CHAPTER I V

SELECTION OF MACROECONOMETRIC MODEL

4.1 The Role of Economic Theory in Macroeconometrics

Klein (1988) gives a very readable survey of the interaction between statistics and economics in the context of macroeconometric modeling. He maintains that the model building approach can be contrasted to pure statistical analysis, which is empirical and not so closely related to received economic theory as is model building.

Now, different approaches to macroeconomic modeling differ in the extent they take economic theory as a given starting point. At one extreme we have theory-driven models that take the ''received theory'' (Klein's terminology) for granted and do not test it. Prominent examples are the general equilibrium models dubbed real business cycle models that have gained a dominating position in academe in the US, [see e.g. Kydland & Prescott (1991)]. There is also a new breed of macroeconometric models with optimizing agents endowed with rational forward-looking expectations leading to a set of Euler equations, [for better clarification, *see* Poloz et al. (1994), Willman et al. (2000) and Hunt et al. (2000)] for models from the central banks of Canada, Finland and New Zealand, respectively. At another extreme, we have data-based VAR models which were introduced in empirical economics by Sims (1980), and Watson (1994). These models can be seen as statistical devices that make only minimal use of economic theory or, in the less extreme case of structural VARs, theory restrictions can be imposed as testable co-integrating relationships in levels or they can be imposed on the error structure of the model.

The rationale for the first three of these approaches—and for theory-driven models in particular—is questionable from the perspective that economics is a discipline that is dominated by persistent controversies. Modeling strategies that ignore testing of controversial issues or preclude tests by imposing the theoretical

restrictions a priori, do not help us to resolve the ambiguities in the existing body of economic theory and may make empirical tests invalid.

The approach that Jansen (2002) has recommended is as a compromise between data-based (purely statistical) models and economic theory: on the one hand learning from the process of trying to take serious account of the data, whilst on the other hand avoiding making strong theoretical assumptions—needed to make theories ''complete''— which may not make much sense empirically, i.e. that are not supported by the data. Jansen (2002) also remarked that econometric methodology lacks a consensus, and thus the approach to econometric modeling is controversal. Even then, the modeling has given the future track of courses, though the results are not correct always, for the policymakers that help them to formulate the most effect policies at a large scale.

4.2 Selection of the Model

A series of attempts has been conducted in retrospect to fabricate macroeconomic model for Bangladesh economy. As macroeconomic model is still an art to formulate, each model has some advantages and disadvantages that have already been analyzed in Chapter II. However, in recent years, one of the most comprehensive models has been formulated by Hossain (1995) that included 29 behavioral equations and 15 identities. It includes six building blocks– production, expenditure, balance of payments, government, monetary, and price block. The thesis has endeavored to reconstruct the Hossain model, as it has some primal dominance over other models. In Hossain model, it is recognized that supply constraints have major influences on the macroeconomy of Bangladesh though in some areas demand side factors also exert important influences. That is, the model can be used to examine the effects of both domestic and external shocks on the economy. The model can also be used to analyze the effects of monetary, fiscal and exchange rate policies on the macroeconomy.

The macroeconomic linkages between output, government deficit, external sector, money supply and inflation are captured in the model. One of the most crucial features of Hossain model is that it excludes labor from its aggregate production function (as labor does not act as a constraint to production in a labor abundant economy of Bangladesh). It has also incorporated the effects of time-lag to analyze the model under dynamic simulation. Finally yet importantly, one idiosyncratic characteristic of Hossain model is that it does not include interest rate as a policy variable. It has realized that there is also rigidity in the interest rate because of the oligopolistic structure of the banking system. The equilibrating mechanism in the monetary sector does not work through the demand for and supply of money determining the rate of interest. Rather, the change is money supply affects the price level. Accordingly, demand for money is not modeled in Hossain model.

However, this model cannot be estimated empirically as it does not achieve a convergence rule to run the simulation. In other words, a model is said to constitute a system of simultaneous equations if all of the relationships involved are needed for determining the value of at least one of the endogenous variables included in the model. This situation implies that at least one of the relationships includes more than one endogenous variable. Due to this estimation problem, Hossain and Razzaque (2003a) have revised the model that can run policy simulation scenarios. However, this model has only 18 behavioral equations and 13 identities, which are not enough to explain the diversified economy of Bangladesh by any standard. Therefore, the thesis has considered the initial Hossain (1995) model and attempted to reconstruct for accomplishing empirical forecasting with alternative shocks based on monetary, fiscal, and exchange rate policies.

4.3 Modification in the Selected Model

As Hossain model has lost the convergence to run simulation, the fundamental objective of this reconstruction is to overcome estimation problem incorporating a dynamic behavior of policy simulation. In this regard, the thesis has considered the

same building blocks including production, expenditure, balance of payments, government, monetary, and price blocks. The major changes that have been integrated in the thesis needs to be interpreted respectively.

In production block, precisely 6 major changes have been accomplished to restructure aggregate production function. As fertilizer, total arable land, and petroleum oil are scarce in the production process of the economy, no model can be effective by excluding these indispensable inputs. Furthermore, education plays a vital role to denote the productivity of service sector directly. From this realization, secondary school enrollment (SSE) has been used as a proxy to measure the effect of education in total output of the economy. Finally, Hossain model has considered sectoral credits as exogenous variables that should be endogeneized by adding interest rate on credits as a determinant of total sectoral credits. Otherwise, the model cannot explain the changes in total volume of sectoral credits with respect to time.

In expenditure block, only consumption function has been incorporated by adding consumer credit rate as well as currency outside the banking system. The rationale behind the inclusion of consumer credit rate is that on an average the consumers behave to purchase more under different credit schemes. That is, if the credit rate on consumable goods and services is lower, consumers buy more and the vice versa. The incorporation of currency outside banks has been discussed later.

In balance of payments block, one more equation has been plugged in based on exports of non-traditional goods, as the total share of these exported goods has been increasing almost progressively. Moreover, wholesale price index of food-grains has been included to determine total volume of imports of food-grains.

After that, in formulating government block, total government expenditures has been included as a fiscal policy indicator. In Hossain model, government consumption expenditures and investment expenditures have been fabricated individually that could not facilitate to measure the total expenditures of government

on the real output of the economy. The thesis has overcome this difficulty by restructuring an identity that total government expenditures is a summation of government consumption and investment expenditures for the sake of giving an overall fiscal shock in the model.

Perhaps the most important aspect of any macroeconomic model is the monetary block. It is exposed earlier that Hossain model did not include rate of interest, which is very important policy variable to measure the effects of monetary policy on real GDP. It is argued that interest rate is regulated by the government. There is also rigidity in the interest rate because of the oligopolistic structure of the banking system. The equilibrating mechanism in the monetary sector does not work through the demand for and supply of money determining the rate of interest. Rather, the change in money supply affects the price level (Hossain, 1995). But recently the banking sector of Bangladesh is facing a competitive environment as the central bank of Bangladesh has approved many domestic as well as international banks to run the operational activities in the economy. Hence, money supply is now fundamentally dependent on the rate of interest. The model used in this thesis, that is why, has included rate of interest rate to formulate money supply function under monetary block as an exogenous variable.

Under price block, only GDP deflator function has been remaining the same as the Hossain model. To make wholesale price indices for exported goods, imported food-grains and raw materials as exogenous variables, the thesis has excluded price indices functions from the model. Another reason is- as all endogenous variables have to be included in the identities for achieving the convergence of the model, the study has no option but to make changes the status of wholesale price indices into exogenous terms.

Finally yet importantly, exchange rate has considered as exogenous variable to get policy scenarios through balance of payments block. Recently the macroeconomic policymakers of Bangladesh have taken the managed floating exchange rate policy.

However, for avoiding complication within the model, exchange rate has been included as an exogenous factor to the model. On the whole, it is to be marked out that the above discussion regarding the modification of the Hossain model has to be elaborated equation-by-equation in Chapter VI of the dissertation.