

## **CHAPTER 1**

### **BACKGROUND AND INTRODUCTION**

#### **1.1 INTRODUCTION**

Macroeconometric modelling is a fairly mature field in the discipline of economics. It has over the years continued to fascinate modellers and policy makers alike because of its dynamic nature and usefulness. Its importance in policy-making decisions need not be emphasized any further. Macroeconometric models have over the years and continue to provide effective analytical frameworks for policy-making decisions.

The development of a sound and comprehensive macroeconometric model is of utmost importance if robust policy decisions are to be taken and followed. The entire exercise of profound macroeconomic management rests on the ability of the model to capture adequately and reasonably the key characteristic features of the economy under observation.

As with other developing economies, sound economic analysis of the economy of Lesotho is to a large extent hindered by problems of inadequate and poor quality data. Furthermore, structural instability caused by persistent policy regime changes pose a major challenge in economic modelling. The fact that a robust database is a prerequisite for a model to produce reasonable forecasting and policy analysis qualities does not however preclude attempts to develop econometric models in such situations. It is however necessary that the limitations imposed by these constraints should be borne in mind.

Against this background, the general objective of this study is to develop a fairly comprehensive and operational macroeconometric model for the economy of Lesotho, suitable for the simulation of the effects of fiscal, monetary and external policies. The model developed here takes advantage of the available data, improved analytical

techniques and relevant economic theory. Its merit lies not in its capacity to capture all the complexities of the economy but in its ability to produce reasonable and robust results within a consistent framework.

## **1.2 PROBLEM STATEMENT**

The last two decades provide evidence of several policy regime shifts and not so much improvement in the performance of the economy of Lesotho. Much of this instability has been blamed on structural rigidities, Lesotho's peculiar geographical position, the narrow resource base and lack of credibility in economic policy. Among these, many have hailed appropriate and sound economic policy as a remedy to the ailments of the economy. The need for policy transformation and adjustment is often emphasised. This was also the premise on which the International Monetary Fund (IMF) and World Bank (WB) based their adjustment programmes in many developing countries, Lesotho included in the late 1980s.

The fact remains however, that in order to address issues of policy relevance to the problems that the economy is facing, there is a need for an appropriate framework that serves as a reference point and a reasonable representation of the economy under observation. It is also of utmost importance to have a firm grasp of the underlying interrelationships between policy instruments and targets in order to understand the relevant policy variables to address different objectives. It is also important to evaluate the extent to which policy variables are able to influence given targets. The understanding of transmission mechanisms through which the ultimate target variable are affected is also crucial for identifying and dealing with potential spillovers.

The exercise of modelling is much more important in developing countries like Lesotho for the reason that many of them are nothing like the text-book prototypes on which mainstream economic theory is based. For many of these economies, many relationships that are predicted by theory are either non-existent or do not work as predicted. In these

economies, individual empirical analyses serve as the best predictor of the behaviour of economic variables.

Econometric models provide a representation of the economy in a way that provides answers to policy makers and other interested parties. Although macroeconomic models have undergone criticism in the past, they have proved to still be appropriate tools for this purpose and have been used extensively for policy analysis and various other purposes. Since the introduction of the first macroeconomic model by Tinbergen (1936), macroeconomic modelling has undergone tremendous improvements in terms of theoretical developments and estimation and computing methods.

The six macroeconomic models of the Lesotho economy that are known have either not been revamped adequately to keep up with the economy's structural and other changes or are specific to the needs of a specific sector. These and other deficiencies in the existing models have provided a motivation for the construction, in this study, of a macroeconomic framework that is all-inclusive. Given the developments within the economy, and in the global economy, it is seen as important to develop a framework that will assist in providing a policy guideline by:

- Analysing the potential impact of alternative policy measures;
- Forecasting short-term behaviour of key macroeconomic variables; and
- Providing an informed basis for embarking on long-term planning.

It is perceived that a quantitative model provides both a theoretical and practical structure that can be used to achieve these goals as it features both theoretical structures while taking into account the key attributes of the economy.

### **1.3 OBJECTIVES OF THE STUDY**

The general objective of this study is to develop and estimate a macroeconomic model for the economy of Lesotho that will provide not only short-term but also medium to long-term forecasts. The framework developed in this study is premised on economic

theory and attempts to incorporate the underlying structure of the economy and developments in estimation techniques. The model is then subjected to different policy shocks with the view of evaluating the impacts of alternative policy scenarios and making policy-relevant recommendations. Using the model to forecast one period ahead assesses the forecasting performance of the model.

The specific objectives of this study include:

- To construct a comprehensive and robust macroeconomic model for the economy of Lesotho that captures the basic elements of the economy, theoretical developments and data structure;
- To estimate a macroeconomic model for Lesotho;
- To run different policy simulation experiments with the view of analysing different policy options;
- To evaluate the robustness of the model; and
- To derive policy implications from the analysis.

## **1.4 METHODOLOGY AND ESTIMATION PROCEDURES**

### **1.4.1 Methodology**

The study develops a model that captures both the supply and the demand side of the economy. The model is designed within the framework of the small-open economy IS-LM-aggregate supply framework. It consists of four sectors, namely the real sector, the external sector, the monetary sector and the public sector. The real sector consists of the production sector and the employment sector which make up the supply side, and the aggregate demand and prices. As might be expected, many interrelationships exist between endogenous variables of the model. However, given the softness of the data and to minimize problems that may arise from this limitation, the model is designed to be as parsimonious as possible. The model is made to mimic an economy that is small and open, supply constrained, has a surplus of labour, and in which markets do not clear. There are 65 endogenous variables of which 22 are determined by stochastic behavioural equations and 43 are determined by identities. The model also has 36 predetermined and

exogenous variables. There are 39 dummy variables that are intended to capture structural and policy regime changes and other events that might have had significant impacts on the economy. Thus the model has 140 variables in total.

The equations in the model are estimated using annual time series data spanning the period 1980 to 2000. The primary source of data is the Central Bank of Lesotho database and Annual Reports. Other sources include the Bureau of Statistics (BOS), the IMF's International Financial Statistics (IFS) and South African Reserve Bank (SARB) Quarterly Bulletins.

#### **1.4.2 Estimation techniques**

The estimation technique used in this study is the Engle-Granger (1987) two-step procedure. The procedure involves testing for the order of integration of the individual data series to avoid the common problem of spurious regressions that incorrectly give the impression that relationships exist between two or more variables.<sup>1</sup> Both the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests were used for this purpose. This is followed by testing for the presence of a long-run relationship between various sets of variables. This involves estimating the cointegration or long-run relationships by ordinary least squares (OLS) and subjecting the residuals derived from these relationships to unit root testing. The ADF test was used in this case, although the critical values in this case are the McKinnon (1991) response surface values. The second stage involves constructing the error correction model (ECM), on condition that an equilibrium or long-run relationship between a set of non-stationary variables exists. This implies that the stochastic trends of these variables are linked and that the variables cannot move independently of each other. The ECM is then intended to estimate the short-run or dynamic adjustment process to long-run equilibrium. This approach has several merits; i) in the event that the concerned variables are cointegrated, the ECM captures both the short-run and long-run effects. The short-run component of the model becomes non-zero during periods of disequilibrium and imparts information about the distance of the system

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<sup>1</sup> See for example Granger and Newbold (1974).

from equilibrium; ii) assuming cointegration exists and that estimates of the concerned parameters exist, all terms within the ECM are stationary. This implies that standard OLS estimation techniques can be applied; iii) since the ECM is linked directly to the concept of cointegration, Granger's representation theorem for dynamic modelling effectively implies that the presence of cointegration renders the ECM immune from the problem of spurious regressions; and iv) because it is possible to specify the ECM in a multivariate form, it is also practically possible to allow for a set of cointegrating vectors. By far, a major advantage of this approach rests in its better forecasting abilities over other methods and its ability to limit specification errors to those that arise because of inclusion of irrelevant variables rather than the omission of relevant variables.

## **1.5 OUTLINE OF THE STUDY**

This study is organised into nine chapters. Chapter one provides an introduction and background of the study. Chapter two provides an overview of the economy of Lesotho. The overview seeks to establish an understanding of the structure of the economy and grounds to adopting various modelling strategies in line with the objective of capturing the key salient features of the economy. Literature related to macroeconomic modelling is divided and presented in two distinct parts. Chapter three provides a review of the related theoretical literature. This takes the form of an inspection of the theoretical models for each of the sectors of the economy. This is done with the view of establishing the possible linkages that exist between the sectors and that make the economy a single interdependent system. The second part of literature reviewed is presented in chapter four and deals with the empirics and practicalities of macroeconomic modelling. This exercise is carried out by an inspection of some of the relevant empirical work. The literature review in its entirety makes preparation for the specification of the model in line with developments in theory and in estimation techniques. The model is specified and presented in chapter five and follows directly and draws heavily from the literature discussed in chapters three and four as well as consideration of the structure of the economy as discussed in chapter two. Chapter five also discusses in detail the estimation techniques adopted in this study. The actual estimation of the model is done in chapter

four. The estimation results are presented in three parts. First, the estimation results of the individual behavioural equations are presented and discussed in chapter six. The discussion in this chapter involves assessing the consistency of the individual equations with regard to economic and statistical theoretical criteria as well as evaluating their individual performance. Chapter seven presents the results of the consolidated model. This chapter presents the tracking performance of the model for the static and dynamic solution values of the endogenous variables for both *ex ante* and *ex post* scenarios. The chapter also makes an evaluation of the forecast accuracy of the model. Simulation experiments that are aimed at impact analysis of the model are made and presented in chapter seven. Here the sensitivity of the endogenous variables of the model, to changes in some exogenous and policy variables is assessed with the aim of evaluating the potency of various policy instruments and regimes. Chapter eight presents an evaluation of the model and policy simulation experiments and makes an assessment of the policy implications drawn from the analysis. Chapter nine presents a summary of the study and draws conclusions based on the analysis.