

METHODOLOGICAL ISSUES IN THE CONSTRUCTION OF EFFECTIVE EXCHANGE RATES

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1. INTRODUCTION

This paper is set out to study the adequacy and consistency of exchange rate indices for Ethiopia. There are two definitions of real exchange rate. Balassa (1987) classifies them as "traditional" and "modern" definitions. The traditional approach estimates the nominal effective exchange rate and then deflates it by the relative price movement of a given and a partner country so as to finally get the "pure" exchange rate indicator - the latter is referred to as the real effective exchange rate. The modern version estimates the ratio of price indices of traded and non-traded goods. In the modern version, a simple model is formulated whereby an export demand (foreign) and export supply (domestic) equations are estimated. Similar formulation may be developed for imports. This is what is commonly referred to as the Multilateral Effective Exchange Rate (MEER).

In this study we will consider the traditional definition of exchange rate only. Section 2 reviews various indices of nominal and real effective exchange rates, and Section 3 considers some of the conceptual and methodological issues involved in the construction of such indices. Sections 4 to 6 discuss briefly the real effective exchange rate. Section 7 discusses the results of the estimations of nominal, real and parallel market exchange rates while Section 8 gives some concluding remarks.

2. INDICES OF EXCHANGE RATES: NOMINAL INDICES

Most currencies of African countries are pegged to one of the major currencies of the West. For example, the Ethiopian birr is pegged to the US dollar while the Kenyan shilling and Sudanese sterling are pegged to the British pound. However, in a world where currency floating is the order of the day, fixed exchange rates are becoming more and more inappropriate. This leads to the question of what the exchange rate of the currency of an African country is vis-a-vis its major trading partners should be. In order to estimate the exchange rate of the currency at a given time, one needs to identify the country's major trading partners. Once the major trading partners have been identified the next step would be to devise an index that expresses the "average" change in the exchange rate of the currency against the currencies of major trading partners. The simplest way of doing this would be to get the simple arithmetic mean of individual bilateral exchange rates; however, this approach is valid only if each trading partner has the same share in the trade of the country under consideration. This, obviously, is unlikely to be the case. The most reasonable approach would be to have a weighted "average" of the bilateral exchange rates. This method provides what is known as the Effective Exchange Rate.

Hirsch and Higgins (1971) were among the first to develop this concept of effective exchange rate. They recognized that, for analytical purposes, the exchange rate of a particular currency should "reflect the evolving relationship between that currency and all other currencies". They also identified that the effective exchange rate should be an index and should not be expressed in absolute terms and that only the currencies of major trading partners (not *all* currencies) should be included.

2.1 Development of an Effective Exchange Rate

After recognizing that an effective exchange rate should be an index and be expressed in relative terms, Hirsch and Higgins defined the effective exchange rate of a given currency as "the percentage 'direct' change in the numeraire rate *minus* the weighted percentage 'indirect' change in the numeraire rates of other currencies". Thus, given n currencies $(1, 2, \dots, n)$ with the currency n as the numeraire, N the percentage change in the numeraire rate and $W_1, W_2, \dots, W_n$ the relevant weights, the percentage change in the effective exchange rate, E , can be expressed as:

$$E = N - \sum_{i=1}^{n-1} W_i N_i \quad (1)$$

Alternatively, equation (1) may be rewritten as the ratio of the numeraire rate of a given currency to the sum of weighted changes in numeraire rates of other currencies. In other words,

$$E = \frac{N}{\sum_{i=1}^{n-1} W_i N_i} \quad (2)$$

To clarify further the index in equation (1) or (2), consider a particular currency and the dollar as a numeraire. The effective exchange rate of that currency is equal to the percentage change in its dollar rates of other currencies. In equation (1), N is known as the direct effect while $\sum W_i N_i$ is the indirect effect. If the numeraire rates of other currencies show no change, the indirect effect will be insignificant. After equation (1) or (2) have been estimated for each period, a base period is chosen and an index formulated.

Rhomberg (1976) elaborates more on the construction of indices of exchange rates. He discusses issues that have to be taken into consideration when constructing effective exchange rates. Like Hirsch and Higgins, he confines his analysis to developed western economies; in

other words, the unique conditions and characteristics of developing countries is not taken into consideration.

When considering the choice of a base period in the construction of an index, Rhomberg states that the base period should be chosen in such a way that the base is as close to the equilibrium rates as possible.

According to Rhomberg, weighting is an important issue in the construction of an index of effective exchange rate. The choice of weights is said to depend on the objective of the study or of the economic analysis, and that one may have as many weights (indices) as the number of policy issues that one likes to analyze. In Rhomberg's words, "The proper choice of weights depends, therefore, on the particular policy objective selected as focal point of the index. For different weighting schemes different policy implications would be appropriate" (1976:89).

The most commonly considered issue is the effect of a change in the exchange rate on a country's balance of payments. In this case, the proper choice of weights could be the average of bilateral export and import weights. If one is to study the effect of exchange rate changes on the cost of imports, the appropriate weights would be the value of imports from major trading partners. This is because the change in the price of foreign currency in terms of home currency based on bilateral import weights measures the effect of a set of foreign exchange changes on the cost of imports in local currency. If one wishes to study the effect of exchange rate changes on the competitiveness of a country's exports in the world market, the appropriate weights would then be the volume of exports to major trading partners. The reason behind this weighting system is that the change of home currency in terms of currencies of trading partners weighted by the volume (share) of exports would help indicate the cost of home country's exports to foreign customers. In general, one could come up with other examples showing the correspondence between a particular policy issue and an appropriate weighting system.

Rhomberg discusses seven indices that are commonly used by various financial institutions. He states that it is generally difficult to compare the various indices because they may differ on the choice of the sample countries included, the base period, as well as the data inputs. Even though Rhomberg considers seven different indices, only four of them are major ones. The other three are simple extensions.

2.2 The Import-weighted Index

This is defined as the average price of partner currencies in terms of home currency relative to the base period, the weights being partners' shares in the total imports of home country. Symbolically, this may be written as:

$$EM_i = \sum_j \frac{M_{ji}}{\sum_j M_{ji}} R_{ji} \quad (3)$$

where M_{ji} = imports of country i from country j
 ΣM_{ji} = total imports of country i
 $1/R_{ji} = R_{ij}$ = price of one unit of currency i in terms of currency j expressed as an index relative to the base period and the summation is over all the currencies of major trading partners.

2.3 The Bilateral Export-weighted Index

This is defined as the arithmetic mean of the price of home currency in terms of partner currencies, relative to the base period and weighted by partners' share in total exports of home country. Symbolically, it is expressed as follows:

$$EX = \sum (\frac{X_{ij}}{\sum X_{ij}}) R_{ij} \quad (4)$$

where X_{ij} = exports of country i to country j
 ΣX_{ij} = total exports of country i.

2.4 The Bilateral Trade-weighted Index

This is the arithmetic mean of equation (4) and reciprocal of equation (3) weighted by the ratio of exports and imports to their sum. This is symbolically expressed as:

$$EMX = \frac{[M_i (\frac{1}{EM_i}) + X_i (EX_i)]}{M_i + X_i} \quad (5)$$

where M_i = total imports of country i
 X_i = total exports of country i to the world market.

2.5 The Global Export-weighted Index

This is defined as the arithmetic mean of prices of home currency in terms of foreign currencies relative to the base period and weighted by partner countries' shares in total exports to the world market. The market of home country is not included. This may be written as:

$$EXW_i = \sum_{j \neq i} \left[\frac{(X_i - X_{ij})}{\sum_{j \neq i} (X_i - X_{ij})} \right] R_{ij} \quad (6)$$

where $X_i - X_{ij}$ = total export of country i minus export of country i to j .

2.6 The Average Export-weighted Index

This is a simple arithmetic mean of the bilateral export weighted and global export-weighted indices and is expressed as:

$$EXBW = 0.5 EX + 0.5 EXW \quad (7)$$

2.7 The Average Trade-weighted Index

This is a simple arithmetic mean of the average export-weighted index and the reciprocal of the import-weighted index. This may be expressed as:

$$EMXBW = 0.5 \left[\frac{1}{EM_I} \right] + [EXBW] \quad (8)$$

The last index discussed by Rhomberg is based on the more complex Multilateral Exchange Rate Model (MERM) and is not considered here.

2.8 Uses of the Various Indices

The import-weighted index, EM, would help one study the effect of changes in the exchange rate on the cost of imports while the bilateral export-weighted index, EX, may help analysts to understand the effect of changes in the exchange rate on the competitiveness of a country's exports. The bilateral trade-weighted index, EMX, which is an average of the two indices weighted by bilateral export and import weights, is used as a measure of the overall trade movements. The reason why one of the indices (i.e. EM) is inverted is that the export and import-weighted indices move in opposite directions because they are the weighted averages of changes in the prices of foreign currencies in terms of domestic currency. The other indices are weighted averages of prices of domestic currency in terms of foreign currency. The average trade-weighted index (EMXBW), which incorporates import weights as well as the two types of export weights, can be regarded as a trade-weighted index. This formula is expected to show the change in the structure of trade as a result of changes in the exchange rate. It is also expected to give some indication about price responses to exchange rate changes. This index is closer to the MERM-type indices which use general equilibrium approach to come out with an appropriate weight.

Rhomberg states that the best method of constructing indices is to use the MERM whereby a general equilibrium model is developed and the effect of exchange rate changes on several economic variables could be studied. He used the seven indices to compare movements of effective exchange rates for the developed countries of Western Europe. In order to make a valid comparison, he chose the same base period and the same set of exchange rate data. The indices showed general conformity with respect to upward and downward movements over the study period. The MERM indices showed trends that are neither too high nor too low, and he concluded that the MERM-weighted index as being the better measure.

3. SOME CONCEPTUAL AND METHODOLOGICAL ISSUES

The index of effective exchange rate as suggested by Hirsch and Higgins, Rhomberg and others do not seem to consider some major methodological and conceptual issues involved in the construction and interpretation of the various indices. More specifically, the information content of different indices and their interpretation in relation to different market conditions need to be analyzed. Moreover, the indices already summarized do not seem to differentiate between the nominal and real effective exchange rates. Maciejewski (1983) states that a meaningful interpretation of the various nominal and real exchange rates depends on the combination of four issues, namely the proper choice of a base period, the proper choice of weighting and the policy question being addressed, the plausibility of the relative price or cost indicator and the mathematical formulation. He then develops nominal and real effective exchange rates and states that an index can only answer one question at a time - more specifically, the index provides answers to the problem of the effects of changes in exchange rate relative to the base period and is confined to a given set of currencies.

One major issue that Maciejewski addresses in appraising various indices is the need to link economic theory as related to exchange rate movements and the process of index construction. Again this link can only be realized by considering only one issue at a time.

Suppose one wants to assess the impact of changes in the exchange rate on the "competitiveness of exports". The appropriate weight could be the volume of exports and a Laspayre-type index where constant quantity and constant quality basket of goods are assumed. First we put down the standard Laspayre price index that is commonly used in the construction of wholesale, retail, cost of living and other indices. This is given by:

$$P_{01}^{La} = \frac{\sum P_1 Q_0}{\sum P_0 Q_0} \quad (9)$$

where P_0 and P_1 are base and current prices and Q_0 is the weight and is nothing but the base period quantity purchased.

By the same logic one may develop a Laspayre-type exchange rate index. Suppose one considers the bilateral export-weighted index of equation (4). It may be rewritten as a Laspayre-type index as follows:

$$NEER = \frac{\sum_j X_0^p \left(\frac{e_1^p}{e_1^r} \right)}{\sum_j X_0^p \left(\frac{e_0^p}{e_0^r} \right)} \quad (10)$$

where X_0^p = value of exports to p^{th} trading partner in the base period (the value is expressed in partner country's currency)

e_1^p = dollar value (dollar over currency) of one unit of p^{th} partner in period 1

e_0^p = dollar value of one unit of p^{th} partner country in the base period

e_1^r = dollar value of one unit of reporting country's (country under study) currency in period 1

e_0^r = dollar value of one unit of reporting country's currency in the base period

NEER = Nominal Effective Exchange Rate.

It may easily be noted that X_0^p in equation (10) plays the role of Q_0 in equation (9) while e_1^p/e_0^p plays the role of P_0 and P_1 in the same equation. A simple manipulation of equation (10) yields the following result:

$$E = \sum_p \frac{W_0^p}{\sum_p W_0^p} \left(\frac{e_1^p/e_0^p}{e_1^r/e_0^r} \right) \quad (11)$$

where

$$W_0^p = X_0^p \frac{e_0^p}{e_0^r}$$

One should note that equation (11) is nothing but a bilateral export-weighted index

where $W_0^p/\sum W_0^p$ = weight

e_1^p/e_0^p = indices of change from base period exchange rate in p 's exchange rate

e_1^r/e_0^r = indices of change from base period in reporting country's numeraire exchange rate.

Again equation (11) is similar to equation (9) where:

$$W_o^P = X_{ij}$$
$$R_{ij} = \frac{e_i^P / e_o^P}{e_i^T / e_o^T}$$

The above formula answers the question of how the value of a country's earnings from commodity exports in the current period with the value of its earnings in the base period changes as a result of cumulative effects of exchange rate movements. Contrary to the common view, it is not a direct measure of international competitiveness in a country's export sector because competitiveness is a function of many different economic variables.

It is also possible to change the weights of equation (11) so as to answer a different question on the effect of exchange rate movements on export earnings. For example, if one wants to study the effect of changes in exchange rate on a country's export earnings on a group of specific commodities, then the weight ought to be the distribution of specific market shares of principal competitors for the commodities in the base period.

3.1 Implication of the Use of Laspayre-type Indices

We have already stated that Laspayre-type indices of effective exchange rate assume an unchanged product composition as well as unchanged quality of goods. In other words, the above indices imply changing exchange rate policy so as to maintain the status quo of the base period. This approach may be unrealistic in a world where quantity and quality of products and services have been changing. At the same time developing countries are facing a changing world with deteriorating terms of trade in the export of primary commodities such as coffee and cocoa. It may thus be questionable to use Laspayre-type exchange rate indices within the context of developing countries.

The second problem with Laspayre-type exchange rate indices is that such indices are biased downwards compared with other indices such as the Paasche index. The latter uses current period as a base. The extent of this downward bias has not been verified, but Mansur (1983) states that they are likely to be substantial.

The preceding paragraph showed that the bilateral export-weighted index is similar to Laspayre-type indices and briefly considered the consequences of using such indices. Similar discussion may be developed for the other indices, that is for equations (3) and (6). Also

equations (3), (4) and (6) are usually referred to as the nominal effective exchange rates. Below we will briefly consider the real effective exchange rate; we will continue to confine our discussion to the bilateral export-weighted exchange rate.

4. THE REAL EFFECTIVE EXCHANGE RATE (REER)

The NEER is not adjusted or deflated for corresponding changes in relative prices. If the NEER is applied to study the effects of exchange rate policy, then the 'real' exchange rate effect may not be isolated. This is because the NEER may include the effect of inflation differentials between a country under consideration and its partners. Thus, in order to isolate the pure exchange rate effects on export 'performance', the NEER may have to be deflated so as to get the REER. Unlike the NEER, the REER may not be used to measure the effect of undervaluation or overvaluation of a currency. In this particular case, the REER may be interpreted as a gain or loss in international price competitiveness between the current and the base period.

Below we present the corresponding value of the REER for the bilateral export-weighted index. If we deflate equation (4) by a ratio of price changes from the base period in partner countries to the country under consideration, we will get the following result:

$$REER = \sum_p Z_p \frac{(e_1^{pr} / e_0^{pr})}{(p_1^{pr} / p_0^{pr})} \quad (12)$$

where $Z_p = W_p / \sum W_p$ = bilateral share of export

$e_0^{pr} = e_0^p / e_0^r$ = bilateral exchange rate of partner countries to home country in the base period

$e_1^{pr} = e_1^p / e_1^r$ = bilateral exchange rate of partner countries to home country in the current period

$p_0^{pr} = p_0^p / p_0^r$ = ratio of export prices of partner countries to home country in the base period

$p_1^{pr} = p_1^p / p_1^r$ = ratio of export price of partner countries to home country in the current period.

Equation (12) can be rewritten in a manner easier to understand as follows:

$$R = \sum_p Z_p \left(\frac{r_1^p}{r_0^p} \right) \quad (13)$$

where $r_1^p = e_1^{pr} / p_1^{pr}$ and $r_0^p = e_0^{pr} / p_0^{pr}$.

5. IMPLICATIONS OF THE MATHEMATICAL FORMULATIONS

Each of the indices described above include relative price or cost component. The method of averaging and the calculation of the relative prices will have an effect on the finally calculated indices. When one wants to estimate the REER, one may easily estimate two separate indices - relative price and exchange rate changes. The same weighting procedure will be used for each, and they will then be combined. This approach would help one decompose the variation in the real exchange rate into exchange rate change and price change components.

Usually, the exchange rate changes are easy to obtain or estimate; this is not so for the price changes; in such a case, one may have to use proxies for price change indices and combine them with the exchange rate indices. Obviously, this approach is more restrictive, and the interpretation of the final indices may not be easy.

The method of averaging may also affect the calculated value of such indices. The most common methods are the arithmetic mean, the geometric mean and the harmonic mean. Each one of these averaging methods has its own bias; however, the geometric mean seems to be relatively better because it treats appreciating or depreciating values in a symmetrical manner and also is not affected by extreme values. In other words, the averaging process is a linear function of the components of bilateral exchange rate indices.

6. RELATIVE PRICE (COST) INDICES

We have already stated that the NEER should be adjusted by relative price (cost) indices in order to eliminate inflation differentials and to obtain the pure exchange rate change effects. There are different relative price indices that are useful for deflating NEER indices. These indices are widely used in the industrial countries of the West. Below we consider the most important ones.

6.1 Index of Export Unit Values

This index compares the value of export of home country with those of competitors. In this index export unit values are used as the proxies for prices. It may be easily estimated provided that one obtains data on values and quantities. While it is easy to estimate the unit values, their use as proxies for prices of exports have been questioned. This is because the changes in value may not only be due to changes in prices but also due to shifts in the composition of the set of commodities selected.

Also, the index of export unit values may not be regarded as indices of price competitiveness because export values include different taxes and that export prices may not be increased or

decreased in response to competitiveness. In general, the index may be regarded as an indicator of price competitiveness of manufactured goods.

6.2 Index of Wholesale Prices

This index compares the price of home country to those of competitors. It is expected to reflect price developments for "potentially exportable" products. However, it includes non-traded goods as well as imported goods. It may thus incorporate indirect taxes or subsidies levied on imports. Because of these, the wholesale price index may overstate or understate the changes in export prices. Besides, the wholesale price index may not be temporarily comparable because of differences in scope and coverage of the regimes as well as the method of averaging. It may be possible to derive a wholesale price index for the purpose of deflating changes in exchange rates.

6.3 Cost Index

This index compares labour costs of home country to those of competitors and is a cost-based measure of profitability of exports. Labour is engaged in the production of both tradable and non-tradable goods and may not be a good indicator of a cost-based measure of competitiveness in international trade. The labour cost is normally defined as the ratio of labour costs to the volume of output produced, and when this index is taken as a measure of costs, it assumes that labour is a major input in the process of production, or that other costs are similar across all competing countries. Another problem of the labour-based cost index is that it may incorporate erratic movements and may not give a true indication of cost trends. Such erratic movements may be due to 'lead-lag' relations.

6.4 Consumer Price Index (CPI)

This index measures the consumer price of reporting country vis-a-vis competitors and is used as a proxy for measuring relative total unit producer costs. If the CPI goes up this could imply that the relative cost of production will also go up, and this may lead to reduced profits in tradeables and may eventually reduce supply and market shares. If the CPI is used for measuring producer costs, we are assuming that it is the major determinant of wages as well as other inputs. The problem with the CPI has to do with intercountry comparisons. This is especially so when one compares labour-intensive and capital-intensive structures of production as is the case when one compares a developed country with a least developed country.

6.5 The GDP Deflator Index

This index compares a country's GDP deflator with those of its competitors and is a measure of total unit costs of a country in terms of its partners. If properly measured, it may give a

satisfactory indication of the profitability of exported goods of a reporting country against its competitors.

7. EMPIRICAL ESTIMATES OF EFFECTIVE EXCHANGE RATES

In this and subsequent sections empirical estimates of various exchange rates for Ethiopia will be presented. Indices of effective exchange rate movements have been constructed in accordance with the formulae given above (equations (3),(4) and (12)). The indices that have been constructed are both the nominal and real effective exchange rates. The indices are constructed for the effective exchange rates of both the official and parallel markets. In other words, the following effective exchange rates are constructed:

- export-weighted nominal effective exchange rate;
- import-weighted nominal effective exchange rate;
- trade-weighted nominal effective exchange rate;
- export-weighted real effective exchange rate;
- import-weighted real effective exchange rate; and
- trade-weighted real effective exchange rate;

The estimates of these indices were done by assuming two different base periods: 1970 and 1980.

Before considering the empirical results of the various exchange rates, we will first show the official exchange rates of Ethiopia. This is given in Table 1. The table shows that there is very little variability in the official exchange rate of the country.

7.1 Some Preliminary Indicators

A simplified table showing the relationship between exports with major trading partners and the corresponding bilateral exchange rates is given in Annexes 1 and 2. For purposes of comparison, the data is for both 1970 and 1980. In 1970, the major bulk of Ethiopia's exports went to the United States, while the other six partner countries took only 23 per cent of the total. By 1980, the proportion of Ethiopian exports to the United States has decreased dramatically, while those to Japan, France, Germany and Italy have shown a relative increase. This may be explained by the relative change in the exchange rate of the Ethiopian birr relative to those of its trading partners. Between the two periods, the Ethiopian birr has shown an appreciation of about 17 per cent relative to the United States dollar; on the other hand, the Ethiopian birr has shown a depreciation of 71.4, 44.3 and 54.1 per cent compared to the currencies of Japan, France and Germany.

Table 1: Official and Parallel Market Exchange Rates in Ethiopia (1970-1988)

Year	Official Rate	Parallel Market Rate
1970	2.50	2.93
1971	2.50	2.92
1972	2.50	2.61
1973	2.50	2.20
1974	2.07	2.49
1975	2.07	5.07
1976	2.07	3.76
1977	2.07	3.98
1978	2.07	4.05
1979	2.07	3.10
1980	2.07	2.80
1981	2.07	3.04
1982	2.07	3.34
1983	2.07	3.54
1984	2.07	4.13
1985	2.07	4.71
1986	2.07	3.85
1987	2.07	5.50
1988	2.07	5.70

We have also tried to relate the change in the import shares of the country's trading partners in 1970 and 1980 with the corresponding bilateral exchange rates. This is given in Annex 2. In relating changes in import shares of a partner country to the bilateral exchange rate, the latter is measured as the ratio of partner country's currency to home currency. The reason for using this ratio is given in Section 2.2 and 2.8. From the data given in Annex 2, one observes that Japan, Germany and Italy are the three major sources of Ethiopian imports. There is very small change in the import shares between 1970 and 1980. On the other hand, the Ethiopian currency

has shown some appreciation between the two periods, suggesting that the change in import shares could not be explained by changes in the corresponding bilateral exchange rates.

The preceding discussion suggests that variations in exports to and imports from major trading partners may be partially explained by changes in bilateral exchange rates. We will next construct the indices of effective exchange rates as explained in Sections 2.2, 2.3, 2.4, and 3 so as to see the patterns of such indices and to give economic interpretation to our results.

7.2 Results and Economic Interpretations

7.2.1 The Nominal Effective Exchange Rates

We have already stated that one can develop as many indices as there are policy questions to be answered. In our empirical estimation we have confined ourselves to the nominal export-weighted and nominal import-weighted indices as well as the average of the two. The empirical results of the estimation of each of the three indices should give some indication on the effects of changes in the exchange rate on the competitiveness of a country's exports, on the cost of imports and on the extent of trade movements.

The three indices are first estimated with 1970 as a base period. These are presented in columns 2-4 of Table 2. The export and import weights used are those given in Annexes 1 and 2. An increase in the trend value of an export-weighted nominal exchange rate implies that a country's currency has been depreciated over the study period. This is because, a bilateral exchange rate, as defined in section 2.2, is the dollar value of reporting country's currency over the dollar value of partner country's currency. The results clearly show that the Ethiopian birr has been continuously appreciating; the extent of appreciation is higher during the 1980s than the 1970s, indicating that one cause for Ethiopia's poor export performance is the appreciation of its currency compared to those of its major trading partners.

The import-weighted estimates are obtained by defining the bilateral exchange rate as the ratio of the exchange rates of the partner countries to those of Ethiopia. Because of this, the import-weighted index should move in opposite direction to the export-weighted effective exchange rate. A lower value of the index suggests lower costs of imports and vice versa. Interpreted in this way, the estimates indicate that the cost of Ethiopia's imports were high over the study period.

Finally, the estimates of the trade-weighted nominal effective exchange rate suggest that Ethiopia has not experienced impressive trade movements.

We also tried to see the movements of the three indices when the base period was changed from 1970 to 1980. The results in Annexes 1 and 2 show that there is a big change in the export and import weights. The nominal effective exchange rates, given in Table 2, are estimated using the 1980 weight.

Table 2: Nominal Effective Exchange Rates for Ethiopia (1970-1988)

Year	1970=100			1980=100		
	Export-weighted Index	Import-weighted Index	Trade-weighted Index	Export-weighted Index	Import-weighted Index	Trade-weighted Index
1970	1.00	1.00	1.00	1.15	1.06	1.05
1971	1.02	0.45	1.03	1.19	1.00	1.09
1972	1.03	0.72	1.06	1.23	0.96	1.14
1973	0.87	1.08	0.89	1.03	1.10	0.97
1974	0.86	1.12	0.89	1.01	1.08	0.97
1975	0.86	1.13	0.87	1.01	1.09	0.97
1976	0.85	1.28	0.84	0.97	1.09	0.94
1977	0.87	1.16	0.87	1.00	1.02	0.99
1978	0.91	1.10	0.91	1.08	0.93	1.08
1979	0.89	1.12	0.89	1.04	0.98	1.03
1980	0.89	1.17	0.87	1.00	1.00	1.00
1981	0.89	1.28	0.84	1.11	1.02	1.04
1982	0.85	1.45	0.77	0.91	1.15	0.89
1983	0.84	1.64	0.72	0.89	1.26	0.84
1984	0.83	1.82	0.69	0.90	1.38	0.81
1985	0.86	1.72	0.72	0.91	1.25	0.95
1986	0.91	1.35	0.82	1.05	1.03	1.01
1987	0.97	1.22	0.89	1.14	0.93	1.11
1988	0.95	1.31	0.85	1.10	0.98	1.06
$\bar{X}$	0.90	1.25	0.86	1.04	1.07	0.99
S	0.06	0.25	0.10	0.10	0.12	0.01

In general, there seem to be little difference in the export-weighted or import-weighted or trade-weighted effective exchange rates of Ethiopia.

7.2.2 The Real Effective Exchange Rate

In Section 4, we stated that the nominal effective exchange rate may not explain export performance, import costs or trade movements unless the index is deflated by a ratio of the prices of a partner to a reporting country. However, if the nominal exchange rate is deflated so as to give the pure exchange rate effect, then this deflated effective exchange rate will help us to measure the trend in international price competitiveness between the base and current period.

The export-weighted, import-weighted and trade-weighted indices computed with 1970 as the base year are given in Table 3. There is little difference between the nominal and real effective exchange rates, suggesting that the ability of the country to compete in international trade seems to be low due to the overvalued currency. Similar results are also observed when the base period is changed to 1980.

7.3. Parallel Market Exchange Rate

In economies where the exchange rate is overvalued, there are strict official exchange rate controls. This is because the demand for foreign exchange exceeds the supply. Governments resort to rationing by classifying imported goods as 'essentials' and 'non-essentials'. Restrictions are usually imposed on the latter. Even if one is allowed to import essential commodities, one is usually faced with highly bureaucratic application procedures.

These controls lead to corruption within the official government channels, and this will eventually lead to the development of parallel markets where foreign currency (usually the US dollar) is sold at a much higher rate than the official one. Visitors and exporters prefer to use the parallel market; remittances sent by residents in Western countries are transferred through non-bank intermediaries which reduce the amount of foreign exchange that was due to national banks or other authorised dealers. The parallel market exchange rate fluctuates according to the rules of demand and supply for the dollar or other currency. In economies where an overvalued currency has been in existence for a long period, the parallel market for foreign exchange accounts for a larger portion of financing imports.

There is an argument in favour of using the parallel market exchange rate in the construction of effective exchange rate indices. The reason given for this is that the parallel market exchange rate is more or less a floating one since its value is governed by supply and demand.

Table 3: Real Effective Exchange Rates for Ethiopia (1970-1988)

Year	1970=100			1980=100		
	Export-weighted Index	Import-weighted Index	Trade-weighted Index	Export-weighted Index	Import-weighted Index	Trade-weighted Index
1970	1.00	1.00	1.00	1.60	0.72	1.49
1971	1.10	1.01	1.05	1.57	0.72	1.48
1972	1.20	1.04	1.08	1.49	0.75	1.41
1973	0.98	1.21	0.90	1.23	0.88	1.18
1974	1.02	1.16	0.94	1.28	0.85	1.23
1975	1.06	1.08	1.00	1.33	0.81	1.28
1976	0.88	1.32	0.82	1.08	0.99	1.05
1977	0.84	1.30	0.81	1.06	0.99	1.04
1978	0.82	1.26	0.81	1.09	0.97	1.06
1979	0.74	1.38	0.73	1.00	1.07	0.97
1980	0.80	1.30	0.78	1.06	1.00	1.03
1981	0.84	1.32	0.80	1.07	1.04	1.02
1982	0.79	1.43	0.74	0.99	1.10	0.95
1983	0.81	1.53	0.73	0.94	1.18	0.89
1984	0.87	1.62	0.70	0.93	1.25	0.87
1985	0.97	1.70	0.78	0.86	1.28	0.82
1986	0.85	1.18	0.85	1.11	0.97	1.07
1987	0.94	1.01	1.97	1.29	0.94	1.24
1988	0.90	1.10	0.90	1.19	0.90	1.15
$\bar{X}$	0.91	1.26	0.86	1.17	0.96	1.12
S	0.12	0.21	0.12	0.21	0.15	0.20

Most nominal and real effective exchange rates are, however, estimated using the official exchange rates. In economies with large parallel markets the official nominal and real effective exchange rates may not show the true picture. One may also have to estimate effective exchange

rates based on the parallel market. If it is possible to estimate the share of the parallel market, then a weighted average of the official and parallel market effective exchange rates could give a better indication of the extent of appreciation or depreciation of a currency. Unfortunately this is not easy to do. Also, time-series data on parallel exchange rates are not easy to obtain.

Table 4: Parallel Nominal Effective Exchange Rate for Ethiopia (1970-1988)

Year	1970 = 100			1980 = 100		
	Export-weighted Index	Import-weighted Index	Trade-weighted Index	Export-weighted Index	Import-weighted Index	Trade-weighted Index
1970	1.00	1.00	1.00	1.01	1.23	0.91
1971	1.02	0.95	1.03	1.04	1.16	0.95
1972	1.00	1.03	0.99	0.98	1.25	0.89
1973	0.84	1.17	0.85	0.84	1.40	0.78
1974	0.87	1.04	0.92	0.91	1.22	0.87
1975	1.15	0.52	1.55	1.71	0.60	1.69
1976	1.00	0.74	1.17	1.26	0.81	1.24
1977	1.05	0.66	1.28	1.37	0.72	1.38
1978	1.13	0.61	1.39	1.50	0.64	1.53
1979	0.97	0.81	1.10	1.13	0.88	1.13
1980	0.93	0.94	1.00	1.00	1.00	1.00
1981	0.98	0.96	1.01	1.21	0.95	1.13
1982	0.94	0.99	0.98	1.07	0.97	1.05
1983	0.95	1.05	0.95	1.10	1.00	1.05
1984	1.00	1.01	0.99	1.27	0.95	1.61
1985	1.11	0.83	1.15	1.45	0.76	1.39
1986	1.10	0.80	1.18	1.40	0.75	1.37
1987	1.46	0.50	1.73	2.14	0.47	2.12
1988	1.46	0.52	1.70	2.12	0.48	2.09
$\bar{X}$	1.05	0.85	1.16	1.29	0.91	1.25
S	0.17	0.20	0.26	0.37	0.27	0.38

An estimate of parallel market exchange rate was made available by this author. These results are given in Table 1. As should be expected the difference between the official and the parallel market exchange rates in Ethiopia is high. The difference has become wider in the late 1980s compared to the early 1970s.

Table 5: Parallel Real Effective Exchange Rate for Ethiopia (1970-1988)

Year	1970 = 100			1980 = 100		
	Export-weighted Index	Import-weighted Index	Trade-weighted Index	Export-weighted Index	Import-weighted Index	Trade-weighted Index
1970	1.00	1.00	1.00	1.31	0.93	1.19
1971	1.09	1.00	1.04	1.28	0.93	1.18
1972	1.07	1.15	0.97	1.08	1.06	1.02
1973	0.89	1.31	0.83	0.91	1.17	0.88
1974	1.04	1.12	0.97	1.07	0.99	1.04
1975	2.21	0.60	1.94	2.27	0.54	2.06
1976	1.37	0.92	1.22	1.38	0.79	1.32
1977	1.38	0.88	1.26	1.43	0.75	1.38
1978	1.37	0.84	1.28	1.49	0.72	1.44
1979	0.94	1.13	0.91	1.05	0.98	1.03
1980	0.92	1.16	0.89	1.00	1.00	1.00
1981	1.05	1.11	0.98	1.10	0.92	1.09
1982	1.09	1.11	0.99	1.12	0.93	1.10
1983	1.19	1.13	1.04	1.14	0.94	1.10
1984	1.34	1.06	1.14	1.31	0.89	1.22
1985	1.90	1.01	1.45	1.37	0.84	1.28
1986	1.34	0.84	1.27	1.45	0.72	1.42
1987	2.13	0.56	1.95	2.39	0.50	2.20
1988	2.10	0.60	1.89	2.29	0.52	2.10
$\bar{X}$	1.34	0.97	1.21	1.39	0.85	1.05
S	0.43	0.21	0.36	0.44	0.18	0.30

Having assembled the estimated parallel market exchange rates, we then derived the nominal and real effective exchange rates based on the parallel market. The results are given in Table 4.

When one compares the nominal effective exchange rate based on the official rates with those based on the parallel market rates, one observes that the extent of overvaluation is lower in the parallel market. Real effective exchange rates have also been estimated for the parallel market. The results, given in Table 5, show that there are large differences between the indices based on the official and those based on the parallel rates. Also, the trend equations for the parallel-market-based real exchange rates for Ethiopia seem to be highly irregular.

8. CONCLUSIONS

In this study, we attempted to see whether the standard measures of nominal and effective exchange rates can be applied within the Ethiopian context. To this effect, we tried to critically analyze various indices. Our results showed that the nominal effective exchange rate indices tend to give some indication of the extent of overvaluation of the currency. The results also showed that there is very little difference between the nominal and real effective exchange rates, an indication of the low level of competitiveness of Ethiopia in the world market.

We also estimated the parallel nominal and real exchange rates; the nominal rates provided very interesting results. Chances are that the parallel exchange rate may be a better estimate of the value of the Ethiopian currency. The conclusion that emerges is that, whether we use the nominal, real or parallel market exchange rate index, the currency of Ethiopia is overvalued. The negative effect of an overvalued currency on trade balance and other economic variables is well-known. Given that the currency is overvalued, what needs careful consideration is the effect of various rates of devaluation on the trade balance and related variables.

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Annex 1

Distribution of Exports by Partner Country

	Ethiopian Export Shares*			Bilateral Exchange Rate**		
	1	2	2/1**	1	2	2/1**
	1970	1980		1970	1980	
United States	0.77	0.33	0.43	2.500	2.070	0.826
Japan	0.05	0.11	0.20	0.007	0.010	1.714
France	0.02	0.12	6.00	0.318	0.459	1.443
Germany	0.08	0.17	2.13	0.685	1.056	1.541
Italy	0.06	0.19	3.17	0.004	0.002	0.500
Netherlands	0.01	0.04	4.00	0.735	0.972	1.322
United Kingdom	0.03	0.04	1.33	1.046	0.866	0.828

* Standardised

** Reporting over partner country

Annex 2

Distribution of Imports by Partner Country

	Ethiopian Import Share*			Bilateral Exchange Rates**		
	1	2	2/1	1	2	2/1
	1970	1980		1970	1980	
United States	0.13	0.190	1.46	0.40	0.48	1.20
Japan	0.22	0.210	0.95	143.20	98.07	0.68
France	0.04	0.003	0.75	3.14	2.18	0.69
Germany	0.21	0.200	0.95	1.46	0.95	0.65
Italy	0.25	0.200	0.80	250.00	500.00	2.00
Netherlands	0.04	0.040	1.00	1.36	1.03	0.76
United Kingdom	0.11	0.130	1.18	1.15	1.21	1.05

* Standardised

** Partner over reporting country