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THE MEASUREMENT OF EFFECTIVE EXCHANGE RATES

by Elmar B. Koch

BANK FOR INTERNATIONAL SETTLEMENTS
Monetary and Economic Department
BASLE

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The measurement of effective exchange rates

Elmar B. Koch*

Introduction

Many countries have sought to use a single indicator - a nominal effective exchange rate index (EER index) - to measure the behaviour of their currencies against other currencies. Although attempts to produce such indices had been made previously, it was only after the move to generalised floating in March 1973 that serious efforts were devoted to constructing EER indices on rigorous lines and that composite yardsticks were developed by major industrial countries and international institutions to measure their currencies' behaviour.

EER indicies are always based on a weighted basket of currencies, the weights being determined by the purpose for which the index is to be used. Such indices are solely a measure of changes over time; their level at a given point in time has no specific meaning. The ways in which EER indices are calculated may differ in several respects, depending on the availability of data, expediency and an unavoidable "trade-off" between transparency of calculations and theoretical rigour.

In Parts I and II of this paper some of the major conceptual and methodological issues involved in the construction of many of the EER indices currently published are reviewed. Part III describes a mixed-weight index as currently compiled by the BIS; Part IV analyses how the movements of various indices have differed over time; and in Part V an attempt is made to arrive at some tentative conclusions.

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Although the two issues are difficult to separate, this paper focuses on nominal effective exchange rates and does not discuss the many conceptual and methodological questions that arise concerning the choice of deflators for deriving real EER indices or measures of international competitiveness. It also excludes questions relating to countries choice of an exchange rate régime and, while it does provide an assessment of the advantages and disadvantages of various weighting schemes, it does not attempt to come up with an optimum scheme. Finally, given the purpose of the paper, there is no discussion of the ECU and SDR baskets.

I. The purpose of effective exchange rate (EER) indices

Since the beginning of generalised floating many international organisations and central banks have developed EER indices.

Exchange rate movements have a direct effect on the prices of traded goods and may thus have consequences for international trade flows as well as domestic price developments. Accordingly, different EER indices may be constructed, depending on whether greater emphasis is placed in the analysis on relationships between the exchange rate and the trade balance on the one hand or between the exchange rate and domestic inflation on the other. For example, in the latter case the weight structure of the exchange rate index would be determined primarily by the geographical distribution of imports, whereas questions relating to trade and international competitiveness would be more appropriately examined with the help of a weighted EER index which also takes into account bilateral and third-market export flows. Indeed, a number of central banks - for instance, the National Bank of Belgium, the Netherlands Bank and the National Bank of Denmark - regularly monitor differently-weighted EER indices for these purposes.

As far as the practical use of EER indices is concerned, some countries (such as the United States) look at these indices as a convenient summary measure of the performance of their currency against all other currencies which may be used for a variety of purposes. Other

countries (such as Sweden, Norway and Finland)[1] use the EER as a policy guide, for example, for purposes of exchange-market intervention. The majority of indices examined here, however, are intended for use with direct reference to trade or as a component in the analysis of international competitiveness.

II. The construction of EER indices

Some characteristics of existing EER indices are summarised in Table 1 (see page 5), which hightlights questions which have given rise to discussion in the past:[2]

A. What type of averaging formula should be adopted?

B. Which countries and currencies should be included?

C. Which base period should be used?

D. What weights should be used?

A. Averaging method

Table 1 shows that geometric averaging is currently used for practically all the indices examined. Alternative calculations based on arithmetic averaging (e.g. Laspeyres, Paasche, Palgrave indices) have been discredited by index number theory essentially on two grounds: time reversibility and weight bias.

The time reversal test was defined by Irving Fisher,[3] and a number of studies dealing with EER indices repeat this argument.[4]

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1 The exchange rate arrangements of these countries are classified by the International Monetary Fund as 'pegged' against a composite basket of currencies. See, for instance, IMF, Annual Report, 1983, p.66.

2 Studies dealing with these questions on a comparative basis date back at least to 1976-77; see, for example, Rhomberg (1976) and National Bank of Belgium (1977).

3 "..., the formula for calculating an index number should be such that it will give the same ratio between one point of comparison and the other point, no matter which of the two is taken as the base". See Fisher (1922). For the algebraic test see pp. 118-119.

4 See, for instance, Pinçon (1979), Bank of England (1981) and Brodsky (1982).

The weight bias criticism rests on the fact that in arithmetic averaging the weights change over time - even though they have been fixed initially;[1] geometric averaging does not suffer from this shortcoming.[2] It has been shown repeatedly that the biases and distortions due to arithmetic averaging are at times quite substantial, especially when dispersion increases.[3]

Many institutions, including, inter alia, the Federal Reserve Board, the Deutsche Bundesbank, Morgan Guaranty, the Swiss National Bank and, in 1984, the Bank of Finland (January), the National Bank of Denmark (March) and the Bank of Norway (July), have consequently changed from an arithmetic to a geometric averaging system for calculating their EER indices.

When geometric averages are used, percentage changes from one period to another will always be the same whatever the base period chosen for the calculation of the EER index.[4] The choice of base period will only be important where normative significance is attached to it, e.g. where it is deemed that exchange rates are in equilibrium.

B. Currency basket

The currency baskets used vary widely. In theory, all convertible currencies and all currencies of countries with which the country constructing the index trades should be included. The actual selection is mainly determined by practical considerations (see Table 1, column 2); efforts are made to ensure that the currencies included account for a

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1 See the example given in Pinçon (1974), p.92.

2 If weights were variable (see p. 8), geometric averaging would also satisfy the reversibility test.

3 Already discussed by Fisher (1922), pp. 108-109.

4 For further discussion see National Bank of Belgium (1977), Hooper and Morton (1978), Pinçon (1979) and Deutsche Bundesbank (1979).

Table 1

Some characteristics of selected EER indices

Institution	Index reference	Column 1 Index base	Column 2 Currency basket	Column 3 Weighting system and base	Column 4 Averaging method	Column 5 Data	Column 6 Objective	Column 7 Source of data
National Bank of Belgium	BNBX BNBM	1975 = 100	Currencies of 20 countries (exports); of 21 countries (imports), accounting for at least ½ per cent. of exports and imports respectively	Bilateral exports/imports in 1974-76, as well as IMF MERM weights	Geometric	Rates quoted in Brussels	To measure effect on trade flows	National Bank of Belgium Bulletin
Bank of Canada		1971 = 100	Currencies of other G-10 countries					Bank of Canada
National Bank of Denmark		1980 = 100	Currencies of 17 countries	Equal weights for 1980 multilateral exports and bilateral imports, both of industrial goods (SITC 5-8)	Geometric	Daily quotations in Copenhagen	Indicator of international competitiveness of industrial sector	National Bank of Denmark; sent monthly to individual customers
Bank of Finland		1982 = 100	Currencies of 12 countries most important in foreign trade	Moving weights	Geometric	Selling rates as quoted by the Bank of Finland	Indicator for exchange rate policy purposes (stability or adjustment of the markka)	Bank of Finland Monthly Bulletin (monthly) (daily data are also available)
Bank of France		Changing base	Currencies of 18-19 countries	Bilateral trade shares	Geometric			Bank of France
Deutsche Bundesbank	BBK	End-1972 = 100	Currencies of the 23 most important trading partners, with trade shares of at least ½ per cent.	Bilateral trade values (exports, imports) 1978-80 average	Geometric	Daily middle rates in Frankfurt for 17 currencies, spot rates for 6 other currencies	To assess average value changes against trade partners due to exchange rate changes	Bundesbank, Statistische Beihefte Reihe 5 (only major currencies and currency groupings)
Netherlands Bank	MERM MBM MBX	Changing base	12 currencies 19 currencies 12 currencies	Three indices: bilateral imports of manufacturers; bilateral total imports; and manufacturing exports against 11 other countries 1978-80 average weights	Geometric		Indicator of: competitor countries' position in domestic market; supplier countries' position; competitor countries in foreign markets	Netherlands Bank: the MERM rate is not published on a regular basis
Bank of Norway		1975 = 100 1980 = 100	14 currencies	Economic model including bilateral trade as well as competition in third markets	Geometric		To measure relative competitive position in regard to exports of manufactures	Bank of Norway
Federal Reserve Board	FRB	March 1973 = 100	Currencies of other G-10 countries	1972-76 average total trade shares (exports and imports - multilateral weights)	Geometric		Summary measure of the behaviour of the US dollar	Federal Reserve Bulletin
Bank of Sweden	SR	Changing base	Currencies of 15 countries each accounting for at least 1 per cent. of Sweden's total foreign trade	Bilateral trade weights (moving 5-year average) with additional weight given to the US dollar	Arithmetic	Rates quoted in Stockholm	Indicator for exchange rate policy purposes (stability or adjustment of the krona)	Bank of Sweden, Quarterly Review
Swiss National Bank	SNB	November 1977 = 100	Currencies of the 15 most important trading partners	Export weights	Geometric	Spot rates at 11.00 a.m.		Swiss National Bank Monthly Bulletin (nine currencies)
Bank of England		1975 = 100	Same as for the IMF's MERM	1977 weights based on trade flows according to the IMF's MERM	Geometric	Daily middle closing exchange rates in London (except for the Finnish markka)	To measure effect of exchange rate changes on trade flows	Bank of England Quarterly Bulletin (nine currencies)
International Monetary Fund	MERM*	Changing base, mostly 1977 = 100	Exchange value of currencies of G-10 countries, Austria, Denmark, Norway, Australia, Finland, Ireland and Spain	1977 weights reflecting trade flows as well as relevant price elasticities and feedback effects of exchange rate changes on domestic costs and prices	Geometric		To measure effect of exchange rate changes on trade flows	IMF International Financial Statistics
OECD	OECD	Changing base	Currencies of G-10 countries	1974 trade in manufactures (all elasticities of substitutions in third markets: 1.5; all bilateral elasticities: 1)	Geometric		To assess relative competitive positions	OECD
EEC	EEC	Changing base	Currencies of 21 countries - the members of the EEC, Spain, Portugal and nine other countries with the greatest importance in world trade	Bilateral trade weights and competition of exports in third markets, 1980 data	Geometric	Rates quoted in Brussels	To assess relative competitive positions	European Economy, Supplement A
BIS (experimental)	BIS	Changing base	Currencies of G-10 countries	Mixed weights	Geometric	Market middle rate at around noon Swiss time or official fixing	Various applications	BIS
Morgan Guaranty		March 1973 = 100; 1980-82 = 100	Exchange value of currencies of G-10 countries, Austria, Denmark, Norway, Australia and Spain	Bilateral trade weights based on 1980 trade in manufactures		Daily noon spot exchange rates in New York. Monthly data = average of daily data	Various applications	World Financial Markets

* Multilateral Exchange Rate Model.

high proportion of total trade, and due consideration is also given to the question of how "missing" currencies should be handled. The main options as regards the missing currencies are to assume implicitly that they behave like the average or to assume that they behave like particular currencies, say the US dollar and/or the pound sterling.[1]

A particular problem in this respect arises in countries whose trade with countries with non-convertible currencies accounts for a substantial proportion of their total trade. For instance, Finland's and Germany's trade with COMECON countries amounted to 28.3 and 4.7 per cent. of total trade respectively in 1982. Yet, in calculating their EER indices, both countries exclude non-convertible currencies,[2] thereby implicitly assuming that the average for the convertible currencies is a valid measure of the behaviour of the non-convertible currencies. The main reason for the exclusion of non-convertible currencies appears to be that trade with the non-convertible currency area is governed by different criteria (bilateral trade agreements concluded on the basis of world market prices).

The smallest number of currencies included is ten - the currencies of the G-10 countries.[3] Hooper-Morton (1978) have the following to say in support of this choice:

> "As a group, these countries account for nearly two-thirds of world trade and more than half of US trade; their importance in international financial flows is even greater. Moreover, of the countries not included in the index, many either seek to link their currencies directly to one or more of the currencies included or use these currencies for their international transactions."

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1 See, for instance, Deutsche Bundesbank (1973), National Bank of Belgium (1977) and Etienne et al. (1980).

2 The Bank of Finland explicitly excluded the Soviet rouble from its currency index as from 1984.

3 See Appendix 2 for details on the inclusion of various currencies by a number of central banks.

Most countries, however, have tried to minimise the element of arbitrariness associated with specific selection criteria (such as a certain minimum share of bilateral trade) by using a larger number of currencies in their basket. For example, the Bank of Sweden and the Swiss National Bank include fifteen, the National Bank of Belgium and the Bank of France approximately twenty and the Deutsche Bundesbank twenty-three currencies (see Table 1, column 2).

That traditional trade patterns reflecting mainly geographical location call for the inclusion of different currencies is easily demonstrated by three simple examples:

The Deutsche Bundesbank includes twenty-three countries which between 1978 and 1980 accounted for 77.6 per cent. of Germany's total trade. If it were to take only the G-10 countries, the proportion would fall to 62.2 per cent, the most important "missing" country being Austria, whose weight (4.2 per cent.) is much larger than the weights for G-10 countries such as Sweden (2.5), Japan (2.0) or Canada (0.9). In the case of Sweden, the IMF's MERM (Multilateral Exchange Rate Model) index allocates large weights to Norway (7.9 per cent.), Finland (4.8 per cent.) and Denmark (4.2 per cent.), whereas in the Bank of Sweden's index even larger weights are attached to these countries. Ireland is given a fairly substantial weight (4.1 per cent.) in the MERM index for the United Kingdom.

C. Base period

From Table 1, column 3, it can be seen that not only are the various indices based on different periods, but some are based on a single year and others on an average of several years.

The following arguments are usually put forward in this connection: firstly, the base period chosen should be adequate to capture recent developments; in order to maintain "realistic" weights, periodic updating is needed, say, every four to five years; secondly, the base period should be cyclically neutral, and it is therefore preferable to have several years as a base period; and thirdly, the base period should be roughly in the middle of the time period for which the EER is calculated.

Given that trade patterns change over time, it would appear to be logical for the weighting system adopted to assess the most recent movements in EERs to be based on the most recent pattern of trade. For bilateral EER indices (see below) this could entail recalculating the trade weights annually, which would have the further advantage of leading to historically consistent series. In fact, the Bank of Finland's revision as explained by Puro (1984) follows this logic:

> "An alternative to regularly altering the base year is to compare the exchange rates at the time of observation with some variable reference period close in time to the present. It was judged that the introduction of such a system would further increase the reliability of the currency index."[1]

In the case of the model approach (see below), periodic base revisions would be far more complicated. In addition, the choice of a base period for estimating the parameters is quite critical, as the model presupposes a general equilibrium situation. Although mainly for normative reasons, the choice of the proper base is equally crucial if one is attempting to calculate real effective exchange rates.[2]

D. Weighting system

Practically all studies dealing with EER indices address the question of weights. From Table 1, column 3, it can be seen that various weighting systems are used.

(a) MERM weights

The IMF uses its Multilateral Exchange Rate Model (MERM) in order to arrive at its EER weights.[3] The Bank of England and the Bank of Japan use these weights for the calculation of their own indices.

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1 See Puro (1984), pp. 28-29.

2 See, for instance, Williamson (1983), pp. 28-29, with respect to the IMF's MERM.

3 Attention is focused here on the IMF's MERM index, rather than the OECD or EEC indices. The OECD has developed the "double-weighting" system, and the weight matrices are mainly used for deriving measures of international competitiveness. The EEC has recently published a competitive weight matrix and a short statement on the derivation of its EER index. The EEC's model approach seems to be similar to the one adopted by the IMF (see EEC, 1983).

The weights are the output of the IMF's general equilibrium model, and the index measures the

> "unilateral exchange rate change that would have the same effect on a country's trade balance as the set of actual exchange rate changes that have taken place."[1]

The trade balance effect is worth emphasising, as it defines the aim of the index and thereby the appropriate set of weights. Thus, for a given country A the weight assigned to the currency of country B will be B's contribution to the change in A's trade balance when the currency of A changes by a certain amount.[2] The actual contribution of country B (and likewise that of other countries and groups of countries included in the index) is determined by simulations, and underlying these simulations are four major assumptions:

(i) that all goods are subject to finite price elasticities which in practice are estimated or imposed on the basis of external information;

(ii) that domestic factor prices are "sticky", implying that in the event of exchange rate changes and subsequent changes in price deflators there will be certain feedback effects on factor prices, which in turn will dampen the influence of exchange rate movements on relative prices and trade flows. Because of indexation and behavioural differences with respect to the degree of real wage flexibility, these feedback effects are likely to differ from country to country, but for the simulations they have been imposed uniformly for all countries, although several alternatives are considered;

(iii) that demand management policies are conducted in such a way that for each country the level of activity remains constant. In other

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1 This extract and the subsequent explanation are from the IMF's Survey, 8th February 1982, and Artus and McGuirk (1981).

2 For example, a 10 per cent. devaluation improves - ceteris paribus - the trade balance of the depreciating country in the medium term to an extent equivalent to the corresponding deteriorations in the trade balances of each of its trading partners. Weights for the calculation of an EER index can be derived on the basis of the contributions of each trading partner to the improvement in the trade balance resulting from the exchange rate change (the trade balance effect).

words, the simulations only allow for expenditure switching effects;[1]

(iv) that initially exports equal imports in all countries. Since the simulations are based on actual trade figures for a given year (1977), this assumption requires that the simulated changes in trade flows have to be corrected for "valuation effects".

The model (MERM) used for the simulations is a general equilibrium model simplified by the use of input/output matrices. On the demand side, commodities are distinguished by kind (six categories of goods) and by country of production (twenty), yielding a total of 2,400 separate equations. Demand for individual products is determined by a two-step decision process, which first determines total domestic demand for a given good and then derives the demand for a product produced by a specific country from total demand and the price compared with that of competitor countries. The main behavioural parameters on the demand side are the import and export price elasticities and the expenditure elasticities for each good in each country. On the supply side, the key parameter in determining the output of a good in a particular country is the elasticity with respect to producer prices, which in all cases is assumed to be positive.

There is agreement in the literature that the IMF's model approach is theoretically the most soundly based where the aim is to measure the impact of exchange rate changes on trade flows or to assess the movement necessary to induce a specific change in the trade balance. But even though the model is theoretically sound, the IMF itself does not maintain that it has found a panacea, i.e. that it has found a universal measure for the weights. In fact, the results of the IMF's latest simulation exercises lead it to conclude:

> "Clearly the results are quite sensitive to the choice of both price elasticities and feed-back parameters."[2]

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1 This assumption is logically consistent with the global model approach. From a global model point of view, changes in exchange rates are changes in a numéraire which should not affect aggregate demand. However, with reference to individual countries such an approach may be too restrictive and has been subject to criticism.

2 Artus and McGuirk (1981), p.308.

Some objections raised to the MERM weighting system in the literature relate more to practical considerations. Morgan Guaranty refers to the "black box quality" of the MERM approach, which hampers intelligibility, "always a key consideration in practical analysis".[1] Franzén et al. question the IMF approach from their country's point of view:

> "There is reason to believe that ... the IMF's model concentrates mainly on countries which are the most important for world trade. It is thus likely that their assumptions about demand and price conditions for Swedish exports and imports are extremely schematic."[2]

Another consideration that is frequently put forward to justify opting for a simple approach to weight derivation is epitomised by Honohan's statement regarding the Irish pound:

> "..... the present state of knowledge regarding the termination of trade flows between countries does not allow one to form an unequivocal preference as between different indices. Under these circumstances a bilateral index for the Irish pound, rather than a double-weighted or MERM-type index, is published by the Central Bank because the simplicity of this type of index makes it readily understandable to users, and partly because it facilitates regular revision of the weights in line with shifting trade patterns."[3]

(b) Bilateral weights

A large number of central banks use bilateral trade weights for the calculation of their EER indices. These include the National Bank of Belgium, the Bank of Finland, the Deutsche Bundesbank, the Central Bank of Ireland, the Netherlands Bank, the Bank of Sweden and the Swiss National Bank. The majority of central banks have opted for total trade shares, while others, such as the National Bank of Denmark, have derived weights from trade in industrial goods only. Some use several indices, for example the National Bank of Belgium and the Netherlands Bank.

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1 Morgan Guaranty (1979), p.9.

2 Franzén et al. (1980), p.14.

3 Honohan (1979), p.6.

The National Bank of Belgium publishes EER indices based on bilateral export shares, bilateral import shares and the model-derived MERM shares. The Netherlands Bank's domestic research department differentiates between three weighting schemes, each of which has been designed to meet a specific aim. As an indicator of the competitive position in the domestic market an index based on imports of manufactured goods from twelve countries is constructed. A second index using weights derived from total imports is applied in assessing overall supply conditions, and a third index based on multilateral weights (see below) for exports is used in evaluating the competitive position of Dutch exports of manufactured goods.

When comparing indices based on bilateral weights with those derived from the MERM, it is important to keep the different aims in mind. Thus many countries use their EER indices as indicators of how exchange rate changes affect export and import prices, or as a means of assessing changes in competitive positions induced by exchange rate movements, or as a way of evaluating the potential influence of exchange rates on the objective of domestic price stability. For these purposes weights incorporating information on export and import price elasticities, feedback effects and policy assumptions with respect to the level of economic activity are unnecessary, as the influence on trade flows is not at issue.*

Nonetheless, as is illustrated by the Dutch approach, the use of bilateral weights is subject to shortcomings, especially when the aim of the index is to provide a gauge of a country's competitive position with respect to exports. While an EER index based on bilateral weights may constitute a satisfactory measure of potential import penetration and of the external influence on domestic cost changes, such an index is

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* It may be pointed out that there are three major sources of differences between indices based on bilateral trade weights and indices derived from the MERM, so that only under very special conditions will they yield the same results:
(i) elasticities; indices based on bilateral weights implicitly assume that all direct export and import price elasticities are equal and that the cross-price elasticities are zero;
(ii) feedback effects, which bilateral weighting schemes ignore;
(iii) third-market effects, which, as discussed below, are also ignored in the bilateral schemes.

only an incomplete measure of competitiveness in export markets, as third-market effects are not taken into account.[1] This has led to the development of two alternative weighting schemes: global weights and multilateral weights.

(c) Global weights

Under the global scheme currency weights are assigned on the basis of each country's share in total world trade. To this extent, EER indices using global weights constitute a counterpart to EER indices based on bilateral weights, as third-market effects are fully taken into account. On the other hand, by ignoring the distribution of individual countries' exports and imports, such indices tend to understate the influence of traditional trade patterns and, in particular, the influence of exchange rate changes in small neighbouring countries. Mainly for these reasons, global weights are mostly used in deriving complementary measures and weighting schemes, the main exception being the index of the Federal Reserve Board.

(d) Multilateral weights

Multilateral weights are being used increasingly to derive EER indices serving as an input to the calculation of the competitive position of a country's exports,[2] and are designed to overcome the shortcomings of both bilateral and global weights. The system used is usually designed

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1 The effects emanating from the home country and other countries competing in third markets are ignored. Canada is a good example in the case of Sweden and Finland. Trade between Canada and the other two countries is virtually of no importance, but all three countries compete in third markets with wood and paper products.

2 The multilateral weights of the Netherlands Bank are based upon export and import shares of manufactured goods in twelve competitor countries. Since March 1984 the National Bank of Denmark has also been using multilateral export shares, including domestic supplies to home markets, for industrial goods in order to arrive at a sub-index which, together with an equally weighted bilateral import weight index of industrial goods, forms an overall industrial competitiveness index. The approach of the Bank of Norway is somewhat similar, but the weights are derived from a simplified model.

as a "double-weighting" one, the weight assigned to country B's currency in the EER index of country A being determined by two components:

- country B's share in the total of imports of other countries included in A's EER index;
- country A's export shares with respect to the same countries.[1]

In deriving these weights an important consideration is whether or not to include home supplies to domestic markets. Initially most indices were constructed leaving out home supplies owing to problems in reconciling international trade statistics with national output statistics. However, as these problems are gradually being solved, more and more countries are taking account of home supplies, so that the first component is calculated as the share of total supplies to a given market, including that of country B itself.[2]

(e) Invoicing currency weights

Invoicing currencies are mentioned from time to time as possible contenders for the calculation of weights. Bilateral trade flows and bilateral invoicing practices, however, may or may not be related at all. None of the indices examined uses this approach. On the other hand, several central banks, among them the Deutsche Bundesbank and the Netherlands Bank, refer to the invoicing currency as being relevant when including "missing" currencies. One reason for rejecting invoicing currency weights appears to be associated with the lack of reliable statistics. In addition, and probably more importantly, invoicing practices tend to give undue weight to short-run developments, whereas most EER indices are designed to measure the medium-term impact of exchange rate changes.

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1 Mathematically, the double-weighting scheme may be thought of as pre-multiplying a matrix of bilateral import shares for all the countries included in the index by a vector of A's export shares.

2 As shown in Armington (1969), the inclusion or exclusion of home supplies to domestic markets frequently has a more pronounced effect on the weighting pattern than various alternatives with respect to the size of elasticities.

III. The mixed-weight index

For the last four years the BIS has included in its Annual Report a set of EER indices based on mixed weights, and similar procedures have been adopted by other institutions. This section discusses briefly what is meant by a mixed-weight EER index.

Any weighting system involves a certain amount of arbitrariness, and the mixed-weight system is no exception. The literature is unanimous in stating that the weighting system adopted will largely be determined by what the index is intended to measure. On the other hand, once an index is constructed and published it tends to be used for other purposes than those for which it was initially designed. Given that the BIS is an international institution, there was naturally a need for an index that would indicate how various individual currencies were behaving with respect to a basket of other currencies; at the same time, and in combination with an appropriate price or cost indicator, such an index was designed to act also as an indicator of the price/cost competitiveness of the countries concerned.

With these considerations in mind, it was felt that total bilateral trade, multilateral trade in manufactures (SITC 5-9) and nominal GDP should each receive a weight of one-third.[1] The weights of one-third were arrived at after experimenting with several different combinations. While this kind of approach is highly subjective, the following, albeit eclectic, considerations can be advanced:

- bilateral trade weights, though relevant for import competition in domestic markets, do not take account of competition in third markets;[2] consequently, in the mixed index, multilateral trade shares (excluding home supplies to domestic markets) have also been taken into account;

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1 The central banks of Belgium, Denmark and the Netherlands also use a combination of multilateral and bilateral weights (see Table 1).

2 See pp. 12-13.

- multilateral trade in manufactures covers essentially those goods for which competition among the G-10 countries is most important; [1]
- agricultural prices are in many cases regulated, and export prices for farm products are often fixed without any reference to competitiveness. Within the EEC, the practice of subsidising exports of agricultural products also seems to argue in favour of the exclusion of food products.[2] Similarly, the prices of basic energy imports are not set in the light of competitive considerations;
- raw materials have also been excluded, as their prices are largely determined in world markets and changes in the currencies either of the country of origin or of invoicing (usually the US dollar or sterling) have only a marginal medium-term effect;[3]
- the addition of nominal GDP introduces a scaling factor which increases, in particular, the relative weights of the US dollar and the Japanese yen, and thus takes account of the larger countries' importance in international trade developments.[4]

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1 Not only is the competition of manufacturers in third markets important but also that on home markets; for example, import penetration, measured by imports as a percentage of the total supply of manufactured goods, increased between 1970 and 1980 from 59 to 85 in the case of Belgium and from 19 to 31 in the case of Germany.

2 This argument does not apply to North America, as agricultural trade is very important both in the United States and in Canada, and agricultural prices are, to a large extent, market-determined in these countries.

3 This exclusion amounts on average to about 2 per cent. of total trade for the G-10 countries, so any potential bias appears to be negligible.

4 A similar approach has been adopted by the Bank of Sweden, which, in the case of the US dollar has doubled the trade share weight in view of this currency's importance on the international markets. See Bank of Sweden, Quarterly Review 1982/2, p.8.

IV. Testing the EER indices compiled on the basis of different weighting patterns

A. A preliminary test concerning global weights

One way of appraising the significance of different weighting systems would be to take weights based on some unchanged criteria for a number of years and see how sensitive the resulting indices are to changes in weights over time. This may also shed some light on the question of whether averaging over several years is appropriate.

More fundamentally, the question is: when do changes in the weighting matrix cause significant changes in the resulting EER, thus warranting a recalculation of the index?* The Federal Reserve Board (FRB) index was chosen for this test, and Table 2 shows the weights for the various currencies from 1972 to 1982 and average global trade shares for the periods 1972-76 and 1978-82.

Over the period from 1972 to 1982 global trade shares changed significantly in the case of Japan (+4 percentage points) and Canada (-1.9 percentage points). These changes in trade shares are less striking when five-year averages are compared, but even on this basis, Canada (with a 1.3 percentage point drop) and Japan (with a 1.4 percentage point rise) exhibit large changes. Sweden's loss of 0.7 percentage points and Italy's increase of 0.6 percentage points are also substantial.

Table 3 was drawn up in order to give some idea of the sensitivity of EER indices to changes in weight patterns over time. The FRB index stood at 129.77 in August 1983 (March 1973 = 100). Taking global trade weights (columns 5-8), the results are in fact very close, as the difference between using 1978-82 and 1972-76 weights amounts to only 0.1. Even when comparing weights at the beginning (1972) and end (1982) of the period, the difference in the indices amounts to only 0.93. From the above evidence it seems that global trade weight changes over time have not exerted a significant influence on EER indices.

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* The question is, of course, irrelevant when the weights themselves are made variable (see above, p. 8).

Table 2

Global trade shares of the G-10 countries; excluding the United States*

Country	1972	1974	1976	1978	1980	1981	1982	1972-76	1978-82	Change in shares from 1972-76 to 1978-82	Memo: FRB 1972-76
Belgium	.076	.074	.074	.075	.074	.068	.067	.075	.072	-0.003	.064
Canada	.094	.083	.083	.073	.067	.079	.075	.085	.073	-0.013	.091
France	.126	.126	.131	.128	.133	.128	.127	.128	.130	+0.002	.131
Germany	.206	.201	.209	.213	.204	.195	.202	.206	.205	-0.001	.208
Italy	.091	.091	.087	.091	.096	.096	.097	.089	.095	+0.006	.090
Japan	.125	.150	.144	.143	.146	.170	.165	.138	.152	+0.014	.136
Netherlands	.080	.084	.086	.083	.082	.078	.079	.084	.081	-0.003	.083
Sweden	.040	.040	.041	.034	.035	.033	.033	.041	.034	-0.007	.042
Switzerland	.037	.034	.032	.038	.036	.033	.033	.035	.035	±0.000	.036
United Kingdom ..	.125	.118	.111	.122	.127	.119	.121	.119	.123	+0.004	.119

* The source of the data is the OECD's Trade Series A, where imports are on a c.i.f. basis and exports on a f.o.b. basis. There are slight discrepancies between these data and the Federal Reserve Board's data (Memo: FRB).

Table 3

Sensitivity of nominal exchange rate indices for the US dollar to different weighting schemes.

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
Countries	Nominal exchange rates			Weights							
	March 1973	Aug. 1983	Changes %	1972-76	1978-82	1972	1982	1972-76	1977	1980-82	Hypothetical case
				Global trade				FRB	MERM	BIS	
Belgium	2.5377	1.8546	-26.9	.075	.072	.076	.067	.064	.0280	.045	.1
Canada	100.33	81.05	-19.2	.085	.073	.094	.075	.091	.2323	.162	.1
France	22.191	12.431	-43.9	.128	.130	.126	.127	.131	.1158	.104	.1
Germany	35.548	37.403	5.2	.206	.205	.206	.202	.208	.1492	.184	.1
Italy	0.17600	0.06290	-64.3	.089	.095	.091	.097	.090	.0850	.071	.1
Japan	0.38190	0.40906	7.1	.138	.152	.125	.165	.136	.2434	.238	.1
Netherlands	34.834	33.431	- 4.0	.084	.081	.080	.079	.083	.0371	.041	.1
Sweden	22.582	12.725	-43.7	.041	.034	.040	.033	.042	.0313	.026	.1
Switzerland	31.084	46.228	48.7	.035	.035	.037	.033	.036	.0194	.031	.1
United Kingdom	247.24	150.260	-39.2	.119	.123	.125	.121	.119	.0580	.098	.1
Exchange rate index (March 1973 = 100): August 1983				129.67	129.77	130.38	129.45	129.77	125.85	123.29	131.41

Table 3 shows the results obtained using the weighting systems currently employed by the IMF and the BIS. These appear to be broadly in line with the FRB index, considering that the period covered is almost seven and a half years. The results shown in column 12 of Table 3 may also be of some interest. In this case, where the same weight was assigned to all ten countries, the index for the period under review is even closer to the FRB index. These additional tests give the impression that EER indices are not only relatively insensitive to weight changes over time, but are also quite robust with respect to the initial choice of weights. However, in assessing these results and in comparing them with those to be presented below, it should be recalled that the United States itself is not included in the FRB index.

B. Comparison of different weighting patterns

In order to assess the effects of different weighting patterns, the evolution of the various EER indices was tested, taking early 1977 as base. Calculations were made for the G-10 countries, the weights employed being those used by a number of central banks, the IMF, the OECD, the EEC and the BIS.[1] Some detailed results are shown in index as well as percentage change form in Appendix 3.

(a) Longer-run changes

One question that may be asked relates to possible differences between the various EER indices in the longer run.[2] Table 4 sheds some light on this question by showing index levels in June 1984. Looking at the total period from January 1977 to June 1984, the scale of divergence between the various indices varies. For one group of countries - Canada, France, Italy, Japan, Sweden and the United Kingdom - the differences are relatively small, considering that the period is seven and a half years. In the case of the other five countries they are much larger, suggesting that the choice of weights does matter.

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1 The weights used in these tests are shown in Appendix 1. In all indices covering more than the G-10 countries, the weights are adjusted proportionately. For the original weights of the central banks, see Appendix 2.

2 The shorter run will be dealt with in the following section (b).

Table 4

Selected EER indices at the end of a 7½-year period, on 20th June 1984*

Country	High	Low	Difference
Belgium	86.76 (BNBX)	77.97 (BIS)	8.79
Canada	84.74 (BIS)	80.95 (OECD)	3.79
France	72.81 (EEC)	67.98 (BIS)	4.83
Germany	118.47 (BBk)	103.69 (BIS)	14.78
Italy	62.95 (OECD)	59.59 (BIS)	3.36
Japan	150.23 (OECD)	146.33 (MERM)	4.00
Netherlands	103.86 (NBX)	94.02 (BIS)	9.84
Sweden	61.11 (OECD)	58.81 (BIS)	2.3
Switzerland	139.49 (SNB)	128.33 (BIS)	11.27
United Kingdom ..	98.48 (EEC)	95.07 (BIS)	3.41
United States ...	129.19 (FRB)	119.65 (OECD)	9.54

*See Appendix 3 for more details; Table 1 (p.5) explains the index reference codes.

Table 4 reveals another interesting result: for the five countries in the second group (Belgium, Germany, the Netherlands, Switzerland and the United States) the highest index numbers are those calculated by their respective central banks and the smallest those of the BIS index, although, except as regards the United States, this index is very close to the OECD index. It thus appears that national indices, and more precisely those based on export structures,* tend to overstate the appreciation or understate the depreciation of the currencies in question, whereas the BIS's EER indices seem to be biased in the opposite direction. However, these tentative conclusions of course only hold relative to the other indices investigated.

If these results point to consistent biases, it may be useful to take one step back and ask why they occurred. There are two linked reasons: the weighting pattern, as shown selectively in Table 5, and the actual exchange rate developments. In the Belgian, German and Swiss cases particularly large differences exist with respect to the weights attached to Japan and the United States.

Table 5

Selected weight components.

Country	Index	Weights for		
		United States Japan	France Germany Italy	Others
Belgium	BNBX ...	.141	.544	.315
	BIS	.364	.372	.264
Germany	BBK	.143	.325	.532
	BIS	.422	.226	.352
Netherlands ...	NBX	.182	.509	.309
	BIS	.365	.381	.254
Switzerland ...	SNB	.185	.580	.235
	BIS	.382	.405	.213

* National indices based on import structures are different: the import index of the National Bank of Belgium is close to the MERM, OECD and EEC indices, the general import index of the Netherlands is close to the BIS index, and the manufacturing import index of the Netherlands is close to the indices of the other international organisations.

In the German case, for example, the use of bilateral trade shares produces small weights for the US dollar and, particularly, for the Japanese yen (.143), compared with those used for the other indices (MERM: .387; OECD: .277; EEC: .251). On the other hand, the mixed index applied by the BIS attaches a very large weight to the US dollar and the yen (.422). Over the whole period from January 1977 to June 1984 the appreciation of the Deutsche Mark against the other European currencies was relatively stronger than its depreciation against the US dollar, and consequently the Bundesbank's index shows a comparatively large appreciation, while according to the BIS index the appreciation is only 4 per cent.

In the case of the United States the main difference in the index results is due to the weights allotted to Japan: the Federal Reserve Board allocates a relatively small weight of .136, whereas the MERM, OECD and BIS attach weights of .243, .226 and .251 respectively. As the yen was relatively strong over the whole period, the FRB index shows a larger appreciation of the US dollar than the other indices.

(b) Short-run movements

In order to assess the differences in short-run movements of EER indices, an analysis has been made of several sub-periods coinciding with periods of dollar strength/weakness against the major European currencies. On the basis of the detailed data (in Appendix 3) the following conclusions can be drawn:

1. Because of the criteria adopted in selecting the sub-periods, indices in which the dollar has a larger weight tend to fluctuate more. For example, the BIS index shows larger percentage changes in the case of Belgium, France, Germany, Italy, the Netherlands and, to a lesser extent, the United Kingdom, in particular compared with the national EER indices based on exports.
2. The indices are fairly consistent with regard to the direction of change. For example, over the period from 24th January 1984 to 7th March 1984 the indices calculated for Belgium show the following percentage changes: MERM 3.0, OECD 2.4, EEC 1.3, BIS 4.4, BNBX 2.2 and BNBM 2.9. Inconsistencies occur, however, when the percentage changes hover around zero. A case in point may be Switzerland over the period from 24th January to 7th March 1984: MERM 0.8, OECD -1.0, BIS 0.3 and SNB -1.3.

3. A comparison of the indices calculated by central banks and those compiled by international organisations reveals the following:

Belgium: The movements in the EER indices calculated by the National Bank of Belgium are fairly closely in line with those in the indices of international institutions. Because of the larger weight of the US dollar in the National Bank of Belgium's import index, this index has fluctuated somewhat more than the Bank's export index.

Germany: The EER index of the Deutsche Bundesbank tends to show larger appreciations and smaller depreciations than most other indices owing to the larger weight given to European as against overseas currencies.

The Netherlands: The different weighting patterns employed by the Netherlands Bank lead to some short-run divergences between the Bank's own indices and between them and the EER indices of international institutions. For example, during the two adjacent periods from 15th November 1982 to 10th January 1983 and from then to 24th January 1984, the Bank's three indices exhibit the following percentage changes: NBM 3.4 and -8.2, NBMM 0.9 and -3.6 and NBX 0.9 and -4.2, The NBM index moves in tandem with the BIS index, as both indices give large weights to the US dollar. The NBMM and NBX indices move more closely in line with the indices of the other international organisations.

Switzerland: The Swiss National Bank's index tends to overstate appreciations and to understate depreciations compared with other indices.* For example, during the period from 7th March to 20th June 1984 the SNB index fell by 1.9 percentage points, whereas the average drop in the indices of international organisations was 2.7 percentage points.

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* As in the case of Germany, this is due to the weighting system as well as to the Swiss franc's relative strength against European currencies as opposed to the US dollar and yen.

United States: The Federal Reserve Board allocates smaller weights to the yen and the Canadian dollar and correspondingly larger weights to the Deutsche Mark, French franc and pound sterling than do international organisations. As the yen and the Canadian dollar have been relatively stable against the US dollar, the FRB EER index has tended in the past to show larger percentage changes than other indices.

(c) Indices of international organisations

In general, the differences between the indices of international organisations are smaller than those between these indices and the national indices. The MERM and the BIS indices are relatively close,* and the same applies to the OECD and EEC indices. The MERM and the BIS indices tend to exhibit larger movements for the EEC currencies and the Swiss franc. A typical result for a depreciating (appreciating) currency is the Italian lira (Deutsche Mark), for which, at the end of the observation period on 20th June 1984, the largest (smallest) depreciation (appreciation) is indicated by the BIS index, followed by the MERM, EEC and OECD indices.

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* The closeness of the MERM and the BIS indices was investigated further by looking at the first differences of monthly (month-end and monthly average) data for the overall period and various sub-periods. As might be expected, the correlation coefficients were mostly high (from .95 to .98), and the slopes of the estimated linear relationships were always close to one, except in the case of Germany, where the slope was somewhat larger than two, implying that the sensitivity of the BIS index was twice as great as that of the MERM index. This may be explained in part by the difference in weight for the pound sterling, the French franc and the Italian lira.

V. Summary and conclusions

This paper has shown that the different EER indices investigated have a number of characteristics in common as regards their construction. The geometric averaging method is the one chiefly used. The question as to which currencies to include is tackled pragmatically in the light of which readily available market-related exchange rates are relevant for the institution concerned. As far as the base period for the weight calculation is concerned, there is a degree of consensus that a very recent period should be chosen. There is also a tendency to make the base period for the weight calculation itself variable.

This leaves the choice of weights as the major remaining point at issue. This paper has discussed four weighting schemes which are currently being used either separately or in combination:

(i) bilateral trade share weights, which have the advantage of being transparent and easy to calculate and which also seem to provide reliable measures when the aim of the EER index is to give an indication of the influence of exchange rate changes on import prices and competitive conditions in countries' domestic markets. However, because this weighting scheme does not take account of third-market effects, the indices appear insufficient as general indicators of international competitiveness;

(ii) global trade share weights, which overcome this last problem and are also easy to calculate. They have the further advantage of being quite stable over time, but to some extent they overstate the importance of third-market effects by ignoring the pattern and geographical distribution of trade flows;

(iii) multilateral trade share weights, which have been gaining ground in recent years in step with the improvement of international trade statistics and the increased use of computerised methods of handling large quantities of disaggregated data. Indices using multilateral trade weights would seem most suitable in evaluating the potential influence

of exchange rate movements on countries' competitive positions with regard to exports, and the main issue concerning this weighting system is the extent to which existing statistics permit a reconciliation of international trade statistics with national output data;

(iv) model-based weights, which have a distinct advantage when it comes to constructing indices aimed at measuring the influence of exchange rate movements on trade flows and trade balances.* The use of a large model makes it possible to calculate trade effects in a globally consistent way and provides more reliable estimates than methods which only take existing trade patterns into account. On the other hand, as has been pointed out by the IMF itself, model-based weights are derived from a complex, estimated set of equations, the parameters of which still embody certain weaknesses. Furthermore, practical considerations concerning, inter alia, the problem of updating EER indices or the question of the man-hour investment required to set up model-based weights may play a rôle when deciding which weighting system is most suitable for a particular institution.

Obviously the choice of weights is in practice influenced by the purpose for which the EER index has been set up. In analysing the importance of different weighting schemes for the measurement of exchange rate fluctuations, this paper has described the principal features of a mixed-weight index and compared the movements over time of most of the indices currently in use. There is, unfortunately, no objective criterion for judging whether observed divergences between exchange rate movements as measured by individual indices are significant or within the range of

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* The model approach as exemplified by the MERM, OECD and EEC indices has the additional advantage that the model permits the analyst to look at a broad range of other questions. Thus recently the MERM has been used to compute the changes in real exchange rates that would be necessary to offset the differential effects of higher oil prices on the external positions of the major industrial countries (see IMF Survey, 7th November 1983).

stochastic variability and measurement errors. Nonetheless, some tentative conclusions would also seem to emerge from the discussion presented in Parts III and IV of the paper:

(i) over relatively long periods (7-8 years) the differences between the various indices are comparatively minor, possibly reflecting long-run equilibrium mechanisms which tend to modify the influence of different weighting systems. The same applies if the base period for indices using global trade weights is adjusted, but this result seems to be heavily influenced by the stability of global trade shares and by the fact that the index analysed measures all exchange rate movements relative to the US dollar;

(ii) over shorter periods the divergences between the various indices would appear to be large enough to warrant caution in their use, thus indirectly confirming the principle that the weights allocated should depend on the aim of the index. Broadly speaking, three features emerge from the tables and graphs illustrating the developments of the various indices:

- indices based on bilateral weights seem to differ most from the common trends, suggesting that they may be strongly influenced by specific country features and that their use should be confined to assessing the potential influence of exchange rate movements on import prices and competition in domestic markets;

- model-based and mixed-weight indices also display relatively large deviations from the common trends, and in some cases this seems to reflect the large weight assigned to the US dollar;

(iii) in their present form mixed-weight indices are not universally satisfactory and, like other indices, they should be interpreted cautiously when used to analyse a particular issue.

These conclusions may appear unsatisfactory in that they do not provide an objective yardstick whereby one index can be shown to be superior. Nevertheless, they do show that there is probably already more agreement internationally than might appear on the surface.

Appendix 1

Weights* used in calculating effective exchange rate indices by:

the IMF (MERM)
the OECD
the EEC
the BIS
selected central banks

*The weights used are found by reading down the appropriate columns in each case. The sum of the weights (in percentages) for an individual country's currency does not necessarily equal 100, owing to rounding. Where the indices cover more countries than those shown in this Appendix, the weights assigned to these other countries have been reallocated proportionately. The original weights for selected central banks are found in Appendix 2.

Note:

BE = Belgium
CA = Canada
FR = France
DE = Germany
IT = Italy
JP = Japan
NL = Netherlands
SE = Sweden
CH = Switzerland
UK = United Kingdom
US = United States

BELGIUM

	MERM	OECD	EEC	BIS	National Bank Exports	National Bank Imports
BE	-	-	-	-	-	-
CA	1.3	2.0	1.3	3.5	0.4	1.1
FR	20.5	17.0	20.4	12.9	24.2	18.5
DE	25.3	31.5	26.3	18.3	25.1	24.3
IT	10.1	7.6	8.4	6.0	5.1	4.1
JP	7.9	5.5	4.6	12.4	0.6	1.7
NL	10.2	13.1	11.5	9.0	18.3	18.6
SE	2.7	2.3	2.4	2.1	2.0	1.7
CH	2.1	2.6	3.9	2.9	1.9	1.7
UK	2.3	7.5	11.0	9.0	8.9	9.8
US	17.7	10.9	10.3	23.9	13.5	18.6

GERMANY

	MERM	OECD	EEC	BIS	Deutsche Bundesbank
BE	5.5	12.3	6.9	6.4	12.9
CA	1.9	3.6	2.3	4.0	1.4
FR	18.9	16.1	19.6	13.3	19.3
DE	-	-	-	-	-
IT	14.1	10.9	12.9	9.3	13.2
JP	14.2	10.5	7.8	14.4	3.2
NL	6.9	11.1	10.4	8.0	17.5
SE	4.5	3.8	4.1	2.9	4.0
CH	4.0	5.2	6.5	4.1	7.4
UK	5.4	9.3	12.3	9.8	10.0
US	24.5	17.2	17.3	27.8	11.1

UNITED KINGDOM

	MERM	OECD	EEC	BIS
BE	4.6	7.1	6.6	4.7
CA	1.7	5.3	3.1	4.6
FR	11.9	9.9	11.8	10.4
DE	16.2	23.0	17.8	16.8
IT	8.3	6.4	7.4	7.0
JP	15.7	11.3	10.2	13.9
NL	5.5	6.7	8.5	6.7
SE	4.3	4.2	4.6	3.3
CH	3.5	4.0	6.9	5.2
UK	-	-	-	-
US	28.3	22.1	23.1	29.4

FRANCE

	MERM	OECD	EEC	BIS
BE	5.5	13.0	7.3	6.9
CA	3.4	2.3	2.2	3.8
FR	-	-	-	-
DE	22.2	30.9	18.9	19.1
IT	17.4	11.0	16.6	10.4
JP	12.1	7.1	8.3	13.3
NL	4.6	8.2	8.8	5.1
SE	2.6	2.3	2.7	2.3
CH	2.6	4.0	5.6	3.3
UK	4.6	8.0	13.1	9.3
US	25.1	13.0	16.5	26.6

ITALY

	MERM	OECD	EEC	BIS
BE	3.3	8.5	6.2	4.2
CA	2.3	2.9	2.2	3.7
FR	19.6	15.8	15.2	14.1
DE	24.9	29.9	21.2	20.0
IT	-	-	-	-
JP	12.4	8.2	8.8	12.8
NL	4.1	6.9	8.1	4.5
SE	2.3	2.2	2.7	2.1
CH	3.0	4.1	5.7	3.9
UK	5.5	7.5	12.4	8.4
US	22.6	14.2	17.5	26.3

NETHERLANDS

	MERM	OECD	EEC	BIS	Netherlands Bank		
					Bilateral imports of manuf. goods	Total	Multilateral exports of manuf. goods
BE	7.2	15.6	10.9	8.0	17.8	14.2	9.7
CA	3.5	1.6	1.5	3.5	0.9	0.8	2.4
FR	15.7	13.0	14.1	9.7	9.4	7.4	16.3
DE	22.8	32.5	26.7	22.0	37.9	24.7	22.7
IT	13.6	7.5	8.8	6.4	5.3	3.6	11.9
JP	7.7	5.8	5.5	12.2	4.5	2.1	7.0
NL	-	-	-	-	-	-	-
SE	2.5	2.6	3.3	2.3	2.1	2.0	3.8
CH	1.6	2.7	4.0	2.3	1.9	1.4	5.0
UK	3.6	8.4	13.2	9.3	11.1	7.9	10.0
US	21.8	14.0	12.0	24.3	9.1	35.9	11.2

SWEDEN

	MERM	OECD	BIS	Bank of Sweden
BE	2.9	6.8	4.1	5.1
CA	6.0	3.5	3.8	1.5
FR	11.5	9.0	8.6	7.8
DE	15.0	27.1	18.3	23.1
IT	9.1	5.8	6.3	5.1
JP	13.8	6.0	12.9	3.8
NL	3.5	6.3	4.8	7.2
SE	-	-	-	-
CH	2.0	3.8	2.8	3.2
UK	5.4	12.7	12.3	18.1
US	30.7	17.0	26.1	25.1

SWITZERLAND

MERM	OECD	BIS	Swiss National Bank
2.6	6.1	3.7	3.8
4.3	2.6	3.6	1.7
13.0	12.0	10.7	14.1
16.7	29.1	21.2	32.4
8.4	8.6	8.6	11.5
16.0	9.1	13.1	4.6
5.6	5.1	3.7	4.3
3.8	3.0	2.3	3.2
-	-	-	-
-0.5	9.7	8.0	10.5
30.1	14.7	25.1	13.9

UNITED STATES

	MERM	OECD	BIS	Federal Reserve Board
BE	2.8	5.1	4.0	6.4
CA	23.2	22.3	16.4	9.1
FR	11.6	7.5	9.9	13.1
DE	14.9	18.7	16.5	20.8
IT	8.6	5.6	7.6	9.0
JP	24.3	22.6	25.1	13.6
NL	3.7	4.2	4.4	8.3
SE	3.1	2.3	2.5	4.2
CH	1.9	2.7	2.8	3.6
UK	5.8	9.0	10.8	11.9
US	-	-	-	-

CANADA

MERM	OECD	BIS
1.1	2.2	2.5
-	-	-
5.1	3.3	6.2
5.5	9.5	10.6
4.2	2.8	4.9
7.8	18.2	13.9
1.6	1.5	2.5
1.8	1.4	1.6
0.9	1.2	1.8
2.1	6.5	6.5
70.0	53.4	49.5

JAPAN

	MERM	OECD	BIS
BE	2.1	3.9	3.1
CA	3.8	11.2	6.2
FR	8.9	6.6	7.8
DE	14.4	18.5	14.1
IT	4.9	5.1	5.8
JP	-	-	-
NL	2.9	3.5	3.2
SE	2.4	1.9	2.1
CH	1.6	2.6	2.5
UK	4.5	7.8	8.5
US	54.5	39.3	46.7

Appendix 2*

Weights as published by some central banks

*See Appendix 1 for explanation.

Countries	National Bank of Belgium		National Bank of Denmark	Deutsche Bundesbank [1]	Netherlands Bank			Bank of Norway	Swiss National Bank	Bank of Sweden	Federal Reserve Board
	Exports	Imports			Bilateral imports of manuf. goods	Bilateral total imports	Multilateral exports of manuf. goods				
Belgium	-	-	3.6	8.0	17.5	13.5	9.4	2.4	3.30	3.7	6.4
Canada	0.37	1.04	0.6	0.9	0.9	0.7	2.3	3.6	1.51	1.1	9.1
France	22.42	17.20	6.6	12.0	9.2	7.0	15.9	9.2	12.22	5.6	13.1
Germany	23.25	22.55	25.3	-	37.3	23.4	22.1	17.7	28.16	16.6	20.8
Italy	4.74	3.82	4.6	8.2	5.2	3.4	11.6	3.3	10.02	3.7	9.0
Japan	0.54	1.58	5.6	2.0	4.4	2.0	6.8	6.0	3.97	2.7	13.6
Netherlands	16.95	17.26	5.0	10.9	-	-	-	4.6	3.74	5.2	8.3
Sweden	1.87	1.57	14.7	2.5	2.1	1.9	3.7	15.0	2.81	-	4.2
Switzerland	1.74	1.56	2.8	4.6	1.9	1.3	4.9	1.2	-	2.3	3.6
United Kingdom ..	8.27	9.09	11.6	6.2	10.9	7.5	9.7	14.7	9.16	13.0	11.9
United States ...	12.50	17.32	7.6	6.9	9.0	8.5	10.9	11.0	12.09	18.1	-
Sub-total	92.65	92.99	88.0	62.2	98.4	71.0	97.3	88.7	86.98	72.0	100.00
Australia		0.59		0.5		0.2					
Austria	0.76	0.36	1.7	4.2		0.6		1.5	5.82	1.6	
Denmark	1.43	0.45		1.9	1.0	0.8	1.6	6.8	1.74	8.5	
Finland	0.40	0.31	3.1	0.8		0.7		3.0		7.4	
Greece	0.54			1.0		0.4					
Hong Kong				0.6							
Ireland			0.5	0.4		0.5					
Norway	0.92	0.46	5.0	1.5	0.6	1.0	1.1		1.10	9.3	
Portugal	0.34	0.18	0.6	0.4		0.2			1.03		
South Africa		0.70		1.1							
Spain	1.03	0.84	1.1	1.4		0.9			3.33	1.2	
Turkey				0.4							
Yugoslavia				1.2							
Zaïre	0.40	1.74									
USSR	0.90	0.85									
Poland	0.63										
Brazil		0.53									
Other countries .						25.5 [2]					
			100.0	77.6	100.0	100.0	100.0	100.0	100.00	100.0	100.00

Note: The Bank of England, the Bank of Japan and the National Bank of Belgium use MERM weights.

1 Export shares.
2 Iceland, New Zealand, Yugoslavia, OPEC countries, other developing countries and eastern Europe. It is assumed that the currencies of these countries are linked to the US dollar.

Appendix 3

Levels of and movements in EER indices

Levels of EER indices

4th Jan. 1977 = 100

Country	Index	4th Jan. 1982	15th Nov. 1982	10th Jan. 1983	24th Jan. 1984	7th March 1984	20th June 1984
Belgium	MERM	99.06	88.28	88.79	82.98	85.46	84.17
	OECD	97.45	87.09	87.70	82.75	84.71	83.94
	EEC	97.75	88.00	88.88	84.19	85.25	85.53
	BIS	95.02	83.11	84.69	76.41	79.75	77.97
	BNBX	99.11	88.55	89.80	85.62	87.54	86.76
	BNBM	97.74	86.01	87.77	82.20	84.58	83.43
Canada	MERM	84.34	87.02	84.12	86.83	84.04	83.00
	OECD	80.51	85.60	81.21	84.73	81.15	80.95
	BIS	82.25	88.22	83.59	88.79	84.59	84.74
France	MERM	87.98	78.40	80.52	69.79	72.47	70.64
	OECD	86.43	78.74	80.40	71.91	73.49	72.51
	EEC	87.08	78.96	81.28	71.85	74.08	72.81
	BIS	85.27	75.66	78.23	67.02	69.85	67.98
Germany	MERM	108.09	110.23	113.62	107.27	112.56	109.26
	OECD	107.21	110.43	114.03	109.25	113.89	111.25
	EEC	108.08	111.35	115.32	111.11	115.81	113.27
	BIS	104.93	105.17	109.49	101.53	107.17	103.69
	BBK	109.66	114.59	117.98	116.63	120.31	118.47
Italy	MERM	71.45	66.66	68.32	61.18	62.13	61.15
	OECD	71.49	67.52	69.03	63.07	63.45	62.95
	EEC	70.85	66.64	68.67	62.05	62.83	62.14
	BIS	70.70	65.25	67.44	59.43	60.79	59.59
Japan	MERM	137.23	121.08	137.87	146.26	148.27	146.33
	OECD	137.23	122.82	139.24	148.75	150.90	150.23
	BIS	136.83	121.99	138.76	148.46	150.01	148.78
Netherlands	MERM	103.12	105.27	106.62	100.30	103.88	101.60
	OECD	99.96	104.45	105.12	101.20	103.34	102.18
	EEC	99.93	104.10	105.50	100.91	103.54	102.23
	BIS	97.83	98.87	100.76	92.56	96.43	94.02
	NBMM	98.64	102.90	103.79	100.11	101.92	100.98
	NBM	99.58	98.80	102.18	93.81	97.92	95.04
	NBX	101.30	106.06	106.96	102.47	105.24	103.86
Sweden	MERM	74.17	61.45	60.24	59.38	60.64	59.41
	OECD	72.70	61.56	60.09	61.27	61.49	61.11
	BIS	72.28	60.30	59.22	58.78	59.72	58.81
	SR	72.84	60.73	60.22	60.79	61.39	60.74
Switzerland	MERM	138.42	127.92	137.50	131.92	132.94	129.22
	OECD	137.42	129.74	139.37	138.96	137.54	134.66
	BIS	136.23	126.09	136.31	132.01	132.40	128.33
	SNB	140.29	132.65	142.74	144.05	142.13	139.49
United Kingdom ...	MERM	112.40	109.93	99.56	98.30	98.27	95.80
	OECD	113.04	110.78	100.34	100.22	99.66	97.64
	EEC	113.03	111.34	100.73	101.05	100.47	98.48
	BIS	112.58	108.96	99.18	97.43	97.66	95.07
United States	MERM	99.91	117.94	108.30	122.24	115.23	122.37
	OECD	97.83	115.03	106.00	119.55	112.53	119.65
	BIS	96.98	115.39	105.74	120.16	112.67	120.01
	FRB	99.96	120.39	110.60	130.08	120.47	129.19

Movements in EER indices

(in percentages)

Country	Index	Overall period	Sub-periods from 4th Jan. 1977 to 4th Jan. 1982	Sub-periods from 4th Jan. 1982 to 15th Nov. 1982	Sub-periods from 15th Nov. 1982 to 10th Jan. 1983	Sub-periods from 10th Jan. 1983 to 24th Jan. 1984	Sub-periods from 24th Jan. 1984 to 7th March 1984	Sub-periods from 7th March 1984 to 20th June 1984
Belgium	MERM	- 15.8	- 0.9	- 10.9	0.6	- 6.5	3.0	- 1.5
	OECD	- 16.1	- 2.5	- 10.6	0.7	- 5.6	2.4	- 0.9
	EEC	- 14.5	- 2.3	- 10.0	1.0	- 5.3	1.3	0.3
	BIS	- 22.0	- 5.0	- 12.5	1.9	- 9.8	4.4	- 2.2
	BNBX	- 13.2	- 0.9	- 10.6	1.4	- 4.7	2.2	- 0.9
	BNBM	- 16.6	- 2.3	- 12.0	2.1	- 6.4	2.9	- 1.4
Canada	MERM	- 17.0	- 15.7	3.2	- 3.3	3.2	- 3.2	- 1.2
	OECD	- 19.0	- 19.5	6.3	- 5.1	4.3	- 4.2	- 0.3
	BIS	- 15.3	- 17.8	7.3	- 5.3	6.2	- 4.7	0.2
France	MERM	- 29.4	- 12.0	- 10.9	2.7	- 13.3	3.8	- 2.5
	OECD	- 27.5	- 13.6	- 8.9	2.1	- 10.6	2.2	- 1.3
	EEC	- 27.2	- 12.9	- 9.3	2.9	- 11.6	3.1	- 1.7
	BIS	- 32.0	- 14.7	- 11.3	3.4	- 14.3	4.2	- 2.7
Germany	MERM	9.3	8.1	2.0	3.1	- 5.6	4.9	- 2.9
	OECD	11.3	7.2	3.0	3.3	- 4.1	4.3	- 2.3
	EEC	13.3	8.1	3.0	3.6	- 3.7	4.2	- 2.2
	BIS	3.7	4.9	0.2	4.1	- 7.3	5.6	- 3.3
	BBK	18.5	9.7	4.5	3.0	- 1.1	3.2	- 1.5
Italy	MERM	- 38.9	- 28.6	- 6.7	2.5	- 10.5	1.6	- 1.6
	OECD	- 37.1	- 28.5	- 5.5	2.2	- 8.6	0.6	- 0.8
	EEC	- 37.9	- 29.1	- 5.9	3.1	- 9.6	1.3	- 1.1
	BIS	- 40.4	- 29.3	- 7.7	3.4	- 11.9	2.3	- 2.0
Japan	MERM	46.3	37.2	- 11.8	13.9	6.1	1.4	- 1.3
	OECD	50.2	37.2	- 10.5	13.4	7.6	0.8	- 0.4
	BIS	48.8	36.8	- 10.9	13.8	7.0	1.0	- 0.8
Netherlands	MERM	1.6	3.1	2.1	1.3	- 5.9	3.6	- 2.2
	OECD	2.2	- 0.0	4.5	0.6	- 3.7	2.1	- 1.2
	EEC	2.2	- 0.1	4.2	1.3	- 4.4	2.6	- 1.3
	BIS	- 6.0	- 2.2	1.1	1.9	- 8.1	4.2	- 2.5
	NBMM	1.0	- 1.4	4.3	0.9	- 3.6	1.9	- 0.9
	NBM	- 5.0	- 0.4	- 0.8	3.4	- 8.2	4.4	- 4.0
	NBX	3.9	1.3	4.7	0.9	- 4.2	2.7	- 1.3
Sweden	MERM	- 40.6	- 25.8	- 17.2	- 2.0	- 1.4	2.1	- 2.0
	OECD	- 38.9	- 27.3	- 15.3	- 2.4	2.0	0.4	- 0.6
	BIS	- 41.2	- 27.7	- 16.6	- 1.8	- 0.8	1.6	- 1.5
	SR	- 39.3	- 27.2	- 16.6	- 0.8	1.0	1.0	- 1.1
Switzerland	MERM	29.2	38.4	- 0.8	7.5	- 4.1	0.8	- 2.8
	OECD	34.7	37.4	- 5.6	7.4	- 0.3	- 1.0	- 2.1
	BIS	28.3	36.2	- 7.4	8.1	- 3.1	0.3	- 3.1
	SNB	39.5	40.3	- 5.5	7.6	0.9	- 1.3	- 1.9
United Kingdom ..	MERM	- 4.2	12.4	- 2.2	- 9.4	- 1.3	- 0.0	- 2.5
	OECD	- 2.4	13.0	- 2.0	- 9.4	- 0.1	- 0.6	- 2.0
	EEC	- 1.5	13.0	- 7.4	- 9.3	0.3	- 0.6	- 2.0
	BIS	- 4.9	12.6	- 5.5	- 9.0	- 1.8	0.2	- 2.7
United States ...	MERM	22.3	- 0.1	18.1	- 8.2	12.9	- 5.7	6.2
	OECD	19.7	- 2.2	17.6	- 7.9	12.8	- 5.9	6.3
	BIS	20.0	- 3.0	19.0	- 8.4	13.6	- 6.2	6.5
	FRB	29.2	- 0.0	20.4	- 8.1	17.6	- 7.4	7.2

Appendix 4

Graphs of various EER indices
(4th January 1977 = 100)

The following graphs show the development of EER indices since end-1981. For each of the currencies the main features may be summarised as follows:

The effect of the 8.5 per cent. devaluation of the Belgian franc within the EMS on 22nd February 1982 is clearly visible on an effective basis; that devaluation amounted to about 6 per cent. A period of relative stability followed until about March 1983, when a 1.5 per cent. revaluation heralded a period of continued weakness. During the period of US dollar weakness, from 24th January until 7th March 1984, the franc strengthened. Since then the franc has been fairly stable.

The effects of the EMS realignments of 14th June 1982 and 21st March 1983 on the French franc are clearly visible. In the interim period the franc remained fairly stable. However, since March 1983 the pattern of the EER of the French franc has been very similar to that of the EER of the Belgian franc.

The upward movement of the Deutsche Mark reached a peak with the 5.5 per cent. revaluation within the EMS on 21st March 1983. From then until 20th June 1984 the Mark weakened according to the various EER indices, as follows: BIS -7.0, MERM -6.0, OECD -4.7, EEC -4.5 and Deutsche Bundesbank -2.5. The movements of the Dutch guilder were, as might be expected, closely related to those of the Deutsche Mark, the peak also being recorded on 21st March 1983.

The indices for the Italian lira show an almost continuous depreciation, with the exception of temporary periods of strength towards the end of 1982 and the beginning of 1984.

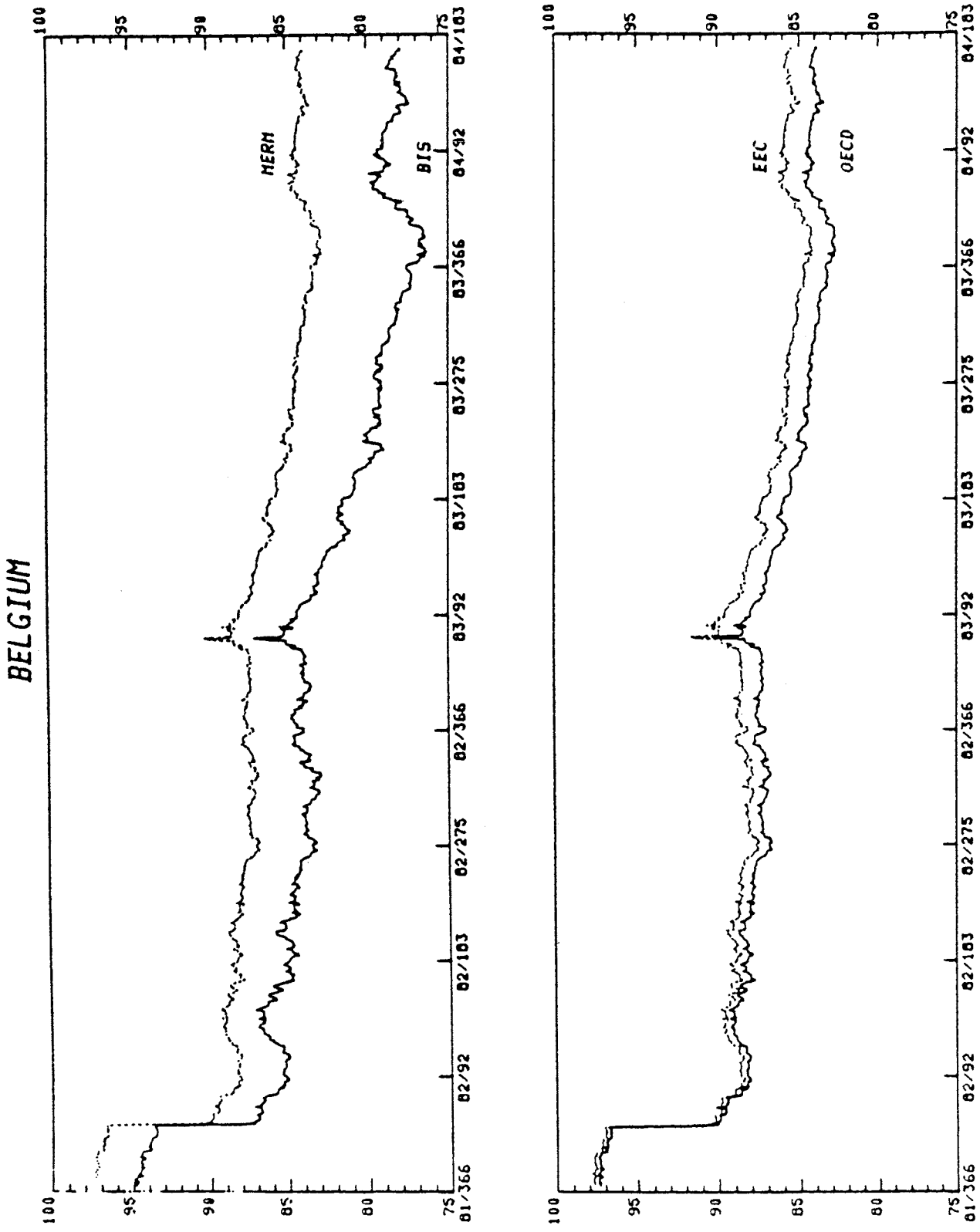
The Swedish authorities' policy of keeping the Swedish krona stable with respect to a basket of currencies is neatly reflected in all four EER indices shown. The movements of the Bank of Sweden's own index and those of the MERM, OECD and BIS indices are quite similar. The Swedish krona was stable both before and after its devaluation on 8th October 1982.

The pattern of the EER indices for the Swiss franc is largely independent of those of other countries. After large swings until the end of the first quarter of 1983, the Swiss franc remained stable throughout the rest of that year. Since the beginning of 1984 the franc has shown continuous weakness, unaffected by the Deutsche Mark/US dollar exchange rate movements.

The indices for the pound sterling are now only slightly below their early-1977 level. All the EER indices have shown large swings.

The Japanese yen appreciated by about 25 per cent. between October 1982 and June 1984. However, the upward movements have not been continuous but have been characterised by ratchet-type effects.

The US dollar and the Canadian dollar have been moving closely in line over the last two and a half years. For the period under review the turning-points of the EER indices are identical. However, in terms of level, the US dollar has been stronger than the Canadian dollar.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BIS
EEC
OECD
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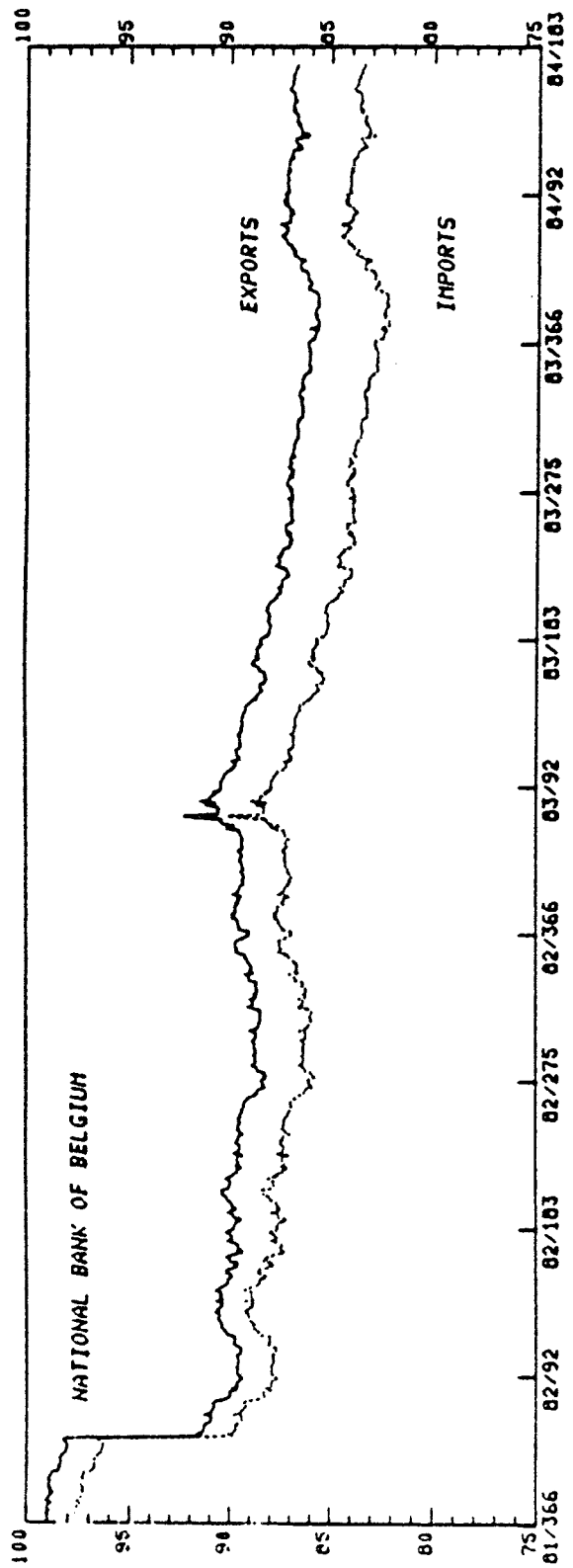
84/183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IMPORTS
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82/92
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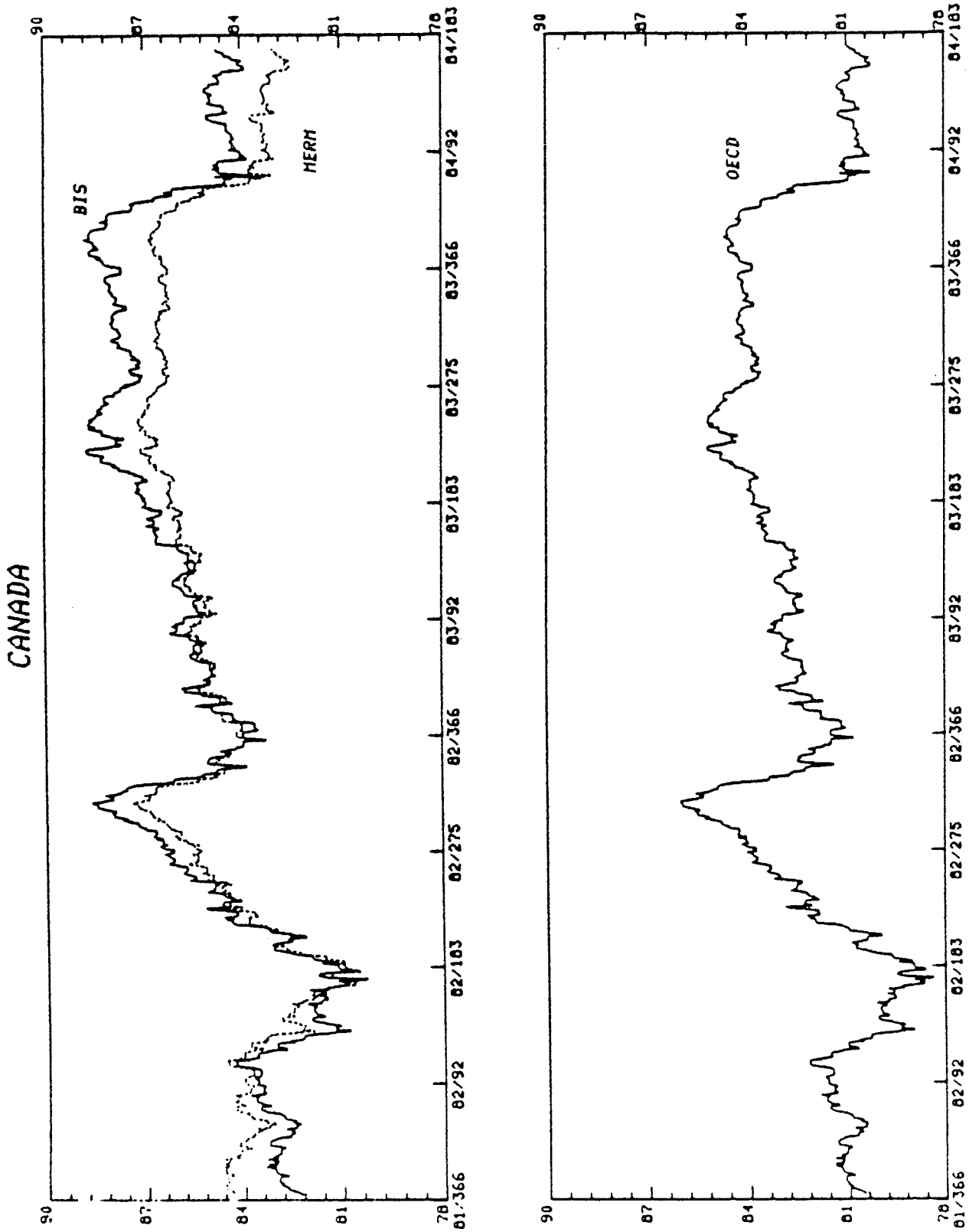
84/92
84/183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OECD
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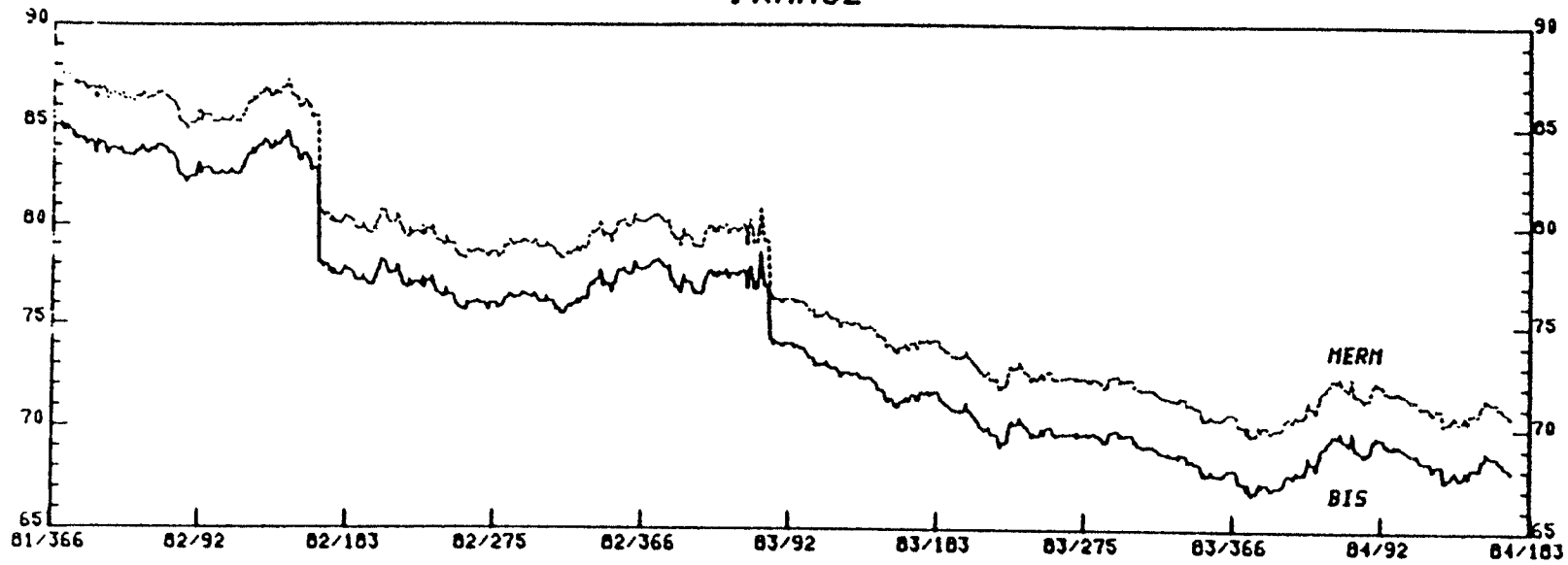
FRANCE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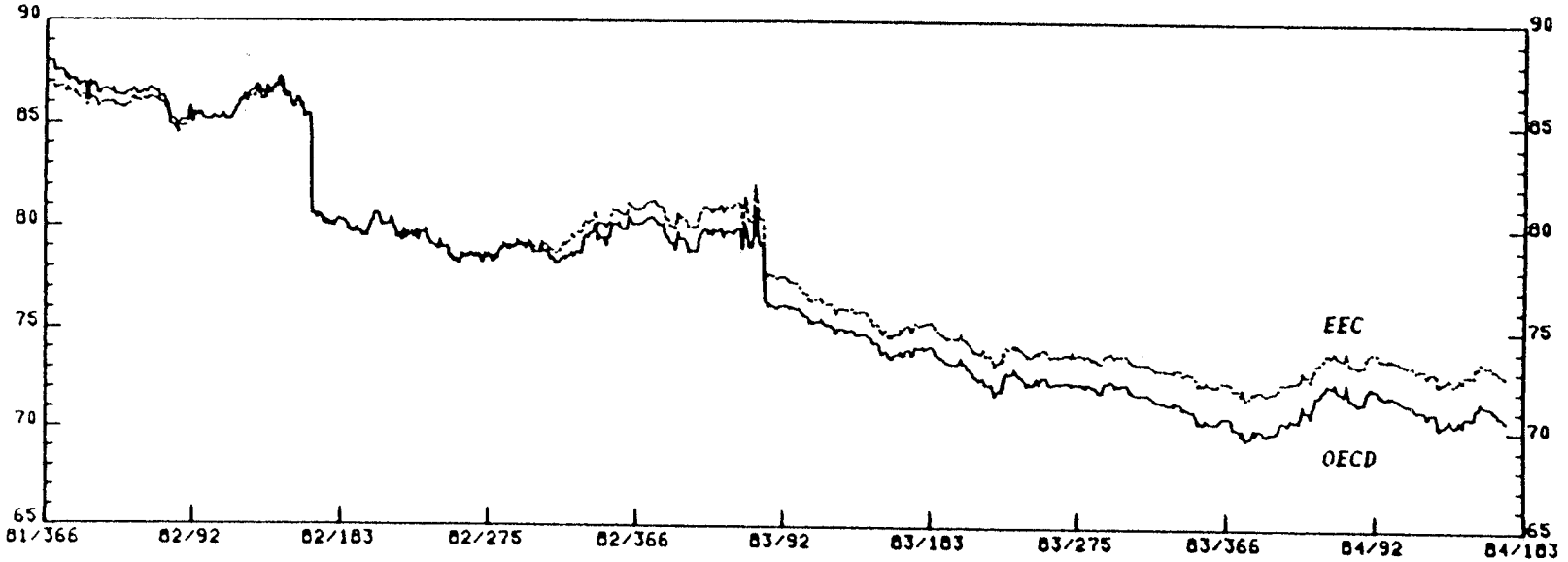
84/183
MERM
BIS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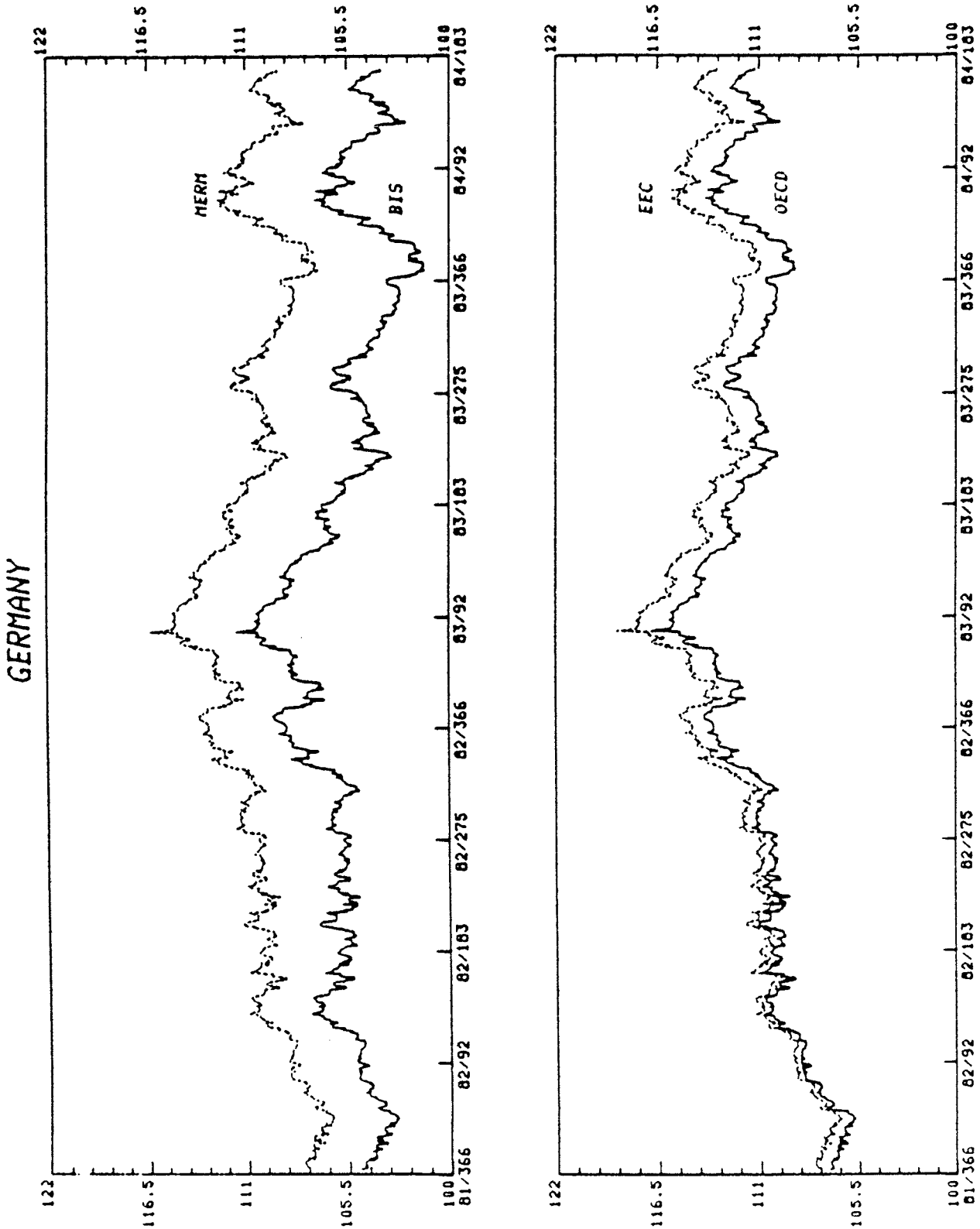
84/183
EEC
OECD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105.5
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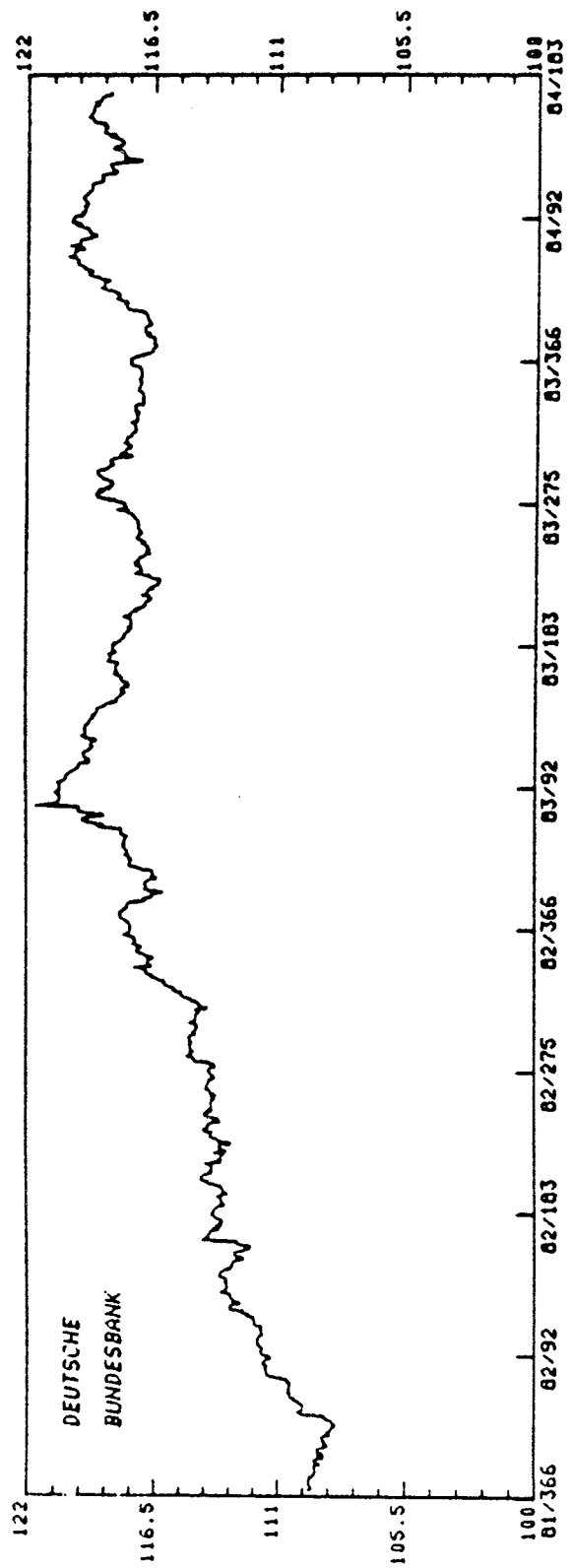
83/366
84/92
84/183
MERM
BIS
EEC
OECD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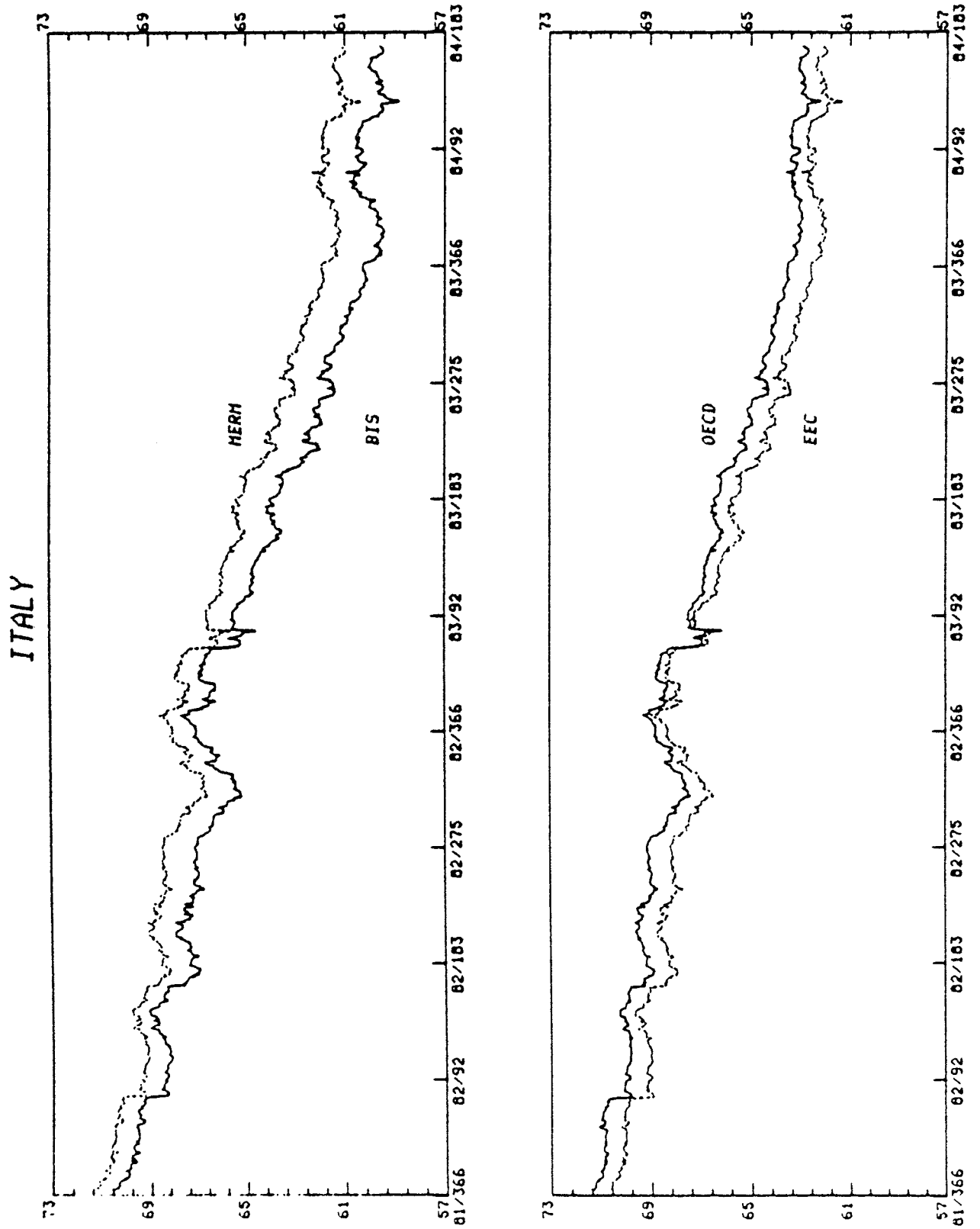
04/183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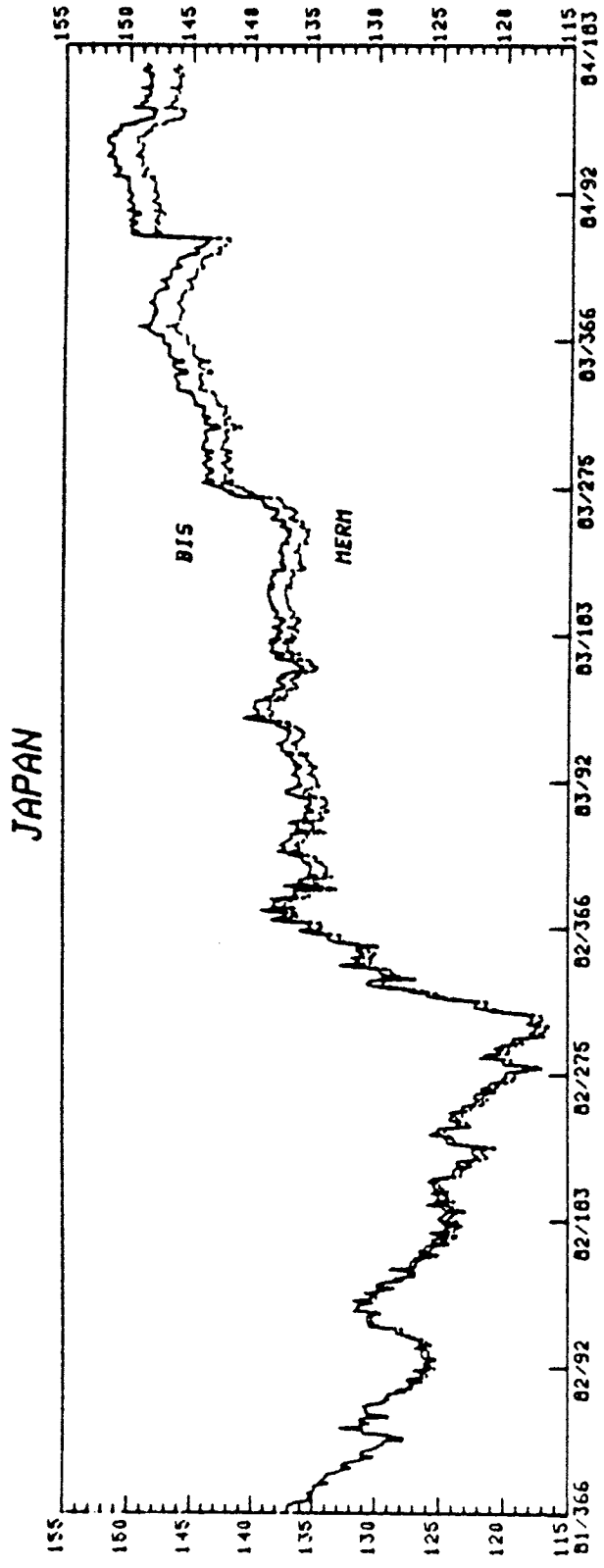
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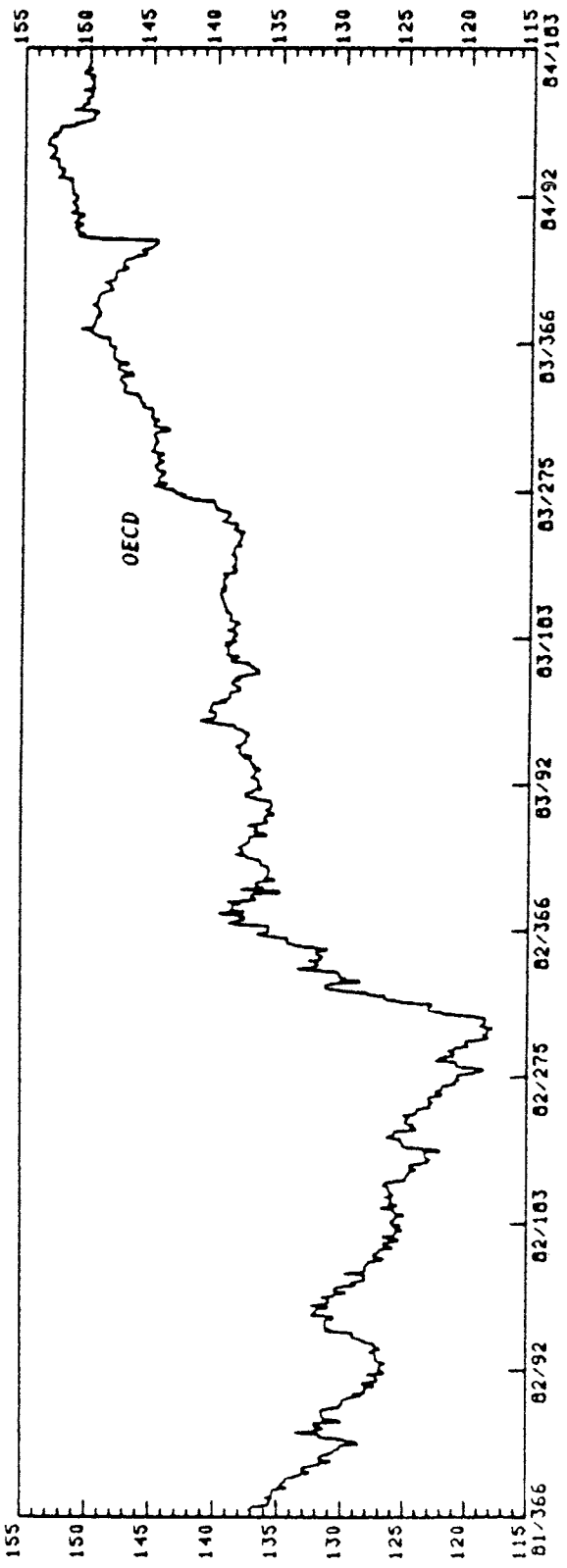
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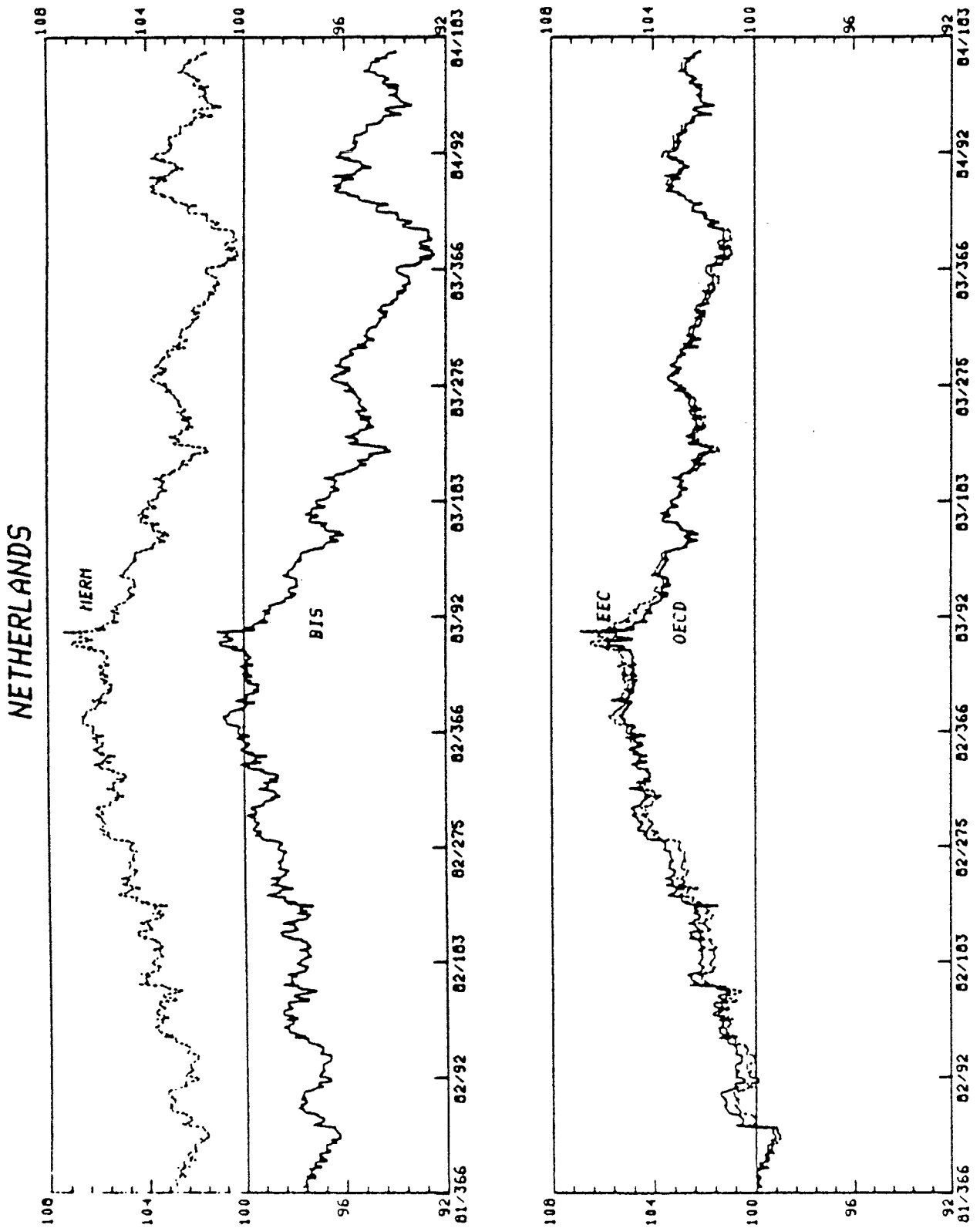
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BIS
EEC
OECD
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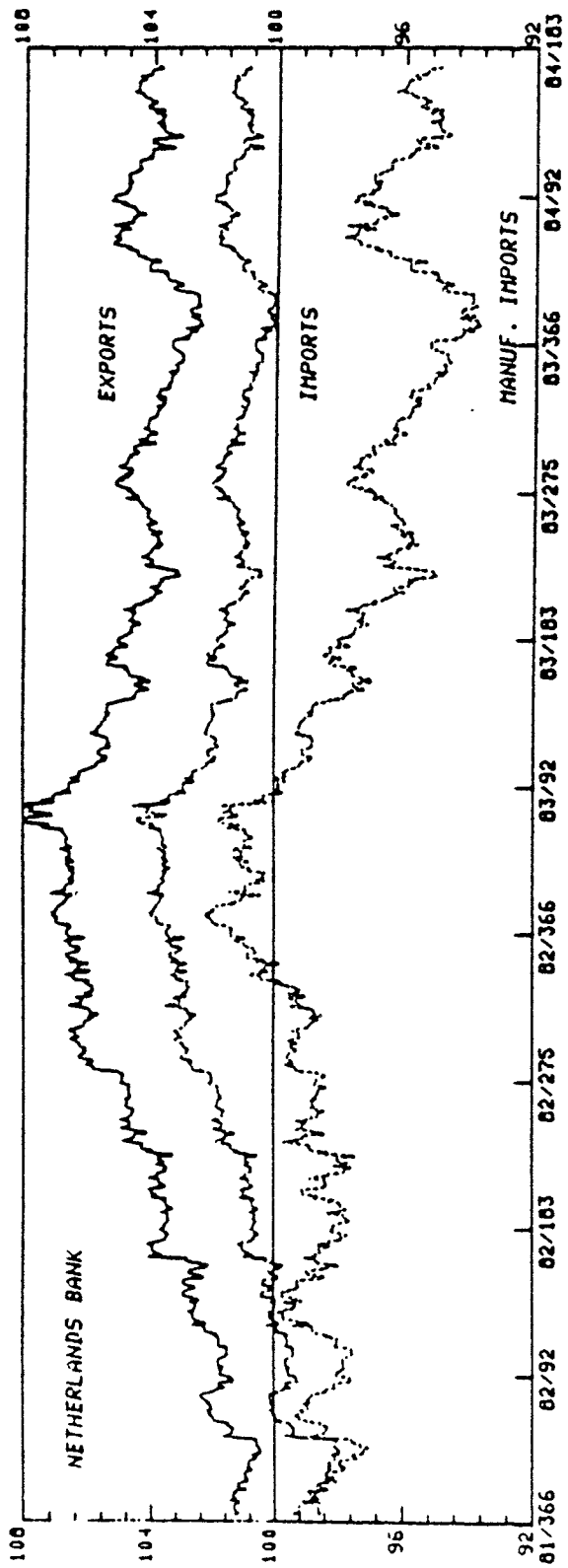
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IMPORTS
MANUF. IMPORTS
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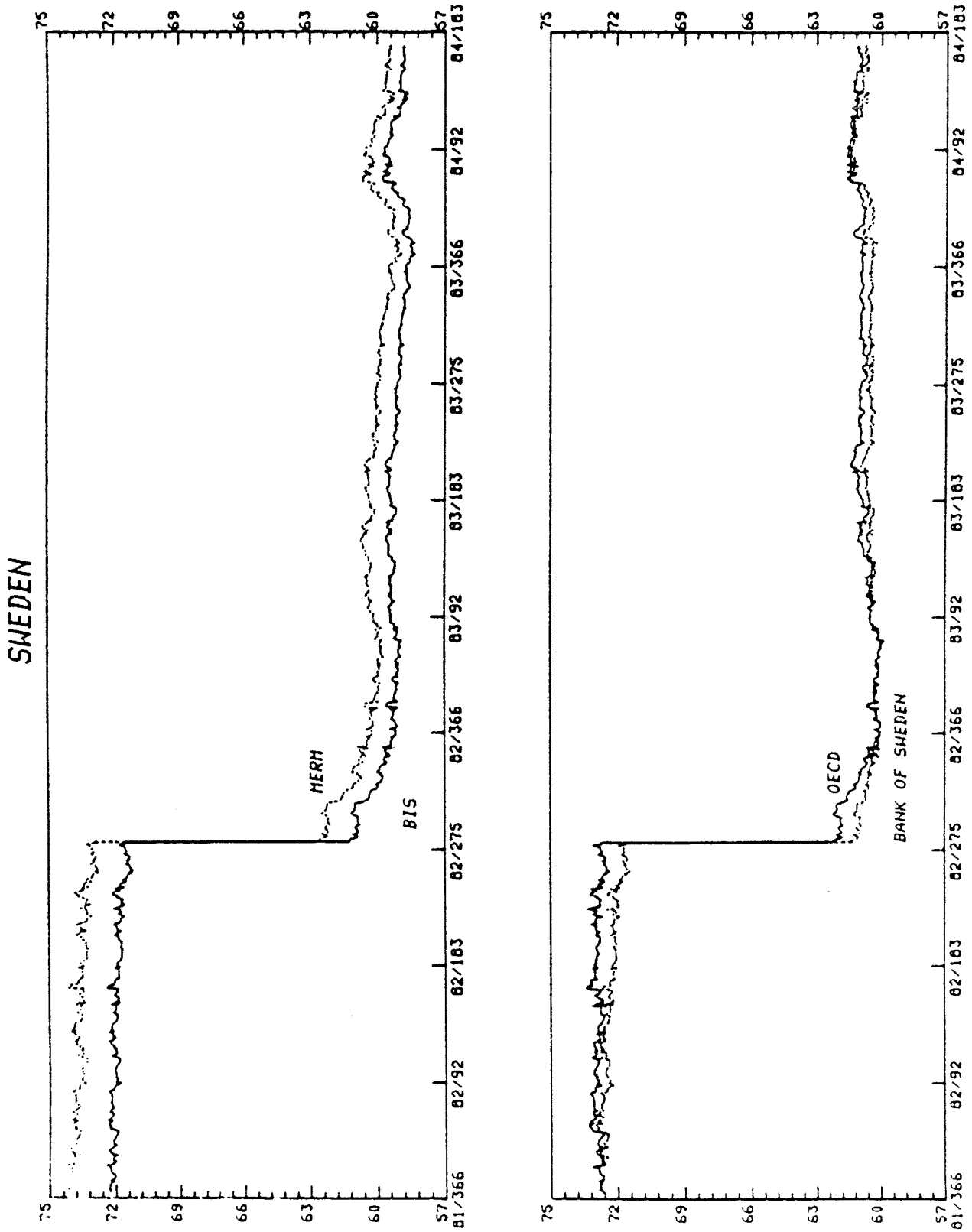
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BIS
OECD
BANK OF SWEDEN
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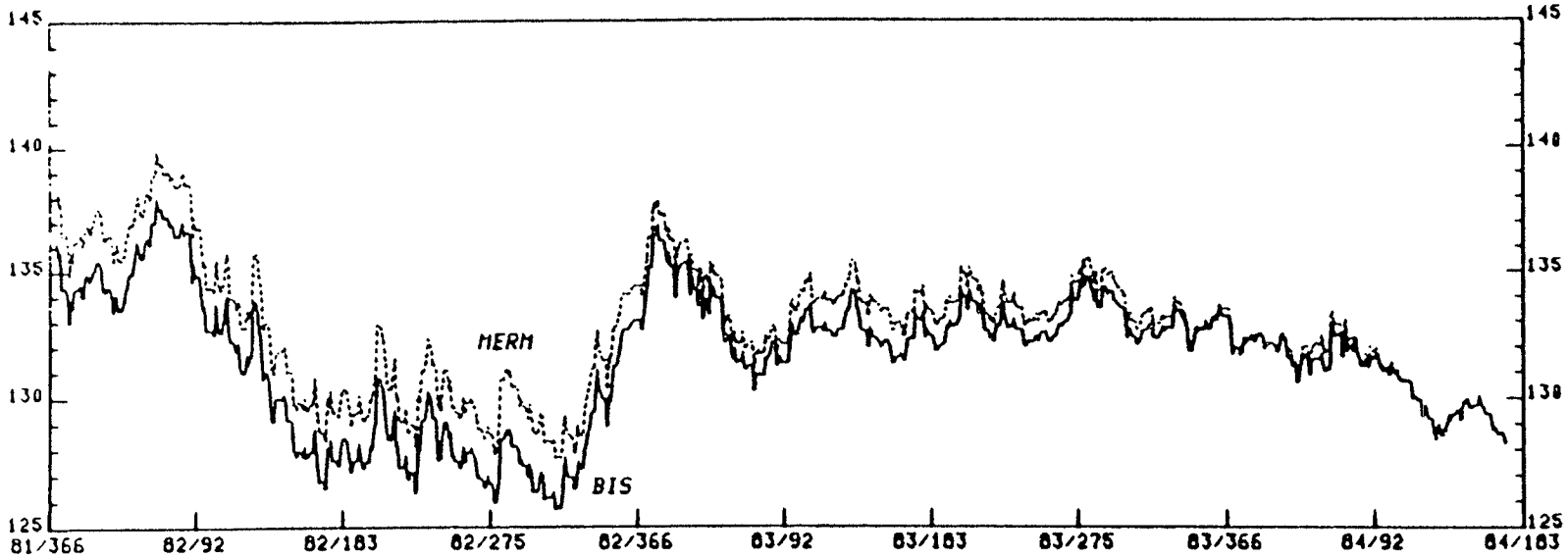
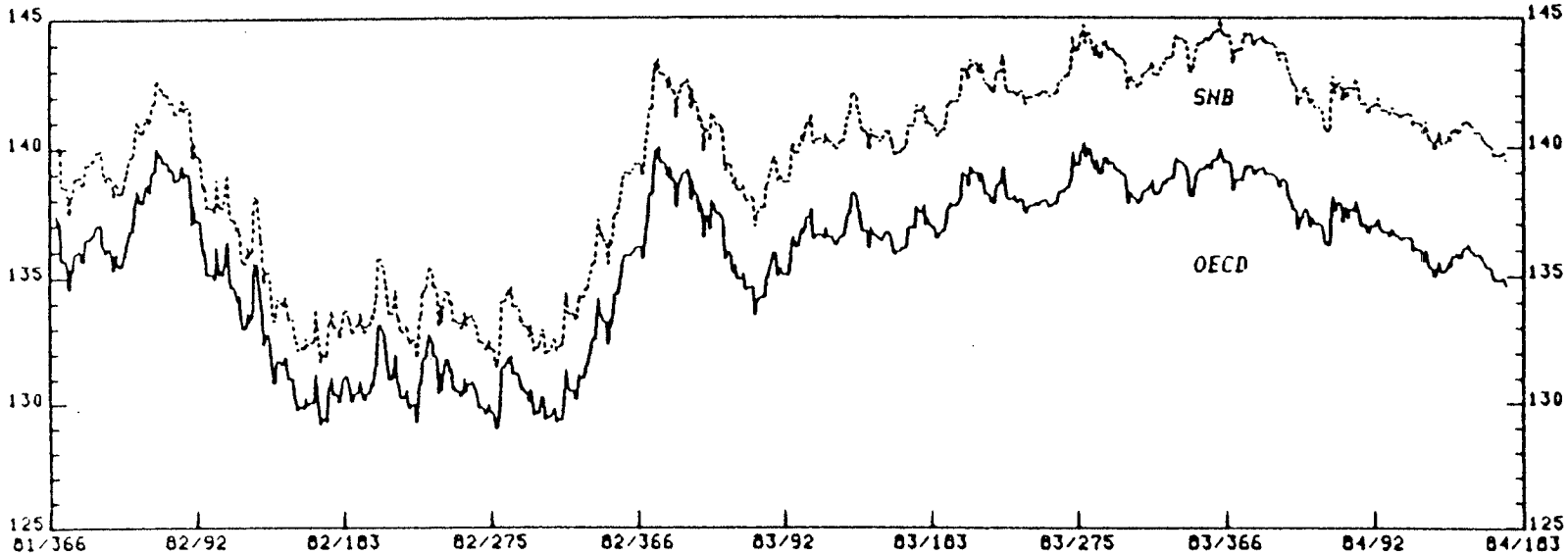
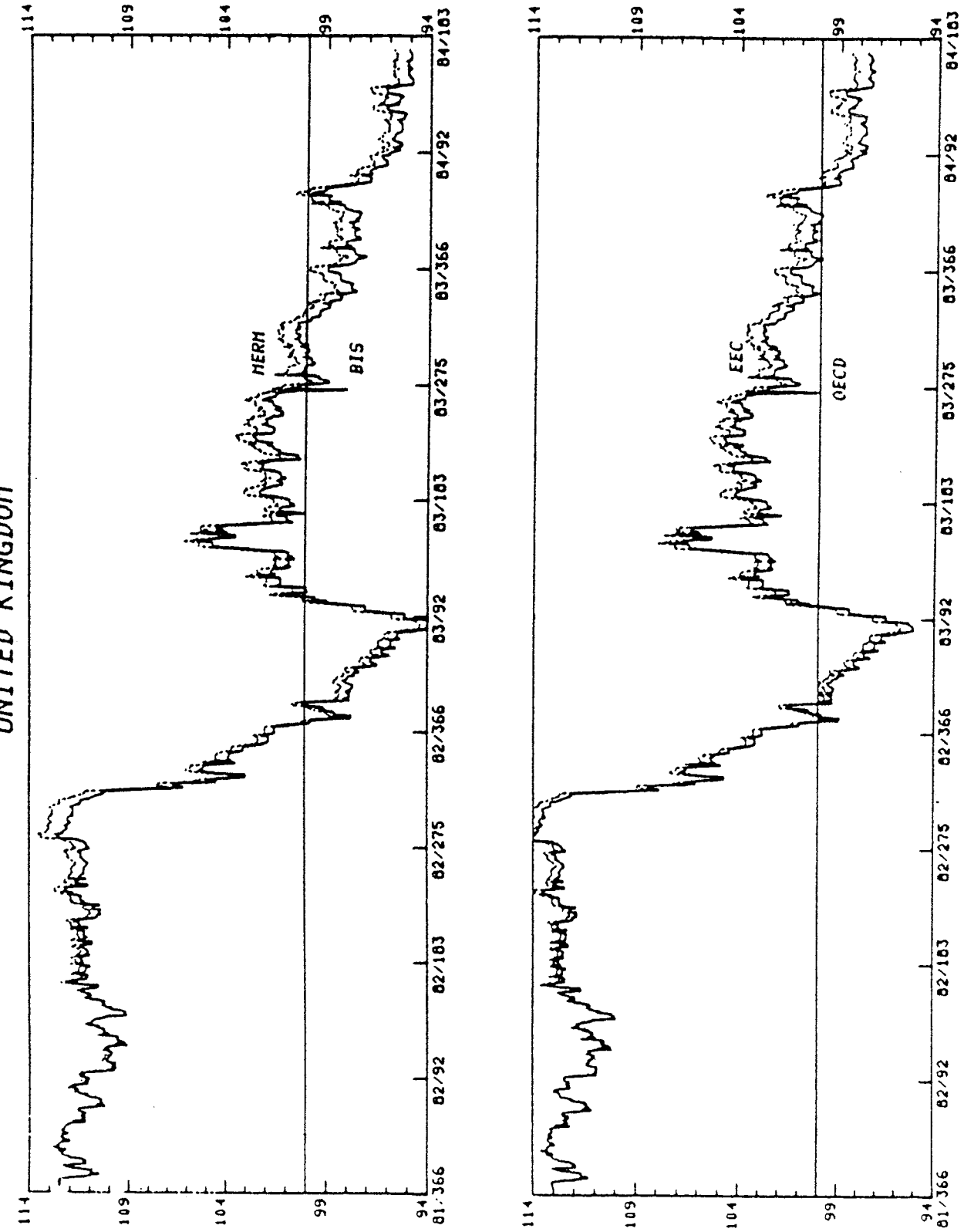
84/183

SWITZERLAND



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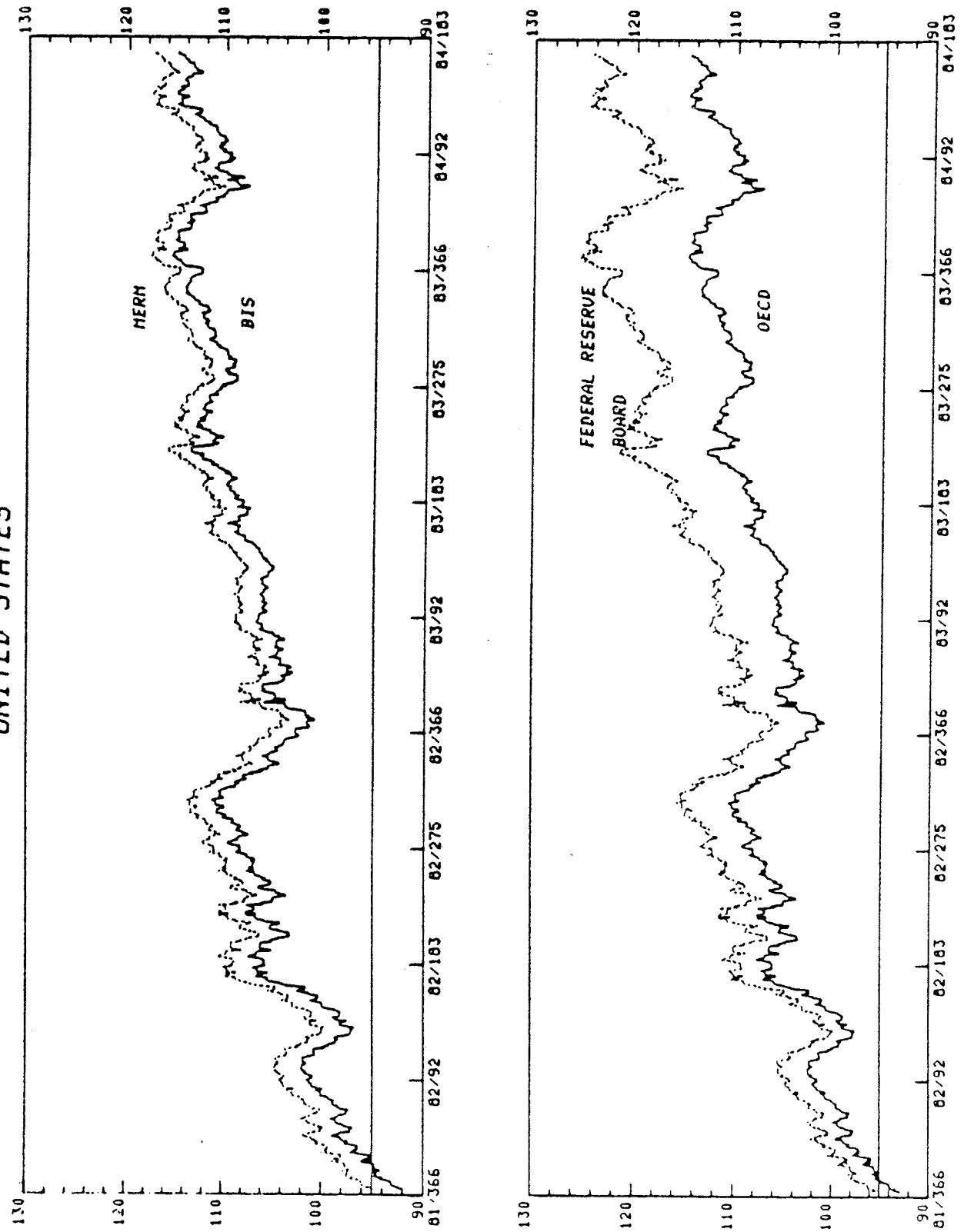
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BIS
FEDERAL RESERVE BOARD
OECD
130
120
110
100
90
81/366
82/92
82/183
82/275
82/366
83/92
83/183
83/275
83/366
84/92
84/183

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