

Measures of competitiveness

This article discusses three different measures of competitiveness. It describes recent developments in UK competitiveness, and explains how the concept is incorporated in some large econometric models. Some simulations using the Bank's model are presented.

Meaning of competitiveness

Even though it is widely felt that British industry lacks competitiveness, there is considerable disagreement over the way in which it should be measured. This reflects statistical problems in part, but there are also a number of analytical issues which need to be considered when assessing the appropriateness of the various measures available. Three different concepts of competitiveness are considered.

Price competitiveness. The product of a particular company could be regarded as competitive in the market if its price, design, quality and other attributes (including after-sales service etc) matched those of rival concerns. A firm might be able to increase the volume of its sales by lowering the price of its products (thus increasing price competitiveness), or by improving its product and thereby increasing its 'non-price' competitiveness. Some goods, such as certain commodities and bulk chemicals, are so similar and are traded in so perfect a market that trading takes place at essentially a single price, and there is little scope for improving non-price competitiveness.⁽¹⁾ In these circumstances the notion of price competitiveness has little meaning, since any trader who reduces his price will find himself swamped by demand for his product. Price competitiveness will have meaning only when the goods of one supplier are sufficiently different from those offered by other suppliers, by virtue of style, performance, quality or service, to enable him to raise his price appreciably above the prevailing price of somewhat similar goods without losing all his custom. (This is characteristic of the markets for many manufactured goods, for example.) In these circumstances, suppliers have some freedom in setting price, and then satisfy whatever demand is generated at home and abroad at that price.

Relative cost competitiveness. Irrespective of the type of market in which goods are sold, prices need to be sufficiently above direct costs, at least in the long run, to provide an adequate return on capital employed. The difference between price and some suitably defined measure of cost will provide an indication of profit, and thus, perhaps, of the willingness to carry on supplying. A lowering of costs relative to competitors—as a consequence of technical innovation, more efficient use of labour with given technology, or lower input prices not shared by

competitors—will enable the supplier to raise his profit margins, or improve his price (and non-price) competitiveness, or both if circumstances allow. Which effect predominates will depend on the structure of the market in question, and on the nature of the supplier's corporate strategy. In general, a firm's output will depend both on its price and on its costs relative to those of its competitors.

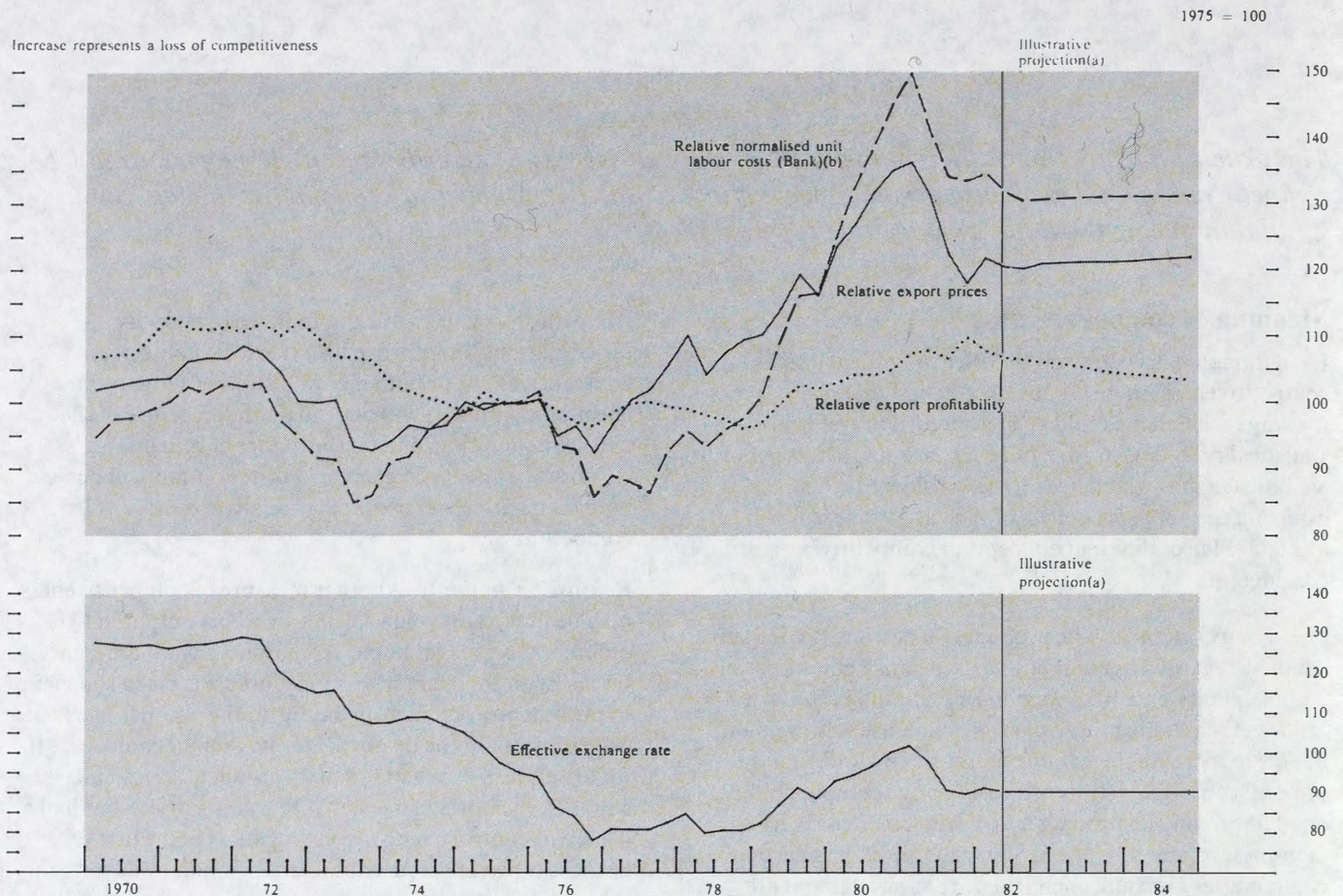
Relative profitability. Another measure of competitiveness may be important when a firm can sell its output in two different markets (at home and abroad, say) at different prices (with such factors as transport costs being sufficient to prevent customers from buying in the cheaper market to sell at a profit in the dearer). This possibility could arise if, for example, a firm had to sell its products, as a small supplier, in a foreign market at the 'going price', but had a degree of control over price setting in its home market because it had ensured a dominant position by advertising, a network of agencies and so on. The price of foreign sales in relation to the price of sales at home would give an indication (after correction for the extra costs of selling abroad) of the relative profitability of operations in each market, and thus of the relative quantities supplied.

These notions can be used to analyse how relative prices and costs might influence UK trade performance. (The physical quantities of exports and imports traded will also depend on a number of other factors, such as incomes and capacity limitations at home and abroad.) For practical reasons, trade flows have to be analysed in aggregate, adding together not only identical goods traded on perfect markets, but also goods which are highly differentiated by style and quality, and goods supplied by a small number of producers. Within each of these categories, goods are produced by firms with different objectives and at different stages of the product cycle. Thus one cannot be confident that any of the measures described above will be wholly satisfactory at predicting trade flows.

One particular aggregation of interest is the manufacturing sector, which brings together trade in semi-manufactures and finished manufactures, ranging from steel and textiles, through cars to complete power stations. In 1980 manufactured exports accounted for 84% of non-oil exports and manufactured imports for 76% of non-oil imports. But some statistical problems must be overcome.

(1) The quality of the distribution network, and the reliability of supply, may remain factors.

Chart 1
Measures of competitiveness (of the manufacturing sector)



(a) Forecast of measures of competitiveness using the Bank short-run model and data, on the assumption that the sterling effective exchange rate remains constant at its 1982 Q2 level.
(b) The normalisation of the Bank series differs from that of the International Monetary Fund.

National accounting categories do not correspond exactly with the classification of goods in the trade statistics, so perfect identification of these trade flows with the fortunes of domestic manufacturing is not possible; but the correspondence is fairly close. Also, choices have to be made about which of the many available price and cost indices should be used in constructing competitiveness indices. Three particular measures of the concepts of competitiveness discussed above are shown in Chart 1.

Measures of manufacturing competitiveness

Price competitiveness

The measure of price competitiveness illustrated in Chart 1 is *relative export prices*—the ratio of UK manufactured export prices to overseas competitors' export prices (both in terms of a common currency).⁽¹⁾ Other things being equal, a fall in relative export prices might be expected to raise the volume of demand for UK exports. The choice of price index raises difficulties, however. The responsiveness of demand to changes in price varies between products, so a given change in average export prices could have a different

effect on the overall volume of manufactured exports, depending on which particular product prices within the aggregate had changed. Some UK exports to a given country may compete with goods produced in that country as well as with exports from 'third' countries, so that relative export prices (excluding the price of home produced goods) may be too narrow a measure. It also needs to be recognised that relative export prices only cover goods actually produced and traded; some categories of home output, not now exported, could become competitive on international markets if prices moved appropriately. This would argue for a wider measure of home prices. On the other hand, to use a price index which included home produced goods could give excessive weight to goods and services which were unlikely to be traded on international markets at any price.

The measure of export price competitiveness used in Chart 1 represents a balance between those opposing considerations. But because of the nature of the price indices used, it is subject to the criticism that any shift in UK exports towards goods with higher value added could

(1) The available indicators of prices of exports and imports are not 'pure' price indices, i.e. they are not based on the prices of individual goods. The measures of price competitiveness referred to in this article use unit value indices (UVIs) based on trade headings. The UVIs reflect pure price movements except to the extent that there are compositional changes among the goods comprising a trade heading. For a detailed explanation see R Sellwood and R Schiller 'United Kingdom overseas trade: unit value and volume index numbers and the terms of trade 1970-75', *Economic Trends*, April 1975.

show up as a worsening in measured price competitiveness even though their true competitiveness is unchanged.

In general, it has not been possible to identify movements in the indices due to such quality changes; anecdotal evidence from industry suggests that manufacturers may have traded up in the recent period, but this is not yet obviously reflected in the available data.

Cost competitiveness

One of the measures of cost competitiveness, illustrated in Chart 2, is *relative unit labour costs*. This is the ratio of UK to overseas unit labour costs in the manufacturing sector, expressed in a common currency.⁽¹⁾ Unit labour costs are used mainly because of the statistical difficulties associated with measuring total costs of production on a comparable basis. Such a measure has the advantage, compared with relative export prices, of covering goods which could enter domestic and foreign trade, as well as those which do. On the other hand, as with average measures of price competitiveness, it might be argued that unit labour costs in sectors which are not, by their nature, subject to extensive foreign competition should not be given equal weight with those that are. Restricting the coverage of the measure to manufacturing may go some way towards meeting this point, but there are still wide variations between, for example, the degrees of competition faced by the electrical engineering industry and the brick industry, both of which are part of the manufacturing sector.

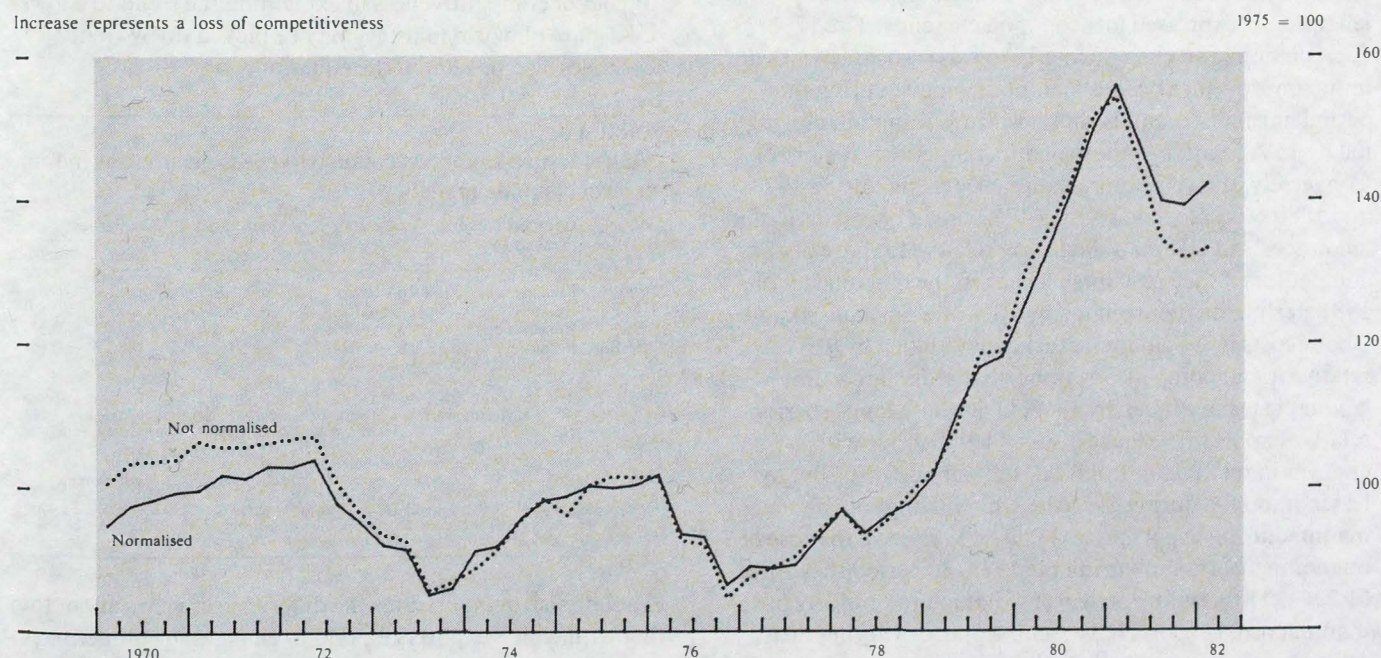
The contribution of disparities in non-labour input prices to differences in total costs appears to be generally small, since

labour is usually both the main factor of production, and that which varies most in price. Even in industries where labour costs appear to account for a low proportion of the selling price of the product, the costs of raw materials and other intermediate products used in production tend to incorporate a sizable element which reflects labour costs. The omission of some raw material inputs may in any case be of little consequence because their cost may not vary much between industrialised countries. Other omitted costs may, however, vary significantly, in particular the burden of taxation on companies, and publicly regulated costs, most notably that of energy.

Chart 2, also shows *relative normalised unit labour costs*, which are adjusted to exclude cyclical fluctuations in productivity from unit labour costs. The reason for the adjustment is that firms may accommodate such fluctuations within their profit margins, rather than vary their prices. Indeed, lack of cyclical adjustment could give rise to misleading conclusions: a cyclical fall in production not accompanied by a proportionate fall in employment would raise unit labour costs, but might represent conditions in which firms were keen to supply foreign markets, or displace imports. In recent years, however, it has been particularly difficult to discern the trend rate of productivity growth. This has led both to difficulties in constructing a reliable measure of normalised unit labour costs, and to some doubts about its continued validity. For example, the recent improvement in productivity, if spread evenly throughout industry, and if sustained in the years to come, should improve competitiveness in a way not yet recognised in the normalised measure.

Chart 2
Relative unit labour costs (of the manufacturing sector)

Increase represents a loss of competitiveness



Source: International Monetary Fund.

(1) Unit labour costs are calculated as the ratio of the current value of compensation per hour to the volume of output per man-hour. The volume of output is calculated using 1975 base weights: for a detailed explanation see M H Small, 'Labour Productivity: output per person hour in manufacturing', *Economic Trends*, January 1982.

Relative profitability

The supply of exports may be influenced by variations in the price of exports relative to their price on the home market, as well as by variations in overall profit margins (sales revenue over costs). *Relative export profitability*, defined as the ratio of export prices to domestic wholesale prices (both in sterling) is therefore included as the third measure of competitiveness in Chart 1. This measure suffers from the coverage and compositional problems which beset the other two measures so that measured relative export profitability may not always accurately reflect changes in the differential between actual export and home prices.

Recent developments in competitiveness

In the short run, institutional limitations on the speed with which export prices are adjusted can give rise to temporary changes in relative export prices expressed in a common currency. For example, a high proportion of UK exports are priced and invoiced in sterling: changes in the exchange rate between sale and delivery therefore result in changes in the foreign currency price of these goods.⁽¹⁾ Sharp movements in the exchange rate in the first half of 1978, the second half of 1979 and the first quarter of 1981, were reflected in similar though less marked changes in relative export prices (Chart 1). The effect of these short-run changes on export volumes is, however, unlikely to be of great significance: unanticipated changes in the exchange rate should have no effect on export sales which have already been contracted. To the extent that overseas purchasers arrange forward cover for exports invoiced in sterling, demand is unlikely to be affected by changes in measured relative export prices.

Fluctuations in the nominal exchange rate, combined with the inflexibility of wages expressed in local currency, can also give rise to changes in relative (normalised) unit labour costs expressed in a common currency. The 17% depreciation of sterling during 1976 was associated with an initial improvement in cost competitiveness: during this period normalised unit labour costs in UK manufacturing fell by 15% relative to those of our competitors (Chart 2). Conversely, the 22% appreciation of sterling during 1979 and 1980 was associated with a 47% rise in normalised unit labour costs in UK manufacturing relative to those of our competitors. Since reaching its peak in the first quarter of 1981 sterling has depreciated by 10% and normalised unit labour costs in UK manufacturing have fallen by 9% relative to our competitors; unnormalised relative unit labour costs have fallen by 14%. Over these longer periods, relative export prices have also tended to move with changes in relative (normalised) unit labour costs, but by lesser amounts: during 1976 the United Kingdom's manufacturing export prices fell by 8% relative to those of our competitors, and during the 1979–80 period they rose by 22%. This reinforces the view that many suppliers of manufactured exports have some scope for varying their selling prices without being either swamped with orders or losing all their customers, ie, they are not price-takers. Even

so, the tendency for cost competitiveness to change by more than price competitiveness suggests that exporters partially accommodate changes in cost competitiveness by varying their profit margins: as a reflection of this, relative export profitability improved by 4% during 1976 and deteriorated by 8% during 1979–80 (Chart 1).

Notwithstanding recent improvements in the measures of competitiveness, when comparisons are made over a number of years unit labour costs and export prices of UK manufacturing have increased relative to those of our competitors: compared with 1975, relative normalised unit labour costs are 42% higher, relative unit labour costs are 33% higher, and relative export prices have risen by 22%. These figures may, however, overstate the scale of the adjustment problem facing the UK economy as a whole because, during this period, the production of North Sea oil has made an increasing positive contribution to the current balance.

Assessment of the effects of competitiveness

Different views about the appropriate measure of competitiveness to use are reflected in the various econometric models of the United Kingdom; the impact of changes in competitiveness on trade flows in four large models are now compared. The National Institute of Economic and Social Research (NIESR) uses a measure of relative export prices, while the other three models adopt some variant of relative unit labour costs. The estimated long-run export elasticities range from -0.27 for the London Business School (LBS) model to -0.69 for the NIESR model; the higher elasticity on relative export prices in the NIESR model may be because relative export prices tend to vary less than relative costs. Comparisons of these estimates, however, are all to some extent unreliable, as the impact of competitiveness in explaining the trend to a lower UK share of world markets may be picked up by trend variables also present in the equations.

Table 1
Manufactured exports: competitiveness elasticities in four macroeconomic models

Model	Competitiveness measure	Longest lag	Mean lag	Elasticities	
				1 year	Long-run
Bank	Relative costs	16 quarters	7 quarters	-0.13	-0.51
HMT	Relative costs	17 quarters	7 quarters	-0.12	-0.53
LBS	Relative costs	4 quarters ^(a)	—	-0.32	-0.27
NIESR	Relative prices	6 quarters	3 quarters	-0.43	-0.69

Sources: LBS —'LBS quarterly econometric model of the UK economy: relationships in the basic model as at October 1981'. LBS Discussion Paper 1981.
NIESR —'Listing of the interim model IV'. NIESR. Discussion Paper No 28, 1979.
Bank —Forthcoming Discussion Paper.
HMT —Macroeconomic model Technical Manual 1982 (forthcoming).

(a) In the LBS model the lagged effect of competitiveness on exports is modelled with a rational lag so that the maximum lag is infinite, but nearly all of the effect of changes in competitiveness occur after four quarters.

Table 1 also demonstrates the difference in views about the lag with which exports respond to changes in competitiveness. Because of the delay between orders and shipments, and uncertainty over whether cost changes are temporary

(1) Surveys of invoicing arrangements indicate that in 1979 76% of UK exports were invoiced in sterling; see 'The choice of invoicing currency in merchandise trade' by S A B Page, *National Institute Economic Review*, November 1981.

or permanent, changes in current competitiveness will take some time to be reflected in trade volumes. The Bank and Treasury (HMT) estimate that less than a third of the total effect of any change in competitiveness is felt in the first year, the mean impact being felt after about seven quarters and the full effect only after four years. The LBS and NIESR, on the other hand, estimate that most of the impact of the change in competitiveness on manufactured export volumes is felt in the first year; though, as the table illustrates, there are other considerable differences between these two models. The difference in lag lengths is striking, and may reflect the different approaches used to estimate the lag structures as well as differences between the measures used. The long lags estimated by the Bank (and HMT) do not arise solely because of delays in the production or delivery of goods ordered; they also reflect the important, and possibly long-delayed impact of changes in relative costs on the investment and sourcing decisions of firms. The long delays arise because firms may not expect changes in relative costs to be sustained unless they have persisted for some time. Expectations about future movements in relative costs could be important because once an investment or sourcing decision has been made the firm may be locked-in to its investment (within limits) for a number of years ahead.

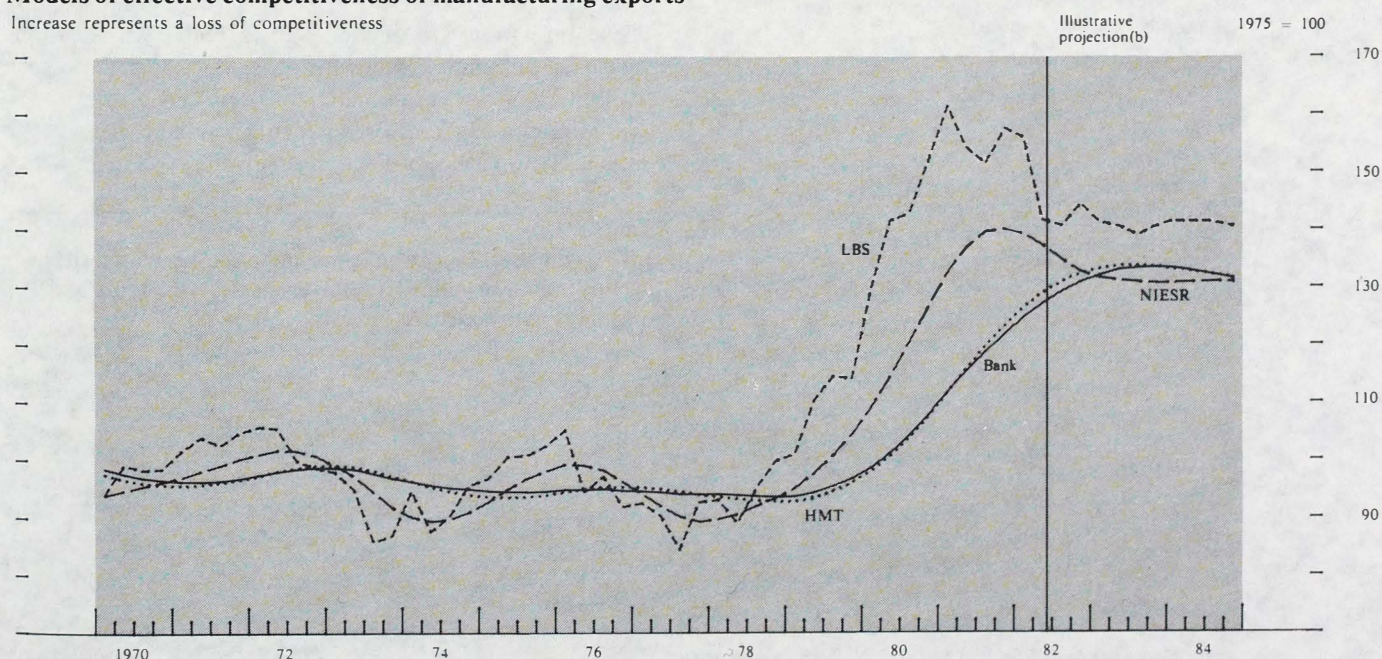
The effects on exports in each period, of past and current changes in competitiveness, can be added up to produce a summary measure: *effective competitiveness*. Chart 3⁽¹⁾ shows the path of manufacturing export effective competitiveness, implied by each of the four models over

the period 1970 to 1984, the illustrative projection being made on the assumption that the sterling effective exchange rate remains at its current level. The different lag distributions in the four models have very different implications for the path of manufactured exports in the next two years, following the massive deterioration in cost and price competitiveness between the first quarters of 1978 and 1981. If, for example, the LBS specification is correct, then the effect of the deterioration in competitiveness on manufactured export volumes has been small, and has already worked through. If, on the other hand, the Bank and HMT models are right, then the earlier loss of competitiveness will have a depressing influence on manufacturing export volumes for some time to come.

Imports also need to be considered in assessing the effect of changes in competitiveness on manufacturing trade as a whole. Research in the Bank and elsewhere suggests that the impact of changes in competitiveness feed through fairly quickly to finished manufactured import volumes. In the Bank model, the full effect of a change in current competitiveness on finished manufactured import volumes is felt within three quarters, the mean lag being one and a half quarters. This contrasts strongly with the mean lag of seven quarters for manufactured exports: the difference can be rationalised on the grounds that, given the small size of the United Kingdom relative to the rest of the world, a change in its demand for overseas manufactures may be more easily accommodated than a change in overseas demand for UK manufactures. Thus, while the benefit of the improvements in current competitiveness in 1981

Chart 3
Models of effective competitiveness of manufacturing exports^(a)

Increase represents a loss of competitiveness



(a) Impact in the current quarter of current and past changes of competitiveness on manufactured export volumes in the four models under consideration.

(b) Illustrative projections using manufactured export volume equations of the four models. Current competitiveness and values of the other regressors are generated by the Bank model on the assumption that the exchange rate remains constant at its 1982 Q2 level.

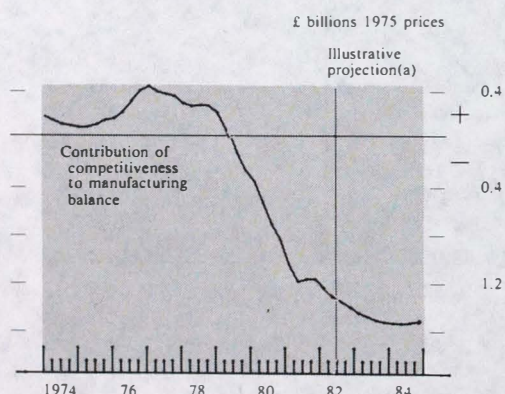
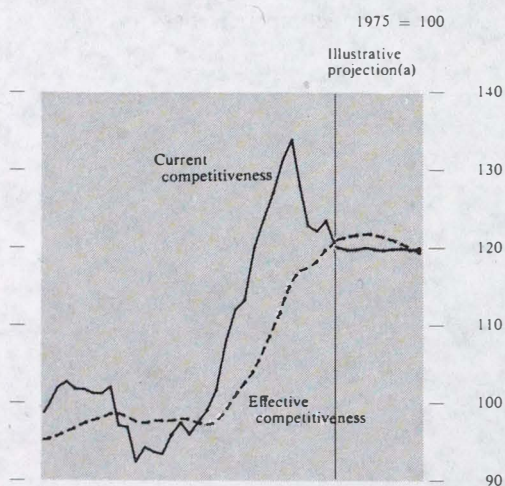
(1) The underlying relative cost and price indices are taken from the Bank model and differ from those used in the other models, so that the series may be distorted as a result; the weights are taken from the coefficients in the manufacturing export volume equations of the published versions of the four macroeconomic models.

probably fed through almost immediately to finished import volumes, the loss of competitiveness prior to 1981 continues to exert a depressing influence on manufactured exports in 1982 and 1983.

The upper panel of Chart 4 shows Bank estimates of effective competitiveness for the overall trade balance in manufacturing, after allowing for lags (ie effective manufacturing competitiveness). It is calculated as a weighted average of the effective competitiveness indices for manufactured exports, and semi- and finished manufactured imports. The maximum impact of a change in the current competitiveness of the manufacturing sector as a whole is estimated to occur after about five quarters. The lower panel of Chart 4 shows the effect, as estimated by the Bank model, of the deviation of effective competitiveness from its 1975 level on the balance of trade in manufactures in volume terms.

In 1981, the improvement in normalised measures of current cost competitiveness was largely due to the depreciation of sterling. The exceptional gains in industrial productivity, which started in 1980 and continued through last year, will not have been an influence, because of the way in which the normalisation is done. Whether they should affect normalised cost competitiveness will depend on whether the improvement represents a fundamental

Chart 4
Current and effective competitiveness of the UK manufacturing sector



(a) Forecast using Bank short-run model and data on the assumption that the sterling effective exchange rate remains constant at its 1982 Q2 level.

structural shift in the underlying rate of productivity growth, or an abnormal response to the unusually prolonged trough in the output cycle; trend changes in productivity are difficult to recognise with confidence until long after they have occurred. Furthermore, recorded changes in productivity may in part reflect changes in the composition of industry. The true competitiveness of UK goods will not necessarily increase because the average level of productivity rises, if that occurs only because low productivity activities are eliminated (for example, by the combined influences of recession and the appreciation of sterling). But, if recent productivity gains reflect an improvement in working practices, or a move to better products, spread throughout British manufacturing, competitiveness will indeed have improved.

The special difficulties of the current situation make it hard to be confident just what measures of competitiveness have particular value, let alone what level of competitiveness is appropriate. It is clear, however, that competitiveness, though recently improved, remains poor: and that continued moderation in pay, and further gains in productivity against the standards set by our competitors, are required.

Some simulations

Table 2, based on the Bank's model of the economy, shows the effects on manufacturing competitiveness and trade which might result if there were particular changes in productivity, the exchange rate and wages in one year, which were sustained in following years. The cases considered are: a 2% upward shift in the level of trend productivity; a 5% step reduction in the effective exchange rate; and wage settlements 5% lower than they otherwise would have been.

These simulations are, of course, to be treated with caution: the earlier discussion makes clear the difficulties that beset econometric work in this field. However, they do serve to illustrate the difficulty of achieving a sustained improvement in the level of competitiveness.

Table 2
Effects on manufacturing trade and effective competitiveness of higher productivity, lower wage settlements and exchange rate depreciation

	Effective competitiveness (% improvement)		Net trade in manufactures as a proportion of manufacturing production (% increase)		Improvement in manufacturing balance at an annual rate (£ millions 1975 prices)	
	After 1 year	After 2 years	After 1 year	After 2 years	After 1 year	After 2 years
Case A. 2% higher productivity:						
No feedback effects on the exchange rate and wages	+0.8	+1.2	+0.6	+1.0	150	260
Case B. 5% exchange rate depreciation:						
No feedback effects on wages	+2.4	+3.2	+2.2	+3.3	540	820
Feedback to wages	+2.2	+2.3	+1.9	+2.0	450	500
Case C. 5% lower wage settlements:						
No feedback effects on the exchange rate	+2.4	+3.3	+1.7	+2.9	410	710
Feedback effects on the exchange rate	+2.0	+2.7	+1.3	+2.3	320	570

Case A shows the effect of a 2% upward shift in the trend level of productivity on the assumption that nominal wages and the exchange rate are unaffected. For reasons outlined above, manufactured exports are slow to respond to the improvements in competitiveness, so the immediate benefit comes through lower imports. After two years, effective competitiveness improves by 1.2% and the annual volume of net trade by £260 million, the full effect being felt after four years. If part of the benefit to competitiveness of higher productivity is absorbed in higher nominal wages, the improvement in net trade would be less pronounced. This is because the improvement in competitiveness would be reduced and real personal disposable income and spending would be increased.

Case B shows the estimated effect of a 5% once for all depreciation in the sterling effective rate. This improves the volume of net trade by £820 million after two years, though part of the benefit to competitiveness is absorbed in higher domestic price inflation even on the (unlikely) assumption that wages do not respond. Inflation increases still further if wages react after a time lag to higher domestic prices; indeed, the lag may be relatively short if wage bargainers perceive that policy has been relaxed in order to secure a decline in the exchange rate.

Case C illustrates the effect on the volume of net trade in manufactures of wage settlements being 5% lower than they otherwise would be. Two variants are considered; in

the first the exchange rate remains unaffected, and in the second lower wage settlements have a feedback effect on the exchange rate. Improvements in the volume of net trade are £710 million, and £570 million respectively after two years.

In both the exchange rate depreciation and the lower wage settlement simulations (Cases B and C), the initial improvement in competitiveness lowers real wages. This depresses real incomes and consumption and thus additionally improves net trade for a given improvement in effective manufacturing competitiveness. In the longer run, nominal wages react to changes in domestic prices, and likewise domestic prices react to overseas prices, so that the initial improvement in competitiveness is eroded.

It would be dangerous to conclude from results such as these that exchange rate depreciation would offer a better solution than wage moderation to the problems facing manufacturing industry. The results of Case B with wage feedback are little different from those in Case C, following wage moderation: moreover, any substantial depreciation might bring about a faster and more complete adjustment of wages to prices than is assumed in Case B, and hence a more rapid erosion of competitiveness. A more assured route to manufacturing prosperity would be through moderation in wage settlements, reinforced by further improvements in productivity, rather than through exchange rate depreciation.