Competitiveness and External Trade Performance of the French Manufacturing Industry

By

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I. Introduction

The concept of competitiveness continues to be the subject of much debate in industrial countries, in large part because of its perceived importance in determining activity in the tradable goods sector and the overall performance of the economy. Krugman (1994), in particular, has argued forcefully that the notion of competitiveness has been used incorrectly in discussions of economic problems that are primarily due to domestic factors.

It is well recognized that the concept of competitiveness encompasses a large variety of factors in addition to changes in nominal exchange rates, relative prices and production costs. Product differentiation, for instance, plays an important role in the competitive strategies of enterprises. Productivity growth, reliability, delivery times, quality, after-sales service, financing arrangements, technological innovation, investment in physical and human capital, and the institutional and structural environment are all factors that need to be taken into account in assessing the competitiveness of a particular country. However, because many of these factors are qualitative in nature – such as product quality and enterprise management style – investigators have often focused on more easily quantifiable indicators, such as those based on export unit values and unit labor costs.

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This paper assesses developments in the international competitiveness of the French manufacturing industry during the 1980s and early 1990s.[1] It also provides a quantitative evaluation of the role of price and nonprice competitiveness (together with demand factors) on the external performance of the French manufacturing sector. Section II analyzes the evolution of a broad range of indicators of competitiveness of the manufacturing sector: cost-based indicators (aggregate as well as bilateral indices, relative to France's main competitors among industrial countries), indicators of import price competitiveness (namely, the differential between domestic producers' market price and that of foreign competitors in the home market), import penetration ratios, relative profitability indices, and nonprice competitiveness indicators. Sections III and IV examine France's external trade performance in manufacturing during the past fifteen years. Section III examines the evolution of export market shares and export performance in manufacturing, whereas Section IV provides an econometric analysis of external trade performance. A vector autoregression model linking the manufacturing trade ratio (defined as the ratio of real exports over real imports of manufactured goods) to domestic and foreign output, relative unit labor costs, an indicator of nonprice competitiveness, and short-run disequilibrium effects (captured through an error correction term) is estimated. The analysis uses variance decompositions to assess the role of changes in relative unit labor costs, domestic and foreign output, and nonprice competitiveness on trade performance. The final section summarizes the results of the analysis and offers some final remarks.

II. Developments in Competitiveness

Indicators of competitiveness may be calculated for any particular aspect of interest, depending on the components used to construct them, the geographical coverage, and the level of aggregation of (actual and potential) competitors, markets, and products. Another source of divergence is given by the mathematical formula and the

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[1] Manufacturing is a key tradable goods sector in France (as in most industrial countries) and plays an essential role in external trade performance. In 1993, for instance, manufactured products (in volume terms) amounted to 71.4 percent of total imports of goods and 76 percent of total exports.

weighting pattern adopted in the aggregation procedure.[2] This section examines the evolution of a variety of measures of competitiveness. We begin by reviewing developments in cost-based indicators of competitiveness (on an aggregate as well as bilateral basis), and then turn to indicators of import price competitiveness, import penetration ratios, relative profitability, and nonprice competitiveness.

1. Cost-Based Indicators

Real exchange rate indices based on unit labor costs are among the most commonly used indicators of competitiveness. As is well known, the use of such indices may in some circumstances be problematic (see Marsh and Tokarick 1994). Available data on unit labor costs in manufacturing encompass only the costs of labor services that are incurred directly in manufacturing, and therefore exclude the costs of other important labor inputs that are used in producing manufactured goods. These excluded costs may be in the form of labor from the services sector (such as marketing and advertisement services) as well as other indirect labor costs embodied in the intermediate inputs needed for producing manufactures. Thus, for a relative unit labor cost index for manufacturing to be a good indicator of the capacity of the manufacturing sector to compete internationally, the share of direct labor costs in total production costs of manufactured goods must be relatively similar across countries. In addition, relative changes in nonlabor costs per unit of output have to be the same as movements in relative unit labor costs. In practice, of course, these conditions are unlikely to hold. Capital intensity differs across countries, and few measures of labor costs allow for such differences.[3]

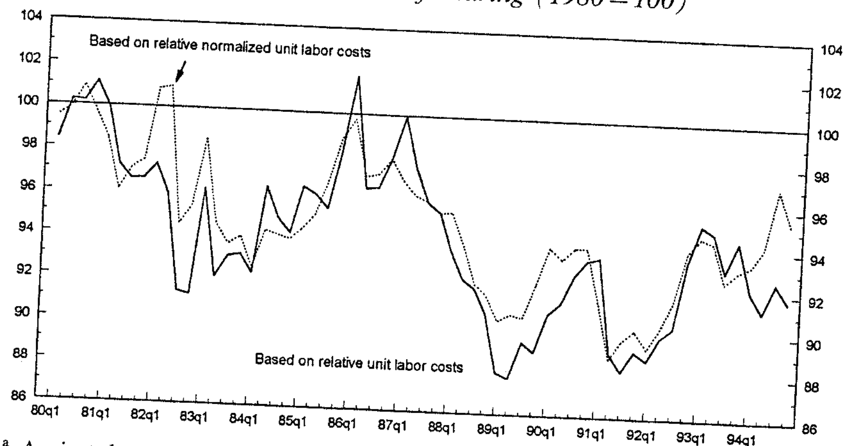
[2] The geometric weighted average (with fixed levels of weights calculated through a double-weighting method applied to bilateral trade data) is the most frequently used formula. Traditional indices that do not account for changes in weights may, however, produce second-order approximation errors which may accumulate over time. See Guerrieri and Milana (1993) for an alternative technique based on time-varying weights.

[3] For example, the substitution of capital for labor may result in a lower unit labor cost index but higher capital costs, so that the decline in unit labor costs overstates any improvement in competitiveness. More detailed discussion of these difficulties, as well as of more general difficulties in measures of real exchange rates, is found in Lipschitz and McDonald (1992), Turner and Van't dack (1993), and Marsh and Tokarick (1996).

a. Aggregate Indices

Figure 1 displays the behavior of the real effective exchange rate based on unit labor costs and normalized unit labor costs in manufacturing since the early 1980s. "Foreign" costs are calculated on the basis of a weighted basket of 20 industrial countries, which includes France's main competitors.[4] The figure indicates that the period of

Figure 1 – *Real Effective Exchange Rate of France Based on Unit Labor Costs in Manufacturing (1980 = 100)*[a]

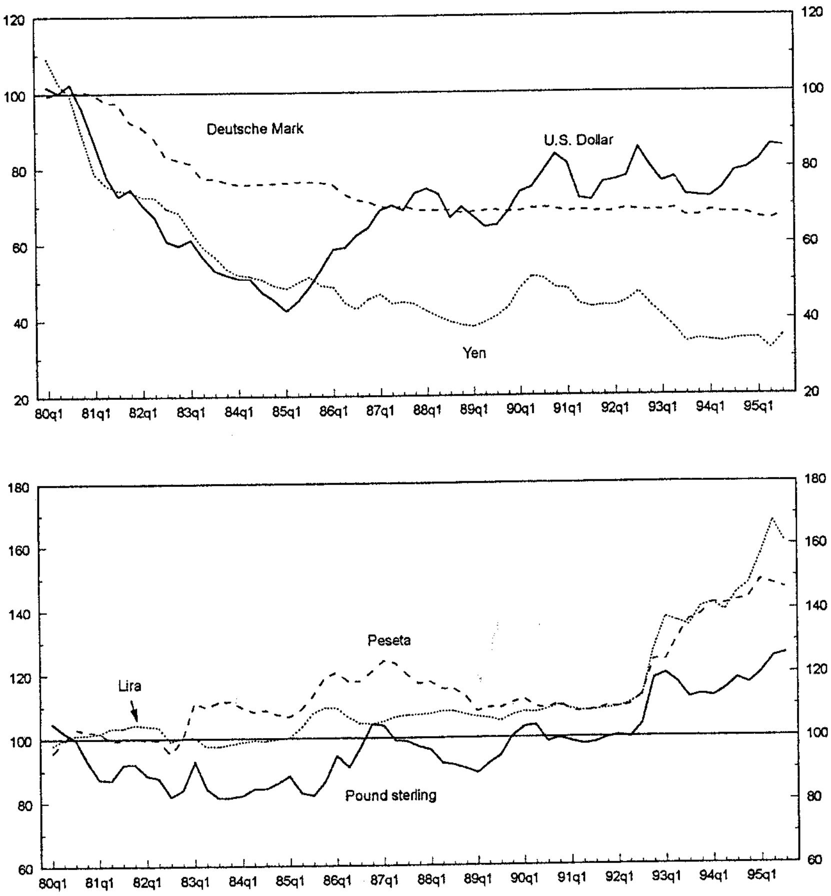


[a] Against the currencies of 20 industrial countries as described in *International Financial Statistics*. An increase indicates real appreciation.
Source: IMF, Research Department; IMF *International Financial Statistics*.

dollar strength in the early 1980s (as shown by the large nominal appreciation of the U.S. dollar relative to the French franc displayed in Figure 2) allowed France to improve significantly its competitiveness. However, between 1985 and 1987, the nominal depreciation of the U.S. dollar and higher wage inflation in France than in its major industrial partners led to a steady loss in competitiveness. This deterioration was temporarily halted by the last two devaluations of the franc within the Exchange Rate Mechanism (ERM) that took place in April 1986 and January 1987.

[4] France mostly trades with European Union (EU) countries. In 1993, trade with these countries represented about 60 percent of total exports and imports. Germany is the largest partner, and accounted for about 17 percent of exports and imports in 1993.

Figure 2 – *Foreign Currency per French Franc (1980 = 100)*[a]



[a] An increase indicates an appreciation of the franc.
Source: IMF *International Financial Statistics.*

Between the last realignment and early 1989, the combination of a stable exchange rate and moderate wage settlements led to significant gains in competitiveness. However, these gains were partly reversed in late 1989 and 1990, notably as a result of a strong nominal appreciation of the franc relative to the U.S. dollar. But competitiveness improved in 1991, as the franc fell sharply in nominal terms vis-à-vis the dollar and the yen (see Figure 2).

During 1992, overall competitiveness of the French manufacturing sector deteriorated markedly, as a result of two factors. First, as discussed below, some of France's main trading partners within the European Union either left the ERM and witnessed a large depreciation of their currencies, or devalued after the exchange rate crisis of September 1992. Second, a marked slowdown in productivity growth in France led to a significant increase in unit labor costs in the French manufacturing sector relative to major partner countries. In 1993 and early 1994, competitiveness of the French manufacturing industry improved somewhat as a result of a more moderate increase in unit labor costs in France relative to her major partner countries, and the fact that exporters of countries with depreciating currencies (Italy, Spain and the United Kingdom) used the exchange rate adjustments to rebuild their profit margins. Overall, external competitiveness has improved significantly since the early 1980s, and has remained broadly stable since the late 1980s.

b. Bilateral Indices

Figure A1 in the Appendix shows bilateral real exchange rates based on unit labor costs between France and her main trading partners. With respect to the United States, no clear trend emerged following the sharp nominal appreciation and loss in competitiveness registered between 1985 and 1987, which offset earlier gains. Competitiveness vis-à-vis the United States has been broadly unchanged in the past ten years. Relative to the Japanese yen, competitiveness of the French manufacturing sector improved in a more or less sustained manner between the early 1980s and 1988 – largely reflecting movements in the bilateral nominal exchange rate. It deteriorated in 1989 as a result of the weakening of the yen, but improved sharply in the early 1990s, as the yen resumed its strong rise. Overall, France's competitiveness relative to Japan has improved by 40–50 percent since 1980.

Competitiveness relative to Germany remained broadly unchanged between 1980 and 1986, but improved continuously thereafter. This improvement reflected mainly a lower wage (and price) inflation in France. Between 1986 and early 1994, the total gain in competitiveness of French producers of manufactured goods was of the order of 20 percent. Relative to the United Kingdom, competitiveness deteriorated sharply in 1985–1986 but improved equally markedly in 1987–1988. Both episodes reflected mainly changes in the nominal bilateral exchange rate. There was a modest improvement in 1990–1991, when the pound was part of the ERM, because unit labor costs continued to grow at a lower rate in France. The 20 percent nominal appreciation of the franc against the pound sterling since 1992 has led to a deterioration in competitiveness of about 15 percent.

Sizable gains in competitiveness were registered vis-à-vis Italy and Spain in the late 1980s and early 1990s, due to more favorable cost developments in France. Between 1987 and 1991, unit labor costs in France grew by only 1.5 percent, whereas in Spain, for instance, they grew by 22.3 percent. Following a period of intense pressure in foreign exchange markets, Italy left the ERM and floated the lira on September 17, 1992, whereas Spain devalued the peseta in September 1992 and again in November 1992. As a result, the franc appreciated sharply in real terms against the Italian lira and the Spanish peseta. The turmoil in currency markets in mid-1993 and the associated weakening of the lira and devaluation of the peseta (by 8 percent on May 14, 1993) led to further losses in competitiveness in late 1993 and early 1994 with respect to Italy and Spain. In all, the real appreciation of the franc in 1992–1994 with respect to the Spanish peseta and the Italian lira broadly offset the large gains in competitiveness achieved during the second half of the 1980s.

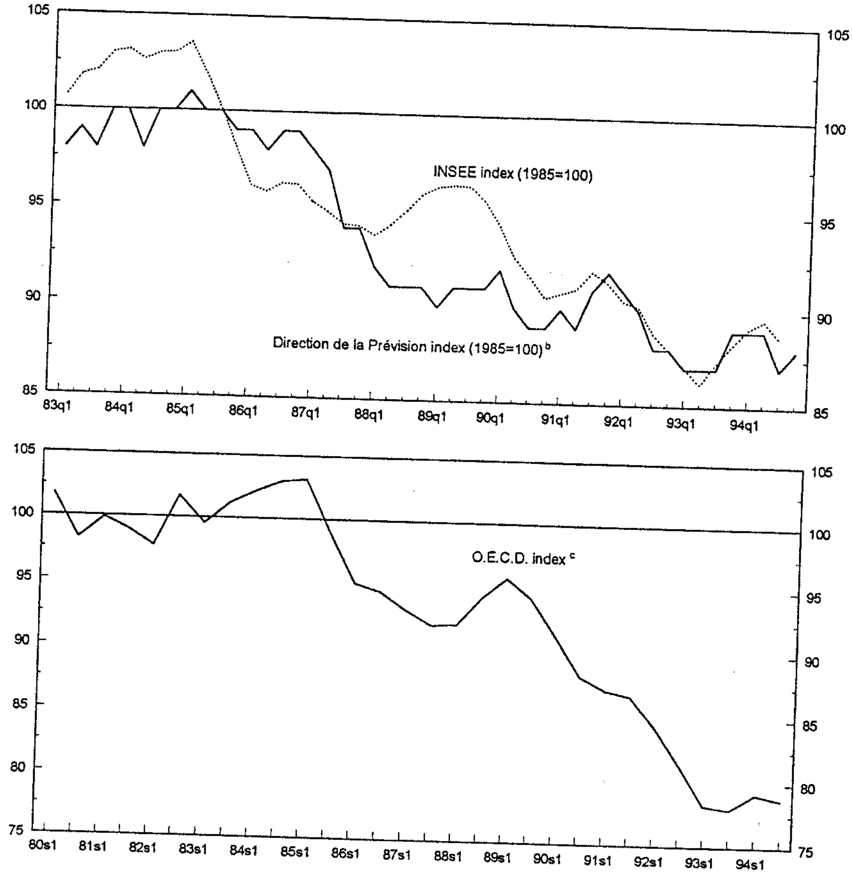
2. Internal Price Competitiveness

Internal price competitiveness can be measured by the ratio of import prices in the home market by foreign competitors over prices of domestic production. Figure 3 shows three aggregate indices of this type for the manufacturing sector as a whole, whereas Figure 4 displays the evolution of internal price competitiveness for different categories of manufactured goods. The first observation is that all indices appear to be significantly less variable over time than the cost-based indicators of competitiveness discussed earlier. This pattern may reflect a "pricing to market" strategy by foreign suppliers (see Section III), which would tend to dampen the response of France's import prices – or foreign competitors' export prices – to changes in relative unit labor costs.

The second observation is that for manufacturing as a whole, and for all categories of manufactured goods except transport equipment, internal price competitiveness appears to have deteriorated almost continuously since 1984–1985.[5] Since early 1993, however, losses in

[5] Unpublished IMF estimates indicate that a similar pattern has been observed in other industrial countries in Europe, including the United Kingdom and Italy.

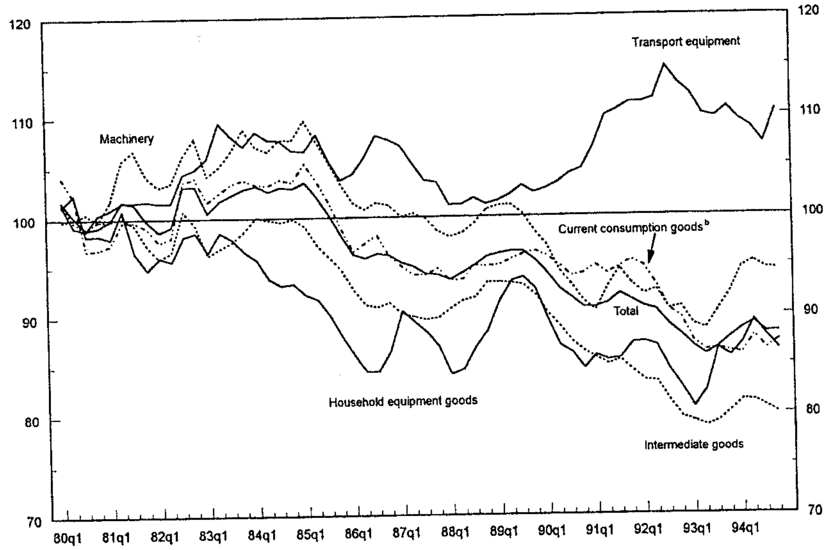
Figure 3 – *Internal Price Competitiveness in French Manufacturing (1980 = 100)* [a]



[a] Internal competitiveness is measured by the ratio of import prices over domestic prices in manufacturing. A decrease indicates a loss in competitiveness. – [b] Adjusted for the price of raw materials. – [c] Index of import unit values over domestic demand deflator for manufacturing (see Durand et al. 1992). Semi-annual data.
Source: INSEE, Direction de Prévision; OECD.

competitiveness have either stabilized or have begun to be reversed, as for instance for household equipment goods and current consumption goods. This may be the result of greater adaptability of French producers to movements in domestic competitors' prices.

Figure 4 – *Internal Price Competitiveness in French Manufacturing by Category of Goods (1980 = 100)*[a]



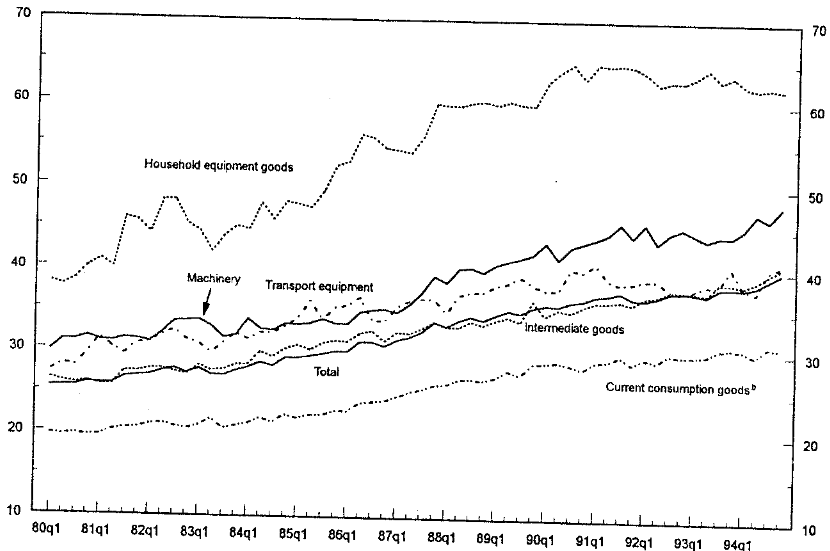
[a] Internal competitiveness is measured by the ratio of import prices over domestic prices, for each category of goods. A decrease indicates a loss in competitiveness. – [b] Include food, beverages and tobacco; textiles, apparel and leather products.

Source: INSEE.

3. Import Penetration Ratios

A quantity-based indicator of internal competitiveness of the manufacturing sector is given by the import penetration ratio, which is equal to the share (at constant prices) of imports over domestic demand, the latter calculated as the sum of domestic production and imports minus exports. Figure 5 shows the evolution of import penetration ratios for the manufacturing sector as a whole and for various groups of manufactured goods. The data suggest a gradual and continuous increase in the share of imports in total domestic demand. This upward trend appears to reflect mainly the gradual opening of the French economy to foreign trade during the 1980s, rather than an erosion in France's competitiveness position. Here again, however, the import share shows a tendency to stabilize for some categories of goods (such as household equipment goods and current consumption goods) since the early 1990s. In part, this outcome may be related to the 1992–1993 recession and a proportionally higher reduction in the demand for imported goods.

Figure 5 – *Penetration Ratios in French Manufacturing by Categories of Goods (percent)* [a]



[a] The penetration ratio is equal to the share of imports to domestic demand, both measured in volumes. – [b] Include food, beverages and tobacco; textiles, apparel and leather products.

Source: INSEE.

4. Relative Profitability

Figure 6 shows the evolution of relative profit margins in manufacturing, calculated as the ratio of the real exchange rate based on relative value-added deflators in manufacturing to the real exchange rate based on relative unit labor costs. [6] The data suggest that profit

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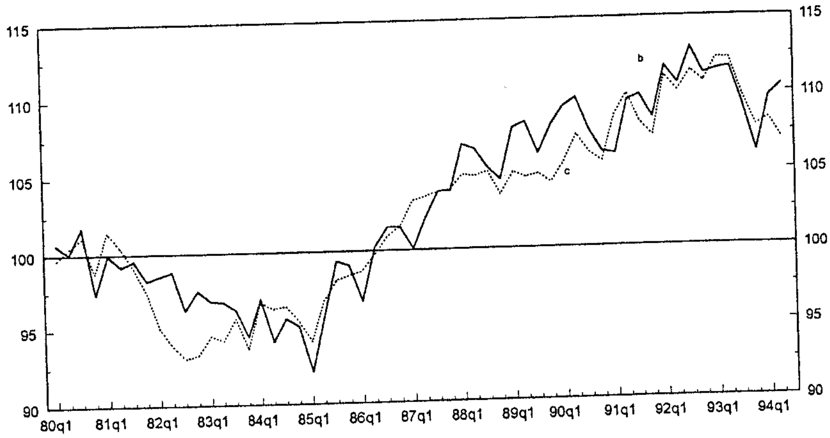
[6] There are a variety of limitations associated with profitability-based measures of competitiveness. As pointed out by Lipschitz and McDonald (1992: 39), relative profit margins may not provide reliable indicators regarding developments in rates of return on capital if there are significant differences in technology across countries: profits per unit of output may fall relative to competitors, but, if capital used per unit of output falls even more, profits per unit of capital will increase faster than for competitors. Furthermore, as indicated earlier, labor costs are only one factor affecting total production costs and thus profitability; nonlabor costs (such as material input costs) are also an important component. Value added other than labor costs includes many elements in addition to pure profits. For example, a shift to more capital-intensive sectors may tend to push up the value-added deflator beyond any rise in unit labor costs, even though no individual sector has become more profitable (Turner and Van't dack 1993: 60).

Figure 6 – *Relative Profit Margin in French Manufacturing (1980 = 100)* [a]



[a] An increase indicates an improvement in profitability. – [b] Defined as the ratio of real effective exchange rates based, repectively, on implicit value-added deflators over unit labor costs. – [c] Defined as the ratio of real effective exchange rates based, respectively, on implicit value-added deflators over normalized unit labor costs.

Source: IMF, Research Department.

margins improved substantially between 1985 and early 1992. These movements are broadly consistent with developments in wage and price inflation during that period and the stability of the franc with respect to the currencies of France's major trading partners. By contrast, since 1992 profit margins have either fallen or remained stable. This pattern appears to reflect more intense competition from European partner countries, following the nominal exchange rate adjustments that took place during 1992–1993.

5. Nonprice Competitiveness

As indicated in the introduction, it is well recognized that competitiveness and trade performance depend not only on the evolution of relative prices and costs, but also on a series of structural factors such as technological innovation and investment in physical and human capital, as emphasized in recent theories of trade and growth (see for instance Grossman and Helpman 1991). Technological innovation, in particular, influences trade flows and export market shares by changing quality characteristics of products and determining the emergence of new products. Quality factors include also the relative performance in sales-related services, such as speed of delivery, reliability of supply, the capacity to adjust rapidly to customers' needs, and maintenance service.

Commonly used indicators do not properly capture the qualitative features of competitiveness. [7] As a result, they may either over- or understate "true" underlying trends. An informative example in that regard is provided by the so-called "Kaldor paradox." As discussed earlier, conventional measures of competitiveness based on changes in relative unit labor costs predict that a deterioration in a country's position implies a reduction in market shares, both at home and abroad. However, the available evidence, discussed by Fagerberg (1988) and Amendola et al. (1993), shows that the fastest-growing countries in terms of exports and aggregate output in the post-war period have at the same time experienced much faster growth in relative unit labor costs than other countries. This apparently "perverse" relationship between growth in unit labor costs and growth in export market shares can be explained by explicitly accounting for the role of relative technological capabilities. A country's export market share depends not only on cost competitiveness (which may play a larger role in the short run) but also on its ability to innovate (which may be particularly significant in the longer run). Fagerberg (1988) provides econometric evidence for fifteen OECD countries for the period 1961–1983 suggesting that price and cost competitiveness matter much less than commonly believed in the determination of market shares. Amendola et al. (1993) have used the share of patents granted in the United States to different countries as indicator of "innovativeness," that is, a measure of the innovative potential of each country. Their results suggest that there was a significant increase in innovative activities in France (with an increase in the share of patents from 2.7 to 3.5 percent) between 1967–1969 and 1985–1987. During the same period, however, Germany's share of patents increased from 6.8 percent to 9.7 percent, whereas Japan's share increased from 2.6 percent to 19.3 percent.

Data on research and development (R&D) expenditure are also commonly used as a measure of technological activities. Table 1 presents recent data on such expenditure in major OECD countries.

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[7] Ideally, techniques of price-index construction should take account of quality changes, with changed quality at the same price being recorded as a price movement at constant quality. However, currently used statistical methods do not capture these aspects adequately.

Table 1 – *Industrial Countries: R & D Expenditure (percent)*

	Business enterprise sector (average annual growth rate)			Share of countries in OECD industrial R&D	
	1981–1985	1985–1989	1989–1992	1985	1990
France	4.9	4.7	5.5	5.7	6.2
Germany	5.2	3.8	0.3	9.9	9.8
Italy	8.5	6.6	5.4	2.5	3.0
Spain	14.1	13.8	8.5	0.5	1.0
United Kingdom	1.9	4.8	−2.4	5.7	5.8
Japan	11.2	7.4	8.5	16.3	20.5
United States	8.6	1.3	−0.8	51.1	45.1

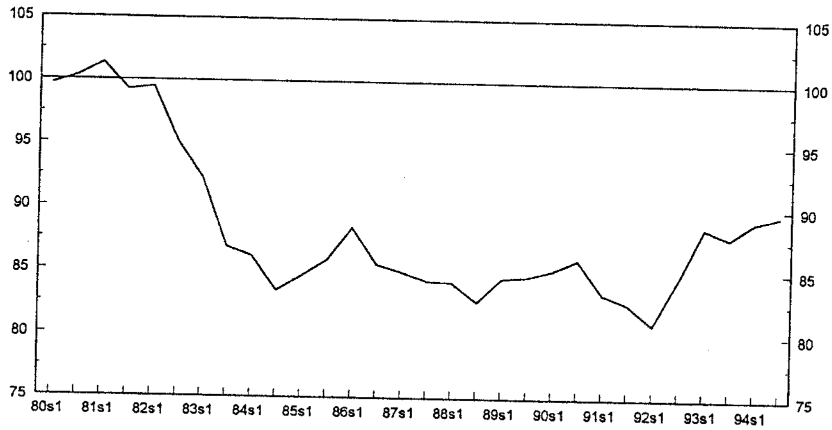
Source: European Economy, Annual Economic Report for 1994 (page 133).

Industrial R&D is generally concentrated in the strong-demand, high-tech sectors, which carry out a substantial fraction (about three quarters) of total R&D. The data indicate that in the United States (which alone represents about half of total spending by OECD countries in this area), R&D expenditure grew faster than in the other industrial countries before 1985. In Japan, R&D spending grew strongly after 1985. In France, R&D expenditure growth rates were higher than in the other large European countries, particularly at the beginning of the 1990s. France has also improved its relative share of R&D among OECD countries, as did Italy. Germany's and the United Kingdom's shares, by contrast, have remained stable. While the share of the United States in total OECD R&D expenditure fell between 1985 and 1990, Japan's share recorded a strong increase.

Nonprice competitiveness is also related to production potential, which is itself positively correlated with investment and the capacity to innovate. A low rate of capital accumulation in manufacturing may create conditions for lower growth in productive capacity, and may also lead to losses in price competitiveness, if lack of flexibility of the production structure leads to higher labor costs.[8] Figure 7 displays the behavior of an index of nonprice competitiveness based on relative capital accumulation in France and her major trading partners. This

[8] Moreover, fixed capital accumulation and nontangible investment (R & D and education) expenditures are positively correlated with productivity performance, and thus unit labor costs.

Figure 7 – *Index of Nonprice Competitiveness for France (1980 = 100)*[a]



[a] Semi-annual data. Nonprice competitiveness is measured as the smoothed ratio of capital accumulation in France and in eight major partner countries. An increase indicates an improvement in nonprice competitiveness.
Source: OECD.

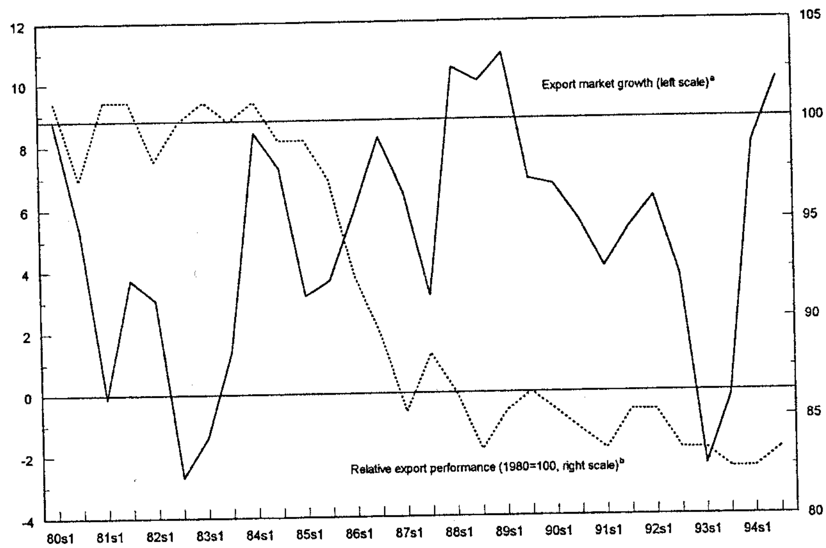
indicator should be interpreted with some caution;[9] monopolistic competition considerations would suggest that indicators based on R&D expenditure and/or the number of patents per employee might provide better measures. Nevertheless, the data suggest that while nonprice competitiveness deteriorated in the early 1980s and remained broadly stable in the second half of the 1980s, significant improvements have been recorded since 1992. However, this aggregate indicator does not provide sufficient information to assess to what extent capital accumulation has taken place in sectors producing goods with strong demand potential, such as automated office equipment, information technology, electrical equipment and electronics, chemical and pharmaceutical products.

[9] The indicator focuses only on the quantitative aspect of capital accumulation and does not account for its efficiency, which depends in particular on its technological content and its sectoral orientation. As pointed out by the referee, it could also be argued that measures of relative capital accumulation may be viewed as indicators of the country's ability to attract capital. In that sense, relative capital accumulation is more an indicator of investment profitability. There appears to be, however, no direct relation between investment in physical capital and nonprice competitiveness of the products sold by a country.

III. Export Performance and Export Market Shares

Changes in competitiveness must eventually lead to changes in export performance and export market shares. Figure 8 shows the evolution of France's export market performance in manufacturing (as calculated by the OECD), which is defined as an index of export volumes divided by an index of export markets. The latter (whose rate of change is also represented in Figure 8) is calculated on the basis of import volumes of all countries to which France exports and represents a measure of France's potential for export growth. The data suggest that export performance deteriorated sharply between 1983 and 1986, and worsened at a more gradual pace until 1993, in line with a deteriorating export market potential. Export performance

Figure 8 – *Export Market Growth and Relative Export Performance of Manufacturing for France*



[a] Semester over semester, annualized percentage rate. A country's export market growth is equal to the rate of change of its export market, which is defined as a weighted average of all imports (in volume terms) of all countries to which the country under consideration exports. See Durand et al. (1992). A positive number indicates an improvement in France's potential for export growth. – [b] Relative export performance is measured as the ratio of export volumes to the export market. An increase indicates that the country's exports rise faster than its market, and is thus registering a gain in market shares. See Durand et al. (1992).

Source: OECD.

improved in 1994, as exporters expanded sales abroad at a faster rate than potential market growth would indicate.

Table 2 shows an alternative measure of relative export performance since the mid-1980s: export market shares in manufacturing goods, defined as the ratio of exports of each country relative to exports of the nine major industrial countries, in addition to France, Germany, Italy, Japan, the Netherlands, Spain, the Belgian-Luxembourg Economic Union, the United Kingdom, and the United States. In line with the depreciation of the dollar, the market share of the United States rose by more than 6 percentage points between 1985 and 1994. By contrast, Japan's share declined continuously in the past ten years. Germany's share in the exports of major industrial countries deteriorated steadily between 1985 and 1993, but improved significantly in 1994. Italy, Spain and the United Kingdom recorded a significant increase in market shares in 1993, in line with the real exchange rate developments reviewed earlier. However, while Spain maintained its relative position in 1994, both Italy and the United Kingdom lost market shares in that year. France's relative position among major industrial countries (notwithstanding the significant drop in market share recorded in 1993) shows no discernible pattern over the past ten years.

Table 2 – *Industrial Countries: Market Shares in Manufacturing, 1985–1994 (at prices and exchange rates of 1980)*

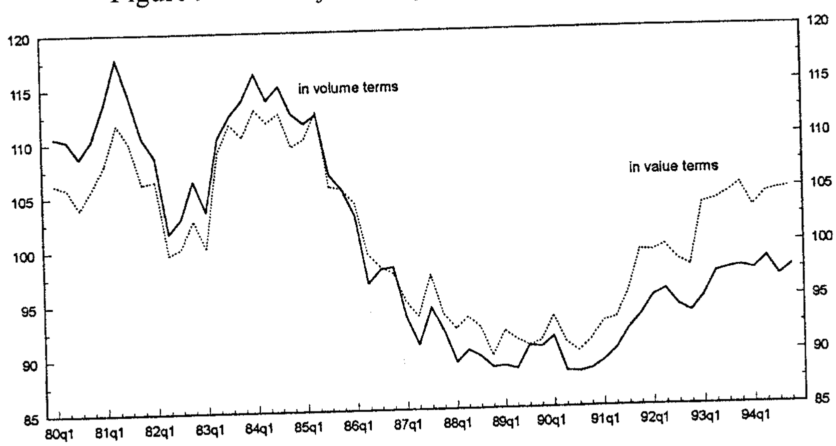
	1985–87	1988	1989	1990	1991	1992	1993	1994
Belgian-Luxembourg Economic Union	6.7	6.8	6.9	6.9	6.7	6.5	6.7	6.5
France	10.1	9.8	10.0	10.1	10.3	10.4	9.2	10.3
Germany	22.7	21.8	21.8	21.2	21.0	20.5	19.0	21.4
Italy	8.8	8.3	8.3	8.2	7.9	7.9	8.9	8.0
Japan	17.8	16.5	15.9	16.0	15.8	15.6	15.0	14.1
Netherlands	5.7	6.2	6.0	6.0	6.1	6.1	6.0	6.0
Spain	2.2	2.1	2.1	2.2	2.3	2.3	2.6	2.6
United Kingdom	9.5	9.1	9.1	9.2	8.9	8.7	9.1	8.3
United States	16.4	19.4	19.9	20.3	21.1	22.2	23.4	22.8

Note: The data shown represent exports of each country relative to total exports of the nine major OECD countries in percent. On January 1, 1993, a new system of data collection for intra-EU trade (INTRASTAT) was put in place in EU member countries. Trade data are no longer recorded through customs services but through VAT declarations. Estimates for 1993 and 1994 are based on national accounts and balance of payments data and may be subject to large biases.

Source: INSEE, *Rapports sur les Comptes de la Nation,* various issues.

Another quantity-based indicator of external trade performance in manufacturing goods is the trade ratio, that is the ratio of exports over imports. Figure 9 shows the behavior of the trade ratio since the early 1980s, at both constant and current prices. The data suggest that relative export performance deteriorated significantly between 1985 and 1988, a phenomenon which appears to reflect the (lagged) effects of the sharp appreciation of the franc between 1985 and 1987. Following a period of relative stability between 1989 and 1991, the performance of the French manufacturing sector has improved almost continuously.

Figure 9 – *Manufacturing Trade Ratio for France*[a]



[a] The trade ratio is defined as the ratio of exports over imports.
Source: Direction de la Prévision, Ministère de l'Economie.

In interpreting the above results, it is important to keep in mind that there are several difficulties involved in assessing movements in export market shares and the effect of cost-based indicators of competitiveness on trade flows. The first is that aggregate results for the manufacturing sector must be interpreted with care. Various studies based on more disaggregated data suggest that France has a low share of exports in sectors with strong external demand (such as chemicals, pharmaceuticals, office and data-processing products, precision and optical instruments, and electrical goods), in comparison with Germany, Japan, and the United States.[10] Market shares have also been

[10] See, for instance, Bonnaz and Paquier (1993). It is worth noting that analyses along these lines have been at the forefront of the debate on competitiveness in France since the early 1970s. See, most notably, Lafay (1976).

lost in the areas of automobiles and textiles. The second is the existence of significant lags between movements in competitiveness indicators and changes in trade flows. Year-to-year movements are also affected by differences in relative cyclical positions. To account for lagged effects and isolate the impact of competitiveness on trade flows requires a dynamic econometric framework, as discussed below.

The third difficulty results from the fact that price-setting behavior of domestic producers on foreign markets involves a trade-off between profitability and competitiveness. On the one hand, prices must be maintained sufficiently above costs to ensure profitability of exports, and therefore some long-term relation between prices and costs must be maintained. On the other hand, if export prices are pushed too high, national producers will lose market shares on foreign markets, and therefore in the long term there must also be some relation between export prices and the prices of foreign competitors denominated in the same currency. While not a sustainable strategy in the long run, exporters may try in the short run to defend their market share by "pricing to market" and squeezing profits. Recent evidence suggests that export prices denominated in French francs are relatively sensitive to exchange rate changes, and that adjustment in these prices tend to stabilize the local currency prices in the destination market.[11] For instance, an appreciation of the domestic currency would lead to a squeeze on profit margins, rather than an increase in export prices and a loss in export market shares. The same mechanism is also relevant in interpreting the behavior of internal price competitiveness, as discussed in Section II.

Despite its usefulness, the preceding descriptive analysis of developments in competitiveness indicators and export market shares suffers from an inherent weakness: the relative importance of these indicators in the overall competitiveness and export performance of the manufacturing sector is difficult to assess. By contrast, a formal econometric analysis of trade flows would permit such an assessment, by allowing different indicators to be introduced simultaneously in the regression model, while at the same time controlling for cyclical factors. The next section provides such an analysis, by distinguishing the effect of price and nonprice competitiveness in the determination of trade flows.

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[11] See most notably Bismut (1994), who found the weight attached to competitors' prices in export markets to be twice as large as the weight attached to domestic labor costs in the determination of French export prices in the long term.

IV. Competitiveness and Trade: An Econometric Analysis

An analysis of the short- and long-run determinants of the external trade performance of the French manufacturing industry is presented in this section. Traditional econometric analyses of external trade performance tend to focus on two types of factors: changes in competitiveness (or relative prices), and changes in domestic and foreign demand. Here, as in the traditional approach, the effect of demand factors and relative prices on trade flows in the long run is assessed through cointegration analysis. In addition, however, the role of nonprice competitiveness factors is also explored.[12] Short-run fluctuations in trade flows are then explained by taking into account short-term movements in all these variables in a vector error correction framework. We begin by presenting the econometric methodology and then turn to estimation results and variance decompositions.

1. Methodology

The methodology used here proceeds in two steps. The first step consists of estimating a cointegrating (or long-run) relationship between the trade ratio in manufacturing and domestic demand, foreign demand, a cost-based competitiveness indicator, and an indicator of nonprice competitiveness. After testing for the existence of unit roots in the basic series, cointegration tests among the variables are performed.

The second step of the procedure consists of estimating the short-run dynamics of the trade ratio through a vector error correction (VEC) model, that is, a vector autoregression (VAR) system based on the first differences of (the logarithm of) the variables described above, in which the series of residuals from the cointegrating relationship (lagged one period) appears as an additional regressor in the system.

As is well known, VAR models allow for the exploration of empirical regularities and dynamic interactions with a limited number of auxiliary assumptions. VAR systems treat all variables as endogenous and model each variable as a function of lagged values of itself and all other variables in the system. Estimated VAR systems do not provide estimates of structural parameters but rather unconstrained estimates of the relationships among the variables in the system (Hamilton

[12] Erkel-Rousse (1992) provides a recent study emphasizing the role of nonprice competitiveness (using an indicator very similar to the one used here) on the behavior of manufacturing trade flows in France and Germany during the 1970s and 1980s.

1994). They can be used to compute variance decompositions, which provide estimates of the share of the variance of each variable that is explained by the other variables in the system.[13] In examining the trade ratio, for instance, variance decompositions can be examined to determine the relative importance of innovations in all variables in the system. Incorporating a cointegrating relationship in the VAR is important for computing variance decompositions, as it ensures the long-run consistency of the dynamic response of the variables of the system.

2. Estimation Results

The variables that are the focus of the analysis are defined as follows, all given in natural logarithms:

- *tratio* denotes the manufacturing trade ratio, defined as the ratio of exports over imports of manufactured goods;
- y is real gross domestic product in France;
- *nulc* is the index of relative normalized unit labor costs;[14]
- y^* is an index of real gross domestic product in G-6 industrial countries, that is, G-7 minus France;
- *npc* is the indicator of nonprice competitiveness calculated by the OECD, as discussed in the previous section.[15]

Before performing cointegration tests, the time-series properties of the different variables must be examined. Augmented Dickey-Fuller unit root tests were used to determine the time-series properties of the

[13] To construct the variance decompositions, the variables in the system must be ordered according to their degree of contemporaneous exogeneity. To check for robustness, different orderings of the variables are used below. In all alternative orderings, the first variable (the most contemporaneously exogenous variable in the system) is G-6 output and the last either the trade ratio or domestic output. Thus, in any given quarter, innovations in foreign demand are assumed to affect all of the other variables in the system, whereas innovations in other variables do not affect foreign demand in the same quarter; trade flows (or domestic output) are also assumed to be affected by contemporaneous innovations in all other variables.

[14] In the preliminary stages of the anaylsis, experiments were performed with a variety of other price- and cost-based indicators of competitiveness. Some measures (such as relative profitability indicators) yielded poor results, whereas others (such as the real exchange rate index based on wholesale prices) yielded results that were close to those obtained when using normalized relative unit labor costs.

[15] Sources of the data for the index of relative unit labor costs and the manufacturing trade ratio are described in Figures 1 and 9. France's real GDP was obtained from the IFS database. G-6 real GDP was obtained from the World Economic Studies Division of the IMF Research Department. The quarterly series on nonprice competitiveness was obtained by interpolation from the semi-annual series.

Table 3 – *Order of Integration: ADF Test Statistics (estimation period: 1983 Q1–1994 Q2)*

	Log-level form		First differences	
	k	test statistic	k	test statistic
tratio	3	−1.724	0	−6.847**
y	2	−2.141	0	−4.862**
nulc	3	−2.826	0	−5.918**
*y**	1	−1.821	0	−4.998**
npc	3	−3.231	1	−3.554**

Note: The asterisks * and ** indicate significance at the 5 and 1 percent levels, respectively, based on the critical values tabulated by McKinnon (1991). – The ADF test statistics reported in the table are given by the t-statistic on the estimated coefficient a_1 in the regression

$$\Delta z_t = a_0 + a_1 z_{t-1} + \sum_{h=1}^{h=k} b_h \Delta z_{t-h},$$

for each variable z. The value of k is determined by the highest order lag for which the corresponding t-statistic is significant. A constant term and a time trend were included in all regressions. – The variables *tratio, y, nulc, y** and *npc* denote the trade ratio, domestic GDP, the real effective exchange rate based on relative normalized unit labor costs, G-6 GDP, and the OECD's index of nonprice competitiveness (as shown in Figure 9), respectively.

variables (see Dickey and Rossana 1994). The results of these tests are reported in Table 3. They indicate that all the variables defined earlier are nonstationary in levels, but stationary in first differences.

Since the trade ratio, relative unit labor costs, domestic and foreign demand, and the nonprice competitiveness indicator are integrated of order one, we may test for the existence of a cointegrating relationship among these variables. Preliminary results using the Engle-Granger procedure and Johansen's maximum likelihood procedure (see Dickey and Rossana 1994) did not prove successful.[16] To

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[16] The Johansen technique yielded implausibly high elasticities (almost 6, for instance, for domestic output in some of the tests that were performed). The OLS regression obtained by applying the Engle-Granger procedure was, for the period 1980 Q1–1994 Q2:

$$\underset{}{tratio = constant} \; \underset{(-4.285)}{-2.151\,y} \; \underset{(3.682)}{+0.791\,npc} \; \underset{(-3.537)}{-1.359\,nulc} \; \underset{(2.485)}{+0.923\,y^*}$$

$$\bar{R}^2 = 0.735 \qquad see = 0.049 \qquad DW = 0.347,$$

where $\bar{R}^2$ denotes the coefficient of determination, see the standard error of the regression, and DW the Durbin-Watson statistic. Coefficients in parentheses are t-ratios. While the parameters of the above equation appear reasonable, applying the ADF unit root test to its residuals indicated that the variables were not cointegrated.

a large extent, this appears to result from the small sample used in this study. An alternative approach was therefore used. A regression model with polynomial distributed lags of up to 8 quarters in relative unit labor costs and the nonprice competitiveness index was estimated. The model with distributed lags was used in order to capture the fact that changes in labor costs and nonprice competitiveness factors on trade flows typically operate with long lags. The results are presented in Table 4 for different specifications of the model. The cointegrating relationship (which is denoted *ec* below), was taken to be the long-run solution of equation (3) in Table 4, that is, the equation in which the coefficients of *nulc* and *npc* were set equal to the sum of their current and lagged effects. Thus, the long-run equation takes the implicit form

$$ec = tratio - 35.354 + 3.587\,y - 2.021\,y^* - 1.85\,npc + 3.736\,nulc.$$

We then tested for the existence of a unit root in the residuals from the long-run relationship. The results of the augmented Dickey-Fuller test (performed over the period 1982 Q1–1994 Q2) led to a test statistic equal to −3.521, which is borderline significant at the 1 percent level.[17] The linear combination described above is thus stationary and is used in the second stage of our estimation procedure. The elasticities of the trade ratio with respect to domestic output and relative unit labor costs are significantly larger than those obtained in studies in which overall import and export equations are estimates (see, for instance, Bonnaz and Paquier 1993). The long-run elasticity with respect to the nonprice competitiveness variable, at about 1.9, is also large. The behavior of the actual, predicted (on the basis of (3) in Table 4) and long-run values (as given by the above equation with $ec=0$) are shown in Figure 10. The sharp increase in the long-run value of the trade ratio in 1988–1989 and 1991 reflects the large gains in competitiveness registered during these periods, as shown in Figure 1.

The second step of the procedure consists in estimating a VEC model to capture the short-run dynamics of the trade ratio. Let $Z=[tratio\ y\ y^*\ nulc\ npc]'$; the VEC model to be estimated is

$$\Delta Z_t = \sum_{k=1}^{k=n} A_k \Delta Z_{t-k} + \alpha\, ec_{t-1} + u_t\,, \qquad (1)$$

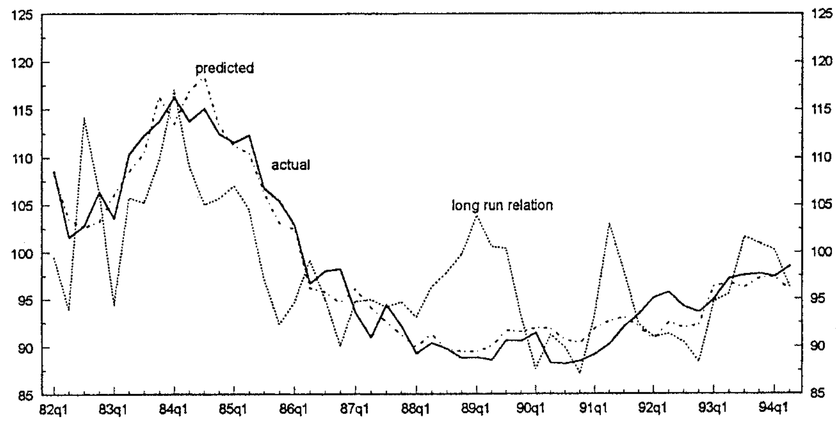
[17] McKinnon's (1991) critical values are −2.913 and −3.547 at the 5 and 1 percent significance levels, respectively.

Table 4 – *Polynomial Distributed Lag Regressions for the Estimation Period: 1982 Q1–1994 Q2 (ordinary least squares)*

	(1)	(2)	(3)		(4)	
Constant	39.824 (12.349)	10.553 (2.390)	35.354 (11.001)		17.594 (3.407)	
y	−2.832 (−6.755)	−0.544 (−1.332)	−3.587 (−10.386)		−1.716 (−3.135)	
npc	1.176 (5.241)	0.329 (1.781)	—		—	
*y**	0.885 (2.763)	0.090 (0.384)	2.021 (7.215)		0.983 (2.813)	
tratio(−1)	—	0.790 (7.549)	—		0.515 (4.046)	
	nulc	*nulc*	*npc*	*nulc*	*npc*	*nulc*
t	−1.025 (−3.990)	−0.604 (−3.419)	0.199 (0.921)	−0.350 (−1.615)	0.178 (0.975	−0.409 (−2.221)
t−1	−0.924 (−7.546)	−0.345 (−3.113)	0.256 (3.142)	−0.619 (−5.652)	0.129 (1.697)	−0.373 (−3.368)
t−2	−0.697 (−5.820)	−0.150 (−1.409)	0.257 (2.083)	−0.653 (−5.998)	0.092 (0.819)	−0.289 (−2.243)
t−3	−0.419 (−4.336)	−0.019 (−0.235)	0.224 (2.032)	−0.534 (−5.441)	0.069 (0.687)	−0.185 (−1.539)
t−4	−0.163 (−2.275)	0.048 (0.883)	0.179 (2.198)	−0.350 (−4.069)	0.061 (0.826)	−0.091 (−0.947)
t−5	−0.002 (−0.017)	0.051 (0.816)	0.141 (1.401)	−0.186 (−1.907)	0.069 (0.795)	−0.041 (−0.453)
t−6	−0.011 (−0.095)	−0.007 (−0.097)	0.132 (1.139)	−0.125 (−1.246)	0.093 (0.939)	−0.062 (−0.709)
t−7	−0.264 (−3.006)	−0.129 (−2.147)	0.174 (2.134)	−0.255 (−3.409)	0.133 (1.908)	−0.186 (−2.809)
t−8	−0.835 (−4.059)	−0.314 (−2.076)	0.287 (1.403)	−0.661 (−3.860)	0.191 (1.089)	−0.441 (−2.850)
sum	−4.339 (−9.731)	−1.470 (−3.067)	1.850 (9.849)	−3.736 (−9.490)	1.017 (3.908)	−2.078 (−3.932)
$\bar{R}^2$	0.854	0.937	0.928		0.949	
see	0.033	0.022	0.023		0.019	
DW	0.837	2.157	1.332		2.179	

Note: $\bar{R}^2$ denotes the adjusted coefficient of determination, see the estimated standard error of the regression, and DW the Durbin-Watson statistic. Coefficients in parentheses are t-ratios.

Figure 10 – *Actual, Predicted and Long-Run Values of the Trade Ratio for France*[a]



[a] The trade ratio is defined as the ratio of exports over imports, in volume terms.
Source: Direction de la Prévision, Ministère de l'Economie; author's calculations.

where A_k is a (5×5) matrix and α a (5×1) vector of parameters to be estimated, and *ec* the error correction term. In the equation, *n* denotes the lag length, and u_t a vector of error terms. The errors are assumed to be identically and independently distributed, with zero means and constant variances and covariances. Thus, each variable in the VEC is assumed to be determined by *n* lagged values of each of the variables in the system (including its own lagged values), and the error correction term ec_{t-1}.

The VEC model described by (1) was estimated over the period 1986 Q1 – 1994 Q2. All variables were restricted to have identical lag lengths across equations to cut down the number of possible specifications. The "optimal" lag length, determined on the basis of Akaike's Final Prediction Error statistic (starting from a maximum lag length of 6 quarters), was equal to 3.[18] The results yielded an estimate of the coefficient of the error correction term ec_{t-1} in the trade ratio equation of -0.259 (with a t-ratio equal to -2.687), which implies a

[18] See Lütkepohl (1985) for a discussion of alternative criteria for choosing the lag length in VAR models. Imposing equal lag lengths on each of the variables in the model implies that the resulting parameter estimates may suffer from bias or inefficiency, depending on whether the model is under- or over-parameterized.

relatively rapid adjustment to disequilibrium in the cointegrating relationship.

Table 5 presents decompositions of the forecast error variances of the trade ratio at 4-quarter intervals (up to 24 quarters), and for four different orderings of the variables since, as indicated earlier, variance

Table 5 – *Variance Decomposition of the Trade Ratio*

Quarters	*tratio*	*y*	*y**	*npc*	*nulc*
	A. *Ordering: y*–y–npc–nulc–tratio*				
1	95.96	3.23	0.79	0.01	0.01
4	32.25	11.59	23.75	16.98	22.81
8	30.97	11.73	22.61	18.74	23.94
12	30.70	11.54	23.13	19.54	23.65
16	30.63	11.50	23.24	19.28	23.56
20	30.60	11.48	23.28	19.18	23.53
24	30.59	11.48	23.29	19.35	23.51
	B. *Ordering: y*–npc–nulc–y–tratio*				
1	95.96	2.61	0.79	0.54	0.09
4	32.25	8.10	23.75	14.06	21.83
8	30.97	8.59	22.61	13.98	23.82
12	30.70	8.44	23.13	14.17	23.54
16	30.63	8.39	23.24	14.28	23.45
20	30.60	8.38	23.28	14.31	23.43
24	30.59	8.38	23.29	14.32	23.41
	C. *Ordering: y*–npc–y–nulc–tratio*				
1	95.96	2.69	0.79	0.54	0.01
4	32.25	7.11	23.75	14.06	22.81
8	30.97	8.48	22.61	13.98	23.94
12	30.70	8.34	23.13	14.17	23.65
16	30.63	8.28	23.24	14.28	23.56
20	30.60	8.27	23.28	14.31	23.53
24	30.59	8.27	23.29	14.32	23.51
	D. *Ordering: y*–npc–nulc–tratio–y*				
1	98.57	0.00	0.79	0.54	0.09
4	31.79	8.56	23.75	14.06	21.83
8	29.87	9.71	22.61	13.98	23.82
12	29.59	9.56	23.13	14.17	23.54
16	29.51	9.52	23.24	14.28	23.45
20	29.48	9.50	23.28	14.31	23.43
24	29.47	9.50	23.29	14.32	23.41

Note: The numbers in the table indicate the proportion of the variance of the manufacturing trade ratio attributable to each of the variables of the system, after the number of quarters specified in the first column.

decompositions are sensitive to the ordering of the variables according to their presumed degree of exogeneity. In the first three orderings, G-6 output appears first and the trade ratio last. To be more specific, in ordering A, after the indicator of foreign demand we have domestic output, the nonprice competitiveness index, and relative normalized unit labor costs. In ordering B, domestic output is positioned after the indicators of nonprice competitiveness and relative unit labor costs. In ordering C, domestic output is positioned between the indicators of nonprice competitiveness and relative unit labor costs. In ordering D, domestic output appears last, and the trade ratio is positioned after the nonprice competitiveness index and the index of real exchange rate based on unit labor costs.

All four orderings yield relatively similar results. At a horizon of one quarter, the percentage contribution of each variable to the variation in the trade ratio is small relative to the variability of the trade ratio itself. After 24 quarters, however, the share of the variation in the trade ratio accounted for by its own variations drops to about 30 percent. Shocks to relative unit labor costs explain about 23 percent, domestic output between 8 and 11 percent, world output about 23 percent, and the nonprice competitiveness index about 14 percent, of innovations in the trade ratio. Thus, shocks to price and nonprice competitiveness account for about 40 percent of fluctuations in the trade ratio, compared to about 30 percent for shocks to domestic and foreign output.

V. Summary and Conclusions

The purpose of this paper has been to provide an assessment of competitiveness and external trade performance of the French manufacturing industry during the 1980s and early 1990s. The first part of the paper focused on developments in a broad range of competitiveness indicators (cost-based measures, both at the aggregate and bilateral levels, measures of internal price competitiveness, import penetration ratios, profitability indices, and measures of nonprice competitiveness). The analysis in this part suggests that overall the French manufacturing sector has improved its competitiveness position since the early 1980s, and has maintained its relative position since the late 1980s. However, these improvements have not necessarily occurred in sectors with the highest potential for expansion. Some components of the manufacturing sector may have continued to lose their competitiveness, as suggested by measures based on internal prices and trade penetration ratios.

The second and third parts of the paper focused on trade performance in manufacturing. The evolution of export market shares and relative export performance was first examined in the second part. The analysis suggests that France's market share in manufacturing relative to other major industrial countries did not change in any significant way over the past decade, but that export market performance (defined as an index of export volumes divided by an index of export markets) has improved since the mid-1980s.

An econometric analysis of the short- and long-run determinants of trade performance was then conducted in the third part of the paper. The first stage of the analysis consisted of estimating a cointegrating relationship between the manufacturing trade ratio, relative unit labor costs, domestic and foreign demand, and a measure of nonprice competitiveness (based on relative capital accumulation rates). In the second stage, a vector error correction model (that is, a VAR system in first differences of all variables, with an error correction term in level form lagged one period), relating trade performance in manufacturing to the variables described above and an error correction term, was estimated. Variance decompositions indicated that about 40 percent of fluctuations in manufacturing trade flows are accounted for by changes in price and nonprice competitiveness, significantly more than the proportion accounted for by innovations in domestic and foreign output.

As emphasized by many commentators in France (at least since the mid-1970s) and elsewhere, a key element in the strategy aimed at improving the external economic performance of the French manufacturing sector is the need to foster a sectoral reallocation of investment towards strong-demand sectors in order to increase productive capacities and meet the growth in internal and external demand. This argument may be supported by the foregoing discussion which has also highlighted the importance of nonprice competitiveness for the French economy, particularly in the context of the move towards a common monetary and economic area in which the use of parity adjustments are precluded as instruments of external adjustment. Since in the years ahead, international competitiveness of the French manufacturing industry may become less and less related to price and cost developments, the ability to innovate, the diffusion of new technologies, quality standards, delivery time, marketing, before- and after-sales services, the capacity to adapt rapidly to user needs, and increased globalization will be increasingly important for capturing markets.

Appendix

Figure A 1 – *Bilateral Real Exchange Rate Based on Unit Labor Costs in Manufacturing for France (1980 = 100)* [a]

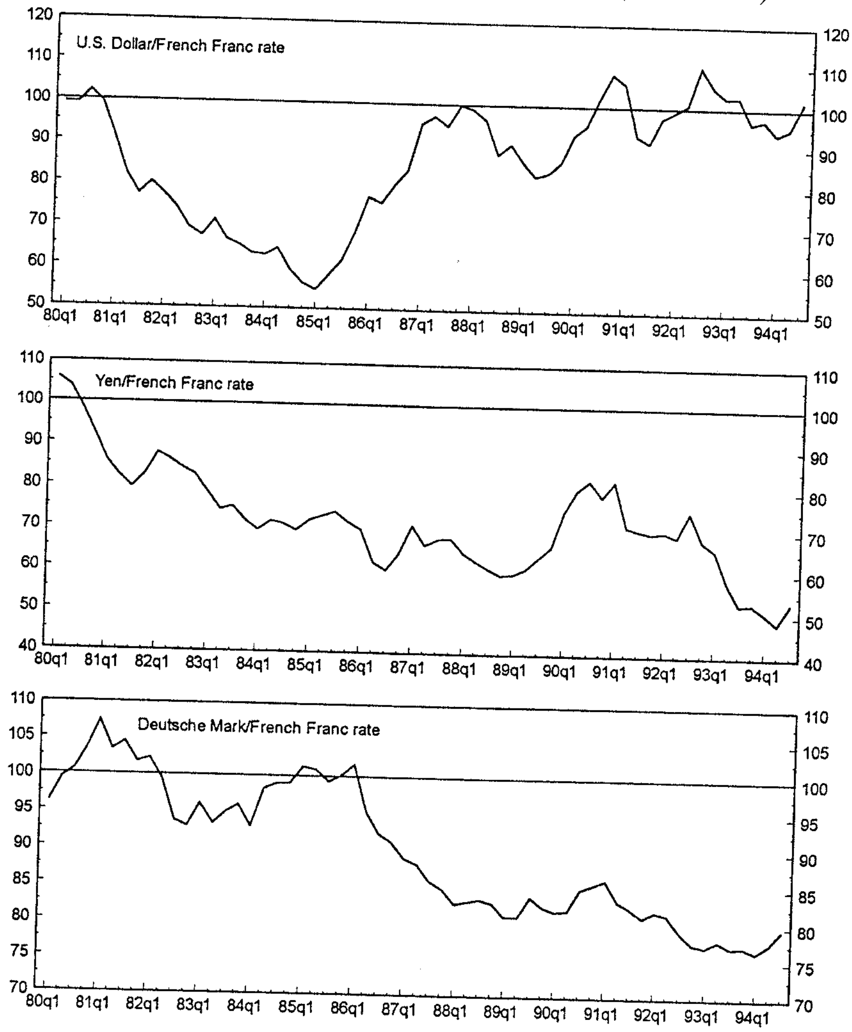
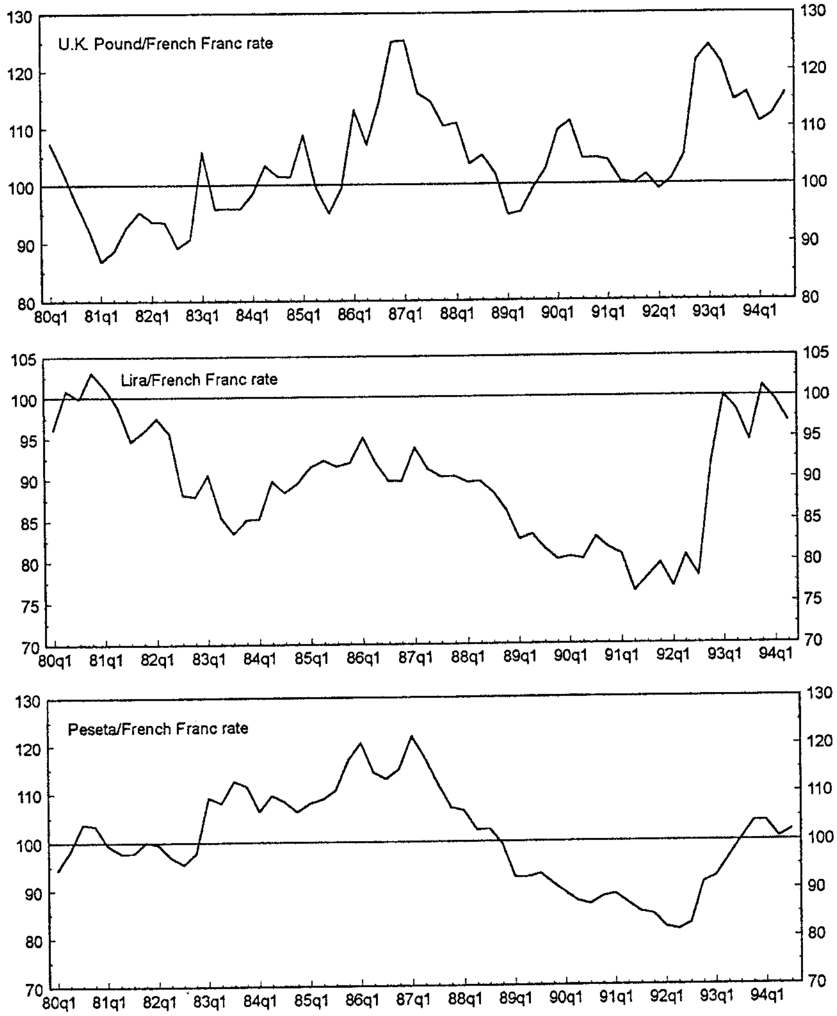


Figure A 1 (continued)



[a] An increase indicates a real appreciation of the French currency.

Source: IMF *International Financial Statistics;* IMF, Research Department.

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Abstract: Competitiveness and External Trade Performance of the French Manufacturing Industry. – This paper evaluates the competitiveness and external trade performance of the French manufacturing industry during the 1980s and early 1990s. It reviews developments in a broad range of competitiveness indicators, showing that the manufacturing sector appears to have maintained its competitive position, discusses developments in export market shares, and estimates a vector error correction model relating the trade ratio to relative unit labor costs, domestic and foreign demand, and nonprice competitiveness. Variance decompositions suggest that fluctuations in price and nonprice competitiveness account for about two-fifths of fluctuations in manufacturing trade flows. JEL no. C32, F17, F41

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Zusammenfassung: Wettbewerbsfähigkeit und Erfolg der französischen Industrie im Außenhandel. – Der Verfasser analysiert die Wettbewerbsfähigkeit und die Erfolge im Außenhandel der französischen Industrie in den achtziger und frühen neunziger Jahren. Im ersten Teil kommentiert er die Entwicklung einer ganzen Reihe von Indikatoren für die Wettbewerbsfähigkeit und zeigt, daß der gewerbliche Sektor seine Wettbewerbsposition gehalten zu haben scheint. Danach analysiert er die Entwicklung der Anteile an den Exportmärkten und schätzt ein Vektor-Fehlerkorrekturmodell, das den Handelsanteil in Beziehung setzt zu den relativen Lohnstückkosten, der heimischen und der ausländischen Nachfrage und der Nichtpreis-Wettbewerbsfähigkeit. Eine Aufspaltung der Varianz deutet darauf hin, daß Schwankungen in der Preis- und Nichtpreis-Wettbewerbsfähigkeit etwa zwei Fünftel der Schwankungen in den Handelsströmen für gewerbliche Güter bewirken.