FOR AGENDA

SM/93/197
Correction 1

CONTAINS CONFIDENTIAL INFORMATION

October 26, 1993

To: Members of the Executive Board

From: The Secretary

Subject: France - Selected Background Issues

The simulated effects of movements in the real interest rate on aggregate manufacturing were underestimated in the sections on French interest rates and investment in the recent background paper (SM/93/197, 8/30/93). The reason was that in the simulation exercises, attention was paid only to the long-run impact of a change in the real interest rate on investment. Accordingly, Tables 1 and 2 and sections 7, 8, and 9 (pages 52-55) have been corrected, and a new page 54a was added.

In addition, the following corrections were made:

Page 138, footnote 4, lines 2-4: for "and nontariff barriers...input subsidies--reasonably"
read "barriers...nontariff barriers--broadly"

Page 139, line 4: for "10 percent...next three years."
read "15 percent...subsequent years."

Corrected pages are attached.

Att: (7)

Other Distribution:
Department Heads

$$p(t) = q(t)[[(i(t)/400) - \Delta p(t+1)/p(t)] + \delta/400] \quad (3)$$

--i.e. the real price of capital goods multiplied by the opportunity cost of funds (real interest rate) and the quarterly depreciation rate, where the annual depreciation rate, δ was set at 6 percent. 1/

6. A summary of the empirical results

Using very recent applied econometric techniques on the estimation of long-run economic relationships (Engle and Granger (1987), Johansen (1988), Phillips and Loretan (1991)), we obtained the following constrained estimate of equation (1):

$$\log I(t) = \log Y(t) - 0.6\log[p(t)/w(t)] + v(t) \quad (4)$$

This estimated equation is extremely encouraging in that the long-run coefficient constraints, of a unit output elasticity and of a negative relative factor rental elasticity equal in magnitude to the share of labor in aggregate output, are not rejected by the data (see Technical Appendix II for further details).

The deviations from long-run equilibrium from this equation, i.e., the fitted values of $v(t)$, were then used to estimate a dynamic short-run investment function of the form (2). This resulted in a highly stable estimated equation which fitted the data well, explaining some 55 percent of the quarterly percentage change in aggregate investment, and which passed a whole range of modern regression diagnostic tests. The stability of the estimated coefficients is particularly impressive. The short-run elasticity of investment demand with respect to relative factor rentals was estimated to be about -0.37, or roughly half the long-run elasticity of around -0.6, and to operate with a six-month lag. The estimated value of the adjustment coefficient, γ_4 in (2), was approximately -0.02, implying a very slow adjustment towards the long-run or equilibrium level of investment demand: a ten percent deviation from the long-run equilibrium level of investment generates an adjustment of only 0.2 percent in the current quarter.

Thus, although we have found an effect of real interest rates on investment which is statistically significant and consistent with optimizing economic theory, the small magnitude of the relevant estimated coefficients and the extremely slow implied speed of adjustment towards long-run

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1/ This value was suggested by economists at the French Direction de la Prévision. Setting δ as low as 2 percent per annum or as high as 15 percent per annum made no qualitative difference--and slight quantitative difference--to the results reported below.

equilibrium (and increased capital-labor substitution possibilities) suggest that this link may not be economically important for practical policy purposes. This issue is explored in the following two sections.

7. What caused the recent decline in investment?

The marked slowdown in French private investment over the 1990-1992 period has been variously explained as due to the effect of high real interest rates operating through the user cost of capital, or the recession itself operating through a decline in output and an accelerator effect on investment. In an attempt to shed some light on this issue, we carried out three counterfactual experiments using our estimated investment equation.

In the first experiment, we held the short-term real interest rate constant, over the period 1990-92, at its 1989 average level of 6.3 percent per annum, as opposed to an actual path of the ex post real interest rate of between 6.7 and 8.2 per cent over this period. Assuming no feedback effect on output, prices and the wage level, we then used the equation to forecast investment dynamically over this three-year period. The percentage deviation of the forecast level of investment from the level predicted by the model with the real interest at its actual historical values was then computed.

In the second counterfactual exercise, the real interest rate was held at 5 percent per annum from 1990QI, and in the third exercise, real output was assumed to grow at 2.5 percent per annum from 1990QI (with the real interest rate at its actual historical values). This growth rate, corresponding to the growth of output in 1990, is a slightly higher growth path than was actually experienced, since aggregate output actually grew at some 0.7 percent in 1991 and 1.3 percent in 1992.

The results of these exercises, expressed as the percentage difference in the value of the simulated level of investment from the base simulation level, are given in Table 1. It appears that increases in the real interest rate may have had a significant negative impact on investment over the 1990-92 period. Indeed, the equation implies that holding the real rate at its average 1989 level would have led to real investment expenditures that were 9.25 percent higher by the end of 1992. This compares with 6.75 percent simulated increase in real investment which follows when the 1990 average growth rate of output is projected over the period.

Overall, these counterfactual exercises suggest that high real interest rates, as well as the decline in aggregate demand, may have played a significant role in the fall in the investment-output ratio over the 1990-92 period.

Table 1: Simulated Paths for Investment, 1990 QI-1992 QIV
(Percentage deviations from base simulation)

	Real Interest Rate = 6.3 percent from 1990 QI	Real Interest Rate = 5 percent from 1990 QI	Annual growth of output = 2.5 percent from 1990 QI
1990 QI	0.00	0.00	-0.67
QII	0.00	0.13	-0.31
QIII	0.47	4.84	-0.49
QIV	4.20	8.64	1.31
1991 QI	6.16	11.32	1.96
QII	1.30	6.52	2.49
QIII	1.14	7.19	2.42
QIV	3.93	10.00	3.65
1992 QI	5.50	11.84	3.47
QII	5.24	11.61	4.33
QIII	8.54	15.08	4.91
QIV	9.25	15.81	6.75

8. Will lower real interest rates stimulate recovery through increased investment?

The final question which we address is whether the prospective decline in real interest rates, as forecast in the World Economic Outlook (WEO), will have a significant impact on investment expenditure. In examining this issue, we used our estimated equation to carry out four forecast simulation exercises.

In the first exercise, we forecast the growth path of real investment over the period 1993QIII through 1994QIV, using values of all of the exogenous variables consistent with the September 1993 WEO forecast.

In the second exercise, we performed the same forecast simulation with the same WEO assumptions except that the real interest rate was held constant at its 1993QII level of 5.9 percent, rather than declining as foreseen in the WEO forecast to some 2.8 percent in 1994.

In the final forecast simulation, we used the WEO assumptions for real interest rates but assumed a higher growth rate for manufacturing output, equal to 1 percent per quarter.

The results of these exercises, expressed as the difference in the forecast level of investment at the end of 1994 from the level of investment produced by using the WEO forecast as assumptions, are given in Table 2. As the Table shows, the interest rate effects on investment are again significant: failure to reduce the real interest rate by about 2 percentage points (to some 2.8 percent) by end 1994, leads to a simulated 10 percent fall in investment over the simulation period. On the other hand, increasing output growth to some 4 percent per annum (from the WEO forecast of -1 percent for 1993 and +1.1 percent for 1994) would increase real investment by 5 percent over the WEO base forecast by the end of 1994.

It should also be noted that these single-equation simulation results are not dissimilar from those obtained from MULTIMOD simulations. In particular, MULTIMOD simulations for France suggest that a movement of 100 basis points in the real interest rate will move real investment by some 5 percent in the opposite direction over a one to two-year period. 1/

9. Conclusion

In this appendix, we have combined recent econometric techniques on the long-run properties of economic time series and economic theory to derive and estimate an empirical investment equation for France which is both consistent with economic theory and empirically tractable. The resulting equation, estimated on French quarterly data for the period 1970-1992,

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1/ Although, in MULTIMOD, some of the effect on investment comes indirectly through the effect on output.

performed well empirically, and suggested a statistically significant effect of real interest rates on aggregate investment demand, operating through the user cost of capital.

Simulations using the estimated equation suggested that the high level of real interest rates over the 1990-92 period may have been an important contributory factor in the decline in the investment-output ratio over the same period. Similarly, further forecast simulations suggested that failure to reduce real interest rates in the future may have important negative effects on aggregate investment.

As with all applied econometric studies, the results reported in this paper should be interpreted with caution, and the reader may wish to consider the following points. It is clear that new econometric estimates do not have quite the same scientific authority as, say, new estimates of the speed of sound or of the gravitational constant. Thus, the forecast simulations reported above can only be taken as illustrative and indicative of the effects of real interest rate movements on real investment, rather than as definitive measures of these effects. In addition, the estimated effects of short rates on investment were obtained using a sample period during which short and long rates tended to move together. They may not give very accurate predictions for the last year, when the two rates have diverged considerably due to a sharply downward-sloping yield curve. As well as considering the reliability of a single estimate of the investment-interest rate nexus, one should also consider the implications of basing simulations on a single equation rather than on a full, general equilibrium model, although simulations using MULTIMOD do yield broadly similar results. On the other hand, our econometric results do provide a synthesis of received economic theory and the very latest econometric techniques, and they do in some sense encompass previous estimates of the French investment function.

Thus, the major conclusion which should be drawn from this study is really that the debate on the transmission mechanism of monetary policy in France should not be closed; in particular, it cannot be simply assumed or asserted that real interest rates will not affect aggregate investment expenditure.

Table 2. Simulated Effects on Investment of Alternative Assumptions, 1993QIII-1994QIV

(Assumptions)

	Real Interest Rate Unchanged from 1993QII Level (-5.9 Percent p.a.)	Quarterly Growth Rate of Manufacturing Output-1 Percent from 1993QIII On
Cumulative percentage increase in investment over base simulation	-10.00	5.04

Notes: The simulations assume paths for the exogenous variables consistent with the WEO forecast, except those indicated.

The Theoretical and Empirical Framework

Consider a representative firm producing according to a constant-returns Cobb-Douglas technology and facing a demand constraint. Its optimization problem is therefore one of cost minimization subject to a given level of output. Consider first the one-period static optimization problem:

$$\text{Minimize } [w(t)\ L(t) + \rho(t)\ K(t)] \tag{A1}$$

Subject to:

$$A(t)\ L(t)^{\alpha}\ K^{1-\alpha} - Y(t) \tag{A2}$$

where $w(t)$ and $\rho(t)$ denote the real wage and real user cost of capital at time t, respectively, $L(t)$ and $K(t)$ measure inputs of labor and capital at time t, and $A(t)$ denotes total factor productivity at time t.

The solution to this problem can be expressed as a cost function of the form:

$$c(w(t),\rho(t),Y(t)) = \mu A(t)^{-1}\ w(t)^{\alpha}\rho(t)^{1-\alpha}Y(t) \tag{A3}$$

where

$$\mu = \alpha^{-\alpha}(1 - \alpha)^{\alpha-1}$$

By Shephard's lemma, the factor demand schedules are given by the derivatives of the cost function with respect to the relevant factor price. 1/ Thus, we have the demand for the capital stock at time t given by:

$$K(t) = \frac{\partial c}{\partial \rho} = \mu^{*}A(t)^{-1}\left[\rho(t)/w(t)\right]^{-\alpha}\ Y(t) \tag{A4}$$

where

$$\mu^{*} = \alpha^{-\alpha}(1-\alpha)^{\alpha} \tag{A5}$$

Taking logarithms of (A4)

1/ A proof of Shephard's lemma can be found in Varian (1978), Chapter 1.

Table 5. Revealed Comparative Advantage, 1980-90 1/

	Revealed Comparative Advantage	
	1980	1990
Food	1.5	1.8
Raw materials	0.7	0.8
Ores and other minerals	0.7	0.9
Fuels	0.6	0.6
Nonferrous metals	0.9	1.1
Iron and steel	1.4	1.4
Chemicals	1.3	1.3
Other semi-manufactures	1.1	1.1
Power generating machinery	0.9	1.4
Other nonelectrical machinery	0.9	0.8
Office and telecommunication equipment	0.6	0.6
Electrical machinery and apparatus	1.1	0.9
Automotive products	1.0	1.0
Other transport equipment	0.8	1.0
Textiles	1.1	1.1
Clothing	1.4	1.0
Other consumer goods	1.0	0.9

Source: Staff estimates based on data from GATT, "International Trade 1990-91."

1/ Revealed comparative advantage is measured as the ratio of a country's share in world exports of a particular commodity category to its share in "world" exports. A value greater than one indicates comparative advantage in that category, and a value less than one disadvantage. For this table "world" comprises the United States, EC, Canada, Japan, Hong Kong, and Singapore.

the "world." 1/ In brief, the tables show that France has comparative advantage in the following sectors: nonferrous metals, iron and steel, chemicals and pharmaceutical, power generating machinery, semi-manufactures, and civil aircraft. 2/ The pattern of comparative advantage has remained broadly unchanged between 1980 and 1990. 3/

Orders of magnitude of the gains to France from a successful conclusion of the Round can be discerned indirectly from the gains estimated for the EC as a whole. According to an OECD study, the EC stands to gain 1 percent of GDP from market liberalization in the Uruguay Round, which is greater (as percent of GDP) than the corresponding gain for the world as a whole. 4/ This is likely to be an underestimate because the assumptions underlying the calculations do not include liberalization of services. Another study calculates the gain to the EC at 0.8 percent of GDP. 5/ France, which is the Community's largest exporter of services, and the second largest exporter and importer of goods is thus likely to be a major beneficiary of the Uruguay Round. 6/

3. Agriculture

a. Blair House agreement

In November 1992, the United States and the EC Commission concluded an agreement (the Blair House agreement) to resolve their long-standing differences over trade in agriculture, which was also expected to be an important step in unblocking the impasse in the Uruguay Round. The Blair House agreement addressed two issues: oilseeds and agriculture in general.

1/ Because of lack of data, not all countries are included in the calculation of the index at the global level. The countries included constituted about 70 percent of world exports. The two tables give contradictory assessments of comparative advantage in some instances, for example, textiles and clothing. Some differences, for example, in relation to transport equipment, are also due to the different levels of product aggregation in the two tables.

2/ In three of these sectors, namely, steel, pharmaceutical, and chemicals, the Tokyo tariff agreement calls for zero or very low tariffs.

3/ Freudenberg and Müller (1992) compares French and German comparative advantage in 1989 at a more disaggregated level and shows that French specialization is concentrated in products whose export unit values are in the intermediate range relative to the European average. Germany, on the other hand, specializes in products with high export unit values.

4/ Goldin and van der Mensbrugghe (1993). The assumptions underlying the analysis--a 30 percent reduction in all tariff barriers on agricultural and industrial products, and a 30 percent reduction in agricultural nontariff barriers--broadly approximate the Draft Final Act of the Uruguay Round.

5/ Nguyen, Perroni and Wigle (1991).

6/ This is likely especially since some of the major tariff cuts are concentrated in sectors in which France has comparative advantage.

The oilseeds section of the Blair House agreement prescribes limits on the area devoted by the EC to oilseeds cultivation. Starting from a base of 5.128 million hectares, the area under cultivation would be reduced by 15 percent in the first year and at least 10 percent in all subsequent years. Any excess would lead to the imposition of a penalty. Oilseeds cultivation for industrial purposes is not included in the above calculation; however, should the production of by-products resulting from the cultivation of oilseeds for industrial purposes exceed 1 million tons of soya meal equivalents, the EC would take corrective action. The EC agreed to undertake binding arbitration in case the United States believed the agreement had been breached. In return, the United States would give up any claims for further compensation and consider its GATT dispute with the EC as settled.

The salient features of the section on agriculture in general, which would apply to all parties, are as follows.

(1) Market access

All nontariff barriers are to be converted to their tariff equivalents calculated on the basis of barriers prevailing between 1986 and 1988. The simple average of all tariffs is to be reduced by 36 percent over six years from the average of the levels prevailing between 1986 and 1988, with a minimum reduction of 15 percent for each product. A variable element--special safeguard--is to be added automatically to the tariff if the c.i.f import price falls by more than 10 percent below the average 1986-88 import price. This variable element grows proportionately with the difference between the actual and average 1986-88 import price. The purpose of this safeguard is to offset surges in imports, resulting in particular from exchange rate changes, that might adversely affect domestic producers. Minimum import opportunities--"minimum access"--equal to 3 percent of domestic consumption initially and growing to 5 percent after six years, must be provided. This is not a target for ex post measurement, but for ex ante opening.

(2) Internal support

Internal support as measured by the aggregate measurement of support (AMS) for agriculture as a whole will be reduced by 20 percent over six years compared to average support in the years 1986-88. 1/ Direct support, provided it is based on fixed areas and fixed yields, and is implemented in the context of a production limiting program, as provided for under the CAP reform, is excluded from this reduction.

(3) Export subsidies

The value of export subsidies is to be reduced by 36 percent and the volume of subsidized exports by 21 percent over six years, on a product

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1/ The AMS includes all price support for outputs and inputs, but does not include general support not linked to the volume of production.

by product basis, from the average levels prevailing in 1986-90. (Current export levels are far higher than the average for 1986-90. As a result, actual reductions relative to current levels will be much larger.)

(4) Rebalancing

The United States and EC agreed that if EC imports of nongrain feed ingredients increased relative to the average 1986-90 level, they would consult with a view to finding a mutually acceptable solution.

(5) Peace clause

Both parties agreed to a clause under which each would refrain from initiating action in the GATT on the other's internal support and export subsidy measures.

b. Reform of the common agricultural policy

The main features of the CAP reform agreed in May 1992 in the main sectors are as follows. In cereals, the intervention price is to be reduced by 29 percent over 3 years to Ecu 100 per ton in 1995/96. Compensatory income payments, made on a per hectare basis, are contingent on farmers who produce more than 92 tons per year (equivalent to an average acreage of 20 hectares) setting aside 15 percent of arable land. 1/ The payments are based on a historical yield figure in order to reduce the incentives to increase production through increasing yield. The principles of reform for oilseeds are similar to those agreed for cereals. As for the beef sector, a 15 percent reduction in the intervention price is envisaged which will be spread equally over three years beginning 1993/94. In order to compensate for this reduction, the current premium for male bovine animals will be raised. The economic impact on this sector will be further mitigated because the reduced cereal prices consequent upon reform will lower feed costs for this sector. In the dairy sector, annual milk quotas are to be cut by 2 percent over 1993/94 and 1994/95, and butter prices are to be reduced by 5 percent over these two years. The reform plans will not significantly affect production in this sector.

c. Outstanding issues

France rejected the Blair House agreement initially. However, in June 1993, it declared that it could accept the agreement as it related to oilseeds. This acceptance was made possible after EC agriculture ministers agreed to increase France's share of total area devoted to oilseeds cultivation and to increase the compensation payments to farmers for set-asides and price cuts agreed under the CAP reform. For French oilseed

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1/ The 29 percent reduction is relative to prices in 1991/92. The intervention prices for 1993/94 and 1994/95 are Ecu 117 and 108 per ton, respectively. The basic amount of the compensatory payment is 25, 35 and 45 Ecus per ton in 1993/94, 1994/95, and 1995/96 respectively.