Chapter 6
Exogenous Shocks and Macroeconomic Policy Analysis using Applied Macro-Econometric Models in Africa: The Case of Rwanda

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ABSTRACT

In this study we have developed a macro-econometric model for a typical supply constrained African economy. This is aimed at developing a theoretical and empirical template for such policy tools which are increasingly demanded in Africa. We have concretized it by building a macro-econometric model for Rwanda. The Rwanda macro-econometric model has 107 equations of which 72 are endogenous. In addition, a supplementary ARIMA based model with 33 equations for exogenous variable is built to make the model useful for forecasting. The fiscal, balance of payment and money supply block of the model is fairly disaggregated to offer an adequate picture of the macro economy. An econometric estimation of the core behavioral equations of the model using equilibrium [error]-correction approach is made with the database that stretches from 1960 to 2009. The model is similar to successful macro models in the region such as that of the KIPPRA-Treasury model of Kenya. It can also easily be further extended to the support budgeting, forecasting and macroeconomic policy analysis work at the relevant ministries in Africa such as the Ministry of Finance in Rwanda. We have managed to successfully solve the model from 1999 to 2009 and forecast major macro outcomes from 2010 to 2014. We have also used it to conduct a policy simulation exercise which is very important for policy makers such as those in Rwanda. We hope this model offers a theoretical and empirical framework for building macro model across Africa which is increasingly being demanded in many countries.

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1. INTRODUCTION

Macroeconomic Policy making in Africa is increasingly being informed by medium to long-term plans such as ‘The Poverty Reduction Strategy Paper (PRSP)’. This is closely linked to a widely used budgeting approach called the Medium Term Expenditure Framework (MTEF). Both the realization of a strategy such as the PRSP and the use of MTEF requires an overall macroeconomic framework that ensures consistency in defining the aggregate resource envelop of a country and how it is going to be spend, as well as forecasting major macro aggregates three to four years ahead. A macroeconometric model is an invaluable instrument in achieving that. Since both the preparation of the budget and forecasting of key macro variables are made in a consistent framework, it does not allow the components of the budget to be changed in a discretionary manner (i.e. without taking the overall consistency framework into account). In addition, such forecasts could be used to monitor the economy with reference to the government’s current economic strategy, and to suggest modifications, either of substance or of the tactics.

Another important justification for having macro modeling in many African countries is its capability to help policy makers take informed decisions by conducting policy analysis using policy simulation. This is crucial for policy makers because it will help them to assess the implications of proposed policy packages before their actual implementation. Policy analysis conducted with the aid of such models avoids a partial analysis, and hence partial understanding, of issues of national significance. It has the advantage of taking all possible inter-linkages in the economy that are not easily tractable by human mind. In addition, macro models are also instrumental to carry macroeconomic research by allowing macro policy research institutions to organize their research across the major components (block) of the macro model and carry out an in-depth analysis of major issues in each block such as inflation or fiscal deficit. This in turn improves the model and hence policy formulation (see Huizinga et al, 2001; Huizinga & Geda, 2004).

Despite such important use of macro model, the use of macro models in Africa is limited. Recently, however, many countries are showing interest to have such models. Thus, there is a need to come up with a template macro model for the majority of countries in the continent by ensuring that such model is grounded on African reality, applicable and built based on rigorous analysis. The building of the Rwandan macroeconometric model in this study is primarily motivated to develop such template model that can be used in majority of the countries in the continent. We will be doing that by (a) developing a macro econometric model well-grounded in theory and rigorous econometric analysis and (b) by illustrating the use of such model using actual macroeconomic policy issues in Rwanda with a suggested framework of innovative use of macro model by combing it with expert opinion. Our experience in building and using model in Kenya and Ethiopia shows that notwithstanding the weakness of macro models in forecasting, in practice, things are not as bad as they at first look. This is because model outcome is not meant to be used by itself, but jointly with expert opinion for additional information. This information may be based on events that have just been realized and will affect the immediate future such as a new retrenchment program or multi-year development aid programs, or drought in the horizon. Also, expert opinion from different parts of the government may be incorporated into the macro model’s forecast. Examples here are specialists on government expenditure and revenue and specialist on different sectors of the economy. In turn, these specialists benefit from this exchange as well, since they get a better picture of the overall economy. In practice, adding such outside information significantly reduces the forecast uncertainty, especially for the short run (see Huizinga et al, 2001; Huizinga & Geda, 2004).