure of activity
Asset price channel	↑	↑	Firms with large financing in stock markets
Credit channel	↑	↑	
Aggregate impact	↑/↓	↑	

Source: IMF staff.

- The **interest rate channel** is the key mechanism underpinning counter-cyclical monetary policy. It comprises two distinct effects:
  - A contractionary (expansionary) monetary policy modifies the relative price of current and future goods and services, inducing economic agents to postpone (advance) consumption and investment, provided they do not face liquidity constraints. This is the **substitution effect**.
  - The **income effect** refers to the changes monetary policy generates in the disposable income of households. These changes have a sign that is dependent on the household sector's net position: lower interest rates increase the available income of net borrowers and reduce that of net savers. Depending on the aggregate characteristics of a country's economic agents (net savers or borrowers), this income effect can on aggregate be positive or negative.
- The **exchange rate channel** is caused by the modification a change in monetary policy brings about in the relative rates of return between domestic and foreign currency denominated assets. In a context of flexible exchange rates and an open capital account, a loosening of monetary policy tends to put downward pressure on the domestic currency. This in turn alters the relative price of domestic and foreign goods and services, stimulating exports and activity. However, to some extent the exchange rate effect could be mitigated by developments in other asset markets. For example, lower interest rates could push up equity prices and improve the attractiveness of FDI, thus triggering capital inflows that tend to push the exchange rate up.

- The **asset price channel** refers to two distinct effects. First, changes in monetary policy tend to have an impact on equity prices and thus on the ratio of the market value of firms to the replacement cost of their capital stock (Tobin's Q). This in turn determines the incentives for firms to invest using the proceeds of equity issuance. Second, through its impact on the valuation of assets, monetary policy also has an effect on the intertemporal savings plans of households: higher asset prices make them feel wealthier and less in need of additional savings (wealth effect).

- The **credit channel** emphasizes the impact of monetary policy changes on asymmetric information in bank lending. With higher interest rates, the value of collateral used to secure borrowing and the net present value of expected future cash flows are revised downwards, and as banks perceive the financial health of certain agents relying more on borrowing—principally small and medium enterprises—as deteriorating, they tend to be more reluctant to lend to them.

114. The literature sometimes identifies additional channels. One of the most important among these is the expectations channel,[61] which refers to the effect that monetary policy announcements and actions have on economic agents' decisions by influencing their expectations. This channel is not discussed in detail here, because it is less obvious how national idiosyncrasies could affect its functioning, other than through mechanisms which affect the other channels as well.

115. To empirically evaluate the aggregate impact of monetary policy on the real economy and the relative weights of the various transmission channels, the literature offers two different methodologies: macroeconometric models and structural VAR models. Using these two tools, various studies have compared the impact of monetary policy across euro-area countries:

- **Macroeconometric models point to a somewhat smaller reaction to monetary policy in France than in other large euro-area economies (Table 21).** Van Els and others (2001), using national central bank models under common assumptions and forward-looking behavior throughout the euro area, find that French economic growth is reduced by 0.28 percentage points after a 100 basis point hike that is sustained for two years. In the euro area as a whole, growth is reduced by 0.38 percentage points. Germany, Italy and Spain all exhibit a larger reaction, the effect in the two latter countries being more than twice that in France. However, the lags with which monetary variables impact the real economy are relatively similar, with the maximum impact generally reached after two years. Differences in specification in the national models may explain part of the differences in results, though McAdam and Morgan (2001) reach a similar conclusion using the multinational NIGEM model. National models used by the French authorities also yield comparable results, even though they do not take into account links between euro-area economies (Baghli and others (2003)).

[61] See, for example, Bank of England (1999).

- **Structural VARs suggest a relatively higher sensitivity of the French economy, but raise cross-country comparability issues** (Table 22). Mojon and Peersman (2001) find the impact on GDP of a one standard deviation monetary policy shock in France to be close to the euro-area average. In fact, the large estimated confidence bands they find do not allow them to conclude that the aggregate effects of monetary policy are significantly different between countries. However, by construction, the link between the interest rate variations and the magnitude of the monetary policy shock estimated in the VAR is not straightforward and differs from country to country. Therefore, on the basis of these VAR exercises, it is difficult to compare sensitivity to monetary policy under the (now prevailing) constraint that changes in policy interest rates are the same in all countries. Only Bouscharain and others (1999) specify their shock so as to generate the same interest rate variation in every country, and find the French economy to be the most reactive among the five European countries in the study, including the United Kingdom.

116. **In all models, the exchange rate effect dominates in the short run, domestic channels becomes more important in the medium run, and the main impact is on investment rather than on consumption, which reacts little and slowly.** Mc Adam and Morgan (2001) estimate that, out of a total impact of -0.31 percent an interest rate increase has on activity after two years, the impact on the cost of capital accounts for -0.10 percent, while the direct interest effect on consumption explains a mere -0.03 percent, the rest stemming from a combination of income, wealth and exchange rate effects. In the same vein, Peersman and Smets (2001) find the magnitude of the effect on investment to be three times as large as the magnitude of the effect on GDP. A similar conclusion is drawn by Angeloni and others (2003c), who also show that this result contrasts sharply with the one for the U.S. economy, where household consumption and investment in residential real estate are important factors.

117. **Although evidence is mixed, consumption in France could be even less reactive to changes in monetary conditions than it is in other euro-area countries.** While van Els and others (2001) find that monetary policy's impact on consumption in France is stronger than the euro-area average, they note that this is a new result, which had not been found during a previous exercise in 1995 (BIS, 1995).[62] They also find that the income effect has become less important and suggest that the financial liberalization of the late 1980s could explain why the substitution effect became significant only recently. Conversely, France is, with Spain and Germany, one of the countries where the empirical evidence of wealth effects was too weak for such effects to be incorporated in the national central bank models. In the VARs estimated by Bouscharain and others (1999), the aggregate effect is larger for France, but the reactivity of private consumption is, with Germany, the lowest of the sample.

[62] In the French model used by van Els and others (2001), the substitution effect was imposed in the consumption equation, which could overestimate the real impact of monetary policy.

Table 21. France: Maximum Effects of Monetary Policy Shocks on Output: Cross-Country Comparisons From Macroeconometric Models Available in the Literature 1/

Studies	Assumptions	Models used	France	Germany	Italy	Spain	Belgium	Netherlands	Finland	Austria	Ireland	Portugal	Euro Area Aggregated Results	Euro Area Single Estimation
Macro-econometric models : impact of a 100 basis point hike sustained for two years														
van Els and others (2001)	exchange rate determined by uncovered interest parity condition - no fiscal or monetary rules forward-looking long-term interest rates	national central banks models	-0.28 (2 years)	-0.33 (2 years)	-0.60 (2 years)	-0.62 (3 years)	-0.20 (2 years)	-0.27 (3 years)	-0.34 (1 year)	-0.49 (3 years)	-0.48 (2 years)	-0.81 (3 years)	-0.38 (2 years)	
Mc Adam and Morgan (2001)	exchange rates and long-term interest rates forward-looking - fiscal and monetary policy rules	ECB euro area model												-0.86 (2 years)
		NIGEM	-0.29 (2 years)	-0.34 (2 years)	-0.34 (2 years)	-0.41 (2 years)	-0.18 (2 years)	-0.27 (1 year)	-0.36 (2 years)	-0.45 (1 year)	-0.28 (1 year)	-0.17 (1 year)	-0.31 (2 years)	
BIS (1995)	exchange rate backward-looking, nominal rates within the ERM only frozen for Germany, France, the Netherlands, Belgium, and Luxembourg no fiscal or monetary rules	national central banks models	-0.36 (2 years)	-0.37 (2 years)	-0.53 (2 years)	-0.17 (5 years)	-0.23 (3 years)	-0.18 (2 years)		-0.14 (2 years)				
Baghli and others (2003)	exchange rate determined by uncovered interest parity condition long-term interest rate forward-looking no fiscal or monetary rules no feedback from other euro-area countries	MASCOTTE *Banque de France* 's model	-0.24 (3 years)											

1/ The number of years after which the maximum effects of the shock materialize are indicated in parenthesis.

Table 22. France: Maximum Effects of Monetary Policy Shocks on Output: Cross-Country Comparisons from VAR Models Available in the Literature

Studies	France	Germany	Italy	Spain	Belgium	Netherlands	Finland	Austria	Ireland	Portugal	Euro Area	United States
VAR models: impact of one standard deviation monetary policy shock												
Mojon and Peersman (2001)	-0.20	-0.20	-0.12	-0.14	-0.32	-0.45	-0.44	-0.25	-0.32			
Peersman and Smets (2001)											-0.15 (30 bp) 2/	-0.18 (45 bp) 2/
Peersman (2001) 1/	-0.19	-0.28	-0.17	-0.22	-0.18	-0.11		-0.17				
Barran, Condert and Mojon (1997) 1/	-0.46	-0.65	-0.30	-0.55		-0.35	-0.36	-0.48				
Peersman and Smets (1999) 1/	-1.15	-0.87	-1.85		-1.80	-1.00		-0.93				
VAR models: impact of a 100 basis point interest rate hike												
Bouscharain, Herbet, and Menard (1999)	-1.1	-0.8	-0.6			-0.7						

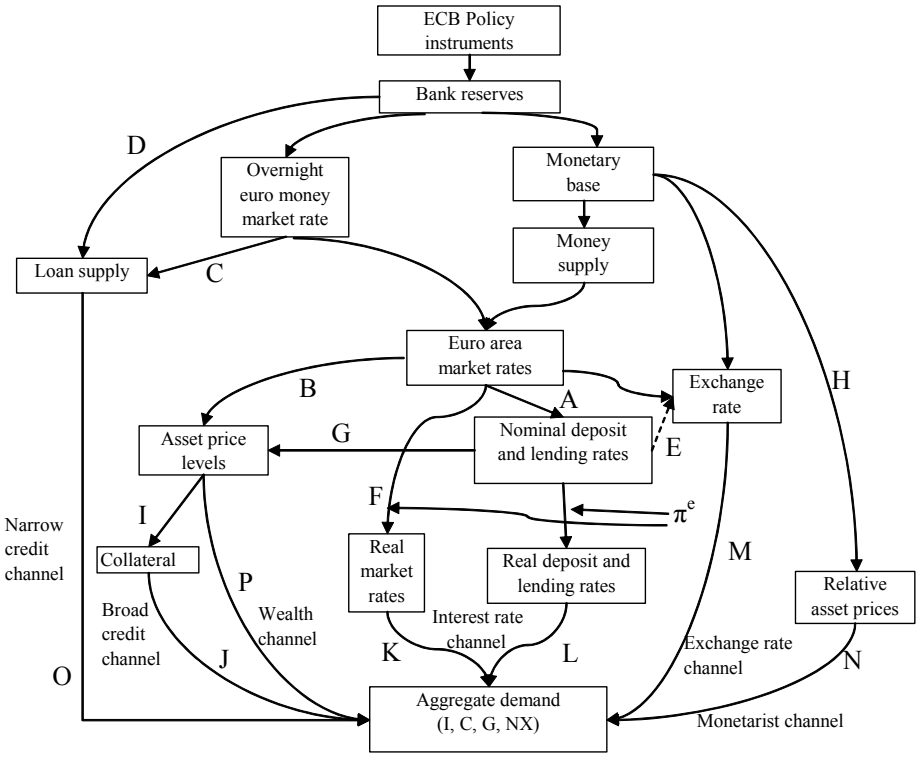
1/ Quoted from Mojon and Peersman (2001).
2/ Size of the shock in basis points.

C. Transmission of Monetary Policy in the Context of France's Idiosyncrasies

118. **This section identifies structural and institutional features of the French economy and financial sector that could impact on the transmission mechanism of monetary policy and cause deviations from its functioning in the rest of the euro-area.** In doing so, it pays particular attention to the financial context that French households face, as well as to factors that are within the authorities' control. For a detailed description of these idiosyncrasies, see Appendices II and III.

119. **To determine the potential relevance of French idiosyncrasies for the transmission mechanism of monetary policy, we use the schematic presentation of Kuttner and Mosser** (2002), modified to reflect the situation in the euro-area/French context (Figure 21). The main modification consists of a separation of intermediated interest rates (deposit and lending rates) from nonintermediated ones. This seems necessary to identify the impact of administered interest rates and some other idiosyncrasies that tend to affect intermediated rates only.

Figure 21. France: Overview of the Transmission Mechanism of Monetary Policy in the Euro-Area Context



Source: Kuttner and Mosser (2002), with IMF staff modifications.

120. Government interventions in the financial system likely affect the transmission mechanism of monetary policy in many different ways. However, such interventions are not

the only idiosyncrasies that are likely to be relevant in determining the eventual impact of a monetary policy shock. The arrows labeled with capital letters in Figure 1 mark the channels where we think French idiosyncrasies could affect the transmission of monetary policy. Table 23 lists the specific idiosyncrasies we consider relevant for each of these channels. In our view, the most prominent cases of government interventions interfering with the transmission mechanism (the core effects of which are marked with bold Xs in Table 23) are (i) the fact that administered interest rates, the *ni-ni*[63], and the usury legislation, to a significant extent and at least in the short run, interrupt the transmission from euro-area market rates to nominal deposit and lending rates (Channel A in Figure 21); and (ii) the impact of a wide range of government interventions on the interest rate sensitivity of consumption and investment (Channel L and, to a lesser extent, Channel K). This suspected government impact appears to be in line with the findings in the literature discussed in Section II.

Table 23. Overview of Potential Relevance of a Range of Idiosyncrasies for the Different (Partial) Channels of Transmission

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Administered savings schemes	x	x	x		x		x	x				x		x		
Ni-ni	x		x													
Tax treatment of savings products		x					x	x			x	x		x		x
Usury rate	x						x					x				
Centralization of deposits		x	x	x			x	x		x	x	x		x	x	
Restrictions on the use of deposits		x					x	x		x		x		x	x	
Differential tax treatment of investments		x				x	x	x			x	x		x		x
Balance sheet structure of the banking system			x	x					x			x		x		
Competitive situation in the banking system	x		x	x						x		x		x	x	
Role of remaining public financial institutions	x	x	x	x		x	x	x		x	x	x		x	x	
Housing and mortgage market features		x					x	x	x	x		x		x		x
Level of equity in households' portfolios									x					x		x
Low importance of non-euro-area trade													x	x		
Structure of GDP										x	x	x	x	x	x	x
Structure of production											x	x	x	x	x	
Low leverage of households		x					x		x	x	x	x		x	x	

Source: IMF staff.

121. **The impact of euro-area market interest rates on nominal lending and deposit rates in France** (Channel A) is affected by anything that directly influences the pricing of bank loans and deposits, notably the administered savings schemes, the *ni-ni* and the usury legislation, as well as by factors that affect the pricing power of financial institutions, such as the competitive situation in the financial system and the presence of publicly owned or other institutions that do not behave as profit-maximizers. In this context, it is worth recalling that, until recently, France's cooperative banks were seen as being insufficiently profit-oriented.

[63] For an explanation of the *ni-ni*, see second subheading in section A of Appendix II.

122. **The way euro area interest rates affect French asset prices** (Channel B) depends on the ability of economic agents, including financial institutions, to quickly adjust their asset portfolios in function of changing market conditions. Hence, idiosyncrasies that tend to lead to asset portfolios being insensitive to market conditions (e.g., centralization of deposits and presence of public financial institutions in the market), to high transaction costs or long delays in executing transactions in asset markets (e.g., some features of the housing and mortgage markets) or, more generally, to rigidity in asset portfolios (such as certain administered savings schemes, the tax advantages accorded to life insurance products, tax advantages steering investments toward long-term holdings of certain types of assets, and earmarking of assets) will slow down the adjustment of asset prices.

123. **The way banks' loan supply, in quantitative terms, reacts directly to changes in bank reserves and money market conditions** (Channels C and D), depends on the structural characteristics of the financial system, the structure of banks' balance sheets and the relevance of money market rates for banks' cost of funding. The less competitive and market oriented a system, and the less it is affected by money market rates, the less responsive it is likely to be. As a result, the presence of public financial institutions, the centralization of deposits, and government interventions affecting their cost of funding (such as the *ni-ni* and the administered interest rates), are likely to diminish its responsiveness.

124. **When domestic deposit and lending rates do not move in line with market and policy interest rates, monetary policy's influence over the exchange rate could be affected** (Channel E). For example, a decline in market rates that is not accompanied by a decline in deposit rates will not give depositors much incentive to reallocate their deposits toward foreign exchange. However, since the advent of the euro, the scope for this effect has become limited.

125. Since French financial markets are closely integrated with those of the rest of the euro area, **market interest rates in France should adjust fully and without significant delay to euro market interest rates** (Channel F). However, divergences are still conceivable in smaller market segments dominated by domestic players, or where market distortions exist. For example, the CDC's size and preference to invest in specific kinds of French securities has reportedly led to anomalies in the pricing of those securities. It is also possible that tax discrimination in favor of a specific type of securities leads to deviations from market rates.

126. **If bank lending and deposit rates deviate from market rates, asset pricing will be affected** (Channel G). However, any idiosyncrasies that influence the substitutability between bank deposits and other assets or economic agents' ability to finance the purchase of assets with bank loans, is likely to also affect the relevance of this channel. The same idiosyncrasies that affect Channel B are likely to play here, with the addition of the usury legislation.

127. Under the first leg of the monetarist channel (Channel H), **monetary operations modify the stock of (base) money relative to the stocks of other assets and hence the marginal utility of money compared to that of other assets** (Meltzer, 1995). This triggers

portfolio adjustments as economic agents seek to re-establish equality of marginal utilities, which in turn generates relative asset price changes, including changes in interest rates. While the focus is somewhat different, the idiosyncrasies at work are largely the same as for Channels B and G.

128. **In the broad credit channel, changes in asset values alter the amount of available collateral** (Channel I)**, which in turn alters economic agents' ability to borrow** (Channel J). Idiosyncrasies that could affect the functioning of this channel are mainly related to the balance sheet structure of economic agents, including financial institutions. These include: the structure of households' portfolios; the rate of homeownership; the importance of assets that are difficult to use as collateral (e.g., life insurance policies); and the degree of leverage in economic agents' balance sheets. With aggregate household leverage low in France, asset price variations do not have a disproportionate impact on economic agents' free assets. Idiosyncrasies affecting the second leg of the channel are those that determine the relevance of available collateral in lending decisions and in the loan supply. These include housing and mortgage market characteristics (e.g., the unavailability of cash-out home equity loans), structural and behavioral features of the banking system (e.g., level of competition, lending policies, and [loan] product innovation), the role of public financial institutions, the centralization of deposits, and the low leverage of households.

129. **In the final leg(s) of the interest rate channel** (Channels K and L)**, changes in the real rate of interest and real user cost of capital affect consumption and investment decisions**. Idiosyncrasies that "lock in" interest rates and savings and investment decisions—as some administered savings schemes, life insurance policies, and special tax regimes do—will reduce the functioning of this channel. The interest rate sensitivity of savings and investment decisions also depends on the importance of interest rates relative to the other costs of financial transactions (e.g., fixed fees charged by banks, notary fees, or taxes imposed on financial transactions), hence the importance of factors such as housing and mortgage market features and the competitive situation in the banking system. This sensitivity further depends on the balance sheet structure of economic agents, which determines the relative importance of income and substitution effects and, in the case of financial institutions, the (marginal) profitability of lending. Finally, factors that reduce the flexibility of the loan supply (to respond to interest rate-driven changes in demand)—such as the centralization of deposits, earmarking of noncentralized deposits, and the balance sheet structure of the financial system—may impede the functioning of the interest rate channel.

130. The way **changes in the exchange rate affect aggregate demand** (Channel M) depends in large part on the openness of the economy. In the case of euro-area members, what matters in the first round is the openness toward the non-euro-area world. France's relatively low openness can be expected to make this channel less important than in the rest of the euro area.

131. **Under the second leg of the monetarist channel** (Channel N)**, changes in relative prices on the asset markets spill over to the output markets**, because the price of existing assets has changed relative to their production cost and through the impact of unanticipated inflation on output (Meltzer, 1995). As a result, any factor affecting the flexibility with which

asset portfolios can be reallocated across financial and real asset markets and any factor affecting the ability of output to respond to these portfolio reallocations (including the structure and openness of the economy), will have an impact on this transmission channel.

132. **The impact of the supply (in quantitative terms) of bank loans on aggregate demand** (Channel O)**, will vary with the degree to which economic agents are dependent on bank financing and with the degree to which credit provision is supply-driven.** The balance sheet structure of nonbank economic agents, the degree of disintermediation, and some structural features of the financial system, such as competition and constraints that steer the loan supply in a given direction (for example in the use of PEL resources only for mortgage-related operations), are potentially germane for this channel.

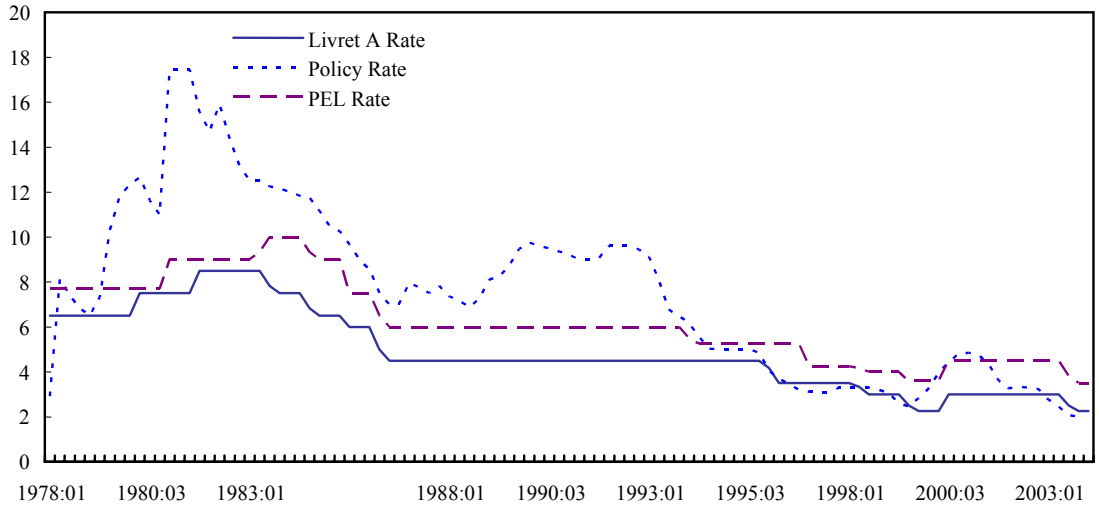
133. **The relevance of wealth for consumption** (Channel P) **depends on the correct perception of wealth, on the importance of wealth relative to income, on the relative and absolute importance of different kinds of assets in households' portfolios, and on the degree to which wealth can easily be converted into consumption**, through asset sales or borrowing. As a result, potentially relevant idiosyncrasies for this channel are those which steer investments toward products of which the value is less easily observable (e.g., tax advantages favoring life insurance products) and housing and mortgage market features.

134. Across channels, the eventual impact of monetary policy-induced changes in consumption, investment and net exports on aggregate demand will depend on the relative importance of these items in aggregate demand. In other words, **the structure of GDP will affect the functioning of all channels**. On the supply side, the structure of an economy's production is also relevant in determining the aggregate impact of a number of channels, because of differences in sensitivity between sectors. For example, industry is typically more capital intensive than services and hence more sensitive to changes in interest rates.

D. Econometric Analysis of Interest Rate Transmission and Consumption

135. **The above analysis and the review of the literature point to interest rate transmission and its effect on aggregate demand, in particular consumption, as two areas where administratively set interest rates play a large role**. Furthermore, the two most important administratively set interest rates have in the past deviated significantly and during sustained periods from the policy rate (Figure 22). In this section, we find that market credit rates are sensitive to administered rates, as the latter influence the cost of banks' resources. Half of the opening of the spread between the consumption credit rate and the policy rate between 2000 Q3 and 2003 Q3 could be explained by the lack of adjustment of the *Livret A* rate*,* a key administered savings scheme, to the easing of monetary policy rates. In line with other studies, we find consumption to be more sensitive to income effects than to substitution effects. A static computation suggests that over the last three years, up to 3¼ percentage points of potential consumption growth appears to have been forgone because of the slow adjustment of consumption credit rates.

Figure 22. Policy Rate, *Livret A* Rate, and PEL Rate
(In percent)



Sources: *Banque de France*; IMF, IFS and staff calculations.

136. **As always, a number of caveats apply to the present exercise.** First, the data—kindly provided by the *Banque de France*—only go back to the beginning of the 1990s, and their frequency is quarterly. Hence, the econometric analysis is constrained by a relatively low number of observations. Second, no weighted average series of deposit rates was available, which imposed use of the policy rate as a proxy in the analysis of consumption.[64] Finally, the French economy and financial system have changed tremendously over our sample period, as a result of liberalization and privatization, multiple reforms of administered savings schemes and other government interventions, a structural reduction in inflation, and the advent of EMU. These structural changes inevitably create an additional degree of uncertainty regarding the validity of our results and their relevance in the present and future contexts.

Interest rate transmission from policy rate to retail rates

Short-term credit interest rates

137. **Most of the short-term bank credit rates in the dataset are sensitive to the spread between the policy rate and the main administered interest rate, likely reflecting the impact of the administered savings schemes on the cost of banks' resources.** To evaluate the size of this impact and more generally the nature of interest rate transmission, we proceeded in three steps:

[64] All variables used in the econometric analyses are described in Appendix IV. All variables are found to be integrated of order 1, and the unit root tests are reported in Appendix V.

- First, we test the impact of the administered interest rates (through the *Livret A* rate) on six credit market rates,[65] using a long-term relationship with the following specification:

$$r_{credit} = \alpha\, r_{policy} + \beta \left(r_{Livret\ A} - r_{policy} \right)$$

  We use the spread between the policy rate and the *Livret A* rate, rather than levels of both, to minimize multicolinearity. We find that the *Livret A* rate plays a role for all rates except the rate on small loans to consumers (Appendix VI). Banks adjust their market rates to any change in the policy rate, but this adjustment is mitigated when the *Livret A* rate does not adjust in parallel. The effect of administered rates on the cost of banks' resources is twofold. On the one hand, administered rates directly determine the cost of those administered deposits that remain within the banks, such as most of the deposits collected in *CODEVI* accounts. On the other hand, nonadministered deposits have to compete with the administered ones and this limits banks' freedom in setting nonadministered deposit rates.

- Second, following Mojon (2001), we estimate in one step the full dynamics of the interest rate transmission, using error-correction models. For consumption credit rates, we find the long-term coefficient to be less than one in some cases and greater than one in others. For rates on credit to enterprises, it is in all cases closer to 2 than to 1. While those results should be taken with caution, they could signal different degrees of competition in the consumer and business (in particular SMEs) segments. The estimated equations are detailed in Appendix VII.

- Third, using these estimates, we simulate the reaction of the six short-term credit rates in our dataset to a 100 basis point hike in the policy rate, with different assumptions regarding the subsequent adjustment of the *Livret A* rate: (1) no change; (2) adjustment by 50 basis points with a 6-month delay, mimicking the post-August 2003 system; (3) full adjustment with a six-month delay ; and (4) full and instantaneous adjustment.

138. **The simulations confirm that lack of full and instantaneous adjustment of the *Livret A* rate hampers monetary transmission** (Tables 24 and 25). While the effect on small consumer loans is limited, for all other credit rates, full and immediate adjustment leads to a stronger interest rate response than under the current post-August 2003 system. For consumer credits, interest rates react by an additional 26 to 44 basis points after one year and 31 to 79 basis points after two years. For credits to enterprises, the responsiveness is much

[65] The *Banque de France* monitors six rates: for households, the rates for loans below €1,524, on overdrafts, and for loans above €1,524; for enterprises, the discount rate, the rate on overdrafts and the one for other short-term loans. Details are provided in Appendix IV.

higher with ranges from 75 to 121 basis points after one year and 89 to 129 basis points after two years.

139. **The absence of full adjustment of the *Livret A* rate to the policy rate explains more than half of the increase in the spread between the consumption credit rate and the policy rate over the last two years.**[66] The spreads between the aggregate consumption credit rate and the policy rate, and between the *Livret A* rate and the policy rate have widened over the last three years (Figures 23 and 24). Using the above econometric analysis and simulation, we find that the rise in the spread between the *Livret A* rate and the policy rate explains 143 basis points of the 236 basis point increase in the spread between the consumption rate and the policy rate between 2000Q3 and 2003Q3 (Table 26). A large part of the widening of the spread is, however, due to other factors.

[66] The aggregate consumption credit rate is the simple average of the three rates compiled by the *Banque de France* (namely, on overdrafts, nonoverdraft loans less than €1,524 and nonoverdraft loans greater than €1,524). A weighted average would have been preferable but could not be calculated in the absence of information on the stocks of loans per category.

Table 24. France: Impact on Short-Term Consumer Credit Interest Rates of Shocks to the Policy Rate

(In percentage points)

Rate for Consumer Loans Below € 1,524	100 Basis Points Shock on the Policy Rate			
	No Adjustment on *Livret A*	50 bp Adjustment with 6 Months Delay	100 bp Adjustment with 6 Months Delay	100 bp Adjustment Instantaneously
Instantaneous	0.00	0.00	0.00	0.00
After 3 months	0.65	0.65	0.65	0.65
After 6 months	0.22	0.22	0.22	0.62
After 1 year	0.53	0.73	0.93	0.79
After 2 years	0.63	0.75	0.86	0.78
After 5 years	0.73	0.73	0.73	0.73
Long Term	0.73	0.73	0.73	0.73

Overdraft Rate on Consumer Accounts	100 Basis Points Shock on the Policy Rate			
	No Adjustment on *Livret A*	50 bp Adjustment with 6 Months Delay	100 bp Adjustment with 6 Months Delay	100 bp Adjustment Instantaneously
Instantaneous	0.58	0.58	0.58	0.58
After 3 months	0.75	0.75	0.75	0.75
After 6 months	0.40	0.40	0.40	0.82
After 1 year	0.56	0.78	0.99	1.22
After 2 years	0.57	0.95	1.33	1.26
After 5 years	0.54	0.81	1.08	1.05
Long Term	0.54	0.81	1.08	1.08

Rate for Consumer Loans Above € 1,524	100 Basis Points Shock on the Policy Rate			
	No Adjustment on *Livret A*	50 bp Adjustment with 6 Months Delay	100 bp Adjustment with 6 Months Delay	100 bp Adjustment Instantaneously
Instantaneous	0.00	0.00	0.00	0.00
After 3 months	0.91	0.91	0.91	1.34
After 6 months	0.73	0.73	0.73	1.06
After 1 year	0.72	0.88	1.05	1.04
After 2 years	0.76	1.24	1.72	2.03
After 5 years	0.76	1.47	2.21	2.23
Long Term	0.76	1.49	2.23	2.23

Source: IMF staff calculations.

Table 25. France: Impact on Short-Term Enterprise Credit Interest Rate of Shocks to the Policy Rate

(In percentage points)

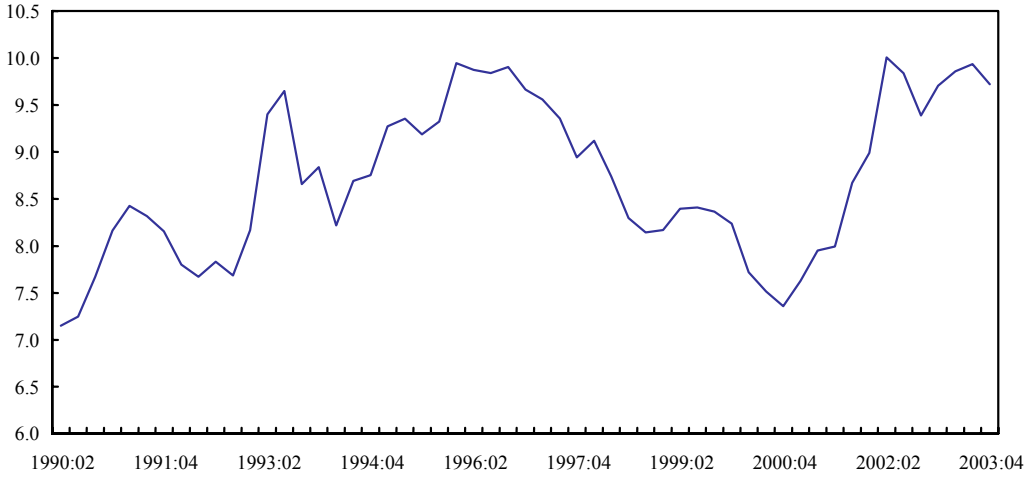
Discount Rate for Enterprises	100 Basis Points Shock on the Policy Rate			
	No Adjustment on *Livret A*	50 bp Adjustment with 6 Months Delay	100 bp Adjustment with 6 Months Delay	100 bp Adjustment Instantaneously
Instantaneous	0.63	0.63	0.63	0.63
After 3 months	1.02	1.02	1.02	1.09
After 6 months	0.83	0.83	0.83	0.77
After 1 year	0.96	0.92	0.89	2.13
After 2 years	0.63	1.49	2.35	2.78
After 5 years	0.56	1.48	2.39	2.39
Long Term	0.55	1.49	2.43	2.43

Overdraft Rate on Company Accounts	100 Basis Points Shock on the Policy Rate			
	No Adjustment on *Livret A*	50 bp Adjustment with 6 Months Delay	100 bp Adjustment with 6 Months Delay	100 bp Adjustment Instantaneously
Instantaneous	0.71	0.71	0.71	0.71
After 3 months	1.02	1.02	1.02	0.74
After 6 months	1.01	1.01	1.01	0.42
After 1 year	0.85	0.56	0.26	1.46
After 2 years	0.60	1.25	1.90	2.52
After 5 years	0.70	1.35	2.01	2.03
Long Term	0.67	1.41	2.14	2.14

Rate for Other Short-Term Loans to Enterprises	100 Basis Points Shock on the Policy Rate			
	No Adjustment on *Livret A*	50 bp Adjustment with 6 Months Delay	100 bp Adjustment with 6 Months Delay	100 bp Adjustment Instantaneously
Instantaneous	0.78	0.78	0.78	0.78
After 3 months	0.98	0.98	0.98	0.69
After 6 months	1.05	1.05	1.05	0.68
After 1 year	1.02	0.84	0.66	1.59
After 2 years	0.74	1.37	1.99	2.26
After 5 years	0.78	1.38	1.97	2.00
Long Term	0.78	1.38	1.99	1.99

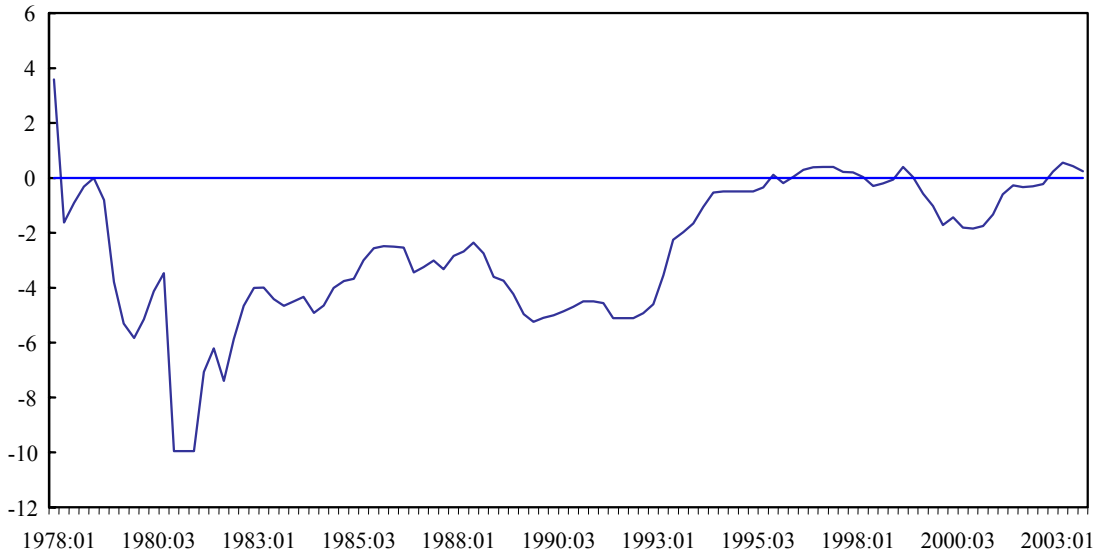
Source: IMF staff calculations.

Figure 23. France: Spread Between Consumption Credit Rate and Policy Rate
(In percent)



Sources:*Banque de France*; IMF, IFS and staff calculations.

Figure 24. France: 4. Spread Between *Livret A* and Policy Rate
(In percent)



Sources: *Banque de France;* IMF, IFS; and IMF staff calculations

Table 26. Contributions of Policy Rate and Spread Between *Livret A* Rate and Policy Rate to the Spread Between Consumption Rate and Policy Rate
(In basis points)

	$r_{credit} - r_{policy}$	$(\alpha - 1)r_{policy}$	$\beta(r_{Livret\ A} - r_{policy})$
Evolution between 2000Q3 and 2003Q3	236	-265	214
Contribution		-92	143

Source: IMF staff calculations.

Medium- and long-term credit interest rates

140. **None of the long-term credit rates appears sensitive to administered saving rates.** The full dynamics of the long-term rates is provided in Appendix VII. Tests within long-term relationships show that mortgage loans are not influenced by the rate on the mortgage-related savings accounts (PEL),[67] nor is the rate for medium-and long-term loans to enterprises influenced by the *Livret A* rate. In contrast, they consistently exhibit a high degree of correlation with the long-term market rate, proxied by the 10-year government bond rate (Appendix VIII). The PEL rate only has a marginal impact on the short-term dynamics of mortgage rates.

141. **Variable mortgage rates are found to be correlated with long-term market rates, with a speed of adjustment that is marginally higher than that for fixed mortgage rates**.[68] However, since changes in variable rates affect the stocks of outstanding loans, whereas changes in fixed rates only affect new flows, even with the same or similar adjustment dynamics, one would expect the former to be of higher relevance to the transmission of monetary policy than the latter. But in the case of France, the majority of mortgage loans are contracted at fixed rates, rendering the fixed-rate dynamics relatively more important and the economy overall relatively less sensitive to changes in monetary policy. Since 1998, the difference between variable and fixed mortgage rates has consistently

[67] The result on mortgage loans is to be taken with some caution. First, it is difficult to compute a relevant effective cost of resources for banks that draw on PEL deposits to finance mortgage loans. The PEL rate we used is the deposit rate for new contracts, but changes in this rate do not affect older contracts. An effective rate, aggregating the cost of all PEL deposits, would be more relevant, but does not exist. Second, a structural break occurred in 1996, when the authorities introduced an obligation for banks to invest PEL deposits in mortgages or similar assets.

[68] We found that variable mortgage rates are better explained by long-term market rates than by short-term ones, and therefore proceeded with the former in our analysis.

been less than 100 basis points, which could potentially signal that the market does not properly price variable mortgage rates (Cherbonnier and Payet (2004)).

Consumption

142. **Household consumption does not appear to be significantly sensitive to the level of the policy interest rate but the spread between the latter and the consumption credit rate matters.** To assess the implications of the low response from the monetary policy rate to interest rates on consumption credit, we estimated a long-term consumption equation, using quarterly data from 1990 to 2003 and real disposable income, the real policy interest rate and the spread between the consumption credit rate and policy rate as explanatory variables. In the absence of a good data series on aggregate deposit rates, we use the policy rate to ensure that the income effect generated by interest rate changes is captured. The consumption credit rate constructed as indicated above is used to capture the substitution effect. The consumer price index is used to convert the nominal interest rate and disposable income data to real series. Our preferred estimation is the following (Equation (1) in Table 27):[69]

$$LogC = \underset{(2.66)}{1.02} + \underset{(31.6)}{0.91} Log\left(\text{Re}\, al\ Disposable\ Income\right) - \underset{(-1.55)}{0.33} r_{Policy} - \underset{(-3.72)}{1.3}\left(r_{ConsumptionCredit} - r_{policy}\right)$$

$$Estimation\ \ Period : 1991:01 - 2003:02$$

[69] The lack of a consistent series of consumption credit rates going back before 1990 restricts the estimation period. On the other hand, in view of the significant liberalization that occurred in the French financial sector during the second half of the 1980s, adding data from the 1980s and before to the data sample might obscure the current impact of the financial sector on household behavior. Nonetheless, a series of regressions was also performed going back further in the past (Equations 7 and 8 in Table 27, with Equation 9 provided for comparison purposes). They tend to show that, with the 1980s data added, real interest rates loose their significance when combined with inflation in a consumption equation, while inflation itself becomes highly significant. During the 1980s, in a context of sticky nominal interest rates, most of the volatility in real interest rates was caused by variations in inflation. Higher inflation reduced real interest rates, but also eroded households' real income and financial wealth, leading to higher savings efforts. This, combined with the impact of the financial liberalization of the 1980s, explains why many long-term studies on French consumption that use inflation and the real interest rate as explanatory variables, only find the latter affecting consumption from the mid-1980s onwards (Bonnet and Dubois (1995), Allard and others (2002)).

Table 27. France: Estimation of the Long-Term Consumption Equation Using Phillips-Loretan Nonlinear Estimator

Log (Consumption) = Cointegration Relation + Sum (Lagged Variables) + Sum (Forward Variables)
+ ρ (Consumption (-1) – Constant – Cointegration Relation (-1))

	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5	Equation 6	Equation 7	Equation 8	Equation 9
Real disposable income	0.91 (31.6)*	0.93 (33.6)*	0.94 (25.72)*	0.87 (10.33)*	0.98 (28.0)*	0.82 (19.9)*	0.80 (14.9)*	0.77 (19.2)*	0.90 (12.1)*
Real policy rate 1/	-0.33 (-1.55)	-0.19 (-0.58)	0.19 (1.20)	0.66 (1.54)	0.66 (1.51)	0.99 (6.18)*	0.18 (0.79)		
Spread between the consumption credit rate and the policy rate 1/	-1.3 (-3.72)*	-0.86 (-2.88)*							
Spread between the *Livret A* rate and the policy rate 1/		-0.098 (-0.39)			0.35 (1.02)	0.83 (3.90)*			
Inflation 1/							-0.57 (-3.30)*	-0.7 (-5.43)*	-0.57 (-0.68)
Constant	1.02 (2.66)*	0.83 (2.33)*	0.56 (1.25)	1.42 (1.39)	0.07 (0.17)	1.98 (3.94)*	2.29 (3.45)*	2.61 (5.27)*	1.08 (1.18)
ρ	0.43 (3.16)*	0.40 (2.92)*	0.59 (5.26)*	0.90 (18.03)*	0.53 (4.41)*	0.78 (11.3)*	0.77 (11.9)*	0.79 (13.3)*	0.78 (6.04)*
Period of estimation	1991:01-2003:02	1991:01-2003:02	1990:04-2003:01	1980:02- 2003:01	1991:01- 2003:02	1980:02- 2003:01	1980:02- 2003:01	1980:02- 2003:01	1990:04-2003:01
Degrees of freedom	33	28	34	74	29	59	66	74	32
Standard error of dependent variable	0.067	0.067	0.066	0.12	0.067	0.12	0.12	0.12	0.066
Standard error of estimate	0.0048	0.0044	0.0048	0.0057	0.0048	0.0058	0.0055	0.0055	0.0051
DW	2.23	2.23	2.23	2.18	2.19	2.41	2.33	2.39	2.34

1/ The coefficients on this explanatory variable should be read as the percentage point change in consumption resulting from a one percentage point increase in the explanatory variable.
* = Significant at 5 percent level.

Source: IMF staff calculations.

The estimation results indicate that the level of the policy rate is not significant,[70] but that interest rates have significance through the spread. In the case where all rates move simultaneously, consumption is not affected, which could be interpreted as income and substitution effects offsetting each other. In the opposite extreme case in which the consumption credit rate does not adjust at all to a change in the monetary policy rate, the impact of a relaxation of monetary policy is a dampening of consumption. In this case, the income effect is negative, as households earn less from their assets, but borrowing remains equally expensive, which prevents the substitution effect from playing in full. In reality, the transmission from the policy rate to the consumption credit rate is not perfect and immediate. This suggests that in practice, the overall impact of a relaxation of monetary policy on consumption in France tends to be slightly negative, as the substitution effect does not fully compensate the income effect.[71]

143. **The absence of full interest rate transmission during the recent monetary loosening likely affected the strength of consumption.** The widening of the spread between the consumption credit rate and the policy rate that occurred during 2000-03 (Figure 23) prevented households from fully taking advantage of the decline in policy rates. The long-term estimated equation even suggests that because banks' credit rates did not adjust fully to the monetary loosening, about 3¼ percentage points of potential consumption growth could have been forgone over the last two to three years.

144. **The *Livret A* rate does not appear to directly influence consumption.** When added to the regression, the coefficient of its spread with the policy rate is not significant (Equations (2) and (5) in Table 27). However, it is worth noting that the same spread comes up significantly positive when the equation is estimated over the 1980–2003 sample period (Equation (6) in Table 27). During the 1980s, the *Livret A* rate was significantly below the policy rate and often negative in real terms. It was also somewhat less variable than the policy rate. As a result, a widening spread can reflect an increase in inflation or more generally a deteriorating macroeconomic context requiring a tightening of monetary policy, which negatively affects households' willingness to consume. In addition, as discussed before, a widening spread during the 1980s was often associated with a decline in the real value of financial wealth, which tended to trigger a "make-up" increase in the savings rate.

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[70] The coefficient for real disposable income (which represents the income elasticity of consumption and should in the long-run trend toward one) was found to be significantly different from one. Potential explanations are low precision of the estimates due to the limited number of observations and the relatively short time period they cover, the fact that the sample period (1990–2003) does not correspond to an integer number of full cycles, and potential trend changes in the savings ratio during the sample period.

[71] This result is in line with a cross-country OECD paper by Serres and Pelgrin (2003), which shows that, over 1970–2000, France, Italy, Spain, and Belgium exhibit a negative correlation between the interest rate and the savings rate, while in all other major OECD countries, the real interest rate has a positive but insignificant impact on the savings rate.

E. Concluding Remarks and Options for Reform

145. The econometric evidence presented in this study suggests that the existence of administered rates exerts a significant influence on some bank credit rates, slowing down the transmission and weighing on the eventual impact of changes in monetary policy. **These results argue for an instantaneous adjustment of the *Livret A* rate and other administered rates to changes in the ECB rates.** The current formula, introduced in August 2003, which adjusts the *Livret A* rate to policy rate changes every six months, and potentially only by half, is helpful but still hampers monetary policy transmission.

146. Nonetheless, slow and partial adjustment of administered rates explains only part of the sluggishness of monetary transmission. From this perspective, **consideration should be given to reassessing a range of other government interventions and policies**. In particular, the requirement to provide checks free of charge as a quid pro quo for zero interest-bearing checking accounts (*ni-ni* policy), and the inertia in setting both deposit and credit PEL rates could bias some prices charged by banks. Furthermore, the PEL's locking-in of interest rates on future loans and savings blunts the impact of monetary policy. Consideration could therefore be given to the elimination of the *ni-ni* rule, to a more rapid—preferably automatic—adjustment of the PEL rates to changes in the monetary environment and in long-term market rates, and to eliminating or reducing absolute interest rate commitments in new PEL contracts, for example by defining commitments relative to market rates at the time a loan is taken up. The usury legislation should also be reassessed, especially since in its current form, it could interfere with the transmission mechanism in case of rapid changes in policy interest rates. A better functioning of the mortgage market should be aimed at, potentially with the introduction of home equity loans and reforms of the system of mortgage liens. Finally, a strong competition policy is needed to safeguard the functioning of market forces in the financial sector.

IDIOSYNCRASIES IN THE FRENCH FINANCIAL LANDSCAPE

147. In this appendix, we discuss the idiosyncrasies of the French financial system and economy that could affect the transmission mechanism of monetary policy. A first section focuses on public intervention in the financial sector. In doing so, we follow the structure of the sector's balance sheet. Hence, we will first discuss the main government interventions on the liability (deposit) side of the system's balance sheet (i.e., administered savings schemes, the tax treatment of savings products, the *ni-ni*, and the usury legislation), and subsequently those on the asset side (i.e., centralization of deposits, restrictions on the use of some administered deposits, and the tax treatment of investments). In Section B, we shift our attention to structural issues in the French financial sector, namely the structure of the banking system's balance sheet, the competitive situation within the system and the role of the remaining public financial institutions. Section C explores some particularities of French asset markets, in particular the housing and equity markets. Finally, Section D assesses the relevance of some structural features of the French economy.

Public intervention in the financial sector

148. One of the most striking features of the French financial system is the extent to which the government still intervenes in the collection, management and allocation of the country's savings. On the liability side of the financial system, the most important interventions are administered savings schemes, differential tax treatment of savings products, the *ni-ni* requirement,[72] and the usury legislation. On the asset side, government intervention is less pervasive, but still significant. It consists of the centralization of deposits to be invested by a state-owned entity, restrictions on the use of funds collected through some administered savings schemes, and differential tax treatment of investments. The continued presence of two sizable government-owned financial institutions (*La Poste* and the *Caisse des Dépôts et Consignations*) also gives the government a foothold in financial intermediation.

Administered savings

149. Administered savings schemes are savings products designed wholly or in part by the government, which determines (a number of) its features and, in most cases, its (minimum) remuneration. These government-designed features define the administered savings products along seven main dimensions: (i) eligibility requirements; (ii) determination of the remuneration; (iii) tax treatment; (iv) quantitative deposit limits; (v) withdrawal rules; (vi) distribution channels; and (vii) the destination and/or purpose of the collected funds. An overview of all administrative savings products, defined along these seven dimensions, is provided in Appendix II.

[72] The *ni-ni* requirement, based on the French term for "neither … nor …" refers to the double prescription that banks can neither remunerate demand deposits, nor charge for checkbooks.

150. Administered savings schemes are very popular. They encompass half of all resident bank deposits in France, for an amount in excess of a third of GDP (Table 28). The most popular schemes are—in volume terms—the housing savings scheme (*Plan d'Épargne-Logement* or PEL) and—in number—the *Livret A*. The *Livret A* rate serves in many ways as the "base rate" for the administered savings products: the *Codevi* and *livret bleu* are remunerated at the same level, the floor on the remuneration of the *livret jeune* is the *Livret A* rate, and other rates are generally adjusted in line with changes in the *Livret A* rate.

Table 28. Composition of Resident Client Deposits at Monetary Financial Institutions and La Poste, December 2003

Depository Category	Amount (In billions of euros)	Percent of Total Deposits	Percent of GDP
Administered deposits	528.7	49.3	34.0
Livrets A	112.0	10.4	7.2
Livrets bleu	15.5	1.4	1.0
Codevi	43.2	4.0	2.8
Livrets jeunes	5.7	0.5	0.4
Livrets d'Epargne Populaire (LEP)	53.8	5.0	3.5
Comptes d'Epargne-Logement (CEL)	36.0	3.4	2.3
Plans d'Epargne-Logement (PEL)	216.5	20.2	13.9
Plans d'Epargne Populaire (PEP)	46.0	4.3	3.0
Of which: centralized deposits	217.0	20.2	14.0
Demand deposits	342.1	31.9	22.0
Other deposits	202.4	18.9	13.0
Total deposits	1,073.2	100.0	69.1

Sources*: Banque de France* and IMF staff calculations

151. Until recently, the *Livret A* rate was in practice set by the government.[73] As noted by Nasse and Noyer (2003), this politicization of changes in interest rates and especially the unpopularity of downward adjustments led to hysteresis in the administered interest rates. In July 2003, it was announced that henceforth, the rate of remuneration would be set automatically at the average of the inflation rate and the ECB's short-term interest rate, plus

[73] Formally, it was a competence of the *Comité de la Réglementation Bancaire et Financière* (CRBF) from 1984 to 1998, when an advisory committee was set up to monitor interest rate developments and propose changes when needed to stay within a predefined band. However, final approval by the government was needed for any interest rate change under both arrangements, resulting in political considerations being one of the main drivers of interest rate changes.

25 basis points. Adjustments are planned to take place every six months, starting on August 1, 2004. The *Banque de France* has been charged with implementing this new arrangement, but is empowered to deviate from the formula under exceptional circumstances. In particular, the *Banque de France* is expected to keep the *Livret A* rate positive in real terms at all times.

152. The planned semi-annual semi-automatic adjustments in the rate of the *Livret A* will reduce the duration and magnitude of deviations from market rates, but not eliminate them. Under the new system, a lag of between 2 and 3 months and 8 and 9 months will remain before a change in the ECB's policy rates is reflected in the *Livret A* rate. The reasons are the 6-month intervals between rate adjustments and the fact that the new rate will be decided some time before the adjustment date, based on earlier observations. More importantly, inflation remains as an important variable in the formula, and may become the sole determinant of the *Livret A* rate when the ECB's policy rate becomes negative in real terms, potentially hampering the ECB's efforts to boost the economy in downturns. Under normal circumstances, the presence of inflation in the formula may lead to divergences between the *Livret A* rate and policy rates, which could be more significant the more backward-looking the chosen inflation indicator is.

153. The *Plan d'Epargne Logement* (PEL), the largest administered savings scheme in terms of volume (representing one fifth of total bank deposits), is a long-term savings scheme that offers tax advantages if maintained for at least four years, a potential interest rate subsidy, and the right to a mortgage loan at a predetermined rate (Appendix II). It tends to reduce and alter households' sensitivity to interest rates for several reasons. First, a PEL requires a depositor to save a contractually specified minimum amount every month, reducing the flexibility of depositors' savings behavior. Second, the deposit interest rate and the lending rate[74] are locked in for the duration of the plan at the time the PEL is set up, at the then going rate established by the government. As a result, for PEL holders, the interest rate at which they can save, or the rate at which they can take out a mortgage loan (be it of a restricted amount), does not alter with changes in policy and market interest rates. Furthermore, the risks of changes in interest rates become asymmetrical for households: in case of higher interest rates, they can maximize their borrowing under the plan. In case of falling interest rates, they can maximize their savings in a high-interest rate PEL, but forego the loan. For banks, the risks are asymmetrical in an opposite way. For them, the PEL consists of a set of long-term options they sell to their customers, of which they need to manage the (asymmetrical) risks. The December 2002 reform of the PEL, which eliminated the interest-rate subsidy for plans that do not result in a loan, has significantly reduced its attractiveness as a savings instrument, and hence new inflows in the scheme. However, the large existing stock of PEL deposits, and the long-term nature of the scheme, guarantee that the PEL will remain a very important item in banks' and households' balance sheets for years to come.

[74] The lending rate will still vary in function of the amounts saved under the plan and the time the plan has been maintained.

The ni-ni requirement

154. The *ni-ni* requirement, in the context of the French financial sector, refers to the provision that banks can neither remunerate demand deposits[75] nor charge for providing checkbooks to their clients. In practice, competitive and client pressure has pushed banks to implement the rule by foregoing any charge for the use of checks.

155. As a result of the *ni-ni*, and the tendency of French households to nevertheless maintain high levels of demand deposits,[76] the majority of the nonadministered deposits in the banking system is excluded from any potential remuneration. Hence, the combination of the *ni-ni* and the administered savings schemes means that more than 80 percent of deposits is insensitive to changes in market and policy rates, at least in the short run.

156. The *ni-ni* affects the transmission mechanism of monetary policy in several ways. It renders economic agents' income and cash flows, as well as the cost of banks' resources, less sensitive to changes in interest rates. In addition, it alters the way monetary policy influences the resources available to the banking system. Normally, a tightening of monetary policy increases the opportunity cost of maintaining cash balances. As a result, the higher interest rates will induce economic agents to economize more on their cash balances and instead maintain higher bank deposits. Currency in circulation will decline, and base money will be transformed from currency in circulation into bank reserves (which, however, may have fallen initially as a result of the original monetary policy action). The *ni-ni* could interfere with this mechanism, because it ensures that economic agents do not face a trade-off between cash and demand deposits in terms of lost remuneration. As a result, the choice between the two is unaffected by changes in interest rates. Instead, economic agents face a trade-off between holding cash or demand deposits on the one hand, and holding less liquid bank deposits or money market instruments on the other. But if a change in interest rate encourages them to shift between demand deposits and other bank deposits, this does not affect the composition of base money. Currency in circulation, total bank deposits, and bank reserves all remain unchanged. However, if reserve requirements are different between different kinds of bank deposits, then there may be an effect on the banks' free reserves (as opposed to the monetary base). However, in the euro-area context, the risk of that happening is reduced by the fact that all deposits with a maturity up to two years are subject to a uniform reserve requirement.

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[75] After finalization of this paper, on October 5, 2004, the European Court of Justice ruled that the prohibition to renumerate demand deposits was contrary to the freedom of establishment within the EU. This ruling is expected to mark the end of the *ni-ni*.

[76] There is no obvious explanation for this tendency.

Tax treatment of savings products

157. Savings products tend to be subject to different tax regimes. In general, the authorities have tried to put in place tax incentives that favor long-term savings instruments, such as life insurance policies,[77] the PEL, the *Plan d'Epargne en Actions* (PEA), the *Plan d'Epargne Populaire* (PEP), the new *Plan d'Epargne-Retraite* (PERP), and others. All these products are characterized by the fact that they only qualify for favorable tax treatment if maintained for a long minimum period, usually between 4 and 8 years. The tax treatment of life insurance products has been especially favorable, leading French households to keep a significantly larger proportion of their wealth in such products than households in other countries (see below).

158. Life insurance policies can offer a guaranteed return, can be linked to the overall returns on the asset portfolio of the insurance company, or can be closely linked to the performance of specific assets in which the policyholder has chosen to invest (unit-linked policies), usually mutual funds investing in stocks, bonds or some combination of the two. Unit-linked policies represented 18 percent of life insurance policies in 2003. Overall, life insurance assets were invested mostly in fixed-income instruments (75 percent), with equity (22 percent) and real estate (3 percent) being of lesser importance. To benefit from favorable tax treatment, the life insurance policies typically have to be invested for over eight years.

159. The tax system's favorable treatment of life insurance products likely reduces the short-term impact of changes in the monetary policy stance on households' savings behavior and perception of wealth, because of the characteristics of life insurance policies. First, many life insurance contracts specify a minimum level of periodic savings that needs to be added to the policy. This, in combination with the practice among some insurers to charge all costs of a policy up front, has a tendency of locking in households' savings behavior by making changes prohibitively expensive. Households thus have a reduced ability to change their savings behavior in response to changing market conditions. However, to some extent, it is possible to borrow against a life insurance contract, which provides an option to change savings behavior while adhering to the contract. Second, the link between interest rates and asset prices on the one hand and returns on life insurance policies on the other, is less tight than it is for alternative investments such as bonds, stocks or bank deposits. The reasons are the existence of performance guarantees, the delay with which financial market developments are reflected in the performance of a life insurance policy, and the fact that insurance companies can use their hidden reserves to smoothen returns on insurance policies. On the other hand, unit-linked life insurance policies are becoming increasingly important, and many of these now simply consist of a portfolio of mutual funds, the value of which policyholders can follow on a daily basis. Finally, because of the required minimum 8-year maturity of life insurance products, holders of insurance policies have a reduced ability to

[77] Many forms of life insurance policies in France are in essence just long-term savings instruments, sold by insurance companies but incorporating little or no insurance elements.

adjust their portfolios in response to financial market developments, as they must stay within the contractually specified parameters of the life insurance contract. This could affect the speed and degree of adjustment of asset markets in France to changes in the monetary policy stance.

160. The latter argument applies more generally to all tax schemes promoting long-term investments. By penalizing early withdrawals, these schemes tend to introduce an additional degree of rigidity in households portfolios. As a result, households have a lower ability to adjust in function of changing circumstances, for example, a change in monetary policy. This may in turn affect asset price adjustments, wealth effects, and the speed with which changes in savings behavior occur.

The usury legislation

161. The French financial system is subject to a usury legislation that caps the interest rate financial institutions can charge on any loan to an individual or on an overdraft provided to a company, at four thirds of the average rate observed in the relevant loan category. For that purpose, the *Banque de France* monitors rates in the market, and calculates on a quarterly basis the average rate observed in each category. Application of the four thirds ratio then provides the usury rate for the next quarter. Hence, the system is backward-looking.

162. At only four thirds of observed rates, the usury rate is a binding constraint in many cases. Especially at very low levels of market interest rates, as observed now, it does not allow an adequate pricing of risk. Moreover, because of its backward-looking nature, it becomes more binding whenever monetary policy tightens, because it can take 6 months or more—especially in case of a rapid tightening of monetary policy—before a change in policy and market interest rates is fully reflected in the usury rate. As a result, the usury rate could either reinforce or blunt the impact of monetary policy, depending on the circumstances and on banks' behavior. If banks refuse to lend whenever they cannot price risk adequately, they should reduce their lending to more risky borrowers whenever a monetary tightening reduces their scope to charge a risk premium. On the other hand, if banks tend to lend even if they cannot fully charge a risky borrower for the risk he represents, monetary policy would be blunted because in a tightening phase, lending rates (to risky borrowers) would only fully adjust to the higher policy rates with a delay in the order of magnitude of 3–7 months. The effect of the usury rate is also asymmetrical. In case of a loosening of monetary policy, there should not be a delay in the downward adjustment of interest rates.

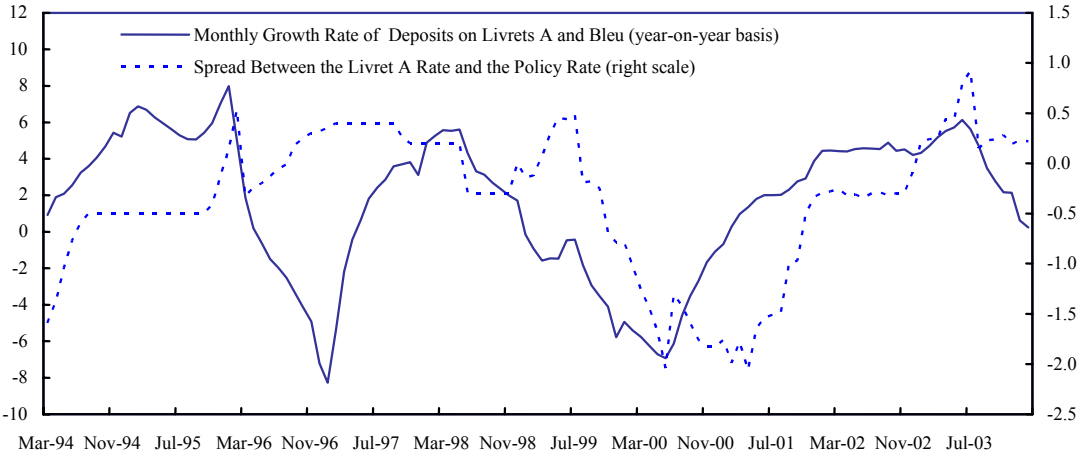
Centralization of deposits

163. A significant share of the funds collected through administrative savings products are centralized in a national savings fund, the *Fonds d'Epargne* (FdE). This centralization applies to all funds collected in the *Livrets A* and *Livrets bleu*, (virtually) all other deposits collected by *La Poste*, and parts of the funds collected in *Codevi* and some other accounts. As of end-2003, €217 billion was centralized in the FdE, out of a total of about €529 billion in administered deposits and €1,073 billion in bank deposits (Table 28). The collecting

institutions generally receive a remuneration to cover their collection costs, expressed as a percentage of their stock of centralized deposits of a given instrument.

164. The centralization of deposits could introduce a degree of instability in the banks' deposit base, in function of the spread between the *Livret A* rate and market rates. If monetary policy is loosened, driving down market interest rates, unregulated bank deposit rates would tend to follow market rates down. However, if the *Livret A* rate remains unchanged, administered savings products become more attractive relative to alternative bank deposits. As a result, savers will tend to redirect their savings toward the administered savings products. As a result of centralization and of the oligopoly on the distribution of the *Livret A* and *bleu*,[78] this will imply a net loss of resources for the banks. Overall, a rising spread between the *Livret A* rate and the policy rate will put downward pressure on banks' resources, while a declining spread will do the opposite. This could partially undo the normal effects of monetary policy on banks' liquidity. This effect is, to some extent, visible in Figure 25.

Figure 25. Growth of Deposits in *Livrets A and* Bleu and Spread Between the *Livret A* and Policy Rates (In percent)



Sources: *Banque de France;* IMF, IFS; and IMF staff calculations.

165. In practice, however, the liquidity effects have been contained because banks have sought to maintain the rates on their other deposit products at levels that are competitive with the *Livret A* rate. Hence, deviations between the *Livret A* and market rates have impacted more on banks' cost of resources than on their liquidity. An additional factor limiting the

[78] Only *La Poste* and the *Caisses d'Epargne* can distribute the *Livret A*. The distribution of the *livret bleu*, which for customers is in practice the same as a *Livret A*, is limited to *Crédit Mutuel*.

liquidity effects is the fact that the most sophisticated and proactive savers are often the ones who have already reached the limit of their *Livret A* deposits.

166. The FdE is managed by a state-owned financial institution, the *Caisse de Dépôt et Consignation* (CDC), in function of certain public policy objectives. The most important of these is the financing of social housing projects, but funds are also invested in loans to local public authorities and some other projects (Table 29). However, half of the assets of the FdE are invested in financial markets, mainly in government securities.

Table 29. France: Assets of *Fonds d'Epargne*, end-2002

	Amount (In billions of euros)	In percent of total
Loans	111.5	49.2
Housing-related loans	85.2	37.6
Equipment loans	6.0	2.6
Other loans	20.3	9.0
Securities	112.5	49.6
Shares	5.2	2.3
Public-sector securities and assimilated	66.5	29.3
Bonds and other fixed-income securities	40.8	18.0
Other assets	2.7	1.2
Total assets	226.7	100.0

Source: CDC annual reports; and IMF staff calculations.

167. On the asset side, the management of the FdE on the basis of public policy principles is likely to reduce the sensitivity of the centralized part of the banking system to economic conditions in general and to the stance of monetary policy in particular. The demand for loans from the FdE is determined to a large extent by public (policy) needs, and is relatively insensitive to interest rates. Conversely, the supply of funds to a large extent adjusts passively to demand, as surplus funds are invested in financial markets. If, as described above, the spread between administered and market rates increases, leading to increasing inflows into the FdE, that is unlikely to lead to an increase in loans provided by the FdE. To the contrary, since social housing companies can also borrow from other sources, a high spread will tempt them to borrow elsewhere rather than from the FdE. In combination with the effects described above, this could lead to a reduction in the supply of bank credit in times of a loosening of monetary policy that is not accompanied by a reduction in the *Livret A* rate. The reason is that the increased spread encourages depositors to move their savings toward centralized deposits and at the demand side discourages the FdE's borrowers

from taking up new loans. As a result, an increased share of deposits is invested in euro-area financial markets instead of being used to finance loans.

Restrictions on the use of administered deposits (earmarking)

168. Most deposits collected through administered savings schemes can only be used for specific purposes. The funds centralized in the FdE can only be used for certain public policy objectives; PEL and *Comptes d'Epargne-Logement* (CEL) deposits can only be invested in mortgage loans, some other real estate-related assets, and energy-saving projects; and *Codevi* deposits can only be used for loans to small and medium sized companies. Overall, this earmarking of banks' funds reduces the asset-side flexibility in the balance sheet of the banking system (including FdE), and it may lead to incentives that are not aligned with changes in monetary policy. For example, if monetary policy is loosened, leading to lower market rates and unregulated deposit rates, households may increase their deposits in older, higher-yielding PELs. These increased inflows could push banks to increase their mortgage lending, potentially at the expense of other loans. Hence, changes in the stance of monetary policy could conceivably lead to a redirection of lending that may, to some extent, blunt the overall impact of the change in monetary policy. This would especially be the case if the sectors favored by the earmarking rules have an inelastic demand for loans.

Differential tax treatment of investments

169. The tax system favors certain investments over others. For example, there are tax breaks for equity investments in small and medium sized enterprises, there are differences in tax treatment between bonds and shares, and often the government promotes specific investments by putting in place tailored tax breaks (for example, for buying a car).

170. Overall, these tax incentives tend to increase the cost of reallocating investments in function of changing circumstances, and hence reduce economic agents' ability to react to adjustments in the monetary policy stance. This is especially the case when tax advantages are contingent on economic agents maintaining their investments for a prescribed period.

171. It must be noted that this is not a typically French phenomenon. Most countries attempt to promote investments in certain privileged sectors through tax incentives. In the United States, for example, the tax system strongly encourages investments in housing.

Structural features of the banking sector

Balance sheet structure

172. Given the nonremuneration of demand deposits, and the strong tax incentives favoring life insurance products over bank deposits, one would expect bank deposits in general, and demand deposits in particular, to be lower in France than would otherwise be the case. A comparison of the structure of the French banking system's balance sheet (including the CDC), with that of its Euro-area peers, appears to confirm this (Tables 30 and 31). The tables show not only that, relative to the banking system's balance sheet total as well as to

GDP, deposits and demand deposits are a significantly less important resource in France than elsewhere. This is further exacerbated by the fact that a significant part of these reduced resources are centralized at the CDC (included here). All in all, noncentralized deposits available to the banking system amount to only 51 percent of GDP, against 91 percent in the rest of the euro-area.

173. This relative shortage of deposits appears to be associated with an overall lower level of bank intermediation, as bank credit is also significantly less important in France than in other euro-area countries. Lending by French banks (excluding CDC) amounts to about 69 percent of GDP, as against 101 percent for the banks of the rest of the euro-area. In fact, relative to the deposits they have available, the French banking system does as well as their euro-area colleagues. The aggregate loan-to-deposit ratio in France is 1.14, slightly better but close to that in the rest of the euro-area, at 1.11. However, the French average is dragged down by the CDC's low loan-to-deposit ratio. Excluding the CDC improves the ratio to about 1.35. Finally, the comparison also appears to indicate that money market funds are especially well developed in France, which is most likely related to the existence of the *ni-ni*.

Table 30. France: Structure of French and Euro-Area Banking System Balance Sheets, End-2002
(In percent of total assets)

	French Banks	Non-French Euro-area Banks	Euro-area Banks
Assets			
Interbank loans to euro-area MFIs	23.0	20.8	21.3
Credit to euro-area non-MFI borrowers	27.8	38.3	36.0
Of which: lending for house purchases	8.4	12.4	11.5
Of which: lending by CDC	2.7	0.0	0.6
Euro-area securities	25.0	17.1	18.9
Non-euro-area and other assets	24.1	23.8	23.8
Total	100.0	100.0	100.0
Liabilities			
Interbank borrowing from euro-area MFIs	26.4	20.7	21.9
Deposits of euro-area non-MFI resident	24.5	34.3	32.1
Of which: demand deposits	7.0	11.5	10.5
Of which: deposits centralized at the CDC	5.8	0.0	1.3
Debt securities	20.8	18.1	18.7
Of which: money market funds	7.3	1.6	2.8
External and other liabilities	21.5	21.3	21.3
Capital and reserves	6.8	5.6	5.9
Total	100.0	100.0	100.0

Sources: ECM Monthly Bulletin; diverse *Banque de France* publications; CDC annual reports, and IMF staff calculations.

In practice, however, investments in the money market come mainly from companies, not from individuals, which would suggest that the latter have a lower ability to circumvent the *ni-ni*.

174. The relatively low level of bank intermediation implies that any transmission channel that depends on the banking system will tend to be weaker in France than in the rest of the euro-area.

Table 31. France: Structure of French and Euro-Area Banking Systems Balance Sheets, Relative to GDP, End-2002
(In percent of GDP)

	French banks	Non-French Euro-area banks	Euro-area banks
Assets			
Interbank loans to euro-area MFIs	62.9	55.2	56.8
Credit to euro-area non-MFI borrowers	76.0	101.3	95.9
Of which: lending for house purchases	23.0	32.9	30.8
Of which: lending by CDC	7.3	0.0	1.6
Euro-area securities	68.4	45.4	50.3
Non-euro-area and other assets	66.0	62.9	63.6
Total	273.3	264.8	266.6
Liabilities			
Interbank borrowing from euro-area MFIs	72.1	54.7	58.5
Deposits of euro-area non-MFI residents	66.9	90.9	85.7
Of which: demand deposits	19.1	30.5	28.1
Of which: deposits centralized at the CDC	15.9	0.0	3.4
Debt securities	56.8	47.9	49.8
Of which: money market funds	20.0	4.1	7.5
External and other liabilities	58.9	56.4	56.9
Capital and reserves	18.7	14.9	15.7
Total	273.3	264.8	266.6

Sources: ECB Monthly Bulletin; diverse *Banque de France* publications; CDC; annual reports and IMF staff calculations.

Competitive situation

175. Competitive forces within the banking system, economic rationale and the quest for "national champions" have led to significant concentration in the French banking sector, which is now dominated by six large banks. Although there is no conclusive evidence that the level of competition has deteriorated, banks have been developing a number of strategies to bind their customers. Among those are aggressive pricing on mortgage loans, the sale of packages of products, and the use of the branch network and personalized service as a significant element of competition.[79] In part thanks to such strategies, banks now rely on fees and commissions for a significant part of their profitability and clients face significant disincentives to changing banks. Those factors may contribute to a relatively low price flexibility and sensitivity (in particular, interest rate sensitivity) of the retail banking market, which in turn could reduce the impact of the interest rate channel of monetary policy.

[79] Overall, the French banking system's branch network has resumed growing in the last few years.

Role of the remaining public financial institutions

176. Two state-owned financial institutions continue to play an important role in the financial system. They are the *Caisse de Dépôt et Consignation* (CDC) and *La Poste*, the post office system. The main effect of the presence of these financial institutions in the market is that, through their less commercially oriented policies, their importance and the competitive pressure they exert, they tend to reduce the overall sensitivity of the financial system to market forces.

177. Apart from managing the FdE, the CDC also collects certain legally protected deposits (€37 billion at end-2003), which it invests in a variety of loans, financial market instruments and equity investments. To process and service those deposits, the CDC has an agreement to use the regional offices of the Treasury as a branch network. The CDC also has significant own funds (€12.5 billion), which it invests similarly. These investments tend to be based not solely on commercial grounds, but also on public policy objectives. For example, the asset portfolio includes long-term investments in loans for urban renewal and public housing projects, credit to "social economy" projects, and seed capital for small and medium-sized enterprises. Overall, the equity investment policy of the CDC has recently been reoriented toward taking stakes in small and medium-sized companies that cannot find financing in the market, and nurturing those companies to growth. Recourse is also made to the CDC for certain public interventions. For example, during 2003 CDC provided a bridge loan at the request of the government, as part of the government-led package in support of Alstom. The public policy nature of investment decisions reduces the sensitivity of CDC's asset portfolio to interest rates and the general economic environment. Hence it may reduce sensitivity to the stance of monetary policy. In addition, the CDC manages a significant part of France's pension funds and maintains large stakes in two important financial institutions, the *Caisses d'Epargne* and the insurance company CNP.

178. *La Poste* conducts only limited banking services. It can collect most kinds of deposits, but in terms of credits, *La Poste* can only provide PEL or CEL-based mortgage loans and associated unregulated mortgage loans. Most of the deposits it collects (the main exception being the deposits in postal checking accounts) are centralized in the FdE and managed by the CDC. With 13,000 post offices providing financial services, it has the largest branch network in the French banking industry. And because this network is shared between the financial and mail activities, the distribution costs per distributed financial product are reduced and not clearly identifiable. *La Poste* also benefits from certain tax and other advantages. The main impact of the presence of *La Poste* in the market is that it tends to provide strong competition to other banks on specific products and has greatly contributed to the success of the administered savings products. Because almost all of the administered deposits it collects are centralized, it reinforces the impact of centralization as discussed above. As a distributor of mortgage loans, it has offered very competitive rates (dumping rates, according to some other bankers) and gained significant market share in recent years, in part because the arrangement it worked under rewarded it for the volume of loans it sold, regardless of price. The mortgage loans it sold stayed off its balance sheet (remaining on that of the FdE), and *La Poste* only received a fixed remuneration based on its outstanding stock

of mortgage loans. As a result of its often less commercial behavior and its extensive network, the presence of *La Poste* in the market has reduced the flexibility of other banks to adapt to changing circumstances, including changes in the stance of monetary policy.

179. Recent reform efforts have gone in the direction of placing *La Poste* on a more commercial footing. On February 26, 2004, a new convention was signed between the CDC and *La Poste* that modified the way it was remunerated for distributing mortgage loans, effective retroactively from January 1, 2004 onwards. Under the new system, instead of a fixed commission, *La Poste* receives the profits on its mortgage portfolio, which however, remains on the balance sheet of the FdE. *La Poste* has also requested to be able to distribute mortgage loans not connected to a PEL, as well as consumer loans. The government, has in principle, agreed to the first of these requests, but on condition that the financial services of *La Poste* are reorganized into a separate banking entity, licensed by the CECEI, supervised by the *Commission Bancaire*, and subject to the same legal and regulatory framework as other banks. The new postal bank will also need to have its own accounts, separate from postal services, to increase transparency and avoid cross-subsidization. Finally, with the exception of the *Livret A* and deposits collected through a few other administered savings schemes, the postal bank will manage its own balance sheet, rather than passing most of the deposits it collects on to the FdE.

Idiosyncrasies related to asset markets

Housing market

180. The French housing market is characterized by a relatively low turnover and by some rigidity in financing arrangements. Typical French households tend to buy a house only once or twice in their lifetime, if at all. Home ownership rates are relatively low in France,[80] perhaps to some extent because of the widespread availability of low-cost rental housing through social housing programs. An important element in the low turnover on the housing market is the transaction costs involved. A sale of real property needs to be done through a notary. The charges a notary applies to such transactions include 4.89 percent in registration rights (a tax), an honorarium of between 0.825 (on the amount of the transaction above a threshold of €16,769.40) and 5 percent (on the part of the transaction amount up to €3,049), and diverse costs of between €458 and €1,525[81] (Table 32). Real estate agents typically charge a commission of 4–10 percent, depending on the size of the transaction.[82]

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[80] According to Eurostat, 53 percent of French households owned their accommodation in 1998, against 59 percent on average in the EU, 82 percent in Spain, 71 percent in Belgium and Italy, and 69 percent in the United Kingdom. However, the French rate of ownership was higher than in Germany (41 percent), the Netherlands, and Austria (both 51 percent).

[81] Source: www.guideducrédit.com

[82] Source: www.lemoneymag.com

181. In terms of financing, the French mortgage system (*hypothèque*) is relatively expensive and inflexible, requires extensive formalities that take time to arrange, and does not provide the lender with full security. The costs related to establishing a mortgage vary depending on the type of loan, but they typically include an honorarium for the notary of between 0.66 percent (for very large amounts) and 3.9 percent (for very small amounts), a tax of 0.61 percent (waived for some types of loans, including PEL loans), and a few hundred euros in various costs. In most cases, these costs total between 1.5 percent and 5.0 percent of the loan amount.[83] If the mortgaged property is sold before two years after the end of the original loan maturity, an additional fee of between 0.5 percent and 2.0 percent is due to lift the mortgage *(mainlevée d'hypothèque*). A somewhat cheaper alternative is a notarized right for a lender to be paid ahead of almost all other creditors (*Privilège de prêteur de deniers*, or PPD). A PPD is subject to similar costs and fees as a mortgage, including the *mainlevée*, but it typically costs about a third less. Realizing a mortgage is time consuming, costly and not always successful. It requires a court procedure and, according to bankers, courts tend to sympathize with debtors and are reluctant to evict families from their house. The procedure routinely takes more than a year.

182. In response to the high costs and other disadvantages of mortgages and PPDs, alternative guarantee mechanisms have been developed. In many cases, banks now lend without mortgage or PPD, instead accepting a guarantee (*caution*) provided by a third party. While such a third party could be another person (e.g., a relative), most often it is a specialized financial company, such as *Crédit Logement*, a company owned by several large banks. For qualifying borrowers, these institutions guarantee the servicing of the loan, in return for an upfront fee paid by the borrower. The fee typically consists of two parts: a regular fee, and participation in the guarantee company's reserve fund. Of the latter contribution, 75 percent is reimbursed at the end of the guarantee arrangement (regardless of whether this end comes on or ahead of schedule). Apart from significantly lower costs, the *caution* offers greater flexibility and other advantages. It does not penalize early repayments of loans or the sale of a property before the loan that financed it reaches maturity. It also allows a more flexible approach to a borrower's financial difficulties. Guarantee companies advertise that in such cases, they seek the best possible solution in consultation with borrower and lender. If a sale of the property is needed to overcome these financial difficulties, guarantee companies allow a borrower to sell the property himself, rather than to resort to a forced sale through an auction, which tends to yield a lower price.

[83] The source for these estimates, and for some of the other estimates provided in this paragraph, is: www.lemoneymag.com.

183. Apart from the mortgage or guarantee costs, mortgage loans come with a one-time processing cost charged by the lender, which is typically about 1 percent of the loan amount (*frais de dossier*). Borrowers are also usually required to insure their mortgage loan in cases of death or disability, at a premium of about 0.4 percent of the loan amount. In many cases, this premium is not adjusted in line with the declining principal during the lifetime of the loan.

Table 32. Typical Transaction Costs Charged by the Notary on the Sale of Existing Residential Real Estate

Transaction Amount	Transaction Costs	*Of which:* Taxes	Transaction Costs (In percent of transaction amount)
	(In euros)		
10,000	1,794	499	17.9
20,000	2,458	998	12.3
50,000	4,251	2,495	8.5
100,000	7,240	4,990	7.2
250,000	16,205	12,475	6.5
500,000	31,146	24,950	6.2
1,000,000	61,030	49,900	6.1
10,000,000	598,933	498,100	6.0

Sources: *Agence Nationale Pour l'Information sur le Logement* website (www.anil.org); and IMF staff estimates.

184. Refinancing of mortgages happens in France but is significantly less frequent than in the United States. The main reason is that the level of fixed costs incurred in such an operation makes it profitable to refinance only in case of significant declines in interest rates. By law, early repayments of mortgage loans must be allowed at a penalty that can be negotiated freely between lender and borrower, subject to a cap equal to the lower of 3 percent of the amount repaid early or six months of interest.

185. As noted by the ECB (2003), only 14 percent of mortgage loans in France are at variable rates, which is in line with the situation in countries such as Belgium, Germany, and the Netherlands, but contrasts starkly with a number of other euro-area countries, most notably Spain, Italy, Luxembourg, and Ireland. Another factor putting France apart from most of the rest of the euro-area is its low level of mortgage debt, 22 percent of GDP in 2001. Within the euro-area, only Greece, Italy, and Finland scored lower.

186. In a study comparing European mortgage markets,[84] Low, Sebag-Montefiore, and Dübel (2003) find that, compared to other European countries, France's mortgage market is characterized by:

- low profitability (the lowest in their sample);
- significant government involvement;
- low loan-to-value (LTV) ratios;
- relatively short loan terms (in part because of the requirement that people pay off their loan within their working lifetime, in combination with the expected significant prior savings);
- good product variation in some respects;
- limited product variation in other respects (in particular: limited availability of second mortgages and no possibility for cash-out mortgage borrowing/home equity loans);
- mortgage lending is focused on people in their 30s and 40s;
- relatively low transparency;
- the existence of usury legislation;
- branch-driven distribution; and
- high transaction costs.

187. These features of the French housing and mortgage markets make residential real estate a relatively inflexible element in French households' asset portfolios. The low turnover likely affects the speed of price adjustments and contributes to a perception of housing as an asset providing a service and less as an asset with a financial value, reducing wealth effects. The facts that most loans are fixed-rate and that refinancing is relatively expensive, make households' (mortgage) interest rate costs largely insensitive to changes in market interest rates. And the high transaction costs and absence of cash-out options limit households' ability to use what is usually their most valuable asset as a financial tool to adjust to changing financial circumstances.

Equity markets

188. Compared to other countries, French households do not hold large amounts of listed shares in their portfolio. In 2000, around the peak of the recent equity bull market, only 5 percent of households' financial assets were directly invested in listed shares (Table 38). To some extent, this was compensated by indirect holdings through mutual funds and insurance policies, as well as by relatively high estimated holdings of unlisted shares. However, this investment profile, in combination with the lack of visibility regarding the value of unlisted shares, is likely to render French households' perception of their balance sheet relatively insensitive to developments in equity markets. This in turn reduces the relevance of the asset price channel of monetary policy (in terms of wealth effects).

[84] The countries studied are Denmark, France, Germany, Italy, the Netherlands, Portugal, Spain, and the United Kingdom.

Idiosyncrasies Related to the Structure of the French Economy

Macroeconomic idiosyncrasies

189. For monetary policy to have a similar impact across euro-area countries, the national economies must be structurally similar. The literature generally finds that this is not the case, in the sense that there remain important idiosyncratic components in the economic growth dynamics of euro-area member states. Nadal de Simone (2002), for example, finds that the French economy is relatively less influenced by a common component in euro-area economic growth than most other member economies, and relatively more by idiosyncratic factors.

190. Compared to the rest of the euro area, the French economy trades less with the non-euro-area world (Table 33). This is likely to render the French economy less sensitive (in a direct way) to variations in the euro's exchange rate, and hence it reduces the importance of the exchange rate channel in France, compared with the rest of the euro area.

Table 33. Trade (Exports Plus Imports) with Non-Euro-Area Countries

(In percent of GDP)

	Total	Non-euro EU	USA	Japan	Other
Euro-area	28.1	6.2	3.8	1.1	16.9
Euro-area excluding France	30.2	6.8	4.1	1.2	18.2
France	20.5	4.3	2.8	1.0	12.4

Sources: ECB; INSEE; and IMF staff calculations.

191. The structure of France's GDP is similar to that in the rest of the euro-area, but household consumption and gross fixed capital formation (investment) are somewhat less important, mainly because government consumption is higher than elsewhere (Table 34). In theory, government consumption is the component of GDP that is least sensitive to monetary policy, while investment is most sensitive and household consumption (in countries other than France) tends to react to monetary policy as well. Overall, this implies that the composition of France's GDP is likely to make its economy somewhat less sensitive to changes in monetary policy, compared to the rest of the euro-area.

Table 34. Structure of Gross Domestic Product, 2001
(In percent of GDP)

	Household Consumption	Government Consumption	Gross Fixed Capital Formation	External Balance
Euro-area	57.3	19.9	21.1	1.7
France	55.0	23.3	20.2	1.6

Source: Eurostat.

192. On the supply side, differences between the structure of the French economy and that of the rest of the Euro-area are also limited (Table 35). However, manufacturing, construction and trade, transport and communication are relatively less important in France, while services play a more prominent role than in the rest of the Euro-area. To the extent that the former sectors are more sensitive to interest rates (e.g., because they are more capital intensive), this could also contribute to an overall lower interest rate sensitivity of the French economy.

Table 35. France: Structure of Gross Value Added, 2001
(In percent of total economy)

	Agriculture	Manufacturing	Construction	Trade Transport Communi-cation	Financial Services Business Activities	Other Services
Euro-area	2.4	22.6	5.5	21.2	27.1	21.2
France	2.8	20.1	4.7	19.3	30.1	23.1

Source: Eurostat.

Low leverage of households

193. As in other countries, French households are net creditors. However, both compared to their foreign peers (Table 36) and in absolute terms (Table 37), French households' income and balance sheet leverage is low. As a result, the income effects of interest rates changes (once fully reflected in interest rates on assets and liabilities) tend to be stronger than in countries with higher levels of household leverage. Interest rates changes are also less likely to lead to balance sheet problems among French households. The composition of

households' assets and liabilities is comparable to that in other major continental European countries except for the greater share of wealth held in the form of insurance claims rather than direct shareholdings or asset in mutual and pension funds (Table 38).

Table 36. France: Cross-Country Comparison of Household Debt and Financial Wealth, 2000

Country	Financial Liabilities (In percent of gross disposable income)	Financial Wealth (In percent of gross disposable income)	Leverage (In percent)
France	54	308	18
Netherlands	177	583	30
United Kingdom	116	456	26
Italy	45	338	13
Spain	72	286	25
Germany	104	222	47
United States	90	405	22
Japan	100	439	23

Source: Babeau and Sbano (2003).

Table 37. France: Overall Balance Sheet of the French Household Sector, end-2002 (Provisional)
(In billions of euros)

	Assets	Liabilities
Cash	32.6	-
Deposits	865.7	-
Debt securities	63.3	0.3
Credits	19.9	587.3
Equity	680.7	-
Mutual funds	241.3	-
Insurance claims	835.1	-
Other	107.9	171.4
(Financial) net worth		2,087.4
Total	2,846.4	2,846.4

Source: *Banque de France.*

Table 38. France: Cross-Country Comparison of the Composition of Households' Financial Assets and Liabilities, 2000

In percent in total financial assets or liabilities	France	Nether-lands	United Kingdom	Italy	Spain	Germany	United States	Japan
Assets								
Currency and deposits	30.4	18.1	22.2	24.0	36.2	33.9	11.1	52.9
Money market funds	1.4	0.4	0.0	0.8	2.5	0.8	3.1	0.2
Securities other than shares	2.7	2.3	1.3	18.7	1.9	10.1	6.4	4.5
Directly-held listed shares	5.0	11.5	8.9	8.9	11.0	5.9	33.1	5.0
Directly-held unlisted shares	19.8	5.3	8.5	18.7	22.7	9.7		3.3
Mutual funds (other than money market mutual funds)	9.0	5.5	5.8	15.9	9.9	10.5	12.9	2.4
Insurance claims	23.3	15.4	27.5	6.2	6.2	13.6	7.1	17.7
Of which: unit-linked policies	*4.9*	*5.7*	*11.6*	*1.9*	*1.2*	*0.3*		
Pension funds	1.5	37.7	22.1	1.2	5.3	5.2	23.8	9.7
Others	6.9	3.8	3.7	5.5	4.3	10.2	2.5	4.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Liabilities								
Mortgage debt	61.0	79.0		41.0	64.0	63.0	69.0	55.0
Consumer credit	20.0	6.0		8.0	24.0	15.0	23.0	13.0
Professional loans	19.0	16.0		51.0	12.0	21.0	8.0	32.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Babeau and Sbano (2003).

Table 39. France: Overview of Administered Savings Products

Product	**Eligibility**	**Remuneration**	**Tax treatment**	**Deposit Limits** 1/	**Withdrawal rules/ term**	**Distribution by**	**Destination of funds**
Livret A	Individuals or legal entities. Maximum one *Livret A* or *livret bleu* per person	Determined by BdF, on the basis of a government-designed formula (2.25%)	Tax exempt	€15,300 (individuals) €76,500 (legal entities)	Freely withdrawable, but interest is only paid until the end of the most recent *quinzaine* 2/	*Caisses d'Épargne La Poste*	CDC (100%)
Livret bleu	Individuals or legal entities. Maximum one *Livret A* or *livret bleu* per person	Same as *Livret A* (2.25%)	1/3 of interest is taxed, but tax is paid by *Crédit Mutuel*	€15,300 (individuals) €76,500 (legal entities)	Freely withdrawable, but interest is only paid until the end of the most recent *quinzaine*	*Crédit Mutuel*	CDC (100%)
Codevi	Individuals with tax residence in France. Maximum one per person and two per household	Same as *Livret A* (2.25%)	Tax exempt	€4,600	Freely withdrawable, but interest is only paid until the end of the most recent *quinzaine* and withdrawals can only take place in branch were the account is held	Free distribution by French financial institutions	CDC: 6.5–9.0 % of deposits collected by banks 50% of deposits collected by *Caisses d'Épargne* 100% of deposits collected by *La Poste* Small and medium enterprises(SMEs): deposits not centralized at CDC must be onlent to SMEs
LEP	Low-income individuals with tax residence in France 3/ Maximum one per person and two per household.	Set by the government (3.25%) 4/	Tax exempt	€7,700		Free distribution by French financial institutions	CDC: 85% of deposits 100% of deposits collected by *La Poste*
Livret jeune	Individuals with tax residence in	Free, but at least equal to *Livret A*	Tax exempt	€1,600	Freely withdrawable, but	Free distribution by French financial	

Product	Eligibility	Remuneration	Tax treatment	Deposit Limits 1/	Withdrawal rules/ term	Distribution by	Destination of funds
	France, 12–25 years old				interest is only paid until the end of the most recent *quinzaine*	institutions	
CEL	One per individual	Set by the government. Currently 1.5%, plus an interest rate subsidy of 0.75% paid by the state if and when a loan is taken up. 5/	Tax exempt, except social taxes (10%)	€15,300	Freely withdrawable. Gives right, after 18 months, to a mortgage loan of up to €23,000 at a predetermined low interest rate.	Free distribution by French financial institutions	Deposits stay in institution that collected them, except in the case of *La Poste*, which forwards them to CDC
PEL	One per individual	Set by the government. Currently 2.5% plus an interest rate subsidy of 1 % paid by the state if and when a loan is taken up. 5/	Tax exempt, except social taxes (10%)	€61,200 (excl. capitalized interests)	Min 4, max 10 year term. Gives right to mortgage loan up to €92,000 at a predetermined interest rate.	Free distribution by French financial institutions	Deposits stay in institution that collected them, except in the case of *La Poste*, which forwards them to CDC
Other *livrets*	No restrictions	No restrictions	Fully taxed (25%)	No limit		Free distribution by French financial institutions	Collecting institutions

Sources: IMF (1999), CNCT (2002), www.patrimoine.com (2003), www.ctrop.net (2003), Nasse and Noyer (2003)

1/ As of December 31, 2001, in euros.

2/ *Quinzaine* = standard two-week period used for the calculation of interest.

3/ In 2003, the threshold for eligibility for an LEP was an income tax of 672 euros or less paid in 2002 on an individual's 2001 income. This threshold is revised each year.

4/ In addition to the ex-ante published rate of remuneration, deposits in a LEP receive an additional ex-post compensatory remuneration in case inflation is higher than the administered interest rate. When applicable, this compensatory remuneration is set by arrest issued by the MINEFI. The rate on the LEP was reduced from 4.25 percent to 3.25 percent on August 1, 2004.

5/ For plans opened before December 12, 2002, the interest rate subsidy is unconditional and paid on a regular basis, together with the interest paid by the bank. For plans opened after that date, the interest rate subsidy is paid as a lump sum at the closing of the PEL-based mortgage loan.

Table 40. France: Definition of Variables Used

Variable	Source	Period of Observation	Remarks
Consumption	Quarterly Accounts - INSEE Variable TD_P3M_D1	1978:01 - 2003:04	
Real disposable income	Quarterly Accounts - INSEE Variable TD_B6_S143	1978:01 - 2003:04	Deflated by consumption price (TD_P3M_D3/TD_P3M_D1)
Inflation rate	Quarterly Accounts - INSEE		Derived from consumption price index Derived from consumption price index
Nominal policy rate	International Financial Statistics	1974:01 - 2004:01	French repurchase agreement rate up to 1998:04 European overnight interbank rate from 1999:01
10-Year government bond rate	International Financial Statistics	1970:01 - 2003:04	
Nominal *Livret A* rate	*Banque de France 1/*	1971:01 - 2004:01	
Nominal PEL rate	*Banque de France 1/*	1971:01 - 2004:01	Deposit rate for new contracts
Nominal consumption credit rates Rate for short-term loans below €1524 Overdraft rate Rate for short-term loans above €1524 Rate for medium- and long-term loans	*Banque de France 1/*	1990:02 - 2004:01	Definitions of the rates derived from the usury legislation
Nominal mortgage rates	*Banque de France 1/*	1990:02 - 2004:01	Rates for mortgages at fixed and variable rates
Nominal credit rates to enterprises Overdraft rate Discount rate Rate for other short-term loans Rate for medium- and long-term loans	*Banque de France 1/*	1984:02 - 2004:01	Definitions of the rates derived from the usury legislation
All real rates			Deflated using contemporary inflation

1/ The most recent observations of these series are available on the *Banque de France* website (http://www.banque-france.fr/)

$$\Delta y_t = \text{constant} + \text{trend} + \rho y_{t-1} + \text{Sum}\,(\delta_i \Delta y_{t-i}) + \varepsilon_t$$

y	Lags 1/	Estimation Period	Statistics for ρ=0 for the Variable y 2/ 5 % Critical Value = -2.89	Statistics for ρ=0 for the Variable Δy (Without Trend) 2/ 5 % Critical Value = -1.95
Consumption	1	1979:01 - 2003:04	-1.34	-3.27
Real disposable income	3	1979:01 - 2003:05	-1.23	-2.71

$$\Delta y_t = \text{constant} + \rho y_{t-1} + \text{sum}\,(\delta_i \Delta y_{t-i}) + \varepsilon_t$$

y	Lags	Estimation Period	Statistics for ρ=0 for the Variable y 2/ 5 % Critical Value = -1.95	Statistics for ρ=0 for the Variable Δy (Without Trend) 2/ 5 % Critical Value = -1.95
Inflation	3	1979:01- 2003:04	-0.39	-5.59
Real policy rate	2	1979:01- 2003:04	-0.75	-8.22
Real consumption credit rate	1	1990:02 - 2003:04	-0.52	-5.31
Real *Livret A* rate	3	1979:01- 2003:04	-0.83	-7.09
Nominal policy rate	4	1979:01- 2003:04	-1.19	-7.09
Nominal consumption credit rate	8	1990:02 - 2003:04	-0.74	-3.79
Nominal mortgage rate	8	1990:02 - 2003:04	0.13	-3.10
Nominal *Livret A* rate	8	1990:02 - 2003:04	-0.37	-6.28
Nominal PEL rate	8	1979:01- 2003:04	-0.24	-6.35

Source: IMF staff calculations.

1/ The number of lags is determined through the maximization of the Schwarz criteria.

2/ ADF statistic is for H0: ρ=0, presence of a unit root.

Table 42. France: Estimation of the Long-Term Equation for Short-Term Market Credit Interest Rate Using Phillips-Loretan Nonlinear Estimator

Market Credit Interest Rate = Cointegration Relation + Sum (Lagged Variables) + Sum (Forward Variables)
ρ (Market Credit Interest Rate (-1) – Constant – Cointegration Relation (-1))

All variables in levels - Figures in parenthesis are t-statistics, and significance at the 5-percent level is signaled with an asterisk.

	Short-Term Consumption Credit Rates				Short-Term Credit Rates for Enterprises		
	Rate for Loans Below €1,524		Overdraft Rate	Rate for Loans Above €1,524	Discount Rate	Overdraft Rate	Rate for Other Short-Term Loans
Real policy rate	0.23	0.9	1.89	2.26	2.33	2.34	1.87
	(0.15)	(2.88)*	(2.29)*	(11.2)*	(7.38)*	(4.86)*	(4.97)*
Spread between the *Livret A* rate and the policy rate	-0.72	---	1.66	1.49	1.76	1.69	1.05
	(-0.34)	---	(1.41)	(5.51)*	(3.93)*	(2.43)*	(1.93)*
ρ	0.92	0.93	0.84	0.67	0.61	0.70	0.54
	(12.3)*	(13.0)*	(9.61)*	(7.09)*	(5.29)*	(6.34)*	(3.74)*
Estimation period	1990:03-2003:03	1990:03-2003:03	1990:03-2003:03	1990:03-2003:03	1990:02-2003:03	1990:02-2003:03	1990:02-2003:03
Degrees of freedom	35	43	35	35	36	36	36
Standard error of dependent variable	2.23	2.23	1.77	2.65	2.53	2.61	2.7
Standard error of estimate	0.51	0.48	0.37	0.26	0.34	0.43	0.5
DW	2.02	2.02	1.70	1.64	1.99	1.89	1.97

Source: IMF staff calculations.

ERROR-CORRECTION MODEL FOR MARKET CREDIT INTEREST RATES

(Figures in parenthesis are t-statistics; significance at the 5-percent level is signaled with an asterisk for the short-term dynamic and the correction-error coefficient[85])

Short Term Market Credit Interest Rates

With the following conventions:
r_{policy} = Nominal Policy Rate
r_{LivA} = Nominal *Livret A* Rate
$spread_{LivA}$ = Spread Between the *Livret A* Rate and the Policy Rate

Rate for Consumer Loans Below €1,524

$$\Delta r = \underset{(c)}{0.83} + \underset{(1.38)}{0.20}\,\Delta r_{-3} + \underset{(1.65)}{0.40}\,\Delta r_{LivA-2} + \underset{(2.34)*}{0.52}\,\Delta r_{policy-1} - \underset{(-1.55)}{0.45}\,\Delta r_{policy-2} - \underset{(-3.57)*}{0.19}\left[r_{-1} - \underset{(-6.52)}{8.09} - \underset{(5.26)}{0.73}\, r_{policy-1} \right]$$

$$DW = 1.80\,,\ SEDepVariable = 0.54\,,\ SEEstimate = 0.50$$

$$Estimation\ Period = 1991:02 - 2003:03$$

Overdraft Rate on Consumer Accounts

$$\Delta r = \underset{(c)}{0.20} + \underset{(2.30)*}{0.31}\,\Delta r_{1} + \underset{(1.29)}{0.20}\,\Delta r_{-2} + \underset{(3.20)*}{0.33}\,\Delta r_{-4} + \underset{(3.76)*}{0.58}\,\Delta r_{policy} - \underset{(-1.72)}{0.43}\,\Delta r_{policy-2} - \underset{(-4.06)*}{0.41}\left[r_{-1} - \underset{(-17.0)}{8.79} - \underset{(6.71)}{1.08}\, r_{policy-1} - \underset{(2.60)}{0.54}\, spread_{LivA-1} \right]$$

$$DW = 1.83\,,\ SEDepVariable = 0.43\,,\ SEEstimate = 0.34$$

$$Estimation\ Period = 1991:03 - 2003:03$$

Rate for Consumer Loans Over €1,524

$$\Delta r = \underset{(2.02)*}{0.25}\,\Delta r_{-1} - \underset{(-2.50)*}{0.22}\,\Delta r_{-3} - \underset{(-3.78)*}{0.52}\,\Delta r_{LivA-2} - \underset{(-1.72)}{0.21}\,\Delta r_{LivA-3} - \underset{(-2.59)*}{0.35}\,\Delta r_{LivA-4} + \underset{(5.31)*}{0.68}\,\Delta r_{policy-1} - \underset{(-2.12)*}{0.36}\,\Delta r_{policy-2} + \underset{(1.96)*}{0.22}\,\Delta r_{policy-4} - \underset{(-4.09)*}{0.29}\left[r_{-1} - \underset{(-2.12)}{1.35} - \underset{(12.3)}{2.23}\, r_{policy-1} - \underset{(6.53)}{1.47}\, spread_{LivA-1} \right]$$

$$DW = 2.15\,,\ SEDepVariable = 0.34\,,\ SEEstimate = 0.23$$

$$Estimation\ Period = 1991:02 - 2003:03$$

[85] T-statistics in the long-term dynamic cannot be interpreted, their significance was assessed in previous steps, described in Appendices VI and VIII.

Discount Rate for Enterprises

$$\Delta r = \underset{(1.65)}{0.18}\Delta r_{-3} + \underset{(2.73)^*}{0.25}\Delta r_{-4} - \underset{(-2.54)^*}{0.66}\Delta r_{LivA-1} - \underset{(-4.00)^*}{0.85}\Delta r_{LivA-2} + \underset{(4.89)^*}{0.63}\Delta r_{policy} + \underset{(2.69)^*}{0.42}\Delta r_{policy-1}$$
$$- \underset{(-5.80)^*}{0.39}\left[r_{-1} + \underset{(3.51)}{2.03} - \underset{(13.0)}{2.43}\, r_{policy-1} - \underset{(7.50)}{1.87}\, spread_{LivA-1} \right]$$
$$DW = 2.02\,,\ SEDepVariable = 0.49\,,\ SEEstimate = 0.34$$
$$Estimation\ Period = 1991:01 - 2003:03$$

Overdraft Rate on Company Accounts

$$\Delta r = \underset{(1.92)}{0.18}\Delta r_{-2} + \underset{(2.46)^*}{0.19}\Delta r_{-3} + \underset{(3.38)^*}{0.33}\Delta r_{-4} - \underset{(-3.28)^*}{0.88}\Delta r_{LivA-1} - \underset{(-4.88)^*}{1.02}\Delta r_{LivA-2}$$
$$+ \underset{(4.98)^*}{0.71}\Delta r_{policy} + \underset{(1.66)}{0.33}\Delta r_{policy-1} - \underset{(-2.22)^*}{0.34}\Delta r_{policy-4}$$
$$- \underset{(-4.71)^*}{0.41}\left[r_{-1} + \underset{(1.99)}{1.22} - \underset{(10.1)}{2.14}\, r_{policy-1} - \underset{(5.07)}{1.47}\, spread_{LivA-1} \right]$$
$$DW = 1.81\,,\ SEDepVariable = 0.52\,,\ SEEstimate = 0.37$$
$$Estimation\ Period = 1991:01 - 2003:03$$

Rate for Other Short Term Loans to Enterprises

$$\Delta r = \underset{(2.52)^*}{0.27}\Delta r_{-1} + \underset{(1.82)}{0.16}\Delta r_{-2} + \underset{(1.90)}{0.23}\Delta r_{-4} - \underset{(-3.00)^*}{0.95}\Delta r_{LivA-1} - \underset{(-3.37)^*}{0.81}\Delta r_{LivA-2} - \underset{(-1.75)}{0.48}\Delta r_{LivA-4} + \underset{(5.72)^*}{0.78}\Delta r_{policy}$$
$$- \underset{(-4.57)^*}{0.54}\left[r_{-1} + \underset{(3.51)}{1.79} - \underset{(10.9)}{1.99}\, r_{policy-1} - \underset{(4.55)}{1.21}\, spread_{LivA-1} \right]$$
$$DW = 2.11\,,\ SEDepVariable = 0.65\,,\ SEEstimate = 0.48$$
$$Estimation\ Period = 1991;01 - 2003:03$$

Medium- and Long-Term Market Credit Interest Rates

With the following convention:
R_{GB} = Nominal 10-Year Government Bond Rate
R_{PEL} = Nominal Deposit Rate on PEL Contracts

Fixed Mortgage Rate

$$\Delta r = \underset{(2.29)^*}{0.15}\Delta r_{-3} + \underset{(4.06)^*}{0.17}\Delta r_{PEL-3} - \underset{(-4.23)^*}{0.22}\Delta r_{PEL-4} + \underset{(2.69)^*}{0.19}\Delta r_{GB-2}$$
$$- \underset{(-3.13)^*}{0.18}\left[r_{-1} + \underset{(1.39)}{0.74} - \underset{(18.5)}{1.36}\, r_{GB-1} \right]$$
$$DW = 1.97\,,\ SEDepVariable = 0.26\,,\ SEEstimate = 0.16$$
$$Estimation\ Period = 1991:02 - 2003:03$$

Variable Mortgage Rate

$$\Delta r = \underset{(1.56)}{0.19}\,\Delta r_{-3} + \underset{(3.25)^*}{0.29}\,\Delta r_{PEL} + \underset{(1.62)}{0.14}\,\Delta r_{PEL-3} - \underset{(-3.18)^*}{0.20}\,\Delta r_{PEL-4} + \underset{(2.51)^*}{0.20}\,\Delta r_{GB} + \underset{(2.56)^*}{0.22}\,\Delta r_{GB-2}$$
$$- \underset{(-1.97)^*}{0.10}\left[r_{-1} + \underset{(0.62)}{0.69} - \underset{(7.01)}{1.27}\, r_{GB-1} \right]$$

$$DW = 2.14\,,\ SEDepVariable = 0.27\,,\ SEEstimate = 0.20$$

$$Estimation\ Period = 1991:03 - 2003:03$$

Rate for Medium and Long Term Loans to Enterprises

$$\Delta r = \underset{(2.92)^*}{0.24}\,\Delta r_{-4} + \underset{(2.38)^*}{0.25}\,\Delta r_{GB-1} + \underset{(2.18)^*}{0.24}\,\Delta r_{GB-3}$$
$$- \underset{(-2.84)^*}{0.14}\left[r_{-1} + \underset{(1.79)}{1.72} - \underset{(8.84)}{1.33}\, r_{GB-1} \right]$$

$$DW = 1.75\,,\ SEDepVariable = 0.36\,,\ SEEstimate = 0.24$$

$$Estimation\ Period = 1990:01 - 2003:03$$

Table 43. France: Estimation of the Long-Term Equation for Medium- and Long-Term Market Credit Interest Rate Using Phillips-Loretan Nonlinear Estimator

Market Credit Interest Rate = Cointegration Relation + Sum (Lagged Variables) + Sum (Forward Variables)
ρ (Market Credit Interest Rate (-1) – Constant – Cointegration Relation (-1))

All variables in levels - Figures in parenthesis are t-statistics, and significance at the 5-percent level is signaled with an asterisk.

	With Administered Rates			Without Administered Rates		
	Mortgage Loans at Fixed Rate	Mortgage Loans at Variable Rate	Medium- and Long-Term loans to Enterprises	Mortgage Loans at Fixed Rate	Mortgage Loans at Variable Rate	Medium- and Long-Term loans to Enterprises
10-year government bond rate	0.94 (2.95)*	0.22 (0.10)	0.31 (0.34)	1.34 (16.0)*	1.32 (6.99)*	1.44 (8.41)*
Spread between the PEL rate and the 10-year government bond rate	-0.78 (-1.37)	-2.10 (-0.52)				
Spread between the *Livret A* rate and the 10-year government bond rate			-1.83 (-1.14)			
ρ	0.81 (10.90)*	0.93 (10.10)*	0.87 (12.40)*	0.80 (8.46)*	0.91 (11.35)*	0.87 (13.20)*
Estimation period	1990:04-2003:03	1990:04-2003:03	1990:02-2003:3	1990:04-2003:03	1990:04-2003:03	1990:03-2003:3
Degrees of freedom	34	34	40	42	42	43
Standard Error of Dependent Variable	2.16	2.24	2.45	2.16	2.24	2.44
Standard Error of Estimate	0.17	0.21	0.27	0.19	0.23	0.28
DW	2.26	2.35	2.06	1.96	2.04	1.77

Source: IMF staff calculations.

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