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UNIVERSITY OF BOTSWANA  
DEPARTMENT OF ECONOMICS

THE EFFICACY OF DEVALUATION AS AN ADJUSTMENT POLICY  
TOOL IN MOZAMBIQUE

BY:

MATIAS JAIME FARAHANE

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS (ECONOMICS)

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R.e. 24918



## DECLARATION

This dissertation was undertaken from October 1997 to June 1998. The study has not been done before and as such, except where referenced, the contents of the paper are my original works.

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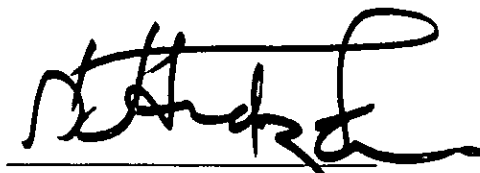
DATE: June 1998

## APPROVAL

This dissertation has been examined and approved as meeting the requirements for the partial fulfilment of MA (Economics) degree.

  
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Date

  
Head of Department

18/6/98  
Date

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## DEDICATION

THIS STUDY IS DEDICATED TO MY BELOVED WIFE LIDIA, MY SON CELSO, MY  
BROTHER SAMUEL, AND MY DAUGHTERS JESSICA AND ANA.

## ACKNOWLEDGEMENTS

Special thanks are due to my supervisors, Dr J.E. Odada and Dr W. Masenya, for their kind support and guidance during the writing of this dissertation. Without their guidance and patience, this dissertation would not have been a success.

Particular thanks are due to my classmates namely, Ernest O. Darko, Emmanuel K. Sah, Jennifer W. Kibicho, Saide Dade, Anthony Mussonda, Theresia Kundy, David O. Matlhape, Sehume Kgabi, and Peggy O. Serame, for their friendship and moral support, during the entire period of our M.A. programme.

In addition, my appreciation is extended to the African Economic Research Consortium (AERC), who provided the funds that made the data collection and analysis phases of this dissertation successful.

I am grateful also to all staff members of the Economics Department for their useful ideas and wisdom that enriched substantially my study proposal when I presented it to a departmental seminar.

I cannot forget to thank my best friend Horacio Simao (of U.B.). I can also not forget to thank Antonio Luciano Jossefa, Alberto Navalha, Elsa Chambal (of the Central Bank of Mozambique), and Firmino Alberto Guiliche (of the National Institute of Statistics), who provided the information without which this dissertation could not have been concluded.

Last but not least, I am thankful to Dr Peter Coughlin and Mr Jose Dias Loureiro (of Eduardo Mondlane University - Maputo), who encouraged me to pursue the M.A. programme in Economics at the University of Botswana.

I thank you all.

Matias J. Farahane



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## LIST OF ABBREVIATIONS

Adj	Adjusted
B	Balance of Trade
BNER	Bilateral Nominal Exchange Rate
BT	Balance of Trade
BRER	Bilateral Real Exchange Rate
COMECON	Council for Mutual Economic Assistance
CPI	Consumer Price Index
$D_i$	Intercept dummy variable
$D_i \cdot \ln MRER_i$	Slope dummy variable
DM	Deutsche Mark
ECOWAS	Economic Community of West African States
EDT	Total External Debt
ERP	Economic Rehabilitation Programme
ESAF	Enhanced Structural Adjustment Facility
ESC	Escudo
FF	France Franc
FRELIMO	Frente de Libertacao de Mocambique
GBP	Pound Sterling
GDP	Gross Domestic Product
GDR	German Democratic Republic
IMF	International Monetary Fund
IPP	Indicative Prospective Programme
LDCs	Less Developed Countries
LIT	Italian Lire
M	Imports

MRER	Multilateral Real Exchange Rate
MT	Metical
NER	Nominal Exchange Rate
OLS	Ordinary Least Squares
$P^d$	Domestic Price Index
$P^f$	Price Index in the Rest of the World
PTG	Portugal
RER	Real Exchange Rate
RSA	Republic of South Africa
SSA	Sub-Saharan Africa
UB	University of Botswana
UNDP	United Nations Development Programme
UK	United Kingdom
USA	United States of America
USD	United States Dollar
USSR	Union Socialist Soviet Republics
WB	World Bank
$Y^d$	Domestic Income
$Y^f$	Foreign Income
YEN	Japanese Yen
X	Exports
X+M	Total Trade
ZAR	South Africa Rand
$\eta_m$	Elasticity of Demand for Imports
$\eta_x$	Elasticity of Demand for Exports
\$	United States Dollar

## ABSTRACT

The period between 1982 and 1986 was characterized by several negative trends in all sectors of the Mozambican economy, mainly due to the natural and also man-made calamities. Given the need to halt the steep economic decline and turn it into growth, the government introduced the ERP, with the support of the IMF/WB, in 1987. Among different economic measures taken within the ERP, the devaluation of the national currency, *the metical*, stands out.

As defended by most traditional textbooks on trade and also by the orthodox stabilization and adjustment programmes sponsored by the IMF/WB, an improvement in economic performance of Mozambique was expected to be brought about by devaluating the *metical*. Thus, the impact of this policy measure on exports, imports, trade balance, and output is the main objective of this study. An attempt is made to test the hypotheses of positive relations between changes in the Mozambican exchange rates and these four macroeconomic aggregates. However, from the results obtained, it is found that such relations do not hold, suggesting that devaluation in Mozambique has not had significant impacts on output and trade flows.

Given that economic performance in Mozambique is not yet good, despite the ERP which was established 11 years ago, we recommend that the government of Mozambique should start thinking of other economic development strategies, instead of relying on the orthodox stabilization and adjustment programmes sponsored by the IMF/WB. An economic development strategy, which is not fully dependent on external resources, and which leads to changes in economic structure of the country, would be more suitable for Mozambique.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

Mozambique is located in the east coast of Southern Africa. The territory covers an area of 799,380 square kilometres. It is bordered by Tanzania on the north. On the west (and from north to south), it is bordered by Malawi, Zambia, Zimbabwe, the Republic of South Africa, and Swaziland. On the south it is bordered by South African province of KwaZulu - Natal, and by the Indian Ocean on the east. According to the National Institute of Statistics (1997:8), Mozambique has a population of 18,027,600 people, growing at a rate of 2.7% per annum.

The economic situation is described by the existence of a development potential with regard to agricultural and fishing production, mineral exploitation, local manufacturing, and international railway transport routes and harbours. Geographical position and physical resources of the country promise significant socioeconomic development, despite the country's distorted economic infrastructure. Blessed with a mild climate, fertile land, mineral riches, ample water resources, and an active population, the country has all the necessary elements for a prosperous economy. However, this great potential has not been realized. Instead, the country's financial and economic situation has deteriorated, until recent times, and according to the World Development Report (1990), "Mozambique is the World's poorest, hungriest, most indebted, and most aid-dependent country" (Hanlon 1991:1).

Mozambique achieved independence on 25<sup>th</sup> June 1975 from Portugal. The immediate period after independence witnessed a near collapse of the economy and its administrative structures, to a large extent due to the sudden exodus of the Europeans, who had held all

important positions in administration and in society. This was accompanied by widespread sabotage in agriculture, in industry, and in commerce, given that "a whole series of activities ground to a halt: farms were left without management, industries were deserted, and shops sold out or emptied such that the commercial network which had spanned the countryside faltered" (Brochmann 1990:11).

However, the independent Mozambique inherited a colonial economic structure largely based on remittances by migrant labour working in South Africa and in the former South Rhodesia, and on the incomes from the transport facilities and port infrastructures developed to serve the neighbouring countries. It inherited a bankrupt, imports-dependent economy, which exported only half as much as it imported. Under these conditions the government formulated a political and economic strategy for the transition from a backward colonial capitalist to a socialist Mozambique.

Marxist-Leninist philosophy dominated the policies of the independent government, whose aspirations were obliterated by the effects of the natural and man-made calamities, such as drought and floods, destruction of social and economic infrastructures by the civil war from 1976 to 1992, and deterioration in the terms of trade, leaving the country in a semi-permanent state of emergence. Balance of trade deficits caused by falling export earnings and heavy reliance on food and oil imports, and deepening balance of payments deficits caused by debt burden characterized the Mozambican economy in the immediate post-independence period, such that by 1986, the economy was reduced to an invalid state. The economic collapse began in 1982, and the descent was rapid indeed. For example, "by 1986 the country had no foreign exchange, it could not pay its foreign debts, its imports plummeted, there were shortages of fuel, consumer goods and medicines, and industrial production fell largely due to shortages of imported raw materials (Hanlon 1991:113).

The exchange rate policy under Marxist-Leninist government was based on the administrative allocation of foreign exchange and on the fixed exchange rate regime. The economic crisis of the 1980s was characterized by scarcity of foreign exchange, an overvalued domestic currency, and the development of parallel markets. There was a strong government opposition to devaluations. To reverse this negative trend of the economy, the government was obliged to modify its ideological position and to adopt an economic rehabilitation programme (ERP) at the start of 1987, in line with the recommendations of the International Monetary Fund (IMF) and the World Bank (WB). The programme was aimed at improving the country's economic performance. Among many economic measures taken within the ERP, the devaluation of the national currency (the *metical*) stands out. The impact of this policy measure on exports, imports, and growth is the main objective of this study.

## **1.2 Statement of the Problem**

As noted in the preceding section, in the 1980s Mozambique found itself in a very serious economic crisis caused by both internal and external factors. In view of the problems, the country embarked on the ERP in 1987. The devaluation of the *metical* was an important component of ERP in Mozambique. According to traditional theory, it was expected that a nominal devaluation of the *metical* would result in expenditure switching, increased production of tradable, higher exports, lower imports, and an improvement in the external trade position of the country. This belief underlies the argument for devaluation that largely supports the orthodox stabilization and adjustment programmes. Apart from this belief, "it has been argued that even though nominal devaluations may achieve their goal of generating a relative price readjustment, they do so at a



high cost, such as the decline in total output" (Edwards 1986:501). This is an argument against devaluation. Basically, critics claim that as devaluation fails to increase export earnings, it creates new economic and social problems among which are the following:

- (a) It leads to either inflationary conditions through wage-price spiral (if governments allow nominal wages to follow increases in prices of imports and their substitutes), or to reverse income redistribution and political conflict if governments suppress the wage increase pressures; and
- (b) By reducing the imports of intermediate goods, including machinery, spare parts, fertilizers, etc., and also by shifting income from wage earners to profit earners who generally have a lower propensity to consume, devaluation leads to contraction of economic activity (Mengisteab 1991:28).

This critique, which has come to be known as the contractionary devaluation problem, is the basis of this study, whose objectives are described in the next section.

The ERP, covering both stabilization policies and structural reforms "sought primarily to reduce domestic and external financial imbalances and at the same time restructure the economy, principally by allowing market forces to play the preponderant role in the allocation of resources" (UNDP 1996:14). This means that in its devaluation component, the ERP emphasises the scarcity of foreign exchange and the need to leave its allocation to the market mechanism. Underlying this move is the neoclassical school of thought which stresses the

assumption that the private sector is inherently stable and more efficient than the public sector, and that counter cyclical policy can only cause more disequilibria. This reasoning is one of the main problems with the orthodox stabilization and adjustment programmes.

Generally speaking, and according to the grievances of the Third World countries against the Bretton Woods institutions, the IMF/WB prescriptions are ideologically based in favour of strengthening market forces and against government controls. The IMF/WB prescriptions, therefore, reflect the neoclassical school of thought. Unlike this school of thought, under the Keynesian school there is a belief that the private sector is unstable, and to fine tune the economy, a country can use any of these policies (fiscal policy, monetary policy, incomes policy, etc). Hence, for the stabilization and adjustment programmes supported by the IMF/WB, emphasis is on ownership. But ownership is not the deciding factor, given that efficiency depends solely on managerial factors. As an illustration of this, "there are so many examples of public enterprises, like in Brazil and South Korea, which have had positive results, and therefore, suggest that public ownership does not necessarily make enterprises have a weak performance; every day there are private enterprises, in all places of the world, that are declared bankrupt; enterprise success does not depend on its ownership, but on the managerial factors" (Wortzel 1989:634).

### **1.3 Objectives of the Study**

Given the important role which the devaluation of the *metical* was supposed to play in the Mozambican economy, it is important to study how its use, since 1987, has affected economic activity after 11 years of implementation of ERP. Thus, this study is an attempt to contribute to

the debate on the relevance of devaluation in the case of Mozambique, by examining the validity of the contention that devaluation, through its impacts on exports and imports, brings about the correction of external disequilibrium, and output growth. The study tries to provide some empirical evidence on the controversy on whether devaluations are contractionary or expansionary taking into account that, according to the traditional theory "it is expected that a nominal devaluation will result in increased production in the economy, higher exports, lower imports and, consequently, in an improvement of the external position of the country in question" (Edwards 1986:501). The specific objectives are:

- (a) To determine exports response to real exchange rate (RER) adjustment.
- (b) To determine imports response to devaluation of the *metical*.
- (c) To determine trade balance response to devaluation of the *metical*.
- (d) To establish the impact of devaluation of the *metical* on output growth.
- (e) To make policy recommendations.

#### **1.4 Significance of the Study**

There are many studies done on the output, exports, and imports responses to devaluation in less developed countries (LDCs), but for the economy of Mozambique there is no specific study on this subject. However, results of some studies on related subjects show that devaluation has two conflicting effects: on the one hand, it generates an expansion in output, and on the other hand, it has a negative effect on output. There is a need to know what is the effect for the Mozambican case.

Our study differs from other studies in this area, given that it is the only Mozambican specific study, and as such, will benefit policy makers in Mozambique. This is explained by the fact that, under devaluation, there is resource reallocation that is expected to have a favourable effect on the supply of exports and import substitutes as well as on output in general. In other words, and according to the elasticity approach to the balance of trade, it is possible for a country to improve its balance of trade (BT) through devaluation because imports are expected to fall and exports are expected to increase, thus stimulating production of goods and services at home.

This study is relevant because it will provide policy makers with useful information on how to improve economic growth by indicating which economic development strategies are feasible for Mozambique, and which ones are not, taking into account that "in only two decades, the national economy suffered two tremendous shocks: from the colonialism structure to the free market, going through centralized socialist orthodox phase, Mozambique travelled between the extremes without ever solving its serious structural problems" (Castel-Branco 1996:58 quoted by Hanlon 1997:119). An analysis and evaluation in this sense will provide useful information needed to identify the negative aspects associated with the current policies. Moreover, our study can also serve as a benchmark for future research on this issue.

## **1.5 Organization of the Dissertation**

This work is comprised of six chapters, namely Introduction, Economic Development Strategies after Independence, Literature Review, Methodology, Analysis of Econometric Results, and Conclusions and Policy Recommendations. Chapter one gives background information on the Mozambican economy, develops statement of the problem, and indicates the significance and the objectives of this study. In chapter two, we present the main economic development strategies established by the Mozambican government after independence. Through chapter three, we briefly discuss the relevant literature associated with this study, and both theoretical framework and empirical studies are taken into account. In chapter four, we indicate the methodology adopted in this study, and four equations with exports, imports, trade balance, and GDP as regressands, are defined. Chapter five analyses the econometric results obtained from the regressions and compares the results with economic theory and the results obtained by selected previous studies on efficacy of changes in exchange rates as an adjustment tool in Mozambique and in other developing countries. Chapter six presents conclusions and policy recommendations.

## CHAPTER TWO

### ECONOMIC DEVELOPMENT STRATEGIES AFTER INDEPENDENCE

#### 2.1 Introduction

In this chapter, we present the main economic development strategies adopted by the Mozambican government after independence. In section 2.2, we present a brief overview of colonial economic collapse and the attempts by the government to halt it, by establishing the first two economic development strategies, namely the economic programme introduced in 1977 and the Indicative Prospective Plan (IPP), which was introduced in 1981. In section 2.3, we present the negative economic trends that characterized Mozambique between 1982 and 1986. We also explain the introduction of the ERP by the government, in 1987, as a necessary measure to halt the economic decline and turn it into growth. In section 2.4, we present the exchange rate policy under ERP, that was mainly characterized by devaluations and exchange rate adjustments aimed at correcting external imbalances and, consequently, at improving economic performance in Mozambique. In the last section, we present the structure of external trade in Mozambique, that enabled us to determine the main trading partners of the country under ERP.

#### 2.2 The Colonial Economic Collapse and the IPP Failure

With independence in 1975, Mozambique set up to follow a different path from many other developing countries. It was not a member of the IMF, the WB, or the Lome Convention; it wanted a socialist domestic policy. The period 1975-76 was characterised by economic

collapse because "most Portuguese fled at the time of independence, and they often smashed equipment and killed livestock before they left" (Hanlon 1991:10). The flight of Portuguese owners and managers meant that many economic units were simply abandoned, and in response to the need to protect jobs and keep these units in production, the state nationalized them.

The independent government of Mozambique inherited a highly distorted economy which "was based on a degree of exploitation and coercion that simply could not be maintained; industry was designed to serve only a tiny urban elite, and export industries" (Hanlon 1991:11). A total transformation of the economy was required. In 1977, the government established an economic programme whose objective was to put back the production levels attained before independence and to develop industry, in order to introduce changes in the underdeveloped industrial structure of the country. This programme was an attempt by the government to halt the legacy of colonial economic collapse and make a great modernizing lead, by putting all its money and energies into the modern sector. As a result of this reorganization, the rapid decline of the economy in the period 1974-76 was followed by a period of recovery, and "from 1977 there was a steady growth until 1981 when, with rising exports, Gross Domestic Product (GDP) was double the 1977 level, and above pre-independence levels" (DNE 1985 quoted by Hanlon 1991:11).

Up to 1981, the priority actions of the government were concentrated in three aspects namely, "to improve the raw materials supplies to firms, to reorganize the major lines of production and industries, and to identify projects for the development of the national basic industry" (Castel-Branco 1994:98). In 1981, the government adopted an accelerated economic development strategy called Indicative Prospective Plan (IPP), which aimed at rebuilding (in ten years) of the essential bases of the modern basic industry and agriculture in Mozambique. However, this programme was fully dependent on external resources which were not available because "from 1980, foreign exchange earnings fell due to the South African economic boycott

against Mozambique, the international sanctions against the former South Rhodesia, and the combined effect of the fall in exports and deteriorating terms of trade" (Castel-Branco 1994:102). At the same time, Mozambique attempted to become a member of the eastern block Council for Mutual Economic Assistance (COMECON), but it failed because the former Soviet Union was not willing to subsidise the Mozambican economy to the extent to which it was subsidising Cuba and Vietnam. Thus, the country was neither able to find alternative sources of external finance, nor partners with whom to share the costs. Therefore, the economy ran out of resources to sustain the IPP.

### **2.3 The Economic Trends up to 1986 and the Introduction of the ERP in 1987**

After a partial recovery in the period 1977-81, the economy of Mozambique declined dramatically over the period 1982-86, as shown in Table 2.1.



Table 2.1 Mozambique's Macroeconomic Indicators: 1980-1986

	1980	1981	1982	1983	1984	1985	1986
CPI, annual average (%)	4.99	5.09	5.99	7.74	10.08	13.03	18.07
Inflation, annual average (%)	1.0	3.8	17.5	11.8	14.8	47.8	12.2
Real GDP (ml USD)	1,564.0	1,656.0	1519.0	1,213.0	1,195.0	1,207.0	1,179.0
GDP Per Capita (USD)	185.0	184.0	192.0	174.0	188.0	245.0	291.0
Exports (ml USD)	280.8	280.8	229.2	131.6	95.7	76.6	79.1
Imports (ml USD)	800.2	801.1	835.9	636.4	539.7	423.7	542.7
Trade Balance (ml USD)	-519.4	-520.3	-606.7	-504.8	-444.0	-347.1	-463.6
Exchange Rate (MT/USD)	34.90	35.28	37.77	40.18	42.44	43.18	40.51
Total External Debt (ml USD)	n.a.	n.a.	n.a.	n.a.	2,400.0	2,794.0	3,398.0
Loan Disbursements (ml USD)	503.1	718.2	724.6	339.3	264.8	238.8	284.0
Grant Disbursements (ml USD)	55.9	57.4	79.4	89.6	167.7	139.0	213.0
Aid = Loans and Grants (ml USD)	555.9	775.6	804.0	428.9	432.5	377.8	497.0

Sources: CPI: Bank of Mozambique 1995:55 ; Real GDP: World Bank 1996: 18; Inflation and GDP Per Capita: Hanlon 1997:206; Balance of Trade and Current Account Balance: Bank of Mozambique 1995:61; Exchange Rate (MT/USD): Bank of Mozambique 1995:55; External Debt: World Bank 1996:168 and Bank of Mozambique 1995:62; Loans and Grants: Bank of Mozambique 1995:61.

Note: n.a = not available.

The economic trends up to 1986 were as follows:

- (a) Domestic food production and marketing declined precipitously after 1981, and

there have not been sufficient food supplies to the cities since that time. In the case of major export crops, marketed production in 1985 was only about one-fourth of the 1980-81 level;

- (b) Industries lacked imported inputs and were not well-maintained for lack of resources since 1981; they operated below their installed capacities. The international railway network, which had formerly earned significant amounts of foreign exchange, and the internal transport system, deteriorated because of attacks by armed opposition and the lack of spare parts for maintenance and rehabilitation;
- (c) The government's budgetary situation deteriorated from a small surplus in current expenditures in the early 1980s to a substantial deficit in 1986. This deterioration reflects the erosion of the tax base resulting from production declines, the growth of illicit markets, and the pressure of defence spending. Revenue declined in nominal terms between 1983 and 1985, and by 1986 the overall deficit (exclusive of public enterprise losses) exceeded 45% of total expenditure. In 1985-86, defence outlays accounted for about one-third of total expenditure, up from 20% in the early 1980s;
- (d) Over the 1981-86 period, domestic credit outstanding more than tripled, with a comparable increase in domestic liquidity and a virtual elimination of the positive net foreign asset position. Until 1986, operating losses of state and private enterprises were financed directly by the banking system rather than through

government subsidies. Of the total increase in domestic credit since 1981, at least 55% reflected the financing of enterprise losses, and 28% resulted from the emergence of the government as a major borrower;

- (e) The 1980 employment census indicated that employment of Mozambicans in South African mines, an important source of foreign exchange for the country, had decreased steadily since independence. Migrant workers returning from South Africa put additional pressure on the domestic labour market. Furthermore, the factors that adversely affected agriculture in the first half of the decade of the 1980s resulted in considerable rural-urban migration and aggravated the urban unemployment problem, especially in Maputo;
- (f) From 1980, when a small overall deficit was recorded, the balance of payments situation worsened each year, reaching a 1986 current account deficit of more than US\$ 600 million. Underlying the sharp deterioration in the external position over this period was a decline in earnings from exports of goods and services of about 44%, and a rise in the debt service burden. In 1986, receipts from merchandise exports were 28% of the 1980 level, and far below the levels achieved before independence;
- (g) During the period 1978-84, over half of Mozambique's merchandise export earnings was needed to pay for net imports of crude oil and petroleum products. Most imports were financed by grants and external borrowing. About 75% of food imports were financed by food aid. In 1986, the percentage of imports of

goods and services other than interest covered by exports receipts had declined from 52% in 1980 to 32%; about 75% of imports of goods and services other than interest were financed by grants and loans; international reserves were nearly exhausted, and outstanding arrears on external debt reached US\$ 1,2 billion; and

- (h) In October 1984, Mozambique rescheduled arrears and current maturities with the Paris Club and in 1985, it concluded bilateral rescheduling agreements with other creditors. Because of the extreme scarcity of foreign exchange, the country became increasingly unable to honour its external debt commitments. The debt service ratio reached 275% in 1986. By the end of 1986, Mozambique's outstanding disbursed external debt, including accumulated arrears, reached US\$ 3,4 billion (Mozambique 1988:4-5).

Given the negative economic trends mentioned above, there was a need to halt the steep economic decline and turn it into growth, and in order to do this, the government introduced the ERP, with the support of the IMF, WB, and the bilateral donor community, in January 1987. The aims of the ERP are summarized in the following statements:

The ERP aimed to gradually move the prevailing centrally-planned economy towards a market-based economy by *inter alia*: curtailing the budget deficit, controlling money supply, correcting external imbalances notably through realignment of the exchange rate, making resource allocation more dependent on market forces through price and trade

liberalization and producer incentives, reducing government involvement in direct productive activities through privatization of state enterprises, reforming and developing the banking sector, improving the delivery of basic health and education services, and providing a minimum-income "safety-net" to the poorest households. (UNDP 1996:3).

However, the government maintained some of its previous centralized economy pillars, given that from 1987 to 1990, the economic policy under the ERP was mainly outlined by the government of Mozambique and not by the Bretton Woods institutions, "which finally affirmed their control with the agreement in 1990 of an Enhanced Structural Adjustment Facility (ESAF) that marked the adoption of complete neo-liberal packages: privatization, free international trade, price liberalization, drastic cuts on government expenditures, and credit restrictions" (Hanlon 1996:116).

#### **2.4 The Exchange Rate Policy under ERP**

As noted earlier, the Mozambican economy had for a greater part of the post-independence period been characterized by chronic deficits in its trade balance, that led to a sharp scarcity of foreign exchange and, consequently, to a decline in the country's capacity to finance its imports and debt service, and to a general decline in the level of economic activity, as shown in Table 2.2.

Table 2.2 Balance of Trade Indicators, 1980-1986

	1980	1981	1982	1983	1984	1985	1986
Growth Rates of:							
Exports (%)		0.0	-18.4	- 42.6	- 27.3	- 20.0	3.3
Imports (%)		0.1	4.3	- 23.9	-15.2	- 21.5	28.1
Real GDP (%)		5.9	- 8.3	- 15.9	- 5.0	- 0.5	- 2.3
Exports as % of:							
Imports	35.1	35.1	27.4	20.7	17.7	18.1	14.6
Total Debt Service		81.4	58.8	34.2	22.9	19.3	16.1

Source: Government of Mozambique 1988:31-2.

Given the difficulty of correcting external imbalances, the economic development strategies in Mozambique have been based on external resources, whose mobilization has been the goal of the exchange rate policy within the ERP framework. Devaluation of the *metical* was considered one of the most important conditions for a return to higher levels of economic performance in the country, taking into account that "among policy instruments available to governments, the exchange rate is one of those that has greatest potential to effect long-term structural change" (Killick 1993:139). Thus, the exchange rate adjustment was considered a basic tool of economic stabilization and adjustment under ERP. In this context, a steady devaluation of the *metical* was implemented, in regular monthly reductions. As a result, the official exchange rate dropped from MT 40 to the dollar at the beginning of 1987, to MT 756 to the dollar in August 1989. Further gradual reductions related to the US dollar and other major currencies were to follow, as shown in Table 2.3.

Table 2.3 Annual Average Exchange Rates: 1986-1996

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MT/USD	40.51	289.44	528.58	744.98	929.09	1,434.47	2,432.38	3,724.4	5,918.1	8,889.75	11,139.67
MT/GBP	59.27	480.32	942.96	1,214.2	1,660.56	2,521.07	4,237.7	5,581.6	8,993.8	13,981.3	17,095.42
MT/YEN	0.24	2.03	4.07	5.39	6.45	10.69	19.26	33.86	57.92	93.95	102.03
MT/FF	5.84	48.45	95.13	116.88	171.30	253.94	464.65	653.02	1,063.6	1,769.67	2,164.83
MT/LIT	0.03	0.22	0.41	0.54	0.78	1.15	2.07	2.43	3.63	341.92	7.73
MT/DM	18.67	162.17	300.41	396.52	577.02	863.26	1,557.78	2,235.9	3,646.5	6,187.58	7,301.08

Source: Bank of Mozambique 1995:56 and 1997:15

Note: The exchange rates are defined in terms of units of the domestic currency (MT) per unit of the foreign currencies.

These devaluations and subsequent exchange rate adjustments aimed at correcting external imbalances through promotion of exports and reduction of imports, taking into account that "a decrease in nominal exchange rate - a devaluation of the domestic currency - improves the current account balance and reduces the balance of payments deficits" (Branson 1989:418).

The devaluation of the *metical* characterized the exchange rate policy under ERP. Up to 1989, the price of foreign exchange played a limited allocative role. However, in October 1989, the government made its first attempt to operate a system for non-administrative allocation of foreign exchange. Since October 1990, a secondary market for foreign exchange has been in operation. This market was later expanded to cover the majority of foreign exchange transactions. In April 1992, the Bank of Mozambique (BM) unified the official and secondary foreign exchange markets. The rates diverged between September 1992 and May 1993, as BM delinked its reference rate from the secondary market rate, but in June 1993, the central bank reunified the markets, as shown in Table 2.4.

Table 2.4 Annual Average Exchange Rates Developments: 1980 - 1996

	Official Market (MT/USD)	Rate of Depreciation in Official Market (%)	Secondary Market (MT/USD)	Ratio of Secondary Market to Official Exchange Rates
1980	34.90			
1981	35.28	1.1		
1982	37.77	7.1		
1983	40.18	5.9		
1984	42.44	5.6		
1985	43.18	1.7		
1986	40.51	-6.2		
1987	289.44	614.5		
1988	528.58	82.4		
1989	744.98	40.9		
1990	929.09	24.7		
1991	1,434.47	54.4		
1992	2,432.38	69.6	2,951.40	1.21
1993	3,724.40	53.1	5,343.16	1.43
1994	5,918.09	58.9	6,651.00	1.12
1995	8,889.75	50.2	10,890.00	1.23
1996	11,139.67	25.3	11,377.00	1.02

Sources: Official Exchange Rates: Bank of Mozambique 1995:55-6. and 1997:15; Secondary Market Exchange Rates: Bank of Mozambique 1997:15.

Besides the gradual enlargement of the secondary market, the government has carried out substantial devaluations of the *metical*, as shown in Table 2.3.

As a consequence of the devaluations, the average annual MT/USD official exchange rate depreciated by 614.5 per cent, in nominal terms, between 1986 and 1987, and by a further 82.4 per cent in 1988. As a result, the difference between the official and the secondary exchange rate was significantly reduced. In 1994 and 1995, the average annual difference between the two rates had shrunk. While the discrepancy between the official and the secondary market rates has shrunk, trade deficit has been increasing, and so has the economy's dependency on aid. Table



2.5 shows that there was no significant improvement in the performance of the Mozambican economy in the post ERP period: 1987-1996.

Table 2.5 Mozambique's Macroeconomic Indicators: 1987 - 1996

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
CPI, annual average (%)	41.2	65.3	100.0	133.4	177.7	257.8	366.7	598.5	923.8	1,336.0
Inflation, annual average (%)	175.8	50.1	40.0	47.1	33.3	45.1	42.3	63.1	54.9	16.6
Real GDP (ml USD)	1,353.0	1,464.0	1,559.0	1,575.0	1,652.0	1,638.0	1,955.0	2,060.0	2,089.0	2,223.0
GDP Per Capita (USD)	105.0	89.0	93.0	102.0	99.0	87.0	94.0	88.0	86.0	123.0
Exports (ml USD)	97.0	103.0	104.8	126.4	162.3	139.3	131.8	149.5	174.3	225.9
Imports (ml USD)	642.0	735.6	807.7	877.5	898.8	855.0	954.7	1,018.5	727.0	801.5
Trade Balance (ml USD)	-545.0	-632.6	-702.9	-751.1	-736.7	-715.7	-822.9	-869.0	-552.7	-575.6
External Debt (ml USD)	3,898.2	4,209.7	4,391.4	4,959.5	4,994.8	5,041.0	5,011.2	5,276.9	5,471.7	5,691.6
Loan Disbursements (ml USD)	301.1	247.5	257.7	251.4	144.1	169.8	185.5	260.3	282.3	347.4
Grant Disbursements (ml USD)	304.2	376.8	387.5	448.4	501.7	499.4	503.3	564.6	339.2	282.9
Aid=Loans and Grants (ml USD)	605.3	624.3	645.2	699.8	645.8	669.2	689.8	824.9	621.5	630.3
Growth rates of:										
Exports (%)	22.6	6.2	1.7	20.6	28.4	-14.2	-5.4	13.4	13.8	29.6
Imports (%)	18.3	14.6	9.8	8.6	2.4	-4.9	11.7	6.7	-21.5	10.2
GDP (%)	14.7	8.2	6.5	1.0	4.9	-0.8	19.3	5.4	1.4	6.4
Aid (%)	21.8	-4.2	11.3	8.4	-7.6	3.6	3.0	19.7	-24.7	1.4

Sources: CPI: Bank of Mozambique 1997:26 and National Institute of Statistics 1997a:129; Inflation: UNDP 1996:4-8; Real GDP: World Bank 1996:18 and Bank of Mozambique 1997:25; Trade Balance: Bank of Mozambique 1995:61 and 1997:19; External Debt: Bank of Mozambique 1995:62 and 1997:20; Loans and Grants: Bank of Mozambique 1995:61 and 1997:19; GDP Growth: World Bank 1996:18 and Bank of Mozambique 1995:70, 1996:53, and 1997:25.

## 2.5 The Structure of External Trade in Mozambique

According to WB (1990:444), in 1986, the Mozambican traditional exports were: prawns (60.8% by value), cashew nuts (13.6%), sugar (6.4%), petroleum products (3.2%), cement (0.24%), cotton (0.8%), tea (0.8%), timber (0.8), and others (13.36%). The imports were: food (27% by value), raw materials (20%), machinery and equipment (16%), consumer goods (15%), spare parts (12%), and crude oil (8.8%). In 1986, the major sources of imports were: OECD countries (60%) mainly from USA, Italy, France, and Portugal. Other sources were eastern Europe (12%, chiefly the former USSR), and South Africa (10.3%). In 1987, the major countries of destination of exports were: OECD countries (72.5%) mainly the USA (20.8%), Japan (18.3%), Spain (18.2%), and Portugal (7.0%). Other destinations were COMECON countries (18.3%, chiefly the former USSR and GDR), and South Africa (12.1%). This structure of external trade has been maintained up to present-day Mozambique as shown in Table 2.6.

Table 2.6 The Main Trading Partners of Mozambique

Countries	1995				1996				Weights in Total Trade
	Exports (ml USD)	Imports (ml USD)	Exp+Imp (ml USD)	% of Distrib	Exports (ml USD)	Imports (ml USD)	Exp+Imp (ml USD)	% of Distrib	
Spain	36.4	23.7	60.1	6.7	47.6	10.2	57.8	5.6	6.2
USA	9.5	49.9	59.4	6.6	25.8	29.5	55.3	5.4	6.0
Portugal	14.6	65.7	80.3	8.9	17.5	54.2	71.7	7.0	8.0
Japan	24.8	36.8	61.6	6.8	17.2	32.5	49.7	4.8	5.8
RSA	41.1	188.2	229.3	25.4	43.8	254.3	298.1	29.0	27.2
UK	0.8	26.5	27.3	3.0	3.0	13.4	16.4	1.6	2.4
Zimbabwe	7.9	30.7	38.6	4.3	9.8	31.7	41.5	4.1	4.2
Others	39.2	305.6	344.7	38.3	61.2	375.7	436.9	42.5	40.2
Total	174.3	727.0	901.3	100	225.9	801.5	1,027.4	100	100

Source: National Institute of Statistics 1997:38-9.

Given the above sources of imports and destinations of exports, the main trading partners of Mozambique are the United States of America (USA), Spain , Portugal (PTG), Japan, South Africa (RSA), United Kingdom (UK), and Zimbabwe, whose shares in total trade of the country are 6.0%, 6.2%, 6.2%, 8.0%, 5.8%, 27.2%, 2.4%, and 4.2%, respectively.

## CHAPTER THREE

### LITERATURE REVIEW

#### 3.1 Introduction

This chapter is comprised of two sections namely, theoretical framework and empirical studies. The first one, which describes the role of changes in the exchange rates in the economy of any country, the definition of real exchange rate (RER), and the arguments in relation to devaluation as well as its effect on trade flows and output growth, provides us with the theoretical framework of analysis. The latter seeks to look at existing empirical work on the efficacy of devaluation of a country's currency as an adjustment policy tool, and also on external trade and growth.

#### 3.2 Theoretical Framework

Given the need to halt the chronic trade deficits that Mozambique ran since its independence, the ERP introduced in 1987 by the government relied heavily on devaluations "that are conventionally believed to be a tool for improving a country's balance of trade" (Melvin 1989:145). The devaluation in Mozambique consisted of a decrease in the value of the national currency, the *metical*, relative to the US dollar.

Most traditional textbooks consider that devaluing a country's currency changes the price of domestically-produced traded goods relative to the prices of the same goods produced in other countries, that is "devaluation reduces the relative prices of the devaluating country's exports and

of its imports-competing goods, and this will, in time, increase the volume of exports and decrease the volume of imports" (Sodersten 1994:617). The process is described in the following statements:

"According to the traditional trade theory, a devaluation of a nation's currency reduces the foreign-currency price of its exports and increases the domestic-currency price of its imports. This stimulates the nation's exports and discourages its imports. The increase in the production of exports and import-substitutes in the devaluing nation increases its GDP and is generally inflationary. The resulting domestic inflation dampens both the expansion of exports and the production of imports-substitutes, thus moderating the expansion of the nation's GDP. The remaining net increase in the devaluing nation's GDP stimulates domestic consumption and investment and usually leads to an increase in the nation's money supply. These lead to further expansion of the nation's GDP" (Milner 1992:34-5).

Devaluations are usually an important component of the orthodox stabilization and adjustment programmes sponsored by the IMF/WB. Their proponents expect it "to stimulate the expansion and diversification of exports by raising their prices in terms of domestic currency, and expanding their market share in the international market by lowering their prices in foreign currencies. On the import side, devaluation is, in the short run, expected to bring about a downward change by raising the prices of imports in terms of domestic currency" (Mengistedeab 1991:28). In other words, the expansion of the volume of exports, in turn, is expected to more

than compensate for the decline in prices and raise export earnings, making the export sector the leading sector for general growth. Moreover, in the long run, the export-led higher income is expected to drive imports upwards to a new equilibrium level at a higher standard of living.

Recently, traditional stabilization packages, and especially their devaluation component, have come under attack by a number of authors. This has led to two arguments in relation to devaluations: Firstly, there is the argument in favour of devaluation that is largely used in the orthodox stabilization and adjustment programmes supported by the IMF/WB. According to this argument, devaluation is expansionary in the sense that it leads to an increased output and an improvement in the balance of trade. Also according to this argument "many of the adjusting countries in SSA have made progress in improving their macroeconomic, agricultural, and trade policies" (World Bank 1994:181). Secondly, there is the argument against devaluation, that "even though nominal devaluations may achieve their goal of generating a relative price readjustment, they do so at a high cost, and one of such indirect costs is the decline in total output" (Edwards 1986:501). The latter argument has come to be known as the contractionary devaluation problem:

"For example, in Tanzania the argument against devaluation was that it would not improve the balance of payments. It would generate inflation thereby causing political tension over income shares and erosion of the budget balance. It would not succeed in increasing the RER to targeted level, because the inflation it generated would lead rapidly to an appreciation of the real exchange rate, requiring in turn further devaluation and causing, therefore, a never-ending spiral of devaluation-inflation-further devaluation" (Campbell 1989:17).

There are several theoretical reasons why, contrary to the traditional view, a devaluation can be contractionary. Firstly, nominal devaluations can result in some contractionary pressures on aggregate demand, which could more than offset the traditional expenditure-switching effect. For example, a devaluation will result in a higher price level, generating a negative real balance effect. This, in turn, will result in lower aggregate demand and output. Moreover, a devaluation can generate a redistribution of income to groups with a high marginal propensity to save, and result in declines in aggregate demand and output. Also, if the price elasticities of imports and exports are sufficiently low, the trade balance expressed in domestic currency may worsen, thus generating a recessionary effect. Secondly, in addition to those demand-related effects, there are a number of supply-side channels through which devaluations can be contractionary. For example, (Edwards 1986:501-2), in a study called "Are Devaluations Contractionary?" shows that Van Wijnburgen (1986) has developed a model with intermediate goods and informal financial markets where, under certain conditions, a devaluation can result in an upward (recessionary) shift in aggregate supply. Once this supply side channel is introduced into the analysis, it is possible for devaluations to be contractionary even if the net effect on aggregate demand were expansionary (i.e., the expenditure-switching effect dominated the expenditure-reducing effect). This would be the case if aggregate demand shifts by less than the shift in aggregate supply.

In our study we consider RER as a key regressor. Killick (1993) defines RER in two ways: bilateral and multilateral RER. The first one is defined as the exchange rate between two countries' currencies, adjusted for inflation differentials of the home and foreign countries. The latter is defined as the exchange rate between one currency and some basket of other currencies, also adjusted for inflation differentials between the home country and its major trade partners.

The effects of devaluation in the economy depend on the manner in which devaluation

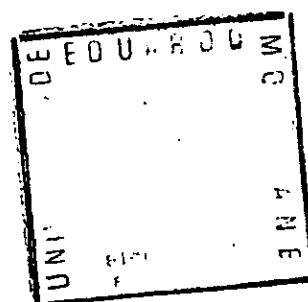
is used. Devaluation may be used to improve the balance of trade or to liberalize trade. However, it is often regarded as succeeding to the extent that "it lowers the real wage and increases the RER, but at the cost of a higher price level, and this is only true of payments-improving devaluations given that, a liberalizing devaluation will raise the real wage, raise the RER, and lower the price level" (Collier 1989:110). These major differences between payments-improving and liberalizing devaluations matter. Thus, in the stabilization programmes it recommends to the developing countries, "the IMF uses the concept of the RER and its own proxy measure, which are applicable only in the context of payments-improving devaluations" (Collier 1989:112-3).

Many classes of models have been used to analyse devaluation, and among them, the elasticity approach stands up. Jha (1994: 122) considers that devaluation is beneficial only if it increases earnings of foreign exchange. He develops the elasticity approach to devaluation as follows:

$$NX = X - M, \quad (3.1)$$

where NX is net exports, X and M are, respectively, exports and imports. Totally differentiating gives:

$$dNX = dX - dM \quad (3.1a)$$





However,  $X = p^f x$ , where  $p^f$  is the foreign price of exports and  $x$  is the physical quantity of exports. He defines  $p^d$  as the home price of exports so that  $p^d = ep^f$ , where  $e$  is the exchange rate. Exports is bought by foreign nationals, so that elasticity of demand for exports ( $\eta_x$ ) must be stated in terms of foreign prices, i.e.

$$\eta_x = (-d_x/x) / (dp^f/p^f) \quad (3.2)$$

Since exports are supplied by the home country, the elasticity of supply of exports must be defined in terms of home prices. Therefore, the elasticity of supply of exports with respect to price ( $S_x$ ) is given by:

$$S_x = (d_x/x) / (dp^d/p^d) \quad (3.3)$$

From  $p^d = ep^f$  we get:

$$(dp^d/p^d) = (de/e) + (dp^f/p^f) \quad (3.4)$$

Substitute this into the expression for  $S_x$  to get:

$$S_x = (d_x/x) / [(dp^f/p^f) + (de/e)] \quad (3.5)$$

Equation (3.5) expresses supply elasticities in terms of foreign prices and the exchange rate.

From equation (3.2) we can write:

$$dx/x = -\eta_x * (dp^f/p^f) \quad (3.6)$$

Substitute this into equation (3.3) to get:

$$(dp^f/p^f) = [-S_x / (\eta_x + S_x)] * (de/e) < 0, \quad (3.7)$$

if  $de/e > 0$ , i.e., if there is a devaluation of the home currency. Substitute this into equation (3.2)

to calculate the proportionate change in the quantity of exports as:

$$dx/x = [(\eta_x S_x) / (\eta_x + S_x)] * (de/e) > 0, \quad (3.8)$$

if  $de/e > 0$ , i.e., if there is a devaluation. Equation (3.7) shows that  $dp^f/p^f$  is negative. The foreign

price of exports, therefore, falls. Adding the proportionate change in foreign price to the proportionate change in quantity given the proportionate change in the value of exports we get:

$$dX/X = (dp^f/p^f) + (dx/x) \quad (3.9)$$

This will be positive if the proportionate rise in quantity exceeds the proportionate decline in price. Substituting from equation (3.7) and equation (3.8) in to equation (3.9) we get:

$$dX/X = [S_x (\eta_x - 1) / (\eta_x + S_x)] (de/e), \quad (3.10)$$

as the proportionate change in the value of exports. If we divide both sides of equation (3.10) by  $de/e$  we shall get the elasticity of supply of foreign exchange with respect to the exchange rate as  $S_x (\eta_x - 1) / (\eta_x + S_x)$ . This elasticity is positive if the demand for exports is elastic. The supply of foreign exchange is constant if the elasticity of supply is zero, i.e.,  $S_x = 0$ . In this case, the domestic price of exports rises in direct proportion to devaluation, i.e., there is no decline in the foreign price of exports and, therefore, no increase in the volume of exports. Further, if  $\eta_x$  is high it would be advantageous to have a high  $S_x$ . But if  $\eta_x$  is low, it would be better to have a low  $S_x$  so as to minimize the reduction in foreign exchange earnings. In the ultra Keynesian case, if  $S_x = \infty$  the elasticity of supply of foreign exchange with respect to the exchange rate is  $\eta_x - 1$ . Devaluation increases foreign exchange earnings if  $\eta_x > 1$ , but decreases foreign exchange

earnings if  $\eta_x < 1$ . Looking at import side, the value of imports is given by:

$$M = p^f m, \quad (3.11)$$

where  $m$  is the physical volume of imports and  $p^f$  is the foreign price of imports. The domestic price of imports is  $p^d$ . We define:

$\eta_m = (-dm/m) / (dp^d/p^d)$  is the domestic price elasticity of demand for imports.

$S_m = (dm/m) / (dp^d/p^d)$  is the foreign price elasticity of supply of imports.

$$p^d = e p^f$$

From equation (3.11) it follows that:

$$dM/M = (dm/m) + (dp^f/p^f) \quad (3.12)$$

From  $p^d = e p^f$ , it follows that:

$$dp^d/p^d = (de/e) + (dp^f/p^f) \quad (3.13)$$

Using equation (3.13) and the definitions of the elasticities:

$$S_m = (dm/m)/(dp^f/p^f) \quad \eta_m = (-dm/m)/[(dp^f/p^f) - (de/e)] ,$$

we have:

$$dm/m = [(-S_m \eta_m)/(\eta_m + S_m)] * (de/e) < 0 \quad (3.14a)$$

$$(dp^f/p^f) = [-\eta_m/(\eta_m + S_m)] * (de/e) \quad (3.14.b)$$

From equation (3.14) we note that devaluation reduces both the physical volume of imports and the foreign price of imports so that the value of imports must decline. Substituting the results in equation (3.14) into (3.12) yields:

$$dM/M = [-\eta_m(1 + S_m)/(\eta_m + S_m)] * (de/e) < 0 \quad (3.15)$$

Hence, devaluation reduces the value of imports and the demand for foreign exchange. Substituting from equations (3.15) and (3.10) into equation (3.1a) we get overall balance of trade measured in foreign currency:

$$NX = \{X[(S_x(\eta_x - 1)/(\eta_x + S_x))] + M[(\eta_m(1 + S_m)/(\eta_m + S_m))]\} * (de/e) \quad (3.16)$$

This is the final expression for the effect of devaluation on net foreign exchange earnings. A much discussed special case arises when supply elasticity is infinite and trade is initially balanced ( $X=M$ ). The equation (3.16) reduces to:

$$dNX = X(\eta_x + \eta_m - 1) * (de/e) \quad (3.17)$$

For  $dNX > 0$  it is necessary that  $\eta_x + \eta_m > 1$ , i.e., the sum of the elasticity of demand for exports and the elasticity of demand for imports should exceed unity. This is called the Marshall-Lerner condition.

According to Edwards (1988:66-7), in the elasticity approach a devaluation will be effective (in the sense that it will improve the balance of trade) as long as the Marshall-Lerner condition holds. That condition states that for a devaluation to be successful in a small country, the price elasticities of the demands for imports and exports should be large. In addition, as long as the Marshall-Lerner condition holds, a nominal devaluation will be effective: the balance of

trade will improve, output will go up, and a real devaluation will take place as a result of a nominal adjustment to the exchange rate. Nevertheless, a devaluation will be expansionary in the sense that it will increase net exports, aggregate output, and employment.

### **3.3 Empirical Studies**

Using RER as a proxy for output, exports, and imports, many researchers over the years have attempted to test the hypothesis of a significant positive relation on the one hand between devaluation and growth, and on the other hand, between devaluation and trade flows. If obtained, such a positive relation would suggest the validity of expansionary devaluation as suggested by the traditional theories and also by the orthodox stabilization and adjustment programmes supported by the IMF/WB. The studies have been either bivariate or multivariate, mainly comparing either RER and output or RER and exports/imports. Some of the studies have adopted a cross-country approach, while others have used time series data to study the relation for specific countries.

Most of the empirical results reported so far have supported the proposition that devaluation stimulates output and net exports growth. They have supported also the hypothesis of a positive relation between exports and output growth. However, other results suggest that devaluation does not generate growth neither in output nor in net exports. According to Edwards (1986:502), among the important cross-country studies, are those undertaken by Cooper (1971a), Bhagwat and Onitsuka (1973), Krueger (1978), Gylfason and Schmidt (1983), Connolly (1983), Taylor and Rosensweig (1984), Gylfason and Radetzki (1985), and Branson (1986). In this context, he shows that Cooper (1971a) analysed 24 devaluations that took place between

1953 and 1966 and concluded that devaluation often initially tends to depress economic activity in the devaluing country, contrary to what has normally been expected. Using a sample of 46 nonindustrial countries that devalued their currencies during the 1960s, Bhagwat and Onitsuka (1973) found that export performance was significantly better in the post-devaluation three-year period, compared with both the pre-devaluation medium-term trend and the three-year period preceding devaluation; in most cases, imports continued to grow after devaluation and, in a majority of cases, the growth rate exceeded the pre-devaluation growth rate. Krueger (1978) analysed output behaviour during the periods surrounding major devaluation episodes, and found that in most cases the evidence did not support the contractionary devaluation hypothesis. Gylfason and Schmidt (1983) have constructed a small macro model with intermediate goods, where devaluations have a positive effect on aggregate output. Connolly (1983) considered a group of 22 countries and regressed the change in the nominal exchange rate on GDP. The coefficient of nominal exchange rate was positive and marginally significant, providing some support to the hypothesis of expansionary devaluation. Taylor and Rosensweig (1984) built a large computable general equilibrium model for Thailand, and simulated the effects of a number of policy measures, including a devaluation. Their results suggest that a devaluation of the *baht* of 10% had an expansionary effect and generated an increase in real GDP of 3.3%. Gylfason and Radetzki (1985) present simulation results for a small macro model for a group of LDCs, that suggest that devaluation generates a decline in real output. Branson (1986) has constructed a small simulation model for Kenya which suggests that, contrary to the traditional view, a devaluation has important contractionary effects in the Kenyan economy.

Among the more important time series studies, the following may be mentioned: Edwards (1986), Edwards (1989), Mengisteab (1991), and Brada, Kutan and Zhou (1997), and Iyoha (1997). Edwards (1986) uses multivariate regression analysis to investigate the effect of RER



changes on real output growth using annual data for a group of 12 developing countries during 1965-80. He found results showing that with other things given, devaluations have an expansionary effect on output growth, but in the long run they tend to be neutral. Edwards (1989) uses a multiple log-linear specification to analyse the impact of devaluation on growth for 12 developing countries using data for 1965-1984. He found results which tend to provide support for the view that devaluations have at least a short-run contractionary effect on real output, and are neutral in the long run. Mengisteab (1991) uses a bivariate regression analysis to investigate the relation between the annual changes in the values of exports and the annual changes in RER, and also the relation between the annual changes in the values of imports and in the annual changes in RER for 14 sub-Saharan Africa (SSA) countries, using data for 1966-1983. He found results showing that the impacts of changes in the values of RERs are not accompanied by significant changes in the values of either exports or imports; the results obtained do not support the contention that devaluation through its impacts on exports and imports brings about the correction of external disequilibrium in SSA. Brada, Kutan and Zhou (1997) used Turkish data for the period 1980-93 to investigate the responsiveness of Turkey's trade balance to devaluation, and found results showing that trade balance was responsive to changes in the exchange rates that were brought about by the economic reforms introduced in the 1980s, suggesting that exchange rate policy was able to create and maintain a satisfactory balance of trade position in the 1980s and in the early 1990s. In their study these researchers used the popular two-country model of trade, starting with the assumption that the quantity of imported goods demanded depends on output and relative price of imported goods.

$$I^d = I^d(Y^d, r^d), \quad (3.18)$$

where  $I^d$  is the quantity of foreign goods imported,  $Y^d$  is the level of domestic real income measured as domestic industrial production, and  $r^d$  is the relative price of imported goods to domestically produced goods. Similarly:

$$I^w = I^w(Y^w, r^w), \quad (3.19)$$

where  $I^w$  is the quantity of domestic goods exported (i.e., foreign imports),  $Y^w$  is the real income in the rest of the world, and  $r^w$  is the relative price of imports abroad. The supply of exportables in each country is assumed to depend on the relative price of exportables (RPX) and on the level of production:

$$X^d = X^d(RPX, Y^d) \quad (3.20)$$

$$X^w = X^w(RPX^w, Y^w), \quad (3.21)$$

where  $X^d$  and  $X^w$  are supplies of domestic and foreign country exportables, respectively. The following equilibrium conditions determine the quantities and the prices:

$$I^d = X^w \quad (3.22)$$

$$I^w = X^d \quad (3.23)$$

The value of the domestic balance of trade in real terms is defined as:

$$B = (RPX * I^w) / (RER * RPX^w * I^d), \quad (3.24)$$

where the first term,  $(RPX * I^w)$ , is the value of domestic exports and the second term,  $(RER * RPX^w * I^d)$ , is the value of domestic imports. Trade balance is expressed as a ratio in order to utilize the logarithm of the trade balance as the dependent variable. Equations (3.1) - (3.4) are structural equations that can be solved with (3.5) and (3.6), and substituted into (3.7). The resulting reduced form equation can be written as:

$$B = (RER, Y^d, Y^w), \quad (3.25)$$

which was used to examine the response of trade balance to the exchange rate. This equation represents a long-run relationship that assumes sufficient time for domestic and world trade,

consumption and production to adjust to changes in the exchange rate.

Finally, in his paper, Iyoha (1997) attempted to analyse the impact of trade on development using econometric evidence from ECOWAS countries during the 1976-92. This was done using both cross-country regression analysis and country time series regression analysis. To do so, he adopted the following specific relation, in the bivariate regression:

$$\ln \text{GDP} = a_0 + a_1 \ln X + u_t, \quad (3.26)$$

where  $\ln$  denotes natural logarithm, GDP stands for gross domestic product,  $X$  represents exports, and  $u_t$  is the stochastic error term. It was expected that  $a_1 > 0$ . In the multiple regression, other trade variables like debt, openness, and the terms of trade were used as possible determinants of the level of activity. The most general relation considered was:

$$\ln \text{GDP} = b_0 + b_1 \ln X + b_2 \ln \text{DYR} + b_3 \ln \text{DSR} + b_4 \ln \text{OPS} + b_5 \ln \text{TOT} + e_t, \quad (3.27)$$

where DYR is the debt-income ratio, DSR is the debt-service ratio (ratio of debt service payments to exports), OPS is openness (measured by the ratio of exports plus imports to GDP), and TOT is the terms of trade. Utilizing 1992 data for 14 ECOWAS countries, a log linear regression equation of GDP on exports and the debt-income ratio was fitted. The two explanatory variables explained over 95% of the systematic variations in GDP. As he expected, exports had

a positive sign and the debt-income ratio (a measure of debt burden) had a negative sign; both variables were highly significant (and passed the significance test at the 1% level). Thus, export expansion stimulates changes in gross domestic product, which confirms the hypothesis that exports are an "engine" of the level of activity. A high debt-income ratio is associated with a lower output growth, thus indirectly confirming the debt overhang hypothesis, according to which a high debt burden reduces investment and growth. Time series regression analysis using annual data for 1976-92 were also fitted for the 14 ECOWAS countries which had the requisite data and the results basically paralleled the cross-country findings. For each country, exports were found to be positively related to income. Thus, again, the hypothesis of exports expansion stimulating development was confirmed.

As described above, there are many studies done on the efficacy of devaluation as an adjustment policy tool. But, for the economy of Mozambique, there is no such study at all. In fact, there are only a few general studies on the impact of the whole ERP on the economy. The first popular study on this topic was by Castel-Branco (1994). According to him, a brief evaluation of the results of the ERP indicates that its main aims and goals have never been close to being achieved, given that between 1986 and 1990, industrial production rose by 2% on average per annum instead of the 13% expected; in early 1990s, output and exports started falling; in 1991, the value of industrial production was less than it was in 1986; between 1987 and 1992, employment in industrial sector fell by 6.6% on average per annum, against an expected increase of 3% per annum.

The second study was by Brochmann and Ofstad (1990) who concluded that one of the effects of the dependent character of the process set in motion by the ERP is that foreign debt is growing concomitant with ever increasing needs of concessional finance to fill in a widening resource gap. One area where ERP appears to have been unequivocally successful is in

increasing the resource flow to Mozambique. Grants have increased from USD 60 million in 1980 and in 1981 to 200 million in 1986, reaching USD 400 million from 1988. As a consequence, imports have been allowed to increase spectacularly, while exports revenues are stagnating. The current account deficit is widening, and the prognosis is that this trend will continue. The clearing of deficits, the strengthening of the market, and the delimitation of the states' tasks were indeed necessary steps, as was the establishment of a rate of exchange more in line with the actual value of the *metical*.

The third study was by UNDP (1996). This institution concluded that the adoption of stabilization and adjustment policies coupled with the inflow of aid associated with them led to an improvement in Mozambique's economic performance. Between 1987 and 1989, real GDP growth averaged 9.8% per year. However, between 1990 and 1992, economic performance deteriorated again, due largely to the continuing civil war, compounded by the most severe drought in decades, as well as to a decline in industrial activity and delays in disbursements of external assistance. GDP rose only by 1.7% per year during this period, actually falling by 0.8% in 1992. As a consequence, real GDP per capita (in constant MT) dropped between 1990 and 1992.

The last study was by Hanlon (1997), who concluded that when the economic policy under ERP was mainly outlined by the government of Mozambique in 1987-1990, the programme stimulated economic growth. But since 1990, when the IMF/WB affirmed their control on ERP, this programme has been completely negative and has created so many difficulties. He argues that stabilization and readjustment have had catastrophic effects and the strategy of the Bretton Woods institutions did not bring about growth in a post-war economy like the Mozambican case, where poverty grew jointly with an enormous gap between the rich and poor people; the economy became dependent on imports, not only for luxury goods, but also for

essential goods, and industrial production is falling. Now there is peace in Mozambique, but the economy has not had the dividend of peace. There is an increasing evidence that the orthodox stabilization and adjustment policies are not prescriptions for growth and development. These conclusions suggest that the Bretton Woods' programmes are not suitable for SSA countries.

## CHAPTER IV

### METHODOLOGY

#### 4.1 Introduction

To empirically examine the impact of devaluation on Mozambican output and trade flows, it is postulated in this study, that changes in values of RER should be accompanied by significant changes in the values of exports, imports, trade balance, and output. This being so, the impact of devaluation of the *metical* can be accounted for by the changes in RER. Because the main concern of this study is the impact of devaluation on trade flows, we employ a framework commonly used to examine such a relation, the model of the trade balance, also known as the elasticity approach<sup>1</sup>. This model, which views imports and domestically-produced goods as imperfect substitutes, provides a simple theoretical framework for researchers concerned with the effects of exchange rate on trade flows.

#### 4.2 Hypotheses

The following hypotheses are tested:

- (a) Devaluation of the *metical* has improved export performance in Mozambique;
- (b) Devaluation of the *metical* has been accompanied by significant reductions in Mozambican imports;



- (c) Devaluation of the *metical* has improved the external balance of the country; and
- (d) Devaluation of the *metical* has led to an expansion of output in Mozambique.

### 4.3 Model Specification

This study undertakes time series regression analysis for Mozambique, using data for 1980-1996. Thus, both bivariate and multivariate regressions are undertaken. Using the two-country model of trade, which starts with the assumption that the quantity of domestic goods exported depends on the RER and income in the rest of the world:

$$X = X ( RER, Y^f ) \quad X_1 > 0 \quad ; \quad X_2 > 0 , \quad (4.3.1)$$

where  $X$  represents Mozambican exports,  $RER$  is real exchange rate,  $Y^f$  is income of the following four largest trading partners of Mozambique: the USA, Portugal, UK, and South Africa, whose currencies are the United States Dollar (USD), Escudo (ESC), Pound Sterling (GBP), and Rand (ZAR), respectively. These four countries have always had the highest shares in Mozambican total trade<sup>2</sup>. In this context, the shares of these four countries in Mozambique's total external trade are used in calculating Mozambique's multilateral real exchange rate. The first model uses multilateral real exchange rate (MRER). Equation (4.3.1) thus becomes:

$$X_t = X (MRER_{t-1}, Y^f_{t-1}, X_{t-1}), \quad (4.3.2)$$

where  $X_t$  represents total exports of Mozambique in year  $t$ ,  $MRER_{t-1}$  represents previous year's level of multilateral real exchange rate between Mozambique and its principal trade partners,  $Y^f_{t-1}$  is previous year's level of foreign real income, and  $X_{t-1}$  is previous year's level of exports. The underlying reasoning of the use of these time lags is that it is the level of  $MRER$ ,  $Y^f$ , and  $X$  last year that determines the ability of foreigners to buy Mozambican exports this year. The use of  $X_{t-1}$  means that apart from other explanatory variables, demand for Mozambique's exports by the rest of the world now is positively determined also by exports level of last year. This positive relation between  $\ln X_t$  and  $\ln X_{t-1}$  is supported by the elasticity approach to devaluation, which states that devaluation increases foreign exchange earnings. In this context, it is assumed that the previous year's earnings level enables Mozambique to buy imported inputs that are needed to produce its exportable goods, and, as a consequence, demand for Mozambique's exports this year is expected to rise.

The second model follows the assumption that the quantity of imported goods demanded depends on RER, domestic real income, and foreign aid:

$$M = M (RER, Y^d, AID) \quad M_1 < 0; M_2 > 0; M_3 > 0 \quad (4.3.3)$$

Likewise, equation (4.3.3) uses  $MRER$ :

$$M_t = M(MRER_{t-1}, Y^d_t, AID_t) \quad (4.3.4)$$

where  $M_t$  represents total imports of Mozambique in year  $t$ ,  $MRER_{t-1}$  is previous year's level of multilateral real exchange rate between Mozambique and its trade partners,  $Y^d_t$  is domestic income in year  $t$ , and  $AID_t$  represents external aid in year  $t$ . The underlying reasoning in the use of  $MRER_{t-1}$  is that it is the level of MRER last year that determines the ability of Mozambicans to buy foreign goods this year.

The third model is associated with the following equation, that is estimated to investigate the responsiveness of balance of trade to exchange rate changes:

$$BT = f(RER, Y^f, Y^d, AID) \quad f_1, f_2 > 0 ; \quad f_3, f_4 < 0 \quad (4.3.5)$$

From this equation, an aggregated model also based on MRER is estimated to determine the combined effects. In this context, we use equation (4.3.5) to provide evidence on the overall effect of the exchange rate on trade flows. Thus, equation (4.3.5) is defined as follows:

$$BT_t = f(MRER_{t-1}, Y^f_{t-1}, Y^d_t, AID_t), \quad (4.3.6)$$

where  $BT_t$  is the Mozambican trade balance in year  $t$ ,  $MRER_{t-1}$  is previous year's level of

multilateral real exchange rate,  $Y^f_{t-1}$  is previous year's level of foreign income,  $Y^d_t$  is domestic income in year  $t$ , and  $AID_t$  represents foreign aid in year  $t$ .

Drawing on previous researches in this area, a direct test of a relation between changes in RER and the level of activity is undertaken by specifying a regression of GDP on RER,  $X$ , and AID as follows:

$$GDP = f(RER, X, AID) \quad f_1, f_2, f_3 > 0, \quad (4.3.7)$$

and this equation gives us the following aggregate model that is also based on multilateral real exchange rate:

$$GDP_t = f(MRER_{t-1}, X_t, AID_t) \quad (4.3.8)$$

where  $GDP_t$  is real gross domestic product in year  $t$ ,  $MRER_{t-1}$  is previous year's level of multilateral real exchange rate,  $X_t$  represents exports in year  $t$ , and  $AID_t$  is foreign aid in year  $t$ . The positive sign of  $f_3$  suggests that external aid in Mozambique is supposed to be growth enhancing, given that, the adoption of the ERP was expected to be coupled with the inflow of external loans plus grants for development purposes.

Note that multilateral real exchange rate (MRER) is calculated with the following formula:

$$MRER = \sum (BNER_{MTj} * W_j) * (P^f / P^d), \quad (4.3.9)$$

where:

$BNER_{MTj}$  is bilateral nominal exchange rate, defined in terms of units of the domestic currency (MT) per unit of each of the following foreign currencies: USD, ESC, GBP, and ZAR.

$W_j = (X_j + M_j) / (X + M)$  represents the principal trade partners' weights in Mozambique's total trade.

$P^f$  is consumer price index (CPI) in the rest of the world (in the USA, Portugal, UK, and South Africa).

$P^d$  is domestic CPI, i.e., CPI in Mozambique.

The four models are estimated by ordinary least squares (OLS) regression technique, with the help of SHAZAM econometric package. Diagrammatical analysis is also undertaken, with the help of other econometric packages, such as PCGIVE 6.0.

It is assumed that the introduction of the ERP in 1987 by the Mozambican government and consequent changes in the exchange rates improved the performance of the Mozambican

economy. Thus, the analysis is conducted by introducing an intercept dummy variable ( $D_i$ ) and a slope dummy variable ( $D_i \cdot \text{MRER}_t$ ) corresponding to the seven years before and ten years after ERP, and both coefficients attached to these qualitative variables (the intercept and the slope) are taken into account.

From equations (4.3.2), (4.3.4), (4.3.6), and (4.3.8), four regression equations are estimated in the following forms:

**Model I - Model with  $\ln X_t$  as regressand:**

$$\ln X_t = \beta_0 + \beta_1 \ln \text{MRER}_{t-1} + \beta_2 \ln Y_{t-1}^f + \beta_3 \ln X_{t-1} + \beta_4 D_i + \beta_5 D_i \cdot \ln \text{MRER}_t + u_t \quad (4.3.10)$$

Expected coefficient signs:  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 > 0$

**Model II - Model with  $\ln M_t$  as regressand:**

$$\ln M_t = \beta_0 + \beta_1 \ln \text{MRER}_{t-1} + \beta_2 \ln Y_t^d + \beta_3 \ln \text{AID}_t + \beta_4 D_i + \beta_5 D_i \cdot \ln \text{MRER}_t + u_t \quad (4.3.11)$$

Expected coefficient signs:  $\beta_1, \beta_4, \beta_5 < 0$  ;  $\beta_2, \beta_3 > 0$

**Model III - Model with  $\text{BT}_t$  as regressand**

$$\text{BT}_t = \beta_0 + \beta_1 \ln \text{MRER}_{t-1} + \beta_2 \ln Y_{t-1}^f + \beta_3 \ln Y_t^d + \beta_4 \ln \text{AID}_t + \beta_5 D_i + \beta_6 D_i \cdot \ln \text{MRER}_t + u_t^3 \quad (4.3.12)$$

Expected coefficient signs:  $\beta_1, \beta_2, \beta_5, \beta_6 > 0$  ;  $\beta_3, \beta_4 < 0$

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<sup>3</sup>Because the Mozambican trade balance was characterized by chronic deficits during the period covered by this study,  $\text{BT}_t$  cannot be specified in logarithm. In other words, we cannot take log of negative values.

**Model IV - Model with  $\ln GDP_t$  as regressand:**

$$\ln GDP_t = \beta_0 + \beta_1 \ln MRER_{t-1} + \beta_2 \ln X_t + \beta_3 \ln AID_t + \beta_4 D_t + \beta_5 D_t * \ln MRER_t + u_t \quad (4.3.13)$$

Expected coefficient signs:  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 > 0$  ,

where:

$\ln$  = denotes natural logarithm, (hence the coefficients may be interpreted as elasticities).

$D_t = 1$  for the years after ERP and 0 otherwise.  $D_t$  is intercept dummy variable and is used to measure the average impact of ERP on exports, imports, trade balance, and real GDP.  $D_t * \ln MRER_t$  is slope dummy variable and is used to measure the marginal impact of ERP on exports, imports, trade balance, and real GDP.

#### **4.4 Sign Expectations**

The elasticity approach to the balance of trade shows that it is possible for a country to improve its trade balance through devaluation, given that imports fall and exports increase. This stimulates production of goods and services, and, consequently, income increases at home. In this context, the signs of the coefficients estimated are supposed to be according to what economic theory predicts.

#### 4.4.1 Modelling $\ln X_t$

In equation (4.3.10), modelling percentage changes in exports ( $\ln X_t$ ), higher levels of MRER are expected to lead to higher demand for Mozambique's exports by the rest of the world. This positive relation between the two variables is accounted for the nature of orthodox stabilization and adjustment programmes sponsored by the IMF/WB, such as the ERP, in which devaluations are usually an important component, and their proponents expect it to stimulate the expansion and diversification of exports by raising their prices in terms of domestic currencies and expanding their market share in the international market by lowering their prices in foreign currencies. Thus,  $\beta_1$  is expected to be positive.

Again in this model, higher levels of lagged values of  $Y^f$  (by one year) are also expected to lead to higher demand of Mozambique's exports by the rest of the world. Given that income in the rest of the world here is expected to be positively related with exports,  $\beta_2$  is also expected to be positive.

In using lagged values of the dependent variable as an explanatory variable ( $\ln X_{t-1}$ ), it is expected that a higher export level of last year leads to higher demand of Mozambique's exports by the rest of the world now. Thus,  $\beta_3$  is expected to be positive. This positive relation between  $\ln X_t$  and  $\ln X_{t-1}$  is supported by the elasticity approach to devaluation, which states that devaluation may increase foreign exchange earnings. Thus, it is assumed that the previous year's earnings level enables Mozambique to increase its purchase of imported inputs that are needed to produce its exportable goods, and, as a consequence, demand for Mozambique's exports by the rest of the world this year is expected to rise.

$\beta_4$  and  $\beta_5$  are coefficients associated with the intercept dummy ( $D_t$ ) and the slope dummy ( $D_t * \ln MRER_t$ ) variables, respectively. These two qualitative variables are introduced in the



model in order to capture the structural patterns (before and after ERP) exhibited by our annual time series data. Given that, the devaluation of the *metical* in the ERP context was assumed to bring about an improvement in economic performance in Mozambique,  $\beta_4$  and  $\beta_5$  are expected to be positive, signifying that there have been positive average and marginal impacts of the ERP, through consequent changes in MRER, on export performance.

#### 4.4.2 Modelling $\ln M_t$

In equation (4.3.11), modelling percentage changes in imports ( $\ln M_t$ ), higher levels of MRER are expected to lead to lower demand for imports by Mozambique. This negative relation between the two variables is explained by the nature of orthodox stabilization and adjustment programmes sponsored by the IMF/WB, such as the ERP, in which devaluations are usually an important component, and their proponents expect it to bring about a downward change by raising the prices of imports in terms of domestic currency. Thus,  $\beta_1$  is expected to be negative.

Economic theory suggests that a rise in real domestic income enables the economy to increase its demand for imported goods. Thus, in this model, a higher level of  $Y^d$  is expected to lead to higher demand for imports by Mozambique. Given that domestic income is expected to be positively related with imports,  $\beta_2$  is expected to be positive.

According to Brochman (1980), one area where ERP appears to have been successful is in increasing the resource flow to Mozambique, such that imports have been allowed to increase spectacularly. This implies that a higher level of external aid also leads to higher demand for imports by Mozambique. Being so,  $\beta_3$  may be positive.

$\beta_4$  and  $\beta_5$  are coefficients associated with the intercept dummy ( $D_t$ ) and the slope dummy

( $D_i \cdot \ln MRER_t$ ) variables, respectively. These two qualitative variables are introduced in the model in order to capture the structural patterns (before and after ERP) exhibited by our annual time series data. Given that, the devaluation of the *metical* in the ERP context was assumed to bring about a reduction in import dependence,  $\beta_4$  and  $\beta_5$  are expected to be negative.

#### 4.4.3 Modelling BT

The traditional theory of trade states that it is expected that a devaluation of a national currency can result in expenditure switching, increased production of tradable goods, higher exports, lower imports, and an improvement in the external trade position of the country. In this context, in equation (4.3.12), modelling trade deficit (BT), a higher level of MRER is expected to lead to an improvement in trade balance. In order to reflect the existence of a positive relationship between these two variables,  $\beta_1$  is expected to have a positive sign.

Both ( $\beta_2$  and  $\beta_3$ ) are coefficients of the income terms. The first coefficient is expected to have a positive sign due to the fact that the foreign income term enters through the export demand equation as exports enhancing, and so leads to an improvement in Mozambican trade balance. The latter is expected to have a negative sign due to the fact that the domestic income term enters through the import demand equation as imports enhancing, and so worsens the Mozambican trade balance.

Again according to Brochmman (1990), in Mozambique, imports rise as external loans and grants increase, while export revenues are stagnating, and, as a consequence of this, the current account deficit widens. This implies that a higher level of external aid worsens the balance of trade. In this case, the sign of  $\beta_4$  is expected to be negative.

$\beta_5$  and  $\beta_6$  are coefficients associated with the intercept dummy ( $D$ ) <sub>$t$</sub>  and the slope dummy ( $D_t * \ln MRER_t$ ) variables, respectively. These two qualitative variables are introduced in the model in order to capture the structural patterns (before and after ERP) exhibited by our annual time series data. Given that, the devaluation of the *metical* in the ERP context was assumed to bring about an improvement in economic performance in Mozambique, both  $\beta_5$  and  $\beta_6$  are expected to be positive, signifying that there are positive average and marginal impacts of the ERP on trade balance.

#### 4.4.4 Modelling $\ln GDP_t$

The elasticity approach to the balance of trade shows that improvement in trade balance of a country through devaluation stimulates production of goods and services, and, consequently, income increases at home. In this context, in equation (4.3.13), modelling changes in real GDP ( $\ln GDP_t$ ), a higher level of MRER leads to an increase in real GDP. Thus,  $\beta_1$  is expected to have a positive sign.

According to Iyoha (1997), export expansion stimulates changes in the level of activity. In connection with this and the fact that devaluation of the *metical* in the ERP context would bring about an improvement in export performance, a positive relation between  $\ln GDP_t$  and changes in exports ( $\ln X_t$ ) may indeed be expected. Thus,  $\beta_2$  is expected to be positive.

The adoption of the ERP by the Mozambican government, in 1987, was expected to be coupled with the inflow of external loans and grants for development purposes. This suggests that foreign aid in Mozambique is supposed to be economic activity enhancing. In this case, a positive relation between  $\ln GDP_t$  and changes in external aid ( $\ln AID_t$ ) may be expected. Thus,  $\beta_3$  has a

positive sign.

$\beta_4$  and  $\beta_5$  are coefficients associated with the intercept dummy ( $D_i$ ) and the slope dummy ( $D_i \cdot \ln MRER_t$ ) variables, respectively. These two qualitative variables are introduced in the model in order to capture the structural patterns (before and after ERP) exhibited by our annual time series data. Given that, the devaluation of the *metical* in the ERP context was assumed to bring about an improvement in economic performance in Mozambique, both  $\beta_4$  and  $\beta_5$  are expected to be positive.

#### 4.5 Data Sources

The study covers a 17-year period from, 1980 to 1996. The period starts in 1980, the year that marks the creation of the Mozambican currency, the *metical*, and ends in 1996, a date that is basically dictated by data availability. We use secondary data in this study, and our primary sources are specific and selected IMF/WB publications, and also publications by Mozambican Government Printers such as:

National Institute of Statistics publications: *Anuario Estatístico de Mocambique* and *Mozambique in Figures*; and

Bank of Mozambique publications: *Statistical Bulletin* and *Annual Report*.

## CHAPTER FIVE

### ANALYSIS OF ECONOMETRIC RESULTS

#### 5.1 Introduction

In this chapter, we present and analyse the econometric results obtained from estimating the four models provided by equations (4.3.10), (4.3.11), (4.3.12), and (4.3.13) in section 4.3 of the previous chapter. In section 5.2, we present and discuss results obtained from estimating the model with  $\ln X_t$  as regressand. In section 5.3, we present and discuss results obtained from estimating the model with  $\ln M_t$  as regressand. In section 5.4, we present and discuss results obtained from estimating the model with  $BT_t$  as regressand. Finally, in the last section, we present and discuss results obtained from estimating the model with  $\ln GDP_t$  as regressand.

The equations are estimated in a step-wise fashion, starting with the  $\ln MRER_{t-1}$  as the only explanatory variable. The other variables are then introduced one by one in a random order. Appropriate tests are performed to establish the existence, or otherwise, of regression problems such as specification errors and econometric problems<sup>3</sup>. Where these problems are found to exist, appropriate measures are taken to correct them.

#### 5.2 Model I - Model with $\ln X_t$ as Regressand

Annual data for 1980-1996 were generated on  $X_t$ ,  $MRER_t$ , and  $Y^f_t$ , as shown in Appendix 6. From preliminary regression results, using the actual values of  $MRER$ , the logarithm of current  $MRER$ , and the logarithm of lagged  $MRER$ , it was found that higher coefficients of

determination ( $R^2$ ) and more significant regression coefficients were obtained from  $\ln MRER_{t-1}$ . Moreover, using the actual values of  $Y^f$ , the logarithm of current  $Y^f$ , and the logarithm of lagged  $Y^f$ , it was also found that higher  $R^2$  and more significant regression coefficients were obtained from logarithm of lagged  $Y^f$  (by one year). Thus,  $\ln MRER_{t-1}$ ,  $\ln Y^f_{t-1}$ , and  $\ln X_{t-1}$  are used as explanatory variables in this model, and equation (4.3.10) produced results presented in Table 5.1.

Table 5.1 Regression Results of  $\ln X_t$  Function

$\ln X_t$	Constant	$\ln MRER_{t-1}$	$\ln Y^f_{t-1}$	$\ln X_{t-1}$	$D_t$	$D_t^* \ln MRER_t$	F-Sta.	$R^2$	Adj. $R^2$	Sigma (a)	h
5.1.1 T-Ratio	12.414 (77.90)	- 0.00245 (- 0.0739)					1.153	0.833	0.821	0.171	(b)
5.1.2 T-Ratio	12.353 (73.04)	0.020129 (0.2785)	- 0.0079 (- 0.494)				2.890	0.834	0.809	0.176	(c)
5.1.3 T-Ratio	12.469 (63.690)	0.19044 (2.615)	0.42737 (6.502)	0.6746 (5.662)			17.21	0.811	0.764	0.196	1.12
5.1.4 T-Ratio	12.471 (68.680)	0.037063 (0.3311)	0.48459 (6.976)	0.8311 (5.804)	0.3131 (1.718)		15.75	0.851	0.797	0.182	0.82
5.1.5 T-Ratio	12.470 (65.717)	0.056319 (0.4098)	0.49097 (6.240)	0.8363 (5.541)	0.7516 (0.455)	0.08311 (0.2669)	11.55	0.853	0.779	0.189	0.96
5.1.6 T-Ratio	12.471 (68.227)	0.028631 (0.24128)	0.47836 (6.9737)	0.8225 (5.776)		0.05747 (1.6638)	15.50	0.849	0.795	0.183	0.77

Notes: (a) Sigma = Standard Error of the Stimute; (b) DW = 1.9113; (c) DW = 1.8255; (d) The t-values a reported in brackets below each coefficient.

In equations 5.1.1 through 5.1.6, appropriate tests were undertaken to establish the presence, or otherwise, of estimation problems, and in cases where such problems were detected, appropriate measures were taken to resolve them. The auxiliary regression method was used in conjunction with the Klein's rule of thumb to establish the presence, or otherwise, of the problem of

multicollinearity. In equations (5.1.1) and (5.1.2), the Durbin-Watson d-statistic was used to establish the presence of the problem of autocorrelation, and SHAZAM auto-command was used to resolve this problem where it was detected. In the remaining equations (5.1.3) to (5.1.6), because we have lagged dependent variable ( $\ln X_t$ ) as an explanatory variable ( $\ln X_{t-1}$ ), the Durbin-Watson h-statistic was used to establish the presence of the problem of autocorrelation. The equations presented in Table 5.1 are, therefore, free of the estimation problems.

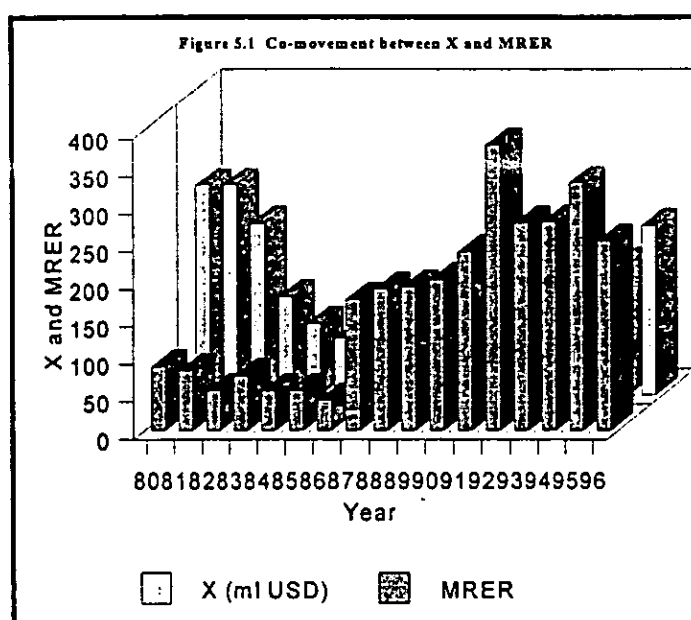
On the basis of the F-statistic, equations (5.1.1) and (5.1.2) are insignificant at the 5 percent level of significance, while equations (5.1.3) to (5.1.6) are highly significant. The unexpected negative coefficients of  $\ln MRER_{t-1}$  and  $\ln Y^f_{t-1}$  in equation (5.1.1) and equation (5.1.2), respectively, do not, therefore, pose any serious cause for concern. The explanatory variables have significant influences on the dependent variable ( $\ln X_t$ ) only in equations (5.1.3) to (5.1.6). However, on the basis of the adjusted coefficient of determination ( $\text{Adj. } R^2$ ), equations (5.1.1) and (5.1.2) have performed better than the other equations (5.1.3) to (5.1.6); the variation in the dependent variable explained by the explanatory variables is higher in equations (5.1.1) and (5.1.2) (about 81%) than in the other four equations (about 78% on average).

On the basis of the t-statistics, equation (5.1.3), which is a standard export demand function, has produced more significant explanatory variables than the other five equations. Besides, equation (5.1.3) performs well with the multilateral real exchange rate significant. Thus, further interpretation of our results is, therefore, based on equation (5.1.3). This equation identifies three significant determinants of the level of Mozambican exports namely; lagged multilateral real exchange rate, lagged foreign income, and lagged level of exports. These variables have positive impacts on the level of Mozambican exports, as expected.

The coefficients of the three significant determinants of exports show that a 1% increase in the levels of previous year's multilateral real exchange rate, foreign income, and Mozambican

exports will increase the current level of Mozambican exports by about 0.19%, 0.43% and 0.67%, respectively. However, these results should be taken only for what they are worth, because in equation (5.1.3), the explanatory variables account only for 76.4% of the variation in the dependent variable; 23.6% would be accounted for by some other factors not included in the model.

A plot of time against the main quantitative variables included in the model gives co-movement between X and MRER, as shown in Figure 5.1.



The above graph shows fluctuating movements in exports and MRER, from 1980 up to 1996. Before 1987, lower levels of both exports and MRER were attained. After 1987, the previous trend changed and MRER increased over time. However, upward and downward movements characterized the latter variable. These changes are attributed to a structural break in the data series. It is evident that 1987 marks the start of such a structural break<sup>4</sup>. Graphic evidence shows



that from 1987 to 1991, exports grew steadily from USD 97 million to USD 162.3 million. However, the direction of growth changed in 1992, falling to USD 139.3 million, i.e., -14% compared to 1991<sup>5</sup>. From, 1993-1995, the level of exports increased by approximately 13% compared to 1993<sup>6</sup>. Finally, in 1996, the level of exports increased by 29.6% compared to 1995<sup>7</sup>. It is important to note that the products which contributed most to the good performance of exports were the ones that Mozambique traditionally exports, such as cotton, cashew nuts, citrus fruits, sugar, wood, and prawns, which exceeded initial expectations.

In order to show the stability requirements for our results with respect to  $\ln MRER_{t-1}$  and  $\ln X_{t-1}$ , the elasticity approach to devaluation is used. This approach predicts that devaluation improves export performance and increases foreign exchange earnings if  $\eta_x > 1$ . However, our results show that both elasticities of demand for exports by the rest of the world do not exceed unity.

### 5.3 Model II - Model with $\ln M_t$ as Regressand

Annual data for 1980-1996 were generated on imports,  $MRER_t$ ,  $Y^d_t$ , and  $AID_t$ , as shown in Appendix 7. From preliminary regression results, using the actual values of  $MRER$ , the logarithm of current  $MRER$ , and the logarithm of lagged  $MRER$ , it was found that  $\ln MRER_{t-1}$  produced better results. Moreover, using the actual values of  $Y^d$ , the logarithm of current  $Y^d$ , and the logarithm of lagged  $Y^d$ , it was found that higher  $R^2$  and more significant regression coefficients were obtained from logarithm of  $Y^d$ . A similar procedure was done in relation to foreign aid, and it was found that higher  $R^2$  and more significant regression coefficients were obtained from logarithm of foreign aid. Thus,  $\ln MRER_{t-1}$ ,  $\ln Y^d_t$ , and  $\ln AID_t$  are used as

explanatory variables in this model, and equation (4.3.11) produced results presented in Table

5.2.

Table 5.2 Regression Results of  $\ln M_t$  Function

$\ln M_t$	Constant	$\ln MRER_{t-1}$	$\ln Y^d_t$	$\ln AID_t$	$D_t$	$D_t^* \ln MRER_t$	F-Stat.	$R^2$	Adj. $R^2$	Sigma (a)	DW
5.2.1 T-Ratio	13.421 (130.3)	-0.001964 (-0.08818)					1.479	0.66	0.64	0.143	1.76
5.2.2 T-Ratio	0.24457 (0.0484)	-0.010457 (-0.4460)	0.93346 (2.591)				12.67	0.75	0.71	0.127	1.72
5.2.3 T-Ratio	2.4879 (0.6850)	-0.029688 (-1.668)	0.51002 (1.836)	0.6094 (3.842)			19.95	0.87	0.83	0.096	1.82
5.2.4 T-Ratio	0.86248 (0.3072)	-0.017396 (-1.194)	0.59716 (2.726)	0.6616 (4.358)	0.00002 (0.3954)		14.96	0.90	0.86	0.089	1.92
5.2.5 T-Ratio	5.7952 (1.7091)	-0.026043 (-1.1687)	0.22567 (0.7664)	0.7112 (3.727)	-0.00045 (-1.229)	0.000116 (1.5079)	13.84	0.87	0.81	0.103	1.76
5.2.6 T-Ratio	3.0868 (1.1703)	-0.017167 (-0.79590)	0.45436 (1.9454)	0.6204 (3.447)		0.000024 (1.2709)	16.13	0.85	0.80	0.105	1.88

Notes: (a) Sigma = Standard Error of the Stimte; (b): the t-values are reported in brackets below each coefficient.

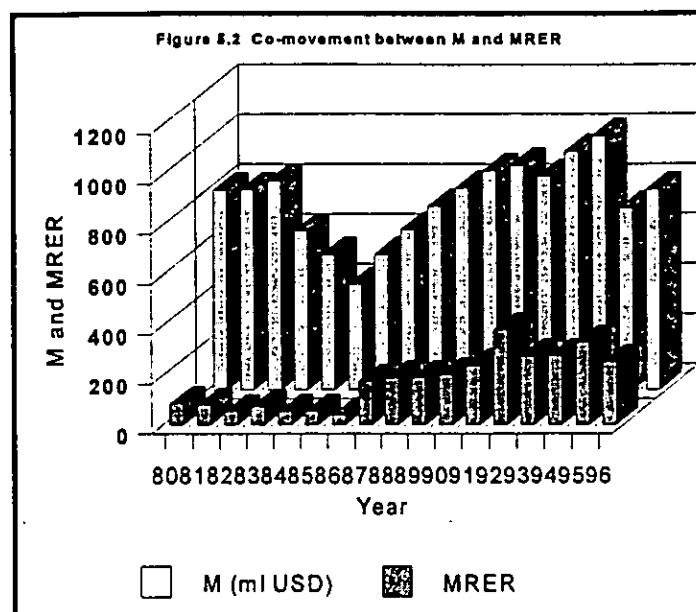
In equations 5.2.1 through 5.2.6, appropriate tests were undertaken to establish the presence, or otherwise, of estimation problems, and in cases where such problems were detected, appropriate measures were taken to resolve them. The auxiliary regression method was used in conjunction with the Klein's rule of thumb to establish the presence, or otherwise, of the problem of multicollinearity. The Durbin-Watson d-statistic was used to establish the presence of the problem of autocorrelation, and SHAZAM auto-command was used to resolve this problem where it was detected. The equations presented in Table 5.2 are, therefore, free of estimation problems.

On the basis of the F-statistic, only equation (5.2.1) is insignificant at the 5 percent level of significance, while equations (5.2.2) to (5.2.6) are highly significant. The explanatory variables do not have significant influences on the dependent variable ( $\ln M_t$ ) only in equation (5.2.1). However, on the basis of the adjusted coefficient of determination ( $\text{Adj. } R^2$ ), equations (5.2.3) to (5.2.6) have performed better than the other equations (5.2.1) and (5.2.2); the variation in the dependent variable explained by the explanatory variables is higher in equations (5.2.3) to (5.2.6) (about 82% on average) than in the other two equations (about 67% on average).

On the basis of the t-statistics, equation (5.2.4) has produced more significant explanatory variables than the other five equations. Further interpretation of our results is, therefore, based on equation (5.2.4). This equation identifies two significant determinants of the level of Mozambican imports namely; logarithm of domestic income and logarithm of the level of foreign aid. Both variables have positive impacts on the level of Mozambican imports, as expected. Even though Mozambique's multilateral real exchange rate ( $\text{MRER}_{t-1}$ ) has got the expected negative coefficient, it is not a significant determinant of the level of Mozambique's imports and, as a result, no firm conclusion can be based on it.

The coefficients of the two significant determinants of imports show that a 1% increase in the levels of current level of domestic income and foreign aid will increase the current level of Mozambican imports by about 0.6% and 0.66%, respectively. However, these results should be taken only for what they are worth, because in equation (5.2.4), the explanatory variables account only for 86% of the variation in the dependent variable; 14% would be accounted for by some other factors not included in the model.

A plot of time against the main quantitative variables included in the model gives co-movement between  $M$  and  $\text{MRER}$ , as shown in Figure 5.2.



From the above graph, it is evident that 1987 marks the start of the structural break, but not for imports. Before 1987, higher levels of imports and lower levels of MRER were attained. During this period, most imports were financed by grants and external borrowing. After 1987, the previous trend changed and MRER increased over time, but in contrast to what was expected, imports did not decline. However, upward and downward movements mark this period, given that the ERP has led to an increase in resource flows to Mozambique and, as a consequence of this, sometimes imports were allowed to increase spectacularly and other times they were declining. For example, the pace of import growth fell steadily in 1992, with imports in 1992 being 5% lower than in the previous year. Nevertheless, the combined effects of the drought and the war also meant that imports of consumer goods continued to be a priority and grew at 36% in relation to 1991. In 1993, there was a contraction in licensed imports in the order of 8.8% compared with 1992. This fall was due to the improved weather conditions and the peace environment which stimulated the production of consumer goods and led to substitution for some

of the goods imported in 1992. In 1995, imports were USD 784 million, which represented a decrease of 28% from 1994 and this reflects the importance of special programmes as well as the fact that there was a relative reduction in external aid.

In order to capture the above mentioned structural break, a dummy variable ( $D_t$ ) is included in the model as an independent variable<sup>8</sup>. This slope dummy tells us by how much the mean value of imports before ERP differs from the mean value of imports after ERP. Again on the basis of the t-statistic in equation (5.2.4), contrary to what was expected, the coefficient of  $D_t$  is positive, and statistically insignificant (it does not pass the significance test at the 5% level). This means that a test of significance of this qualitative variable rejects the hypothesis that the introduction of the ERP has had a differential effect on imports in Mozambique. However, even though this qualitative variable has not got the expected negative coefficient, it is not a significant determinant of the level of Mozambique's imports and, as a result, no firm conclusion can be based on it.

In order to show the stability requirements for our results with respect to  $\ln MRER_{t-1}$ , the elasticity approach to devaluation is used. This approach predicts that devaluation leads to a contraction of imports if  $\eta_m > 1$ . However, our results show that elasticity of demand for imports by Mozambique does not exceed unity, signifying that demand for imports by Mozambique is inelastic.

#### **5.4 Model III - Model with $BT_t$ as Regressand**

Annual data for 1980-1996 were generated on  $BT_t$ ,  $MRER_t$ ,  $Y_t^f$ ,  $Y_t^d$ , and  $AID_t$  as shown in Appendix 8. From preliminary regression results, using the actual values of  $MRER$ ,

the logarithm of current MRER, and the logarithm of lagged MRER, it was found that better performance of the model was obtained only from  $\ln MRER_{t-1}$ . Moreover, using the actual values of the remaining quantitative explanatory variables, the logarithm of their current values, and the logarithm of their lagged values, it was also found that higher  $R^2$  and more significant regression coefficients were obtained from the logarithm of lagged values of  $Y^f$ , the logarithm of  $Y^d$ , and the logarithm of AID. Thus,  $\ln MRER_{t-1}$ ,  $\ln Y^f_{t-1}$ ,  $\ln Y^d_t$ , and  $\ln AID_{t-1}$  are used as explanatory variables in this model, and equation (4.3.12) produced results presented in Table 5.3.

Table 5.3 Regression Results of  $BT_t$  Function

$BT_t$	Const.	$\ln MRER_{t-1}$	$\ln Y^f_{t-1}$	$\ln Y^d_t$	$\ln AID_t$	$D_t$	$D_t * \ln MRER_t$	F-Stat.	$R^2$	Adj. $R^2$	Sigma (a)	DW
5.3.1 T-Ratio	-515630 (-7.500)	-6550.9 (-0.436)						6.01	0.56	0.52	93770	1.6
5.3.2 T-Ratio	-482700 (-5.792)	-156850 (-5.071)	29752 (3.85)					13.5	0.68	0.62	83345	1.9
5.3.3 T-Ratio	-141410 (-0.428)	-127230 (-2.100)	23281 (1.69)	-133680 (-0.574)				8.63	0.68	0.60	85581	1.8
5.3.4 T-Ratio	-230640 (-0.084)	-150280 (-2.996)	29800 (2.59)	248160 (1.042)	-321860 (-2.654)			11.5	0.81	0.74	69790	2.3
5.3.5 T-Ratio	-230530 (-0.204)	-170640 (-2.112)	31862 (5.85)	214460 (2.095)	-246990 (-5.530)	-141111 (-0.914)		10.5	0.95	0.92	38044	2.2
5.3.6 T-Ratio	-130970 (-1.012)	-162120 (-7.074)	31396 (6.11)	346270 (2.635)	-307590 (-5.165)	397250 (1.586)	-79419 (-1.66)	7.88	0.96	0.94	34458	2.4
5.3.7 T-Ratio	-210910 (-0.194)	-168590 (-1.988)	31503 (5.89)	213520 (1.200)	-247480 (-5.821)		-2974.1 (-1.03)	10.4	0.95	0.92	37694	2.2

Notes: (a) Sigma=Standard Error of the Stimate; (b): the t-values are reported in brackets below each coefficient.

In equations 5.3.1 through 5.3.7, appropriate tests were undertaken to establish the presence, or otherwise, of estimation problems, and in cases where such problems were detected, appropriate measures were taken to resolve them. The auxiliary regression method was used in conjunction with the Klein's rule of thumb to establish the presence, or otherwise, of the problem of multicollinearity. The Durbin-Watson d-statistic was used to establish the presence of the problem of autocorrelation, and SHAZAM auto-command was used to resolve this problem where it was detected. The equations presented in Table 5.3 are, therefore, free of estimation problems.

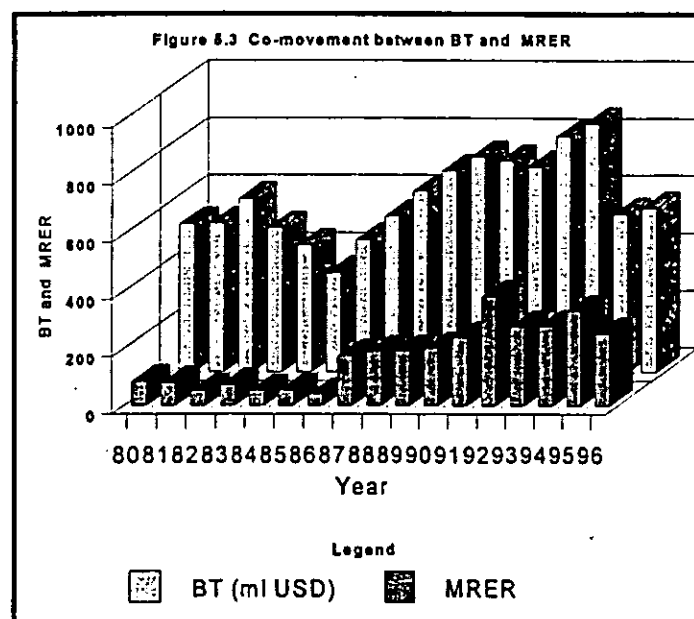
On the basis of the F-statistic, all equations (5.3.1) to (5.3.7) are highly significant at the 5 percent level of significance. The unexpected negative coefficients of  $\ln MRER_{t-1}$  in all the equations,  $D_t$  in equation (5.3.5) and  $D_t * \ln MRER_t$  in equations (5.3.6) and (5.3.7), do therefore, pose a serious cause for concern. The explanatory variables have significant influences on the dependent variable (BT) in all equations, except in equation (5.3.1). However, on the basis of the adjusted coefficient of determination ( $\text{Adj. } R^2$ ), equations (5.3.5), (5.3.6), and (5.3.7) have performed better than the other equations (5.3.1) to (5.3.4); the variation in the dependent variable explained by the explanatory variables is higher in equations (5.3.5) to (5.3.7) (about 93% on average) than in the other four equations (about 62% on average).

On the basis of the t-statistics, equation (5.3.6) has produced more significant explanatory variables than the other six equations. Further interpretation of our results is, therefore, based on equation (5.3.6). This equation identifies four significant determinants of the level of Mozambican trade balance namely; lagged MRER, lagged foreign income, domestic income, and foreign aid. Lagged foreign income has a positive impact on the level of Mozambican trade balance, as expected. Likewise,  $\ln AID_t$  has a negative impact on the level of Mozambican trade balance, as expected. However, even though the coefficients of Mozambique's multilateral real

exchange rate ( $MRER_{t-1}$ ) and domestic income is statistically significant at the 5% level, no firm conclusion can be based on them, given that they have not got the expected positive and negative coefficients, respectively.

The foreign income variable is indeed a significant determinant of trade balance. It shows that a 1% increase in the level of previous year's foreign income will improve the trade balance of Mozambique by about MT 31,396 million. Aid is also a significant determinant of trade balance. It shows that a 1% increase in the current level of foreign aid will worsen the trade balance of Mozambique by about MT 307,590 million. However, these results should be taken only for what they are worth, because in equation (5.3.6), the explanatory variables account only for 94% of the variation in the dependent variable; 6% would be accounted for by some other factors not included in the model.

A plot of time against the main quantitative variables included in the model gives co-movement between BT and MRER, as shown in Figure 5.3.





From the above graph, it is evident that 1987 marks the start of the structural break, but not for trade balance that has continued worsening. Before 1987, lower levels of MRER were attained and successive deficits characterized the Mozambican balance of trade. After 1987, the previous trend changed regarding the real exchange rates that increased over time. However, contrary to what would be desirable, there was no improvement in trade balance, given that from 1980, when a small deficit was recorded (USD 347 million) the balance of trade situation worsened each year, reaching a 1994 deficit of more than USD 869.0 million. The deterioration in trade balance by 15% from 1992-1993 was mainly due to the 12% growth in imports and a 5.4% fall in exports. These results were reflected in the coverage rate of imports by exports, which fell from 16% in 1992 to 14% in 1993. In 1995, the trade deficit of USD 552.7 million was significantly lower than that for 1994, such that there was a substantial improvement over the three previous years in terms of coverage of imports by exports. The volume of exports of commodities during 1995 covered imports payments to about 22%, which means a growth of 7% relative to 1994. The combined effect of the reduction in import values (23%) and the increase in exports (13%), led to such a result. In 1996, the balance of trade kept its deficit nature, though it declined by 4.1% compared to 1995 due to the fact that import growth was less than export growth. However, under ERP the economy continued to be heavily dependent on international assistance, in particular on grants by the international community to alleviate the trade deficits.

In order to capture the above structural break, dummy variables ( $D_i$  and  $D_i \cdot \ln MRER_i$ ) are included in the model as independent variables. Both the intercept dummy ( $D_i$ ) and the slope dummy ( $D_i \cdot \ln MRER_i$ ) tell us by how much the mean value of trade deficit before ERP differs from the mean value of trade deficit after ERP. Note that SHAZAM auto-command was used to generate the latter variable. Again on the basis of the t-statistic in equation (5.3.6)  $D_i$  was positive, as expected, whereas  $D_i \cdot \ln MRER_i$  was negative (contrary to what was expected). Both

variables were found to be statistically insignificant (they do not pass the significance test at the 5% level), meaning that a test of significance of this qualitative variable rejects the hypothesis that the introduction of the ERP has a differential effect on imports in Mozambique. However, even though  $D_i$  has got the expected positive coefficient, it is not a significant determinant of the level of Mozambique's trade balance and, as a result, no firm conclusion can be based on it. As a consequence of this, we cannot draw any conclusion with respect to the average and marginal impacts of both qualitative variables on Mozambican trade balance.

In order to show the stability requirements for our results, the elasticity approach to devaluation is used. This approach predicts that devaluation leads to an increase in net exports, i.e., the balance of trade will improve if  $(\eta_x + \eta_m) > 1$ . From equation (5.1.3), we know that MRER elasticity of demand for Mozambique's exports by the rest of the world is 0.19, and equation (5.2.4) gives us the MRER elasticity of demand for imports by Mozambique, that is -0.02. However, the sum of these two elasticities is too low (i.e., is 0.17), and this fact suggests that the above mentioned and so-called Marshall-Lerner condition does not hold.

#### **5.5 Model IV - Model with $\ln GDP_t$ as Regressand**

Annual data for 1980-1996 were generated on real  $GDP_t$ ,  $MRER_t$ ,  $X_t$ , and  $AID_t$ , as shown in Appendix 9. From preliminary regression results, using the actual values of MRER, the logarithm of current MRER, and the logarithm of lagged MRER, it was found that better performance of the model was obtained only from  $\ln MRER_{t-1}$ . Moreover, using the actual values of the remaining quantitative explanatory variables, the logarithm of their current values, and the logarithm of their lagged values, it was also found that higher  $R^2$  and more significant

regression coefficients were obtained from  $\ln X_t$  and  $\ln AID_t$ . Thus,  $\ln MRER_{t-1}$ ,  $\ln X_t$ , and  $\ln AID_t$  is used as explanatory variables in this model, and equation (4.3.13) produced results presented in Table 5.4.

Table 5.4 Regression Results of  $\ln GDP_t$  Function

$\ln GDP_t$	Const.	$\ln MRER_{t-1}$	$\ln X_t$	$\ln AID_t$	$D_t$	$D_t * \ln MRER_t$	F-Stat.	$R^2$	Adj. $R^2$	Sigma (a)	DW
5.4.1 T-Ratio	14.206 (216.3)	0.027040 (1.979)					2.875	0.862	0.852	0.06974	1.91
5.4.2 T-Ratio	11.704 (9.491)	0.026827 (2.392)	0.2009 (2.001)				11.385	0.896	0.880	0.06271	1.86
5.4.3 T-Ratio	11.444 (10.30)	0.013652 (0.9980)	0.0462 (0.434)	0.1675 (1.725)			8.248	0.908	0.885	0.06141	1.88
5.4.4 T-Ratio	9.7088 (10.45)	0.036989 (4.570)	0.4757 (6.293)	-0.105 (-2.27)	0.1933 (6.546)		12.656	0.942	0.912	0.05081	1.84
5.4.5 T-Ratio	10.820 (9.834)	0.013972 (2.790)	0.3784 (5.722)	-0.105 (-1.17)	-0.0776 (-0.18)	0.0507 (0.643)	12.655	0.941	0.912	0.05379	2.10
5.4.6 T-Ratio	10.956 (10.86)	0.032203 (2.974)	0.3816 (5.764)	-0.1159 (-1.34)		0.0378 (5.007)	13.835	0.929	0.903	0.05627	1.89

Notes: (a) Sigma=Standard Error of the Estimate; (b): the t-values are reported in brackets below each coefficient.

In equations 5.4.1 through 5.4.6, appropriate tests were undertaken to establish the presence, or otherwise, of estimation problems, and in cases where such problems were detected, appropriate measures were taken to resolve them. The auxiliary regression method was used in conjunction with the Klein's rule of thumb to establish the presence, or otherwise, of the problem of multicollinearity. The Durbin-Watson d-statistic was used to establish the presence of the problem of autocorrelation, and SHAZAM auto-command was used to resolve this problem

where it was detected. The equations presented in Table 5.4 are, therefore, free of estimation problems.

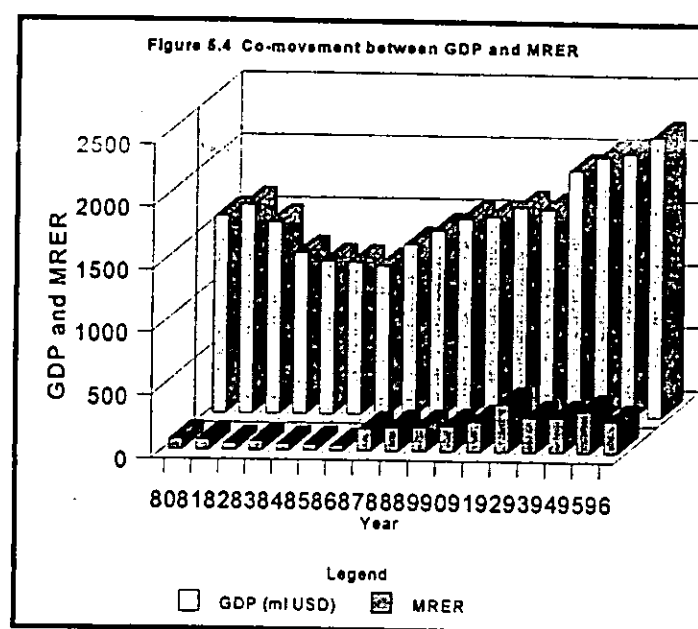
On the basis of the F-statistic, only equation (5.4.1) is insignificant at the 5 percent level of significance, while equations (5.4.2) to (5.4.6) are highly significant. The unexpected negative coefficients of  $\ln AID_t$  in equations (5.4.4) to (5.4.6) and  $D_t$  in equation (5.4.5), therefore, pose a serious cause for concern. The explanatory variables have significant influences on the dependent variable ( $\ln GDP_t$ ) in equations (5.4.2), (5.4.4), (5.4.5) and (5.4.6). However, on the basis of the adjusted coefficient of determination ( $Adj. R^2$ ), equations (5.4.4), (5.4.5), and (5.4.6) have performed better than the other equations (5.4.1), (5.4.2), and (5.4.3); the variation in the dependent variable explained by the explanatory variables is higher in equations (5.4.4), (5.4.5), and (5.4.6) (about 91% on average) than in the other three equations (about 87% on average).

On the basis of the t-statistics, equation (5.4.4) has produced more significant explanatory variables than the other five equations. Further interpretation of our results is, therefore, based on equation (5.4.4). This equation identifies four significant determinants of the level of Mozambican real GDP namely; lagged MRER, current level of exports, foreign aid, and  $D_t$ . The first two variables have positive impacts on the level of Mozambican GDP, as expected. Contrary to what was expected, the third variable has a negative impact on the level of Mozambican GDP.

The coefficients of the first two significant determinant of GDP show that a 1% increase in the level of lagged MRER and current Mozambican exports will increase the current level of Mozambican GDP by about 0.04% and 0.48%, respectively. The coefficient of the third significant determinant of GDP shows that a 1% increase in the level of current foreign aid will reduce the current level of Mozambican GDP by about 0.11%. However, these results should be

taken only for what they are worth, because in equation (5.4.4), the explanatory variables account only for 91.2% of the variation in the dependent variable; 8.8% would be accounted for by some other factors not included in the model.

A plot of time against the main quantitative variables included in the model gives co-movement between real GDP and MRER, as shown in Figure 5.4.



The above graph shows fluctuating movements in output from 1980 up to 1996. It is evident that 1987, the year in which the ERP was launched by the Mozambican government, marks the start of the structural break. Before 1987, lower levels of both GDP and MRER were attained. After 1987, the previous trend changed only regarding MRER which increased over time. However, GDP was not behaving according to what was desirable, given that upward and downward movement characterized it, especially after 1989. The government's policy of incentives for

foreign trade under ERP led to an improvement in Mozambique's export performance between 1987 and 1991, and this stimulated growth. For example, between 1987 and 1989, real GDP growth averaged 9.8% per year. However, between 1990 and 1992, economic performance deteriorated again due largely to man-made and natural calamities. GDP rose only by 1.7% per year during this period, actually falling by 0.8% in 1992. As a consequence of this, GDP per capita dropped between 1990 and 1992 attaining its lowest level (from USD 102.0 to USD 87.0). After a little recovery between 1993 and 1994, real GDP declined again by 24.7% in 1995 and in 1996 a small rise of 1.4% was obtained.

In order to capture the above structural break, a dummy variable is included in the model as a regressor ( $D_i$ ). This intercept dummy tells us by how much the mean value of real GDP before ERP differs from the mean value of GDP after ERP. Again on the basis of the t-statistic in equation (5.4.4) the coefficient of  $D_i$  is positive, as expected, and statistically significant (it pass the significance test at the 5% level). This means that a test of significance of this qualitative variable does not reject the hypothesis that the introduction of the ERP has had a differential effect on the level of activity in Mozambique. Because this qualitative variable has got the expected positive and significant coefficient, it is a significant determinant of the level of Mozambique's GDP.

In order to show the stability requirements for our results, the elasticity approach to devaluation is used. This approach predicts that a devaluation will be expansionary, i.e., it will increase aggregate output if  $(\eta_x + \eta_m) > 1$ . From equation (5.1.3), we know that MRER elasticity of demand for Mozambique's exports by the rest of the world is 0.19, and equation (5.2.4) gives us the MRER elasticity of demand for imports by Mozambique as -0.02. However, the sum of these two elasticities is too low (i.e., is 0.17), and this suggests that the Marshall-Lerner condition does not hold.

## CHAPTER SIX

### CONCLUSIONS AND POLICY RECOMMENDATIONS

#### 6.1 Conclusions

In this paper, an attempt has been made to analyse the efficacy of devaluation as an adjustment policy tool, using econometric evidence from Mozambique. More precisely, we intended to find out whether the devaluation of the *metical* has actually had a positive effect on Mozambican trade flows and output, after 11 years of its implementation.

a) To determine exports response to RER adjustment, an attempt was made to test the hypothesis of a positive relation between RER and exports in Mozambique during the period 1980-96. Thus, an autoregressive log linear regression equation of exports ( $\ln X_t$ ) on multilateral real exchange rate, the logarithm of lagged foreign income, and lagged values of the logarithm of the dependent variable ( $\ln X_{t-1}$ ) was fitted. The three explanatory variables explained about 76.4% of the variation in the level of exports.

Our results identify only three significant determinants of the level of Mozambique's exports, namely  $\text{MRER}_{t-1}$ ,  $Y^f_{t-1}$ , and  $X_{t-1}$ . They give empirical support to the traditional theory of trade, which predicts that an increase in foreign income should lead to an increase in demand for Mozambican exports by the rest of the world.

According to the traditional theory of trade and also to the proponents of the orthodox stabilization and adjustment programmes sponsored by the IMF/WB, devaluation of the *metical*, represented by an increase in MRER, should have led to an increase in demand for Mozambique's exports by the rest of the world. However, this argument is supported by our results, because the coefficient of  $\ln \text{MRER}_{t-1}$  is positive and statistically significant at the 5%

level. In this context, we can conclude that our results do support our first hypothesis, that devaluation of the *metical* has improved export performance in Mozambique.

According to the elasticity approach, devaluation of the *metical*, represented by an increase in MRER, apart from leading to an improvement in export performance, it should also have led to an increase in foreign exchange earnings. Thus, the previous year's export earnings will increase a country's ability to purchase imported inputs, which is needed to produce exportable goods. However, this argument is not supported by our results, because even though the coefficients of  $\ln \text{MRER}_{t-1}$  and  $\ln X_{t-1}$  is positive and statistically significant, their correspondent elasticities of demand for exports ( $\eta_x$ ) do not exceed unity. In this context, we can also conclude that even though our results support our first hypothesis, that devaluation of the *metical* has improved export performance in Mozambique, this improvement is not accompanied by an increase in foreign export earnings. Thus, lagged exports do not affect current exports because the elasticity approach to devaluation does not hold.

b) To determine imports response to devaluation of the *metical*, a log linear regression equation of imports on  $\ln \text{MRER}_{t-1}$ , the logarithm of real domestic income, the logarithm of external aid, and  $D_t$  was fitted. The four explanatory variables explained about 85.7% of the variation in the imports level.

Our results identify only two significant determinants of the level of Mozambique's imports, namely current levels of domestic income and foreign aid. Our results support the traditional theory of trade, which predicts that an increase in domestic income should lead to an increase in demand for imports by Mozambique. The positive and significant coefficient of  $\ln \text{AID}_t$  is in line with the nature of foreign aid in Mozambique, which has been meant to fill in a widening resource gap, and so to finance deficits which have characterized the Mozambican trade balance, such that imports have been allowed to increase.



The coefficients of  $\ln MRER_{t-1}$  and  $D_i$  are negative, but statistically insignificant at the 5% level. A test of significance of the coefficient associated with the qualitative variable ( $D_i$ ) rejects the hypothesis that the introduction of the ERP has had a contractionary impact on imports in Mozambique, signifying that import performance was not different across the two analysed periods. According to the elasticity approach to devaluation and also to the proponents of the orthodox stabilization and adjustment programmes sponsored by the IMF/WB, devaluation of the *metical*, represented by an increase in MRER, should have led to a reduction in imports dependence in Mozambique. However, this argument is not supported by our results, because even though the coefficients of  $\ln MRER_{t-1}$  and  $D_i$  are negative, they are insignificant at the 5% level, and we cannot base any firm conclusion on them. Besides, our results show a low MRER elasticity demand for imports, such that the elasticity approach to devaluation does not hold. This means that demand for imports by Mozambique is inelastic, and, in this circumstances, no reduction in Mozambique's dependence on imports can occur as a consequence of devaluation. Thus, our results do not support our second hypothesis, that devaluation of the *metical* has been accompanied by significant reductions in Mozambican imports.

c) To determine trade balance response to devaluation of the *metical*, a semi-log linear regression equation of trade balance on  $\ln MRER_{t-1}$ , the logarithm of lagged foreign income, the logarithm of real domestic income, the logarithm of external aid,  $D_i$ , and  $D_i * \ln MRER_t$  was fitted. The six explanatory variables explained about 94% of the variation in the level of trade balance.

Our results identify four significant determinants of the level of Mozambique's trade balance, namely MRER, foreign income, domestic income, and foreign aid. Our results, however, support the traditional theory of trade, which predicts that an increase in foreign income should lead to an increase in demand for Mozambique's exports by the rest of the world, and so

to an improvement in Mozambican trade balance. Even though the coefficient of  $\ln Y^d$  has been statistically significant, no conclusion can be based on it, because of the fact that it has got an unexpected positive sign. Our results is also in line with the nature of foreign aid in Mozambique - to fill in a widening resource gap, and so to finance deficits which have characterized the Mozambican trade balance, such that imports have been allowed to increase while exports are stagnating.

Contrary to what was expected, the coefficients of  $\ln MRER_{t-1}$  and  $D_i * \ln MRER_t$  have had negative signs, and, as expected, the coefficient of  $D_i$  has had a positive sign. However, the coefficients of all these explanatory variables are statistically insignificant at the 5% level. Thus, tests of significance of the coefficients associated with the qualitative variables ( $D_i$  and  $D_i * \ln MRER_t$ ) reject the hypothesis, that changes in the exchange rate in the ERP context have had positive average and marginal impacts on Mozambican trade balance. In other words, trade balance performance in Mozambique is not different across the two analysed periods. According to the theory of trade and also to the proponents of the orthodox stabilization and adjustment programmes sponsored by the IMF/WB, devaluation of the *metical*, represented by an increase in MRER, should result in expenditure switching, increased production of tradable goods, higher exports, lower imports, and, as a consequence, an improvement in the external trade position of the country. However, this argument is not supported by our results, because the coefficients of  $\ln MRER_{t-1}$ ,  $D_i$ , and  $D_i * \ln MRER_t$  is all insignificant at the 5% level, and not positively assigned as expected (except for  $D_i$ ), and we cannot base any firm conclusion on them.

According to the elasticity approach to devaluation, for trade balance to improve, it is necessary that the sum of the elasticity of demand for exports and the elasticity of demand for imports should exceed unity. In other words, the Marshall-Lerner condition must hold. However, our results show that this condition does not hold, meaning that net exports in Mozambique have

not increased, yet. Thus, our results do not support our third hypothesis, that devaluation of the *metical* has improved the external balance of the Mozambican economy.

d) Finally, to establish the impact of devaluation of the *metical* on output growth, a log linear regression equation of  $\ln GDP_t$  on  $\ln MRER_{t-1}$ , the logarithm of exports, the logarithm of external aid, and  $D_t$  was fitted. The four explanatory variables explained about 91.2% of the variation in the level of output in Mozambique.

Our results identify four significant determinants of the level of Mozambique's real GDP, namely the lagged MRER, current level of Mozambique's exports, foreign aid, and  $D_t$ . Our results support the traditional theory of trade, which predicts that devaluation of a country's currency brings about an improvement in export performance, and that export expansion stimulates the level of activity. However, the assumption that external aid is GDP enhancing is not supported by Mozambique's empirical evidence.

The coefficients of  $\ln MRER_{t-1}$  and  $D_t$  are positive and statistically significant at the 5% level. A test of significance of the coefficient associated with the qualitative variable ( $D_t$ ) does not reject the hypothesis, that the introduction of the ERP has had a positive average impact on output in Mozambique, signifying that real GDP performance is different across the two analysed periods. According to the elasticity approach to the balance of trade, devaluation of the *metical*, represented by an increase in MRER, should have led to an improvement in trade balance of Mozambique, and, as a consequence, it should have stimulated production of goods and services. Again, the elasticity approach predicts that, as long as the Marshall-Lerner condition holds, a devaluation will be effective or expansionary in the sense that output will go up. However, these arguments are not supported by our results, because even though the coefficients of both  $\ln MRER_{t-1}$  and  $D_t$  are positive and statistically significant at the 5% level, they show that the Marshall-Lerner condition does not hold. In this context, we can conclude that our results do

support our last hypothesis, that devaluation of the *metical* has led to an expansion of output in Mozambique.

## 6.2 Policy Recommendations

The following policy recommendations are derived from the conclusions of our study:

a) With respect to the expectation that devaluation of the *metical* would improve Mozambique's export performance, the results of our study show that this policy measure has had a significant impact on export performance. However, this impact is limited taking into account that, the products which contributed most to the good performance of exports were only those that Mozambique traditionally exports. Our results suggest that Mozambique's export performance depends mainly on the level of foreign incomes, which are not within the control of Mozambique's policy makers. They suggest also that this improvement in exports is not accompanied by an increase in foreign exchange earnings such that previous export earnings, which would determine the economy's ability to buy essential imported inputs needed for the production of more exportable goods, do not affect current exports. With low MRER and foreign income elasticities of demand for Mozambique's exports (i.e., 0.19 and 0.43, respectively), policy interventions should be focussed on diversification of export production into new commodities with higher income elasticities of demand abroad.

b) Devaluation has not significantly reduced Mozambique's demand for imports. This may be because of low price elasticities of demand for such imports and/or the limited range of products produced for the domestic market. Some policy attention should be given to import

substitution, as a possible way of reducing Mozambique's dependence on imports. The use of appropriate fiscal and monetary policies would be another measure to discourage expenditure on imports, and make the economy attain the desirable objective of devaluation.

c) Recommendations in (a) and (b) above suggest that Mozambique's policy makers should adopt a combination of export diversification and import substitution strategies, as a way of improving the economy's external balance.

d) Aid appears to have had negative impacts on the level of activity and trade balance in Mozambique, implying that it has promoted consumption of imports more than it has promoted export production. Policy makers can address this problem by ensuring that foreign aid is put to uses which expand the economy's capacity to produce tradable goods, especially exports and substitutes for imports.

e) Given that the economic recovery programme started in 1987 does not seem to have had a significant effect on Mozambique's economic performance, there is a need to re-define the programme, to incorporate appropriate policy measures and introduce structural changes which will improve export performance, reduce dependence on imports, and promote growth with sustainable internal and external balances.

## NOTES

<sup>1</sup>We model the balance of trade rather than the balance of payments since it is the responsiveness of trade flows to relative prices that is at issue.

<sup>2</sup>During on sample, the USA, PTG, UK, and RSA were four of the main trading partners of Mozambique. Therefore, these countries were used to construct proxy variables for  $BNER_{MT/p}$ ,  $MRER$ , and  $Y^f$ .

<sup>3</sup>The econometric problems are those ones that characterize time series data, namely multicollinearity and autocorrelation. Multicollinearity was tested for using the auxiliary regression method together with the Klein's rule of thumb. Autocorrelation was tested for using Durbin's DW-test. However, in equations in which we have lagged dependent variables as explanatory variables, we have used Durbin's h-test to test for autocorrelation. The specification errors are: omission of relevant variables, inclusion of unnecessary variables, and adoption of the wrong function form.

<sup>4</sup>1987 marks the start of the structural break because it is the year in which the ERP was launched by the government of Mozambique.

<sup>5</sup>This was only 71% of the amount programmed for that year and caused some concern to the authorities, given its negative impact on the objectives of internal and external monetary stability. Although changes resulting from the new foreign exchange system provided better export prices in domestic currency (a rise of 8% in 1992), the fall in exports (by about 45%) resulted in an overall export decline of 14%. Traditional goods also suffered negative effects from international market prices, which fell by 7.5% (Bank of Mozambique 1992:23).

<sup>6</sup>In 1993, exports were around 10% below the amount planned (USD 145.8 million), despite the exchange facilities and the government's policy of incentives for foreign trade.

Reasons for the non-fulfilment of export targets are "low levels of domestic production of cashew nuts, sugar, and minerals; generally downward oscillation of international market prices for other export products, particularly shrimp; loss of markets in Eastern Europe which contributed to the precipitous drop in non-traditional exports" (Bank of Mozambique 1993:27).

<sup>7</sup>One of the factors which contributed to this was "the rise of international prices of some strategic commodities such as cashew nuts, sugar, and copra" (Bank of Mozambique 1995:52).

<sup>8</sup>We use dummy variables as independent variables in these and the rest of the results presented in chapter 5. There are three categories or classes ( $D_i$  and  $D_i \cdot \ln MRER_t$ ), and all of them have two qualities ( $D_i, D_i \cdot \ln MRER_t = 1$  if after ERP and  $D_i, D_i \cdot \ln MRER_t = 0$  if otherwise).

## BIBLIOGRAPHY

- Bank of Mozambique. 1996. *Annual Report 1996*. Maputo: Bank of Mozambique.
- Bank of Mozambique. 1995. *Annual Report 1996*. Maputo: Bank of Mozambique.
- Bank of Mozambique. 1993. *Annual Report 1996*. Maputo: Bank of Mozambique.
- Bank of Mozambique. 1992. *Annual Report 1996*. Maputo: Bank of Mozambique.
- Bank of Mozambique. 1997. *Statistical Bulletin*. No.15/Year 4. Maputo: DEE-Bank of Mozambique.
- Bank of Mozambique. 1995. *Statistical Bulletin*. No.10/Year 3. Maputo: DEE-Bank of Mozambique.
- Bhagwat, A. and Onitsnka, Y. 1974. *Export-Import Responses to Devaluation: Experience of the Nonindustrial Countries in the 1960s*. IMF Staff Papers. Vol. XXI, No.2, pp. 414-462.
- Brada, J., Kutan, A. and Zhou, S. 1997. *The Exchange Rate and the Balance of Trade: The Turkish Experience*. The Journal of Development Studies, Vol. 33, No.5, pp. 675-692.
- Branson, W. 1989. *Macroeconomic Theory and Policy*. 3<sup>rd</sup> Edition. New York: Harper & Row, Publishers.
- Branson, W. 1986. *Stabilization, Stagflation and Investment Incentives: The Case of Kenya 1975-80*. In Sebastian Edwards. 1986. *Are Devaluations Contractionary?* Journal of Review of Economics and Statistics. Vol. 68, No.3, pp. 503.
- Brochmann, G. and Ofstad A. 1990. *Mozambique: Norwegian Assistance in Context of Crisis*. CHR. Michelsen Institute, Department of Social Science and Development. Fantoft, Norway.
- Campbell, B. and Loxley, J. 1989. *Structural Adjustment in Africa*. London: The Macmillian



- Castel-Branco, C. 1994. *Mocambique: Perspectivas Economicas*. Maputo: Faculdade de Economia, Universidade Eduardo Mondlane, e Fundacao Friedrich Ebert.
- Collier, P. and Vijay, J. 1989. *Exchange Rate Policy in Developing Countries*. Oxford Review of Economic Policy 5(3), pp. 94-113.
- Connoly, M. 1983. *Exchange Rates, Real Economic Activity and the Balance of Payments: Evidence from the 1960s*. In Sebastian Edwards. 1986. *Are Devaluations Contractionary?* Journal of Review of Economics and Statistics. Vol. 68, No.3, pp. 502.
- Cooper, R. 1971a. *Currency Devaluation in Developing Countries*. In Sebastian Edwards. 1986. *Are Devaluations Contractionary?* Journal of Review of Economics and Statistics. Vol. 68, No.3, pp. 502.
- Direccao Nacional de Estatistica. 1995. *Anuario Estatistico de Mocambique - 1994*. Maputo: Direccao Nacional de Estatistica.
- Direccao Nacional de Estatistica. 1994. *Anuario Estatistico de Mocambique- 1993*. Maputo: Direccao Nacional de Estatistica.
- Edwards, S. 1989. *Real Exchange Rates, Devaluation, and Adjustment-Exchange Rate Policy in Developing Countries*. London: The MIT Press.
- Edwards, S. 1988. *Exchange Rate Misalignment in Developing Countries*. The World Bank. Occasional Paper Number 2 / New Series. Washington, D.C. 20433, USA.
- Edwards, S. 1986. *Are Devaluations Contractionary?* In: Journal of Review of Economics and Statistics. Vol. 68, No.3, pp. 501-508.
- Government of Mozambique. 1988. *Strategy and Programme for Economic Rehabilitation 1988-91. Report Prepared by the Government of Mozambique for the Meeting of the Consultive Group for Mozambique, Paris, November 3-4. 1988*. Maputo: Government of

Mozambique.

Gylsason, T. and Radetzki, M. 1985. *Does Devaluation Make Sense in the Least Developed Countries?* In Sebastian Edwards. 1986. *Are Devaluations Contractionary?* Journal of Review of Economics and Statistics. Vol. 68, No.3, pp. 502.

Gylfason, T. and Schmidt, M. 1983. *Does Devaluation Cause Stagflation?* Canadian Journal of Economics. In Sebastian Edwards. 1986. *Are Devaluations Contractionary?* Journal of Review of Economics and Statistics. Vol. 68, No.3, pp. 502.

Hanlon, J. 1997. *Peace Without Profit - How the IMF Blocks Rebuilding in Mozambique.* Maputo: Centro de Estudos Africanos, Universidade Eduardo Mondlane.

Hanlon, J. 1991. *Mozambique: Who Calls the Shots?* James Currey Ltd. 54b Tornhill Square, London N1 1BE.

International Monetary Fund. 1997. *International Financial Statistics: August 1997.* Washington, D.C. 20431 USA.

International Monetary Fund. 1994. *International Financial Statistics: Yearbook.* Washington, D.C. 20431 USA.

International Monetary Fund. 1988. *People's Republic of Mozambique: Recent Economic Developments.* Washington D.C. (SM/88/246).

Iyoha, M. 1977. *Trade and Development: Theories and Evidence from ECOWAS.* Benin City, Nigeria: Department of economics and Statistics, University of Benin.

Jha, R. 1994. *Macroeconomics for Developing Countries.* Routledge, London.

Killick, T. 1993. *The Adaptive Economy: Adjustment Policies in Small, Low-income Countries.* Washington, D.C.: World Bank.

Krueger, A. O. 1978. *Liberalization Attempts and Consequences.* In Sebastian Edwards. 1986. *Are Devaluations Contractionary?* Journal of Review of Economics and Statistics. Vol.

68, No.3, pp. 502.

Melvin, M. 1989. *International Money and Finance*. 2<sup>nd</sup> Edition. New York: Harper Collins Publishers.

Mengisteab, K. 1991. *Export-Import responses to Devaluation in Sub-Saharan Africa*. In: Africa Development. Vol. XVI, No.3/4, pp.27-43.

Milner, C. and Rayner, A. 1992. *Policy Adjustment in Africa*. Case-Studies in Economic Development, Volume I. London: Macmillan Academic and Professional Ltd.

National Institute of Statistics. 1997. *Mozambique in Figures - 1996*. Maputo: National Institute of Statistics.

National Institute of Statistics. 1997a. *Statistical Yearbook of Mozambique - 1996*. Maputo: National Institute of Statistics.

Sodersten, B. and Reed, G. 1994. *International Economics*. 3<sup>rd</sup> Edition. London: Macmillan Press Ltd.

Taylor, L. And Rosensweig, J. 1984. *Devaluation, Capital Flows and Crowding Out: A CGE Model with Portfolio Choice for Thailand*. In Sebastian Edwards. 1986. *Are Devaluations Contractionary?* Journal of Review of Economics and Statistics. Vol. 68, No.3, pp. 502.

UNDP. 1996. Development Co-Operation Report. Mozambique: 1994-1995 Report. Maputo: UNDP.

Wijnbergen, V. 1986. *Exchange Rate Management and Stabilization Policies in Developing Countries*. In Sebastian Edwards. 1986. *Are Devaluations Contractionary?* Journal of Review of Economics and Statistics. Vol. 68, No.3, pp. 501-2.

World Bank. 1996. *African Development Indicators - 1996*. Washington, D.C.: The World Bank.

World Bank 1994. *Adjustment in Africa - Reforms, Results, and the Road Ahead*. Washington, D.C.: The World Bank.

World Bank. 1990. *World Economic and Business Review - Mozambique*. Oxford: The World Bank.

Wortzel, V. 1989. *Privatization: Not the Only Answer*. World Development 13(5). Washington, D.C.: The World Bank.

## APPENDICES

Appendix 1 -  $X_j$ ,  $M_j$ , and  $(X_j + M_j)$  values for all the models

Year	United States			Portugal			United Kingdom			South Africa		
	X ml \$	M ml \$	X+M ml \$	X ml \$	M ml \$	X+M ml \$	X ml \$	M ml \$	X+M ml \$	X ml \$	M ml \$	X+M ml \$
1980	66.3	29.6	95.9	11.2	36.0	47.2	12.6	20.8	33.4	19.7	88.0	107.7
1981	48.6	20.0	68.6	14.9	36.9	51.8	5.6	28.0	33.6	19.7	100.1	119.8
1982	36.2	19.2	55.4	9.4	51.0	60.4	2.8	20.1	22.9	16.0	67.7	83.7
1983	18.7	21.6	40.3	8.6	61.7	70.3	5.7	45.2	50.9	9.2	61.1	70.3
1984	14.0	31.3	45.3	8.8	44.8	53.6	4.6	22.7	27.3	6.7	63.1	69.8
1985	14.2	48.7	62.9	6.6	20.8	27.4	0.9	13.1	14.0	5.4	49.6	55.0
1986	16.5	67.3	83.8	5.5	31.1	36.6	2.4	21.2	23.6	5.5	55.9	61.4
1987	20.2	64.8	85.0	6.8	30.2	37.0	0.8	30.2	31.0	4.2	77.7	81.9
1988	15.9	43.4	59.3	8.1	46.3	54.4	0.9	44.1	45.0	6.7	80.9	87.6
1989	12.6	47.7	60.3	10.1	50.9	61.0	0.9	48.5	49.4	5.4	88.8	94.2
1990	14.6	51.8	66.4	7.1	55.3	62.4	5.1	52.7	57.8	8.9	96.5	105.4
1991	21.4	29.9	51.3	9.7	48.8	58.5	0.7	54.4	55.1	14.1	173.7	187.8
1992	18.6	59.1	77.7	18.7	35.6	54.3	0.7	49.1	49.8	23.0	232.4	255.4
1993	4.7	56.3	61.0	16.8	60.1	76.9	0.1	57.3	57.4	20.0	105.0	125.0
1994	14.0	60.1	74.1	14.6	64.2	78.8	1.4	61.1	62.5	23.6	112.0	135.6
1995	9.5	49.9	59.4	14.6	65.7	80.3	0.8	26.5	27.3	41.1	188.2	229.3
1996	25.8	29.5	55.3	17.5	54.2	71.7	3.0	13.4	16.4	43.8	254.3	298.1

Sources:  $X_j$  and  $M_j$ : Direccao Nacional de Estatistica 1994:108, 1995:62, and National Institute of Statistics 1997: 38-9.

Notes: j = USA, PTG, UK, and RSA; \$ = USD;  $X_j$  = exports to country j;  $M_j$  = imports from country j.

Appendix 2 - X, M, (X+M), and  $W_j$  values for all the Models

Year	X ml USD	M ml USD	X+M ml USD	$W_{USA}$	$W_{PTG}$	$W_{UK}$	$W_{RSA}$
1980	280.8	800.2	1,081.0	0.09	0.04	0.03	0.10
1981	280.8	801.1	1,081.9	0.06	0.05	0.03	0.11
1982	229.2	835.9	1,065.1	0.05	0.06	0.02	0.08
1983	131.6	636.4	768.0	0.05	0.09	0.07	0.09
1984	95.7	539.7	635.4	0.07	0.08	0.04	0.11
1985	76.6	423.7	500.3	0.13	0.05	0.03	0.11
1986	79.1	542.7	621.8	0.13	0.06	0.04	0.10
1987	97.0	642.0	739.0	0.12	0.05	0.04	0.11
1988	103.0	735.6	838.6	0.07	0.06	0.05	0.10
1989	104.8	807.7	912.5	0.07	0.07	0.05	0.10
1990	126.4	877.5	1,003.9	0.07	0.06	0.06	0.10
1991	162.3	898.8	1,061.1	0.05	0.06	0.05	0.18
1992	139.3	855.0	994.3	0.08	0.05	0.05	0.26
1993	131.8	954.7	1,086.5	0.06	0.07	0.05	0.12
1994	149.5	1,018.5	1,168.0	0.06	0.08	0.05	0.12
1995	174.3	727.0	901.3	0.07	0.09	0.03	0.25
1996	225.9	801.5	1,027.4	0.05	0.07	0.02	0.29

Source: X and M: Bank of Mozambique 1996: 61 and 1997: 19.

Notes: (X+M) = Mozambique's Total Trade and  $W_j = (X_j + M_j) / (X+M)$  = weights in Mozambique's Total Trade;

J = USA, PTG, UK, and RSA.

Appendix 3 -  $BNER_{MT/j}$ ,  $P^f$ , and  $P^d$  values for all the Models

Year	BNER MT/USD	BNER MT/ESC	BNER MT/GBP	BNER MT/ZAR	$p^{USA}$	$p^{PTG}$	$p^{UK}$	$p^{RSA}$	$P^d = p^{MOZ}$
1980	34.90	0.65	75.34	41.54	63.1	20.6	53.0	25.5	4.99
1981	35.28	0.58	71.62	40.67	69.6	24.7	59.0	29.4	5.09
1982	37.77	0.48	66.06	34.86	73.9	30.3	64.4	33.7	5.99
1983	40.18	0.37	60.93	36.09	76.2	37.9	67.4	37.8	7.74
1984	42.44	0.29	56.66	29.43	79.5	49.0	70.7	42.2	10.08
1985	43.18	0.25	55.67	19.66	82.4	58.5	75.0	49.1	13.03
1986	40.51	0.27	59.27	16.95	83.9	65.3	77.6	58.2	18.07
1987	289.44	2.06	480.32	142.52	87.0	71.5	80.8	67.6	32.3
1988	528.58	3.68	942.96	231.35	90.5	78.3	84.7	76.3	48.5
1989	744.98	4.74	1,214.21	283.85	94.9	88.2	91.3	87.5	68.0
1990	929.09	6.55	1,660.56	359.31	100.0	100.0	100.0	100.0	100.0
1991	1,434.47	9.92	2,521.07	517.26	104.2	111.4	105.9	115.3	132.9
1992	2,432.38	18.71	4,237.74	861.75	107.4	121.3	109.8	131.3	193.4
1993	3,724.40	23.18	5,581.65	1,149.31	110.6	129.6	111.5	144.1	275.0
1994	5,918.09	36.30	8,993.84	1,715.92	113.4	136.0	114.3	157.1	448.8
1995	8,889.75	59.49	13,981.33	2,494.92	116.6	141.5	118.2	170.5	693.1
1996	11,139.67	72.14	17,095.42	2,718.75	120.0	146.0	121.1	183.2	1,005.0

Sources: BNER: Bank of Mozambique 1995:55 and 1997:15;  $p^{USA}$ : IMF 1994: 741 and 1997: 718;  $p^{PTG}$ : IMF 1994: 605 and 1997: 572;  $p^{UK}$ : IMF 1994: 735 and 1997: 710;  $p^{RSA}$ : IMF 1994: 659 and 1997: 630;  $p^{MOZ}$ : IMF 1994: 525 and 1997: 490.

Notes:  $P^f$  and  $P^d$  are Consumer Price Index (CPI) and all index numbers (1990 =100).

Appendix 4 -  $(BNER_{MTj} * W_j) * (P^f/P^d)$  and MRER values for all the models

Year	$(BNER_{MT/USD} * W_{USA})$ $* (P_{USA}/P_{MOZ})$	$(BNER_{MT/ESC} * W_{PTG})$ $* (P_{PTG}/P_{MOZ})$	$(BNER_{MT/GBP} * W_{UK})$ $* (P_{UK}/P_{MOZ})$	$(BNER_{MT/ZAR} * W_{RSA})$ $* (P_{RSA}/P_{MOZ})$	MRER
1980	39.72	0.11	24.01	21.23	85.07
1981	28.95	0.14	24.91	25.84	79.84
1982	23.30	0.15	14.20	15.69	53.34
1983	19.78	0.16	37.14	15.86	72.94
1984	23.43	0.11	15.90	13.55	52.99
1985	35.50	0.06	9.61	8.15	53.32
1986	24.45	0.06	10.18	5.46	40.15
1987	93.55	0.23	48.06	32.81	174.65
1988	69.04	0.36	82.34	36.40	188.14
1989	72.78	0.43	81.51	36.52	191.24
1990	65.04	0.39	99.63	35.93	200.99
1991	56.23	0.50	100.44	80.78	237.95
1992	108.06	0.59	120.30	152.11	381.06
1993	89.87	0.76	113.16	72.27	276.06
1994	89.72	0.88	114.53	72.08	277.21
1995	104.69	1.09	71.53	153.44	330.75
1996	66.50	0.73	41.19	143.72	252.14

Sources:  $W_j$  : Appendix 2;  $BNER_{MTj}$  : Appendix 3.

Notes:  $MRER = \sum (BNER_{MTj} * W_j) * (P^f / P^d)$ ;

i = Mozambique; j = USA, PTG, UK, and RSA



Appendix 5 -  $Y^f$  values for the Models I and IV

Year	$Y^{USA}$		$Y^{PTG}$		$Y^{UK}$		$Y^{RSA}$		Total $Y^f$
	bl USD	bl MT	bl ESC	bl MT	bl GBP	bl MT	ml ZAR	bl MT	bl MT
1980	4,275.6	3,972,417.2	6,554.1	42,929.4	423.49	703,230.6	227,429	81,717.5	4,800,294.6
1981	4,351.1	4,042,563.5	6,636.8	43,471.0	418.03	694,163.9	239,621	86,098.2	4,866,296.7
1982	4,257.3	3,955,414.9	6,775.0	44,376.3	425.25	706,153.1	238,702	85,768.0	4,791,712.3
1983	4,423.0	4,109,365.1	6,761.6	44,288.5	440.89	732,124.3	234,295	84,184.5	4,969,962.4
1984	4,696.8	4,363,749.9	6,638.7	43,483.5	451.13	749,128.4	246,242	88,477.2	5,244,839.0
1985	4,845.5	4,501,905.6	6,838.2	44,790.2	468.07	777,258.3	243,258	87,405.0	5,411,359.2
1986	4,986.7	4,633,093.1	7,121.4	46,645.2	488.12	810,552.5	243,302	87,420.8	5,577,711.7
1987	5,140.1	4,775,615.5	7,488.0	49,046.4	511.62	849,575.7	248,413	89,257.3	5,763,494.9
1988	5,342.3	4,963,477.5	7,788.5	51,014.7	537.22	892,086.0	258,846	93,006.0	5,999,584.2
1989	5,477.6	5,089,183.4	8,169.1	53,507.6	548.94	911,547.8	265,045	95,233.3	6,149,472.1
1990	5,743.8	5,336,507.1	9,585.1	62,782.4	551.12	915,167.8	276,060	99,191.1	6,413,648.5
1991	5,687.9	5,284,571.0	9,790.6	64,128.4	540.31	897,217.2	273,249	98,181.1	6,344,097.7
1992	5,842.7	5,428,394.1	10,203.0	66,829.7	537.45	892,468.0	267,257	96,028.1	6,483,719.9
1993	5,973.1	5,549,547.5	10,995.2	72,018.6	548.59	910,966.6	270,702	97,265.9	6,629,798.6
1994	6,183.6	5,745,120.9	11,258.8	73,745.1	572.30	950,338.5	278,143	99,939.6	6,869,144.1
1995	6,309.1	5,861,721.7	11,467.3	75,110.8	583.82	969,468.1	287,506	103,303.8	7,009,604.5
1996	6,462.5	6,004,244.1	11,679.5	76,500.7	596.29	990,175.3	296,469	106,524.3	7,177,444.5

Sources:  $Y^{USA}$ : IMF 1994: 743 and 1997: 722;  $Y^{PTG}$ : IMF 1994: 605 and 1997: 572;  $Y^{UK}$ : IMF 1994: 735 and 1997: 714;  $Y^{RSA}$ : IMF 1994: 659 and 1997: 632.

Note:  $Y^f$  = GDP 1990 prices.

Appendix 6 - X, MRER, Y<sup>f</sup>, and D<sub>i</sub> values for the Model I

Year	X=Exports		MRER	Y <sup>f</sup> ml MT	D <sub>i</sub>
	ml USD	ml MT			
1980	280.8	260,885.5	85.07	4,800,294,627.4	0
1981	280.8	260,888.5	79.84	4,866,296,657.3	0
1982	229.2	212,947.4	53.34	4,791,712,262.6	0
1983	131.6	122,268.2	72.94	4,969,962,384.9	0
1984	95.7	88,913.9	52.99	5,244,839,042.8	0
1985	76.6	71,168.3	53.32	5,411,359,156.2	0
1986	79.1	73,491.0	40.15	5,577,711,661.8	0
1987	97.0	90,121.7	174.65	5,763,494,891.2	1
1988	103.0	95,696.3	188.14	5,999,584,181.5	1
1989	104.8	97,368.6	191.24	6,149,472,114.4	1
1990	126.4	117,437.0	200.99	6,413,648,492.8	1
1991	162.3	150,791.3	237.95	6,344,097,712.8	1
1992	139.3	129,422.2	381.06	6,483,719,877.7	1
1993	131.8	122,454.1	276.06	6,629,798,585.0	1
1994	149.5	138,899.0	277.21	6,869,144,113.3	1
1995	174.3	161,940.4	330.75	7,009,604,454.1	1
1996	225.9	209,881.4	252.14	7,177,444,448.8	1

Sources: X: Appendix 2; MRER: Appendix 4; and Y<sup>f</sup>: Appendix 5.Note: D<sub>i</sub> = intercept dummy variable.

Appendix 7 - M, MRER, Y<sup>d</sup>, AID, and D<sub>i</sub> values for the Model II

Year	M=Imports		MRER	Y <sup>d</sup>		AID=Foreign Aid		D <sub>i</sub>
	ml USD	ml MT		ml USD	ml MT	ml USD	ml MT	
1980	800.2	743,457.8	85.07	1,564.0	1,453,096.8	555.9	516,481.1	0
1981	801.1	744,386.9	79.84	1,656.0	1,538,573.0	775.6	720,602.2	0
1982	835.9	776,626.3	53.34	1519.0	1,411,287.7	804.0	746,988.4	0
1983	636.4	591,272.9	72.94	1,277.0	1,186,448.0	428.9	398,486.7	0
1984	539.7	501,429.9	52.99	1,213.0	1,126,986.2	432.5	401,831.4	0
1985	423.7	393,655.4	53.32	1,207.0	1,121,411.6	377.8	351,010.2	0
1986	542.7	504,217.1	40.15	1,179.0	1,095,397.1	497.0	461,757.7	0
1987	642.0	596,475.8	174.65	1,353.0	1,257,058.8	605.3	562,378.2	1
1988	735.6	683,438.6	188.14	1,464.0	1,360,187.8	624.3	580,030.9	1
1989	807.7	750,426.0	191.24	1,559.0	1,448,451.3	645.2	599,448.9	1
1990	877.5	815,276.5	200.99	1,575.0	1,463,316.8	699.8	650,177.2	1
1991	898.8	835,066.1	237.95	1,652.0	1,534,856.7	645.8	600,935.4	1
1992	855.0	794,372.0	381.06	1,638.0	1,521,849.4	669.2	621,747.0	1
1993	954.7	887,002.2	276.06	1,955.0	1,816,371.0	688.8	639,957.2	1
1994	1,018.5	946,278.2	277.21	2,060.0	1,913,925.4	824.9	766,406.3	1
1995	727.0	675,448.3	330.75	2,089.0	1,940,869.0	621.5	577,429.4	1
1996	801.5	744,665.6	252.14	2,223.0	2,065,367.1	630.3	585,605.4	1

Sources: M: Appendix 2; MRER: Appendix 4; Y<sup>d</sup> = Y<sup>MOZ</sup> = GDP 1990 prices: World Bank 1996:18 and Bank of Mozambique 1997:25; and AID: Bank of Mozambique 1995:61 and 1997:19.

Note: D<sub>i</sub> = intercept dummy variable.

$$\ln \text{mt} = \beta_0 + \beta_1 \ln \text{mrer} + \beta_2 \ln y^d + \beta_3 \ln \text{aid} + \beta_4 D_i + \beta_5 D_i \ln \text{mrer} + \beta_6 D_i \ln y^d$$

Appendix 8 - BT, MRER,  $Y^f$ ,  $Y^d$ , Aid, and  $D_i$  values for Model III

Year	BT ml MT	MRER	$Y^f$ ml MT	$Y^d$ ml MT	Aid ml MT	$D_i$
1980	483,033.9	85.07	4,800,294,627.4	1,453,096.8	516,481.1	0
1981	483,405.5	79.84	4,866,296,657.3	1,538,573.0	720,602.2	0
1982	563,678.9	53.34	4,791,712,262.6	1,411,287.7	746,988.4	0
1983	469,004.6	72.94	4,969,962,384.9	1,186,448.0	398,486.7	0
1984	412,516.0	52.99	5,244,839,042.8	1,126,986.2	401,831.4	0
1985	322,487.1	53.32	5,411,359,156.2	1,121,411.6	351,010.2	0
1986	430,726.1	40.15	5,577,711,661.8	1,095,397.1	461,757.7	0
1987	506,354.1	174.65	5,763,494,891.2	1,257,058.8	562,378.2	1
1988	587,742.3	188.14	5,999,584,181.5	1,360,187.8	580,030.9	1
1989	653,057.4	191.24	6,149,472,114.4	1,448,451.3	599,448.9	1
1990	697,839.5	200.99	6,413,648,492.8	1,463,316.8	650,177.2	1
1991	684,460.6	237.95	6,344,097,712.8	1,534,856.7	600,935.4	1
1992	664,949.7	381.06	6,483,719,877.7	1,521,849.4	621,747.0	1
1993	764,548.2	276.06	6,629,798,585.0	1,816,371.0	639,957.2	1
1994	807,379.2	277.21	6,869,144,113.3	1,913,925.4	766,406.3	1
1995	513,508.0	330.75	7,009,604,454.1	1,940,869.0	577,429.4	1
1996	534,784.2	252.14	7,177,444,448.8	2,065,367.1	585,605.4	1

Sources: Trade Balance (BT): Bank of Mozambique 1995:61 and 1997:19; MRER: Appendix 4;  $Y^f$ : Appendix 5;  $Y^d$  and Foreign Aid: Appendix 7.

Notes: f = USA, PTG, UK, and RSA ;  $D_i$  = intercept dummy variable.

Appendix 9 - GDP, MRER, X, Aid, and  $D_i$  values for Model IV

Year	GDP ml MT	MRER	X ml MT	AID ml MT	$D_i$
1980	1,453,096.8	85.07	260,888.5	516,481.1	0
1981	1,538,573.0	79.84	260,888.5	720,602.2	0
1982	1,411,287.7	53.34	212,947.4	746,988.4	0
1983	1,186,448.0	72.94	122,268.2	398,486.7	0
1984	1,126,986.2	52.99	88,913.9	401,831.4	0
1985	1,121,411.6	53.32	71,168.3	351,010.2	0
1986	1,095,397.1	40.15	73,491.0	461,757.7	0
1987	1,257,058.8	174.65	90,121.7	562,378.2	1
1988	1,360,187.8	188.14	95,696.3	580,030.9	1
1989	1,448,451.3	191.24	97,368.6	599,448.9	1
1990	1,463,316.8	200.99	117,437.0	650,177.2	1
1991	1,534,856.7	237.95	150,791.3	600,935.4	1
1992	1,521,849.4	381.06	129,422.2	621,747.0	1
1993	1,816,371.0	276.06	122,454.1	639,957.2	1
1994	1,913,925.4	277.21	138,899.0	766,406.3	1
1995	1,940,869.0	330.75	161,940.4	577,429.4	1
1996	2,065,367.1	252.14	209,881.4	585,605.4	1

Sources: GDP: Appendix 7; MRER: Appendix 4; Exports (X): Appendix 6 ; Aid: Appendix 7.

Note:  $D_i$  = intercept dummy variable.

