higher than the average levels reported by the two studies, except for the MSA base case. As our price data do not extend beyond 1990, it is not possible to compare the tariff equivalent implied by FEBCs with the implicit tariff index. As intermediate and capital goods have priority in access to import licenses and foreign exchange, FEBCs were most likely used to finance more restricted consumer imports. The somewhat high tariff equivalent of 30 percent may therefore reflect the composition of imports using the FEBC market.

V. Testing for Biases in Domestic Deflators

As shown earlier, the narrative of changes in trade policy concurs fairly well with changes in the implicit tariff index, although there are a few deviations. It is rather the extent of liberalization indicated by the index than the direction of annual changes that seems problematic in the light of the other evidence that we have on the protective structure of Kenyan industries. First, the snapshots of actual levels of protection convey a more or less opposite picture of the Kenyan trade regime: tightening of import controls since the late-1960s up to the late-1980s (and even to the early-1990s). Second, the import compression index (the IIIR), which is another quantitative index of trade policy (Narasimhan and Prichett 1993), also indicates increased protection both in the 1980s compared to the 1970s, and in the latter half of the 1980s compared to the early part of the 1980s. Why does the implicit tariff index, which should be one of the most appropriate aggregate measures of trade policy in the presence of QRs, have such a different trend from that indicated by the snapshots of the NRP, the ERP, or the IIIR? In order to answer that question we will have to take a closer look at two deflators used for constructing the implicit tariff index, i.e. the domestic ex factory price and the import price index.

This section will analyze potential biases in the domestic producer price index for semi-manufactured and manufactured goods in Kenya. The base case is the domestic ex factory price, which was derived from the value of manufacturing output and the respective quantity index, and which was used to calculate the implicit tariff index depicted in Figure 1. Our first hypothesis is that incentives for misreporting domestic sales may have increased

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19The NRP derived using the weighted average UK price for total imports, including food, is also slightly higher.
over time, resulting in incorrectly recorded domestic deflator. Misreporting, if any, is likely to biased downwards. An increase in underreporting of sales can be triggered by a policy change, such as an increase in taxation, or tightening of price controls. In the presence of capital controls, there may be a further incentive to underinvoice exports. If the share of manufacturing exports increases over time, the share of under invoiced sales is likely to go up, too.

Figure 2:
Import Demand and Domestic Supply of Importables in a Foreign Exchange Constrained Economy

The second hypothesis is that the ex factory price picks up a falling price level over time as more firms enter and the manufacturing output expands. In the beginning of the period under study (late-1960s and early-1970s) the unit cost was likely to be higher than the long run unit cost as many industries were starting up their activities. In other words, the domestic price index is dominated by the manufacturing sector moving down along its demand curve rather than by relaxation of protection. We illustrate this issue in Figure 2, assuming a foreign exchange constrained economy.

Figure 2 depicts a situation where protection (i.e. the domestic price of importables, \( p^* + \tau \)) declines even if there is no change in trade policy. The initial equilibrium is at \( E \), given foreign exchange supply constraint \( F \), perfectly elastic supply of imports \( S^* \), and
domestic supply and demand for importables, \( S \) and \( D \), respectively. Both demand for imports \( Q^{\text{IMP}} \) and domestic production \( Q^{\text{DOM}} \) are determined by \( F \) and the domestic price of importables \( (p^* + \tau) \), where \( \tau \) is the premium above the world price \( p^* \). Assuming that the demand curve for importables does not shift, a fall in the domestic price (or in \( \tau \)) can be brought about by an increase in export earnings \( F \), an outward shift of the domestic supply curve \( S \), or both. When domestic supply \( S \) shifts to the right, while the foreign exchange constraint and the demand curve for importables remain in place, domestic output \( Q^{\text{DOM}} \) increases, and the implicit tariff \( \tau \) (i.e. the domestic price) falls.

There are basically three ways of testing whether the domestic deflator has a bias. First, alternative price series can be derived from different sources. Inconsistencies can give some indication of the type or the source of the bias. Second, we can trace other policy changes which may dominate changes in price deflators over those in trade restrictions. Policy changes may induce misreporting and hence create a bias in the data. Third, a demand system can be estimated for the Kenyan economy. If the expenditure and price elasticities obtained from the estimation turn out to be implausible, it is likely that the price index in question is biased (assuming that the expenditure series are unbiased). If the price index turns out to be biased, we can proceed by using demand elasticities estimated elsewhere in order to derive a hypothetical domestic price series which can be used to calculate the implicit tariff index.

A. Alternative price series

To test our two hypotheses let us first look at the alternative price series for our base case domestic deflator, the ex factory price obtained using the value of manufacturing output and the quantity index. Two other ex factory price indices can be calculated by using manufacturing value added data from the National Accounts as well as data from the Survey of Industrial Production. The National Accounts report total manufacturing only. All three implicit tariff indices depicted in Figure 3 are therefore calculated on the same basis, i.e. food processing, beverages and tobacco are included. When the total output deflator is used, the implicit tariff index indicates relatively modest liberalization over time, whereas both the National Accounts and the Survey of Industrial Production value added deflators produce a dramatic fall in the index since 1967.
Hence, we are not able to confirm or reject the first hypothesis of underreporting of sales on the basis of the alternative indices derived using the value added instead of the value of output data. Other things being equal, underreporting of sales should produce a similar trend in each index. As price controlled foodstuffs are now included, we would also expect all the indices to be flatter than the non-food index. One explanation for the observed deviation could be the share of foodstuffs which is higher in output than in value added.

Figure 3:
*Implicit Tariff Index: Total Manufacturing 1967 & 1972–90*

The difference, however, is too small to account for the entire discrepancy. Another explanation could be that if the value added price of manufacturing falls relative to input prices (e.g. oil), the output price series will rise faster than the other two. In other words, either increasing overvaluation of inputs, such as over invoicing of imports, or a faster increase in the price of (imported or other) inputs than that in the domestic value added price could give rise to the observed deviation. In the latter case profits as well as industrial wages must have fallen from the levels of the late-1960s and early-1970s.

For another domestic price comparison we choose clothing and footwear industry because both a producer and consumer price index (CPI) are available for this sector. The equivalent domestic ex factory price is again derived from the value of output and the quantity index of the sector. As can be seen from Figure 4, the implicit tariff indices based on consumer and producer prices of clothing and footwear behave quite differently from one
The huge fall in producer prices in 1976-81 was not fully passed on to consumers, while the increase in the mid-1980s is only partially reflected in consumer prices. It is very difficult to determine what makes the two series behave so differently, whether it is a data problem in either of the domestic price series, an increase in underreporting of sales in the latter part of the 1970s and in the early 1980s, or retailers not passing price changes on to consumers.

Figure 4:
Implicit Tariff Indices: Clothing and Footwear, 1967-90

The implicit tariff index derived using a CPI series instead of a producer price (Figure 4) is in sharp contrast with our base case (Figure 1). The CPI index indicates that import controls were tightened from 1973 onwards, with the exception of 1974. The coffee boom, for instance, is shown as a tightening of import controls rather than liberalization in the CPI index. Since 1980 its trend has been declining, with the exception of 1983-84 and 1986. In 1990 the index fell to an all-time low level. According to the snapshots of NRPs, protection of textiles, garments etc. has not changed much since the late-1960s. Despite some small variations, readings of the CPI alternative match quite well the snapshots of actual levels of protection, except for the UK import prices for textiles and textile products applied in the MSA study (1989).

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20 Years 1968-75 have been omitted from the ex factory price index because comparable data for 1968-71 is not available, and 1972-75 data show extremely high levels of implicit tariff (over 500 percent). This is likely to be an indication of a data problem at low levels of production.
Let us for a moment assume that there is no bias in the domestic deflator but that the ex factory price series is dominated by entry and expanding domestic production. In other words, changes in protection are not observable from the implicit tariff index as they are being swamped by the falling price level as the economy moves down the demand curve. Despite the fact that domestic producers face these prices, the base case implicit tariff index is therefore not a good indicator of trade policy. Were the second hypothesis confirmed, the tradable component of the consumer price index (CPI) would be an obvious alternative. Unfortunately, the Kenyan CPI has also a few shortcomings. First, it is based on the household budget survey of 1974-75 and therefore may not represent subsequent consumption patterns very well. Second, the share of importables relative to nontradables is very small in the CPI. Third, as we pointed out earlier, its decomposition is not compatible with that for imports. Finally, comparison of consumer goods alone would exclude many tradable import-competing goods used as inputs. For all these reasons, if we cannot use the domestic ex factory price, we are left with a few special cases of importables, such as clothing and footwear, for which the CPI is available.

Summarizing, the evidence we obtain from using alternative domestic price series for calculating the implicit tariff index is far from conclusive. First, different data sources seem to yield very different series for producer prices. There is some indication that the recorded value of inputs could be a source of deviation. Second, producer and consumer prices behave very differently over time. In the case of clothing and footwear at least, the former creates a strong declining trend for 1974-81, which is modestly reversed in 1982-87, while the latter indicates almost an opposite trend.

B. Other data which could reveal biases

Let us next look at policy changes that may have impacted on how sales have been reported over time. First, the effects of price controls have largely been eliminated by the choice of industrial sub-sectors. Second, taxation of profits in Kenya has not changed much since the early-1970s. In 1974 the corporate tax rate was raised from 40 percent to 45 percent where it remained until 1988. In three subsequent years it was reduced by 2.5 percentage points each year (International Bureau for Fiscal Documentation). Hence there has been no incentive to
increase underreporting of sales due to changes in the corporate tax rate, except perhaps in 1974.

Underreporting of exports may also produce flawed domestic producer price deflators. As depicted in Figure 5, the share of exports in manufacturing output has fallen considerably since 1967. Hence, assuming that the incentive for underreporting exports has remained constant, there is no reason to believe that increased underreporting of exports has caused a general downward bias in the domestic price. It is, however, possible that the incentive for understating the value of exports has changed over time. It may, for example, be correlated
with the black market rate premium so that a peak was likely to have occurred after the attempted coup d'etat in 1982.

In order to test our second hypothesis of falling prices as more firms enter and output expands, let us look at the annual growth rate of manufacturing output (calculated from the quantity index). As can be seen from Figure 6, the growth rate was very high in the 1970s, with the exception of 1975. The exceptionally high growth rates coincide with the coffee boom in 1976-78. It is, therefore, quite plausible that the dominant source of change in the domestic price is the expansion of manufacturing production. Larger quantities imply a lower price level which is reflected in the domestic price index. Although positive, the growth rate of manufacturing was considerably slower in the 1980s, as was the decline in the trend in the implicit tariff index (Figure 1). The steepest fall in the share of imports occurred in 1981-83 rather than in 1976-79 as one would have expected on the basis of manufacturing growth. Therefore, we are left with the other explanation, i.e. relaxation of the foreign exchange constraint $F$ having been responsible for the persistence of the import share during the latter part of the 1970s, despite rapid growth in domestic manufacturing. As Figure 8 shows, there was indeed a huge relaxation of $F$ in 1976-78, which gradually returned to its previous level by 1981. Concluding, the large fall in the implicit tariff index in the latter part of the 1970s and during the early years of the 1980s can be explained by a fall in the domestic deflator, which was due to both growth in manufacturing and relaxation of the foreign exchange constraint during the coffee boom.

According to the theory of a constant foreign exchange constraint captured by Figure 2, the share of imports in importables (as well as the domestic price) should fall as domestic output expands. As another test for the second hypothesis, we will examine what happened to the Kenyan share of imports in importables over time. If the share of imports has been falling, assuming a constant foreign exchange constraint, the theory implies that domestic production must have expanded, and the domestic price fallen. The share of imports is depicted in Figure 7.

By 1988 the share of imports had regained its mid-1970s level, although in 1989 there was a large peak. As $F$ has remained fairly constant since the early-1980s, except for a small peak in 1986 which coincided with a mini-coffee boom, and domestic production was still expanding, although at a slower pace, we would expect the share of imports to have remained somewhat lower than in the 1970s. Therefore, we cannot explain the trend in the market share
of imports during the last few years, including the 1989 peak, in terms of the theory of a foreign exchange constrained economy.

At least two of the peaks in the market share of imports reflect speculative inventory accumulation. As shown in Reinikka (1994), large stocks of durable imports were accumulated in 1978 when private agents, anticipating that the coffee boom was coming to an end, took advantage of temporarily relaxed import controls. Similarly in 1980, when the exogenous trade liberalization was incompatible with exchange rate management, stocks of imported intermediate and consumer durables surged. It is plausible that the 1989 peak also
reflects mistrust on the part of private agents in import liberalization which was initiated during that year.

C. Estimating an aggregate demand system

For the final test of bias in the domestic deflator, we will estimate a demand system for the Kenyan economy, which is assumed to consist of three sectors: exportables, importables and nontradables. Exportables are not consumed domestically. There are two ways to approach the problem. First, we can estimate price and expenditure elasticities, given prices, budget shares (or quantities) and expenditure. If the downward trend in the domestic price is false, we are likely to obtain implausible elasticities (assuming, of course, that the data for expenditure and price of nontradables are unbiased). For example, if the expenditure elasticity indicates that importables are a necessity, or if the elasticity with respect to its own price is positive, we can suspect a bias in the data. Second, if the elasticities turn out to be implausibly high or low, we can use elasticities derived from other studies and, given the price of nontradables, demand for importables and private expenditure, obtain an unbiased price series for importables.

We will use the Nearly Ideal Demand System which can be defined by the following model (Deaton and Muellbauer 1980a,b):

\[ w_i = \alpha_i + \sum_j \gamma_j \log p_j + \beta_i \log (x/P) \]  

(13)

where \( w_i \) is the budget share of good \( i \), \( p_j \) is the price of good \( j \), \( x \) is total expenditure, and \( P \) is a price index defined by:

\[ \log P = \alpha_p + \sum \alpha_i \log p_i + \frac{1}{2} \sum \gamma_j \log p_j \log p_i \]  

(14)