Book Reviews

Farzana Naqvi. *Energy, Economy and Equity Interactions in a CGE Model for Pakistan.* Aldershot: Ashgate Publishing Company, 1997. Hardbound. Price not given. xxii+290 pages.

Modernisation of the agricultural, industrial and household sectors causes the demand for energy to increase more rapidly than its supply. In countries that aim to modernise quickly a heavy investment is required to redress this imbalance. That is why in countries such as Pakistan, the energy has remained on the top of the agenda of loan negotiation with international donor agencies.

Energy serves as both a final consumption good and as an essential intermediate input in the production of goods. Thus any change in the price of energy at both these levels affects consumption as well as production and that, in turn, can cause changes in the prices of all other commodities. A change in the prices of exportables affects their demand in foreign markets and any change in the prices of import-competing and non-traded goods affects their demand at home. The net effects of all these changes can be measured in terms of the effects on real GDP, balance of trade, and government revenue. And, because any change in commodity prices exerts a negative impact on real consumption of households; the formulation of a comprehensive energy policy requires a framework that can take the immense complexity of the linkages of all the sectors of the economy into consideration. In the book under review, Dr Farzana Naqvi, argues that the issues of energy pricing can not be examined in isolation and presents a general equilibrium framework to address the complex issues related to energy, economy and equity.

The author has formulated a Computable General Equilibrium (CGE) model for Pakistan's economy (GE-PAK) which she uses to present a case study on energy pricing policy for the country. This is a multi-sectoral model of energy-economy interactions. The model examines the distortions in the energy sector and evaluates the effects of removing these distortions on economy. This model is built around a social accounting matrix (SAM) that contains a detailed input-output table and income-expenditure accounts of 4 types of institutions: households; government; corporations; and rest of the world. The analysis is based on 128 industries that produce 131 commodities, 53 consumption items, 2 types of labour categories, 5 types of land and 6 types of capital ownership, and 14 types of households in two types of region. An estimation of the welfare costs of taxes on energy products strengthens the analysis. The year 1983-84 has been chosen as the base year for the analysis of GE-PAK.

This book is divided into seven chapters and six appendices. Chapter 1 introduces the book. The conclusions of the research work reported in this book are presented in Chapter 7. A review of energy pricing policies in Pakistan since 1971 is given in Chapter 2. This chapter reports the estimates of explicit and implicit taxes on petroleum products, natural gas and electricity; and on energy prices for different types of consumer groups for the base year. Chapter 3 presents the review of literature on the issues of energy pricing in the general equilibrium framework conducted in Pakistan and other developing countries. Chapter 4 outlines the theoretical framework of the multi-sectoral CGE model for Pakistan's economy. This chapter is divided into 43 sections. The second section provides information model structure. In order to explain the dimension of GE-PAK model, the names of commodities, industries, consumption items, are grouped into eleven sets. A detailed description is reported in section 4.3. A diagrammatic presentation of the model's data base is given in section 4.4. Section 4.5 and Table B1 in Appendix B outline the notational system for the variables and parameter of the model. The GE-PAK model is divided into 30 blocks of equation. These blocks are listed in section 4.6. All the equations of GE-PAK model are reported in Appendix A and a detailed discussion on these 30 blocks is presented in sections 4.9 to 4.39. Among these, section 4.7 discusses the procedure of transforming an equation system given in levels into linear percentage change form. Table D1 in Appendix D contains the conversion formulae. Section 4.13 presents a discussion of the industry specific production structures that represent certain energy-factor and inter-fuel substitution possibilities. The rules to categorise the variables into exogenous and endogenous groups and lists the selected exogenous variables that gives a one plausible way to close the model are listed in section 4.40. A hypothetical interpretation of the model's results is given in section 4.41 and section 4.42 explains the solution procedure of the model. The computational aspects of the model with the help of GEMPACK (General Equilibrium Modelling Package) are outlined in section 4.43.

Chapter 5 discusses the data base for GE-PAK. In this regard SAM (1983-84) has been used. In order to develop the data base for Pakistan, nine changes has been made according to the model's specification by using supplementary data. This chapter also reports the parameters that are assigned externally estimated values, selected from various micro-level empirical studies.

Chapter 6 is the core chapter of the book. This chapter highlights three major distortions in the energy prices that arise due to source-, product- and user-discrimination. The effects of removing these distortions are presented through 21 simulations of five experiments by using GE-PAK, outlined in Chapter 4. The simulation results are presented in sections 6.3 to 6.10. These simulations are: the effects of removing source discrimination (import tax/subsidies) from four petroleum products; the effects of removing product-discrimination (uniform sales tax) on petroleum products; the cumulative effect of removing source- and product-discriminating tax rates on petroleum products; the effects of abolishing source- and product-discriminating

taxes on petroleum products; the effects of removing user-discriminating taxes on electricity sales; the effects of revenue-neutral reforms on user discriminating taxes on electricity; the effects of removing user discriminating taxes on natural gas sales; and the cumulative effects of revenue-neutral reforms in user-discriminating taxes on natural gas. The analysis focuses on the social equity effects of removing these distortions, along with the macro and micro economic affects of the reforms and provides a detailed information on the effects of exogenous shocks. The author has evaluated the effects of the reforms in energy prices on real GDP, the balance of trade, total real consumption, real consumption of households by income group and region, and sectoral output. The distributional effects of a policy shock are analysed by comparing changes in real per capita consumption of 14 types of households. The households are grouped by region, employment category and income group. The author found a drastic decline in government's revenue through indirect taxes when these distortions are removed. Therefore she computes the effect of revenue-neutral reforms for source- product- and user-discriminating taxes on energy products. In case of petroleum products, she noted that in order to maintain the level of indirect tax revenue, an increase of 0.09 percent is required in the power of indirect taxes on all commodities. This caused a rise in real GDP and offset the decline in the trade balance. However, a decline in the real per capita consumption of low-income groups has been noted. The removal of user discriminating taxes on electricity generated additional indirect tax revenue. In order to balance out the surplus, the power of indirect taxes on all commodities is declined by 0.05 percent. This caused an increase in real GDP and decline in the trade balance. A negative effect on the urban households of all income groups has been observed. Similarly, the elimination of user discriminating tax on natural gas caused a decline in the indirect tax revenue. This requires a uniform 0.08 percent increase in the power of taxes on all commodities in order to maintain the level of indirect tax revenue. The net effect is a negligible increase in real GDP, a decline in real private consumption and a decline in the real per capita income of all income groups except rural high-income group. An improvement in the trade balance is, however, observed.

Section 6.11 reports the elasticity of social welfare cost by increasing the tax rates on energy products. The author successfully demonstrated that the social welfare effects of imposing a tax on a commodity, without and with due consideration of the income distributional impacts, will be different. The analysis presented in sub-sections 6.11.2 and 6.11.3 enables the reader to compare the social welfare effects with and without distributional effects. This analysis provides a useful insight not only for the students and researchers but also for the policy-makers and planners who involve in energy pricing.

In recent years the General Equilibrium Modelling has received the attention of researchers wanting to examine the impact of macro policies on micro units. However, in Pakistan, this technique for evaluating policy issues is somewhat new. Evidence from other countries shows that it is a useful tool of examining the effect of a policy change

on the whole economy including households. This book is the first attempt in Pakistan that uses this extremely important technique to examine the burning issue of energy pricing policy. The construction of CGE model is useful for the students and teachers of economics as well as for the researchers. They can exercise the same model for other commodities. In this regard, the author has made some suggestions for future research in section 7.3. Such an exercises would, of course, help the planners and policy-makers in formulating and implementing such policies that would lead the economy towards the path of overall development based on equity and efficiency considerations.

The book could be an extremely useful tool for policy analysis in Pakistan. However, two minor caveats apply. The analysis is based on data that are now at least fifteen years old; and, the book is written in highly technical language that limits its audience only to those who can understand it. A summary of the book that briefly describes the background, methodology and presents findings in layman's language would have helped the non-technical readers also. Similarly re-estimating the model with more recent data would considerably increase the relevance of the results.

Hina Nazli

Pakistan Institute of Development Economics,
Islamabad.