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Towards a System of Multilateral Unit Labor Cost-Based Competitiveness Indicators for Advanced, Developing, and Transition Countries

Prepared by Anthony G. Turner and Stephen S. Golub[1]

Authorized for distribution by Graham Hacche

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Abstract

This paper attempts to extend the range of countries covered by the IMF's multilateral real exchange rate indexes based on relative unit labor costs (REER-ULCs) in manufacturing. A data set was assembled that permits calculation of REER-ULCs for 23 newly industrialized, developing, and transition countries in addition to the 21 industrial countries covered by the current system. Although the results are mostly quite encouraging, they should be considered preliminary because of uncertainty about the reliability and comparability of the underlying data. Also, unit labor costs are not available on as timely a basis as consumer price indexes (CPIs), especially for nonindustrial countries. Thus, the ULC-based indicators should supplement rather than replace the current CPI-based system.

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Author's E-Mail Address: Aturner@imf.org., Sgolub1@cc.swarthmore.edu

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Table of Contents **Page**

SUMMARY

This paper attempts to extend the range of countries covered by the IMF's multilateral real exchange rate indexes based on relative unit labor costs (REER-ULCs) in manufacturing. Currently, the Fund's REER-ULCs cover 21 industrial countries, representing 68 percent of world exports and 53 percent of world GDP in 1996. The Fund computes real exchange rates on the basis of consumer price indexes (REER-CPIs) for a broader group of countries, but it is generally accepted that for some purposes unit labor costs are preferable to consumer price indexes as measures of international competitiveness, for the reasons outlined below. This paper expands the Fund's REER-ULCs to include 23 newly industrialized, developing, and transition economies, which increases the covered countries' share of 1996 world exports and GDP to 91 percent and 88 percent, respectively.

The paper reviews the issues in calculating and evaluating competitiveness indicators and summarizes the IMF's approach to REER computation. It then discusses the data sets used to expand the coverage to newly industrialized, developing, and transition countries and presents the new indexes in graphic form. The measures that are based on unit labor costs are compared with the measures that are based on consumer price indexes. The strengths and weaknesses of the expanded indexes are assessed, and the paper concludes that the ULC–based indicators should supplement rather than replace the current system.

I. Competitiveness Indicators

A. General Issues[2]

International competitiveness may be defined as the relative price of foreign in terms of domestic tradable goods.[3] In this usage, a country's competitiveness "improves" if the relative price of its tradable goods declines. The nominal exchange rate alone is clearly an unsatisfactory indicator of competitiveness, since movements in relative prices also matter. Instead, competitiveness is better measured by the real exchange rate $q = EP/P^*$, which adjusts the nominal exchange rate E (foreign currency per unit of domestic currency) by domestic and foreign prices (P and P* respectively).[4] E and P* are weighted-average measures, with weights based on the domestic country's pattern of trade, as discussed further in Section I.B.

The underlying theoretical model justifying a focus on the relative price of tradable goods across countries assumes that foreign and domestic tradable goods are imperfect substitutes and/or that adjustment of q to its long-run equilibrium value takes time because of market imperfections of various sorts.[5] If traded goods were perfect substitutes and adjustment instantaneous, purchasing power parity would hold at all times, i.e., q would be constant, and competitiveness indicators would show no variation over time if measured correctly.[6] This framework therefore applies to international trade in differentiated manufactured goods (and increasingly trade in services), where there are known departures

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[2]For more details see Marsh and Tokerick (1994), Turner and Van't Tack (1993), Wickham (1993), Durand and Giorno (1987) and McGuirk (1987).

[3]This narrow definition of price or cost competitiveness should not be confused with the popular usage of the term competitiveness, which refers to a broad assessment of economic performance.

[4]Real exchange rates often refer to the relative price of tradable and non-tradable goods within a country, rather than on the relative price of domestic to foreign goods. The focus here, however, is on international competitiveness across countries, so the traded/non-traded goods measures of real exchange rates are not discussed further in this paper. For further discussion of this issue see Turner and Van't dack (1993, section V.) and Wickham (1993).

[5]See McGuirk (1987) for discussion of theoretical underpinnings.

[6]Even if the law of one price holds for all goods separately, aggregate price indexes could still diverge due to differences in weights across countries. But such changes would not reflect movements in competitiveness.

from the law of one price.[7] In contrast, for most primary products, which are homogeneous and traded in well-organized markets, the law of one price holds much more closely.

International competitiveness is a useful indicator of economic performance, but by itself is insufficient for assessing the appropriate level of the exchange rate or other policies.[8] For example, a deterioration in competitiveness, i.e., a real appreciation of the domestic currency, could reflect, among other possibilities, an increased demand for domestic relative to foreign goods, and hence improved terms of trade, or an overvaluation of the domestic currency. Without further information about the structure of and shocks to the economy, no firm conclusions are possible. This paper focuses only on the measurement of competitiveness, not on its causes or consequences.

A major practical problem is the choice of price index to measure P and P*. In principle, P and P* should represent a representative basket of traded goods and services, possibly excluding primary products, because the latter's prices cannot diverge much internationally even if underlying competitiveness changes. P and P* should also be exogenous with respect to the exchange rate and represent equilibrium values, rather than temporary movements associated with "pricing to market" or other short-run influences. In practice such equilibrium traded-goods price indexes do not exist. The available alternatives are consumer price indexes (CPIs), wholesale price indexes (WPIs), GDP deflators, export and import unit values, and unit labor costs. As is well recognized in the literature, each of these measures has its pros and cons.

The main problem shared by CPIs, WPIs and GDP deflators is that they include non-traded goods as well as traded goods. If traded and non-traded goods prices diverge over time, as they often do for various reasons such as differential sectoral productivity growth, aggregate price indexes could be very misleading indicators of the prices of traded goods. The CPI-based measures have some advantages relative to WPIs and GDP deflators. CPIs are more similar across countries than WPIs and GDP deflators, and as the most common basis for measuring inflation, are available for more countries on a timely basis. On the other hand, CPIs may be poor measures of equilibrium traded goods prices and are endogenous to the exchange rate. First, CPIs may be distorted by price controls and excise taxes, and thus diverge from the underlying domestic cost of production. Second, CPIs may not accurately reflect the prices of intermediate goods, which represent an increasingly important part of trade in manufactures. Third, a relative decline in the CPI associated with "pricing to market" may not signify an improvement in competitiveness, but rather a temporary reduction in profit margins. Fourth, CPIs are endogenous to the exchange rate since they

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[7]Isard (1976) for example showed sustained departures from the law of one price across countries even for very similar manufactured products.

[8]See Artus and Knight (1984) for a discussion of the role of competitiveness indicators in assessing the appropriate level of exchange rates.

include import prices, and therefore understate changes in competitiveness. For example, if country j's currency depreciates, its import prices rise, pushing up its CPI and reducing the extent of j's real depreciation.

Relative export and/or import unit values have the advantage of excluding non-traded goods, but have other deficiencies. Export and import prices may be heavily influenced by short-run pricing to market and are not exogenous to the exchange rate. Also, they may be heavily weighted with prices of primary products. They may fail to reflect the endogenous effects of international competitiveness on the composition of the goods that are exported and imported, and consequently on the observed prices of exports and imports. Also, in most cases they are average values rather than actual prices and may be distorted by composition effects. Moreover, they are not available for many countries.

Unit labor costs in manufacturing (labor cost per unit of output or equivalently labor cost divided by output per worker) capture a key underlying determinant of competitiveness in an important subset of traded goods. By focusing on costs rather than prices, unit labor costs avoid some of the endogeneity problems of the CPI and export price measures. Labor costs are less directly subject to direct exchange-rate effects than traded-goods prices. Unit labor costs have several limitations, however. First, data on labor productivity and labor compensation, both of which are needed to compute unit labor costs, are not always reliable and available on a timely basis. The quality of the data is discussed more fully below. Second, these measures are not widely available for services, which constitute a growing although still secondary component of international trade. Third, labor productivity may have short-run countercyclical movements, as firms "hoard" labor in recessions. This problem can be partially overcome by filtering, however. Fourth, unit labor costs ignore other costs of production, notably intermediate goods, non-labor taxes, and capital costs. Similarly, movements in unit labor costs may sometimes reflect factor substitution rather than changes in efficiency. For example, an increase in the capital stock may raise the productivity of labor and reduce unit labor costs without necessarily improving competitiveness, since capital now represents a higher share of unit costs. But to the extent that capital and intermediate goods are traded in international markets whereas labor remains largely immobile internationally, labor costs are likely to diverge much more across countries than other costs of production, and therefore play a disproportionately important role in competitiveness. Moreover, especially in the advanced economies and increasingly also in emerging market countries, manufactures constitute a large part of trade. Turner and Van't dack's (1993, p. 112) comprehensive survey of competitiveness indicators concludes that for industrial countries, "relative unit labor costs in manufacturing is probably the best single indicator." Also, international differences in labor costs are often the focus of policy discussions regarding trade with developing countries, as industrial countries often express concerns about the alleged unfair competitive advantage provided by low wages and labor

standards.[9] Competitiveness measures based on unit labor costs are therefore particularly attractive if the focus is on including the emerging developing countries that are major exporters of manufactures, which is the objective here.

B. The IMF's Indicator System

The Fund's REER calculations use the following geometric weighted average to obtain the real exchange rate q_i for country i, relative to other countries j:

$$q_i = \Pi_{j \neq i} \left(\frac{P_i E_i}{P_j E_j} \right)^{w_{ij}} \quad (1)$$

where E_j denotes the exchange value of country j's currency against the U.S. dollar, w_{ij} is country j's weight in country i's index, and P_j is the price index in country j (either unit labor costs or the CPI).

The choice of weights has been the subject of extensive research at the Fund, and the current system is reviewed in detail by Zanello and Desruelle (1997). The current weights are based on a complex formula involving exports, imports, and domestic production in such a way as to capture both bilateral trade and competition with third countries. For REER-ULCs, weights are based on manufactured goods, since the unit labor costs are for manufacturing. For REER-CPIs, the weights are based on non-oil primary products and tourism as well as manufactured goods.

II. Data Sources and Methods

The expanded multilateral unit labor cost indicators add 23 non-industrial countries to the current coverage of 21 industrial countries. The 21 industrial countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany (West), Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States. The data for unit labor costs for these countries are mostly obtained from the United States Bureau of Labor Statistics (BLS), widely accepted as a reliable source of information on unit labor costs.[10] Until now, developing and transition countries were not included in the Fund's REER-ULCs due to lack of readily available estimates of unit labor costs. In an attempt to remedy this, estimates of productivity and

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[9]For a review of the issues raised by international differences in wages and labor standards, see Golub (1997).

[10]Italy and Sweden are obtained from national sources.

labor compensation for non-industrial countries have been compiled from several sources. See Appendix 1 for further details on individual countries.

1. BLS coverage of non-industrial country unit labor costs is limited to Taiwan Province of China and Korea. The BLS estimates of unit labor costs for these two economies have been used rather than the sources listed below.

2. The bulk of the data for non-industrial countries come from the United Nations Industrial Development Organization (UNIDO) Industrial Statistics (INSTAT) database, obtained on disk from UNIDO, supplemented with manufacturing value added deflators from The World Bank *World Tables* (obtained from STARS database).[11] The INSTAT database provides manufacturing value added, labor compensation and employment. Productivity is obtained by dividing value added by employment and deflating with the *World Tables* manufacturing value added deflators. Compensation per employee is obtained as total earnings of labor divided by employment. Unit labor cost is then calculated as compensation per employee divided by productivity. The UNIDO data have several drawbacks. First, the value added data are based on the census definition rather than the national accounts compatible definition used by the BLS. The main difference is that census value added does not deduct some service inputs from gross output in deriving value added. Second, labor compensation as reported by UNIDO includes fringe benefits such as maternity pay and payment in kind, but excludes employer contributions to social insurance funds, and is thus an incomplete measure of labor costs. Other sources, such as BLS, however, suggest that employer contributions represent a smaller share of labor costs in non-industrial countries than in industrial countries, so this problem is mitigated.[12] The following countries' unit labor costs were obtained primarily from INSTAT in this way: Chile, Hong Kong, Hungary, India, Indonesia, Malaysia, Peru, Philippines, Poland, Singapore, South Africa, Turkey, and Venezuela. In addition, some of the data for Argentina, Brazil, and Colombia are from INSTAT.

3. Estimates of unit labor costs for Bangladesh, China (partially), and Thailand were obtained from the IMF's Asia and Pacific Department (APD). This database covers fewer

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[11]In some cases manufacturing value added deflators were not available. If so, industry value added deflators, producer price indexes or GDP deflators were used. See Appendix 1 for details.

[12]BLS data for production workers in manufacturing shows that the share of employer contributions averages about 20 percent of labor costs for industrial countries and 10 percent for developing countries in the 1990s, but there is substantial variation within each group of countries. Source: BLS *International Comparisons of Hourly Compensation Costs for Production Workers in Manufacturing, Supplementary Tables*, Table 13. The BLS data on labor compensation of production workers in developing countries is limited to a half dozen countries, however.

years than UNIDO, so UNIDO was selected when the data was available from both sources. In the case of China, compensation and employment are from APD, and industrial production from the IMF's *International Financial Statistics* (manufacturing value added is not available for China). The data for China are likely to be subject to more problems than those for other countries for this reason as well as others. Since China is a partly command-based economy, labor costs and output may not be measured at market prices. China was included despite these problems because of its importance in world trade of manufactures.

4. Country desks and the World Economic Outlook database provided data for: Argentina, Brazil, Israel, and Poland.

5. The Banco de Mexico provided data for Mexico directly.

The time period covered in this analysis is from 1975 through 1995. In some cases, however, there are missing data for the beginning or end of the period. In such cases, the data were filled in by extrapolation using consumer price indexes instead of unit labor costs. Appendix I lists the countries and years for which this was necessary. Note also that the coverage of countries in transition in central Europe is limited to Hungary and Poland. In particular, satisfactory data for the Czech Republic and Russia could not be obtained.

In most cases, therefore, data were obtained from secondary sources. The reliability and comparability of the underlying primary sources is uncertain. Differences in definitions of value added, employment and labor compensation across countries may affect the results. This problem is attenuated, however, to the extent that changes over time are less affected than levels by these differences. No attempt is made here to compare levels of labor costs across countries. The focus is solely on indexes with base 1990 = 100, showing changes over time.[13] Comparisons of unit labor costs indexes computed from UNIDO data with those of BLS, e.g., for Korea, are fairly encouraging in that they show similar trends over time.

Another problem is timeliness of the data set used. At the time of writing (June 1997), the data on unit labor costs extend through 1995 in most cases. In some instances, the data end several years before 1995 (see Appendix I), in which case they were extended using CPIs, as mentioned above. Also, quarterly data are not available in most cases. The REER-ULCs estimated in this paper are therefore not very useful for analyzing the latest developments in competitiveness, but rather are more appropriate for examining longer-term trends. CPI-based measures have a distinct advantage in terms of timeliness.

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[13]Elsewhere, Golub (1995) obtains international comparisons of levels of productivity and labor costs using the UNIDO data base. To do this, estimates of purchasing-power parity exchange rates are also needed. Hooper and Larin (1989) and Hooper and Vrankovich (1995) compute unit labor cost levels for industrial countries.

The productivity data were not filtered to remove cyclical variations, in order to obtain what might be a clearer comparison with the CPI-based measures. The weights used are based on manufacturing trade and production, provided by the IMF's Policy Development and Review Department, which are obtained following the methodology described by Zanello and Desruelle (1997).

III. Results

Figure 1 presents estimates of REER-ULCs for the 21 industrial countries, along with corresponding REER-CPIs and nominal effective exchange rates (NEER), on a semi-logarithmic scale. The data are plotted over 1975-1995, except for the REER-CPI which are only available starting in 1979. Figures 2, 3, and 4 present the same data for the 23 non-industrial countries. It is difficult to do justice to 44 different countries without going into great detail, but some patterns are evident. For the vast majority in both groups of countries, REER-ULCs and REER-CPIs move broadly together, and are less variable than the corresponding NEER. The divergent movements of real and nominal rates are especially evident in countries with high inflation. For such countries, it is difficult even to plot the nominal and real exchange rates on the same figure. In such cases, additional figures with varying scales are shown in Appendix Figures 1 through 11.

Tables 1 and 2 present the coefficient of variation (standard deviation divided by mean) for industrial and non-industrial countries, respectively, to provide a summary measure of variability. The tables confirm that both REERs are usually less variable than NEERs, especially for the non-industrial countries. That is, much of the observed nominal exchange-rate variation offsets differential international movement in traded goods prices, especially for countries with high inflation, as the theory of purchasing power parity suggests. As a comparison of Tables 1 and 2 as well as visual inspection of the figures show, REERs for the non-industrial countries tend to be much more volatile than those for developed countries. In addition, the REER-ULC tend to be more volatile than the REER-CPI for both groups of countries. This is to be expected. The movements in REER-CPI are dampened by the endogenous response of import prices to exchange rates, as noted in Section I.

Figures 1 through 4 often display more pronounced trends over time for REER-ULCs than for REER-CPIs, as well as greater fluctuations around their respective trends. For example, the trend real depreciation observed over 1979-1995 for the United States and the real appreciations for Japan and Germany are greater when measured with REER-ULC, than when measured with REER-CPI. The higher short-run volatility of REER-ULC is evident for many of the non-industrial countries, especially in Latin America.

Table 1. Coefficient of Variation of Nominal and Real Effective Exchange Rates, Industrial Countries, 1979-1995 1/

	Nominal	Real-Unit Labor Costs	Real-CPI
United States	0.13	0.17	0.14
Japan	0.36	0.23	0.21
Germany	0.17	0.13	0.05
France	0.07	0.03	0.04
United Kingdom	0.08	0.10	0.08
Italy	0.13	0.09	0.09
Canada	0.07	0.08	0.08
Australia	0.22	0.09	0.13
Austria	0.11	0.06	0.05
Belgium	0.09	0.13	0.06
Denmark	0.08	0.11	0.05
Finland	0.07	0.14	0.09
Greece	0.58	0.07	0.07
Ireland	0.06	0.17	0.04
Netherlands	0.12	0.08	0.04
New Zealand	0.19	0.11	0.07
Norway	0.05	0.04	0.03
Portugal	0.41	0.15	0.10
Spain	0.14	0.11	0.10
Sweden	0.13	0.12	0.08
Switzerland	0.14	0.13	0.06
Average	0.16	0.11	0.08

Source: Authors' calculations, as described in text.
1/ Standard deviation divided by mean.

Table 2. Coefficient of Variation of Nominal and Real Effective Exchange Rates, Non-industrial Countries, 1979-1995 1/

	Nominal	Real-Unit Labor Costs	Real-CPI
Hungary	0.32	0.13	0.11
Israel	2.26	0.10	0.04
Poland	1.09	0.27	0.26
South Africa	0.54	0.13	0.16
Turkey	1.64	0.47	0.30
Argentina	2.32	0.33	0.35
Brazil	2.16	0.15	0.17
Chile	0.91	0.45	0.32
Colombia	0.89	0.24	0.31
Mexico	1.61	0.44	0.19
Peru	1.74	0.21	0.46
Venezuela	0.87	0.54	0.35
Bangladesh	0.28	0.13	0.11
China	0.58	0.65	0.53
Hong Kong	0.06	0.24	0.12
India	0.45	0.37	0.33
Indonesia	0.56	0.49	0.37
Korea	0.17	0.10	0.12
Malaysia	0.16	0.22	0.17
Philippines	0.57	0.18	0.15
Singapore	0.11	0.16	0.08
Taiwan	0.13	0.16	0.06
Thailand	0.18	0.13	0.13
Average	0.85	0.27	0.22

Source: Authors' calculations, as described in text.
1/ Standard deviation divided by mean.

Table 3 presents correlation coefficients between the two real exchange rate indicators, REER-ULC and REER-CPI. It confirms the visual impression that the two series are usually highly positively correlated, often at a level of around .90. Austria is an anomaly with a substantial negative correlation, as are Ireland and Norway to a lesser extent. The coefficient of variation of the two REERs is small in these three cases, however, as Table 1 and Figure 1 indicate, so there is in fact less discrepancy between the levels of the two REERs for these countries than the low or negative correlations suggest. All the correlation coefficients between REER-CPI and REER-ULC are positive for the non-industrial countries.

Table 3. Correlation Coefficients Between REER-ULC and REER-CPI

Industrial Countries		Non-Industrial Countries	
United States	0.94	Hungary	0.61
Japan	0.93	Israel	0.39
Germany	0.48	Poland	0.85
France	0.72	South Africa	0.51
United Kingdom	0.93	Turkey	0.98
Italy	0.89	Argentina	0.84
Canada	0.92	Brazil	0.41
Australia	0.52	Chile	0.92
Austria	-0.61	Colombia	0.99
Belgium	0.89	Mexico	0.82
Denmark	0.96	Peru	0.31
Finland	0.78	Venezuela	0.97
Greece	0.37	Bangladesh	0.83
Ireland	-0.16	China	0.99
Netherlands	0.88	Hong Kong	0.75
New Zealand	0.70	India	0.99
Norway	0.13	Indonesia	0.98
Portugal	0.93	Korea	0.68
Spain	0.90	Malaysia	0.89
Sweden	0.96	Philippines	0.53
Switzerland	0.90	Singapore	0.77
		Taiwan	0.77
		Thailand	0.32
Average	0.66	Average	0.74

Source: Authors' calculations.

Although there is substantial positive correlation between the two measures of REERs for almost all countries, sizable medium-run differences between the two measures do occur frequently, as can be seen in Figures 1, 2, 3, and 4. In recent years, for example, the REER-ULCs have appreciated noticeably relatively to REER-CPIs in Japan and Portugal, and depreciated relatively for Austria, Finland, Greece and Ireland. Since 1990, the two REER measures have moved closely together for most non-industrial countries. For Argentina, Brazil, Mexico, Korea, and Hungary, however, REER-ULCs have fallen noticeably relative to REER-CPIs recently.

Most Latin American countries have experienced very large swings in real exchange rates. Sometimes this volatility reflects the effects of pegged nominal exchange rates under high domestic inflation. In many Latin American countries (particularly Argentina, Chile, Mexico and Venezuela), large real appreciations occurred when the currency was pegged, followed by huge corrections when the peg collapsed. The big gap between the behavior of REER-CPI and REER-ULC for Peru until the late 1980s raises questions about the quality of the data for at least one of the two indicators.

Like most Latin American countries, India, Indonesia and to a lesser extent Bangladesh also experienced large real depreciations during the 1980s. Indonesia's depreciation follows the decline in world oil prices, which occasioned an important adverse terms of trade shock to Indonesia, a major oil exporter. India's depreciation coincides with its efforts to liberalize its foreign trade regime. China has apparently also had a very large real depreciation since the late 1970s, although the quality of the Chinese data requires caution. In particular, the small increase in Chinese unit labor costs amid a big nominal depreciation could reflect a high degree of government determination of wages or inaccurate data. In comparison to Latin America and most other developing countries, most East Asian developing countries have had relatively stable nominal and real exchange rates (the Philippines and Indonesia are exceptions). Since the early 1980s, Hong Kong, Singapore and Taiwan Province of China have experienced gradual real appreciations, Malaysia a moderate real depreciation, while Korea, the Philippines and Thailand show no clear trend.

Hungary, Poland, Israel, and South Africa all experienced large nominal depreciations in recent years, associated with high inflation. Israel's real exchange rate has been quite stable since 1979, measured by either ULCs or CPIs. South Africa also shows relatively little variation in real exchange rates, at least compared to most developing countries. Poland has experienced sharp swings but no clear trend, while Hungary has had a steady real appreciation.

Figures 5 through 11 compare REER-ULCs for the group of seven major industrial countries (G-7), calculated with and without the non-industrial countries, was made to see how much difference the addition of the latter matters. Some short-run divergence between the two series was seen, but it was usually small and the two series displayed very high correlation of both trends and fluctuations around trend. For Canada, the inclusion of non-industrial countries leads to a slightly more pronounced real depreciation over the 1979-95 period, but for other countries, the change over the whole period is hardly affected. The small effects of adding non-industrial countries to the real exchange rates of industrial countries reflects the fact that the bulk of industrial country trade in manufactured goods remains with other industrial countries.

IV. Assessment

A data set has been assembled which allows an extension of the IMF real effective exchange rate estimates based on unit labor costs (REER-ULCs) to a large group of newly industrialized, developing and transition countries. The data for these countries is derived from several sources, most importantly the UNIDO Industrial Statistics database and various IMF databases. The results are mostly quite reasonable. REER-ULCs generally move quite closely with CPI-based indexes, but display more volatility, which is to be expected since CPIs are endogenously linked to exchange rates via import prices.

Nonetheless, the results should be considered preliminary since there is uncertainty about the reliability and comparability of the underlying data. Also, REER-ULCs are not available on as timely a basis as CPIs, especially for non-industrial countries. Moreover, the fact that unit labor cost and CPI based indicators usually move together quite closely suggests that REER-CPIs may be adequate indicators of competitiveness for non-industrial countries. Thus, the ULC-based indicators reported in this paper could be used in conjunction with the current CPI-based ones, as a check on the validity of CPI indicators and for purposes of longer-run analysis.

In the future, it would be desirable to examine and refine the estimates of unit labor costs. A more timely updating of country data would be desirable, but progress on this front may be limited by reporting lags at the national level. It is hoped that the results reported in this paper will stimulate discussion of these issues and stimulate efforts to assess and promote the quality of the unit labor cost data.

Figure 1. Effective Exchange Rates: Selected Industrial Countries[1]
(1990 = 100; logarithmic scale)

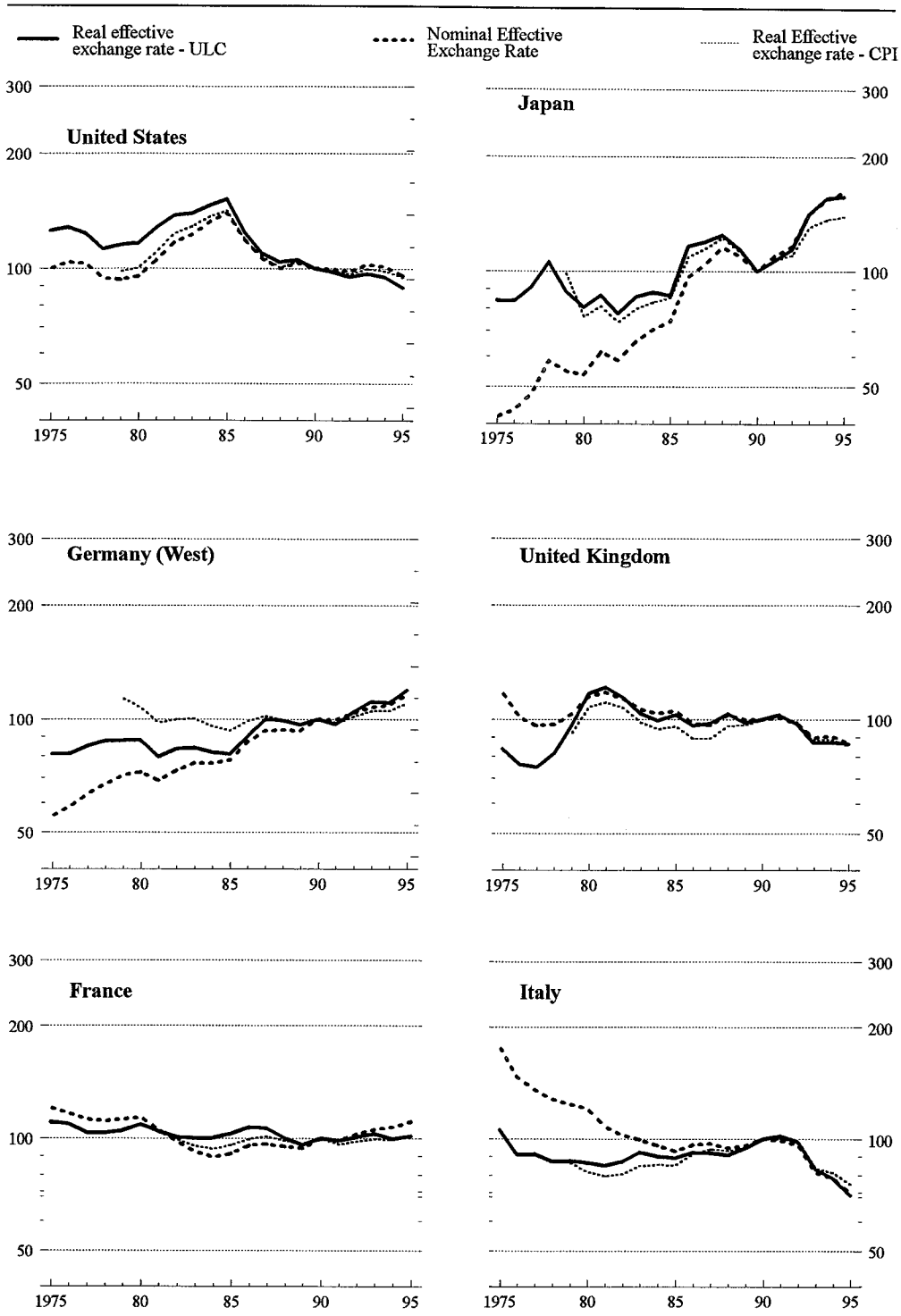


Figure 1 (*continued*)
(1990 = 100; logarithmic scale)

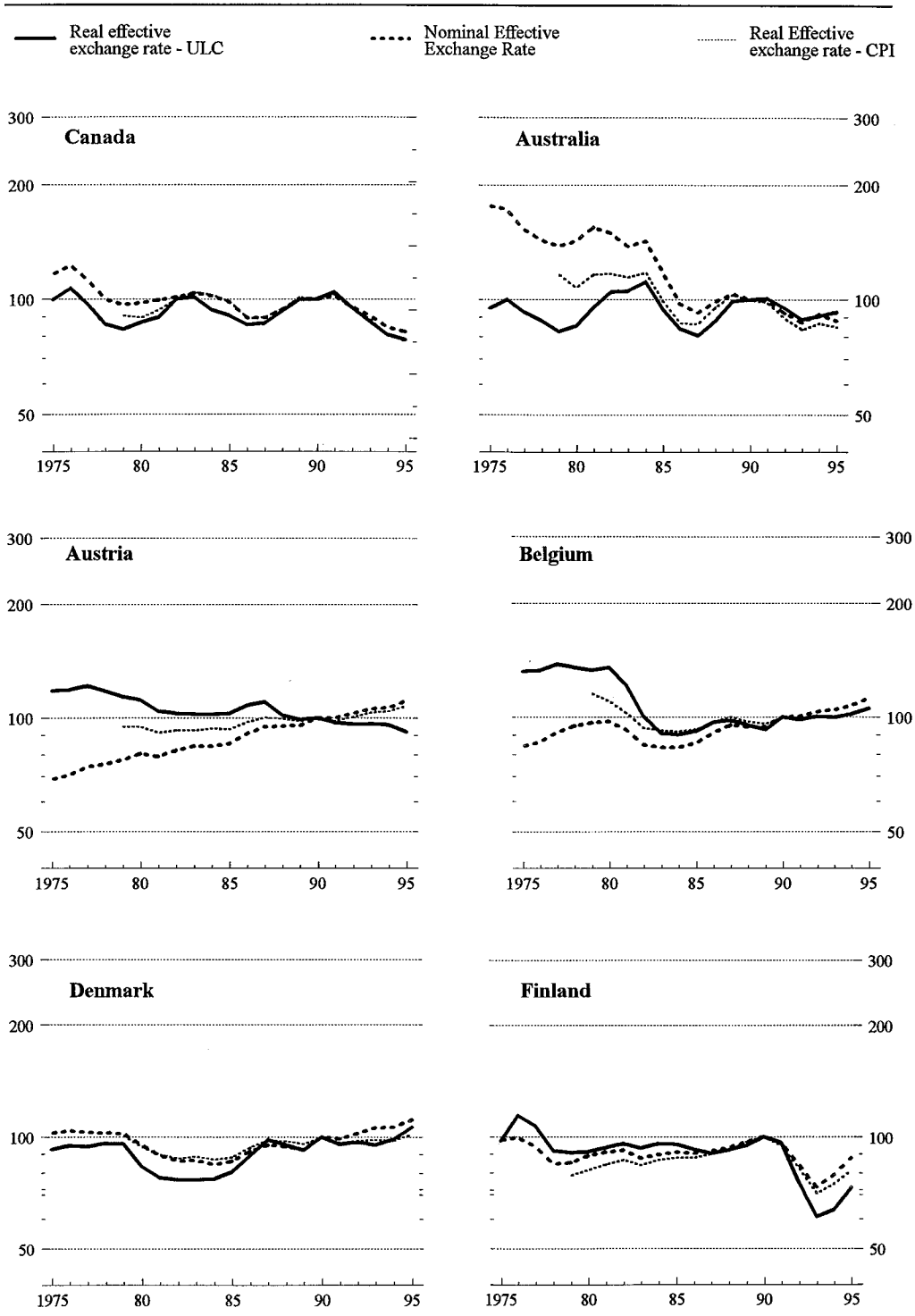


Figure 1 (*continued*)
(1990 = 100; logarithmic scale)

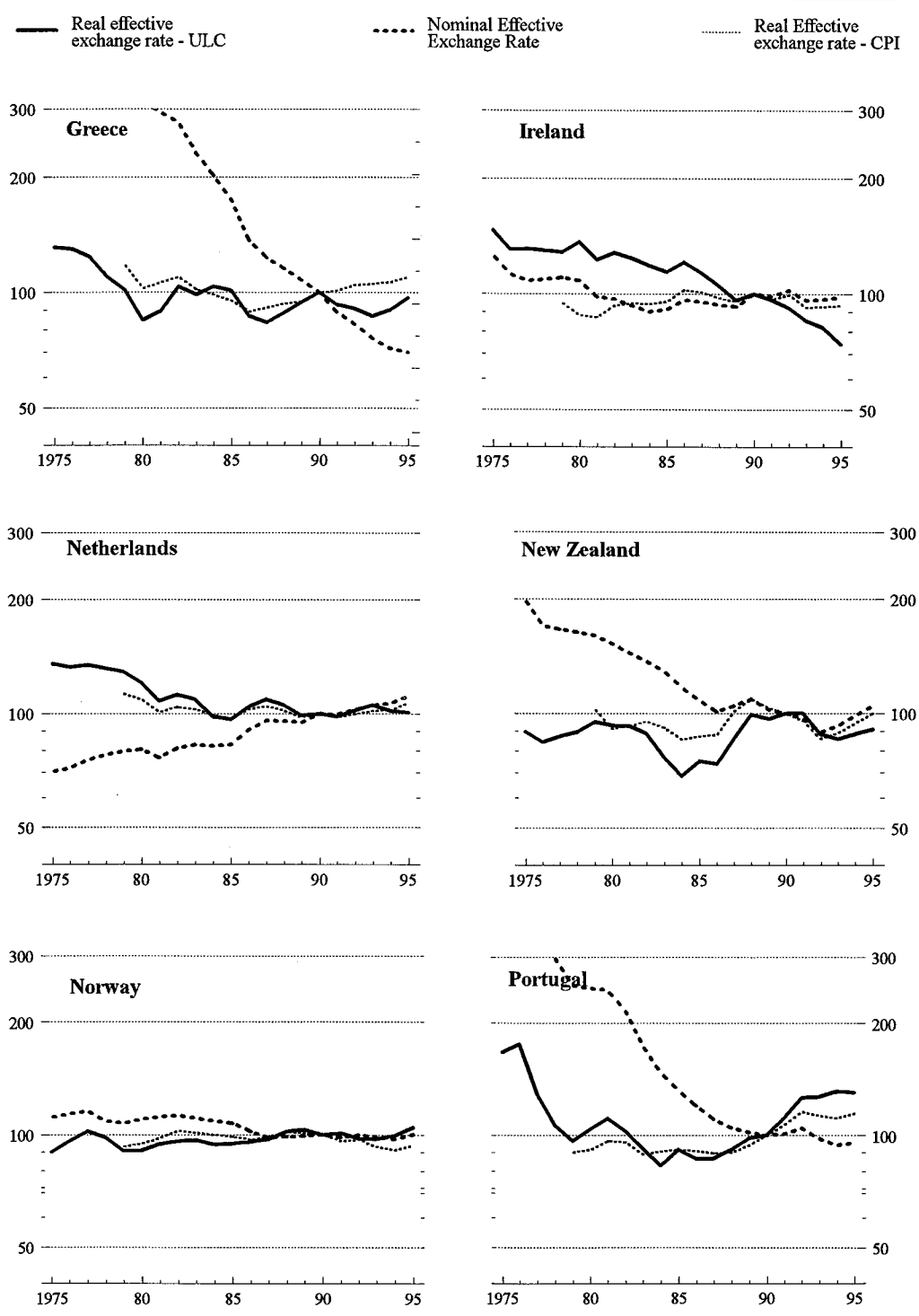
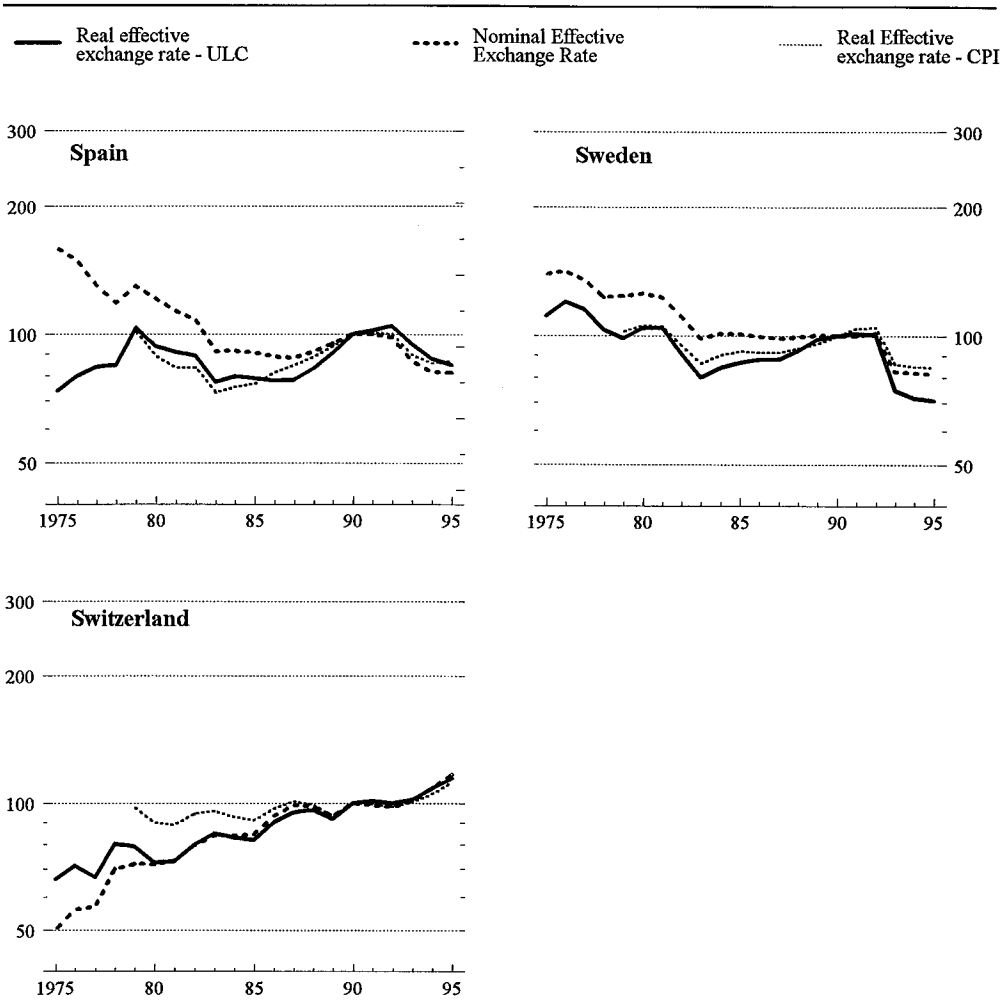


Figure 1 (*concluded*)
(1990 = 100; logarithmic scale)



Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Figure 2. Effective Exchange Rates: Selected Western Hemisphere Countries[1]

(1990 = 100; logarithmic scale)

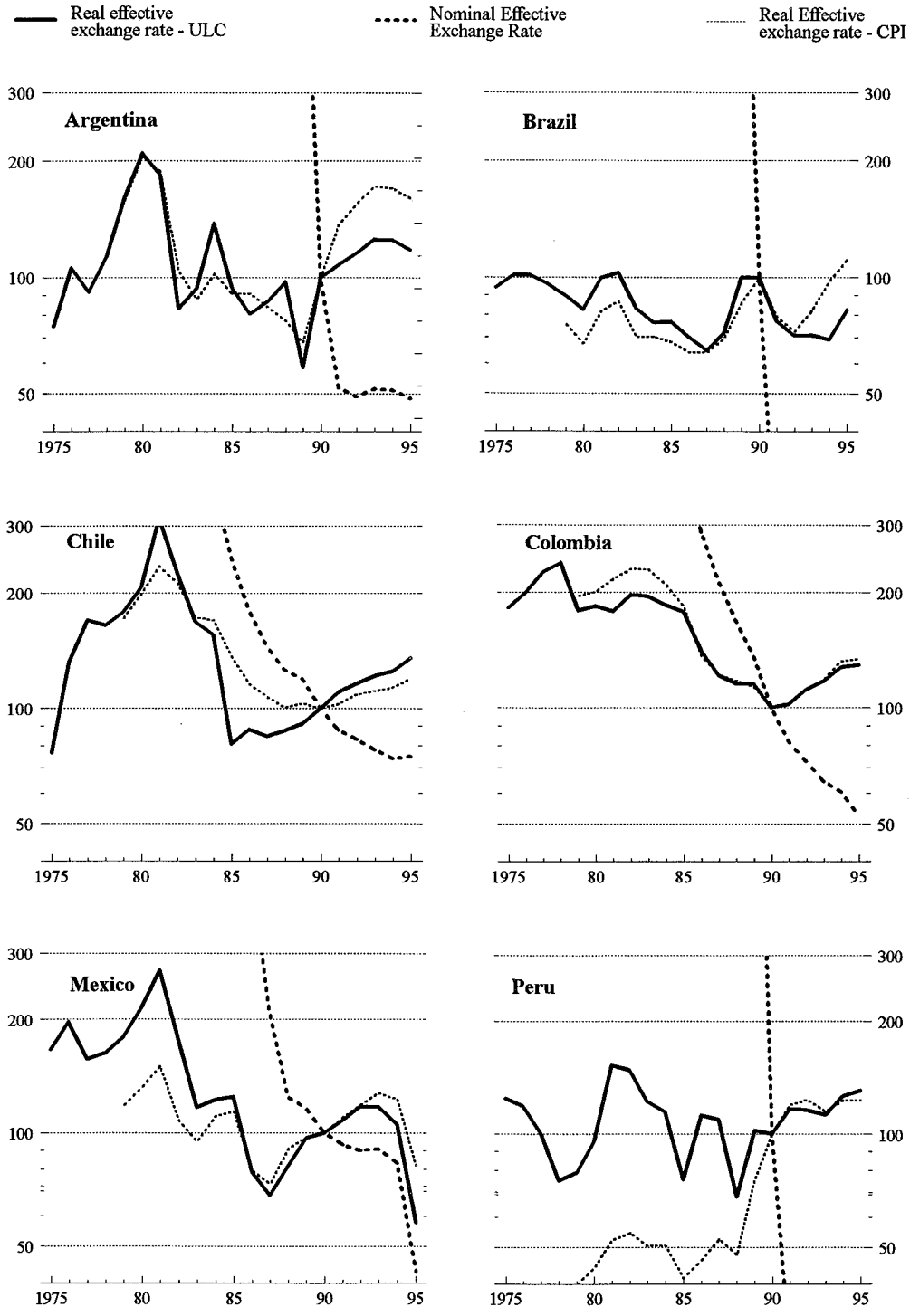
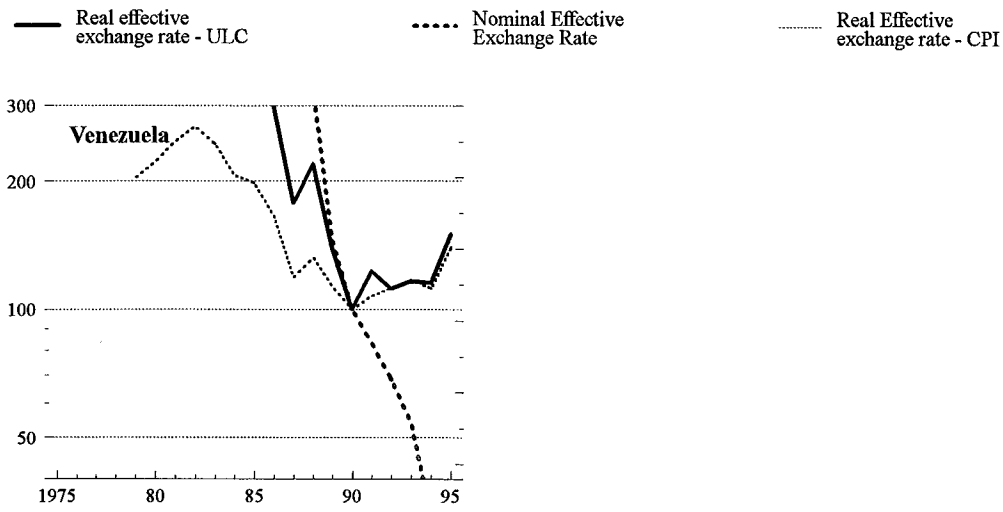


Figure 2 (*concluded*)
(1990 = 100; logarithmic scale)



Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Figure 3. Effective Exchange Rates: Selected Asian Countries[1]
(1990 = 100; logarithmic scale)

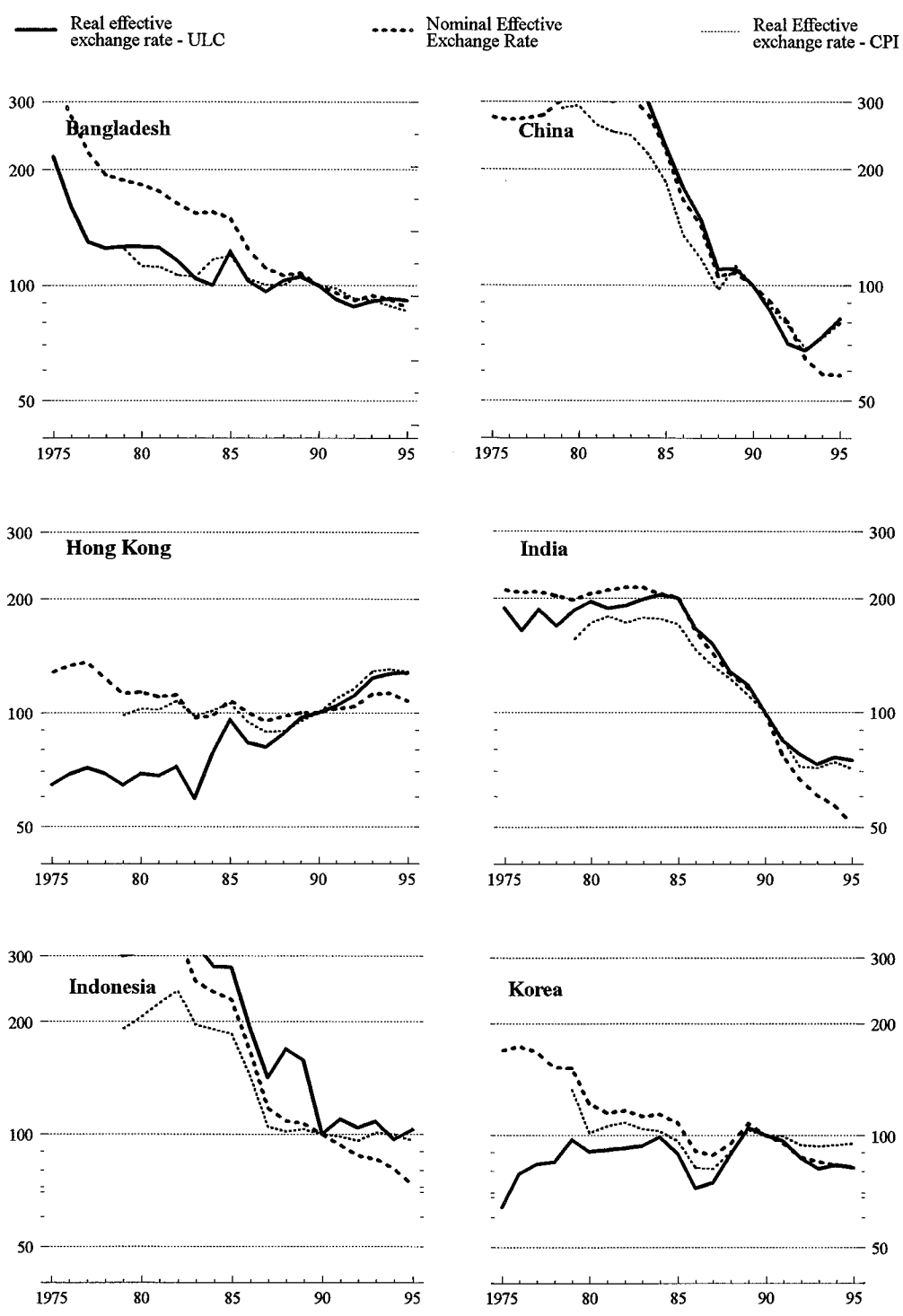
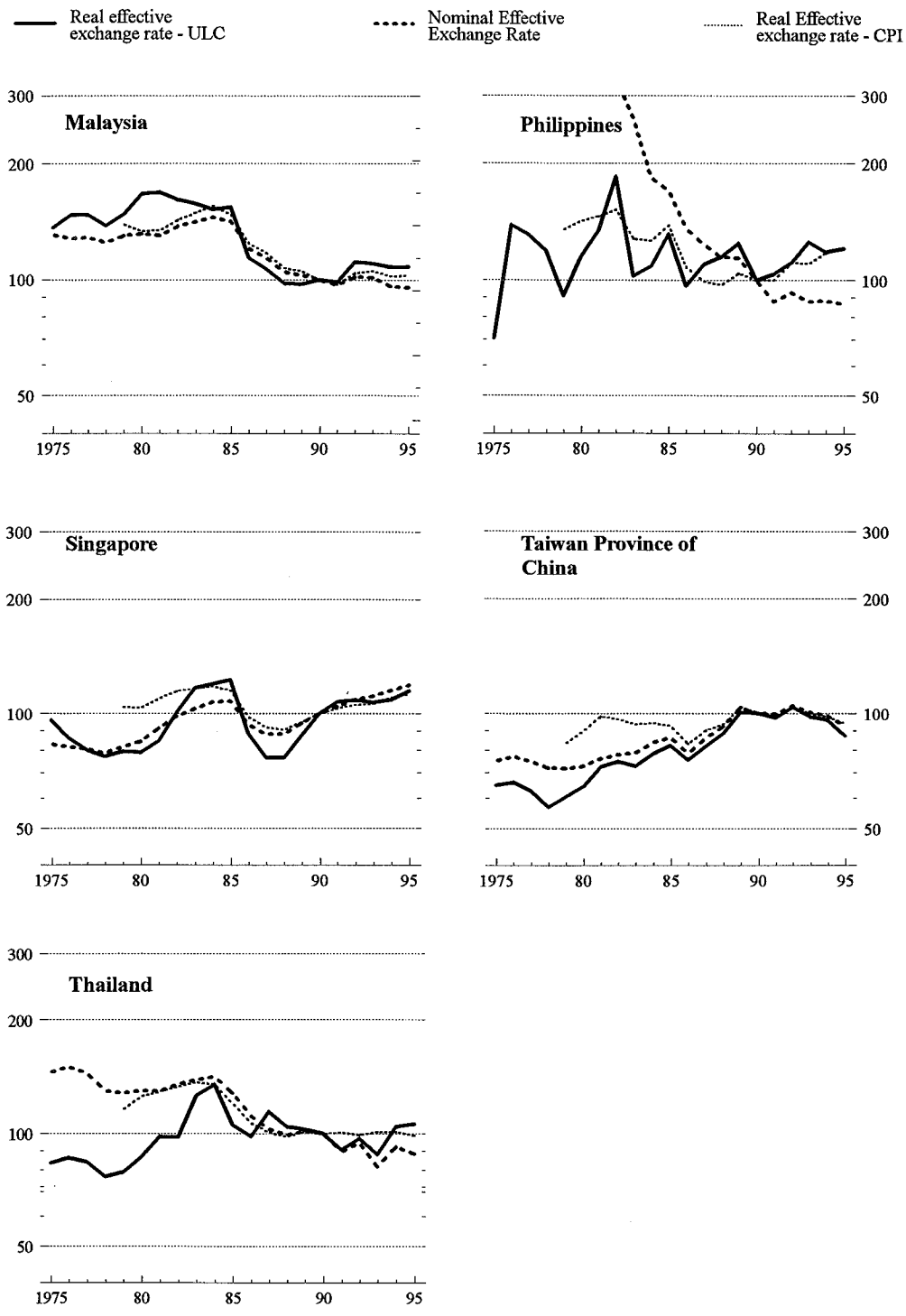


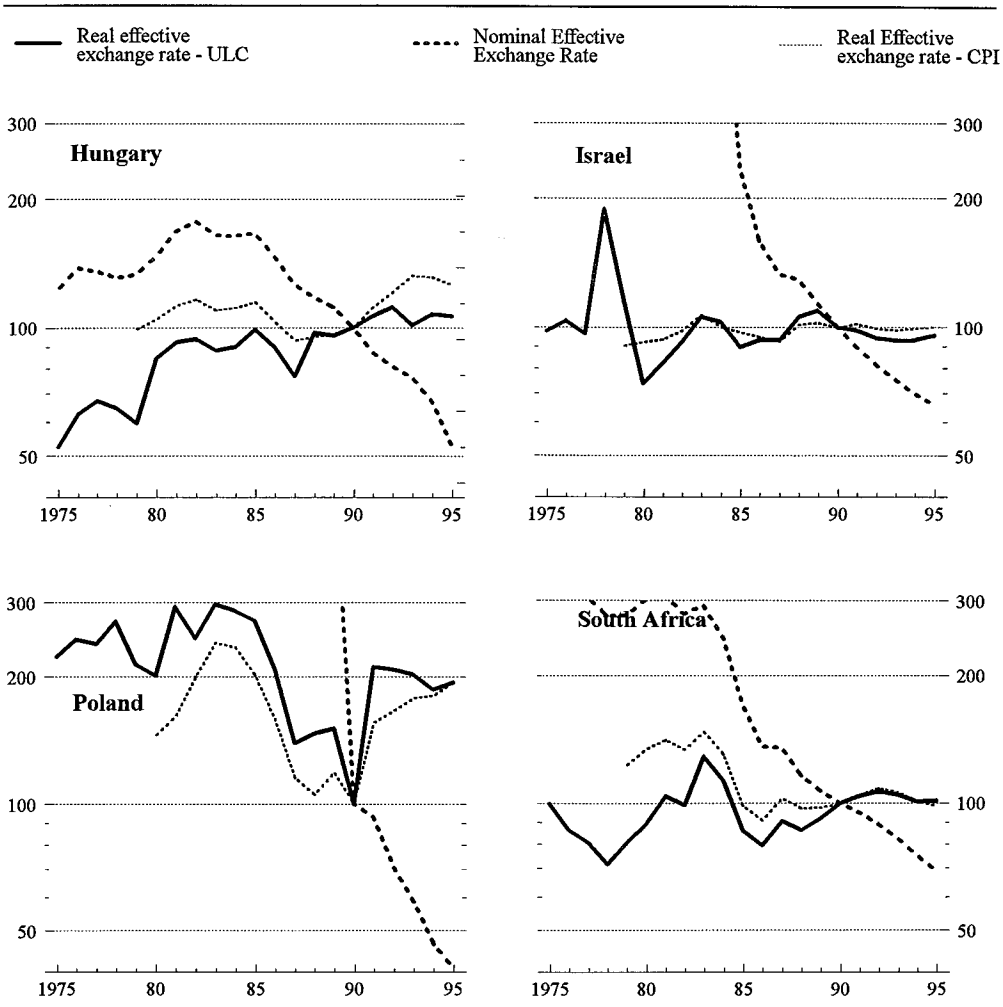
Figure 3 (*concluded*)
(1990 = 100; logarithmic scale)



Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Figure 4. Effective Exchange Rates: Selected Other Countries[1]

(1990 = 100; logarithmic scale)

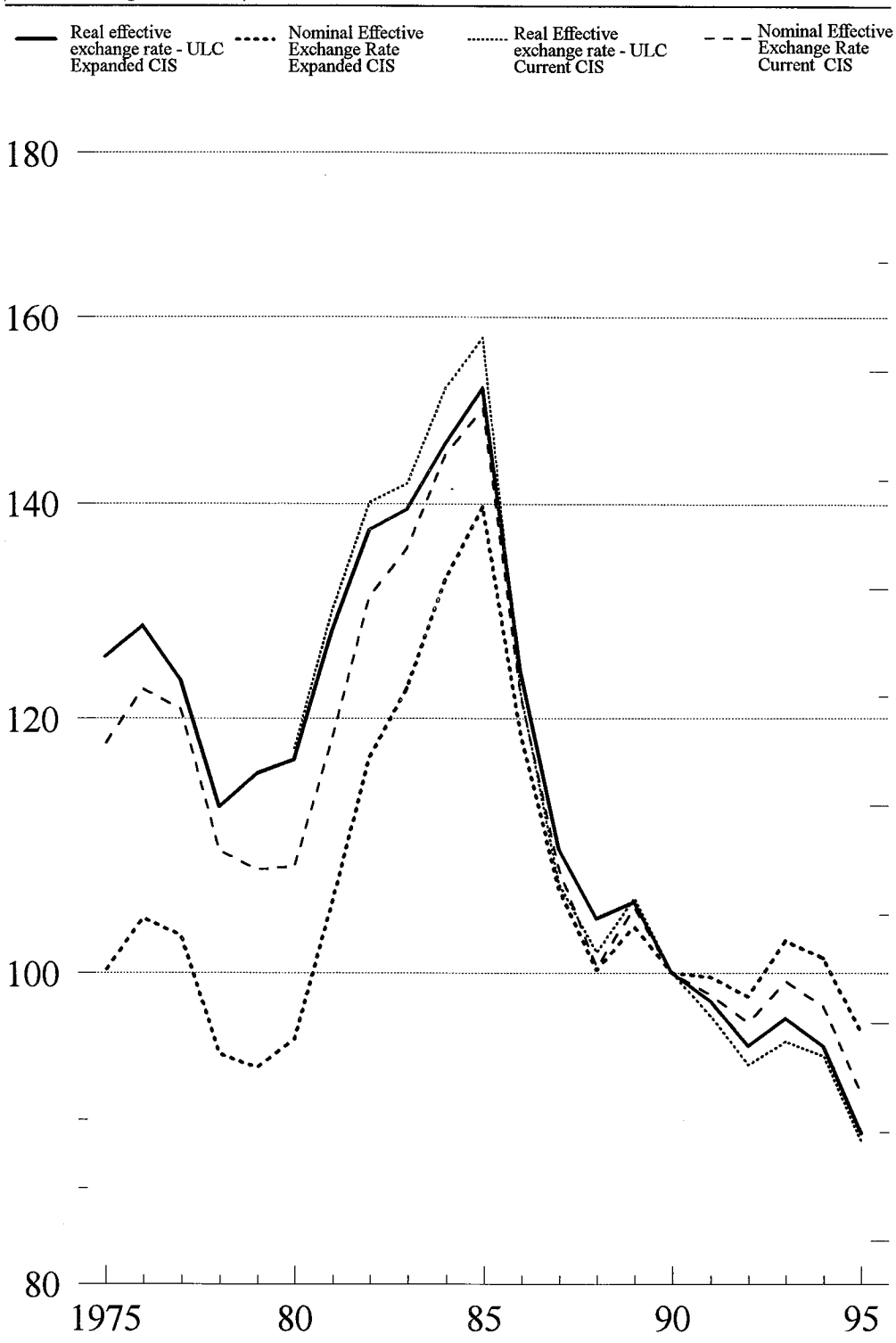


Sources: IMF, *Expanded Competitiveness Indicators System.*

[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Figure 5. Comparison of Effective Exchange Rate Estimates: United States[1]

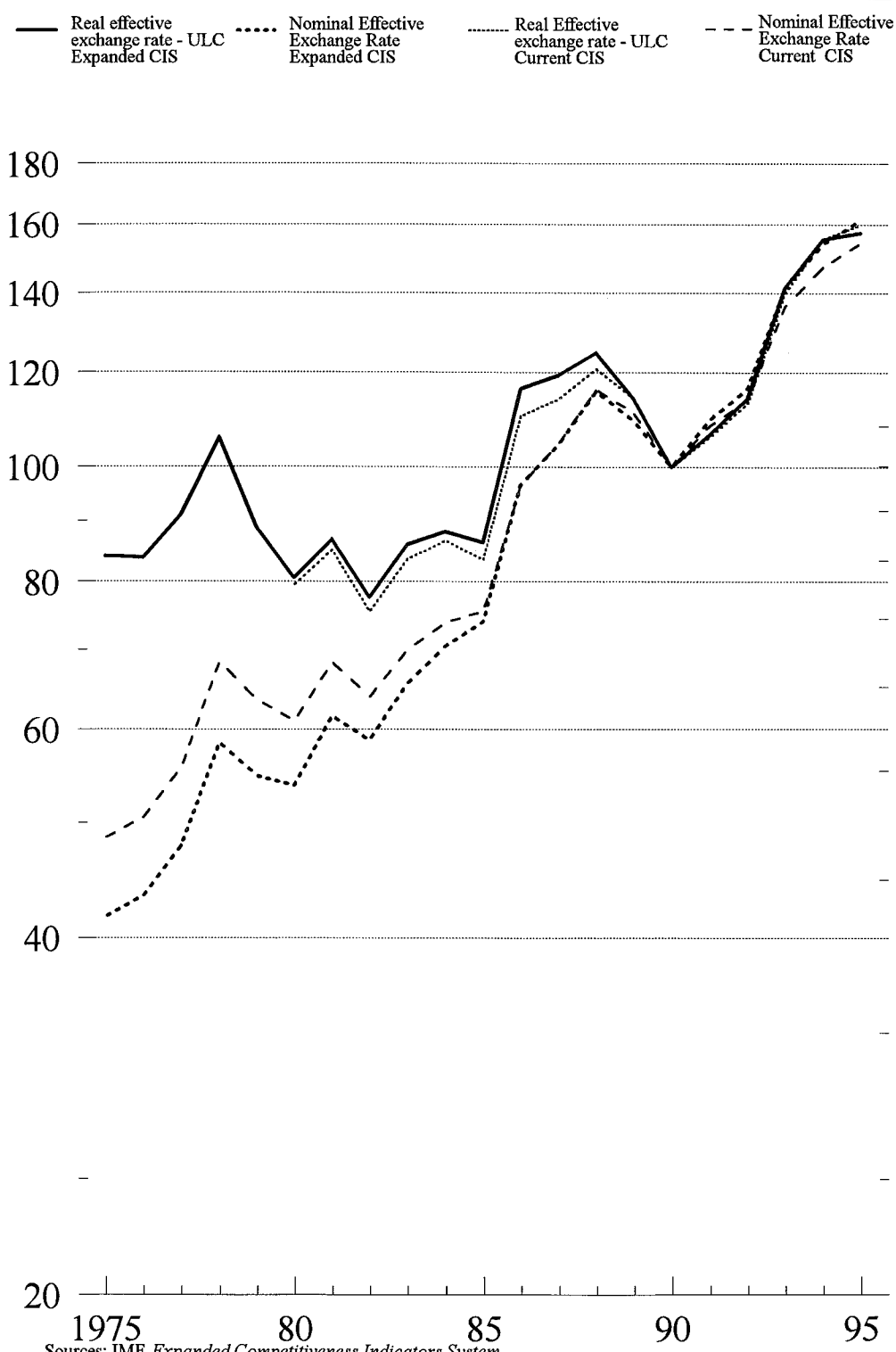
(1990 = 100; logarithmic scale)



Sources: IMF, *Expanded Competitiveness Indicators System.*

[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

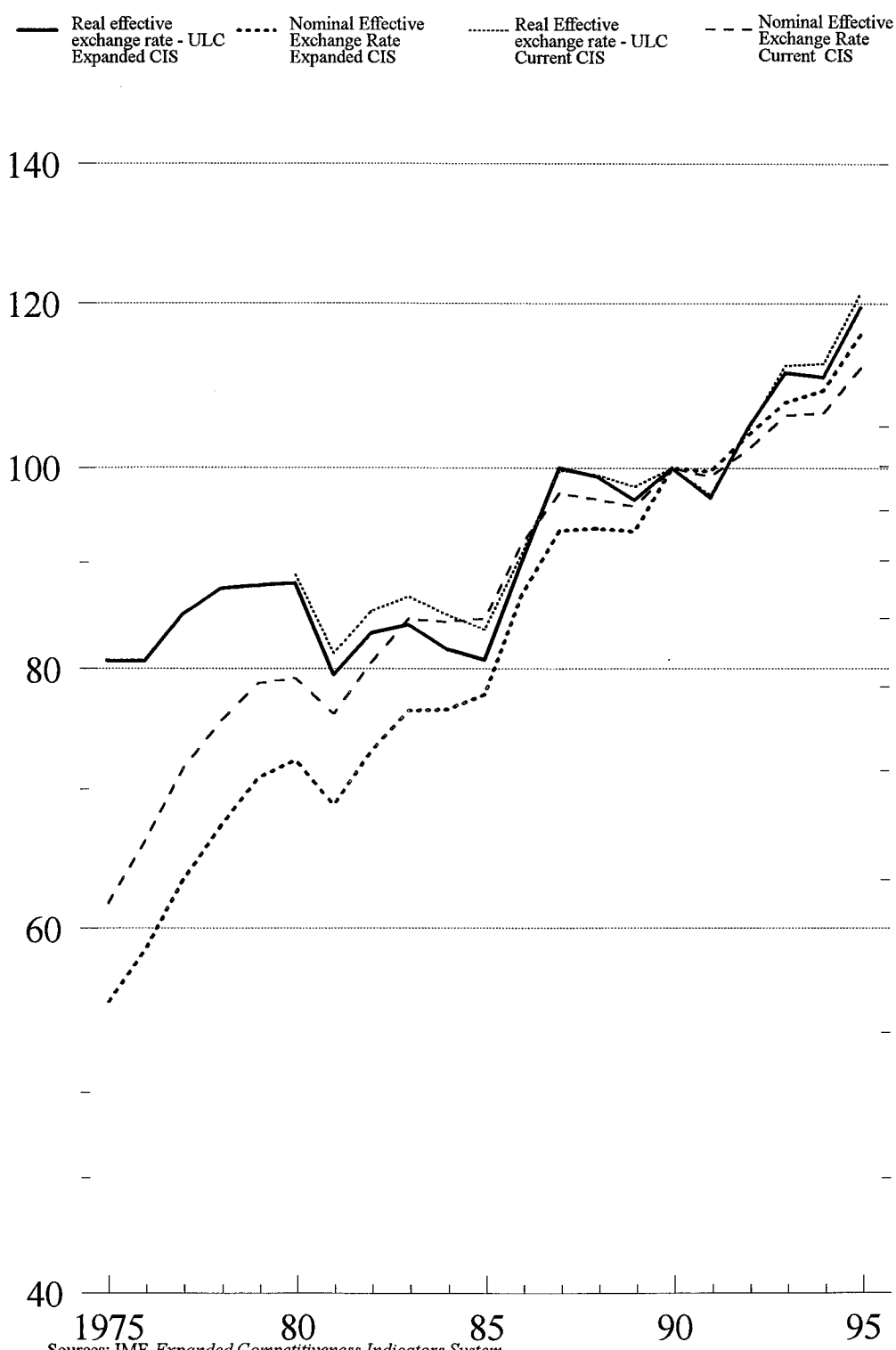
Figure 6. Comparison of Effective Exchange Rate Estimates: Japan[1]
(1990 = 100; logarithmic scale)



Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Figure 7. Comparison of Effective Exchange Rate Estimates: Germany (West)[1]

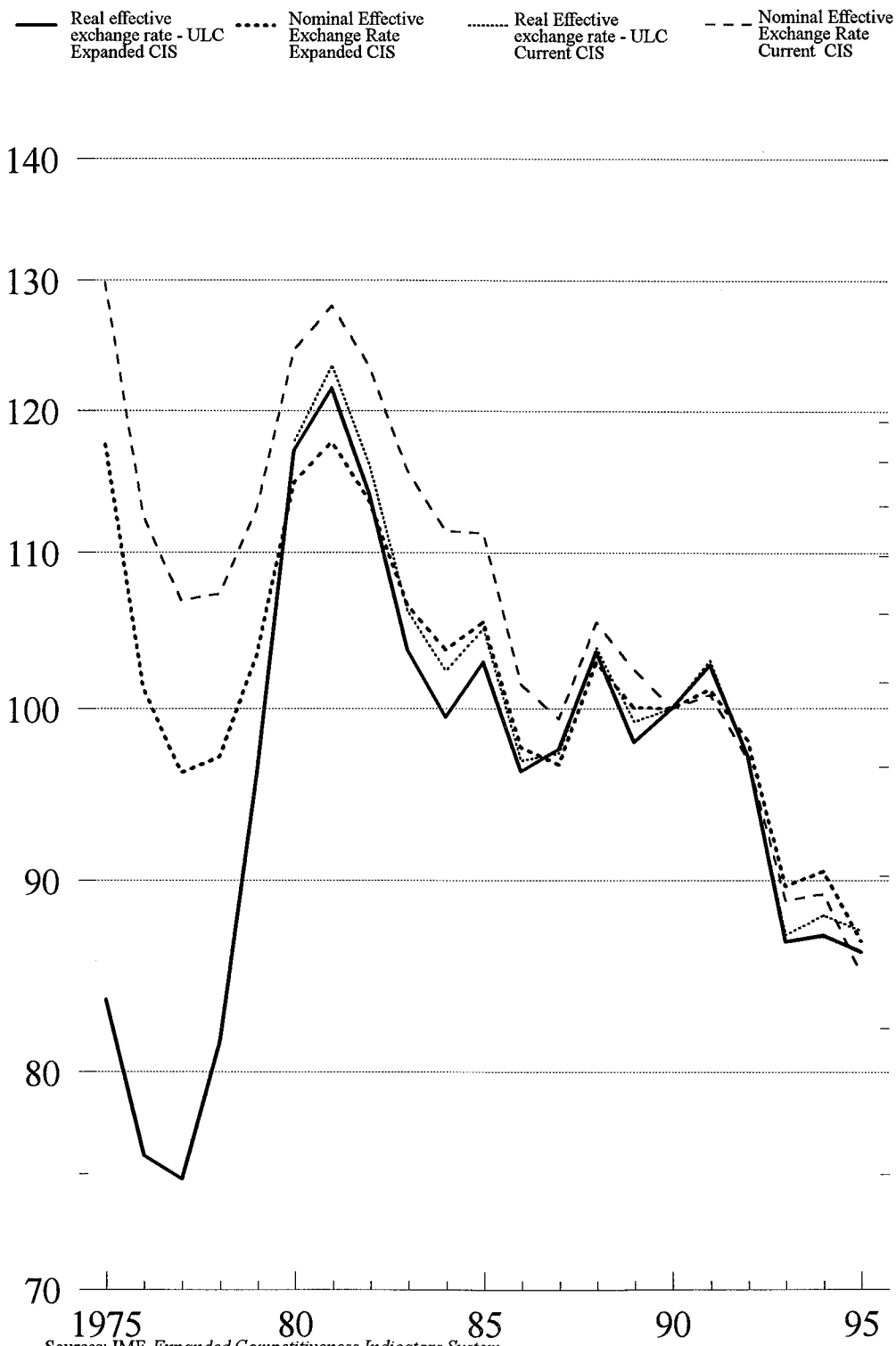
(1990 = 100; logarithmic scale)



Sources: IMF, *Expanded Competitiveness Indicators System.*

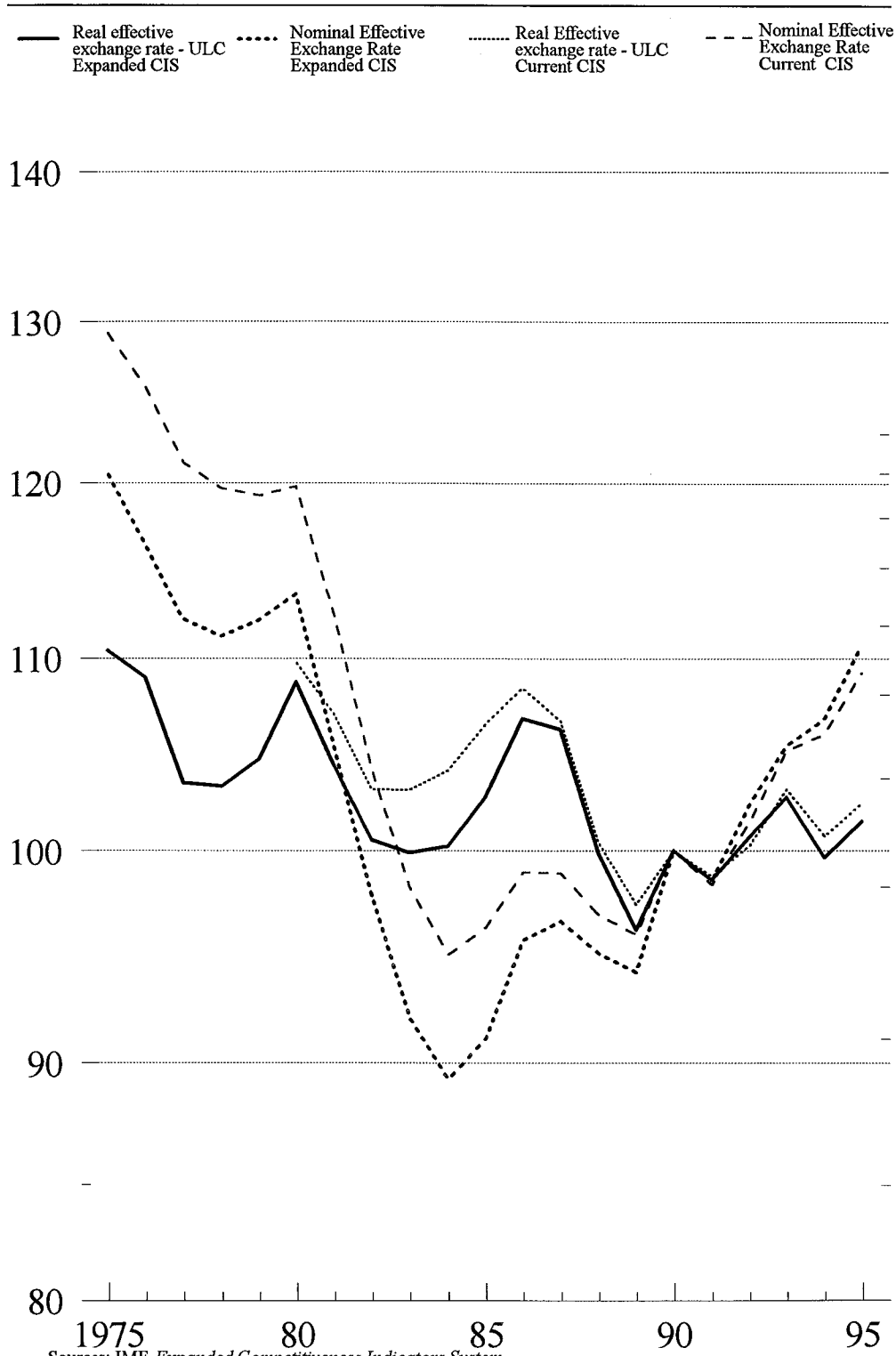
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Figure 8. Comparison of Effective Exchange Rate Estimates: United Kingdom[1]
(1990 = 100; logarithmic scale)



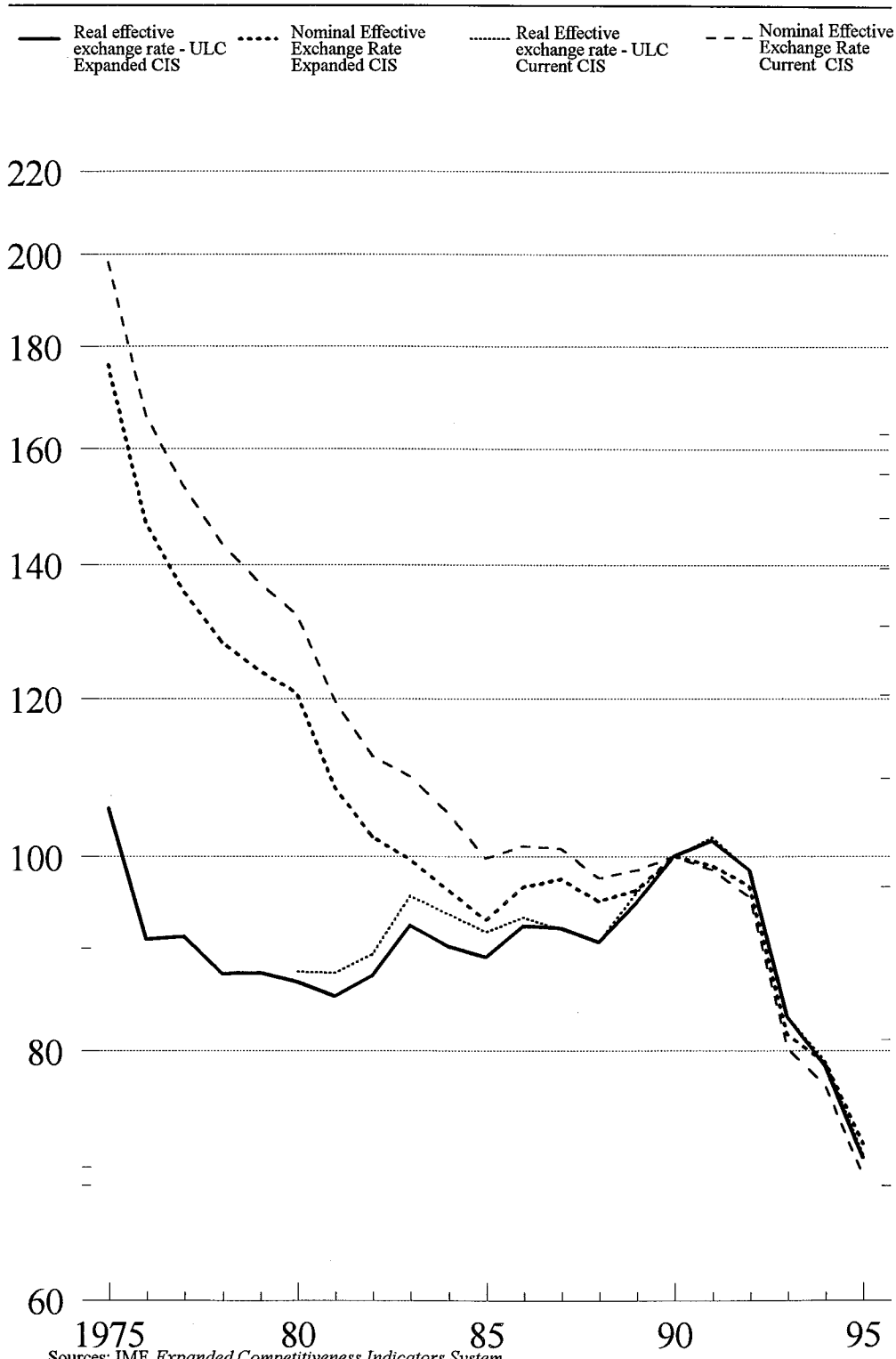
Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Figure 9. Comparison of Effective Exchange Rate Estimates: France[1]
(1990 = 100; logarithmic scale)



Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

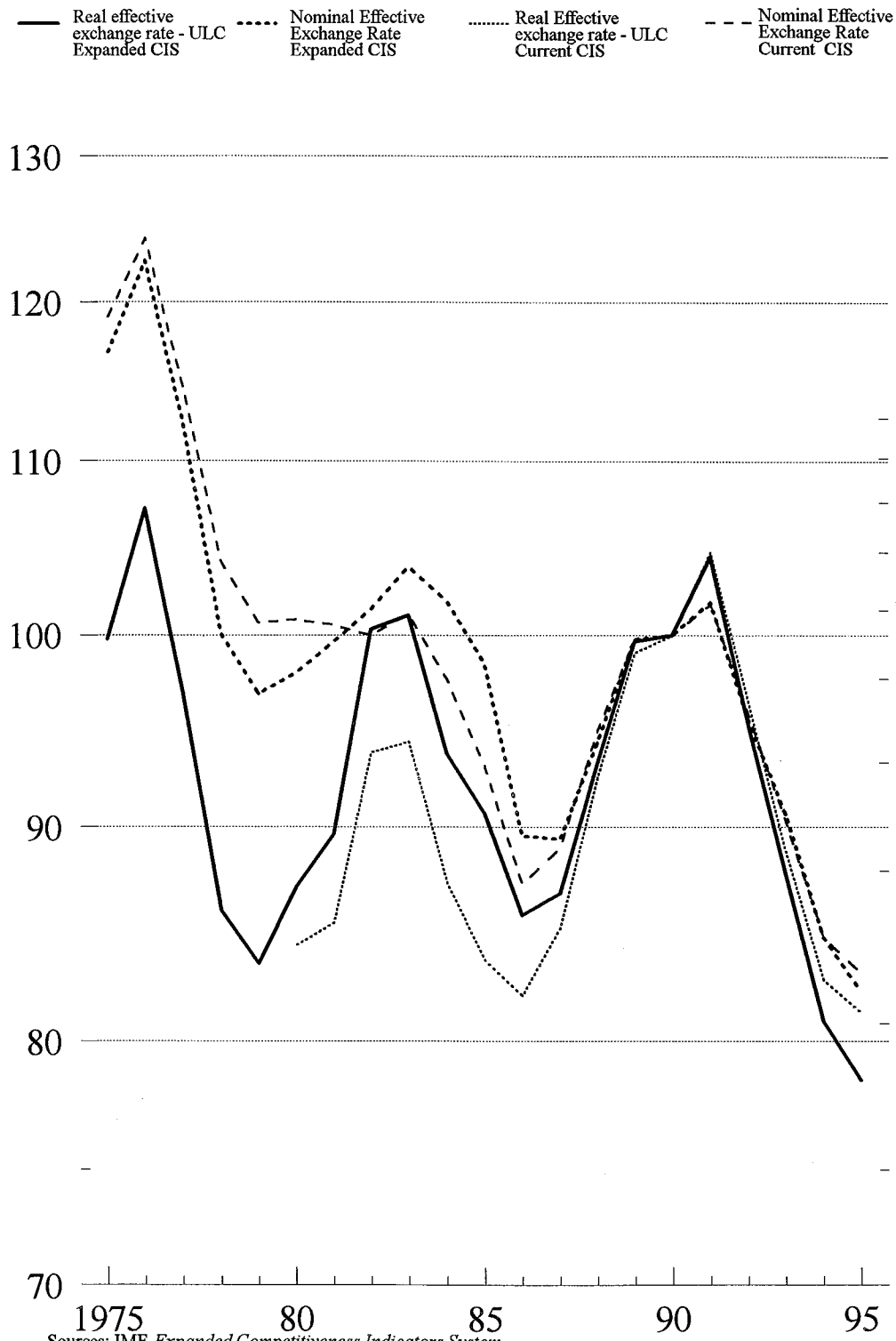
Figure 10. Comparison of Effective Exchange Rate Estimates: Italy[1]
(1990 = 100; logarithmic scale)



Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Figure 11. Comparison of Effective Exchange Rate Estimates: Canada[1]

(1990 = 100; logarithmic scale)



Sources: IMF, *Expanded Competitiveness Indicators System.*

[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

NOTES ON UNIT LABOR COST DATA FOR NON-INDUSTRIAL COUNTRIES

Table A1 lists the source of the unit labor cost data for each country and the time period for which this source is applicable. As noted in Section II, the main source is the UNIDO INSTAT database. The other sources are the Bureau of Labor Statistics (BLS), and the IMF World Economic Outlook database, the IMF Asian Department and IMF country desks. When unit labor cost data was not available for some years, we spliced the series with the CPIs from the World Economic Outlook database.[14] For data obtained from the UNIDO INSTAT database, a deflator for nominal value added was needed. The preferred deflator is the manufacturing value added deflator, which was available in most cases. Where the latter was not available we chose in the following order of descending preference: industry value added deflator , wholesale price index (WPI) , and GDP deflator. These deflators are all obtained from World Bank statistical data (STARS). Alternate deflators were used for Chile (1989-1995 WPI), Colombia (1994-95 WPI), Hong Kong (GDP), Hungary (1970-1983 WPI, 1983-95 Industry), Peru (WPI), Poland (1979-1983 WPI, 1983-1993 Industry).

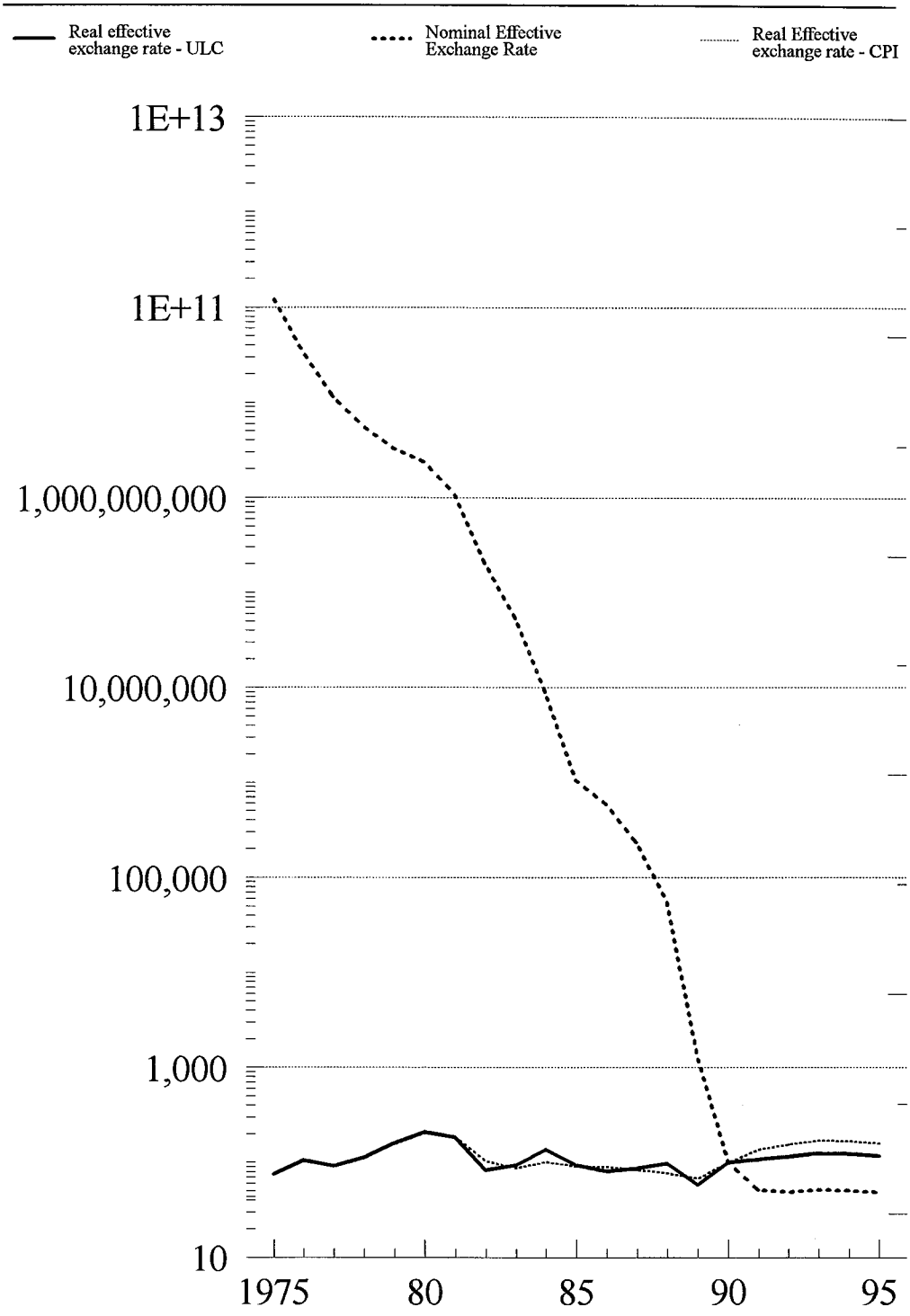
[14]For a few industrial countries, CPIs were also used to backdate unit labor costs (Australia 1975-1977, Greece 1975-1979 and New Zealand 1975-1977).

Table A1. Sources for Unit Labor Cost Data for Non-industrial Countries

Country	Source	Time Period Covered
Argentina	CPI	1975-1982
	UNIDO	1983-1987
	WEO	1990-1995
Bangladesh	CPI	1975-1979
	IMF Asian Dept.	1980-1991
	CPI	1992-1995
Brazil	CPI	1975-1982
	UNIDO	1983-1987
	WEO	1990-1995
Chile	UNIDO	1975-1995
China	CPI	1975-1983
	IMF Asian Dept. 1/	1984-1993
	CPI	1994-1995
Colombia	UNIDO	1975-1981
	WEO	1982-1995
Hong Kong	UNIDO	1975-1993
	CPI	1994-1995
Hungary	UNIDO	1975-1995
India	UNIDO	1975-1993
	CPI	1994-1995
Indonesia	UNIDO	1975-1995
Israel	CPI	1975-1977
	WEO	1979-1995
Korea	BLS	1975-1995
Malaysia	UNIDO	1975-1995
Mexico	Mexican Central Bank	1975-1995
Peru	CPI	1975-1978
	UNIDO	1979-1992
	CPI	1993-1995
Philippines	UNIDO	1975-1995
Poland	UNIDO	1975-1991
	IMF Country Desk	1992-1995
Singapore	UNIDO	1975-1995
South Africa	UNIDO	1975-1995
Taiwan	BLS	1975-1995
Thailand	CPI	1975-1979
	IMF Asian Dept.	1985-1994
	CPI	1995
Turkey	UNIDO	1970-1994
	CPI	1995
Venezuela	UNIDO	1970-1993
	CPI	1994-1995

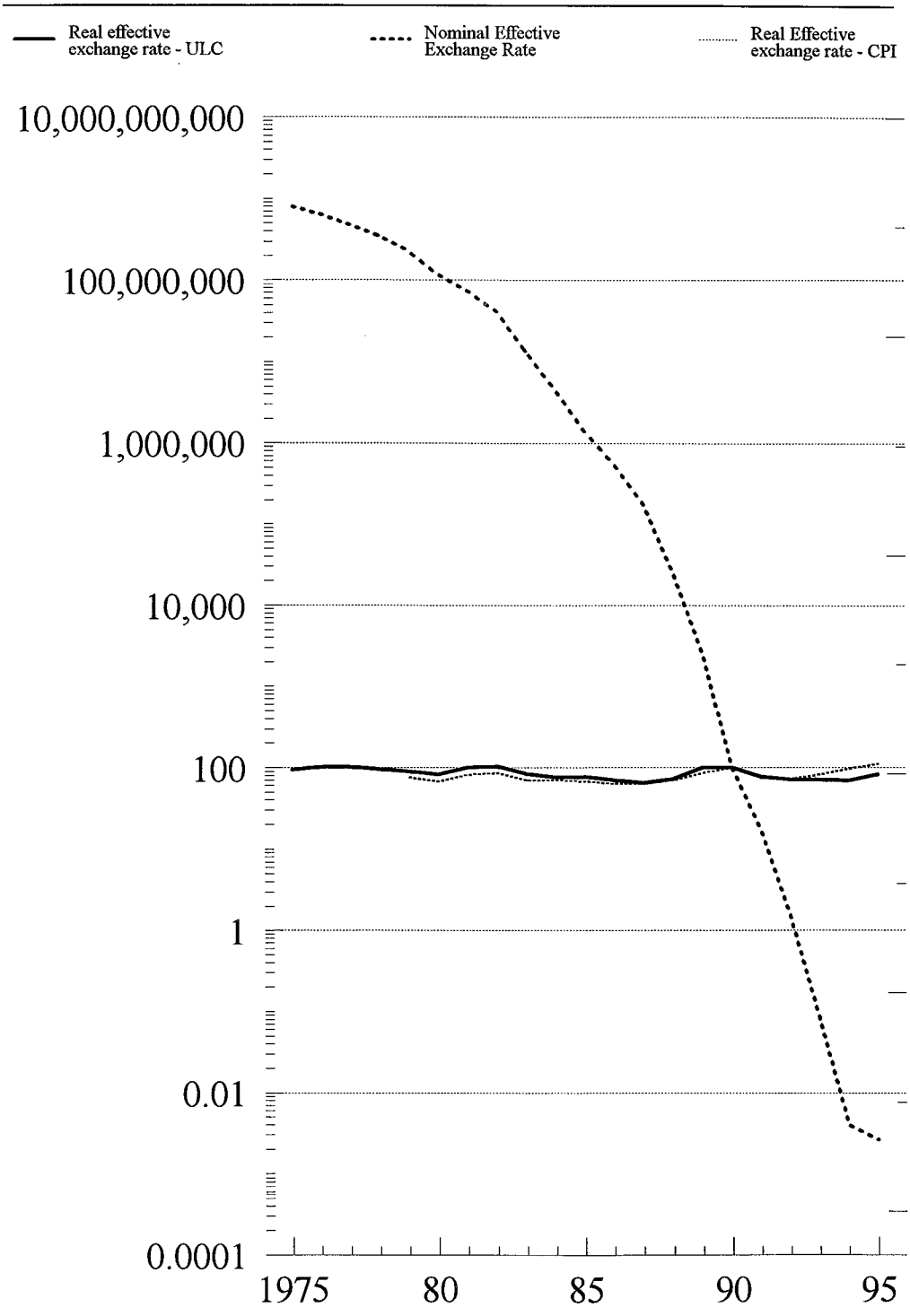
1/ Compensation and employment from Asian Dept. and Industrial Production from IMF *International Financial Statistics.*

Appendix Figure 1. Effective Exchange Rates: Argentina[1]
(1990 = 100; logarithmic scale)



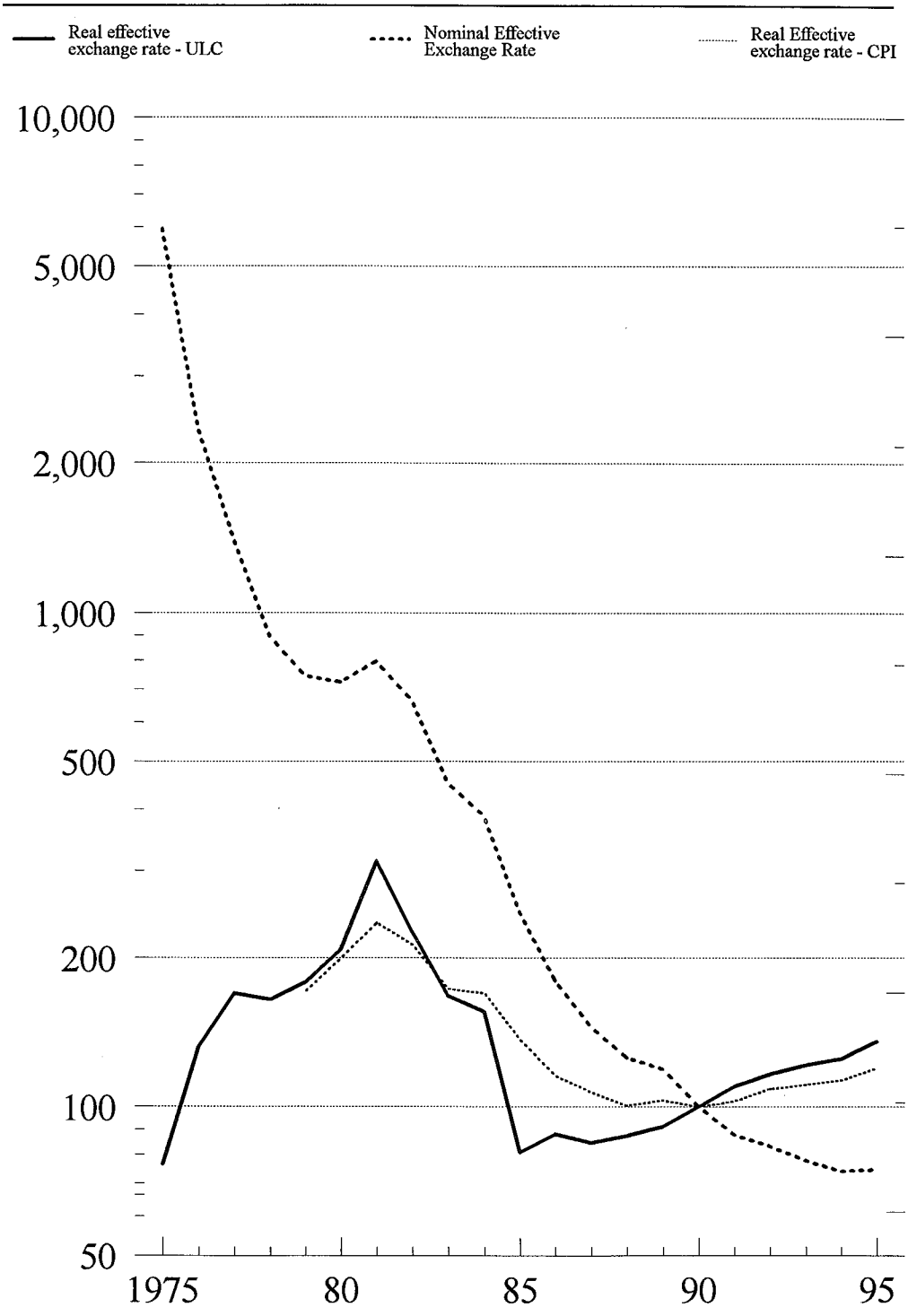
Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Appendix Figure 2. Effective Exchange Rates: Brazil[1]
(1990 = 100; logarithmic scale)



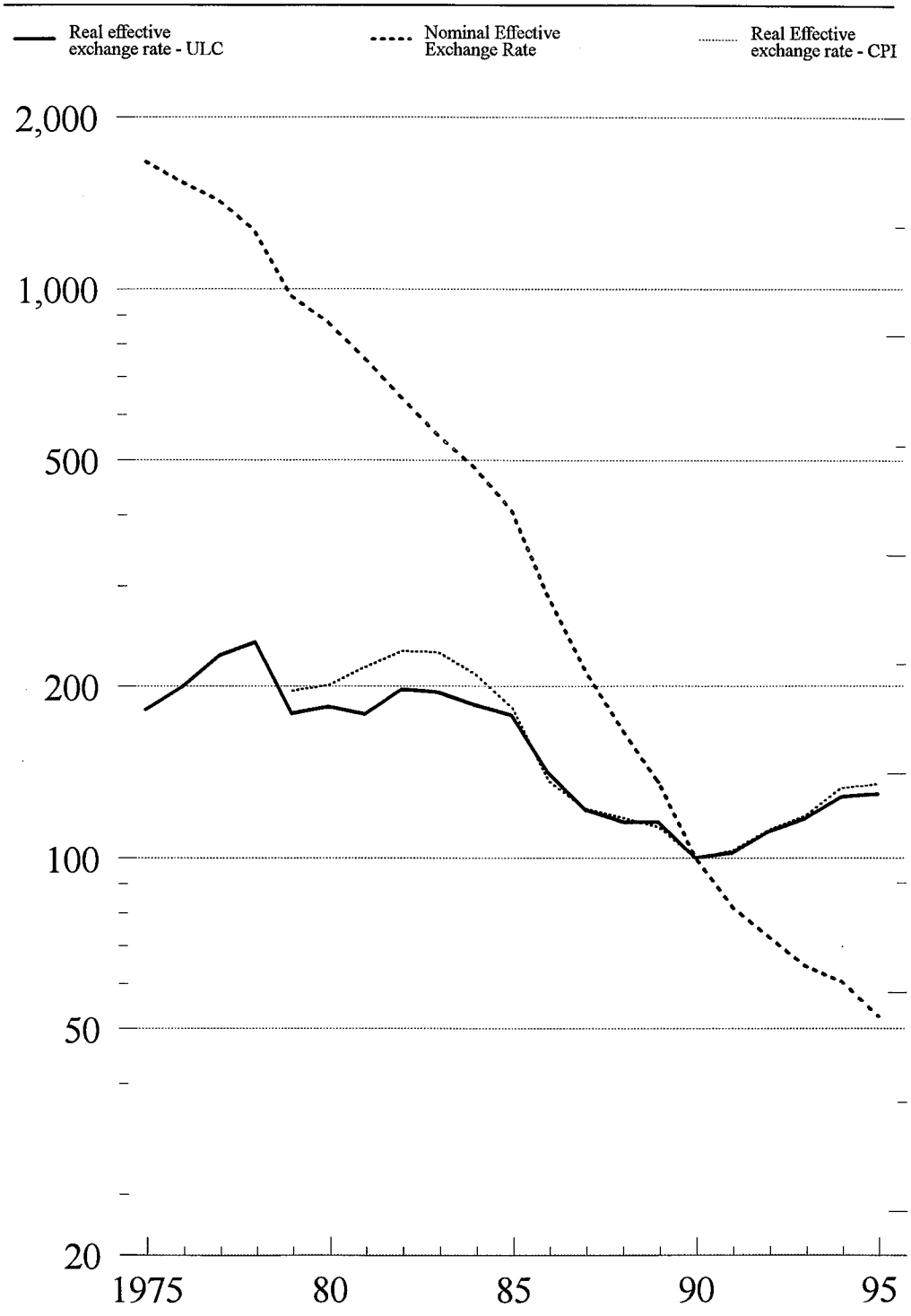
Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Appendix Figure 3. Effective Exchange Rates: Chile[1]
(1990 = 100; logarithmic scale)



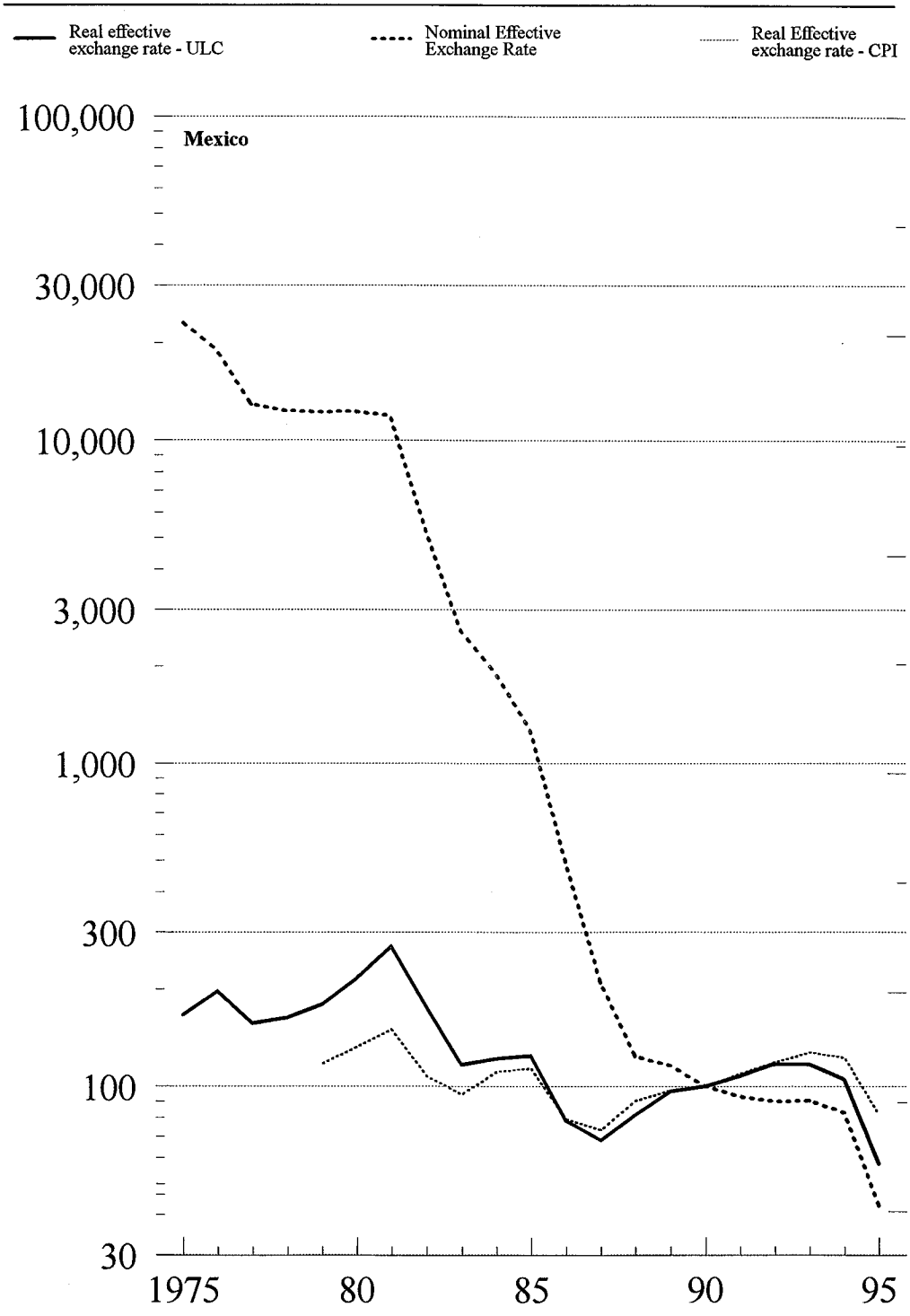
Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Appendix Figure 4. Effective Exchange Rates: Columbia[1]
(1990 = 100; logarithmic scale)



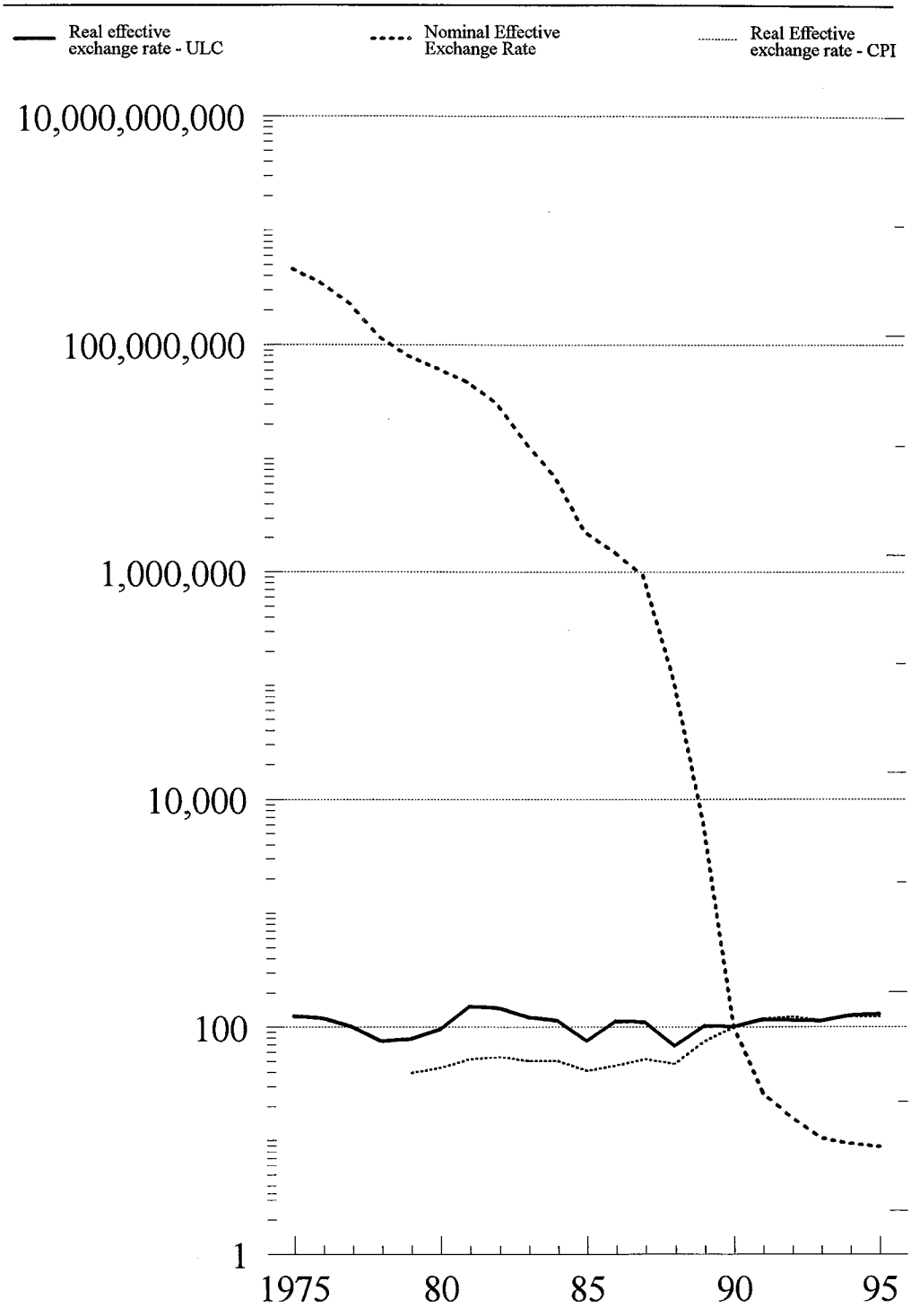
Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Appendix Figure 5. Effective Exchange Rates: Mexico[1]
(1990 = 100; logarithmic scale)



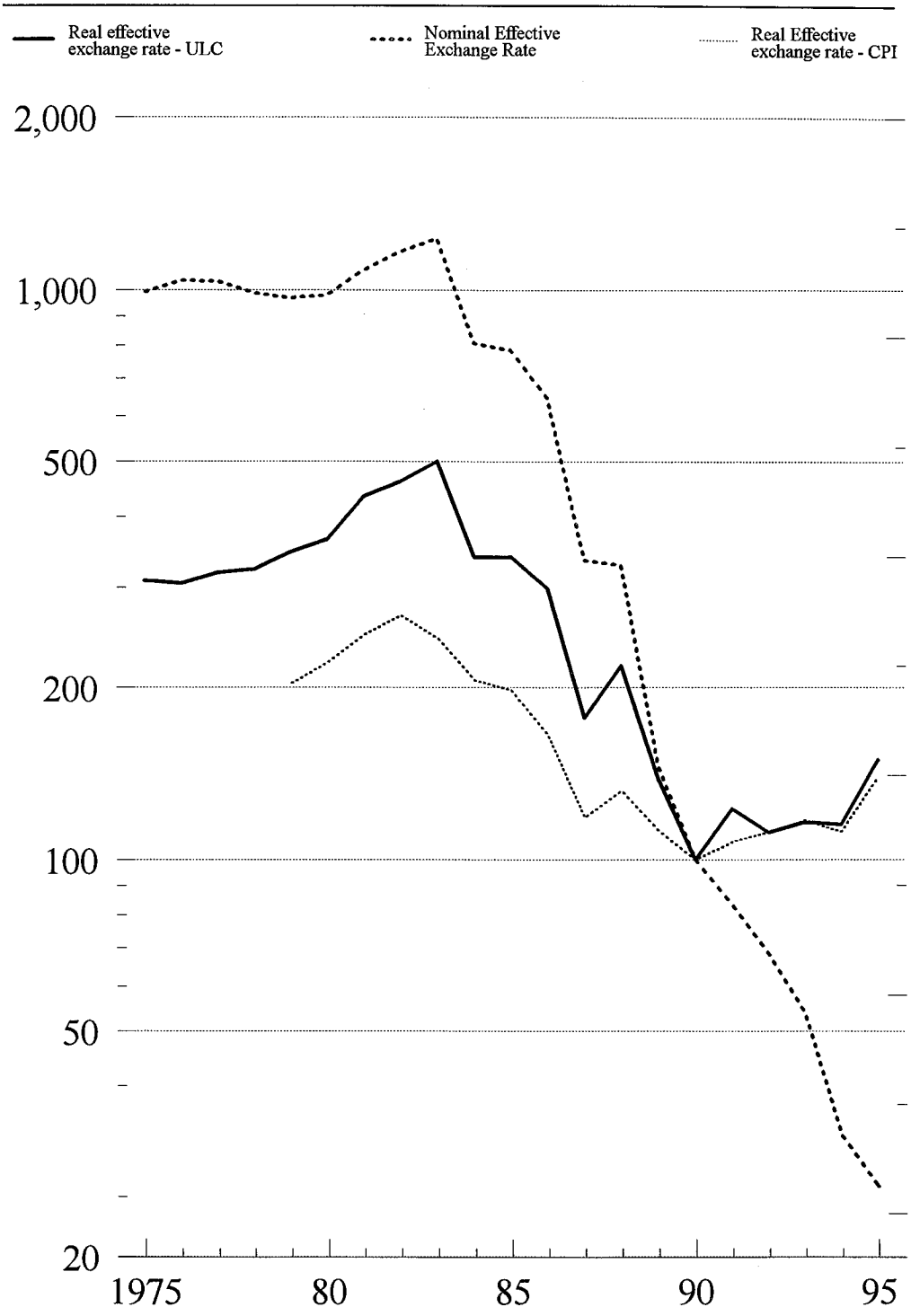
Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Appendix Figure 6. Effective Exchange Rates: Peru[1]
(1990 = 100; logarithmic scale)



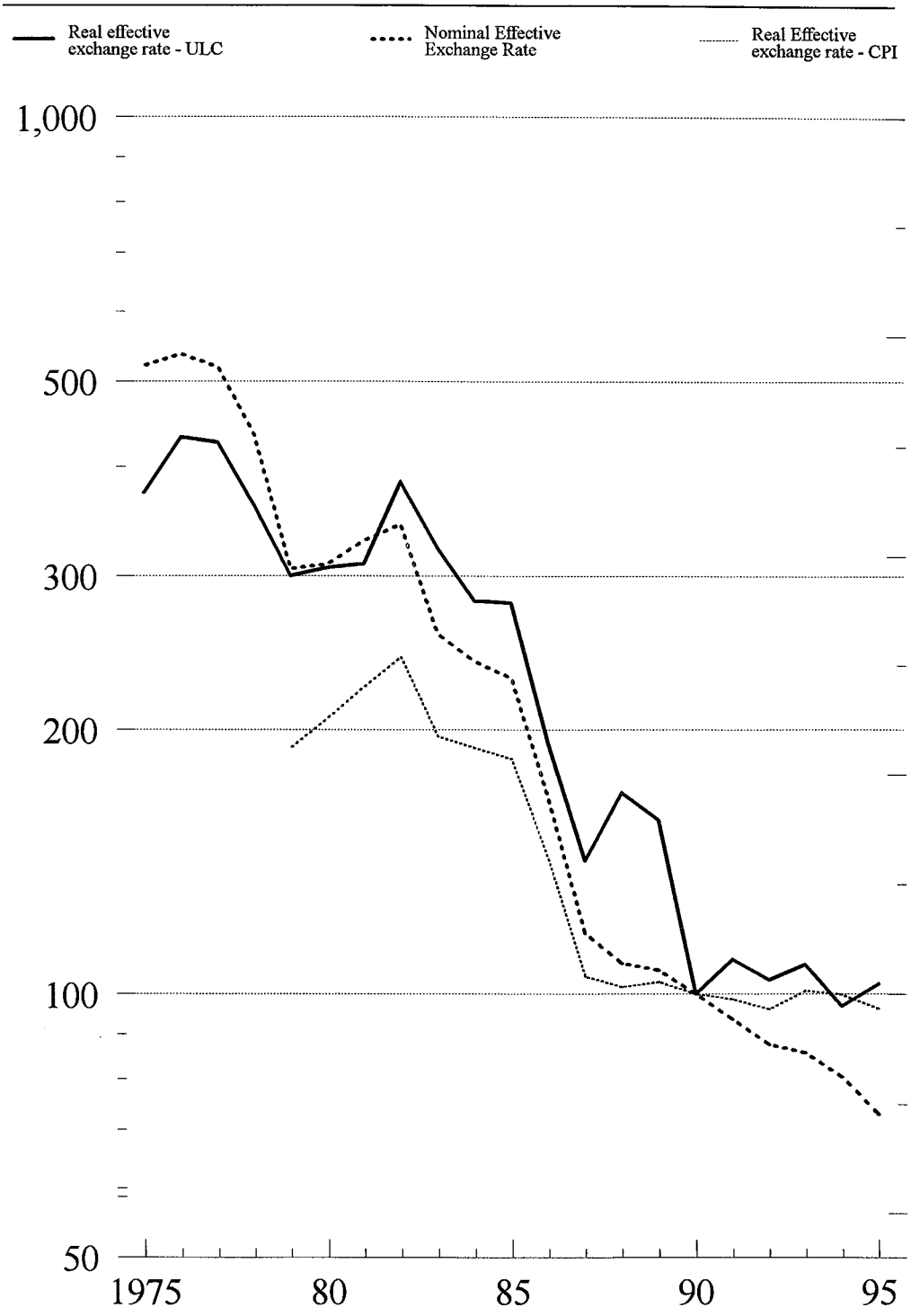
Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Appendix Figure 7. Effective Exchange Rates: Venezuela[1]
(1990 = 100; logarithmic scale)



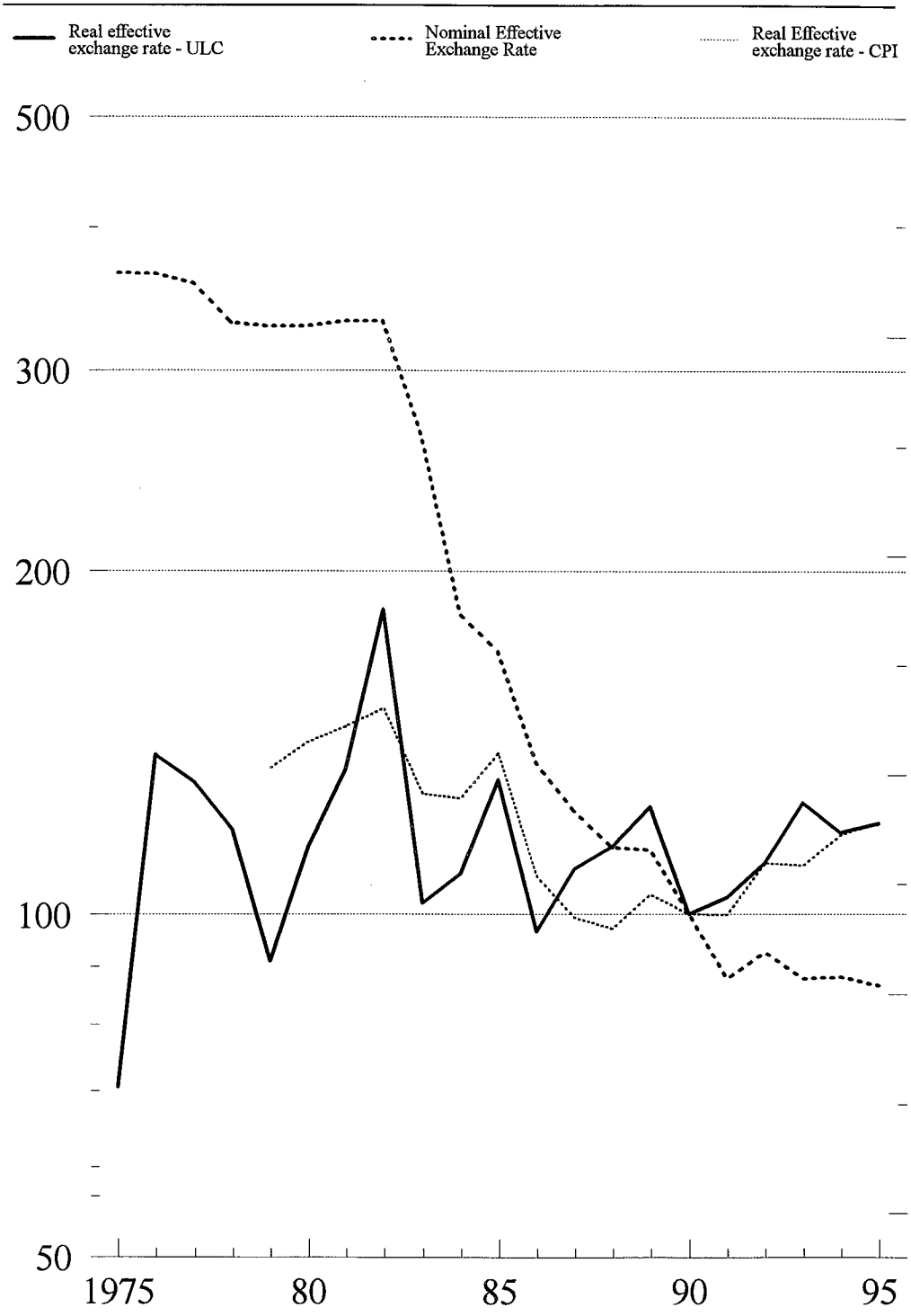
Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Appendix Figure 8. Effective Exchange Rates: Indonesia[1]
(1990 = 100; logarithmic scale)



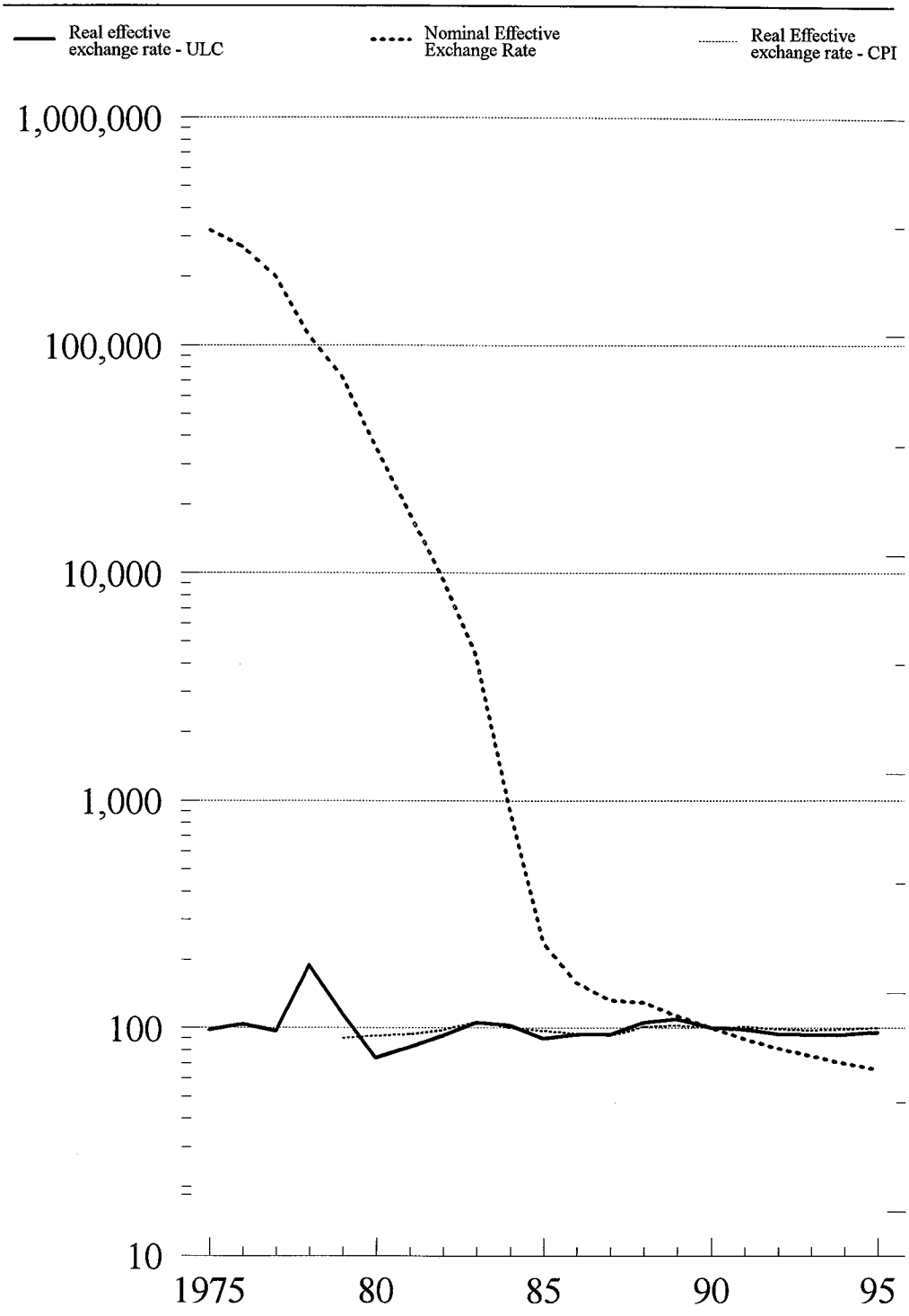
Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Appendix Figure 9. Effective Exchange Rates: Philippines[1]
(1990 = 100; logarithmic scale)



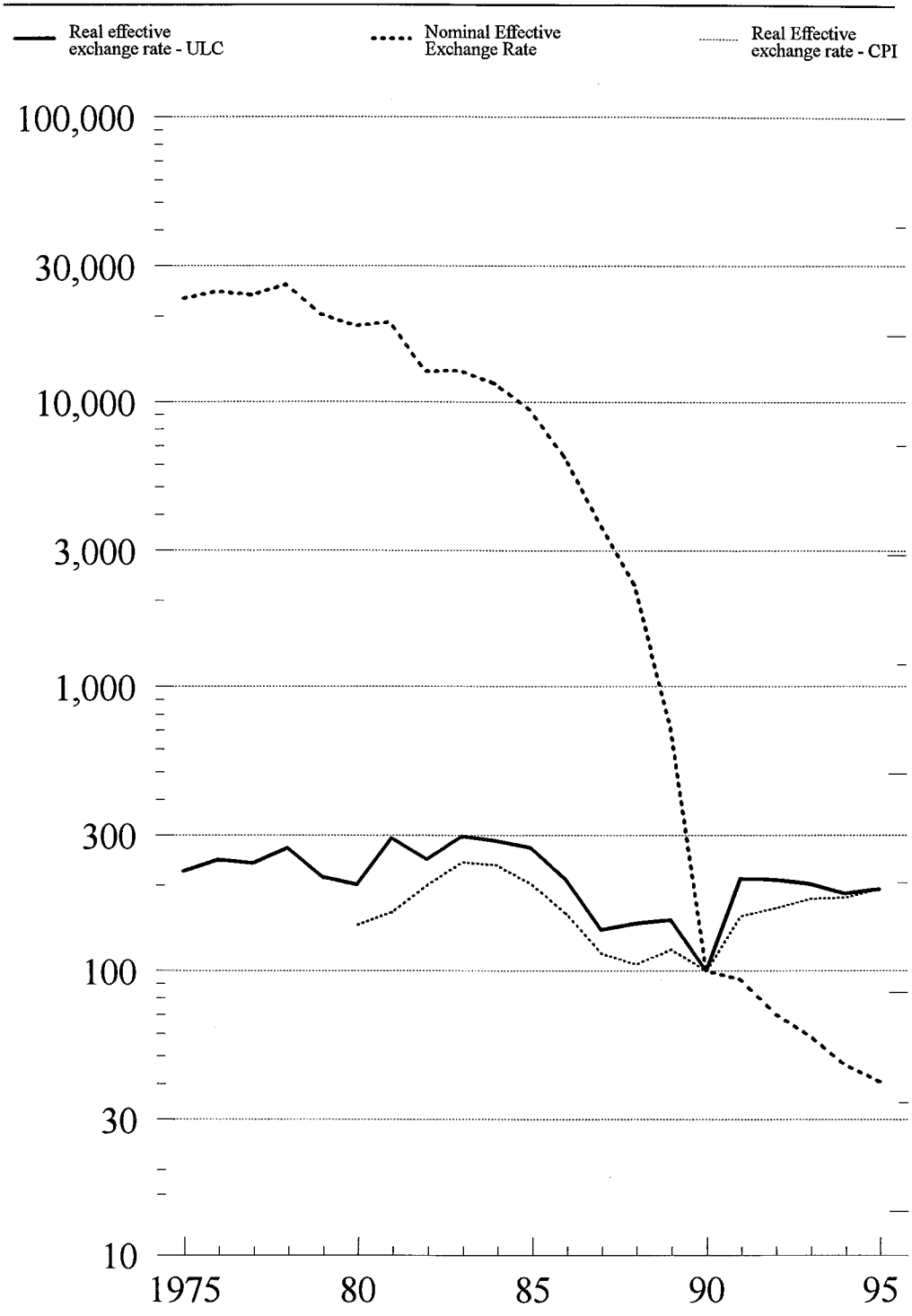
Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Appendix Figure10. Effective Exchange Rates: Israel[1]
(1990 = 100; logarithmic scale)



Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

Appendix Figure 11. Effective Exchange Rates: Poland[1]
(1990 = 100; logarithmic scale)



Sources: IMF, *Expanded Competitiveness Indicators System.*
[1]Constructed using weighting scheme based on disaggregated trade data for manufactured goods covering the three-year period 1988-90.

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