

CENTRAL BANK OF LESOTHO

EFFECTS OF THE 1990 INCREASE IN  
THE PRICE OF CRUDE OIL ON  
LESOTHO'S BALANCE OF PAYMENTS POSITION

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## 1. INTRODUCTION

### 1.1 Problem Setting

Following the emergence of, and largely as the result of the political crisis in the Persian Gulf on the second of August 1990, the price of crude oil increased from a monthly average of \$15 per barrel during 1990 to an average of \$25 per barrel in August 1990. It has remained relatively high since the start of the Crisis averaging not less than \$25 per barrel (see figure 1 below).

On the home front, retail prices of basic fuels (petrol, diesel and paraffin) rose two months after the start of the Crisis rising from M1.16 per litre for petrol to M1.28 per litre on 1<sup>st</sup> October, 1990. The price again rose temporarily to M1.60 per litre before coming down to M1.45 at the beginning of 1991.

Needless to say, that the derivatives of crude oil are not only of strategic economic and social importance but also that Lesotho imports 100 per cent of its crude oil products. Under the circumstances, therefore, the question that arises becomes to what extent will Lesotho economy be affected by the recent increases in the price of crude oil?

Figure 1

## 1.2 Purpose

The overall objectives of this paper are:

- 1) to quantify the effects of the recent oil price increases on Lesotho's balance of payments position particularly on the current account position, and
- ii) to examine policy instruments, available to the Lesotho authorities, that could be used in an effort to cushion the impact, should such an impact be found to be adverse.

## 1.3 Justification

A study of this nature is not only timeous but also imperative for a number of reasons. First, the results of the study should prove useful to the Lesotho authorities in evaluating alternative protective measures in that since corrective measures themselves have to be evaluated against the magnitude of the impact, the results of the study will provide part of the information regarding relative costs of the impact vis-à-vis the costs of corrective measures. The monetary authorities, concerned with maintaining the stock of foreign assets at a certain desirable level, may need to know the extent to which foreign assets will deteriorate as the results of continued high prices of oil. The results of the study could also be used in preparing proposals for requesting financial assistance from such arrangements as the IMF's special oil facility.

Aside from being useful for policy purposes, the results could also be of interest to the general public interested in knowing the extent to which increased oil prices have affected Lesotho's balance of payments position.

## 1.4 Organisation of the Rest of the Paper

The paper has been organized as follows: In the rest of this first section, a discussion of the methodology that will be used in pursuit of the first objective of the paper will be given. The discussion of the methodology will be followed by a brief justification of the choice

of the particular methodology. Section two of the paper gives the model specification of the various components of the merchandise imports while section three offers a discussion of the type of data used in estimating the parameters of the model. In section four, the estimated results of the model are given together with a discussion of the authenticity of the results obtained as well as a discussion on the implications of the estimated results on the value of imports. Section five contains simulation results made, based on the results of the estimated model. A discussion of the policy options available to Lesotho authorities to cushion the effects of the impact is offered in section six of the paper. Section seven offers the conclusion.

### 1.5 Methodology

Since the objective is to estimate the effects brought about by the oil price increases, the approach taken is that of estimating the current account position that would occur under 'normal' circumstances. This is called Scenario A. Then, estimates of the current account position under the conditions of increased oil prices are made. This is Scenario B. The difference in the current account position between Scenario A and B is the effect of the oil price increases brought about by the Gulf Crises.

The current account position is defined as the balance on the current account by the basic current account identity as:

$$\text{Balance on current account} = \text{EX} - \text{IM} = \text{LI} + \text{OTH} = \text{UN}$$

where

|     |   |   |
|-----|---|---|
| EX  | = | The value of merchandise exports at current Market prices.    |
| IM  | = | The value of merchandise imports at current Market prices.    |
| LI  | = | Net Inflows of labour income at current market Prices.        |
| OTH | = | The net value of other non-merchandise trade                  |
| UN  | = | Net Inflows of unrequited transfers at current Market prices. |

Having defined what is meant by the current account position, the next step is to outline how the above components of the current account will be estimated.

Imports of merchandise have been disaggregated into imports of petrol, diesel, paraffin and other imports. This desegregation allows for the separate modelling of imports of immediate products of crude oil - petrol, diesel, and paraffin from the rest of other merchandise imports. It is thought that the immediate impact of higher oil prices will be limited to these products during the early part of the Crisis while the economy wide impact will only be felt with some time lag. In fact, an assumption made concerning the estimation of other merchandise imports is that the inflationary impact on other imports will be fully felt from the beginning of 1991 (1).<sup>1</sup>

Separate functions for petrol, diesel, paraffin and other merchandise imports have been estimated through the method of ordinary least squares using the 'small-country' assumption to allow for the identification of these functions. Various simulations were then run on the computer spreadsheet package, using the estimated results of the model, to obtain the value of merchandise imports under different scenarios.

Other current account items (exports, labour income, other non-merchandise trade and unrequited transfers) were estimated using the straight-line method. This rather crude method of estimating other components of the current account position could be defended on the grounds that:

- i) the present objective of the paper is to offer estimates of the EFFECTS of increased oil prices on the current account position and not the current account position in itself. The crucial point is whether under scenario A; values of exports, labour income, unrequited transfers, and other non-merchandise trade are likely to be different from their respective values under scenario B. More specifically, is the price of crude oil a significant determining factor for the value of exports for Lesotho? If the answer to this question is positive, then, the value of exports under scenario A will be different from the value of exports under scenario B. If the answer to this question is on the negative side, the value of exports will be the same in both scenarios.

- ii) The effects of increased oil prices on a particular current account components under the two scenarios are less clear. At one extreme, the value of imports under scenario A is likely to be different from the value of imports under scenario B. Depending on the import elasticities, imports are likely to be higher, ceteris paribus, under scenario B if the import demand is price inelastic. At the other end of the extreme, it is less clear how increased oil prices could affect the value of unrequited transfers (grants). It is likely for example, that increased oil prices could lead to increased or lower value of unrequited transfers?
- iii) the position taken is that except for imports, all other current account items are not likely to be affected by increased oil prices and therefore that their estimates, even if less precise, will not affect the impact of increased oil prices since their values will be the same under both scenarios.

2. MODEL SPECIFICATION - MERCHANDISE IMPORTS:

Merchandise imports (for petrol, diesel, paraffin have been modelled using the general function of the form:

$$Q = Q(P, Y)$$

Where Q = Quantity of imports of a particular product

P = Price of the product

Y = National income

Two different functional forms were considered for each product: the linear and the log-linear functional forms. Both functional forms fitted the data well but the linear functional form tended to exhibit serial correlation problem particularly for petrol and paraffin. A log-linear functional form was then used for these products. Specific functional forms of petrol, diesel and paraffin imports are as follows:

Where:

- = Quantity of petrol imports (in million litres) during quarter t.
- = Quantity of diesel imports (in million litres) during quarter t.
  
- = Quantity of paraffin imports (in million litres) during quarter t.
  
- = Import parameter for petrol
- = Import parameter for diesel
- = Import parameter for paraffin
- = Import parameter for other merchandise imports
- = Import price elasticity of petrol
- = Import income elasticity of petrol
- = Price coefficient of diesel imports
- = Income " " " "
- = Dummy coefficient
- = " "
- = Import price elasticity of paraffin
- = " income " " "
- = Price coefficient for other merchandise imports
- = Income " " " " "
- = Dummy coefficient
- = Coefficient of money supply
- = Import price index (1981=100)
- = Value of imports during quarter
- = Gross national income during quarter
- = Real money supply (M3) as at the beginning of quarter
- = Dummy variable, takes value of 0) for the first three quarters and 1 for the fourth quarter.
- = Dummy variables, takes the value of 0) for the years 1984-1987 and 1 for the years 1988-1989.
- = Dummy variable, takes the value of 0) for the first two quarters and 1 for the last two quarters.

### 3. DATA DESCRIPTION AND ADJUSTMENTS MADE ON THE DATA

#### 3.1 Quantities of petrol, diesel and paraffin imports:

Amounts of these imports are presented in million litres and represent all imports coming into Lesotho during a given period. The figures were originally given in monthly terms and have been aggregated into quarterly quantities.

#### 3.2 Prices of petrol, diesel and paraffin

Prices are quoted in maloti per litre. They represent inbond-landed cost (IBLC) which are the landed costs free of any form of tax.

#### 3.3 National Income

Gross national product figures at 1980 prices have been used. To obtain quarterly figures, the yearly figure has been apportioned using equal weighting to all the four quarters.

#### 3.4 Import Price Index

Import price index (1981=100) has been used as a proxy to the general price level of imports.

#### 3.5 Value of Other Merchandise Imports

The nominal value of imports of petrol, diesel and paraffin were subtracted from the total nominal value of imports (c.i.f.) to give the nominal value of other imports. The difference was then adjusted using the import price index to obtain real value of other merchandise imports. Imports of LHWP (see 4.2 for a note on LHWP) have not been included in the data. It was felt that imports for this project were determined, to a large extent, by the contractual timing of the implementation of the project. LHWP imports used in the simulations were obtained from the project authorities.

### 3.6 Money Supply

Money supply figures used are those of M3 (M2 plus government deposits). The figures used are as at the beginning of the quarter and have been deflated using the import price index.

## 4. ESTIMATED RESULTS OF THE MODEL

### 4.1 Petrol Imports

The estimated petrol imports function is as follows:

$$\begin{aligned} \text{Log } (Q_t) = & - 1.52733 - 0.22227 \text{ Log } (P_{t-3}) + 1.12054 \text{ Log } (Y_{t-3}) \\ & (0.01924) \quad (0.05891) \quad (0.18970) \\ \text{t-Statistic}^* = & - 79.38306 \quad - 3.77304 \quad 5.90690 \quad R^2 = 0.80925 \\ & & & & \text{D-W} = 1.16 \end{aligned}$$

All coefficients are significant at 5 per cent level of significance. The Durbin-Watson test for third order serial correlation returned inconclusive results both at 5 per cent and 1 per cent level of significance. The coefficient of multiple determination is high at 0.80925.

### 4.2 Diesel Imports

The estimated diesel import function was found to be<sup>2</sup>

$$\begin{aligned} Q_t^o = & -5.82600 - 3.73648 P_{t2} + 0.09849 Y_{t2} + 1.74341 \\ & D_1, +1.22610 D_2 \\ & (0.75158) \quad (2.18154) \quad (0.03743) \quad (0.36970) \quad (0.68025) \\ \text{t-statistics} = & -11.74326 \quad -1.71277 \quad 2.63131 \quad 4.71574 \quad 1.80243 \\ & & & & R^2 = 0.86626 \end{aligned}$$

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\* All t-statistics in this section are calculated on the hypothesis that the relevant coefficient is zero.

$$DW = 1.7$$

The price coefficient is insignificant at 5 per cent level of significance. The coefficient for the dummy variable D2 (the dummy variable intended to capture the effect of increased diesel consumption as the result of the LHWP (2<sup>2</sup>)) is also insignificant at 5 per cent level of significance. However, both the income and seasonal dummy coefficients are significant at the same level of significance. Based on Durbin-Watson test, there is no evidence of second order serial correlation at 5 per cent level of significance.

#### 4.3 Paraffin Imports

Results of the estimated paraffin imports function are as follows:

$$\begin{array}{l} \text{Log } (Q_t^{pa}) = -8.87782 \quad -0.53592 \quad \text{Log } (Pt-3) = 4.40042 \quad \text{Log } (Yt-3) \\ \quad (0.07099) \quad (0.21934) \quad \quad \quad (0.6197) \quad R^2=0.77247 \\ \text{t-statistic} \\ \quad -125.057 \quad 2.44333 \quad \quad \quad 6.54854 \quad \quad \quad DW = 1.86 \end{array}$$

All coefficients are significant at 5 per cent level of significance. The Durbin-Watson test returned no evidence of third order serial correlation (either negative or positive) at 5 percent level of significance. The R2 is high (77.2473 per cent).

#### 4.4 Other Merchandise Imports

Results of the estimated 'other imports' function are as follows:

$$\begin{array}{l} Mt = -0.10628Pit + 0.6146938Y + 11.14258D + 0.094460M3t \\ \quad (0.0723) \quad (0.07227) \quad (3.15018) \quad (0.08053) \\ \text{t-statistic} \\ \quad -1.47002 \quad 8.50593 \quad 3.53712 \quad 1.17302 \\ \\ \quad \quad \quad R^2 = 0.61766 \\ \quad \quad \quad DW = 1.90 \end{array}$$

#### Multicollinearity in 'Other Imports' Model

The presence of gross national product and money supply (M3) as independent variables in this model raises some

suspensions about the presence of multicollinearity. This suspicion would be particularly strong for people with monetarist views. Monetarists believe that there is a DIRECT and RELIABLE link between money supply and national income brought about by a stable money velocity. There would thus be a stable, and possibly linear, relationship between money supply and national income.

Indeed, when the regression function of the form:

$$Y_t = d + \beta M_{st} + E_t$$

was run, the following results were obtained:

|             |     |            |   |            |       |       |     |          |
|-------------|-----|------------|---|------------|-------|-------|-----|----------|
| $Y_t$       | $=$ | 109.6476   | + | 0.183308   | $M_t$ | $R^2$ | $=$ | 0.812474 |
|             |     | (4.105174) |   | (0.018775) |       |       |     |          |
| t-statistic |     | 26.7096    |   | 9.7634     |       |       |     |          |

This indicates the presence of a linear relationship between M3 and national income (taken to mean real GNP). These results should please monetarists. For every unit increase in real money supply, real national income increases by 0.183308 units. This means that if real M3 increases by M1 million, real national income increases by M0.183308 million (or nearly M183 thousands).

Multicollinearity is usually detected by the presence of a high value of R and low t-statistic. Examination of the results of 'other imports' model shows that both R and t-statistics are high. Which means that multicollinearity even though present, it is not a serious problem in this model.

#### 4.5 Implications of the Estimated Results on the Value of imports

Estimated results of various import functions are plausible. The price coefficients are negative in accordance with what economic theory suggests, indicating that as the price increases, imports of these products are reduced. Price coefficients are also consistent with what one would expect of the elasticities of oil products - that they would be inelastic. The price elasticity of imports of petrol for example is estimated to be 0.22 which is inelastic. That of paraffin is estimated at 0.54.

Income elasticities of imports are also consistent with the results suggested by theory. Income elasticity of petrol imports is estimated at 1.12 while that of paraffin is estimated at around 4.40.

The inelastic nature of nature of petrol imports, indicates that as the price of petrol increases, the value of imports increase, even though the quantity of petrol imported will decrease (since the price coefficient is negative). The conclusion that could be drawn from this is that increases in the price of crude oil have a two-way impact. First, under fixed exchange rate system (as is the case with Lesotho exchange rate between RSA rand and loti) the increased value of import bill, as the result of increased oil prices, will lead to increased outflow of foreign exchange holdings. More foreign exchange will be needed to purchase a smaller quantity of imports. Secondly, since the price coefficient is negative, when the price increases, everything else remaining constant, lower quantities of petrol will be imported and in the absence of close substitutes for petrol to meet the energy requirements, this could mean lower levels of the standard of living as economic agents are forced to cut down on their consumption of petrol. This does not mean that other methods of economizing will not be pursued, but for those economic agents who had reached the threshold of efficiency of petrol utilization, increased oil prices will lead them to cut down on the consumption as avenues for economizing will already have been exhausted. This analysis could also be extended to the other estimated import functions.

The overall conclusion that could be drawn from the results of the estimated various import functions is that the results are plausible, free from the statistical problems of estimation, and do not appear to be suggesting results contrary to what economic theory suggests. Further, the results indicate that an increase in the price of crude oil will lead to increased value of imports. In order to quantify the extent of the increase, simulation exercises have been performed and the results are discussed in the next section.

## 5. SIMULATION RESULTS.

Simulation results for Scenario A and B are shown below. Scenario A represents the situation without the Crisis while Scenario B represents the situation under increased oil prices - the Crisis situation.

Results for quarter III 1990, for example, show a current account position of M44.71 million under Scenario A and a current account position of only R41.42 million under Scenario B. Because of increased oil prices, the current account position is lower by M3.29 million.

Table 9 shows how the figures shown under the different scenarios have been obtained. Taking imports of petrol for example, under Scenario A, (quarter III, 1990), it is assumed that without the crisis the dollar price of a barrel would be 15 dollars per barrel, the loti-dollar exchange rate would be M2.6. This converts into M39-00 per barrel. If the price of crude oil is M39-00 per barrel then the IBLC is calculated to be M0.53 per litre (see Appendix C). Values of independent variables in equation 5.1 are also shown in the table. Also under Scenario A, (quarter III, 1990)) exports are expected to increase by 2 per cent giving a value of M36.74 million, labour income is expected to grow by 15 per cent to M289.18 million.

From table 9, during quarter III, 1990, the dollar price of a barrel of crude oil averaged 25 dollars per barrel. This is shown under Scenario B. The IBLC during the same period was M0.66 per litre. This and other information was used in equation 5.1 to find the value of petrol imports under Scenario B.

Simulation results show that the impact of increased oil prices is higher in 1991 than during 1990. For the last two quarters of 1990, the current account position deteriorates by M6.7 million while for the first two quarters of 1991 the deterioration amounts to M19.39 million. A deterioration for the last two quarters of 1991 amounts to M11.25 million.



CURRENT ACCOUNT PROJECTIONS (Million Maloti)

| Scenario A                          | Scenario B                          |
|-------------------------------------|-------------------------------------|
| Quarter III 1990                    |                                     |
| MERCHANDISE IMPORTS (c.i.f) -442.88 | MERCHANDISE IMPORTS (c.i.f) -446.17 |
| - PETROL - 5.44                     | - PETROL - 6.75                     |
| - DIESEL - 4.91                     | - DIESEL - 5.77                     |
| - PARAFFIN - 4.93                   | - PARAFFIN - 6.06                   |
| - OTHER IMPORTS -354.84             | - OTHER IMPORTS -354.84             |
| - LHWP - 72.75                      | - LHWP - 72.75                      |
| EXPORTS 36.74                       | EXPORTS 36.74                       |
| LABOUR INCOME 289.18                | LABOUR INCOME 289.18                |
| OTHER ITEMS (NET) - 7.79            | OTHER ITEMS (NET) - 7.79            |
| <u>UNREQUITTED TRANSFERS 169.46</u> | <u>UNREQUITTED TRANSFERS 169.46</u> |
| CURRENT ACCOUNT BALANCE 44.71       | CURRENT ACCOUNT BALANCE 41.42       |

OIL PRICE EFFECT = -3.29

| Scenario A                          | Scenario B                          |
|-------------------------------------|-------------------------------------|
| Quarter IV 1990                     |                                     |
| MERCHANDISE IMPORTS (c.i.f) -449.37 | MERCHANDISE IMPORTS (c.i.f) -452.78 |
| - PETROL - 5.63                     | - PETROL - 6.92                     |
| - DIESEL - 5.76                     | - DIESEL - 6.89                     |
| - PARAFFIN - 6.01                   | - PARAFFIN - 6.99                   |
| - OTHER IMPORTS -359.22             | - OTHER IMPORTS -359.22             |
| - LHWP - 72.75                      | - LHWP - 72.75                      |
| EXPORTS 39.09                       | EXPORTS 39.09                       |
| LABOUR INCOME 268.48                | LABOUR INCOME 268.48                |
| OTHER ITEMS (NET) - 8.43            | OTHER ITEMS (NET) - 8.43            |
| <u>UNREQUITTED TRANSFERS 172.48</u> | <u>UNREQUITTED TRANSFERS 172.48</u> |
| CURRENT ACCOUNT BALANCE 22.24       | CURRENT ACCOUNT BALANCE 18.83       |

OIL PRICE EFFECT = -3.41

| Scenario A                          | Scenario B                          |
|-------------------------------------|-------------------------------------|
| Quarter I 1991                      |                                     |
| MERCHANDISE IMPORTS (c.i.f) -411.39 | MERCHANDISE IMPORTS (c.i.f) -422.33 |
| - PETROL - 5.63                     | - PETROL - 8.31                     |
| - DIESEL - 4.91                     | - DIESEL - 7.31                     |
| - PARAFFIN - 6.01                   | - PARAFFIN - 9.39                   |
| - OTHER IMPORTS -313.17             | - OTHER IMPORTS -315.64             |
| - LHWP - 81.68                      | - LHWP - 81.68                      |
| EXPORTS 42.91                       | EXPORTS 42.91                       |
| LABOUR INCOME 263.54                | LABOUR INCOME 263.54                |
| OTHER ITEMS (NET) - 26.00           | OTHER ITEMS (NET) - 26.00           |
| <u>UNREQUITTED TRANSFERS 123.57</u> | <u>UNREQUITTED TRANSFERS 123.57</u> |
| CURRENT ACCOUNT BALANCE - 7.38      | CURRENT ACCOUNT BALANCE - 18.32     |

OIL PRICE EFFECT = -10.94

| Scenario A                          | Scenario B                          |
|-------------------------------------|-------------------------------------|
| Quarter II 1991                     |                                     |
| MERCHANDISE IMPORTS (c.i.f) -413.02 | MERCHANDISE IMPORTS (c.i.f) -421.48 |
| - PETROL - 5.63                     | - PETROL - 7.61                     |
| - DIESEL - 4.91                     | - DIESEL - 6.93                     |
| - PARAFFIN - 6.01                   | - PARAFFIN - 8.00                   |
| - OTHER IMPORTS -314.80             | - OTHER IMPORTS -317.25             |
| - LHWP - 81.68                      | - LHWP - 81.68                      |
| EXPORTS 35.24                       | EXPORTS 35.24                       |
| LABOUR INCOME 266.86                | LABOUR INCOME 266.86                |
| OTHER ITEMS (NET) - 38.85           | OTHER ITEMS (NET) - 38.85           |
| <u>UNREQUITTED TRANSFERS 145.76</u> | <u>UNREQUITTED TRANSFERS 145.76</u> |
| CURRENT ACCOUNT BALANCE - 4.01      | CURRENT ACCOUNT BALANCE - 12.46     |

OIL PRICE EFFECT = -8.45

| Scenario A                          | Scenario B                          |
|-------------------------------------|-------------------------------------|
| Quarter III 1991                    |                                     |
| MERCHANDISE IMPORTS (c.i.f) -449.31 | MERCHANDISE IMPORTS (c.i.f) -455.44 |
| - PETROL - 5.63                     | - PETROL - 6.88                     |
| - DIESEL - 4.75                     | - DIESEL - 5.61                     |
| - PARAFFIN - 6.01                   | - PARAFFIN - 7.14                   |
| - OTHER IMPORTS -351.24             | - OTHER IMPORTS -354.14             |
| - LHWP - 81.68                      | - LHWP - 81.68                      |
| EXPORTS 32.74                       | EXPORTS 32.74                       |
| LABOUR INCOME 281.16                | LABOUR INCOME 281.16                |
| OTHER ITEMS (NET) - 41.71           | OTHER ITEMS (NET) - 41.71           |
| <u>UNREQUITTED TRANSFERS 220.00</u> | <u>UNREQUITTED TRANSFERS 220.00</u> |
| CURRENT ACCOUNT BALANCE - 42.89     | CURRENT ACCOUNT BALANCE - 36.76     |

OIL PRICE EFFECT = -6.13

| Scenario A                          | Scenario B                          |
|-------------------------------------|-------------------------------------|
| Quarter IV 1991                     |                                     |
| MERCHANDISE IMPORTS (c.i.f) -462.15 | MERCHANDISE IMPORTS (c.i.f) -467.27 |
| - PETROL - 5.50                     | - PETROL - 6.45                     |
| - DIESEL - 5.60                     | - DIESEL - 6.82                     |
| - PARAFFIN - 5.50                   | - PARAFFIN - 5.70                   |
| - OTHER IMPORTS -363.87             | - OTHER IMPORTS -366.61             |
| - LHWP - 81.68                      | - LHWP - 81.68                      |
| EXPORTS 30.04                       | EXPORTS 30.04                       |
| LABOUR INCOME 279.17                | LABOUR INCOME 279.17                |
| OTHER ITEMS (NET) - 37.08           | OTHER ITEMS (NET) - 37.08           |
| <u>UNREQUITTED TRANSFERS 221.99</u> | <u>UNREQUITTED TRANSFERS 221.99</u> |
| CURRENT ACCOUNT BALANCE - 31.98     | CURRENT ACCOUNT BALANCE - 26.86     |

OIL PRICE EFFECT = -5.12

There are three main reasons for the higher oil impact during 1991 than during 1990. First, the dollar price of crude oil per barrel is expected to rise to well above \$25 (a 1990 crisis average) a barrel during 1991 as the result of the break out of war and fears that some oil wells may be rendered unoperational. The dollar price of crude oil is expected to average \$28 per barrel during 1991 with the highest price of \$32 per barrel expected during the first quarter of 1991 (see table 9).

Secondly, the US dollar is expected to appreciate during 1991 as it is expected to perform its traditional role of a safe haven for investors during periods of uncertainties. The loti-dollar exchange rate is expected to average M2.66.

Thirdly, it is expected that there will be a general increase in the prices of goods and services as oil and its derivatives are inputs into virtually every production line. Although equation 5.4 shows that the price coefficient for real imports is  $-0.106$ , nominal imports increase as a result of higher inflation rate as evidenced by the simulation results.

## 6. POLICY IMPLICATIONS OF SIMULATION RESULTS

Based on the assumption that the deterioration in the balance of payments position by M6.70 million during the last six months of 1990 and by M30.64 million for the 1991 year is an undesirable situation, this section offers a discussion of the policy options available to the Lesotho authorities to minimize this impact.

Before going into the discussion on the policy options available, it is necessary first to set the framework within which such policies have to be evaluated. In a market economy, the ultimate policy goals are usually out of the direct control of the authorities. To take a specific example, it is clear that the current account position depends on the relative magnitudes of various components of the balance: imports, exports, etc. The magnitude of these items in turn depend on several factors, some of which as suggested in this paper are national income and prices. National income and prices themselves are outside the direct control of the authorities. Under the circumstances, the authorities have to depend on manipulating certain instrumental

variables on which variables like national income and prices in turn depend. This relationship between instrumental variables and ultimate policy goals is shown schematically below. Most policy actions involve the manipulation of instrumental variable in order to achieve a certain ultimate policy target indirectly through intermediate variables.

Figure 2



Policy actions themselves may have certain side-effects including the cost of implementing them. If over and above achieving a certain ultimate policy target, a given policy leads to other undesirable effects on the economy, such a policy measure may not have to be adopted. Another possibility is that a given policy measure may prove as expensive, in terms of implementation, as the impact itself.

Other policy measures, while not having side effects, and may be effective, may achieve desired objectives with a considerable time lag. Still other policies may work better when they are complemented by other policy measures. All these factors have to be taken into account when deciding upon a given policy measure to deal with a particular problem at hand.

It is clear from the simulation results that the single source for the observed negative impact of increased oil prices on Lesotho's balance of payments position is a higher level of imports, of both fuel products and other merchandise imports, under Scenario B than under Scenario A. Accordingly, measures geared towards reducing the extent of the impact should concentrate on reducing the growth rate of merchandise imports. What follows below is a discussion of policies designed to reduce the growth rate of imports as well as policies designed to increase exports to counteract increased imports.

## 6.1 Short-Term Policies

### 6.1.1 Micro-Economic Policies: Rules and Regulations

In an effort to reduce imports of fuel products, the authorities may wish to consider reducing the statutory business hours for Filling-Stations. At present, Filling-Stations are free to operate 24 hours. Shorter business hours for filling stations may go some way in reducing imports of fuel products. This policy measure scores high marks when judged in terms of its operational lag - it is capable of producing desired results within a relatively short time frame.

Judged in terms of other criteria, this policy measure may prove to be undesirable. First, its impact will be limited to curtailing of only imports of fuel products. It could therefore, have a limited effect because as shown by the simulation results, the largest contributor of negative impact is imports of other merchandise. Secondly, depending on the new length of business hours, motorists may seek to obtain fuel long before the closure time or even seek to source their fuel from the border towns of RSA, which would then defeat the purpose of the policy measure. Further, the policy may not prove to be in accordance with the requirements of the Structural Adjustment programme, which requires that Lesotho may not impose rules or regulations aimed at controlling imports for balance of payments purposes.

### 6.1.2 Monetary Policy

In section 4.4, it was observed that the data seems to suggest that there is no direct relationship between money supply and the level of imports (the coefficient was found to be statistically insignificant). However, an indirect link between money supply and imports exists. This link is through national income - a slower rate of growth of money supply will lead to a slower rate of growth of national income and hence from equation 4.4 a slower rate of growth in imports. Monetary policy could therefore prove to be a powerful policy instrument in controlling the growth rate of imports. In terms of figure 2, money supply would then be an instrumental variable, which the authorities could manipulate with the ultimate objective of controlling the growth of imports.

While this policy could work within a relatively short time frame, it appears to have considerable side effects. A slower rate of growth of imports can be achieved through reduced growth rate in national income and therefore by implication at the cost of reduced national standard of living.

Another aspect of monetary policy that could be pursued would be to put in place measures that could encourage savings on a large scale. This would achieve the twin objective of reducing the growth rate of imports while allowing national income to grow. This fact is usually demonstrated with reference to basic national accounting identity which states that:

$$Y = C + I + G + X - M$$

Where

- Y = National Output
- C = Private Consumption
- I = Private Investment
- G = Total Government Expenditure
- X = Exports of Goods and Services
- M = Imports of Goods and Services

From the above identity, various national output components could be rearranged to express the current account balance in terms of national savings as follows:

$$S = Y - (C + I + G) = X - M$$

It could therefore be seen that, ex post, national savings are equal to current account balance. (Caution must be exercised when interpreting the above equation. It does not say anything about the factors that may lead to increased savings. The equation just tells us that in the accounting sense, national savings are always identical to the balance on the current account).

Although this particular measure does not appear to have side effects its operational time-lag could be considerable especially in the Lesotho's situation of relatively less developed financial markets.

### 6.1.3 Fiscal Policy

Fiscal policy geared towards reducing imports through the imposition of taxes on imports is constrained by Lesotho's membership to the Southern African Customs Union (SACU). Lesotho currently obtains over 80 per cent of imports from RSA. She cannot impose taxes on imports from RSA according to SACU Agreement. This immediately leaves out a large portion of imports outside the tax bracket. Even for imports coming from outside the SACU area, the tax rate to be levied on these imports, has to be agreed upon jointly by SACU member states. It would therefore appear that there is no scope for the institution of fiscal policy for balance of payments purposes.

### 6.1.4 External Financial Assistance

There are two broad ways in which financial assistance sought could be used to deal with the problem at hand. The first, would be to use the funds to maintain foreign assets at the desirable level. This policy measure, by its nature presupposes that the effects will be short-lived and that the potential for repayment of such financial assistance is available. However, the amount of borrowing has to be carefully weighed against the extent of the impact. Used in this manner, such funds will have been used to treat the symptoms of the problem and not the root cause - which is the increase in imports.

The second would be to channel such funds to the promotion of export-oriented activities. In this regard, since the nature of the problem is such that the effects of the remedial measures have to be felt within a relatively short period of time, selective channelling will have to be applied. Funds should be channeled to only those industries that will be ready to export within a period of six months from the start of the crisis. Perhaps the best way would be to expand the capacity and size of the already existing export - oriented industries (assuming the market for increased exports exists or can be secured readily)

## 6.2 Long-term policies

### 6.2.1 Expanding the objectives of the oil equalisation fund

Lesotho is a member of the Oil Equalisation Fund Scheme. Other members are Botswana, The Republic of South Africa, and Swaziland. The scheme raises funds by levying taxes on fuels particularly on petrol, diesel and paraffin. There are three types of taxes levied on these fuels: basic levy, fire fighting levy, and synthetic fuels levy. Funds raised from the basic levy are used to subsidize purchases of oil by the member states during periods of high oil prices. This subsidy is then passed on to the consumer through lower retail prices<sup>3)</sup>. In 1990 for example, when the price of crude oil increased from \$15 per barrel, in August to around \$25 per barrel for the rest of August and again up to \$30 per barrel for the rest of 1990, retail prices of petrol for example, remained at M1.16 for two months (August and September). Thus from the manner in which the scheme is being currently operated, it could be inferred that the primary concern of the scheme is the welfare aspects of the consumers. It does not appear to have in-built arrangements to counteract balance of payments problems that could arise out of increased oil prices. It would seem therefore that there is scope expanding the role of the scheme to cushioning of balance of payments problems as well. This could perhaps be achieved through the establishment of the joint fuel depot.

### 6.2.2 Establishment of a national strategic depot.

The Government of Lesotho is already considering the establishment of a national strategic fuel depot. This measure will, to some extent, cushion the balance of payments problems caused by increases in the price of crude oil. The effectiveness of the measure would however be limited to fuel imports only.

## 7. CONCLUSION

The objective of the paper was to quantify the impact of the recent increases in the price of crude oil on

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<sup>3)</sup> Lesotho's fuel price regime is regulated by the Government through the setting of retail prices of basic fuels.

Lesotho's Balance of Payments Position. The second objective was to examine the policy options available to the Lesotho authorities, both in the short-term and long-term, in an effort to hedge against the adverse effects of the Crisis. The basic methodology applied has been to model imports of merchandise employing the small country assumption to allow for the identification of various functions. Merchandise imports were disaggregated into imports of petrol, diesel, paraffin and other merchandise imports. These were modelled separately to enable the separate analysis on the balance of payments position of immediate oil products and other merchandise imports.

Simulation results indicate that during the last six months of 1990, the balance of payments position deteriorates by M6.70 million. For 1991, the results indicate a deterioration of M30.64 million.

There appears to be a very limited scope both in the short-run and long-run to minimize the extent of the impact. In the short-run, several policy options considered appear to have considerable side effects. Those without side effects have a relatively longer operational time lag. Under the circumstances, the best alternative appears to be the policy of expansion of the size and capacity of already existing export oriented industries that could be ready to increase their export within a relatively short period of time, less than a year. This could be complemented by the policy of aggressive savings mobilization.

In the long run, the envisaged construction of a national strategic fuel depot may prove to be worthwhile. Its effectiveness could, however, be limited to lessening imports of fuel products only. The large impact caused by other non-fuel imports could still be left intact.

The extent of the impact depends on the time frame of the crisis. The shorter the Crisis, the lesser will be the impact. On the other hand, if the prices remain high for a longer time period, the magnitude of the crisis could place considerable stress on the country's foreign exchange. Accordingly, the need for remedial action will increase.

## APPENDICES

**APPENDIX A**

**TABLES**

TABLE 1

## DATA USED FOR ESTIMATION OF PETROL IMPORTS

|      |      | LOGARITHMS                        |                             |                             |                   |             |           |
|------|------|-----------------------------------|-----------------------------|-----------------------------|-------------------|-------------|-----------|
|      |      | QUANTITY<br>(Million)<br>(Litres) | PRICE<br>(Maloti/<br>Litre) | GNP<br>(Million<br>(Maloti) | LOG<br>(QUANTITY) | LOG (PRICE) | LOG (GNP) |
| 1984 | QI   | 8.93                              | 0.36                        | 145.95                      | 0.95              | -0.44       | 2.16      |
|      | QII  | 8.86                              | 0.39                        | 145.95                      | 0.95              | -0.41       | 2.16      |
|      | QIII | 9.01                              | 0.45                        | 145.95                      | 0.95              | -0.35       | 2.16      |
|      | QIV  | 9.48                              | 0.50                        | 145.95                      | 0.98              | -0.30       | 2.16      |
| 1985 | QI   | 9.15                              | 0.56                        | 142.45                      | 0.96              | -0.26       | 2.15      |
|      | QII  | 8.91                              | 0.54                        | 142.45                      | 0.95              | -0.27       | 2.15      |
|      | QIII | 9.13                              | 0.61                        | 142.45                      | 0.96              | -0.22       | 2.15      |
|      | QIV  | 8.82                              | 0.70                        | 142.45                      | 0.95              | -0.16       | 2.15      |
| 1986 | QI   | 8.10                              | 0.52                        | 139.05                      | 0.91              | -0.28       | 2.14      |
|      | QII  | 8.46                              | 0.40                        | 139.05                      | 0.93              | -0.40       | 2.14      |
|      | QIII | 8.57                              | 0.42                        | 139.05                      | 0.93              | -0.38       | 2.14      |
|      | QIV  | 9.00                              | 0.40                        | 139.05                      | 0.95              | -0.40       | 2.14      |
| 1987 | QI   | 9.21                              | 0.39                        | 148.85                      | 0.96              | -0.41       | 2.17      |
|      | QII  | 9.40                              | 0.38                        | 148.85                      | 0.97              | -0.42       | 2.17      |
|      | QIII | 9.68                              | 0.40                        | 148.85                      | 0.99              | -0.40       | 2.17      |
|      | QIV  | 10.01                             | 0.38                        | 148.85                      | 1.00              | -0.42       | 2.17      |
| 1988 | QI   | 9.90                              | 0.38                        | 161.90                      | 1.00              | -0.42       | 2.21      |
|      | QII  | 10.36                             | 0.41                        | 161.90                      | 1.02              | -0.39       | 2.21      |
|      | QIII | 10.52                             | 0.40                        | 161.90                      | 1.02              | -0.39       | 2.21      |
|      | QIV  | 10.65                             | 0.39                        | 161.90                      | 1.03              | -0.41       | 2.21      |
| 1989 | QI   | 10.43                             | 0.46                        | 162.58                      | 1.02              | -0.34       | 2.21      |
|      | QII  | 11.53                             | 0.58                        | 162.58                      | 1.06              | -0.23       | 2.21      |
|      | QIII | 11.00                             | 0.55                        | 162.58                      | 1.04              | -0.26       | 2.21      |
|      | QIV  | 10.94                             | 0.53                        | 162.58                      | 1.04              | -0.28       | 2.21      |

Source : Ministry of Water Energy and Mining

TABLE 2

## DATA USED FOR ESTIMATION OF DIESEL IMPORTS

|         | QUANTITY<br>(Million<br>(Maloti) | PRICE<br>(Maloti) | GNP<br>(Million)<br>(Maloti) | SEASONAL<br>DUMMY | CONSTR<br>DUMMY |
|---------|----------------------------------|-------------------|------------------------------|-------------------|-----------------|
| 1984 QI | 6.04                             | 0.44              | 145.95                       | 0                 | 0               |
| QII     | 6.04                             | 0.44              | 145.95                       | 0                 | 0               |
| QIII    | 6.13                             | 0.41              | 145.95                       | 0                 | 0               |
| QIV     | 7.59                             | 0.46              | 145.95                       | 1                 | 0               |
| 1985 QI | 5.80                             | 0.51              | 142.45                       | 0                 | 0               |
| QII     | 6.32                             | 0.49              | 142.45                       | 0                 | 0               |
| QIII    | 6.76                             | 0.54              | 142.45                       | 0                 | 0               |
| QIV     | 8.01                             | 0.63              | 142.45                       | 1                 | 0               |
| 1986 QI | 5.74                             | 0.48              | 139.05                       | 0                 | 0               |
| QII     | 6.31                             | 0.35              | 139.05                       | 0                 | 0               |
| QIII    | 7.15                             | 0.32              | 139.05                       | 0                 | 0               |
| QIV     | 8.54                             | 0.33              | 139.05                       | 1                 | 0               |
| 1987 QI | 6.79                             | 0.37              | 148.85                       | 0                 | 0               |
| QII     | 7.16                             | 0.35              | 148.85                       | 0                 | 0               |
| QIII    | 7.85                             | 0.38              | 148.85                       | 0                 | 0               |
| QIV     | 10.13                            | 0.38              | 148.85                       | 1                 | 0               |
| 1988 QI | 7.79                             | 0.37              | 161.90                       | 0                 | 1               |
| QII     | 8.74                             | 0.40              | 161.90                       | 0                 | 1               |
| QIII    | 10.04                            | 0.38              | 161.90                       | 0                 | 1               |
| QIV     | 11.60                            | 0.36              | 161.90                       | 1                 | 1               |
| 1989 QI | 8.92                             | 0.45              | 162.58                       | 0                 | 1               |
| QII     | 10.58                            | 0.50              | 162.58                       | 0                 | 1               |
| QIII    | 10.77                            | 0.50              | 162.58                       | 0                 | 1               |
| QIV     | 11.33                            | 0.52              | 162.58                       | 1                 | 1               |

Source: Ministry of Water, Energy and Mining

TABLE 3

## DATA USED FOR ESTIMATION OF PARAFFIN IMPORTS

|         | QUANTITY<br>(Million)<br>(Litres) | PRICE<br>(Maloti/l) | GNP<br>(Million)<br>(Maloti) | LOGARITHMS        |                |         |
|---------|-----------------------------------|---------------------|------------------------------|-------------------|----------------|---------|
|         |                                   |                     |                              | LOG<br>(QUANTITY) | LOG<br>(PRICE) | LOG GNP |
| 1984 QI | 6.13                              | 0.48                | 145.95                       | 0.79              | 0.32           | 2.16    |
| QII     | 7.75                              | 0.48                | 145.95                       | 0.89              | 0.32           | 2.16    |
| QIII    | 7.24                              | 0.45                | 145.95                       | 0.86              | 0.34           | 2.16    |
| QIV     | 6.11                              | 0.50                | 145.95                       | 0.79              | 0.30           | 2.16    |
| 1985 QI | 5.96                              | 0.56                | 142.45                       | 0.78              | 0.25           | 2.15    |
| QII     | 7.36                              | 0.54                | 142.45                       | 0.87              | 0.27           | 2.15    |
| QIII    | 7.32                              | 0.59                | 142.45                       | 0.86              | 0.23           | 2.15    |
| QIV     | 4.57                              | 0.70                | 142.45                       | 0.66              | 0.16           | 2.15    |
| 1986 QI | 4.55                              | 0.58                | 139.05                       | 0.66              | 0.23           | 2.14    |
| QII     | 5.22                              | 0.41                | 139.05                       | 0.72              | 0.39           | 2.14    |
| QIII    | 5.74                              | 0.36                | 139.05                       | 0.76              | 0.44           | 2.14    |
| QIV     | 5.00                              | 0.39                | 139.05                       | 0.70              | 0.41           | 2.14    |
| 1987 QI | 4.60                              | 0.40                | 148.85                       | 0.66              | 0.39           | 2.17    |
| QII     | 6.38                              | 0.38                | 148.85                       | 0.80              | 0.42           | 2.17    |
| QIII    | 7.95                              | 0.41                | 148.85                       | 0.90              | 0.39           | 2.17    |
| QIV     | 6.62                              | 0.40                | 148.85                       | 0.82              | 0.39           | 2.17    |
| 1988 QI | 6.32                              | 0.42                | 161.90                       | 0.80              | 0.38           | 2.21    |
| QII     | 9.25                              | 0.43                | 161.90                       | 0.97              | 0.37           | 2.21    |
| QIII    | 9.71                              | 0.41                | 161.90                       | 0.99              | 0.38           | 2.21    |
| QIV     | 11.23                             | 0.41                | 161.90                       | 1.05              | 0.38           | 2.21    |
| 1989 QI | 9.60                              | 0.52                | 162.58                       | 0.98              | 0.29           | 2.21    |
| QII     | 11.78                             | 0.53                | 162.58                       | 1.07              | 0.28           | 2.21    |
| QIII    | 12.60                             | 0.54                | 162.58                       | 1.10              | 0.27           | 2.21    |
| QIV     | 10.01                             | 0.59                | 162.58                       | 1.00              | 0.23           | 2.21    |

Source: Ministry of Water, Energy and Mining

TABLE 4

DATA USED FOR ESTIMATION OF OTHER IMPORTS  
(in Million Maloti unless indicated otherwise)

|      | TOTAL IMPORTS (f.o.b) | PETROL Imports | DIESEL Imports | PARA FFIN Imports | OTHER Imports | IMPORT PRICE INDEX 1981=100 | OTHER IMPORTS (IN REAL TERMS) | GNP    | SEA-SONAL DUMY | REAL MONEY SUPPLY (M3) |
|------|-----------------------|----------------|----------------|-------------------|---------------|-----------------------------|-------------------------------|--------|----------------|------------------------|
| 1984 | 145.17                | 3.22           | 2.66           | 2.94              | 136.65        | 152.10                      | 89.84                         | 145.95 | 0              | 191.47                 |
| QI   | 144.24                | 3.43           | 2.66           | 3.72              | 134.43        | 157.50                      | 85.35                         | 145.95 | 0              | 184.37                 |
| QII  | 167.06                | 4.02           | 2.54           | 3.28              | 157.22        | 160.90                      | 97.71                         | 145.95 | 1              | 183.15                 |
| QIII | 183.42                | 4.77           | 3.51           | 3.07              | 172.07        | 165.70                      | 103.84                        | 145.95 | 1              | 179.20                 |
| QIV  |                       |                |                |                   |               |                             |                               |        |                |                        |
| 1985 | 167.47                | 5.08           | 2.96           | 3.34              | 156.09        | 172.70                      | 90.38                         | 142.45 | 0              | 174.85                 |
| QI   | 171.80                | 4.78           | 3.09           | 3.97              | 159.96        | 176.70                      | 90.53                         | 142.45 | 0              | 186.41                 |
| QII  | 181.61                | 5.55           | 3.64           | 4.30              | 168.12        | 184.60                      | 91.07                         | 142.45 | 1              | 181.20                 |
| QIII | 201.18                | 6.17           | 5.04           | 3.18              | 186.79        | 196.40                      | 95.11                         | 142.45 | 1              | 180.04                 |
| QIV  |                       |                |                |                   |               |                             |                               |        |                |                        |
| 1986 | 162.25                | 4.23           | 2.73           | 2.65              | 152.64        | 209.40                      | 72.89                         | 139.05 | 0              | 180.56                 |
| QI   | 207.48                | 3.36           | 2.21           | 2.12              | 199.79        | 215.60                      | 92.67                         | 139.05 | 0              | 186.35                 |
| QII  | 188.73                | 3.60           | 2.26           | 2.09              | 180.78        | 221.80                      | 81.51                         | 139.05 | 1              | 197.29                 |
| QIII | 218.02                | 3.57           | 2.79           | 1.95              | 209.71        | 227.70                      | 92.10                         | 139.05 | 1              | 201.91                 |
| QIV  |                       |                |                |                   |               |                             |                               |        |                |                        |
| 1987 | 194.77                | 3.59           | 2.49           | 1.86              | 186.83        | 236.80                      | 78.90                         | 148.85 | 0              | 200.27                 |
| QI   | 223.13                | 3.60           | 2.53           | 2.43              | 214.57        | 245.60                      | 87.37                         | 148.85 | 0              | 213.83                 |
| QII  | 241.67                | 3.84           | 2.98           | 3.26              | 231.59        | 249.40                      | 90.93                         | 148.85 | 1              | 216.78                 |
| QIII | 258.38                | 3.80           | 3.80           | 2.67              | 248.11        | 252.40                      | 94.76                         | 148.85 | 1              | 219.27                 |
| QIV  |                       |                |                |                   |               |                             |                               |        |                |                        |
| 1988 | 277.36                | 3.73           | 2.90           | 2.64              | 268.09        | 262.20                      | 99.70                         | 161.90 | 0              | 259.13                 |
| QI   | 266.00                | 4.25           | 3.53           | 3.95              | 254.27        | 265.10                      | 92.17                         | 161.90 | 0              | 248.23                 |
| QII  | 361.59                | 4.24           | 3.81           | 4.01              | 349.53        | 268.80                      | 122.89                        | 161.90 | 1              | 255.75                 |
| QIII | 372.38                | 4.19           | 4.19           | 4.64              | 359.36        | 270.90                      | 124.23                        | 161.90 | 1              | 270.82                 |
| QIV  |                       |                |                |                   |               |                             |                               |        |                |                        |
| 1989 | 306.67                | 4.79           | 4.04           | 4.97              | 292.87        | 279.50                      | 94.62                         | 162.58 | 0              | 273.08                 |
| QI   | 320.26                | 6.73           | 5.27           | 6.23              | 302.03        | 285.80                      | 93.11                         | 162.58 | 0              | 289.10                 |
| QII  | 363.36                | 6.05           | 5.42           | 6.83              | 345.06        | 293.90                      | 100.45                        | 162.58 | 1              | 289.05                 |
| QIII | 406.76                | 5.80           | 5.85           | 5.91              | 389.20        | 304.10                      | 105.49                        | 162.58 | 1              | 338.01                 |
| QIV  |                       |                |                |                   |               |                             |                               |        |                |                        |

Source: Bureau of Statistics and Customs Department

TABLE 5

DURBIN-WATSON TEST CALCULATIONS FOR PETROL IMPORTS MODEL

| ACTUAL QUANTITY | ESTIM. QUANTITY | ERROR TERM | $e(t-3)$ | $e(t)-e(t-3)$ | $\{e(t)-e(t-3)\}^2$ | $e(t)^2$ |
|-----------------|-----------------|------------|----------|---------------|---------------------|----------|
| 8.93            |                 |            |          |               |                     |          |
| 8.86            |                 |            |          |               |                     |          |
| 9.01            |                 |            |          |               |                     | 0.19     |
| 9.48            | 9.91            | -0.43      |          |               |                     | 0.37     |
| 9.15            | 9.76            | -0.61      |          |               |                     | 0.30     |
| 8.91            | 9.45            | -0.54      |          | 0.36          | 0.13                | 0.01     |
| 9.13            | 9.21            | -0.08      | -0.43    | 0.66          | 0.44                | 0.00     |
| 8.82            | 8.76            | 0.06       | -0.61    | -0.19         | 0.03                | 0.53     |
| 8.10            | 8.83            | -0.73      | -0.54    | -0.05         | 0.00                | 0.02     |
| 8.46            | 8.59            | -0.13      | -0.08    | 0.19          | 0.04                | 0.06     |
| 8.57            | 8.33            | 0.24       | 0.06     | 1.08          | 1.18                | 0.12     |
| 9.00            | 8.65            | 0.35       | -0.73    | 0.15          | 0.02                | 0.00     |
| 9.21            | 9.19            | 0.02       | -0.13    | 0.08          | 0.01                | 0.11     |
| 9.40            | 9.08            | 0.32       | 0.24     | 0.13          | 0.02                | 0.24     |
| 9.68            | 9.19            | 0.49       | 0.35     | 0.03          | 0.00                | 0.00     |
| 10.01           | 9.96            | 0.05       | 0.02     | -0.42         | 0.18                | 0.01     |
| 9.90            | 10.00           | -0.10      | 0.32     | -0.05         | 0.00                | 0.19     |
| 10.36           | 9.92            | 0.44       | 0.49     | 0.45          | 0.20                | 0.25     |
| 10.52           | 10.02           | 0.50       | 0.05     | -0.28         | 0.08                | 0.14     |
| 10.65           | 11.03           | -0.38      | -0.10    | -0.83         | 0.69                | 0.15     |
| 10.43           | 10.82           | -0.39      | 0.44     | 0.17          | 0.03                | 0.45     |
| 11.53           | 10.86           | 0.67       | 0.50     | 0.46          | 0.21                | 0.01     |
| 11.00           | 10.92           | 0.08       | -0.38    | 0.73          | 0.53                | 0.11     |
| 10.94           | 10.60           | 0.34       | -0.39    |               |                     |          |
|                 |                 |            | 0.67     |               |                     |          |
|                 |                 |            | 0.08     |               |                     |          |
|                 |                 |            | 0.34     |               |                     |          |
| TOTAL           | _____           | _____      | _____    | _____         | 3.78                | 3.26     |

DURBIN-WATSON STATISTIC = 1.16

TABLE 6

DURBIN-WATSON TEST CALCULATIONS FOR DIESEL MODEL

| ACTUAL QUANTITY | ESTIMATED QUANTITY | ERROR TERM | $e(t-2)$ | $e(t)-e(t-2)$ | $\{e(t)-e(t-2)\}^2$ | $e(t)^2$ |
|-----------------|--------------------|------------|----------|---------------|---------------------|----------|
| 6.04            |                    |            |          |               |                     |          |
| 6.04            |                    |            |          |               |                     |          |
| 6.13            | 6.90               | -0.77      |          |               |                     | 0.60     |
| 7.59            | 8.65               | -1.06      |          |               |                     | 1.12     |
| 5.8             | 7.00               | -1.20      | -0.77    | -0.43         | 0.18                | 1.44     |
| 6.32            | 6.82               | -0.50      | -1.06    | 0.56          | 0.31                | 0.25     |
| 6.76            | 6.30               | 0.46       | -1.20    | 1.66          | 2.77                | 0.21     |
| 8.01            | 8.12               | -0.11      | -0.50    | 0.39          | 0.15                | 0.01     |
| 5.74            | 6.19               | -0.45      | 0.46     | -0.91         | 0.84                | 0.20     |
| 6.31            | 5.85               | 0.46       | -0.11    | 0.57          | 0.32                | 0.21     |
| 7.15            | 6.09               | 1.06       | -0.45    | 1.51          | 2.28                | 1.12     |
| 8.54            | 8.30               | 0.24       | 0.46     | -0.22         | 0.05                | 0.06     |
| 6.79            | 6.69               | 0.10       | 1.06     | -0.96         | 0.91                | 0.01     |
| 7.16            | 6.65               | 0.51       | 0.24     | 0.28          | 0.08                | 0.26     |
| 7.85            | 7.46               | 0.39       | 0.10     | 0.28          | 0.13                | 0.15     |
| 10.13           | 9.26               | 0.87       | 0.51     | 0.36          | 1.53                | 0.76     |
| 7.79            | 6.84               | -0.85      | 0.39     | -1.24         | 0.63                | 0.73     |
| 8.74            | 8.66               | 0.08       | 0.87     | -0.79         | 0.88                | 0.01     |
| 10.04           | 9.95               | 0.09       | -0.85    | 0.94          | 0.00                | 0.01     |
| 11.06           | 11.58              | 0.02       | 0.08     | -0.06         | 1.19                | 0.00     |
| 8.92            | 9.93               | -1.01      | 0.09     | -1.09         | 0.32                | 1.02     |
| 10.58           | 10.00              | 0.58       | 0.02     | 0.56          | 4.23                | 0.34     |
| 10.77           | 9.72               | 1.05       | -1.01    | 2.06          | 0.30                | 1.10     |
| 11.33           | 11.29              | 0.04       | 0.58     | -0.55         |                     | 0.00     |
| TOTAL           |                    |            |          |               | 17.19               | 9.60     |

DURBIN-WATSON STATISTIC

1.79

TABLE 7

DURBIN-WATSON TEST CALCULATIONS FOR PARAFFIN IMPORTS MODEL

| ACTUAL QUANTITY | ESTIMATED QUANTITY | ERROR TERM | $e(t-2)$ | $e(t) - e(t-2)$ | $\{e(t) - e(t-2)\}^2$ | $e(t)^2$ |
|-----------------|--------------------|------------|----------|-----------------|-----------------------|----------|
| 6.13            |                    |            |          |                 |                       |          |
| 7.75            |                    |            |          |                 |                       |          |
| 7.24            |                    |            |          |                 |                       |          |
| 6.11            | 6.56               | -0.45      |          |                 |                       | 0.20     |
| 5.96            | 6.55               | -0.59      |          |                 |                       | 0.35     |
| 7.36            | 6.76               | 0.60       |          |                 |                       | 0.36     |
| 7.32            | 6.39               | 0.93       | -0.45    | 1.37            | 1.88                  | 0.86     |
| 4.57            | 5.42               | -0.85      | -0.59    | -0.26           | 0.07                  | 0.72     |
| 4.55            | 5.53               | -0.98      | 0.60     | -1.58           | 2.51                  | 0.96     |
| 5.22            | 5.28               | -0.06      | 0.93     | -0.99           | 0.98                  | 0.00     |
| 5.74            | 4.83               | 0.91       | -0.85    | 1.76            | 3.11                  | 0.84     |
| 5.00            | 4.77               | 0.23       | -0.98    | 1.21            | 1.46                  | 0.05     |
| 4.60            | 5.79               | -1.19      | -0.06    | -1.13           | 1.27                  | 1.42     |
| 6.38            | 6.14               | 0.24       | 0.91     | -0.67           | 0.45                  | 0.06     |
| 7.95            | 5.92               | 2.03       | 0.23     | 1.81            | 3.26                  | 4.13     |
| 6.62            | 7.83               | -1.21      | -1.19    | -0.02           | 0.00                  | 1.47     |
| 6.32            | 8.09               | -1.77      | 0.24     | -2.01           | 4.03                  | 3.13     |
| 9.25            | 7.77               | 1.48       | 2.03     | -0.56           | 0.31                  | 2.18     |
| 9.71            | 7.84               | 1.87       | -1.21    | 3.08            | 9.48                  | 3.48     |
| 11.23           | 11.14              | 0.09       | 1.77     | 1.86            | 3.45                  | 0.01     |
| 9.60            | 11.01              | -1.41      | 1.48     | -2.89           | 8.33                  | 1.99     |
| 11.78           | 11.21              | 0.57       | 1.87     | -1.30           | 1.68                  | 0.32     |
| 12.61           | 11.21              | 1.40       | 0.09     | 1.31            | 1.73                  | 1.97     |
| 10.01           | 10.12              | -0.11      | -1.41    | 1.30            | 1.70                  | 0.01     |
|                 |                    |            | 0.57     |                 |                       |          |
|                 |                    |            | 1.40     |                 |                       |          |
|                 |                    |            | -0.11    |                 |                       |          |
| TOTAL           |                    |            |          |                 | 45.70                 | 24.51    |

DURBIN-WATSON STATISTIC = 1.86

TABLE 8

DURBIN-WATSON TEST CALCULATIONS FOR 'OTHER IMPORTS MODEL

| ACTUAL<br>IMPORTS | ESTIMATED<br>IMPORTS | ERROR<br>TERM | $e(t-2) \quad e(t) - e(t-2) \quad \{e(t) - e(t-2)\}^2$ |        |          |         |
|-------------------|----------------------|---------------|--|--------|----------|---------|
|                   |                      |               | $e(t)$   |        | $e(t)^2$ |         |
| 89.84             | 91.64                | -1.79         |  |        |          | 3.22    |
| 85.35             | 90.39                | -5.04         | -1.79  | -3.25  | 10.54    | 25.39   |
| 97.71             | 101.06               | -3.34         | -5.04  | 1.69   | 2.87     | 11.18   |
| 103.84            | 100.17               | 3.67          | -3.34  | 7.01   | 49.20    | 13.47   |
| 90.38             | 85.72                | 4.66          | 3.67   | 0.99   | 0.97     | 21.69   |
| 90.53             | 86.39                | 4.13          | 4.66   | -0.52  | 0.27     | 17.10   |
| 91.07             | 96.20                | -5.13         | 4.13   | -9.27  | 85.84    | 26.32   |
| 95.11             | 94.84                | 0.27          | -5.13  | 5.40   | 29.14    | 0.07    |
| 72.89             | 80.27                | -7.38         | 0.27   | -7.65  | 58.49    | 54.47   |
| 92.67             | 80.16                | 12.51         | -7.38  | 19.89  | 395.45   | 156.39  |
| 81.51             | 91.68                | -10.17        | 12.51  | -22.68 | 514.32   | 103.49  |
| 92.10             | 91.49                | 0.61          | -10.17   | 10.78  | 116.30   | 0.37    |
| 78.90             | 85.25                | -6.35         | 0.61   | -6.96  | 48.46    | 40.32   |
| 87.37             | 85.59                | 1.77          | -6.35  | 8.12   | 65.97    | 3.14    |
| 90.93             | 96.61                | -5.68         | 1.77   | -7.45  | 55.52    | 32.25   |
| 94.76             | 96.53                | -1.76         | -5.68  | 3.92   | 15.34    | 3.11    |
| 99.70             | 96.13                | 3.57          | -1.76  | 5.34   | 28.47    | 12.77   |
| 92.17             | 94.79                | -2.62         | 3.57   | -6.20  | 38.41    | 6.89    |
| 122.89            | 106.25               | 16.64         | -2.62  | 19.26  | 370.96   | 276.75  |
| 124.23            | 107.45               | 16.78         | 16.64  | 0.14   | 0.02     | 281.55  |
| 94.62             | 96.02                | -1.40         | 16.78  | -18.18 | 330.53   | 1.96    |
| 93.11             | 96.87                | -3.76         | -1.40  | -2.35  | 5.54     | 14.10   |
| 100.45            | 107.14               | -6.69         | -3.76  | -2.94  | 8.63     | 44.80   |
| 105.49            | 110.69               | -5.19         | -6.69  | 1.50   | 2.26     | 26.95   |
|                   |                      |               | -5.19  |        |          |         |
| TOTAL             |                      |               |  |        | 2233.53  | 1177.75 |

DURBIN-WATSON STATISTIC = 1.90

## APPENDIX B

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### SIMULATION RESULTS

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<sup>2)</sup> LHWP – Lesotho Highlands Water Project. This is the largest water project ever to be undertaken in Lesotho involving billions of dollars. It is intended for sale of water by Lesotho to neighbouring RSA upon its completion. Its construction involves construction of access roads, large dams and transfer tunnels. Diesel was thought to be an important source of energy for heavy construction equipment involved with the project.

TABLE 9

## CURRENT ACCOUNT PROJECTIONS (Million Maloti)

SCENARIO A

SCENARIO B

QUARTER III 1990

1.a) IMPORTS

|                      | PETROL  | DIESEL         | PARAFFIN        | OT<br>HE<br>R | IMPORTS   |  | PETROL               | DIESEL        | PARAFFIN       | IMPORTS         | I              |  |
|----------------------|---|----------------|-----------------|---------------|---|--|----------------------|---------------|----------------|-----------------|----------------|--|
| S/BARREL*            | 15.00   | 15.00          | 15.00           |               | --  |  | S/BARREL*            | 25.00         | 25.00          | 25.00           | --             |  |
| EXCH.RATE*           | 2.60  | 2.60           | 2.60            |               | --  |  | EXCH.RATE*           | 2.60          | 2.60           | 2.60            | --             |  |
| M/BARREL             | 39.00   | 39.00          | 39.00           |               | --  |  | M/BARREL             | 65.00         | 65.00          | 65.00           | --             |  |
| IBLC (t)             | 0.53  | 0.49           | 0.52            |               | --  |  | IBLC (t)             | 0.66          | 0.58           | 0.65            | --             |  |
| IBLC (t-2)           | --  | 0.49           | --              |               | --  |  | IBLC (t-2)           | --            | 0.54           | --              | --             |  |
| IBLC (t-3)           | 0.53  | --             | 0.59            |               | --  |  | IBLC (t-3)           | 0.53          | --             | 0.60            | --             |  |
| GNP GROWTH RATE*     | --  | 0.03           | --              |               | 0.03  |  | GNP GROWTH RATE*     | --            | 0.03           | --              | 0.03           |  |
| Y (t)                | --  | --             | --              |               | 167.46  |  | Y (t)                | --            | --             | --              | 167.46         |  |
| Y (t-2)              | --  | 167.46         | --              |               | --  |  | Y (t-2)              | --            | 167.45         | --              | --             |  |
| Y (t-3)              | 162.58  | --             | 162.58          |               | --  |  | Y (t-3)              | 162.58        | --             | 162.58          | --             |  |
| IPI (t) {1981=100*   | --  | --             | --              |               | 319.10  |  | IPI (t) {1981=100*   | --            | --             | --              | 319.10         |  |
| M3 (t)               | --  | --             | --              |               | 328.56  |  | M3 (t)               | --            | --             | --              | 328.56         |  |
| VALUE                | 5.44  | 4.91           | 4.93            |               | 354.84  |  | VALUE                | 6.75          | 5.77           | 6.06            | 354.84         |  |
| b) LHWP IMPORTS      | 72.75   |                |                 |               |   |  | b) LHWP IMPORTS      | 72.75         |                |                 |                |  |
|                      | 2.EXPORTS 3.LABOUR 4.OTHER 5.UNREQUITTED<br>INCOME ITEMS TRANSFERS<br>(NET) |                |                 |               | 2.EXPORTS 3.LABOUR 4.OTHER 5.UNREQUITTED<br>INCOME ITEMS TRANSFERS<br>(NET) |  |                      |               |                |                 |                |  |
| BASE+<br>GROWTH RATE | 36.15<br>0.02   | 250.59<br>0.15 | -54.51<br>-0.86 |               | 140.28<br>0.21  |  | BASE+<br>GROWTH RATE | 36.15<br>0.02 | 250.59<br>0.15 | -54.51<br>-0.86 | 140.28<br>0.21 |  |
| VALUE                | 36.74   | 289.18         | -7.79           |               | 169.46  |  | VALUE                | 36.74         | 289.18         | -7.79           | 169.46         |  |

CURRENT ACCCOUNT POSITION 44.71

CURRENT ACCOUNT POSITION 41.42

PRICE EFFECT = -3.29

- Values of variables marked with an asterisk represent assumed values
- + Unless indicated otherwise, the base period for 1991 projections is 1990.

TABLE 9 (CONT..)

QUARTER I 1991

SCENARIO A

SCENARIO B

## 1. IMPORTS

|                      | PETROL                           | DIESEL | PARAFFIN | OTHER  |                      | PETROL                           | DIESEL | PARAFFIN | OTHER IMP. |
|----------------------|----------------------------------|--------|----------|--------|----------------------|----------------------------------|--------|----------|------------|
| S/BARREL*            | 15.00                            | 15.00  | 15.00    | --     | S/BARREL*            | 32.00                            | 32.0   | 32.00    | --         |
| EXCH.RATE*           | 2.60                             | 2.60   | 2.60     | --     | EXCH.RATE*           | 2.70                             | 2.70   | 2.70     | --         |
| M/BARREL             | 39.00                            | 39.00  | 39.00    | --     | M/BARREL             | 86.40                            | 86.40  | 86.40    | --         |
| IBLC (t)             | 0.53                             | 0.49   | 0.52     | --     | IBLC (t)             | 0.79                             | 0.75   | 0.83     | --         |
| IBLC (t-2)           | --                               | 0.49   | --       | --     | IBLC (t-2)           | --                               | 0.58   | --       | --         |
| IBLC (t-3)           | 0.53                             | --     | 0.52     | --     | IBLC (t-3)           | 0.55                             | --     | 0.53     | --         |
| GNP GROWTH RATE*     | -0.02                            | -0.02  | -0.02    | -0.02  | GNP GROWTH RATE*     | --                               | 0.03   | --       | 0.03       |
| Y (t)                | --                               | --     | --       | 164.11 | Y (t)                | --                               | --     | --       | 164.11     |
| Y (t-2)              | --                               | 167.46 | --       | --     | Y (t-2)              | --                               | 167.46 | --       | --         |
| Y (T-3)              | 167.46                           | --     | 167.46   | --     | Y (T-3)              | 167.46                           | --     | 167.46   | --         |
| IPI (t) {1981=100}*  | --                               | --     | --       | 323.93 | IPI (t) {1981=100}*  | --                               | --     | --       | 327.93     |
| M3 (t)               | --                               | --     | --       | 320.0  | M3 (t)               | --                               | --     | --       | 320.00     |
| VALUE                | 5.63                             | 4.91   | 6.01     | 313.17 | VALUE                | 8.31                             | 7.31   | 9.39     | 315.64     |
| b) LHWP Imports      | 81.68                            |        |          |        | b) LHWP Imports      | 81.68                            |        |          |            |
| 2 Exports, 3. Labour | 4. Other 5.Unrequitted transfers |        |          |        | 2 Exports, 3. Labour | 4. Other 5.Unrequitted transfers |        |          |            |
| Income               | Items Net                        |        |          |        | Income               | Items Net                        |        |          |            |
| BASE                 | 44.24                            | 258.37 | -29.73   | 91.53  | BASE                 | 44.24                            | 258.37 | -29.73   | 91.53      |
| GROWTH RATE          | -0.03                            | 0.02   | -0.13    | 0.35   | GROWTH RATE          | -0.03                            | 0.02   | -0.13    | 0.35       |
| VALUE                | 42.91                            | 263.54 | -26.00   | 123.57 | VALUE                | 42.91                            | 263.54 | -26.00   | 123.57     |
| CURR A/C POSITION    | -7.38                            |        |          |        | CURR A/C POSITION    | -18.32                           |        |          |            |

Price effect = -10.94

- Values of variables marked with an asterisk represent assumed values
- + Unless indicated otherwise, the base period for 1991 projections is 1990

TABLE 9 (CONT..)

QUARTER I 1991

SCENARIO A

SCENARIO B

## 1. IMPORTS

|                                  | PETROL | DIESEL | PARAF. | OTHER  |  |                     | PETROL | DIESEL | PARAF  | OTHER  |
|----------------------------------|--------|--------|--------|--------|--|---------------------|--------|--------|--------|--------|
| S/BARREL*                        | 15.00  | 15.00  | 15.00  | --     |  | S/BARREL*           | 30.00  | 30.00  | 30.00  | --     |
| EXCH.RATE*                       | 2.60   | 2.60   | 2.60   | --     |  | EXCH.RATE*          | 2.65   | 2.65   | 2.65   | --     |
| M/BARREL                         | 39.00  | 39.00  | 39.00  | --     |  | M/BARREL            | 79.50  | 79.50  | 79.50  | --     |
| IBLC (t)                         | 0.53   | 0.53   | 0.52   | --     |  | IBLC (t)            | 0.75   | 0.71   | 0.78   | --     |
| IBLC (t-2)                       | --     | --     | --     | --     |  | IBLC (t-2)          | --     | 0.58   | --     | --     |
| IBLC (t-3)                       | 0.53   | 0.53   | 0.52   | --     |  | IBLC (t-3)          | 0.66   | --     | 0.65   | --     |
| GNP GROWTH RATE*                 | -0.02  | -0.02  | -0.02  | -0.02  |  | GNP GROWTH RATE*    | --     | 0.03   | --     | -0.03  |
| Y (t)                            | --     | --     | --     | 164.11 |  | Y (t)               | --     | --     | --     | 164.11 |
| Y (t-2)                          | --     | 167.46 | --     | --     |  | Y (t-2) *           | --     | 167.46 | --     | --     |
| Y (T-3)                          | 167.46 | --     | 167.46 | --     |  | Y (T-3)             | 167.46 | --     | 167.46 | --     |
| IPI (t) {1981=100}*              | --     | --     | --     | 326.56 |  | IPI (t) {1981=100}* | --     | --     | --     | 330.56 |
| M3 (t)                           | --     | --     | --     | 320.00 |  | M3 (t)              | --     | --     | --     | 320.00 |
| VALUE                            | 5.63   | 4.91   | 6.01   | 314.80 |  | VALUE               | 7.61   | 6.93   | 8.00   | 317.25 |
| B) LHWP Imports                  | 81.68  |        |        |        |  |                     |        |        |        |        |
| 2 Exports, 3. Labour             |        |        |        |        |  |                     |        |        |        |        |
| 4. Other 5.Unrequitted transfers |        |        |        |        |  |                     |        |        |        |        |
| Income Items Net                 |        |        |        |        |  |                     |        |        |        |        |
| BASE                             | 36.33  | 261.63 | -44.41 | 107.97 |  | BASE                | 36.33  | 261.63 | -44.41 | 107.97 |
| GROWTH RATE                      | -0.03  | 0.02   | -0.13  | 0.35   |  | GROWTH RATE         | -0.03  | 0.02   | -0.13  | 0.35   |
| VALUE                            | 35.24  | 266.86 | -35.85 | 145.76 |  |                     |        |        |        |        |
| CURR A/C POSITION                | -4.01  |        |        |        |  | CURR A/C POSITION   | -12.46 |        |        |        |

Price effect = -8.45

• Values of variables marked with an asterisk represent assumed values

+ Unless indicated otherwise, the base period for 1991 projections is 1990

TABLE 9 (CONT..)

QUARTER I 1991

SCENARIO A

SCENARIO B

## 1. IMPORTS

|  | PETROL | DIESEL | PARAF  | OTHER  |  | PETROL   | DIESEL | PARAFF. | OTHER  |  |
|--|--------|--------|--------|--------|--|--|--------|---------|--------|--|
| S/BARREL*  | 15.00  | 15.00  | 15.00  | --     |  | 25.00  | 25.00  | 25.00   | --     |  |
| EXCH.RATE*   | 2.60   | 2.60   | 2.60   | --     |  | 2.65   | 2.65   | 2.65    | --     |  |
| M/BARREL   | 39.00  | 39.00  | 39.00  | --     |  | 66.25  | 66.25  | 66.25   | --     |  |
| IBLC (t)   | 0.53   | 0.49   | 0.52   | --     |  | 0.68   | 0.64   | 0.70    | --     |  |
| IBLC (t-2)   | --     | 0.49   | --     | --     |  | --   | 0.75   | --      | --     |  |
| IBLC (t-3)   | 0.53   | --     | 0.52   | --     |  | 0.66   | --     | 0.65    | --     |  |
| GNP GROWTH RATE*   | -0.02  | -0.02  | -0.02  | -0.02  |  | --   | 0.03   | --      | -0.02  |  |
| Y (t)  | --     | --     | --     | 164.11 |  | --   | --     | --      | 164.11 |  |
| Y (t-2)  | --     | 164.11 | --     | --     |  | --   | 164.11 | --      | --     |  |
| Y (T-3)  | 167.46 | --     | 167.46 | --     |  | 167.11   | --     | 167.46  | --     |  |
| IPI (t) {1981=100}*  | --     | --     | --     | 326.64 |  | --   | --     | --      | 330.64 |  |
| M3 (t)   | --     | --     | --     | 320.00 |  | --   | --     | --      | 320.00 |  |
| VALUE  | 5.63   | 4.75   | 6.01   | 351.24 |  | 6.88   | 5.61   | 7.14    | 354.14 |  |
| b) LHWP Imports 81.68<br>2 Exports, 3. Labour 4. Other 5.Unrequitted transfers<br>Income Items Net |        |        |        |        |  | b) LHWP Imports 81.68<br>2 Exports, 3. Labour 4. Other 5.Unrequitted transfers<br>Income Items Net |        |         |        |  |
| BASE   | 33.75  | 275.65 | -47.68 | 190.00 |  | 33.75  | 275.65 | -47.68  | 190.00 |  |
| GROWTH   | -0.03  | 0.02   | -0.13  | 0.16   |  | -0.03  | 0.02   | -0.13   | 0.16   |  |
| VALUE  | 32.74  | 281.16 | -41.71 | 220.00 |  | 32.74  | 281.16 | -41.71  | 220.00 |  |
| CURR A/C POSITION  | 42.89  |        |        |        |  | 36.76  |        |         |        |  |

PRICE SHEET = -6.13

- Values of variables marked with an asterisk represent assumed values
- Unless indicated otherwise, the base period for 1991 projections is 1990

TABLE 9 (CONT..)  
 QUARTER I 1991  
 1. IMPORTS

SCENARIO A

SCENARIO B

|  | PETROL | DIESEL | PARAFFIN | OTHER  |  | PETROL | DIESEL | PARAFFIN | OTHER  |
|--|--------|--------|----------|--------|--|--------|--------|----------|--------|
| S/BARREL*  | 15.00  | 15.00  | 15.00    | --     | S/BARREL*  | 25.00  | 25.00  | 25.00    | --     |
| EXCH.RATE*   | 2.60   | 2.60   | 2.60     | --     | EXCH.RATE*   | 2.65   | 2.65   | 2.65     | --     |
| M/BARREL   | 39.00  | 39.00  | 39.00    | --     | M/BARREL   | 66.25  | 66.25  | 66.25    | --     |
| IBLC (t)   | 0.53   | 0.49   | 0.52     | --     | IBLC (t)   | 0.68   | 0.64   | 0.70     | --     |
| IBLC (t-2)   | --     | 0.49   | --       | --     | IBLC (t-2)   | --     | 0.71   | --       | --     |
| IBLC (t-3)   | 0.53   | --     | 0.52     | --     | IBLC (t-3)   | 0.79   | --     | 0.83     | --     |
| GNP GROWTH RATE*   | -0.02  | -0.02  | -0.02    | -0.02  | GNP GROWTH RATE*   | --     | 0.03   | --       | 0.03   |
| Y (t)  | --     | --     | --       | 164.11 | Y (t)  | --     | --     | --       | 164.11 |
| Y (t-2)  | --     | 164.11 | --       | --     | Y (t-2)  | --     | 164.11 | --       | --     |
| Y (T-3)  | 164.11 | --     | 164.11   | --     | Y (T-3)  | 164.11 | --     | 164.11   | --     |
| IPI (t) {1981=100}*  | --     | --     | --       | 344.44 | IPI (t) {1981=100}*  | --     | --     | --       | 348.44 |
| M3 (t)   | --     | --     | --       | 320.00 | M3 (t)   | --     | --     | --       | 320.00 |
| VALUE  | 5.50   | 5.60   | 5.50     | 363.87 | VALUE  | 6.45   | 6.82   | 5.70     | 366.61 |
| b) LHWP Imports 81.68<br>2 Exports, 3. Labour 4. Other 5.Unrequitted transfers<br>Income Items Net |        |        |          |        | b) LHWP Imports 81.68<br>2 Exports, 3. Labour 4. Other 5.Unrequitted transfers<br>Income Items Net |        |        |          |        |
| BASE   | 30.97  | 273.70 | -42.39   | 192.27 | BASE   | 30.97  | 273.70 | -42.39   | 192.27 |
| GROWTH   | -0.03  | 0.02   | -0.13    | 0.15   | GROWTH   | -0.03  | 0.02   | -0.13    | 0.15   |
| VALUE  | 30.04  | 279.17 | -37.08   | 221.99 | VALUE  | 30.04  | 279.17 | -37.08   | 221.99 |
| CURR A/C POSITION  | 31.99  |        |          |        | CURR A/C POSITION  | 26.86  |        |          |        |

PRICE EFFECT = -5.12

- Values of variables marked with an asterisk represent assumed values
- + Unless indicated otherwise, the base period for 1991 projections is 1990

APPENDIX C

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PRICE OF CRUDE OIL AND INBOND LANDED COSTS

Relationship between the Dollar-price of a Barrel of Oil and  
IBLC Cost of Petrol, Diesel and Paraffin

The following relationships between the dollar-price of oil and the IBLC costs of petrol, diesel and paraffin have been estimated using ordinary least squares method.

6.1 Petrol

$$\text{IBLC} = 0.316161 + 0.005485 P,$$

where P is the loti  
Price of crude oil  
Per barrel converted  
Using the period average  
Exchange rate.

6.2 Diesel

$$\text{IBLC} = 0.269605 + 0.005591 P \quad P \text{ is defined as above}$$

6.3 Paraffin

$$\text{IBLC} = 0.274425 + 0.006376 P \quad P \text{ is defined as above}$$

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