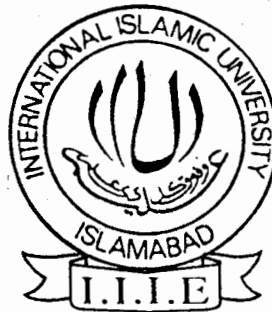


***Consequences and Prospects of Islamization
An Applied General Equilibrium Approach
with reference to Pakistan economy***

by

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Abstract

Pakistan is passing through a difficult phase of its history. Its economic performance has not been very encouraging during the past half a century. Phenomena like mass poverty, income inequalities, fiscal deficits and indebtedness have become its identification. The nation is detracted from its ideological course of action and embarked on socialist and capitalist models from time to time with changing perspectives. Every experiment proved to be a failure and terminated with new issues and additions to grievances of masses. The last ray of hope is embedded in restructuring of the social life according to the tenets of Islam.

The objective of this study is to demonstrate empirically, that Islamic injunctions, when carefully translated into public policies, are capable to solve the socioeconomic problems of the nation. The primary focus of research is to evaluate the implications of public policies destined to eliminate interest-based transactions and to enforce Zakah as the instrument of redistribution. The study adopts the computable, general equilibrium framework for the purpose and uses the fiscal year 1989-90 as the base for all the simulations and projections into the future.

The model is moderately disaggregated. The product market incorporates eighteen producer goods and ten consumer goods. The households are divided into four major groups according to their income level and consumption pattern. The model employs two primary factors, the labour and capital. The relevant data is derived from official sources. Parameters of the model are obtained partly from available literature and partly through calibration. The first simulation provides the replication check and serves as the benchmark equilibrium for further analysis.

In the first stage, the model is applied to evaluate various fiscal reforms. It is assumed that each option is targetted to eliminate the budget deficit in the short run. The comparative statics reveal that a fiscal policy-mix, that allows a 5% reduction in recurring expenditure, a 10% increase in commodity taxation and nearly 50% enhancement in direct taxes, can best solve the problem with minimum welfare costs.

In the second round, the model is used to study the impact of alternative policies on the dynamic performance of the economy. Four perspective plans have been proposed to facilitate comparison of the policies concerned in terms of selected micro and macro indicators. The 'status quo' refers to the scenario if the economy is allowed to operate for the specified period with all the conditions of the base-year intact. The 'semi-Islamic' set comprises two separate options, the first dealing with enforcement of 'Zakah only' and the second with 'profit sharing only'. The 'full-scale Islamic' plan annexes the two instruments to work simultaneously. All other conditions of the base year have to remain undisturbed.

It is shown that the 'full scale Islamic plan' ensures the best results within a moderate span of time as compared to maintaining the secular traditions or going through the semi-Islamic experimentation haphazardly. The empirical evidence so emerged prepares a strong case for Islamization of the economy and leaves no scope for skeptical reservations regarding the feasibility of the programme. It is however, beyond the scope of present study to provide the details of technical procedures and/or to advise on specific modes of operation of the system.

Preface

At the time we took admission in the Ph.D. programme of the International Islamic University, all the class mates were highly ambitious. Islamic Economics was a new but expanding discipline and we expected to do some thing extra ordinary in the field. Later on, it was revealed that research in social sciences and particularly in this field is not so easy.

I got some acquaintance with the general equilibrium modelling when a graduate course 'Development Planning' was offered by the School of Economics. My interest with the subject developed when I came across a thesis by Serra Puche (1979) and then studied a book by Shoven and Whalley (1992). However, when I expressed the idea of working on the topic, many a friends were of the opinion that the task was heavier and not suitable for individual research. I discussed the draft proposal with many teachers and colleagues. Dr. M. Fahim Khan¹ appreciated the idea and Dr. Sayyid Tahir² could see a faint light across the tunnel. Their positive response and kind attitude encouraged me to put hands in the matter.

There were difficulties in getting consistant data and in estimation of the parameters. However, the major problem was that of an appropriate computer package; and, I didn't know how to start the machine even. I tried to understand the algorithm with the help of the book referred to above and prepared the sketch of a miniature economy to work as experimental tool. Mr. Muqeemul Islam³ could catch my point and passed on the story in technical language to Mr. Shujaat Hussain⁴ who wrote the priliminary programme. The process of hit and trial continued for quite a long time and the things got improved. Gradually, I also learned to handle computer and do programming my self. Whenever I was caught in a problem, Mr. Shakil Shah Hashmi⁵ was there for rescue. In fact no body, associated with computics in this University, can afford to bypass his services. Mr. Sardar Hussain⁶ extended full cooperation in writing many equations on computer and drawing the figures. Mr. Ziaullah Niazi⁷ very kindly provided some of the relevant data otherwise not available in the University. Man is weak by nature and always dependent on his fellow beings. The cordial services of all the friends in this work are gratefully acknowledged. May Allah reward them for their well wishing.

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I am very much indebted to Dr. Sayyid Tahir, my teacher and the principal adviser in this work. He checked the heap of papers time and again despite time constraints. His directives proved to be useful in improving the quality of work and rendering it palatable. I am grateful to Dr. Eatezaz Ahmed⁸ and Dr. Salman Syed Ali⁹, the co-advisers, who gave their helpful suggestions in model formulation and data simulations respectively. Special thanks are due to my fast friends and colleagues, Dr. Nasim Shirazi¹⁰ and Mr. Arshad Mirza¹¹, who provided me with all the facilities at their disposal and kept on pushing me forward to complete the task, besides Mr. Mamoon Abbas Khan¹² who always encouraged me and used to relieve me of tension by his light humour.

Of course, I couldn't have achieved any thing without the blessings of Allah Almighty. My old parents always prayed for my success and my wife patiently shouldered the affairs of family during my long absence. They even didn't know as to what exactly I was doing here in Islamabad. My younger children used to enquire the class in which I was reading when they found books and papers in my bag. My friends and relatives anxiously waited for the outcome, they were ambitious in the beginning but disappointed later on as the matter prolonged. May Allah reward them all for their sincerity and patience.

I was obstinate enough to pull along in this age, with my home near Mardan, my service there at Kohat and my studies here at Islamabad. I could work only during vacation in the college and my friends used to welcome me in the University as a 'visiting student'. Although the first draft was complete by August 1998, yet it couldn't see the final shape until now on account of my weakness and time limitations. I owe the responsibility for all the shortcomings and welcome healthy critiques from the readers. May Allah accept our good efforts and render them beneficial for the Muslim Ummah, and pardon us for our mistakes and blunders. I dedicate this work to all those who strive for the cause of Islam.

Islamabad,
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¹³ The author is particularly grateful to Dr. M. Aslam Chaudhary, Associate Professor, Quaid-e-Azam University, Islamabad, who spared his precious time and conducted the viva-voce examination on behalf of the external examiner.

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CHAPTER 1

INTRODUCTION

The present study aims to evaluate the economic implications of Islamization in a General Equilibrium context. The motivation behind this attempt and the rationale of selecting the particular tool of analysis for research is unveiled if one looks curiously into the prevailing economic situation in the country. Pakistan came into existence on August 14th, 1947 as the largest Muslim State. This was preceded by a century long history of tiresome struggle and record sacrifices of lives and property by the Muslims of the subcontinent since the war for Independence fought against the British rule in 1857. By the Grace of Allah, the nation has completed half a century of its survival and celebrating its Golden Jubilee these days¹. People at all levels are reviewing, criticizing and offering their comments, from different angles and on different aspects, about the failures and achievements of the nation over the past fifty years. There are both optimistic and pessimistic assessments about the past performance and future prospects of the nation. However, there seems consensus on a few points. For instance, the country called 'Pakistan' today is surely not that one founded in 1947, so far as its ideological and geographical frontiers are concerned. The successive rulers not only failed to build the nation according to its basic ideology² but also lost the Eastern Wing within 25 years. The vicious clouds of political instability and scarcity of sincere leadership most often stretched over the fortunes of the poor country. The very cause behind the struggle for an independent state for Muslims of the sub-continent has gone behind the screen. A number of socio-economic hardships have emerged over time which the poor masses have to suffer. Besides the heavy burden of foreign debt, poverty and inequalities, the nation faces severe issues like corruption, sectarian violence, lawlessness, drug trafficking, default and bankruptcy.

¹ We started writing these lines in August 1997.

² Please see the appendix to this chapter for a brief note on the ideology of Pakistan.

1.1 The Economic Scenario

The nation took a start with a meager, if not altogether empty, basket of resources. These resources were not in any way sufficient in the face of the Herculean task of building up an infrastructure for a newly born nation. During the past half a century, a viable economic base that should cater to the needs of its growing population and enable it to compete in the international markets could not, unfortunately, be developed despite massive investment in all sectors. Of course, there is respectable progress in sectors like textile manufacturing, ship building, communications and production of nuclear arsenals. Anyhow, the country is lagging far behind many developing nations on the economic front. The nation generally lacks exportable surplus, except an unskilled labour force, some primary goods and quite a few processed commodities. The agriculture sector is sluggish despite the fact that it is the backbone of the economy. The country has to rely heavily on imports for consumption, investment and defence needs that leads to a persistent deficit in the balance of trade. The domestic currency is constantly under pressure and losing its exchange value continuously. The tax collection machinery has always been inefficient and the fiscal executives have not been upright in carrying out the sacred trust imposed in them. All the governments of past and present, whether democratic or authoritative, have followed the routine of borrowing, money creation and indirect taxation to fill the budgetary gaps. As a result, high inflation and mass unemployment have become the order of the day. The lower income groups are particularly hurt and they find no rescue in front of the general price hike running like an unbridled beast. The nation as a whole is now trapped in an extremely difficult and explosive situation. The most serious cause of worry is the large debt burden accumulated overtime due to excessive borrowing to accommodate persistent deficits in the balance of payments and fiscal budgets. Total debt, disbursed and outstanding, is estimated to exceed 50 billion dollars by June 1998, which is nearly 90% of our GDP. (Per capita debt burden is estimated to Rs. 18000/-). The country needs at least \$ 4 billion just for debt servicing. The matter has aggravated to the extent that it is threatening the national

sovereignty. The IMF, World Bank and international donor agencies are imposing their own conditionalities in response to requests for rescheduling the existing obligations and sanctioning fresh loans³. The political leadership is making appeals for donations to retire the debts somehow. The debt liabilities have reached to a point that now they are unserviceable and unsustainable. The problem needs immediate attention with sincere and passionate efforts to put off the burden somehow⁴.

The process of economic decay accelerated particularly after Dec.1971 war when the country was bifurcated. Prior to 1970, there used to be some surplus on the revenue account of the annual budget which could be appropriated towards the capital account and the rest of the public sector development programme (PSDP) financed through borrowing. Today the picture is different. Debt servicing occupies the top position in the federal budget and engulfing every thing else. Next comes the expenditure on defence, which is a matter of life and death for the nation, and can not be reduced in any case. The government is bound to borrow even to finance its current expenditure and nothing is left out of domestic resources for the social sector

³ State Bank of Pakistan, in its annual report 1996-97 depicts the following position:

Total debt	Rs. 2240.1 billion	.... (89.5% of GDP)
Domestic	1041.8	
External	1198.3	....(\$ 29.617 billion)
Total debt servicing	254.8	.... (65.6% of total revenues)
Interest payment	150.2	
On domestic debt	120.4	
On foreign	29.8	
Repayment of principal	104.6	

It further notes: Pakistan debt servicing liability has increased in recent years both as a result of large accumulation of external debt and decline in the share of concessional loans along with increasing recourse to short/medium term borrowing from the internal market.

⁴ The editorial remarks by Prof. Khurshid Ahmad - Tarjaman-al-Quran vol 125 No. 1 May, 98 are noteworthy: The greatest burden on the economy is the curse of debt accumulated and compounded overtime due to interest based transactions. The responsibility rests with the secular leadership of the nation which considered debt finance as the only guarantee of growth and prosperity. In the final analysis, this behaviour not only destroyed the domestic economy but has led to the present grave situation of bankruptcy and loss of political and economic freedom as well as sovereignty of policy making. Today, we are merely puppets in the hands of our foreign masters and international agencies and the nation is trapped in a whirlpool of which there seems no rescue.

development. As such, not only the volume of PSDP has shrunk in real terms and in view of the needs of growing population, but it depends solely on the availability of aids and grants from donor agencies. The outcome is clear. Pakistan ranks very low among the developing countries so far as the social sector is concerned⁵.

The basic statistics reveal another story on the socio-economic side. Nearly one third of the population in Pakistan is living below the poverty line and is deprived of the basic necessities of survival⁶. The distribution of income is getting more and more skewed as compared to the decade of sixties⁷. The elite class (comprising landlords, industrialists, traders, high ranking officials and smugglers) behaves as parasite. It remains indulged in tax evasion practices, rent seeking, luxurious living and transfer of wealth abroad. On the other hand, the poor and middle income groups are screaming beneath the ever growing burden of inflationary taxes while striving for their sustenance. Today Pakistan depicts a portrait of dualistic society. One can pinpoint a few big cities with industry and business, magnificent buildings, better facilities of travelling, health, education etc. among the wilderness of rural areas scattered haphazardly through the length and breadth of the country and deprived of such facilities. The remarks by *Economist* (June 1998), while commenting on the problems and conflicts of Pakistan, that " it is a poor country with plenty of rich people" fit the scene truly.

⁵ Please refer to Social Development in Pakistan, Annual Review 1999, pp 16.

⁶ The miserable condition of life can be judged from various social indicators. Life expectancy at birth is 61.5 years and infant mortality rate is more than 12% due to malnutrition. The daily calorie intake per capita is 2316. Population having access to health services is 55%, to safe water 68%, to sanitation facilities 38%. The adult literacy rate is 35.7% by the bare minimum definition. Pakistan ranks among the countries with low human development index. Obviously, the statistics pertain to overall population and the condition of rural population is far miserable. (Ref: Human development Report 1995, UNDP - Oxford University Press).

⁷ The share of bottom 20% of population in the national income has reduced from 8.4% in 1971-72 to 6.2% in 1992-93 whereas that of top 20% has increased from 41.5% to 48.2% during this period. About 40% of the cultivated land is held by 6000 landlords out of a population of 140 million. Likewise nearly 90% of 'revealed' nominal wealth, in terms of deposits held with Pakistani banks by June 1997 and exceeding Rs one million, belongs to 50,000 individuals only.

1.2 The Problem Defined

It may be evident from the above that the prevailing situation is the result of mal-governance and inadequate planning in the past⁸. The socioeconomic problems are tightly interwoven and mutually reinforcing. However, two darkest spots are readily identified on the scenario which occupy the central positions, one at the surface and the other at some depth. The outstanding debt problem, although as old as the country itself, has surfaced only recently when it began to pose constraints on the system from the mid eighties onwards. There is a general public consensus that blind reliance on interest-based borrowing and misappropriation of funds by the corrupt management are the root causes of this situation. The second problem of mass poverty is old and persistent and has been the focus of public discussion since the late sixties⁹. The inherited system of ownership (of land and productive assets) coupled with the inequitable system of distribution (of income and means of livelihood) is certainly at the root of the problem.

The third world countries, including Pakistan, who got independence from colonial rules after the second world war, launched elaborate welfare programmes in terms of medium and perspective planning under the auspices of the United Nations. However the emphasis continued to shift with changing scenarios. The planning practice in Pakistan can be analyzed in this perspective. For instance, the UNO declared the 'sixties' as the decade of growth in the national produce¹⁰. It was assumed that an increase in the output will have spread over and trickle down effects on the societies through creation of employment, increase in incomes and demand and

⁸ Please refer to Human Development in South Asia - Report 1997, HDC, Islamabad.

⁹ The Pakistan Peoples Party led by Mr. Z.A. Bhutto, won the general election of 1970 in the Western Wing by attracting masses with the slogan of providing basic needs (Food, Clothing and Shelter).

¹⁰ Please refer to Gerald M. Meir (1984) -Leading Issues in Economic Development, Fourth Edition, Oxford university Press.

eventually raising the living standard of the masses¹¹. Although the national produce more than doubled by the end of second plan (1960-65) in Pakistan and the per capita income increased considerably despite increase in population, the state of income inequalities worsened. The emphasis then shifted to a strategy of growth with distribution during the 'seventies'. The planners believed that the goal could be achieved through active fiscal management and a leading role for the public sector¹². Unfortunately, the strategy resulted into slowing down of the pace of growth and private investment. The gulf of income disparities further widened and issues like inefficiency and corruption in the administration emerged. After the mid 'eighties' the focus has shifted to poverty reduction through provision of basic needs and facilities of education, health, drinking water, sanitation etc¹³. The entire planning period in Pakistan recorded too much reliance on borrowing, large fiscal deficits and monetary expansion. We survive today with heavy burden of debt on our shoulders and stand among the low income nations of the world community.

11 Ample facilities of aid and loans at concessional rates were provided by international agencies and consortia of donor countries to speed up industrialization and investment in infrastructure. Likewise considerable incentives in terms of taxation, import licenses and credit were offered to the private sector during the 2nd Five years plan.

12 This was the era of nationalization and public management of key industries, strict price controls, state intervention in the market mechanism and land reforms. As a result, the private sector was crowded out and depressed and it paved its way through investment in real assets, drug trafficking and seeking avenues abroad. On the other hand, the public sector was overburdened and assigned with the task of business for which it had no experience.

13 This is now the era of privatization and minimization of the role of the public sector to the extent that the government is preparing to shed off even the basic responsibility of providing mass education and health facilities to the society. Throughout the planning practice in Pakistan during the four decades, the goal of reduction in population growth remained the top priority. Billions were allocated for the purpose, but the outcome is fruitless.

1.3 The Solution Proposed

The nation has lost its destination after having been exposed to much experimentation and wandering on capitalist and socialist (or mixed) models of growth and prosperity during the past half a century. A genuine alternative, which is unique in character but naive in practice, is the solution proposed by Islam. It requires restructuring of the entire socioeconomic and political system according to injunctions of Islam. It is not only consistent with the ideology of Pakistan but also prescribed by Muslim intelligentsia right from the very beginning and supported by strong public demands¹⁴ from time to time. This option carries the a ray of hope for the nation that remains to be enlightened. However, the secular leadership has always been reluctant to try this option. It is regretted and ignored on the plea that a full scale operating model does not exist (to be copied) and that such a system will not be viable in the present day complicated socioeconomic setup or that the ground is not yet ready for its trial. Although the constitution of the country binds the rulers to adopt and enforce the norms of *Shariah* in every aspect of social life, not much has been done so far except lip service or introduction of a few incomplete reforms in the financial sector and distribution side¹⁵. Had even these limited reforms been seriously followed in letter and spirit, the outcome would have been certainly positive.

The teachings of *Quran and Sunnah* emphasize the concept of *Al-Adle wa Al-Ehsan*. This implies keeping of a balance and equilibrium between rights and responsibilities on the one hand and promotion of an attitude of kindness and benevolence towards the human beings on the other. The first goal may be translated in modern economic terminology to assume the form of an efficient allocation of resources through a just price mechanism while the second goal may be materialized

¹⁴ For a brief account of the struggle for an Islamic order, please see the appendix to this chapter.

¹⁵ Here we refer to the introduction of PLS system in the commercial banking and enforcement of Zakah and Usher in Pakistan in 1980"s through Martial Law ordinances which were protected later on by the 8th amendment in the constitution.

through an equitable distribution of resources and alleviation of mass poverty. At the same time, the Islamic injunctions unequivocally condemn *Az-Zulm wa Al-Udwan*, which requires the prevention and eradication of oppression, transgression and cruelty from the society.

Islam discourages the concentration of wealth in a few hands since it eventually leads to formation of monopolies, weakening of the competitive market forces, deprivation of the masses, social injustice, political unrest and ultimately nothing but conflicts and anarchy. This fact has been witnessed by modern economies based on the philosophy of capitalism during the 20th century. The Great Depression of the 1930's and subsequent trade cycles, inflation and unemployment in the Western world; and the eventual collapse of the socioeconomic pyramid based on philosophy of communism after a long and forced trial in the Eastern Block; may be quoted in example¹⁶. In contrast, the evil was recognized by Islam centuries earlier and remedies prescribed. Perhaps the institution of interest plays the pivotal role in extracting the economic power, otherwise meant for circulation, and dumping it within a narrow circle. That is why Islam strictly prohibits interest based transactions to eradicate the evil from the very root. On the positive side, it ordains Zakah to redistribute the resources should these get condensed above a tolerable limit.

¹⁶ Dr. Umar Chapra in his book "Towards a just monetary system"- The Islamic Foundation, Leicester, U.K. (1985)- gives two quotations from eminent statesmen:

"The world economy has entered a phase of extraordinary instability and its future course is absolutely uncertain".. by Helmut Schmidt.

" No previous theory seems capable of explaining the current crises of the world economy"... by Henry Kissinger.

He points to a few problems like high inflation, unemployment, recession, extreme poverty amidst plenty, socio-economic injustice, large budget deficits and increasing debts etc and notes:

" The persistence of these problems and their gravity indicates that there is some thing basically wrong some where. But what is it that is wrong? The mistake which is commonly committed is that the source of crises is sought in symptoms. The remedies adopted, like analgesics, ease the crises only temporarily; after some time the crises reappear, deeper and more serious".

No social system can function properly without the support of the coercive power of the State. At least two areas in the economic sphere of life have been recognized by Jurists and Islamic economists where public policy is relevant and direct state intervention is mandatory; namely the abolition of the institution of interest (*Riba*) and the implementation of the redistributive system (*Zakah*)¹⁷. In other words, the abolition of interest and enforcement of *Zakah* can be considered as the backbone of the monetary and fiscal policies of an Islamic State. Therefore, an economic construct erected on these lines will exhibit an "Islamic character"¹⁸ clearly distinguished from other systems. This doesn't imply that responsibilities of the state to Islamize the economy are limited to these pairs of policies only. In fact, there are other areas where public policies are relevant and socially desirable, if not mandatory.

1.4 Objectives and Rationale of the Study

The Islamization of the economy implies an effective switch-over from the conventional modes of operation to a policy regime guided by Islamic principles. However, political zeal and loyalty to the cause of Islam are the necessary conditions for its success. Keeping in view the following facts about the socio-economic and political conditions prevailing in Pakistan, the initiation and promotion of such a 'Programme' is the need of the time :

1. The existing financial transaction mechanism in the economy is largely based on interest and stands in contrast to the provisions of Shariah. Likewise, the taxation structure of the country is devoid of a welfare package to eliminate or reduce abject poverty as required by Shariah.
2. The State is constitutionally obliged to abolish any existing law or to abandon any prevailing practice that contradicts the injunctions of Shariah.

¹⁷ Ziauddin Ahmed et al (ed)- Money and Banking in Islam-(1983) remark that social justice is the hall-mark of the Islamic economic system and abolition of interest and establishment of *Zakah* system are to be seen as two major institutional devices to establish a just social order. Islam seeks to promote the virtues of *Adle* and *Ihsan* among its followers and any society which is permeated by these qualities would need a minimum of state intervention to establish a just social and economic order.

¹⁸ Please see the appendix for a brief overview on the characteristics of an Islamic economy.

3. The present (PML) government enjoys effective mandatory power to formulate and implement appropriate fiscal, monetary and administrative policies in order to launch the economy on the tracks illuminated by Islam.
4. An overwhelming majority of the citizens have strong emotional affiliation to the religion. The general public can be expected to extend full cooperation to the Islamization programme.

As discussed above, there is consensus among the Muslim jurists that abolition of interest and enforcement of Zakah are among the prime duties of an Islamic state. As such, the Islamization programme requires a switch over to alternative modes of financing permissible in Shariah and formulation of an economy-wide welfare package for the rescue of poor and destitute. In order to conform to the requirements of Shariah, it is necessary to bring about a fundamental change in the existing legal framework, monetary and fiscal structure and in the administrative set up so as to ensure effective implementation.

The present study aims at evaluating the impacts of Islamization schedule leading to the elimination of interest from financial transactions and enforcement of Zakah as an instrument of redistribution. However, it is beyond the scope of this study to respond to the socio-political questions as how to devise and implement the policies concerned and what institutional changes and administrative actions will be required per se. In fact, sufficient explanation has been offered by the economists and jurists in this regard¹⁹. In short, we simply focus on the implications of the public policies formulated to achieve the goal and not on their mode of operation.

The explicit objective of this study is to evaluate the impact of relevant changes in the monetary and fiscal policies in terms of selected socio-economic indicators such as GDP growth, efficiency and welfare, fiscal stability, income inequality and extent of poverty etc. In particular, we prefer to adopt a comparative approach to study the implications of the prevailing and proposed policies so as to demonstrate the difference and to facilitate comparisons in numerical terms. The implicit objective is

¹⁹ Please refer to the CII reports on introduction of PLS system in banking (1980) and to Zakah & Usher ordinance of the Govt. of Pakistan (1979-80).

to test the hypotheses held by certain quarters that elimination of interest is not an economically viable policy and that the introduction of Zakah as a fiscal instrument is inimical to economic growth.

An ordinary Muslim may claim, on the basis of his/her beliefs and motivations, that a socioeconomic construct founded on the eternal principles of Islam will be superior to all other man-devised systems. As a corollary, it may be argued for example, that the elimination of interest and enforcement of Zakah will bear far reaching and positive impacts on resource allocation, income distribution, stability and growth. In the absence of any real economy model, however, such claims can be supported only intuitively, by explaining the working of the system and drawing the logical conclusions. A lot of valuable theoretical work in Islamic economics has emerged so far to show the superiority of the economic doctrine of Islam²⁰. Anyhow, there is want of research in Islamic economics on the empirical side. Empirical testing constitutes the core of modern research and no theory can claim validity unless it withstands the realities of facts and figures. Unfortunately, there seems no scope for econometric investigation to verify the validity of claims put forward in favour of Islamic economic planning; and without empirical support, such hypotheses may be liable to outright rejection or at least confronted to serious skepticism.

One way out of this impasse is to utilize the Computable General Equilibrium (CGE) framework and to analyze the numerical forecasts, in case the economy is supposed to switch over from a regime of secular traditions to one guided by Islamic injunctions. No serious effort, according to our information, has been made so far on these lines. Of course, one can find valuable examples of empirical work in the Islamic economic literature, however the efforts are directed towards specific issues and confined to partial equilibrium analyses²¹. The present study intends to fill the gap by using the CGE framework and focussing on all important features of real economy. In case we succeed in demonstrating that an Islamic model is more efficient and

²⁰ We discuss some of the theoretical work in the next chapter.

²¹ Reference is invited to the work of Shirazi et al discussed in the next chapter.

equitable viz-a-viz the secular models, while keeping along the mainstream economics mode of reasoning, the exercise will contribute some thing positive to the Islamic Economic paradigm.

1.5 Methodology and Scope

The CGE framework seems to be an appropriate tool of analysis for the task we intend to carry out. As already mentioned, none of the existing Muslim-World economies can claim to be organized according to the norms of Shariah and therefore, the application of an econometric framework is out of question²². However no analytical framework devised so far is free from limitations and the CGE tool is no exception. It assumes a competitive market mechanism, relies heavily on micro consistent data set for all sectors and adopts the calibration procedure for most of the parameters. Naturally, the assumptions, data set and procedures of a model using this framework, like the others, are always open to criticism.

To comply with the CGE procedures, a comprehensive model is specified to capture the behaviour of economic agents at various sectors of the economy. The present is linked to the future through saving/investment decisions. The model is fitted to a single year's observed micro-consistent data-set after searching for the parameters to obtain the benchmark. If the system is left to work with existing policies for a certain period, the factual equilibrium or forecast values of the target economic variables are obtained. In the second round, the model can be confronted to parametric changes compatible with policy objectives. The model projects the counterfactual equilibrium values for the same variables under different scenarios. The results of simulations can then be compared and policy conclusions derived.

We intend to introduce only two parametric changes in the basic model on the

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To quote Shoven and Whalley (1992) " The Applied (Walrasian) General Equilibrium models provide an ideal framework for appraising the effects of policy changes on resource allocation and income distribution; policy impacts not well covered by empirical macro models, as well as to provide fresh insights in long standing policy controversies"

distribution side of the economy to attain the objectives. In the first case, Zakah at a constant proportional rate will be incorporated in the wealth portfolio of the households along with a redistribution scheme for low income groups. In the second case, the total return to capital stock / investment will be divided among the households in proportion to their respective shares in investment / capital ownership. This mechanism has to replace the prevailing system of distribution in which the majority of households get their pie according to a fixed minimal rate of interest on their tiny savings and the rest of excess value or the lion's share is appropriated by the owners of business. These changes will enable us to see the implications of the Islamic system and to compare it against that currently in operation.

Hopefully this numerical exercise may prove beneficial to the students of Islamic economics, provide guidelines to the professional economists, open avenues for further research in the area and provoke interest within the policy makers for an operational Islamic economic system. The general reader and specifically those who believe in the Ideology of Pakistan may find it interesting.

1.6 Organization and Layout

Chapter-2 provides a review of the relevant literature. Chapter-3 outlines the basic structure of the model that claims to portray the prevailing shape of the economy. Chapters-4,5 are devoted to matters relating to data and Chapter-6 discusses the model parameters. In chapter-7, discusses the algorithm and strategy of computation and deal with the benchmark equilibrium obtained as replication check. Chapter-8 is meant for an appraisal of various fiscal options in a static framework, each targetted at eliminating the fiscal deficits in the short-run. Chapter-9 occupies the central position in this work. It provides simulations and the results of the Islamization programme in a dynamic framework. Chapter-10 is reserved for conclusions and policy recommendations. Each chapter is supported by appendices and annexures, where necessary. At the end we provide important references.

Appendix

1.1 The Ideology of Pakistan

The concept of an independent homeland for the Muslim of the subcontinent, where they could have freedom to organize their style of living and to frame the social structure according to their beliefs, values and traditions, was first put forward by Dr. Muhammad Iqbal in his presidential address to the annual meeting of the Muslim League held at Allahabad in November 1930. He was very clear in realizing that implementation of Shariah and its evolution could be possible only in a sovereign state and hence the need for it¹⁹.

The struggle for independence on the basis of two-nation theory got momentum under the versatile leadership of Quaid-e-Azam Muhammad Ali Jinnah and the destination became clearer when a resolution was unanimously passed on 23rd March, 1940 in the All India Muslim League convention held at Lahore. The major demand was that India be split into Muslim and Hindu states based on the majority of population. The Lahore resolution gained popularity under the title of Pakistan Resolution afterwards, although the name 'Pakistan' was proposed by Ch. Rahmat Ali in 1933. The Muslim of the subcontinent, united under the flag of Muslim League pressed hard on the demand. The popular slogan in the public congregations, meetings, processions and demonstrations during the forties was, that Pakistan meant- A Land of Islam (Pakistan ka matlab kiya- La Elaha Ellallah). Thus the rationale underlying the demand for a separate homeland was to build the society according to the teachings of Islam. Quaide-e-Azam Muhammad Ali Jinnah, the first Governor General of Pakistan expressed these feelings time and again in his public addresses

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In a letter to Mr. M.A. Jinnah dated 28th May, 1937, he addressed the economic problems of the Muslim by writing that " Happily there is a solution in the enforcement of the Law of Islam and its further development in the light of modern ideas. I have come to the conclusion that if this system of law is properly understood and applied, at least the right to subsistence is secured to every body. But the enforcement and development of the Shariah of Islam is impossible in this country without a free state or states". Ref: Towards Pakistan- by Dr. Waheeduz Zaman, Publishers United Lahore, March 1956.

before and after independence²⁰. Unfortunately he passed away very soon (Sep 1948) and found no chance to visualize the dream of an Islamic, democratic and prosperous Pakistan being materialized. The reins of the nation then gradually came within the grips of powers which planned to detract it from its very ideology with the passage of time.

1.2 Movements for an Islamic Order

Through out the past half a century, the general public exhibited a strong affiliation with the cause of Islam and remained conscious of the sacrifices offered for this country. The religious leaders (*Ulema*) in particular, played a very important role in this regards. Soon after independence, the government adopted the All India Act 1935 as a stop-gap arrangement before the formulation of an acceptable constitution. Under a heavy pressure developed through the public demand for an Islamic Order, the Constituent Assembly had to adopt a preliminary framework, now called the Objectives Resolution, on 16th March, 1949. This was a major achievement since it rightly pinpointed the very goals and targets that ought to be achieved; and provided the guideline principles for the constitution of an Islamic Republic. Unfortunately, no further steps were taken at the state level to reap the benefits of the said breakthrough. Neither necessary preparatory workshops were arranged to welcome a fundamental switch-over nor administrative and legal policy actions were initiated afterwards to materialize the expected transition. Resultantly, the document proved not more than a sacred piece of paper to serve as preamble for the constitutions

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For instance, while addressing the Sarhad Muslim League meeting held at Peshawar in Nov 1945, he said: " The Muslim of India demand Pakistan where they should rule according to their own code of life, values, law and civilization". Similarly while addressing government officials in Oct 1947, he said: "We had the objective of creating a country where we could live like free men, which could flourish according to our civilization and where the Islamic concept of social justice would develop properly". At another occasion while inaugurating the State Bank of Pakistan in July 1948, he said: "We must work our destiny in our own way and present to the world an economic system based on the true Islamic concepts of equality of man and social justice. We will thereby be fulfilling our mission as Muslim and giving the humanity the message of peace which alone can save it and would secure the welfare, happiness and prosperity". Ref: *ibid*.

framed thereafter²¹. Only recently it has been made part of the 1973 constitution through the 8th amendment.

In response to the invitation from the government asking suggestions for the constitution, the top-most thirty one *Ulema*, from all schools of religious thought, held a three days conference at Karachi in Jan 1951 and formulated unanimously twenty two points / principles upon which the structure of a modern Islamic State could be erected. These points were later on incorporated in the "directive principles" of state policy alongwith a 'repugnancy clause' stating that no law shall be passed by the parliament repugnant to the injunctions of Islam.

The weakening of Muslim League as a driving force and the dominance of drawing room politics, manipulated by a gang of bureaucrats, confronted the nation to political instability. The most urgent task was held in abeyance which lingered on till 1956 when the first constitution was promulgated. The 1956 constitution provided for a parliamentary form of the government and a federal structure composed of two units; East and West Pakistan. Many Islamic principles were incorporated in the constitution and this was the green signal to the right direction. Unfortunately the imposition of Martial law in October 1958 closed this chapter and the future of Islam and democracy had to remain dark in the years to come.

A new constitution was imposed in June 1962 which provided for a presidential form of the government erected on the foundations of 'basic democracy' or Indirect representation. Although the fundamental rights were given protection, however, the president was empowered to declare emergency in eve of external aggression and/or internal disturbance. It also contained a repugnancy clause referred to above, however no modification in prevailing laws could be noticed during the entire ten years

²¹ Maulana Syed Abul Aala Mawdudi in a statement dated 23rd July, 1950 remarked: "In fact the adoption of it (Objectives Resolution) resembled a strange rainfall; before which no clouds spread over the horizons and after which no greenery appeared on the barren lands".Ref. Weekly Aain dated 31st March, 1967.

regime²². On the other hand, the government willfully tried to take the nation farther from its destination. The 1962 constitution later on came to be known as a constitution of one man, promulgated by one man, and perhaps designed for one man to remain in power, in accordance with the theory of controlled democracy.

The nation saw an era of acute instability and crisis during the late sixties and early seventies. During this period, two wars were inflicted by India and the country was split into two on 16th Dec 1971. The former East Pakistan was separated as Bangladesh and the leadership in the Western wing claimed that the remainder was the true and new Pakistan. Martial Law, in military and civilian garments, continued from 1969 till 1973. A new constitution was promulgated on 23rd March 1973, with a parliamentary form of government. However, the leadership neither paid any attention to the constitutional rights of the masses nor showed seriousness towards enforcement of the Law of Shariah²³. A strong agitation started in reaction to the rigging in the general elections of 1977 under the leadership of combined opposition, the Pakistan National Alliance (PNA), which gradually took the shape of a grand movement for an Islamic Order- *Tehrik Nizam-e-Mustafa*. The drop scene was however, the imposition of third Martial Law on July 5, 1977. Much has been spoken and written for and against the military intervention and the matter has also been tried in the courts. However, apart from the moral and constitutional legitimacy of the longest martial law regime, many positive steps were taken towards the establishment of an Islamic order during that period²⁴. From 1985 to-date, the nation is in the grips

²² An (Advisory) Council of Islamic Ideology' was set up in 1962 with the task of going through the entire code of law and to make recommendations to the government in case some thing was found repugnant to Islam. The government was however, not bound to accept all such an advice.

²³ The only noteworthy reform during Z.A. Bhutto regime in this regards is the constitutional amendment of 1974 declaring the 'Ahmadi' section as non Muslim in response to the country wide movement for that end.

²⁴ These include, for example, the introduction of PLS system in financial transactions, enforcement of Zakah & Usher and Hudud ordinances, establishment of Shariah court as well as Shariah bench in the Supreme court etc., besides restoration of democracy in 1985. Initially promulgated through Martial law ordinances, these

of political instability, lawlessness, terrorism and so on and so forth. Many governments came into power and left office as a result of mid-term elections. There is much disturbance and havoc beneath the seemingly smooth and quite surface. People are tired of the dirty politics that uses the caption of Islam to fulfill its own designs²⁵.

1.3 Characteristics of an Islamic Economy

Islam is not merely a religion in the narrow literal sense of the word i.e. a bunch of beliefs plus a few manners of worshipping. Likewise it is not merely a compendium of moral and spiritual teachings. Rather it is a complete code of life - a full fledged social system devised for the entire humanity that addresses every aspect of this worldly life. Man is eventually held responsible for his deeds before his Lord on the Day of Judgement. The basic aim of Islam is to propagate the good values of life (*Maaruf*) and restrict the evils (*Munkar*) in the society. The complete legal code, derived from the directives and principles of the *Quran* and *Sunnah* is the *Islamic Shariah* that comprises the details of what to do and what not to do (*Al-Awamer wa An-Nawahil*). It draws up a clear line of demarcation between the lawful (*Halal*) and the unlawful (*Haram*) for all walks of human life. An Islamic State is supposed to implement the ordains (*Ahkam*) of Shariah in letter and spirit through its coercive power and also to prevent its violation by imposing penalties as well as declaration of

reforms were given constitutional protection through the Eighth amendment. However the leadership couldn't pay due attention to necessary reformation of the administrative machinery and restructuring of the institutions concerned due to its involvement in the internal disturbance and external crises on account of Afghan war so that the expected results couldn't be materialized.

²⁵ The Federal Shariah Court, gave a landmark judgement on Riba on 14th Nov 1991 and set the deadline of 30th June 1992 for the government by which the task of elimination of Riba from the economy was to be completed. The government approached the Supreme court for a judicial review of the case and succeeded in getting a stay order till the final verdict. The issues were raised about most of the settled phenomena like the definition of Riba, the permissibility of indexation of loans for inflation, the status of existing loan contracts, Riba-free options for a modern banking and the strategy for transition to a Riba-free economy. The matter is still pending final decision.

sacred war (*Jihad*) by adopting all the possible means including the use of force against the evils. It is obligated to devise ways and means and to lay down rules and regulations for the materialization of the objectives and requirements of Shariah.

The social system prescribed by Islam stands for the preservation of the five foundations of good individual and social life, namely religion (*Iman*), life (*Nafs*), mind (*Aql*), offspring (*Nasl*) and wealth (*Ma'Il*). As expounded by Al-Ghazali and Al-Shatibi²⁶, the social utilities, required for the achievement of this goal, may be divided into three categories; the necessities, the conveniences and the refinements. The Islamic system not only pursues the individual to struggle for the attainment of these utilities within the boundaries set by Shariah, but also obliges the society in general and the State in particular to ensure equal opportunities for all and provide full moral support and legal protection to the individuals in this regards. Islam prescribes an economic system that makes it absolutely imperative to use the God-given resources for fulfilling the essential needs of the society at large and providing the citizen with decent living conditions. Islam stands for the attainment and maintenance of (*Al-Adle wa Al-Ehsan*) which means keeping of a balance and equilibrium between rights and responsibilities as well as promotion of kindness and well being in human relations. Similarly it stands for the prevention and eradication of cruelty and oppression (*Az-Zulm wa Al-Udwan*) from the society.

Islam emphasize human freedom to be maintained at any cost. There should be harmony between the moral and material growth rather than a trade-off. The process of growth and development should proceed in an atmosphere of mutual cooperation and coordination, albeit with fruitful competition among various parties, but to avoid class conflict and transgression over the right of others. To achieve these targets, the system devises the governing principles upon which the whole structure is to be founded. These include the right of private ownership, striving for livelihood within permissible limits, moderation in spending, recognition of social rights on individual

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Referred to by Anas Zarqa(1981)- Islamic Economics: An approach to human welfare- in K.Ahmed (Ed) Studies in Islamic Economics, The Islamic Foundation, Leicester, U.K.

property and a just distribution of resources. It also prescribes certain strategies for the purpose and suggests positive as well as prohibitive measures to attain the goal of social justice. These include, for instance, the law of inheritance, a well established system of Zakah & Infaq, promotion of healthy business; and abolition of the institution of interest, prohibition of the socially undesirable and harmful activities like gambling, speculation, hoarding, black marketing, adulteration, deceitful dealings, bribery and embezzlement, trade of intoxicants, propagation of obscenity and other malpractices etc. All these measures are provided with full legal protection²⁷.

Interest (*Riba*)²⁸, which is defined as the fixed rate of return on lending against a known period of time; without taking into consideration the elements of risk and uncertainty otherwise embodied in trade and investment, is of course the worst form of economic exploitation and transgression over the rights of other fellow beings. It is therefore strictly prohibited by Shariah, in words used in the *Holy Book*; otherwise unparalleled in caution and severity²⁹. On the other hand caring for the worldly needs

²⁷ For a good coverage, see S.A. Mauwdudi- The Economics of Islam (in Urdu) edited by K. Ahmed (1969)- The Islamic Publications Limited, Lahore.

²⁸ The literal meaning of Riba, in Arabic language, is excess. In the technical terminology, used by Fuqaha, it is the excess stipulated in one of the two counter values in a transaction of exchange (Bay). Traditionally, it is viewed as a predetermined and fixed return claimed by lenders on loans while they do not share in the concerns/ business/ efforts at the borrowers end. From the economist point of view, it is the discrepancy which results from the contractual obligations of a party in the context of a direct exchange of items of the same general kind between two parties. For details please refer to Sayyid Tahir (1994)- what is Riba? in Hikmat-e-Quran Vol 13, No. 11, Lahore, and by the same author- The Qura'n and Riba- in the Quranic Horizons, Vol 1 No. 2 (1996)-The Quran Academy, Lahore.

²⁹ O ye who believe! be fearful of Allah, and give up what remains of your demands for usury; if you are believers indeed! And if you don't refrain (from interest based transactions), then be prepared for a war (unlimited) declared by Allah and His Messenger (and His followers); but if you return back, you shall be entitled to your capital sums (principal), deal not unjustly and you shall not be dealt with injustice. Al-Quran, chapter 2 (Surah Al-Baqarah), verses 278-79.

Many writers have contributed on the rationale of prohibition of Riba in an Islamic economy. For instance, Umar Chapra (1985) notes:

"The principal reason why the Quran has delivered such a harsh verdict against interest is that Islam wishes to establish an economic system when all forms of exploitations and injustices are eliminated. Islam likes to establish justice between

of the poor and least endowed is obligatory on the well-to-do sections of the society and the State is responsible to arrange for collection and disbursement of the poor's due (*Zakah and Usher*). Its importance can be judged from the emphasis laid on the subject in the form of repeated instructions³⁰. The rates, exemption limits and bases are statutorily determined by Shariah and not left to the exercise of parliament. The attainment of the objective of just distribution of wealth alongwith a wider circulation of productive resources in the society through Zakah system can be easily realized.

It is obvious that elimination of interest from economic transactions will require an alternative and better arrangement otherwise permissible in Shariah . This is accomplished through organization of productive activities in manufacturing, trade, services and agriculture sectors on the basis of profit loss sharing (*Sharikah*) and principal-agent contracts (*Mudarabah and Muzara'h*) to share risk and uncertainty between the parties and to promote fair game. Likewise, the system of Zakah when

the two parties, the financier and the entrepreneur and cannot tolerate the injustice in the form of a sure positive return to the former without bearing the risk and uncertainty and without contributing to the value added; and a variable positive or negative or zero return to the latter despite his management and hard work. The difficulty to understand the prohibition of interest comes from a lack of appreciation of the whole complex of the Islamic value system. Any attempt to treat the prohibition of interest as an isolated religious injunction and not as an integral part of the Islamic economic order is bound to create confusion".

30 For instance:

And in their wealth, there is a right acknowledged, of those who beseech (for aid) and for oppressed. Al-Quran, chapter 70 (Surah Al-Maarej), verses 24-25.

O Prophet! accept propitiatory offering from their wealth to cleanse (their assets) and purify (their souls) them thereby, and pray for their blessings, since your prayer will bring comfort to them, and Allah hears and knows(everything). Al-Quran, chapter 9 (Surah At-Taubah), verse 109.

As a matter of fact, these alms (Sadaqat) are only for the needy and destitute, for those (officials) responsible for collection (and disbursement) and to soften the attitudes (of opponents) towards Islam, and for ransoming of slaves (captives) and to relieve the burden of debtors and to be spent in the way of Allah and for the welfare (hospitality) of wayfarers. This is an obligation from Allah, and Allah is all knowing all wise. Al-Quran, chapter 9 (Surah At-Taubah), verse 60.

institutionalized, may negate and dismiss certain forms of taxation on wealth and property which lead to harassment of the tax payer and oppression.

A certain doze of State intervention is essential in order to materialize the objectives of Shariah. There may be certain individuals within the Muslim society who might not respond properly to what is ordained by Shariah and they will need proper inducement. Further the presence of hostile elements in such a society cannot be excluded and hence the coercive power of the State is a must to combat such cases³¹. Islamic economists and jurists have identified at least two areas within the economic sphere where state intervention becomes directly relevant and essential, namely the abolition of interest and enforcement of Zakah³². There may be other areas where public policies are relevant and socially desirable, however not mandatory. The extent of State intervention in such areas, however, depend on the factual conditions of the economy and on the general moral standards of the society.

31 We sent our apostles with illuminations and guidance and revealed with them the Book/s and the Balance (so) that people might establish justice (may be held on the right track). Al Quran, chapter 57 (Surah Al-Hadid), verse 25.

32 Ziauddin Ahmed et al (ed)- Fiscal Policy and Resource Allocation in Islam (1983) remark that the absence of interest-based transactions and presence of a well functioning Zakah system are to be regarded as the two distinguishing features of an Islamic economy.

CHAPTER 2

REVIEW OF LITERATURE

This study investigates the impact of Islamization programme on the economy of Pakistan in a general equilibrium framework. As pointed out earlier, there is consensus among the scholars that direct state intervention is necessary and mandatory in two areas at least, namely the elimination of interest from financial transactions and enforcement of Zakah as a system of redistribution, if it is desired that the economy should conform to the requirements of Shariah. The present research focuses on the study of (forecast) economic implications resulting from changes in monetary and fiscal policies particularly meant to materialize the said objectives. This chapter is therefore, devoted to a brief review of the relevant literature in areas of general equilibrium modelling practice. We also discuss the important theoretical and empirical work done so far in the concerned areas of Islamic economics.

2.1 General Equilibrium Theory - An Overview

The general equilibrium theory occupies a prominent place in modern economics and is considered as a link between micro and macro economics. The very idea, of showing as to how a whole economy with many goods fits together and reaches an equilibrium, is associated with the name of the French economist, Leon Walras (1834-1910)¹. He built a system of simultaneous equations to describe a hypothetical economy and then showed that the system can be solved to give equilibrium prices and quantities provided that the number of equations is equal to the number of unknowns. He gave the concept of 'tatonnement' or trial and error process, carried about by an auctioneer such that the prices grope or adjust towards equilibrium. The process continues as long as the excess demands is positive or negative and terminates when the market is clear. A parallel reasoning was offered by Alfred

¹ His work is translated and annotated by William Jaffe (1954) under the title 'Elements of Pure economics' published by Allen & Unwin, London.

Marshall (1842-1924), who assumed that quantities of commodities tend to adjust if excess demand price is positive or negative. Starting from different assumptions, both the Walrasian and Marshallian concepts lead to the same conclusions so far as the stability of equilibrium is concerned.

A formal proof of the existence of general equilibrium was given by Arrow and Debreu (1954) and McKenzie (1959). A simple two person two commodity pure exchange economy is designed for the purpose. The endowments are assumed to be positive, and the market demand functions continuous and homogeneous of degree zero in prices. A general equilibrium model with production and exchange includes a specification of production technology and endowment of factors. Households own these factors which are supplied to the production sector. The intermediate and primary inputs are transformed into commodities and the technology is supposed to exhibit constant or diminishing returns to scales. The consumers maximize their utilities subject to income constraints and commodity prices, whereas the producers maximize their profits subject to technical constraints and factor prices. In equilibrium, market prices are such that demand equals supply for commodities and factors. Brouwer's and Kakutani theorems are usually applied to prove existence of the equilibrium.

2.2 Applied General Equilibrium Analysis

To borrow from Shoven and Whalley (1992) "the central idea underlying this work is to convert the Walrasian G. E. structure (formalized in the 1950's by Kenneth Arrow, Gerald Debreu and others) from an abstract representation of two person two sector economy into realistic models of actual economies. Numerical, empirically based G.E. models can then be used to evaluate concrete policy options by specifying production and demand parameters and incorporating data reflections of real economies"². Most of the contemporary G.E. models are the numerical analogues of the traditional two

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Abstract from Shoven & Whalley (1992) - Cover story.

sector models developed by J.Meade (1955), H.Johnson (1958), A.Harberger (1962) H.Uzawa (1963) and others. A brief account is as under:

2.2.1 Input-Output Models

The path-breaking attempt in this area is the well known work of Wassily Leontief (1953), referred to as the input-output models. Subsequent attempts have extended his work by incorporating substitution effects in both production and consumption functions.

The Input-Output models, both static and dynamic, were basically designed for planning purpose. The total output of a particular sector (called the sector of origin) could be allocated partly as intermediate input for use in other producing sectors (called the sectors of destination) and the rest used as final demand meant for consumption, investment and export etc. The very purpose of I/O models was to forecast the input requirements of the economy, given the future estimates of the final demand and keeping in view the projected growth rate of the economy. However, I/O models suffered from inherent rigidity, i.e. these were consistency models that didn't permit choice among alternative feasible scenarios. This weakness limited their extensive use.

2.2.2 Linear Programming Models

These models introduced flexibility in the basic linear structure of the input-output models and allowed for inequality constraints thereby transforming the exercise of rigid planning into constrained optimization problem. The pioneers in this field are Dorfman, Samuelson and Solow(1958), Chenery (1960), Bruno (1966), Adelman (1969) and Stone (1970) etc.

However, the linear programming models like their predecessors (the I/O models) were best suited for centrally planned economies where the planning authority had considerable control over resource allocation and had to face technological and physical constraints only. The major drawback of these models was their inconsistency with incomes and budgets of the households and thereby with the

demand side of the economy. In other words the entire emphasis in these models was laid on the supply side. As such they were ill suited for policy evaluation in market economies³.

2.2.3 CGE Models

The applied (computable) general equilibrium models , developed since 1970's onwards, have resolved the problems of I/O and L.P. models by integrating the demand and supply sides of the economy. The advent of computer technology and the development of fast solution algorithms has made it feasible to introduce non-linearities both in the production and consumption structures thus rendering the models to represent the real economies as closely as possible. CGE's are some times called price endogenous models because all prices must adjust till the decisions taken in the production sector get compatible with those taken in the consumption sector.

CGE's are structural models designed for policy analysis and cannot be used to make unconditional projections. They thus stand in stark contrast to the large, temporally disaggregated, macro economic models whose econometric specification relies heavily on lagged endogenous variables and reduced form equations to capture the role of expectations through (stochastic estimation) and frictions in the economy. In such models, however, it is often difficult to track the causal mechanism at work. CGE models have rich theoretical content, however simpler statistical structure as against the macro econometric forecasting model that have rich statistical content but poorer theoretical underpinning. A major advantage of CGE models is that the mechanism driving them is clear and easy to grasp since their structure is rooted in the conceived theory. Transparency is a key characteristic that an empirical G.E. model must have if it is to provide a framework for policy analysis⁴.

³ A fairly good account of this class of models may be seen in A. Manne (1974).

⁴ For a clear exposition and applications, please refer to Dervis et al (1982).

The prominent figures in this field are:

- i. Leif Johanson (1960), who applied his model to study policy impacts on resource allocation in Norway, using the simplex method for solution⁵.
- ii. Arnold Harberger (1962), who developed a numerically based two-sector G. E. framework to analyze the issues of tax incidence and welfare⁶.
- iii. Herbert Scarf (1967), who endeavored to find fixed point algorithm for computation of the G.E. models⁷.

These works, along with the development of more efficient solution algorithms, computer power and data availability, stimulated research in many areas, particularly in taxation and international trade, to address the questions of efficiency and welfare as well as stability and distribution resulting from alternative policy options. These models differ in issues emphasized, scope & coverage, specification and dynamic aspects. The economy-wide, general purpose models are used for policy evaluation in the areas of growth and distribution, taxation and international economics. Examples are Whalley (1975), Serra puche (1979), Piggot (1980), Dixon et al (1982), Piggot and Whalley (1985), BSFW (1985) etc. Attempts have also been made to incorporate specific issues in the analyses like, money (Fullerton-1978), price intervention policies (Imam and Whalley-1982), unemployment (Kehoe and Serra-puche -1983), trade and capital inflows (Manne and Preckel -1983), welfare costs of price ceiling (H.Imam-1985), housing (Hamilton and Whalley-1985), energy policies (Lenjosek and Whalley -1986), restrictions on trade (Feltenstein- 1986) etc.

The existing models may be segregated into four general categories on the basis of issues dealt with:

⁵ A good account of the model is provided in Dervis et al (1982).

⁶ The model has been discussed at length and re-estimated with new techniques in Shoven and Whalley (1992).

⁷ A fairly good concept of the algorithm is provided in Shoven & Whalley(1984).

- a. models focussing on issues of growth, development policies, economic structure and income distribution,
- b. models focussing on taxation and public finance,
- c. models focussing on issues of international trade; single country/global issues,
- d. models focussing on specific issues,

A fairly good survey may be found in Shoven and Whalley (1984).

2.2.4 Economy-wide CGE models - some examples

At this stage, it seems appropriate to discuss a few economy-wide models at some length that are more relevant to our study.

1. **Serra Puche (1979):** This model is formulated for the Mexican economy. It is static and meant for single-period simulations. The supply side is represented by 10 sectors, including a foreign and an investment sector. There are 3 factors of production namely the capital, the rural labour (employed in agriculture) and the urban labour (employed in manufacturing, trade and other services). The demand side is represented by 8 consumer and a public sector. No distinction is made between the producers and consumer goods. The behaviours in production and consumption are managed through Cobb Douglas(C.D.) specification. The government derives its income from taxation and its share in public enterprises. Budget deficits are incorporated via the concept of capital tomorrow. The data is taken from official sources pertaining to 1968 and the parameters are derived from calibration and available literature. Simulations are obtained with Scarf-Merill algorithm using the mainframe computer at Yale university. The model is used to see the impact of fiscal reforms introduced in the economy on resource allocation and income distribution. These include the substitution of Value-added tax for the sales tax, the substitution of the sales tax for income taxes, lumpsum taxation, rebates to the four poorer groups, change in the income tax-rate progressivity etc.

2. **BSFW (1985):** This is a general purpose dynamic general equilibrium model designed for the analysis of U.S. tax policies. The production side is represented by

19 industries and the consumption side by 15 commodities. The relationship between the two is established through a fixed coefficient transformation matrix. The households are divided into 12 groups, each endowed with 2 primary factors, capital and labour time. The behaviour of households is represented by a CES nested structure. The first nest concerns allocation between present and future consumption. The second phase concerns with allocation between commodity consumption and leisure. The final nest allocates present consumption among the 15 commodities via a C.D. specification. The production relationships are represented by CES specifications of Value added and fixed proportions of intermediate consumption. Cost minimization and Utility maximization are the usual behaviours assumed in production and consumption. The behaviour of government is shown as a consuming agent with a C.D. utility function when demanding commodities and factor services. The main source of its income is however, the revenues from taxation. Foreign trade enters the model through specification for the export demand and import supply functions, using elasticities as available in the literature, and with a balanced trade assumption. The model is dynamic and the present is linked to the future via saving, investment activities leading to increase in capital stock alongwith an exponential growth of the effective labour force. The economy is assumed to be on the steady state at the base year. The model is based on 1973 data updated by RAS method. The model is used for the analysis of various fiscal policy options which include schemes like the integration of corporate and personal income tax, complete and partial, which is represented in four distinct plans. The impacts of these policies on resource allocation and the respective industrial structure are studied using different indicators, in particular the HEV. Various simulations are obtained for the long run stretching to 50 years with 10 year intervals⁸.

3. **Hassan Imam (1985):** The objective of this model is to evaluate the degree of economic inefficiency arising out of distortion in the capital market due to ceiling imposed on the rate of return to private savings. The model is dynamic and applied to

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A fairly detailed account of the model and important results is provided in Shoven and Whalley (1992).

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the case of Indian economy. The model is highly aggregated. The production side is represented by 3 aggregated sectors- agriculture, manufacturing and services. The corresponding data is derived from 144 sector Input-output tables of Indian economy with 1970-71 as the base year. The value added functions are shown with CES specification alongwith a fixed coefficient matrix to show intermediate consumption. Consumers are divided into 4 groups, urban and rural, each with categories of poor and rich. The intertemporal Utility function is CES that allows allocation of income between present and future and the contemporaneous function is Cobb Douglas. The model employs 2 primary factors, capital and labour, and 3 final commodities namely food and non-food consumer goods and a composite investment good. There is no explicit role for the government, likewise the foreign sector is also depressed. The model is used to evaluate the impacts on efficiency, growth rate of national income and capital formation if the rate of interest is liberalized or the ceiling on the rate is relaxed. The model results confirm the thesis of financial repression in numerical terms that repressive interest rate policy in LDC's is one of the most important reasons for their slower economic growth⁹.

4. **Dervis et al (1982):** The TGT (Turkey Growth and Trade) model is a SAM based model with 19 sectors that incorporating foreign trade. It was developed to review the fourth five-year plan of Turkey at the World Bank. Appendix 7.A pp 249-54 of their book (General Equilibrium Models for Development policies - A World Bank Publication- 1982) describes the structure of the model in equation form. The model has been used for the analysis of the country's growth prospects during the 1980's and to explore the impact of alternative policies, like import substitution and rationing, export promotion, foreign exchange controls and protection through tariffs and quotas etc, on growth and income distribution. The solution strategy is however different from the models discussed above.

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He refers to the works of Shaw(1973)- Financial deepening in economic development- Oxford university press, and Mc-Kinnon (1974)- Money and capital in economic development- Brooking Institute, Washington State.

2.3 Solution Strategies and Algorithms

Different approaches have been used by modelers to solve different problems within the G.E. framework. In order to successfully implement the model on a computer it is necessary to reduce the solution space or dimensionality of the model. The way in which the equations of the model are substituted, one in the other, and rearranged to achieve this objective is referred to as the solution strategy whereas the actual steps implemented on a computer to solve the model numerically is called a solution algorithm.¹⁰

The standard methodology has been to describe/specify various sectors (disaggregated) of the economy through linear or non-linear relationships (whatever the situation may be) and to incorporate various constraints so that the standard optimization techniques could be applied. The production sectors are often specified in terms of fixed-coefficient technologies for intermediate inputs and Cobb-Douglas and/or C.E.S. functions for primary factor inputs. The assumption of cost minimization behaviour in the production sectors leads to the derived demands for factors which are affected by the taxation mechanism in the sectors concerned. The cost per unit output is then derived from the aggregation of the intermediate and primary input costs. Using the zero-profit conditions under the competitive market assumption the producer's price should then match the marginal/average cost. Commodity taxes are introduced at this stage which are reflected in the market (consumer) prices of goods and services. Given the endowments of capital and labour as well as other productive resources, the households are assumed to maximize their utilities subject to the incomes (net of taxes) generated from the sale of their resources at market prices. The behaviour of the households are often described with C.D. or C.E.S. (general or L.E.S.) functional forms. This mechanism gives rise to the demands for goods and services, given the market prices. The standard neoclassical assumptions underlie all the factor and commodity demand functions. The aggregate demand for commodities should match the aggregate supply if the markets have to clear at the equilibrium prices. The

¹⁰ Please refer to K.Dervis et al (1982)- Methodological Appendix B, pp 486-96, and Shoven & Whalley (1992)- Chapter 3-Computing General Equilibria, pp 37-68.

excess demand functions for factors and commodities are then calculated and, given the set of equilibrium prices, they should tend to zero. The dimensionality of the system can be reduced considerably if all the equations can be expressed in terms of excess demand functions for factors. The assumption of factor mobility across sectors plays an important role in this background. However, if some factors are sectorally fixed or if the tax revenues depend on the particular structure of production, then the dimensionality of the solution space depends on the number of commodities instead of the number of factors employed. Several other structural features of real economies can be incorporated in the standard model; however the solution strategy has to be modified accordingly.

The solution algorithms may be divided into three categories:

1. The fixed-point algorithms based on Brouwer's and Kakutani fixed-point theorems for point-to-point and point-to-set mapping respectively, developed by Scarf (1967, 1973), elaborated and improved by Merrill (1972) and Van der Lann & Talman (1979) and modified for the inclusion of taxes by Shoven & Whalley (1973). These algorithms are guaranteed to converge to a single point provided the dimensionality of the model is small.
2. Algorithms based on a tatonnement process by simply adjusting the price in each sector in response to the sign of excess demand functions using the Gauss-Seidel iteration procedure used by Ginburgh and Waelbroeck (1980).
3. Algorithms based on linear approximation techniques using Newton-Raphson method of solving the derivatives of function or the Jacobian matrices employed by Dervis et al (1982) and Dixen et al (1982).

2.4 G.E. Modelling Practice in Pakistan.

The earlier work focussed at construction of the input-output tables for the economy. The first attempt in this regard was made in the Pakistan Institute for Development Economics (PIDE) Islamabad when the tables were constructed in 1976-77. Cohen & Havinga et al (1985) developed a Social Accounting Matrix (SAM) for the economy

pertaining to the 1979-80 data and an input-output model to show inter industry relations. Cohen(1985) also constructed the labour force matrix of Pakistan using data for the same period . S. Aftab Ali (1985) used these tables for the analysis of inter industry relations. The task was later on entrusted to the Federal Bureau of Statistics (FBS), an institution meant for developing the data base at the government level. The 1984-85 SAM and input-output tables were developed at the FBS in collaboration with the Netherlands government under the joint venture of "Improvement of National Income Accounts" or INAS and published in 1993. The said institution (FBS) also publishes the Household (Integrated) Income and Expenditure Survey (HIES) on a three yearly basis. It was decided that SAM and I/O tables will be published after each five years, however, publication of the next edition for 1989-90 is still awaited.

A summary of important contributions towards G.E. modelling is presented:

1. **AERC (1994) model¹¹**: The model is constructed to evaluate the economic reforms dictated by the IMF/World Bank on their longrun impacts on economic growth, environmental quality, industrial structure and land degradation/improvement. The reforms are often referred to as the Structural Adjustment Programme (SAP). Foreign assistance from these agencies is provided under the Enhanced Structural Adjustment Facility (ESAF) from 1993-94 onwards which is conditional upon the implementation of the programme in letter and spirit. The details of the conditionalities are not officially available, however the model under study provides summary of the proposed reforms on the authority of the daily Business Recorder dated 19th December, 1993. The report also refers to other CGE models and comments upon their shortcoming, particularly the following:

(i). **AERC Tax Policy Simulation model (1992)**- a study carried out for the Central Board of Revenues (CBR) to estimate the impact of changes in tariffs

¹¹ Developed in 1994 at the Applied Economic Research Center, Karachi University in collaboration with the Harvard Institute for International Development, Cambridge, Massachusetts, USA, under the title : Economic Reforms and the Environment in Pakistan, AERC ,Research Report No. 102 dated October 21, 1994,

and indirect taxes upon the nominal revenues. It was based on survey of 600 manufacturing and 200 service units, the information was converted to 77x77 inter-industry absorption matrix with 10 agricultural, 50 industrial and 16 service sectors. The model was static and issue specific.

(ii). Z.F. Naqvi(1994)- which is a CGE model for the evaluation of distributional impacts of public enterprise operational policies in Pakistan submitted as Ph.D. dissertation to the Department of Economics, Boston university. The details are however not available.

(iii). PIDE (1992) model: Probably the most significant contribution of the PIDE collective research is the construction of the Macroeconometric models primarily meant for projections of the five year development plans. The latest of this series is the PIDE model (1992), which is subdivided into four sections, the production and expenditure, the labour market, the foreign trade sector and the fiscal & monetary section. The model consists of 97 equations, of which 45 are behavioural and 52 are definitional/identities. The model divides the production sector into 10 broad categories. Although it includes specification and estimation of investment but it is not linked to corresponding future changes in the capital stock. Likewise, it does not allow a reallocation of capital among different uses following policy change. The entire model is estimated simultaneously with instrumental variable technique. The estimation period comprises time series data from 1959-60 to 1987-88. The forecasting power is tested for the period 1987-88 to 1991-92 for which the actual data on all relevant variables was available at the time of model construction. This is termed as the ex-post forecast. Finally the forecasts generated by the model for the end year 2003-2004 have to be used for the Eighth Plan commencing from 1991-92. This is the ex-ante forecast¹².

¹² However, the nature and application of econometric (simultaneous equation) models is quite different from the CGE models. Once the parameters of the model are estimated,

AERC (1994) is in fact a three-piece model. The first is a highly aggregated macro growth model to predict the long run effects of the reforms on economic growth and environmental quality. It adopts the specification of Shafik and Bandyopadhyay (1992)¹³ in which GDP is assumed to be a CRS(Cobb-Douglas) function of capital and labour, Capital stock is related to net investment and population is used as proxy for labour. The second one is a short run CGE model which is of some interest to our work and to which we return shortly. The third model is an extended form of the Indus Basin Plan (revised) model originally developed by the World Bank in 1963. This a linear programming model and used to study the impacts of the reforms on cropping pattern, ground water balance, salinity and agricultural produce the irrigated areas of Punjab and Sind (Indus basin). The results of all the three models are then integrated and conclusions derived.

The CGE sub-model of AERC is based on 1984-85 SAM of the FBS to incorporate 8 production sectors, 2 factors (capital and labour), 4 institutions (enterprises, government, households and rest of the world). It consists of 53 equations and identities and divided into various blocks like production, factor income, corporate, government, households, trade and investment. The model is claimed to be internally consistent and covers all possible details. However, the model lacks dynamic qualities and shows no response to population growth or capital accumulation over time through investment. The model is used to carry out 7 experiments with changes in tariffs, direct taxes, budget deficits, exchange rates; and different policy mix plans as required by SAP. The results have been shown in tabular form in terms of changes in the industrial structure, composition of GDP, resource allocation among different sectors, government revenues, savings and investment and in the external sector.

of course, after going through all the problems of identification and estimation, the model is ready for projection. The future expected value of the endogenous variable/s can be readily obtained by assigning any new value to the parameter due to policy change or any targeted value of the exogenous variable/s.

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A brief account of their model titled 'Economic growth and environmental quality- a time series and cross country evidence' (World development Report working paper WPS 904, The World Bank, Washington D.C.) is provided in the document.

2. **Shafiq Dhanani (1988):** This is a SAM based CGE model which depends on his Ph.D. thesis submitted to the Institute of Agricultural Economics, Oxford University in 1987. It uses the PIDE 1975-76 input-output tables updated by RAS (row and column sum) method, and data from CMI (Census of Manufacturing Industries) for 1983-84 to compile a SAM by his own for use in the analysis. It consists of 9 production sectors, 4 household groups and 9 consumer goods incorporated in the institutional accounts. The production and consumption behaviours are specified with CES and LES functions respectively. Capital supply is held to be constant and labour supply unlimited according to Lewis's assumption. There is no explicit role for the government and it portrays the structure of a small open economy with no constraints on the current account balance. The model is built for static analysis to see the multiplier effects of various fiscal policies. Further it arbitrarily assumes different export-import and capital-labour substitution elasticities for different experiments. The computations are carried out with the help of Hercules Software package, developed by the World Bank for similar exercises in Turkey and other countries. The paper provides no further detail about the model structure and data. The model is used to carry out various experiments like an increase in investment, government spending, indirect taxes, world prices of manufactured and imported goods, and a drop in remittances. and analyze the impacts on the economy performance.

2.5 Modelling Attempts in Islamic Economics

Islamic economics is relatively a new discipline. It started evolving just after the Second World War when a large number of Muslim countries got independence from the colonial rule. People in these countries had always desired to fashion their lives and institutions according to the Islamic views. Islamic economics emerged as one the forerunners in this field. Earlier work focussed mainly on restating the Islamic teachings relating to economics as envisaged in the Quran , the Hadith and the Fiqh. Many researchers contributing to this work were primarily religious scholars having little exposure to the concepts of modern economics. Despite this, their efforts did bear fruit. In 1976, the First International Conference on Islamic Economics held in

Makkah proved to be a watershed in the field. It realized the need for addressing the concepts of economics in light of the Islamic injunctions at a more professional level and opened avenues for rigorous research all over the Muslim world.

The motivation for research in Islamic economics may be rationalized on conceptual and terrestrial grounds. The professional economists feel uneasy and express their dissatisfaction with the way in which the mainstream economics, that is based on unrealistic assumptions about the human nature and behaviours, seeks to analyze the burning issues and suggest solutions to the economic problems of the world. The dominant economic system, the market economy or capitalism, has failed to handle severe problems of inflation and unemployment even in the industrialized world. On the other hand, the economic structure based on the philosophy of socialism also failed to achieve its goals after a long experimentation of more than seven decades and collapsed in its native center during the early nineties. These factors have led to thinking for a new economic order that should be based on social justice¹⁴.

However, the focus of research in Islamic Economics is largely oriented towards modelling of the economies when interest is substituted by profit sharing and/or when Zakah system is introduced. This attitude can be explained keeping in view the following facts.

- i. Modern neoclassical economics evolved in an interest based environment and no attempt seems to have been made by western economists to theorize for interest free system. As a matter of fact, they rule out the possibility of a zero interest rate since the very institution serves as the backbone of capitalist system¹⁵. The Islamic

¹⁴ For a clear exposition, please refer to M.U. Chapra(1991)-The need for a new economic order- Review of Islamic Economics, Vol 1 No. 1 pp 10- , who dilates on the causes of failure and internal ideological and philosophical conflicts of the two systems and provides a rationale for a new economic order.

¹⁵ Irving Fisher (1930) remarks that "despite the persistence of the idea that interest is some thing unnatural and indefensible; despite the opposition to it by socialist and others who rebel against the existing economic system; despite all attempts to prohibit interest taking; there is not and never has been in all recorded history any time or place without the existence of interest"- The theory of interest- As determined by impatience

economist took the issue as a challenge and tried to explain the working of the economies in the absence of interest.

ii. The imperial powers, introduced their own financial and taxation systems in Muslim colonies during the occupation period and destroyed the institutions of Zakah, Auqaf and indigenous business based on profit-loss sharing. After liberation of these countries, a renaissance movement took a start and the scholars interested in Fiqh and Economics had to attend to these issues.

iii. The introduction of PLS system and enforcement of Zakah in some Muslim countries and the establishment of Islamic banks and finance companies at several places all over the world during past two decades expounded the need for providing a theoretical foundation to these practices.

iv. Most of countries in the prevailing Muslim world (with the exception of Malaysia, Turkey and countries exporting petroleum) are poor and underdeveloped. The conventional fiscal and monetary instruments have failed to reduce poverty and income inequalities in these countries. The last remedy, that is believed to solve the problem efficiently, is the implementation of Zakah under state control. The Islamic economists have tried to explain the role of fiscal policy in presence of this instrument and its probable implications.

v. Since the two areas i.e. elimination of interest and enforcement of Zakah, are considered to be exposed to direct state intervention, they attracted considerable attention of the Islamic economists and bankers.

to spend income and opportunity to invest it" in "Reprints of Economic classics"-Sentry Press, New York 1965. Perhaps the sacred period of the Holy Prophet (P.B.U.H.) and the Pious Caliphate as well as several centuries thereafter of Islamic rule in the Middle East, South Asia, North Africa and Southern Europe, which stretches from middle of the 7th century upto early 20th century and during which the institution of interest remained abandoned, remains out of the domain of the so called recorded history.

Another prominent figure remarks that " a zero rate of interest is a little like an absolute zero of temperature in Physics. We can imagine getting closer and closer to it, but we can hardly imagine actually reaching the limiting case of a zero equilibrium rate of interest. Thus interest is a basic phenomenon unlike to disappear even in the most ideal economic world" - Paul Samuelson (1980)- Economics, 11th Edition, Mc-Grow Hill Book Company, New York.

It is difficult at this stage to encompass all the attempts made by Islamic economists so far towards modelling in the two areas . However, we summarize a few important contributions as under. It is to be noted that most of the models are theoretical and quite a few examples may only be found on the empirical side.

2.5.1 Implications of Interest-free systems

We discuss a few studies concerning the institution of interest and the implications of its elimination from the economy.

- 1. Waqar Masood Khan (1985):** A simple, two person, non-zero sum, non-cooperative game- theoretical model is constructed to analyze the optimal behaviour of the lender and the borrower using the Nash equilibrium concept. It is shown that the variable return system (VRS) is more efficient than the fixed return system (FRS), since a wider distribution of risk leads to an all-equity situation which is Pareto-optimal, provided there is no informational asymmetry involved in the contract. However, if monitoring costs are associated with financial contracts, then the FRS will be prevalent since it minimizes such costs. This is referred to as the Moral Hazard problem in the literature that narrows down the scope of interest free systems. The beauty of the model lies in the fact that whereas other authors have discussed the superiority of VRS on equity grounds, this study has shown the superiority of the system on grounds of pure efficiency while using the parameters of an otherwise secular economy. However, the author attaches much weight to the informational asymmetry which makes the working of VRS doubtful in practice. As S.T. Tag el Din (1991) has noted that the theorem claiming that VRS contract is Pareto optimal in relation to FRS contract, given the informational symmetry, contradicts the implications of the mean-variance portfolio theory (see Tobin-1958), since the model assumes risk neutrality as against the most usual behaviour of risk aversion. Further, the moral hazard theory has little relevance to the modern large-scale corporate sector which accounts for the bulk of investment activity. Such corporations are legal entities and have a well established auditing mechanism. As such, the directors may not be

in a position to under report the true returns to the shareholders. He also rejects the results of mean-variance theory on the grounds that the indifference curves (drawn in the risk and return space) may not be necessarily convex to the origin.

2. Naqvi et al (1986): A dynamic economic model is built within the context of optimal control theory, borrowing from the formulations of Arrow(1968) and Dorfman (1969)¹⁶. The optimal time path for capital accumulation is derived using the Pontryagin's principle and maximizing the resulting Hamiltonian equations over time. The rate of interest is then imported from outside and equated to the marginal product of capital so that the economy should remain on the steady state path. It is argued that the rate of interest cannot be zero since it has to cater for the positive growth rate of labour, for the depreciation of capital stock and for a positive growth of per capita consumption. The authors discuss the phenomenon of time preference and contend that it should be positive for the individuals. They introduce the element of uncertainty in economic decision making and express the view that the rate of return must comprise a positive and sure part plus a variable transitory element which may be positive or negative. The fabric of argument is then extended to conclude that since majority of savers are risk avert, then to safeguard their interests and to establish Al-Adle, a minimum positive rate of interest must be guaranteed. In other words, a regime of variable rate of return based on profit sharing will not be feasible without such a guarantee. Such a guarantee can only be provided if financial instruments offering a fixed rate of interest coexist alongwith those giving variable returns. The authors reject the possibility of abolishing the institution of interest by an administrative order or by legislating a mechanical shift from the conventional regime to a profit-based system.

The model can be criticized on economic and ethical grounds. First the authors bypass the case when the rate of return happens to be negative due to loss and which

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1. K.J. Arrow - Application of the control theory to economic growth- American Mathematical Society, Providence (Rhode Island).
 2. R. Dorfman- An economic interpretation of optimal control theory, AER Vol 59.

is the real risk in actual world of business. Second they compromise with the prevailing system based on exploitation by allowing the coexistence of interest with other modes of financing so that small savers must not be hurt since they are risk avert. In fact they are very much hurt if they are guaranteed only with a bare minimum fixed return as suggested by the authors while the bulk of profits are appropriated by the business class which goes against the concept of Al-Adle. Third, a zero rate of interest does not imply a zero rate of return on investment. The rate of return is often confused with the rate of interest in the contemporary literature on capital theory. Riba or interest is the price of financial capital charged by the lender and fixed a priori, which has nothing to do with the ex-post return on investment accrued to the borrower after facing the risk and uncertainty. Finally the marginal product of capital cannot be separated from the person of entrepreneur even if it is assumed separable from labour. As such equating the (fixed) rate of interest to the marginal product of capital becomes unsubstantial. Their concluding remarks, regarding the impossibility of abolishing the institution of interest by an administrative order or by legislating a mechanical shift from the conventional regime to a profit-based financing without restructuring the entire system of allocation and distribution, are quite appealing.

3. Ibrahim Abdul Aziz Al-Dharrab (1986): A microeconomic, static, mathematical probabillistic model for studying the relationship between banks and depositors is formulated and analyzed in the mean-variance theoretical framework (Tobin 1956), using various risk sharing schemes and taking into account different attitudes towards risk. The objective is to provide a theoretical foundation for interest free banks and to compare them with conventional banks. It is shown that interest free banks are theoretically a viable alternative to interest based banks and that the banks and depositors are as well off as the banks and depositors in the conventional system . The model is further extended to examine the functioning of interest free economies at the macroeconomic level where the rate of interest is replaced by a risk-adjusted reward using the basic Keynesian framework so as to address the questions of unemployment, income determination, prices and wages and to study the implications

of fiscal and monetary policies. The model, however, ignores the asset side of the banks balance sheet or the relationship between the bank and clients. Here is problem is more complex, particularly when the bank works in the capacity of a financier and intermediary between the savers and investors rather than an entity responsible for carrying out business and investment by itself.

2.5.2 Economic systems with Zakah

The system of Zakah is regarded as the backbone of the fiscal policy in an Islamic state. Although the institution does exist in muslim societies, however, a mechanism for its collection and disbursement at the state level in the contemporary muslim world is either absent or ineffective if present. Therefore, empirical studies for the real world muslim economies are very rare and limited in scope and coverage. The following are a few examples that incorporate Zakah in the system and evaluate its effects.

- 1. Fahim Khan (1986):** The model is designed with the objective to test the contention that the level of saving will be lower in an Islamic framework than if the same economy operates on a non-Islamic basis. Two arguments are offered to nullify this hypothesis - that aggregate consumption level under the Islamic premises will be lower than that of an un-Islamic premises, and even if there is any chance of a short-run decline in the aggregate savings due to enforcement of Zakah, this adverse effect will soon be wiped out and the long-run savings as well as the growth rate will be higher than if it were a non-Islamic economy. Intuitively, these effects result from the income distribution effects of Zakah which causes the poor sections of the society to enter ultimately into the group of savers as their living conditions improve.

The model incorporates Infaq (spending for gaining favour of Allah, where Zakah is a component of Infaq) in the consumption behaviour of muslim households and derives the macro consumption function for an Islamic economy. The same element gets added to the disposable incomes of the poor households or the recipients of Zakah. A simple macroeconomic distribution model is then formulated to trace the effects of Zakah on saving, growth and income distribution. The model is then used

to study different cases under different behavioural assumptions through numerical forecasts. The results are then compared with the case of traditional consumption function and it is shown that an Islamic model with Zakah and other Islamic virtues, like refraining from conspicuous consumption etc, provide better results.

2. Raquibuz Zaman et al (1987): The study is meant to analyze the distributive effects of the introduction of Zakah empirically. The authors use hypothetical data concerning two economies, one poor with a low per capita income, agrarian and densely populated, and the other rich with high per capita with rich mineral resources and sparsely populated. The estimation procedure is very simple and arithmetical without any formal model or theoretical ground. The population is arbitrarily divided into 10 groups and simulations are carried out by transferring Zakah from high income to lower income groups. The purpose of the exercise is to demonstrate as to how data on income distribution can be extracted from published macro data on GDP and occupational distribution and how this can be utilized.

3. Shirazi et al (1994): The Objective of the model is to estimate the effects of Infaq (Zakah, Usher and voluntary spending) on poverty alleviation using data from HIES 1987-89 at a disaggregate level. The model uses different estimates of the extent of poverty and relies on at least three measures to estimate the incidence of poverty, namely the Head Count, the Poverty Gap and the Foster-Greer-Thorbecke FGT (1984) measure. He converts the expenditure-based measure into income-based measure through a simple log-linear function. The methodology is simple, the incidence of poverty is calculated through the percentage changes in poverty measures with and without Infaq. He also studies the impact of the household size, level of education of the head of family and the number of earners in the family on the incidence of poverty. This is followed by a more elaborated study (Shirazi 1996) that evaluates the performance of Zakah and Usher system in Pakistan taking advantage of the most recent data.

2.5.3 Models of Interest-free Banking

There is complete agreement among Fuqaha (Muslim jurists) that Riba is prohibited by the texts of the Quran and Sunnah and that the bank interest is only a sub-set of the wide range of transactions covered by Riba¹⁷. The Council of Islamic Ideology, Pakistan has unequivocally expressed the view that the term 'Riba' encompasses interest in all its manifestations, irrespective of whether it relates to loans for consumption or for production purposes, whether the loans are of personal nature or of commercial type, whether the borrower is a government, a private individual or a business concern, and whether the rate of interest is low or high¹⁸. However, it is argued by certain sections that contemporary bank credit extended for investment and production purposes doesn't fall within the preview of Riba. This sort of confusion arises since the approach of interpretation adopted by Fuqaha is not precisely understood by the people. As noted by Nyazi(1995), a careful examination of the methodology followed by classical Fuqaha reveals that:

- i. Riba is generally prohibited by the Quran,
- ii. The concept is elaborated with application to specific cases by the Sunnah, and
- iii. The detailed rules for all transactions are expounded by the Fuqaha.

In the final analysis it is clear that Riba is prohibited, whether simple or compound, whether in financial transactions (arising from benefits of delay- Riba- al-Nasia'h) or other forms (arising from weights and measures- Riba-al-Fadl). The contract of Sarf (exchange of money for money) is applicable to all forms of financial transactions, particularly in banking. The sale of currency to a bank by a depositor, and equally by the bank to the final user in return for currency, withdrawn/paid latter on with an excess is Riba.

In view of the above, Islamic economists had to attend to the challenging issue

¹⁷

For instance, please refer to:

1. S. Abul Ala Mawdudi- Sood (interest) in Urdu- Islamic Publications Limited, Lahore.
2. Mufti Muhammad Shafi- Masala Sood (interest) in Urdu- Idara al Ma'arif, Karachi.

¹⁸

'Elimination of Riba from the economy and Islamic modes of financing'- First report of the CII (1980), reproduced in the 2nd revised and enlarged edition (1991), Islamabad.

and the bulk of literature that has emerged after the late sixties is mainly directed towards banking and finance. As noted by M.N. Siddique(1980), a mature and comprehensive model of interest-free banking has emerged from works appearing in the late sixties and early seventies. The pioneers in this field are M. Uzair (1955), Abdullah al-Araby (1967), Manan(1968,69), Siddique (1969,73), Baqir al Sadar (1974),Sami Hamud (1982) and many others¹⁹. The common argument in all the models is the replacement of interest by Musharakah and Mudharabah arrangements. However, quite a considerable number of Islamic banks that have emerged in the past two decades most often follow the practice of mark up (Murabaha), Leasing (Ijara) and other financing techniques instead of profit-loss sharing in their routine business. Siddique (1983) discusses the main problems faced in interest-free banking.

2.5.4 Macro Models for Islamic Economies

A number of attempts have so far been made in the area of income determination and distribution. However all the models borrow heavily from the conventional neoclassical or neo-Keynesian specifications. We briefly discuss two samples as under:

1. **Ausaf Ahmed (1986)** : The model is constructed in the neo-Keynesian(Kaldor-Pasinetti) framework, with Zakah imposed and interest rate (not the profit rate) abolished. The economy consists of the capital owners and workers as usual. The capital owners and some of the workers own capital assets, whereas the rest of workers do not own. The saving functions for the respective groups as well as their shares in profits are derived after incorporating Zakah. The shares and rates of profit are then compared for various groups in Islamic and non-Islamic settings. It is argued that an increase in the disposable incomes of Zakah recipientss will lead to an increase in aggregate demand which will improve the climate for further investment. Anyhow, it remains inconclusive as to how much will be the increase. Further it is admitted that

¹⁹

A comprehensive account of the related works may be found in M.N.Siddique: A survey of contemporary literature, in 'Studies in Islamic Economics, ed. Khurshid Ahmed, The Islamic Foundation, Leicester (1980).

accurate comparison of growth rates of capital and income in Islamic and conventional economies is impossible a priori since these depend upon the values of the crucial parameters of the economies concerned. It is concluded that the profit rate in an Islamic economy will be more flexible due to greater interdependence between various economic agents. It is further confirmed that the prohibition of interest and/or the introduction of Zakah do not inhibit the attainment of steady state in an Islamic economy²⁰.

2. Muhammad Hussain (1994): The model is presented within the formal neoclassical framework. The rate of interest in the IS-LM model is replaced by the variable rate of profit. The demand side includes the usual relations showing the aggregate behaviours of consumption, investment, taxation, and government spending. The society is divided into two broad categories, the well-to-do or the Zakah payers and the poor or the Zakah recipients. The consumption functions of the respective groups incorporate Zakah and other spending. The equilibrium in the product market is represented by the IS curve and that of the money market by the LM curve as usual. The model integrates the demand and supply sides of the economy by incorporating a downward sloping YQ curve to represent the supply side, following the innovation of Beck (1979). It is assumed that its slope is greater than that of the IS curve to ensure stability. Different multiplier effects have been worked out and shown graphically. Despite all the technical elaborations of the model, there is no indication of its particular relevance for an Islamic economy except that the IS curve will be relatively flatter in the presence of Zakah. In other words, the model is as good (or bad) for an Islamic economy as it is for a secular one.

2.6 Concluding Remarks

From the above discussion, it may be clear that modelling an economy, supposed to conform to the requirement of Sharia, is really a tedious job. Most of the attempts

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For criticism please refer to the comments of Dr. Sayyed Tahir and to the alternative model proposed by Mabid Ali Aljarhi, both in M. Fahim Khan Ed. (1986).

made previously in this area suffer from methodological shortcomings. The microeconomic models concerning interest-free systems are mostly intuitive and they lack mathematical rigour. The macroeconomic models of income determination and distribution adopt the conventional style of reasoning and try to show that substitution of a fixed rate of interest by a variable rate of return in the ISLM framework will alter the results drastically. The literature of Islamic economics generally scarce on the empirical side. Very few studies have been carried out so far; and even these are either demonstrative and use hypothetical data or they focus on specific issue and adopt a partial equilibrium framework of analysis if they use the real economy data. A comprehensive general equilibrium model of a real Islamic economy is altogether missing. In the absence of empirical evidence, the theoretical models of economies with Islamic attributes are open to serious skepticism. Although, there is considerable research with reference to Pakistan using the G.E. macroeconometric framework, however and as mentioned earlier, this framework is not suitable yet for research in Islamic economics. Still further, we find only a few attempts using the CGE framework to evaluate fiscal policies in Pakistan, but these models are static in nature and deal with specific issues. As such, there is considerable room for investigation in the field of Islamic economics, on the empirical side in particular. The present study may be regarded as an attempt to fill the gap and to provide a sound foundation for the Islamic economic doctrine.

CHAPTER 3

MODEL SPECIFICATION

As discussed in the introductory chapter, the present study intends to evaluate the implications of the Islamization Programme with special reference to Pakistan. To be specific, we focus attention on the probable impacts of the public policies devised for the purpose rather than their modes of operation. Such an attempt is feasible within the context of general equilibrium framework. The explicit objective of this study is to analyze the implications of relevant changes in the monetary and fiscal policies in terms of selected socio-economic indicators such as GDP growth, efficiency and welfare, fiscal stability, income inequality and extent of poverty etc. In particular, we prefer to adopt a comparative approach to study the effects of the prevailing and proposed policies so as to demonstrate the difference and to facilitate comparisons in numerical terms. The implicit objective is to test the hypotheses held by certain quarters that elimination of interest is not an economically viable policy and that the introduction of Zakah as a fiscal instrument is inimical to economic growth.

A dynamic version of computable general equilibrium model (in Walrasian traditions) is presented in this chapter to materialize the objectives. Technically speaking, it is possible to feed any hypothetical or real economy data to the model so specified to serve our purpose. However, to render the exercise more fruitful, we prefer to carry it out for Pakistan economy. The parameters of the model are selected such that the model replicates the existing structure of the economy in terms of the observed data on the relevant variables for a selected year.

We mainly draw upon the following four studies so far as the specification of the model and methodology of analyses are concerned:

- i. BSW- Ballard, Fullerton, Shoven and Whalley (1985)- which is a general equilibrium model developed to evaluate the U.S. tax policies. The important features of the model are reproduced in Shoven & Whalley(1992).
- ii. J.J.Serra-Puche(1979)- which is in the form of Ph.D. dissertation submitted to Yale University and comprises a computational general equilibrium model for the Mexican Economy to analyse fiscal reforms.

- iii. Hassan Imam (1983)- which is a research paper, reprinted in Piggot & Whalley(1985), and evaluates the welfare cost of interest rate ceilings in developing countries (Indian economy) within CGE framework.
- iv. Kemal Dervis et al(1982)- which is a World Bank publication and discusses at length the structures and applications of CGE models, with special reference to Turkey.

While keeping in view these considerations in general, we may deviate from the studies under reference where found necessary; however with due rationalization. In other words we do not confine ourselves to these sources only. We will refer to other important works, where necessary, in the course of model development.

The present exercise is based on the (usual) assumptions and procedures of a competitive market mechanism; some of which reproduced as under:

- i) Consumers maximize their utilities subject to budget constraints, given incomes and commodity prices. This behaviour gives rise to market demands for goods and services.
- ii) Producers minimize their costs subject to a given level of output-mix and factor prices. This behaviour gives rise to factor demands. The technology does not change in the short run.
- iii) Markets clear at equilibrium prices such that pure economic rents are zero.
- iv) Factor endowments are given, and to begin with, the economy is assumed to be on a steady state equilibrium.
- v) Primary factors are assumed to be freely mobile across sectors.
- vi) Saving/investment activities are linked to capital accumulation and growth overtime to capture the dynamic aspects.

The standard practice in the applied general equilibrium analysis is to reduce the dimensionality of the model to factor-price space instead of commodity prices. The units of commodities and factors for the benchmark equilibrium are defined such that the price per unit equals unity. This procedure is helpful in transforming the data, available in value terms, into physical quantities.

BASIC STRUCTURE OF THE MODEL

In this connection, we proceed as under:

- | | | |
|----|------------------------------------|---|
| 1. | Demand Side of the Economy | Intertemporal decision making
Contemporaneous consumption |
| 2. | Treatment of Income | Household Income & Public revenues |
| 3. | Supply Side of the Economy | Production relations
Behaviour of the Public sector
Incorporation of the Foreign sector
The case of Investment |
| 4. | Computation of general equilibrium | Procedures in brief |
| 5. | Alternative Specification | Behaviours in an Islamic Economy |

3.1 The Demand Side of the Economy

The households are assumed to own factors, capital stock and labour time. The capital stock includes all the physical resources¹. Each factor is assumed to be homogeneous and mobile across sectors. The services of these factors are provided to the ultimate users, the production sector and/or governments, against remunerations determined by market forces. These rewards constitute the household's income. A fraction of the income may be saved and the rest allocated to consumption or procurement of commodities to satisfy the current needs. This behaviour leads to demand for commodities meant for consumption and/or investment. Therefore the behaviour of households may be studied in two stages.

3.1.1 Intertemporal decision making

In the first stage of decision making, a typical household is confronted with the problem of allocating its income, net of taxes between present and future consumption. His Intertemporal utility function is generally given as:

¹ Land and other natural resources may be taken as exogenously given. Land as an important factor of production, particularly relevant in Agriculture and Housing sector, can be included in the analysis provided disaggregated data on the household ownership is available. Presently, we confine to capital and labour, following the practice of two factor aggregate and G.E. models.

$$U = U(C_0, S_0) = U(C_0, C_1)$$

C_0 and S_0 represent the composite commodities meant for consumption and saving in the current period. The part of income saved and invested in the current period is expected to generate income that will finance part of consumption in the future. Therefore, C_1 represents the stream of future consumption.

$$C_t = f(C_1, C_2, \dots, C_t). \quad (1)$$

It is customary to use the rate of return on savings determined by the market forces, given by r , as proxy for the rate of time preference of the consumer to discount future receipts. The present real value of the stream of future consumption can be denoted as under :

$$P_t = \frac{P_1}{(1+r)^1} \frac{P_2}{(1+r)^2} \dots \frac{P_n}{(1+r)^n} = \frac{P_t}{\prod (1+r)^t} \quad (2)$$

$$P_t C_t = P_t \sum_{t=1}^n C_t \quad \text{where } t = 1, 2, \dots, n \quad (3)$$

The household may be assumed to have an infinite time horizon and to make "myopic expectations" about the future in the sense that the current state of affairs may prevail in the future dates. As shown by Liviatan (1966), if the price of consumption good in the first period is taken as unity, then it is possible to write:

$$P_t = \frac{1}{\prod (1+r)^t} \quad \text{and as } t \rightarrow \infty, P_t \rightarrow 1/r \quad (4)$$

This implies that the present value of future consumption stream is inversely related to the rate of discount. As such, the value of savings/investment equals the value of the present worth of future consumption at the margin:

$$P_s S_0 = P_i I_0 = P_t C_t \quad (5)$$

The symbols P_s , P_i and P_f in the above relations stand for the price indices of the composite commodities of saving, investment and future consumption respectively.

Present savings are assumed to be transformed into investment goods valuing $P_i I_0$ through the implicit mechanism of the bonds/equities market or intermediation of the banking system. This assumption is necessary to clear the market for investable funds as the pre-requisite of the G.E. framework. The value of new bonds/equities floated in the stock market may be considered as a proxy for the value of investment or new capital goods. It is sensible to assume a single period lag between investment and capital formation to complete the transformation process.

Each unit of capital good is expected to yield " λ " units of capital services and each unit of these services bears a rental price P_k on selling the same to the ultimate user². Thus the total return on existing capital stock is given by $\lambda P_k K$ and that on the new capital given by $\lambda P_k I_0$ in real terms. The income so generated may be utilized to finance part of future consumption: $C_f = (\lambda P_k I_0)$, (6)

The value of future consumption may be expressed in terms of current consumption price to get $P_0 C_f$. Multiplying both sides by P_i and rearranging the terms, we get:

$$P_i I_0 \lambda P_k = P_i P_0 C_f, \quad \text{or} \quad P_i I_0 = \{(P_0 P_i) / (\lambda P_k)\} C_f = P_f C_f \quad (6a)$$

$$\text{or} \quad P_f = (P_0 P_i) / (\lambda P_k) \quad (6b)$$

The rate of return on investment can be calculated as under:

$$\text{Rate of return (absolute)} \quad r^{\wedge} = (\lambda P_k I_0) / (P_i I_0) = (\lambda P_k) / P_i \quad (7)$$

$$\text{Rate of return (relative)} \quad r = (\lambda P_k) / (P_0 P_i), \quad (7a)$$

(measured in units of consumption goods)

It can be easily verified that $P_f = 1/r$

² The share of capital in nominal GDP is $\pi = \lambda P_k K / VA$ which reflects the distribution aspects. The economy-wide capital-output ratio reflecting the production side is given by $u = K/Q$, where Q denotes the total output net of taxes. Then the relation $(\pi/u) * (VA/Q)$ indicates the number of units of services (λ) produced by each unit of capital stock during the accounting period. P_i is assumed to be unity in the benchmark equilibrium.

All the households may not necessarily save a fraction of their income; some of them in the lower income brackets may be debtors even. However the overall private savings cannot be negative as real data reveal.

Keeping in view the above discussion, the Intertemporal preferences of the households may be specified in terms of CES/LES functions. The optimization problem of a typical household (h) may be stated as under:

$$\text{Max. } U_h = [a^{1/\sigma} C_o^{(\sigma-1)/\sigma} + (1-a)^{1/\sigma} S_o^{(\sigma-1)/\sigma}]^{\sigma/(\sigma-1)} \quad \text{s.t. } P_o C_o + P_s S_o = Y_h$$

where " Y_h " is the disposable income of the household concerned, " a " is the weighting parameter and " σ " is the elasticity of substitution between consumption and saving. The resulting demand functions for present consumption and saving are given by:

$$C_o = \frac{a Y^d}{P_o^\sigma [(a P_o^{1-\sigma}) + (1-a) P_s^{1-\sigma}]} \quad (8)$$

$$S_o = \frac{(1-a) Y^d}{P_s^\sigma [a P_o^{1-\sigma} + (1-a) P_s^{1-\sigma}]} \quad (9)$$

We can also express the fraction of income allocated to current consumption and savings or equivalently the expenditure incurred on consumption and investment in nominal terms as under:

$$P_o C_o = \frac{a Y^d}{P_o^{1-\sigma} D_h} \quad P_s S_o = \frac{(1-a) Y^d}{P_s^{1-\sigma} D_h} \quad (8a), (9a)$$

$$\text{where } D_h = [a P_o^{(1-\sigma)} + (1-a) P_s^{(1-\sigma)}], \quad (10)$$

Alternatively the demand for saving/investment goods may be expressed in terms of the rate of return on savings instead of bond/equity prices, using 7(a):

$$P_i I_o = \frac{(1-a)Y^d}{r^{1-\sigma} (\lambda P_k / P_o)^{\sigma-1} D_h} P_s S_o \quad (11)$$

Next we attend to estimation of the utility function parameters for the household concerned while using the benchmark data. In this connection, we have to consider the following relations:

(i) From the demand functions (8) & (9), we have:

$$Y^d / D_h = (P_o^\sigma C_o) / a = (P_s^\sigma S_o) / (1-a) \quad (12)$$

$$\text{or } a = [(P_o C_o) P_o^{(\sigma-1)}] / [(P_o C_o) P_o^{(\sigma-1)} + (P_s S_o) P_s^{(\sigma-1)}] \quad (12a)$$

$$\text{or } a^{-1} = 1 + (P_s S_o / P_o C_o) (P_s / P_o)^{(\sigma-1)} \quad (12b)$$

$P_o C_o$ and $P_s S_o$ can be directly taken from the concerned data on household income and expenditure, however the estimation of P_o depends on further information about the bundle of consumable goods. P_s is a weighted sum of the prices of commodities meant for investment where each price is unity in the benchmark equilibrium. Another unknown is the parameter " σ " which may be estimated by taking into consideration both the APC and the interest elasticity of savings that enters the relationship as under:

(ii) From the demand function (8), we have:

$$\text{APC} = P_o C_o / Y^d = a / P_o^{(\sigma-1)} D_h \quad (13)$$

$$\text{or } a = \text{APC } P_o^{(\sigma-1)} D_h \quad (13a)$$

and from the demand function (11), we have the elasticity of savings with respect to the rate of return as:

$$\eta_s = (\delta S / \delta r)(r/S) = [(\sigma-1) a P_o^{(1-\sigma)}] / D_h \quad (14)$$

$$\text{or } a = \eta_s D_h / (\sigma-1) P_o^{(1-\sigma)} \quad (14a)$$

(iii) Combining (13a) & (14a), we get :

$$\text{APC} = \eta_s / (\sigma-1) \text{ or } \sigma = 1 + \eta_s / \text{APC} \quad (15)$$

for the household concerned.³

³ See for example, Feldstein M., (1978) pp 482-87 for a similar treatment.

Thus, to estimate elasticity of substitution between consumption in present and future, some information about the response of savings to the rate of return is necessary. This needs econometric estimations and/or literature search to get some idea about the real rate of return. Instead, one may use some proxy like the market rate of interest in calculating the elasticities. Once these are known, the weighting parameters of the utility functions can be easily calculated using equation (12b).

The society may include a sizeable proportion of households whose income may not be sufficient enough to finance their present consumption needs even. The behaviour of a typical poor household can be specified as under, again using a CES/LES function:

$$\text{Max. } U_h = [a^{1/\sigma} (C_o - B_o)^{(\sigma-1)/\sigma} + (1-a)^{1/\sigma} S_o^{(\sigma-1)/\sigma}] \quad \text{s.t. } P_o C_o + P_s S_o = Y^d$$

where B_o is a sub set of C_o and denotes the value of consumption goods necessary for sustenance. Constrained optimization of the utility function gives the following demand functions :

$$C_o - B_o = \frac{a(Y^d - P_o B_o)}{P_o^\sigma D_h} \quad S_o = \frac{(1-a)(Y^d - P_o B_o)}{P_o^s D_h} \quad (8)^*, (9)^*$$

Equation (8)* can also be expressed in terms of $P_o Z_o = P_o C_o - P_o B_o$, where $P_o Z_o$ is the consumption level of the household concerned over and above the basic needs and $Y^d - P_o B_o$ is the income available after fulfilling such needs. This is often called the supernumerary income and gives the intercept for the household concerned above the poverty line. It is just possible that $Y^d - P_o B_o$ is equal to or less than zero for some poor sections of the society; and in case of strict inequality, the concerned household may resort to transfer receipts or compelled to raise loans to finance present consumption needs. In that event $(-)P_s S_o = P_o B_o - Y^d$ represents his indebtedness. If $Y^d - P_o B_o = 0$, then $P_o C_o = P_o B_o$ and $P_s S_o = 0$, which means that only basic needs are being fulfilled at the margin. The weighting parameter in this case is given by the following relation, however it is evident that $a = 1$ if there are zero savings:

$$a^{-1} = 1 + [P_s S_o / (P_o C_o - P_o B_o)] (P_s / P_o)^{(\sigma-1)} \quad (12b)^*$$

3.1.2 Contemporaneous Consumption

In the second stage of the two-nested structure, the household concerned is required to allocate his income devoted to current consumption among the commodities available to him at the market prices. His preferences may be represented by a Cobb-Douglas or LES functions. The problem may be written in the general format as :

$$\begin{aligned} \text{Max. } U_c = U(X_1, X_2, \dots, X_m) & \quad \text{s.t. } \sum P_j X_j = P_o C_o = M \\ & \quad \text{where } P_o C_o = Y^d - P_s S_o \end{aligned}$$

The sub-utility function U_c , may be formally expressed in terms of Cobb Douglas(CRS) specification as under:

$$U_c = X_1^{\beta_1} X_2^{\beta_2} \dots X_m^{\beta_m}, \quad \text{with } \sum \beta_j = 1 ; j = 1, 2, \dots, m$$

The optimization problem leads to the commodity demands :

$$X_j = (\beta_j M) / P_j \quad (16)$$

where β_j is the share of the j th commodity in the total expenditure i-e $\beta_j = P_j X_j / M$.

Substituting the demand functions so derived in the contemporaneous utility function, we get the indirect utility function with income and prices as arguments. From this we derive the Expenditure function and the composite price index. The former indicates the level of income necessary for a household to maintain or reach a given level of satisfaction. In fact it is the True cost of living index:

$$\begin{aligned} \text{Indirect Utility Function } V_h &= (\beta_1 M/P_1)^{\beta_1} (\beta_2 M/P_2)^{\beta_2} \dots (\beta_m M/P_m)^{\beta_m} \\ &= M \prod (\beta_j / P_j)^{\beta_j} \end{aligned} \quad (17)$$

$$\text{Expenditure Function } E_h = M = V_h \prod (P_j / \beta_j)^{\beta_j} = P_o C_o \quad (18)$$

The composite price index P_o for the household concerned can be obtained via this procedure without knowing the actual quantities of the commodities meant for consumption. This is a very convenient property of Cobb Douglas function (that holds for the CES function as well) as noted by Shoven & Whalley (1992).

$$P_o = \prod (P_j / \beta_j)^{\beta_j} \quad (19)$$

A similar treatment can be assumed for the poor households.³

The price index for the saving/investment "composite commodity" is a weighted function of the market prices of various commodities acquired for the purpose and it is unity in the benchmark equilibrium. The gross volume of current saving in the economy is given by $P_s S_0$ which is transformed into investment demand for commodities by the production sector via the implicit intermediation of financial institutions and stock markets. These commodities add to the stock of fixed capital by the end of the accounting period. Consequently, the gross investment valuing $P_i I_0$ can be represented as a composite of n-industries outputs each bearing a fixed proportion in the gross value such that:

$$P_i I_0 = P_1 X_{1k} + P_2 X_{2k} + \dots + P_n X_{nk} = \sum P_j X_{jk} = P_s S_0 \quad (20)$$

where P_j is the market price and X_{jk} is the quantity of the jth commodity purchased for capital formation.

Dividing the relation through I_0 , we get:

$$\begin{aligned} P_i &= P_1 (X_{1k} / I_0) + P_2 (X_{2k} / I_0) + \dots + P_n (X_{nk} / I_0) \\ &= P_1 c_1 + P_2 c_2 + \dots + P_n c_n = \sum P_j c_j = P_s \end{aligned} \quad (20a)$$

In the above relation, c_j is the share of the jth commodity in gross investment such that $\sum c_j = 1$, and P_i is the weighted average of various commodities contributed by different industries for investment purpose. The net price of the investment good can be obtained after making corrections for commodity taxation accordingly.

It may be noted that "public goods" are provided by the government to the society free of direct user charge. As such these can be treated as exogenous

³ The contemporaneous utility function for the poor households may be represented by LES(C.D.) specification if the objective is to emphasize on certain necessities, say food, clothing etc.

$$\text{Max. Co} = \Pi (X_i - H_i)^{b_i}, \quad \text{s.t. } \sum P_j X_j = M$$

The demand function for the jth commodity is given by: $X_j = H_j + \{ B_j (M - \sum P_i H_i) / P_j \}$
Here again, H 's represent the minimum requirements of the commodity concerned and $\sum P_i H_i$ is the expenditure incurred on the dire needs, in other words, the income necessary for that purpose. Under this specification the Expenditure function or the true cost of living index is given by: $E_n = \sum P_i H_i + V_n \Pi (P_i / b_i)^{b_i}$

arguments, and although the consumers derive utility from these goods, they have not been explicitly included in the contemporaneous utility functions described above.

3.2 The Treatment of Income

Income is generated in the economy via the contribution of factors to the process of production. In nominal terms, it corresponds to the cost of production. The accrual of income to households or more correctly the personal distribution depends on the ownership rights enjoyed by the entities concerned as well as on the financial set up which plays an important role. The allocation of income towards various ends depends on the behaviour of the consumers as discussed above.

3.2.1 Household Income

The households are assumed to own capital and labour endowments. The labour endowments include all human efforts offered against wage, either fixed or imputed as in case of self-employment. The labour force may be assumed to grow overtime at a constant exponential rate "n" such that $L_{(t)} = L_{(0)} e^{nt}$. The capital endowments include all kinds of non-human assets. The endowments of land and other natural resources are exogenously given and excluded from discussion as mentioned earlier. The services of these factors are hired by the production sector and the governments, at the market rates. This mechanism gives rise to the gross income in the economy:

$$Y \equiv C = P_k K + P_L L \quad (21)$$

The wage income given by $P_L L$ (where $P_L = w$ or wage rate) is distributed among the households according to the human effort/time they contribute to the value added in the economy. However, the distribution of profits or net return to capital, often called the operating surplus in business accounting, may not be strictly proportional to the share of the respective households in the capital stock and investment. This is because the existing financial system discriminates between the return on bonds/debentures and equities as well as within the equities in terms of ordinary and preferred shares. This needs some explanation.

The households investing their savings through proprietorship, partnership or by purchase of equities/stocks of business firms are entitled to the (ex-post) variable rate of return determined by the market forces. It is given by:

$$r = (\lambda P_k)/P_i \quad \text{so that} \quad P_i r = \lambda P_k \quad (7a)$$

Alternatively, the households investing in bonds or depositing their savings in banks are entitled to an exogenously given (ex-antae) or fixed rate of return given by:

$$r^* = (\lambda P_k)/P_i^* \quad \text{or} \quad P_i^* r^* = \lambda P_k \quad (7a)^*$$

where P_i^* is the acquisition price of the investment good from the purchasers point of view. This is exogenously given due to fixity of the rate of interest as compared to P_i , which is the price of investment composite determined by market forces. Put differently, the number of units of services per unit of capital stock in the fixed return system, given by (λ^*) , may be different from the services generated actually in the market (λ) . Therefore, $r^* = (\lambda^* P_k)/P_i$ (7b)*

In case $r = r^*$, which is just a matter of chance, both the bond and equity holders get the same return. On the other hand if the market rate of return happens to fall below or exceeds the fixed rate, then the equity holders have either to bear a loss or entitled to excess income. The loss will be chargeable to their stock of wealth and the profit will be distributed among the shareholders according to their value of their respective shares. The excess value, positive or negative, is given by :

$$\pm XV = \{(r-r^*)/r^*\} \{P_i^* I_o\} \quad (22)$$

This will be added to the indices of wealth of the business owners by the end of the accounting period. It seems plausible to assume that all the varieties of corporate business are owned and managed by the rich households who deserve preferred shares in the profits /operating surplus.

The relationship between the price of investment goods from the supplier(household) and purchaser(business) point of view in this case may be seen

$$\text{easily:} \quad P_i^* r^* = \lambda P_k = P_i r, \quad \text{so that} \quad P_i^* = (r/r^*) P_i \quad (23)$$

$$\text{or} \quad \lambda^* / r^* = P_i / P_k = \lambda / r, \quad \text{so that} \quad \lambda^* = (r^*/r) \lambda \quad (23a)$$

The financial system ordained by Islam does not allow discrimination between r and r^* or equivalently between P_i and P_i^* . The total profits accrued to the business are to be distributed among the partners in proportion to their investment. Of course, every partner is supposed to face the risk and uncertainty equally. This is termed as the profit-loss sharing mode of business or *Musharakah*. Although some other modes of coordination in business are also permissible in *Shariah*, like Principal- Agent contract or *Mudarabah*, however we will restrict to profit-loss sharing scheme in our analysis. The procedure is further discussed in Section 3.5.

We may define an "initial index of wealth" for each household and assume that the aggregate wealth in the society identically equals the value of productive /physical assets or capital endowments. For some poorer sections, this index may be zero or negative, thereby showing the outstanding debts they own. The value of capital stock or total wealth should however be distinguished from the value of services generated by the capital stock. All savings translated into investment during the current period should add to stock of capital and simultaneously to the index of wealth by the end of the accounting period taking care for depreciation allowance. Thus both the capital stock / wealth grow over time at the rate determined by the market forces that determine the flow of savings.

The Islamic economic system introduces a mechanism of redistribution via the operation of *Zakah*. It is admissible at a constant proportional rate to the stock of wealth (of well to do individuals) by the end of the accounting period after allowing for an exemption limit called *Nisab*. The revenues so generated are distributed among the deserving poor and destitute called *Mustahiqeen* according to their needs. In the context of our model, we allow an instantaneous transfer of assets from rich to poor under this programme. The procedure is discussed in Section 3.5.

The gross income of the household concerned then comprises wages and returns from capital assets (rents, rentals, royalties, interests and dividends). If the income tax rate is t_y , the basic tax rebate is B , and the transfer payment/receipt is R , then the disposable income of a typical household, is given by:

$$Y^d = (1-t_y)(Y - B) + R \quad (21a)$$

3.2.2 Public Revenues

The government receives its share in the form of tax and non-tax revenues. Tax revenues include taxes on personal incomes and wealth/property, corporate profits and taxes on commodities. The government may also own a share in the capital income. The non-tax revenues include the imputed income of the property and capital stock held with the government. Besides, the government may run deficits and create additional purchasing power to finance its expenditure.

Total tax revenue is given by: $TR = IT + PT + ST$ (24)

Income tax (personal) $IT = t_y \sum_h \sum_{pop} (Y_h - B)$ (24a)

Corporate income tax $PT = t_k \sum_i \Delta P_k K$, (24b)

Commodity tax $ST = t_c \sum_j P_j FX_j$, $j = 1, 2, \dots, n$ (24c)

where " t_y " is the tax rate, " Y_h " is the household income falling within group "h" and having a given population represented by "pop", and "B" is the basic exemption limit. Likewise " t_k " is profit tax, " $\Delta P_k K$ " is the operating surplus in the "ith" incorporated industry, whereas " t_c " is commodity tax (sales, excise, customs) rate and " $P_j FX_j$ " is the value of final demand for the output of the industry concerned.

3.3 The Supply Side of the Economy

The supply side of the economy may be divided into a number of goods and services producing sectors. The actual production activities may take place under the control of the private and/or the public sector. The goods and services produced in the private sector may be available to the ultimate users against direct charge or price determined by the market forces. Autonomous bodies under state control, however producing marketable goods, may be treated as if plying in the private sector. The commodities provided by the public sector as social goods free of direct charge, may be considered as non-market output.

Production activities involve consumption of intermediate goods/ raw material and services of capital and labour hired from the market as primary factors in the value addition process. The aggregate quantities of these factors at the beginning of

the accounting period are given, whatever the prevailing distribution may be. The production units may be assumed to be cost minimizers in view of their intention to produce a given level of output just sufficient to honour the market demand.

3.3.1 The Production relations

The production function (PF) for a typical sector j , irrespective of whether the sector concerned produces private or public good, may be represented by :

$$Q_j = \min (A_j, VA_j), \text{ where } j = 1, 2, \dots, n$$

which states that the total output Q_j by a particular entity in the sector concerned bears a fixed relationship with the inputs, raw material and factor services, needed in the transformation process. The PF represents these relationships and may be written in the condensed form to show the requirements of inputs per unit output:

$$q_j = \min(X_{ij}/Q_j, VA_j/Q_j) = \min [a_{ij}, v_j(l_j, k_j)]$$

The first argument A_j denotes a column vector of intermediate inputs X 's, required in fixed proportions for the total output. The minimum quantity of an input from the i th industry required per unit output of the j th industry, denoted by $a_{ij} = X_{ij}/Q_j$ is called the technical coefficient and occupies a unique position in the Technical Coefficient Matrix $[A]$ derived from the input-output tables showing X_{ij} and Q_j . The elements along the principal diagonal ($i = j$), show the intermediate consumption by the sector of origin, and those off the diagonal show the transaction taking place among different sector. The rows thus depict the transactions from the sector of origin "i" and the columns show the demand by the sector of destination "j". The matrix may include an extra row and column to represent transactions with the rest of the world.

The Technical Coefficient matrix and its allies exhibit certain interesting features and useful applications. The Activity Analysis matrix, given by $[I - A]$, where $[I]$ is an identity matrix of $(n \times n)$ order, indicates the net output of the sector concerned given by the entries along the principal diagonal and the inputs, with negative signs, by the off-diagonal elements. The inverse of this matrix, often called the Leontief inverse, is useful in deriving the activity levels by considering the final demand for output of the sectors concerned:

$$Q_j = [I - A]^{-1} F X_j \quad (25)$$

$$A \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1j} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2j} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots & \dots & \dots \\ a_{j1} & a_{j2} & \dots & a_{jj} & \dots & a_{jn} \\ \dots & \dots & \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{nj} & \dots & a_{nn} \end{bmatrix} \quad [I \ A] \quad \begin{bmatrix} (1 \ a_{11}) & a_{12} & \dots & a_{1j} & \dots & a_{1n} \\ a_{21} & (1 \ a_{22}) & \dots & a_{2j} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots & \dots & \dots \\ a_{j1} & a_{j2} & \dots & (1 \ a_{jj}) & \dots & a_{jn} \\ \dots & \dots & \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{nj} & \dots & (1 \ a_{nn}) \end{bmatrix}$$

Another matrix formed from the diagonal elements of the Activity Analysis matrix with positive entries along the diagonal and zeros elsewhere, denoted by $[D]$, is helpful in calculating the gross output or the activity level of each sector, provided the net output (NX_j) of the sector is known: $Q_j = [D]^{-1} NX_j$ (25a)

The Activity levels so determined may be used to estimate the total intermediate usage of goods and services: $A Q_j = X_j$ (25b)

The second argument in the production function represents the value added relationships of the primary inputs, capital and labour services, with output. The proportion of value added in the total output remains constant, although the factor services are variable on account of substitution possibilities and variable prices of factors. Thus the coefficient $v_j = VA_j/Q_j$ remains constant like a_{ij} . Depending on the choice of technology, this relationship may be represented by the CES or Cobb-Douglas function. The two functions are often employed in most models for their desirable properties. A fixed coefficient (Leontief type) function is seldom used.

The production/business sectors hire the services of capital and labour factors, owned by the households, from the market. It is customary to assume that, given the market prices of factors and state of the art, the business sector behaves as cost minimizer subject to a given level of output sufficient enough to meet the market demand. This behaviour leads to demand for factors. The optimization problem of a typical competitive firm within the sector concerned may be stated as under:

$$\begin{aligned} \text{Minimize } & C_j = P_k K_j + P_l L_j; & \text{where } & j = 1, 2, \dots, n \\ \text{subject to: } & VA_j = B_j K_j^d L_j^{(1-d)} & & \text{(CD)} \\ \text{or} & VA_j = B_j [d K_j^{-\rho} + (1-d) L_j^{-\rho}]^{-1/\rho} & & \text{(CES)} \end{aligned}$$

In the above relations, "C_j" is the cost function, "ρ" is the substitution parameter which defines the elasticity of substitution between capital and labour in the sector concerned as : $\sigma = 1 / (1 + \rho)$, "d" is the distribution or factor intensity parameter and "B" is the efficiency or scale parameter defining the units of measurement. The factor demands per unit of output, using different specifications, are given by:

$$l_j^f = L_j / VA_j = \frac{1}{B} \left[\frac{(1-d) P_k}{d P_l} \right]^d \quad (26) \text{ for C.D.}$$

$$k_j^f = K_j / VA_j = \frac{1}{B} \left[\frac{d P_l}{(1-d) P_k} \right]^{(1-d)} \quad (26 a)$$

$$l_j^f = L_j / VA_j = \frac{1}{B_j} \left[(1-d) + d \left[\frac{(1-d) P_k}{d P_l} \right]^{\rho/(1+\rho)} \right]^{1/\rho} \quad (27) \text{ for C.E.S.}$$

$$k_j = K_j / VA_j = \frac{1}{B_j} \left[d + (1-d) \left[\frac{d P_l}{(1-d) P_k} \right]^{\rho/(1+\rho)} \right]^{1/\rho} \quad (27a)$$

It can be shown⁴ that CES specification converges to C.D. as the substitution parameter tends to zero, or equivalently, as the elasticity of substitution becomes unity. On the other hand, it converges to fixed coefficient function as the elasticity of substitution becomes zero.

As stated earlier, we are considering two factors in the production relations of the model. The derived factor demands depend on the market prices and the solution

⁴ Please refer to Chiang, A.C.(1984) Third printing, pp 428-30 for proof.

algorithm finds these values under competitive conditions. The vector of the number of units of factor services(l_j and k_j) per unit output (q_j) of the commodity, may be shown as under:

$$V = \begin{bmatrix} v_1 l_1 & v_2 l_2 & \dots & v_j l_j & \dots & v_n l_n \\ v_1 k_1 & v_2 k_2 & \dots & v_j k_j & \dots & v_n k_n \end{bmatrix}$$

It is necessary to estimate the parameters of the value added functions. The most crucial one is the elasticity parameter which has to be picked up exogenously. The share/distribution parameters can be calculated from the benchmark data utilizing the results of the first order condition of the optimization problem.

$$d_j = \frac{KL}{[(P_l/P_k) + KL]} = \frac{P_k K}{P_k K + P_l L} \quad \text{for C.D.} \quad (29)$$

$$d_j = \frac{[KL]^{1-p}}{(P_l/P_k) + [KL]^{1-p}} = [(P_l L) / (P_k K) \cdot (KL)^{-p} + 1]^{-1} \quad \text{for CES} \quad (29a)$$

Since each price is equal to unity in the benchmark equilibrium, therefore P_l/P_k appearing in the above reduces to unity. The calculation of B_j is then straight forward.

$$B_j = VA_j / \text{Functional form.} \quad (30)$$

It is to be noted that proper correction has to be made to the above system to incorporate taxation on capital income (corporate taxes) if any, and depreciation allowance.

The total cost of production is the sum of Intermediate input cost and factor cost, the later comprising wage bill and rentals. A stochastic element to represent exogenous shocks may be introduced in the cost function but we bypass this aspect in the model. In competitive set up, the after-tax pure economic profits are assumed to be zero. As such the total revenues should at least equal total cost and the price of the commodity should be equal to the marginal/average cost:

$$P_j Q_j = \sum a_{ij} P_i Q_i + P_l L_j + P_k K_j \quad (31)$$

$$\begin{aligned}
 \text{or } P_j &= \sum a_{ij} P_i Q_j / Q_j + P_l L_j / Q_j + P_k K_j / Q_j \\
 &= \sum a_{ij} P_i + v_j (P_l * l_j + P_k * k_j) = A c_j \quad (31a)
 \end{aligned}$$

(since $l_j = L_j / VA_j$, $k_j = K_j / VA_j$ and $v_j = VA_j / Q_j$)

The Leontief inverse when transposed and post multiplied by the vector of value added and factor prices gives the vector of producer's prices for n-industries:

$$\begin{aligned}
 \text{Thus } P_1 &= a_{11} P_1 + a_{21} P_2 + \dots + a_{n1} P_n + v_1 (l_1 P_l + k_1 P_k) \\
 P_2 &= a_{12} P_1 + a_{22} P_2 + \dots + a_{n2} P_n + v_2 (l_2 P_l + k_2 P_k) \\
 &\vdots \\
 P_j &= a_{1j} P_1 + a_{2j} P_2 + \dots + a_{nj} P_n + v_j (l_j P_l + k_j P_k)
 \end{aligned}$$

$$\text{or } [I - A'] P = V' W, \quad \text{or } P = [I - A']^{-1} [V'] W \quad (32)$$

where P and W are vectors of commodity and factor prices, A' is the transposed matrix of technical coefficients and V' is the transposed matrix of primary inputs. Once the primary inputs are determined through equilibrium factor prices, the producer's prices are determined automatically.

It may be noted that real economy data show differences in the classification regarding consumer and producer goods. For example, flour, energy/fuel and bakery services etc are treated as producer goods; whereas bread is a consumer good which requires fixed amounts of the producer goods cited above per unit. In more advanced studies, a fixed coefficient transition matrix Z is used to bridge/translate the n-industrial goods into m-household commodities such that $X_m = \sum z_{jm} Q_j$, where the coefficient z_{jm} shows the amount of producer good Q_j needed to accomplish one unit of consumer good X_m . Similar relationships hold among the prices of the commodities concerned:

$$P_m = \sum z_{jm} P_j, \quad (33)$$

where P_j is the price of Producer's commodity Q_j and P_m is the price of Consumer's commodity X_m , both net of sales taxes. The gross of tax price paid by the households are given by :

$$P_m^* = P_m (1 + t_m) \quad (34)$$

3.3.2 The Behaviour of Public Sector

Modelling the behaviour of Public sector is a difficult and controversial avenue in the applied general equilibrium literature. Many modelers including BSW(1985), Serra-Puche (1979) treat Government as a consuming entity which, like the households, is assumed to maximize its utility subject to the budget constraint given by the tax and non-tax revenues. The utility function is either represented by a smooth Cobb Douglas or a fixed coefficient Leontief function, taking commodities as arguments. This specification of Govt. behaviour looks strange and has been seriously criticized from many angles⁵. In addition, conceptual difficulties may arise in constructing the so called utility function to represent the true behaviour of the Public sector.

In view of the above, we propose to model the behaviour of the Public sector, (often described as public administration and defence in the National Accounts) by giving it the status of an industry/producing unit. The Government is constitutionally obligated to provide a composite commodity "public service/social good" to the society upto a level determined by the parliament, the cost of which is shown as Government consumption in the National accounts. This composite commodity can be related to a fixed-coefficient matrix of social goods like Administration, Defence, Law & Order, Judiciary, Social - Economic & Community services etc. A considerable fraction of this commodity is produced by organizations plying under direct control of the government and the rest is acquired from the market. As such, the industry within the public sector provides its share by hiring the services of labour and capital factors available in the economy at the market prices.⁶

⁵ See the comments on Serra Puche model for the Mexican Economy(1983) by Sherman Robinson, in Scarf & Shoven(Ed) (1984)--Applied General Equilibrium Analysis-

⁶ The treatment of the public sector in the Feltenstein (An Intertemporal Gen Equilibrium Analysis of Financial Crowding Out. J.P.E. 31 ,1986) is similar, however more complicated.

The cost of activities in the public sector is given by:

$$C_g = P_l L_g + P_k K_g, \quad (35)$$

which is to be minimized subject to the exogenously determined level of value added in the public sector. The value added and the level of employment in this case can be easily known from the National Accounts. Assuming that the share of Government consumption in Aggregate demand (GDP) remains more or less constant, and using a Cobb Douglas specification for the value added function, the demand for factors and the "price" for the composite social good can be determined following the routine procedure. A major part of the total cost incurred on the production/provision of the social good is given by the current account of the budget and financed through taxation where a minor portion may be born by households equal to the marketable output. A part of the total revenues may, however, be transferred to the society as social insurance.

As the tax rates are exogenously fixed, the government may run a deficit or surplus. The fact that Govt. may run deficits can be incorporated in the model, following Serra-Puche (1979), by introducing the concept of an imaginary commodity "capital tomorrow" provided by the public sector through external borrowing or issuance of new money.

State enterprises producing/supplying private goods against direct charge may be treated as ordinary businesses/functionaries under the administrative control of the Government as cited earlier.

3.3.3 Incorporation of the Foreign Sector

Transactions with the rest of the world (ROW) may be shown as a separate column and a row in the activity analysis matrix. This sector is assumed to demand goods and non-factor services from the domestic economy, thereby denoting exports and shown in the respective column of the matrix. It also demands labour services from the domestic economy and the remunerations accrue to the households as foreign remittances. The foreign sector adds some value equivalent to the current account deficit (via a C.D./CES function while employing its own capital) and finally

supplies the composite commodity to the domestic economy in the form of imports. The market value of imports includes the tariffs. The imported goods may be demanded for intermediate consumption (shown in the respective row of the matrix) as well as for investment and household consumption.

Although the above treatment is simple and easily manageable, nonetheless, it has a drawback. It does not allow flexibility in the import-export ratio and therefore, does not contain an endogenous mechanism to rectify deficits in balance of trade overtime. Anyhow, this 'cost' relieves us from the complexity of defining the behavioural functions regarding imports (domestic demand) and exports (supply abroad) that need detailed information about elasticity parameters. Further, this specification is compatible with the existing balance of payments (BOP) situation in Pakistan.

In a dynamic set up, the perpetual deficit on the current account of BOP accumulates over time and eventually leads to non-sustainable foreign debt. The factual data in Pakistan depicts such an explosive position. The best policy is to curtail luxurious imports exclusively and to determine a sustainable growth rate for exports. All other options like the imposition of import quota or increase in the tariff rate or devaluation of currency etc. bear only limited impacts on the final outcome.

3.3.4 The case of Investment

Investment plays a dual role in the economy ala Harrod-Domar (1939, 1965). It is an essential ingredient of aggregate demand in the short run. Further it leads to increase the productive capacity of the economy in the long run. In G.E. models, the usual assumption regarding the market clearing condition implies that all savings are instantaneously transformed into investment goods ($I = S$). The saving/investment commodity valuing $P_s S_o = P_i I_o$ is a composite of the n-industry output; and, following BFSW (1985), these outputs go into the composite in fixed proportions given by the observed benchmark data on total investment from each industry. The share of each industry's output in total investment is given by :

$$c_i = P_i X_i / P_i I_o, \quad (36)$$

where P_i is the producer's price discussed earlier.

The treatment of investment in applied general equilibrium models may take different forms. The usual practice of constructing National Accounts is to consider it on the demand side. In the material balance equation, the total output of each sector (and hence that for the entire economy) should match aggregate demand; which in turn comprises the sum of intermediate demand and final demand. The latter comprises private & public consumption, investment demand and foreign sector's net demand (exports - imports). Investment is further bifurcated as fixed capital formation and changes in stocks/inventories. An element of capital consumption or depreciation is also included. This approach is easier to follow keeping in view the availability of data. As such all sectors are supposed to produce commodities which can be simultaneously used for consumption and investment purposes. This approach has been followed in BSW (1985) and Serra-Puche (1979). However, the latter being a static model, therefore, treats investment very briefly and doesn't study its future implications..

The alternative (supply side) approach is to segregate the producing units carefully into consumers and capital goods sectors according to the nature of commodities they produce/supply. The total value of output in the capital goods sectors then represents gross investment taking place in the economy during the accounting period. These goods may be demanded by households, production sector and the government, and a fraction may be exported as well. This approach has been adopted by H. Imam (1983), following Fel'dman and Mahalanobis models for USSR and Indian economies respectively. Although this approach is preferable to the former for its clear vision, however, the difficulty arises in drawing a line of demarcation between the commodities meant for consumption and for investment. Besides the data constraints may pose serious problems. Therefore we follow the demand side approach for the sake of convenience⁸.

⁸ In practice, capital consumption or depreciation is considered a part of total production / value added costs and therefore, it gets included in the producer's prices of the commodities offered for sale. Further, the volume of gross investment in Pakistan exceeds domestic savings; rather it equals national savings which includes a considerable fraction of foreign investment or

A fraction of gross investment is allocated to replacement costs (with ψ as the depreciation rate) and the rest is utilized to build up new capital stock during the year.

$$I_t = (K_{t+1} - k_t) + \psi K_t. \quad \text{Investment} \Rightarrow \text{capital formation} \quad (37)$$

$$I_t = S_t \quad \text{equilibrium condition} \quad (37a)$$

$$S_t = W_{t+1} - W_t \quad \text{Saving} \Rightarrow \text{Increase in wealth} \quad (37b)$$

Parallel to capital accumulation, there is an increase in wealth of the society as the households purchase financial assets from the stock market. The new capital stock renders additional services and thereby entitles the households to a higher income available for future consumption. With this specification, the capital stock grows over time , and it should be in line with the growth rate of labour force if the economy is to remain at a steady state equilibrium path. Any change in public policies may disturb this path and the economy may take some time to be on steady state again. Comparative dynamic analysis are then in order for the two equilibria in terms of allocation, distribution and growth.

3.4 Computation of General Equilibrium

All the economic agents respond to the market prices. Given the factor endowments and preferences of the households, the demand for commodities for final consumption can be calculated. Likewise the demand for commodities for the purpose of investment and for intermediate use by the industries can be determined via the input-output information. The aggregate demand for each commodity should equal the activity level of the sector concerned if the markets have to clear at the equilibrium prices. The derived demands for primary factors by the agents (business, government and ROW) are obtained and the excess factor demands are calculated. Walras law then implies that the sum of all excess demands is zero. The dimensionality of the solution space is greatly reduced by working in factor space instead of commodities space. We reproduce important steps meant for reduction of the dimensionality from Shoven and Whalley (1992) with some modification as under for ready reference:

1. Normalize prices such that $w + r + t = 1$ (38)
2. Determine factor demand per unit output via cost minimization procedure:
 $l_j = L_j / Q_j = f(w, r, t)$ and $k_j = K_j / Q_j = g(w, r, t)$, $j = 1, 2, \dots, n$ (39)
3. Compute producer's prices (per unit cost) using the zero profit condition:
 $p_j(w, r, t) = w l_j(w, r, t) + r k_j(w, r, t)$ (40)
4. Calculate unit value of consumer goods using the transformation matrix:
 $p_m = \sum z_{jm} p_j$ (41)
5. Calculate market prices of commodities (sales taxes inclusive):
 $p_m^* = p_m (1 + t_m)$ (42)
6. Estimate household disposable income, given the factor endowments:
 $Y_h = (1 - t_y)(w L_h + r K_h)$ (43)
7. Evaluate commodity demands per household in terms of factor prices:
 $X_h = x(p_m^*, t_m, Y_h)$ and sum up over (h) $X_m = \sum X_h$, $h = 1, 2, \dots, m$ (44)
8. Find Aggregate demand for producers goods using transformation once more:
 $Q_j = 1 / Z_{jm} X_m = q(w, r, t)$ (45)
9. Calculate derived factor demand as functions of factor prices:
 $L_j = l_j(w, r, t) \cdot Q_j$ and $K_j = k_j(w, r, t) \cdot Q_j$ (46)
10. Evaluate aggregate excess factor demands:
 $\xi_{(l)} = \sum L_j(w, r, t) - \sum L_h$ and $\xi_{(k)} = \sum K_j(w, r, t) - \sum K_h$ (47)
 Walras's Law implies that sum of excess demands is zero at equilibrium:
 $\xi_{(l)}(w, r, t) + \xi_{(k)}(w, r, t) = 0$ (48)

The fixed point algorithm is a search process for factor prices within the normalized range and equilibrium is established at the point where excess demands are zero (or very nearer to zero). At these prices, the quantities are calculated immediately by the computer programme.

3.5 Alternative Specification for an Islamic Economy

The prime objective of the study is to evaluate the implications of Islamization programme in terms of economic indicators. The process involves certain fundamental changes in the system through appropriate public policies that lead to elimination of interest from financial transactions and enforcement of Zakah. To materialize this objective, we refer back to sub-Section 3.2.1 of this chapter and introduce the following parametric changes on the distribution side in the basic model described above. We keep the basic structure of the model regarding utility maximization behaviour of the households and cost minimization behaviour of the business sector unchanged. Similarly all taxes on income and commodities may remain in operation as usual.

1. *Zakah* at a constant proportional rate of 2.5%, chargeable to the household financial wealth⁹ will be incorporated in the model leading to transfer of capital assets from the rich to the poor income groups by the end of each accounting period. This mechanism will enhance the index of wealth of the poor class proportionately and will entitle them to higher level of income (or enable them to attain higher levels of utility) in the following periods. This re-distributive scheme is expected to leave the economy with a more equitable distribution of income, an enhanced rate of saving and investment and higher growth of GDP in the long run, besides an improved allocation of resources reflected by the price indices and utility levels.
2. In the Islamic financial system, the households are free to invest their savings through proprietorship, equity participation (*Musharakah*), principal-agent operation (*Mudarabah*) or other modes of financing investment otherwise permissible in *Shariah*. Financial transactions on the basis of a pre-determined and certain rate of interest, payable to the lender, with all the risk and

⁹ Although Zakah is chargeable to the value of all traded commodities, minerals, herds of live stock, jewelry and all forms of hidden as well as revealed wealth from the *Shariah* standpoint; we may, however, confine to revealed wealth or capital assets in our model due to data constraints.

uncertainty in business to be born exclusively by the borrower, are strictly prohibited in an Islamic economy¹⁰. For the sake of manageability, however, we restrict to equity-participation mode to substitute debt-based financing mechanism in the model¹¹. The total return on capital given by $\Pi_k = r K$ will be distributed among the shareholders in proportion to their respective shares such that $\Pi_k = \sum \gamma_i$, where γ_i is the share of *i*th household. The average rate of return to investment (given by $r = \lambda P_k / P_i$) as determined by market forces may be variable overtime. It may be used as proxy for the rate of time preference appearing in the Intertemporal utility considerations of the consumers.

Hopefully, the above modifications in the model will help in getting to our aim. The model may be used to project the future profile of the economy. General Equilibria will be computed for future 10-20 years under the following scenarios to facilitate mutual comparison. The simulations under alternative scenarios may then be compared in terms of key micro and macro indicators, income distribution, growth rate of saving and investment and allocative efficiency etc.

1. Maintaining the status quo with the prevailing (base year) tax/expenditure structure and financial transactions revolving around the institution of interest.
2. Plugging of Zakah only in the model as a fiscal instrument of redistribution while keeping the rest of the system unchanged.
3. Replacing the fixed rate of interest by the variable rate of return on the distribution side that alters the household portfolio decisions, while retaining all other features in tact.
4. Finally, replacing the prevailing fiscal system as well as the financial mechanism of the basic model simultaneously by incorporating Zakah and substituting interest with the variable rate of return to study the behaviour of the target indicators.

¹⁰ This prohibition can be equally rationalized by referring to the prevailing distribution mechanism in which the ordinary savers, although contributing a sizeable proportion to the aggregate investment, are paid according to a minimal rate of interest whereas the excess value is appropriated by the owners of business.

¹¹ The financial institutions may assume the shape of investment companies floating their equities in the stock markets like other business companies. Alternatively they may be allowed to nominal service charges for their intermediation role.

CHAPTER 4

DATA CONSIDERATIONS : 1

(Production, Aggregate Demand)

Applied General Equilibrium models require disaggregated and microconsistent data on almost all sectors of the economy. The availability and compilation of such a comprehensive data set in developing countries is surely a difficult task; if not impossible. The data are scarce and often unreliable. Further the data on the same variables but from different sources seldom compromise. Compilation of an appropriate data set for the purpose seems to be a cumbersome and laborious part of research work. Therefore an extensive effort is required in collection of the data and its subsequent adjustment so as to ensure micro-consistency.

The important sources of published data on the economy of Pakistan, most relevant to the present study, are:

1. The "National Accounts" prepared by the Federal Bureau of Statistics, Economic Affairs & Statistics Division, Islamabad, which are published on yearly basis.
2. The "Pakistan Economic Survey" prepared by the Economic Adviser's Wing, Finance Division, Islamabad in collaboration with the FBS; published on yearly basis.
3. The "Input-Output or Supply & Use Tables" compiled by the respective section within FBS; the first publication is available for 1984-85 and that for 1989-90 is still awaiting publication. The document is planned to be published on 5-yearly basis.
4. The "Household Income & Expenditure survey- now called the Household Integrated Economic Survey" compiled by the respective section within FBS;

which used to be published on yearly basis upto 1987-88 and thereafter designed to be published on 3-yearly basis from 1990-91 onwards.

5. The "Annual Report" and the "Statistical Year-Book" which are published by the State Bank of Pakistan, Karachi on yearly basis.
6. The "Annual Budget" or the budget estimates prepared by the Finance Division, Islamabad; the revised and actual figures for the concerned years are reproduced in the National Accounts, Pakistan Economic Surveys and other official documents.
7. The "CBR Year-Book", published by the Central Board of Revenues, Islamabad on yearly basis which is the reliable source for data on taxation.
8. The "Government Finance Statistics Year-Book" published by the IMF; which provides the actual statistics on Revenues, Expenditures and deficits.
9. The "International financial Statistics" published by the IMF on monthly basis; which provide information on trade, BOP, capital inflow, Foreign exchange situation etc.

Next we turn to the main task and discuss data information on various aspects of the economy according to the following order. We handle the production and aggregate demand side in this chapter, in the following order:

- | | | |
|----|--|--|
| 1. | Basic (Macro)Statistics | The available information
Comparability of data from different sources |
| 2. | Production Statistics
(Modifications) | Mining and quarrying
Construction
Housing
Depreciation, overall
Banking and insurance
The Public sector
Modified picture - gross value added |

which used to be published on yearly basis upto 1987-88 and thereafter designed to be published on 3-yearly basis from 1990-91 onwards.

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- | | | |
|----|--------------------------------|---------------------------------|
| 3. | International Trade Statistics | Final position of I/O structure |
| 4. | Expend. on GDP/Agg demand | Final shape of the economy |

The remaining data information will be discussed in the next chapter.

4.1 Basic (Macroeconomic) Statistics

The major sources of information for our concern, as stated above, are the National Accounts and the Input-Output tables. The latter provide balanced data on the inter-industry transactions and output for final use. The 1989-90 tables, called SUT (Supply and Use tables) are in the manuscript form and await final considerations and comments of the experts before publication. However the methodology and approach as well as classification & subdivision of industries etc. resemble closely to that adopted in the 1984-85 tables (already published). The differences pertain only to changes in the data overtime, input structures and certain behaviours of the economic agents. Therefore we prefer to adopt from the 1989-90 tables, being the latest. However we may adjust the figures, where necessary, to ensure some correspondence between the tables and the National Accounts.

4.1.1 The Available Information:

We discuss the I/O information with reference to 1989-90 tables. The economy is disaggregated into nearly 86 sectors. About 64 sectors are commodity producing to cover Agriculture, Mining & quarrying, Manufacturing, Electricity & Gas distribution and Construction industries. The remaining sectors cover services like Trade/Commerce, Transport & Communications, Banking & Insurance, Housing, Public Administration & Defence and Other (community, social, business services). Besides the intermediate input structure, the tables provide information on the various components of the GDP (or gross value added) in the respective sectors; like the

indirect taxes, depreciation, compensation of employees and operating surplus (the last item comprises rents, rentals, interest and profits etc. and adopted as residual). On the use side, the tables allocate the net output of the sectors concerned towards private/household consumption, Govt. Expenditure, gross fixed capital formation, changes in stocks, investment demand and exports. The imports fill up the gap between domestic supply and demand.

To comply with the programming facility available at hand, we propose to reclassify and aggregate the supply side of the economy dealt with in I/O tables into 17 sectors as under:

<u>Sector</u>	<u>Sub-sector</u>	<u>I/O Subdivision</u>
i. Agriculture	1. Crop sector I/O branches	1-13
	2. Non-crop	14-16
ii. Mining & Quarrying	3. One sector	17-20
iii. Manufacturing	4. Food Processing	21-28
	5. Textile & Footwear	29-39
	6. Chemicals, Petroleum etc	42-47
	7. Cement & ceramics	48-50
	8. Machinery & Metal works	51-56
	9. Other Manufacturing	40-41, 57-60
iv. Energy	10. One sector	61-63
v. Construction	11. One sector	64
vi. Services	12. Trade & Commerce	65-66
	13. Tpt. & Communication	68-73
	14. Financial Services	74-78
	15. Housing	79-80
	16. Pub. Admin. , Def., Edu. & Health	82-84
	17. Other Services	67,81, 85-86

The Inter-industry flows of commodities (in value terms) derived from the I/O tables according to the proposed aggregation are presented in Table-4.1 and the components of value added in Table 4.2. The figures are given at the purchaser's or market prices and do not include the international transactions. As usual, we read the supply of the sector concerned along the respective rows and the demand by the sector concerned along the respective columns. In other words the sectors of origin are depicted in the rows (left most column) and the sectors of destination are shown in the columns (topmost row). All figures are expressed in terms of Rs. million.

TABLE - 4.1 Inter-Industry Transactions (derived from I/O tables)

Sector or Industry	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	16,332	27,732	00	55,514	24,507	1,012	02	09	886	00	00	00	1,863	00	00	145	823
2	4,878	913	155	10,971	7,496	1,349	346	09	1,034	00	00	23	62	00	01	31	5,386
3	01	14	23	38	36	29,082	4,300	5,319	13	6,616	2,713	08	01	03	11	74	60
4	11	5,652	19	8,857	555	1,407	48	113	511	02	152	733	808	01	540	215	5,323
5	1,230	540	29	2,673	64,977	1,540	10	97	1,110	07	51	258	31	08	29	971	258
6	23,051	2,189	1,552	2,712	12,392	21,645	2,583	2,015	3,332	3,672	7,119	901	29,694	07	815	3,580	1,679
7	00	00	00	93	06	130	878	186	716	00	28,484	144	31	00	00	05	84
8	4,126	432	494	1,369	1,552	891	256	33,916	1,925	4,082	8,584	327	7,050	22	77	30,853	1,568
9	49	74	262	4,319	1,660	1,137	1,052	481	8,750	301	1,451	796	1,670	744	635	1,357	220
10	5,030	1,041	171	3,512	9,223	3,219	3,083	1,578	2,009	3,596	07	1,316	458	498	632	1,830	2,071
11	00	165	385	141	231	136	28	94	67	04	00	21	1,178	00	00	5,533	194
12	15,414	21,595	439	34,690	14,856	17,493	605	2,480	6,765	78	202	202	84	118	397	2,573	239
13	7,041	4,694	1,897	6,108	7,284	5,225	1,248	6,844	1,717	455	972	4,010	2,756	734	1,146	7,270	1,428
14	00	00	261	686	3,090	474	161	790	594	67	157	1,207	288	18,388	09	06	110
15	00	00	06	284	477	120	83	255	338	06	00	4,879	1,032	2,190	41	2,302	2,086
16	00	12	03	18	58	23	02	08	01	00	00	03	00	01	02	222	106
17	115	459	644	821	1,978	1,157	266	863	374	263	78	735	2,631	1,025	1,071	9,747	831
Interm Inpts	77,278	65,512	6,340	132,806	150,378	86,040	14,951	55,057	30,142	19,149	49,970	15,563	49,637	23,739	5,406	66,714	22,466
Value Add	125,124	87,891	28,246	45,267	42,192	19,181	16,641	20,287	12,113	30,442	33,286	99,876	60,871	5,412	75,203	69,858	26,000
Total Cost	202,402	153,403	34,586	178,073	192,570	105,221	31,592	75,344	42,255	49,591	83,256	115,439	110,508	29,151	80,609	136,572	48,466

TABLE -4.1 Continued - Disposal of Activities (derived from I/O tables)

Sector or Industry	Interm. demand (i)	Private Consump (ii)	Govt. Consump (iii)	Total Investmt (iv) #	Exports(fob) (v)	Imports (cif) (vi)	GDP(mp) Agg.Demd (vii) ii + iii + iv + v - vi	Domestic Supply (viii) i + vii	Total Resources (ix) i + ii + iii + iv - v + vi
1	128,825	82,609	00	1,384	1,597	12,001	73,589	202,414	223,222
2	32,654	120,121	00	06	2,271	1,368	121,030	153,684	151,878
3	48,312	496	00	2,281	992	15,884	- 12,115	36,197	65,981
4	24,947	163,794	00	1,888	8,882	21,145	153,419	178,366	202,892
5	73,819	37,054	00	1,909	84,883	4,630	119,216	193,035	32,529
6	118,938	35,353	00	1,136	1,663	51,532	- 13,380	105,558	205,296
7	30,757	1,418	00	459	248	1,196	929	31,686	33,582
8	97,524	7,775	00	79,302	2,714	111,071	- 21,280	76,244	292,958
9	24,958	16,759	00	4,580	2,829	5,727	18,441	43,399	49,195
10	39,274	10,395	00	18	04	102	10,315	49,589	49,785
11	8,177	6,995	00	68,090	00	00	75,085	83,282	83,262
12	118,230	725	00	1,554	63	5,122	- 2,780	115,450	125,568
13	60,829	25,433	00	00	22,314	00	47,747	108,576	63,948
14	26,288	1,467	00	00	00	00	1,467	27,755	27,755
15	14,099	66,508	00	00	00	00	66,508	80,607	80,607
16	459	15,447	120,754	20	09	124	136,106	136,565	136,795
17	23,058	35,933	53	431	04	11,011	25,410	48,468	70,482
Intrm Inputs	871,148 *	628,282 *	120,807 *	163,058 *	128,473 *	240,913 *	799,707	1670,855 *	1895,735
Value Added	797,890 *								
Total Cost mp	1669,038 *								

Notes : # Total Investment aggregates gross fixed capital formation and changes in stocks. * Figures with aesteriks are our derivations from the tables.

The reported figures in the I/O tables against macro-aggregates are : Interm inputs = 872,636, Value added = 794,544, Total input cost = 1667,180, Private Consumption = 628,284, Govt.Consumption = 120,806, Exports(fob) = 128,472, Imports(cif) = 240,911, Domestic Supply. = 1672,344

TABLE -4. 2 Composition of Value Added (derived from I/O tables)

Components of V. Added	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
Indirect Taxes (domestic)	1,539	19	8,316	19,940	542	3,425	5,593	1,412	872	2,042	1,235	4,662	1,178	05	233	102	815	51,930
Customs (net)	2,177	248	2,882	3,836	840	9,348	217	20,149	1,039	19	00	929	00	00	00	22	1,998	43,704
Total Ind. Taxes	3,716	267	11,196	23,776	1,382	12,773	5,810	21,561	1,911	2,061	1,235	5,591	1,178	05	233	124	2,813	95,634
Depreciation	4,343	4,522	2,890	3,151	6,278	2,236	1,425	2,578	1,548	4,554	8,701	2,816	8,891	714	19,244	3,194	4,388	81,473
Compensation of Employees	36,742	8,941	6,199	5,347	14,615	4,861	3,412	7,135	3,844	1,328	14,784	4,319	17,927	11,605	2,437	61,151	6,200	210,847
Operating Surplus	82,500	74,409	10,841	16,829	20,757	8,659	6,211	9,162	5,849	22,518	8,566	88,079	32,875	-6,912	53,289	5,411	14,597	453,640
Prim. Factor Cost	119,242	83,350	17,040	22,176	35,372	13,520	9,623	16,297	9,693	23,846	23,350	92,398	50,802	4,693	55,726	66,562	20,797	664,287
Value Added (f.c)	123,585	87,872	19,930	25,327	41,650	15,756	11,048	18,875	11,241	28,400	32,051	95,214	59,693	5,407	74,970	69,756	25,185	745,960
value Added (mp)	127,301	88,139	31,128	49,103	43,032	28,529	16,858	40,436	13,152	30,461	33,286	100,805	60,871	5,412	75,203	69,880	27,998	841,594
Value Added * (mp)	125,124	87,891	28,246	45,267	42,192	19,181	16,641	20,287	12,113	30,442	33,286	99,876	60,871	5,412	75,203	69,858	26,000	797,890

* Excluding customs

I/O Reported Figures are : Depreciation = 81,093, Wages = 209,289, Op. Surplus = 452,232, V.A.(excluding customs) = 794,544

4.1.2 Comparability:

The information derived from the I/O tables as above can be compared with the National Accounts, of course, both being the official sources. Besides the statistical discrepancies, errors and omission, the following observations are in order. A minor statistical error due to aggregation may be noted in the reported figures of the I/O tables and those derived by us from the tables on reclassification and shown in the tables:

(a) Value Added (m.p) :

<u>Sector</u>	<u>I/O Tables (Reptd)</u>	<u>I/O Tables (Derived)</u>	<u>National Accounts</u>
Agriculture	211,455	211,457	197,441
Agri. Crop	123,585	123,582	115,065
Agri. Non-Crop	87,872	87,872	82,376
Manufacturing	123,899	123,897	132,329
L.Scale	83,795	-	93,729
S.Scale	40,104	-	38,600
Mining	19,930	19,930	5,403
Elect. & Gas	28,400	28,400	21,470
Construction	32,052	32,051	32,052
Trade	95,215	95,214	129,135 *
Tpt & Commun.	57,751	59,693	60,487
Bank. & Insurance	5,407	5,407	21,434
R.estate & Dwell.	74,970	74,970	34,126 **
Pub.Admn & Def.	69,756	69,756	69,115
Other Services	25,186 ***	25,185	56,859
GDP(fc)	744,021	745,960	759,851
Indirect Taxes	95,634	95,634	96,092
GDP (mp)	839,655	841,594	855,943

Notes : * N.A. aggregate Hotels & Restaurants with trade.

** N.A. exclude Real estates.

*** I / O aggregate Hotels & Restaurants with other services.

There are huge differences in the estimates given by the I/O tables and National Accounts (N.A) against the sectors Mining, Trade, Banking & Insurance, Real estates & Ownership of dwelling and other services . The explanation for the differences in

case of Mining and Financial sector follows shortly. So far as the treatment of hotels & Restaurants is concerned, this sub-sector is aggregated with the Wholesale & Retail Trade in the N.A. and aggregated with Other Services in the I/O tables. Secondly the N.A. provide estimates on the Ownership of dwellings only and (perhaps) aggregates the Real estates with other services.

(b) Expenditure on GDP -- Aggregate Demand :

<u>Head</u>	<u>I/O Tables (Reportd)</u>	<u>I/O Tables (Derived)</u>	<u>National Accounts</u>
Private Consumption	628,284	628,282	611,015
Govt. Consumption	120,806	120,807	129,562
Fixed Cap. Formation	155,075	155,073	148,076
Changes in stocks	7,981	7,985	14,000
Exports(G & NFS)	128,472	128,473	126,583
Less Imports(G&NFS)	197,207	197,209	173,293
Expend. on GDP	843,412	843,412	855,943
Discrepancy	(-) 3,757	(-) 1,817	00
GDP(mp) in (a) above	839,655	841,594	855,943

The Private Consumption expenditure is residually arrived at in the N. A., whereas the same has been derived by the I/O table basically from HIES and then manipulated. I/O tables consider only pure current expenditure of the government derived from the budget whereas the N.A. figures include grants to NGO's as well. The combined Investment on Fixed Capital Formation and changes in stocks in both estimates are somewhat comparable (163,056 in I/O and 162,076 in N.A). So far as Exports and Import (Goods & Non-Factor Services) are concerned, there are some differences in the two estimates due to coverage. Finally Eeneral Equilibrium models cannot tolerate any sort of discrepancies; so this item must be somehow eliminated.

(c) Components of Value Added - Income Approach:

<u>Item</u>	<u>I/O Tables(Reportd)</u>	<u>I/O Tables(derived)</u>	<u>National Accounts</u>
Net Indirect Taxes	95,634	95,634	96,092
Consump. of Capital	81,093	81,473	49,871
Compens. of Employees	209,289	210,847	-
Operating Surplus	452,232	453,640	-
Gross Income	838,248	841,594	855,943
Discrepancy	(+) 1,407	-	-
GDP(mp) in (a) above	839,655	841,594	855,943

The figure on Net Indirect Taxes reported in I/O tables has been taken from the CBR yearbook which is the authentic source. Anyhow the difference in the two estimates is negligible. N.A. do not provide information on wages and operating surplus. The estimates on wages/compensation of employees given in the I/O tables has been derived from various Labour Force surveys and Censuses on Manufacturing/ Agriculture etc. and then manipulated during balancing. Estimates on operating surplus are however arrived at as residual. Again the discrepancies in Output, Agg. demand and Incomes have to be removed somehow to ensure micro-consistency in the model.

(d) Depreciation/ Capital consumption allowance (sector wise):

<u>Sector</u>	<u>I/O Tables</u>	<u>National Accounts</u>	<u>I/O versus NA</u>
Agriculture	8,865	9,872	Comparable
Manufacturing	17,216	11,303	150% higher
Mining	2,890	270	Very high
Elect.&Gas	4,554	2,187	Double
Construction	8,701	801	Very high
Trade	2,816	2,583	Comparable
Tpt & Commun.	8,891	8,361	Comparable
Bank. & Insurance	714	510	140% high
R.estate & Dwellings.	19,244	7,985	Very high
Pub.Admn & Defence.	3,194	3,291	Comparable
Other Services	4,388	2,708	Double
Total	71,373	49,871	143% higher
1984-85 estimate	32,427	26,904	120% higher

As evident from the above, the estimates of the two sources differ considerably. However the most severe cases can be readily identified- i.e. Mining, Construction and Housing (real estates and ownership of dwelling) which need some modification to bring about some compromise between the estimates.

4.2 Production Statistics - Modifications

It is evident from the above that data from the two official sources do not compromise. Therefore we propose the following modifications to the basic I/O structure for the purpose of micro-consistency which is the basic requirement of our model. We will provide possible justification/rationale for this exercise.

4.2.1 Mining & Quarrying:

The value added estimate given by I/o (Rs. 19,930 mill) exceeds considerably (by about 369%) than the N.A. estimate (Rs. 5,403 million). The explanation offered in the document in this regards runs as under:

" The use/demand of 'Other (cheap) mining' products was found to exceed total supply by a large amount. This discrepancy has been resolved by multiplying the entire set of (V.A.) estimates in the concerned branch by a factor 7.10, resulting in a gross output estimate of Rs. 13,342 million. A similar discrepancy occurred in the initial estimate of 1984-85 tables. At that time, the N.A. estimate of gross output was raised from Rs. 515 million to Rs. 5,066 million".

We reproduce the details of initial and final (balanced) estimates as under:

Components of V.A. in "Other Mining"

<u>Component</u>	<u>Initial estimates</u>	<u>Balanced estimates</u>
Indirect taxes	135	962
Depreciation	193	1,374
Wages	479	3,401
Profits	705	5,003
V.A.(mp)	1,513	10,740

However, this manipulation resulted into another gross discrepancy in terms of depreciation. The I/O figure of Rs. 2,890 m for the overall Mining sector turned out to be 1070.37% higher than that of N.A. figure, Rs. 270 m. and this contributed a considerable part to the over all discrepancy as shown in 1(d) above. Therefore we propose an alternative treatment to provide some relief, however endorsing the explanation provided in the document. We retain the initial estimate (Rs. 193 m) of depreciation in "other Mining" and distribute the difference of Rs. 1181 m(1374-193) between the initial and final estimates proportionately towards wages and profits, thereby keeping the gross V.A. figure in tact. The new breakup will be as under:

<u>Component</u>	<u>Modified estimates</u>	<u>I/O estimates</u>
Indirect taxes	962	962
Depreciation	193	1,374
Wages	3,879	3,401
Profits	5,706	5,003
V.A.(mp)	10,740	10,740

This modification will bring down the depreciation estimate for the overall "Mining" from Rs. 2,890 m to Rs. 1709 m ; still 633% higher than the N.A. estimate.

4.2.2 Construction:

The I/O estimates for 1989-90 are based closely (according to their statement) on the 1984-85 tables and the methodology. We reproduce the figures for gross V.A. as given in the two estimates for comparison, alongwith our modifications, and rationale thereof.

<u>Components</u>	<u>1984-85</u>	<u>1989-90</u>	<u>Ratio</u>	<u>Modified</u>
Indirect taxes	727	1,235	1.698	1,235
Depreciation	886	8,701	9.820	1,505
Wages	12,942	14,784	1.142	21,981
Profits	5,044	8,566	1.698	8,566
V.A.(mp)	19,599	33,287	1.698	33,287

If the overall and the most often occurring ratio (or mode) of 1.698 between the 89-90 and 84-85 estimates is maintained, the breakup emerges as shown in the modified formate above: This treatment removes the huge discrepancy in the depreciation estimates of I/O and N.A. (8,701 versus 801) and leaves the modified figure nearly double of N.A. estimate.

4.2.3 Housing:

Another item of discomfort is the depreciation estimate provided by I/O for Housing sector (real estate & ownership of dwelling). The disturbing element is the cost of repair and maintenance incurred by the owner-occupiers, which has been considered as depreciation but without any convincing justification. Before we rectify the situation, it is advisable first to reproduce the figures for gross output, intermediate consumption and value added provided in 1984-85 and 1989-90 tables to see the differences:

<u>Item - Sector</u>	<u>1984-85</u>			<u>1989-90</u>		
	<u>R.estate</u>	<u>Own.dwell.</u>	<u>Total</u>	<u>R.estate</u>	<u>Own.dwell.</u>	<u>Total</u>
Gross output	12,246	15,756	28,002	27,851	52,756	80,607
Interm.Consum.	984	2,149	3,133	5,404	00	5,404
Value Added	11,262	13,607	24,869	22,447	52,756	75,203

Components of V.A.

Indirect Taxes	233	00	233
Depreciation	1,659	17,585	19,244
Wages	2,437	00	2,437
Operating Surplus	18,118	35,171	53,289

The first thing to consider is the output in the Housing(owner- occupied) branch which is nothing but the imputed rent and has been simultaneously booked as V.A. Now if the ratio of gross output for '89-90 versus 84-85 ($52,756/15756 = 3.348$) is assumed for the corresponding value added figures in the two sets as well, the value added for 89-90 should be Rs. 45,556 m. instead of 52,756m (the ratio will be $45,556/13,607 = 3.348$). It is then plausible to assume that the remaining amount of Rs. 7200 m ($52,756 - 45,556$) be allocated for intermediate consumption in this sub-sector, emanating from the sector Cement/ceramics etc, taking into account the routine minor repairs, decoration and maintenance cost on dwellings which is treated as "falling outside the production boundary" in the System of National Accounts.

The second point that deserves attention is the case of depreciation which is kept at 33% of V.A. in Ownership of dwellings as against 7.4% in case of the Real estates and non-residential buildings. If the V.A. is taken to be Rs.45,556 m. as proposed above and depreciation is assumed at roughly 10% of V.A., then the resulting figure of Rs.4556 million set aside for substantial repairs may be plausible and nearer to common wisdom. Combined with the general maintenance cost of Rs. 7200 m. proposed above, the total expenditure of Rs. 11,756 m. is nearly 22% of the gross output or imputed rent. The residual figure of Rs. 5,829 m. can be safely allocated towards the compensation of household members and unofficial servants otherwise engaged in housekeeping jobs not paid for.

The revised format will be as under:

<u>Head - Sector</u>	<u>R.estate.</u>	<u>Own.dwell.</u>	<u>Total</u>
Gross output	27,851	52,756	80,607
Interm.Consum.	5,404	7,200	12,604
Value Added	22,447	45,556	68,003
<u>Components of V.A.</u>			
Indirect Taxes	233	00	233
Depreciation	1,659	4,556	6,215
Wages	2,437	5,829	8,266
Operating Surplus	18,118	35,171	53,289

4.2.4 Depreciation Overall:

After incorporating the proposed adjustments, the economy-wide position in terms of the depreciation will be as under. Surprisingly enough, the overall ratio of depreciation in the modified estimates to that given in the National Accounts turns out to be 120%, the same as for 1984-85 I/O tables.

<u>Depreciation/Sector</u>	<u>Mod.Figures</u>	<u>N. A.</u>	<u>Mod. vs NA</u>
Agriculture	8,865	9,872	Comparable
Manufacturing	17,216	11,303	150% higher
Mining	1,709	270	633% high
Elect. & Gas	4,554	2,187	Double
Construction	1,504	801	187% high
Trade	2,816	2,583	Comparable
Tpt & Commun.	8,891	8,361	Comparable
Bank. & Insurance	714	510	140% high
R.estate & Dwellings.	6,215	7,985	Comparable
Pub.Admn & Defence.	3,194	3,291	Comparable
Other Services	4,388	2,708	Double
Total	60,066	49,871	120% higher
1984-85 estimate	32,427	26,904	120% higher

4.2.5 Banking and Insurance:

This aggregated sector comprises the Central bank, scheduled Banks, Other Credit Institutions and Insurance. Banks and other credit institutions are basically financial

intermediaries and the major part of their earnings consists of the capital gain incurred on account of the difference between the interest/markup charged from the borrowers and the return passed on to the depositors. Although these institutions offer certain real services as well and for which a commission is charged, however, the income so earned against the non-imputed services constitutes only a very small part of the total cost incurred by them during their operation. These institutions do not charge any remuneration explicitly for the intermediation services; although the charge is implicit in the capital gain. As such the (imputed) Finance Service Charge should, in principle, be counted towards the gross output of the Financial sector, failing which their value added may turn out negative. The System of National Accounts (SNA) 1993 renames the charge as Financial Intermediation Services Indirectly Measured (FISIM) and recommends to allocate these explicitly among the users, which may be industries, households or the governments, as the intermediate consumption. Anyhow, due to lack of information, the alternative methodology adopted in both 84-85 and 89-90 SUTs is to create a hypothetical "nominal sub-sector" within the overall Financial sector, that is supposed to be the abstract user of the said services as intermediate input, and, obviously producing no output and adding no value of its own per se. The full description of the methodology and its rationale has been discussed in 84-85 I/O table and referred to again in 89-90 draft. The situation that emerges from this treatment is illustrated below:

Inter Industry transactions and value added in Banking and Insurance

<u>Item/ Sector</u>	<u>Cent.Bank</u>	<u>Sched.Banks</u>	<u>Other Cred. Inst.</u>	<u>Nominal</u>	<u>Insur. Sect.</u>	<u>Total</u>
Gross output	2,087	19,029	3,911	00	4,135	29,162
Fin. Srv. Charge	2,087	12,345	2,504	00	00	16,936
Non-imputed Srv.	00	6,684	1,407	00	4,135	12,226
<u>Interm Consump</u>	641	4,131	303	16,936	1,738	23,749
From Other sect.	491	4,130	282	00	459	5,362
From Cent. Bank	00	00	00	2,087	00	2,087
From Sched. Banks	150	00	03	12,345	03	12,501
From Other Crd. Inst.	00	00	00	2,504	00	2,504
From insurance	00	01	18	00	1,277	1,296
<u>Value Added</u>	1,446	14,899	3,608	- 16,936	2,396	5,413
Indirect taxes	00	00	00	00	05	05
Depreciation	21	583	71	00	40	715
Wages	725	9,705	418	00	757	11,604
Oper. surplus	701	4,611	3,118	- 16,936	1,594	- 6,911

Although the methodology and rationale for the treatment of finance service charge followed in the tables concerned is correct, however this approach has resulted into a serious problem when the financial sector is seen in entirety, Not only the operating surplus has turned negative but the gross value added figure has steeply gone down when compared to that reported in the N.A.(only 25% of N.A. i.e. 5,413/21,434).

This anomaly can be handled easily if the imputed finance services are allocated to the "nominal sector" as 'final consumption demand' instead of 'intermediate input'. In other words, the proper place of the "nominal sector" is outside the overall Financial Sector; contrary to that proposed in the 84-85 and 89-90 SUTs. This treatment will not only solve the problem but also will be beneficial for our modelling since the "consumption" of financial intermediation services is nothing but a redistribution of income among users implemented through the interest rate differentials maintained by the Financial sector. The modified picture will be as under:

<u>Item/ Sector</u>	<u>Cent.Bank</u>	<u>Sched.Banks</u>	<u>Other Cred. Inst.</u>	<u>Insur. Sect.</u>	<u>Total</u>	<u>Nominal</u>
<u>Gross output</u>	2,087	19,029	3,911	4,135	29,162	_____
Fin. Srv. Charge	2,087	12,345	2,504	00	16,936	16,936
Non-imputed Srv.	00	6,684	1,407	4,135	12,226	
<u>Interm Consump</u>	641	4,131	303	1,739	6,814	
From Other sect.	491	4,130	282	459	5,362	
From Cent. Bank	00	00	00	00	00	
From Sched. Banks	150	00	03	03	156	
From Other Instit.	00	00	00	00	00	
From insurance	00	01	18	1,277	1,296	
<u>Value Added</u>	1,447	14,899	3,608	2,396	22,349	
Indirect taxes	00	00	00	05	05	
Depreciation	21	583	71	4	715	
Wages	725	9,705	418	757	11,605	
Oper. surplus	701	4,611	3,118	1,594	10,024	

After this shuffling, the figure for value added compares well with that of N.A.

A little further extension to the above treatment suggests to allocate the finance service charge rendered by the central bank (Rs. 2087 m) to the scheduled banks and other credit institutions as intermediate input since most of the business of the central bank is directed towards the said institutions and very little to the general public.

However allocation of the said services rendered by commercial banks and other organizations may be retained as before, i.e. as final consumption by the nominal sector. Anyhow, we will not emphasize this modification.

4.2.6 The Public Sector:

This aggregated sector comprises Public Administration, Defence, Education, Health and other social services. However a smaller portion in Education and Health services is also contributed by the private sector. The set up given in the document is as under:

<u>Item</u>	<u>Input-Output Branch 82-84</u>	<u>Value</u>
<u>Gross Output</u>	1. Public Sector	127,585
	a. Non-market output	120,806
	b. Market output	6,779
	2. Private Sector (Edu & Health)	8,992
	Total	136,577
<u>Interm. Consumption</u>	1. Public Sector	64,790
	2. Private Sector	1,924
	Total	66,714
<u>Value Added</u>	1. Public Sector	62,795
	2. Private Sector	7,063
	Total	69,858
Final consumption of Non-Market output by the government		120,806
Total Market output (Public + Private) (6,779 + 8,992)		15,771
<u>Allocation</u>	as Interm input	459
	as Final consumption	15,407
	as exports & Invest	29
	Less imports	124

This structure may be acceptable in its present form since the share of private sector is negligibly small. However, to be more precise, an alternative arrangement may be advisable to separate the private sector's contribution to Education and Health and let it be aggregated with 'Other services'.

4.2.7 Modified Picture and Gross Value added:

After incorporating the above modifications, the revised format of input structure and value added may be depicted in Tables 4.3 and 4.4 on the following pages. At this stage, all other estimates of taxation as given in the original I/O tables remain unchanged.

Finally it remains to be decided as to which figure of the National Product be selected for use as pivotal point in all the future calculations. This is important since different sources of data give different estimates. To arrive at some appropriate conclusion, we may start from the N.A. figure for GDP(m.p). The actual estimate for 1989-90 reported in all the relevant official documents amounts to Rs. 855,943 million. To complete the picture, we pick up a figure of Rs.93,480 million of Indirect taxes (net of subsidies) given in the N.A. for the relevant year, however retaining the adjusted I/O estimate of Rs. 60,067 million for depreciation, being more reliable. The National Income or GDP(f.c) net of depreciation, which is the sum total of wages & salaries and all the rents/rentals, interests, profits etc., figure out to Rs.702,396 million. The operating surplus, which is arrived at as residual can be selected such that our modified estimates are easily adjusted to that figure. The aggregate set will assume the following shape:

National Income (Prim. Factor Cost)	= Rs. 702,396 million
Indirect Taxes	= Rs. 93,480
Depreciation Allowance	= Rs. 60,067
Gross Value Added (m.p)	= Rs. 855,943

TABLE - 4.3 Inter Industry Transactions (Modified)

Sector or Industry	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Interm. Inputs
1	16,332	27,732	00	55,514	24,507	1,012	02	09	886	00	00	00	1,863	00	00	145	823	128,825
2	4,878	913	155	10,971	7,496	1,349	346	09	1,034	00	00	23	62	00	01	31	5,386	32,654
3	01	14	23	38	36	29,082	4,300	5,319	13	6,616	2,713	08	01	03	11	74	60	48,312
4	11	5,652	19	8,857	555	1,407	48	113	511	02	152	733	808	01	540	215	5,323	24,947
5	1,230	540	29	2,673	64,977	1,540	10	97	1,110	07	51	258	31	08	29	971	258	73,819
6	23,051	2,189	1,552	2,712	12,392	21,645	2,583	2,015	3,332	3,672	7,119	901	29,694	07	815	3,580	1,679	118,938
7	00	00	00	83	06	130	878	186	716	00	21,284	144	31	00	72 00	05	84	30,757
8	4,126	432	494	1,369	1,552	891	256	33,916	1,925	4,082	8,584	327	7,050	22	77	30,853	1,568	97,524
9	49	74	262	4,319	1,660	1,137	1,052	481	8,750	301	1,451	796	1,670	744	635	1,357	220	24,958
10	5,030	1,041	171	3,512	9,223	3,219	3,083	1,578	2,009	3,596	07	1,316	458	498	632	1,830	2,071	39,274
11	00	165	385	141	231	136	28	94	67	04	00	21	1,178	00	00	5,533	194	8,177
12	15,414	21,595	439	34,690	14,856	17,493	605	2,480	6,765	78	202	202	84	118	397	2,573	239	118,230
13	7,041	4,694	1,897	6,108	7,284	5,225	1,248	6,844	1,717	455	972	4,010	2,756	734	1,146	7,270	1,428	60,829
14	00	00	261	686	3,090	474	161	790	594	67	157	1,207	288	1,463	09	06	110	9,363
15	00	00	06	284	477	120	83	255	338	06	00	4,879	1,032	2,190	41	2,302	2,086	14,099
16	00	12	03	18	58	23	02	08	01	00	00	03	00	01	02	222	106	459
17	115	459	644	821	1,978	1,157	266	863	374	263	78	735	2,631	1,025	1,071	9,747	831	23,058
Inter Inputs	77,278	65,512	6,340	132,806	150,378	86,040	14,951	55,057	30,142	19,149	42,770	15,563	49,637	6,814	12,606	66,714	22,466	854,223
Value Added	125,121	87,891	28,246	45,267	42,192	19,181	16,641	20,287	12,113	30,442	33,286	99,882	58,929	22,348	68,003	69,858	26,000	805,687
Total Input Cost (mp)	202,399	153,403	34,586	178,073	192,570	105,221	31,592	75,344	42,255	49,591	83,256	115,445	108,566	29,162	80,607	136,572	48,466	1,659,910

TABLE - 4.4 Components of Value Added (Modified)

Components	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
Other Indirt Taxes	1,539	19	8,316	19,940	542	3,425	5,593	1,412	872	2,042	1,235	4,662	1,178	05	233	102	815	51,930
Customs	2,177	248	2,882	3,836	840	9,348	217	20,149	1,039	19	00	929	00	00	00	22	1,998	43,704
Total Ind. Taxes	3,716	267	11,198	23,776	1,382	12,773	5,810	21,561	1,911	2,061	1,235	5,591	1,178	05	233	124	2,813	95,634
Deprecn	4,343	4,522	1,709	3,151	6,278	2,236	1,425	2,578	1,548	4,554	1,505	2,816	8,891	714	6,215	3,194	4,388	60,067
Compens Employees	36,742	8,941	6,677	5,347	14,615	4,861	3,412	7,135	3,844	1,328	21,980	4,319	17,927	11,605	8,266	61,151	6,200	224,350
Operating Surplus	82,497	74,409	11,544	16,829	20,757	8,659	6,211	9,162	5,849	22,518	8,566	88,085	30,933	10,024	53,289	5,411	14,597	469,340
Primary Fact Cost	119,239	83,350	18,221	22,176	35,372	13,520	9,623	16,297	9,693	23,846	30,546	92,404	48,860	21,629	61,555	66,562	20,797	693,690
Vaue Added (f.c)	123,582	87,872	19,930	25,327	41,650	15,756	11,048	18,875	11,241	28,400	32,051	95,220	57,751	22,343	67,770	69,756	25,185	753,757
Value Added Excl.Custm	125,121	87,891	28,246	45,267	42,192	19,181	16,641	20,287	12,113	30,443	33,286	99,882	58,929	22,348	68,003	69,858	26,000	805,687
Value Added (mp)	127,298	88,139	31,128	49,103	43,032	28,529	16,858	40,436	13,152	30,462	33,286	100,811	58,929	22,348	68,003	69,880	27,998	849,391

4.3 International Trade Statistics

The Input-Output tables 1989-90 derive estimates of merchandise exports and imports from the FBS/Customs data, whereas the estimates of trade in Non- Factor Services are based on B.O.P. published by the State Bank of Pakistan. Summary of the B.O.P. for the year 1989-90(as reported in Table VII of the SBP Annual Report 1991-92) is given as under:

Summary of B.O.P.

Trade Balance	\$ - 2,485 m.
Exports(fob)	\$ 4,926 m.
Imports(fob)	\$ - 7,411 m.
Services (net)	\$ - 1,616 m.
Receipts	\$ 1,398 m.
Payments	\$ - 3,014 m.
Unrequited Transfers(net)	\$ 2,739 m.
Private .	\$ 2,210 m.
Official	\$ 529 m.
Current Account Balance	\$ - 1,362 m.

The I/O estimates (1989-90) for trade in goods and non-factor services are as under. These are comparable with the above estimates if the average rupee/dollar exchange rate (Rs. 21.44529 per US dollar) is taken into account.

Trade Balance	Rs. - 57,268 m.
Exports(fob)	Rs. 106,432 m.
Imports(fob)	Rs. - 163,700 m.
Services (net)	Rs. - 14,061 m.
Receipts	Rs. 27,649 m.
Payments	Rs. - 41,710 m.
Balance on current account	Rs. - 71,329 m.

Thus total exports of goods and NFS value to Rs. 134,082 m. and total imports amount to Rs. 205,409 m. The I/O tables however, exclude Rs. 5,609 m. and Rs. 8,200 m. respectively from total exports and imports , with the rationale that these transactions are unspecified and therefore, unallocable. Thus the reported figures for exports and imports are 128,473 and 197,209 million as against a total of 134,082 and 205,409 respectively. We have however, accommodated this discrepancy alongwith slight adjustment in customs. The sector-wise breakup is given in the document (I/O Tables). We reproduce the same in Table-4.5 with the most probable allocation of the imports (gross of tariffs $205,4090 + 45,783 = 251,192$ m), keeping in view the fact that demand for commodities arises simultaneously for domestic as

well as imported items irrespective of the nature of demand i.e. as intermediate or final demand. This arrangement will make our task easier.

4.3.1 Final position- I/O structure:

At this stage, we would like to incorporate a final sector "Rest of the world" in the basic I/O structure in order to accommodate the international transactions instead of dealing with exports and imports separately. Consequently we reduce the intermediate inputs drawn from domestic sources proportionately in the respective columns to accommodate the inputs drawn out of imports, where necessary. Thus the final row will represent the supplies from abroad to the economy and the final column within the industry-industry flow matrix will show demand for domestic produce by rest of the world.

Although this manipulation will relieve us of explicit formulation of the export supply and the import demand functions (since data on the requisite elasticities and other parameters is not available), however, the treatment seems to be simplistic. In addition, this arrangement suffers from a major drawback, that is, the parameters concerned, particularly the coefficients in the relevant columns and rows of the input-output matrix, will remain fixed throughout. Obviously it will not be possible to devise an inherent flexible mechanism in the model on the basis of the respective data that should lead to correct the B.O.P. situation overtime. The factual position reveals the fact that our B.O.P. is unfavourable since long and a persistent deficit (although fluctuating) prevails in the B.O.T. for the past several years as evident from the following statistics. All figures are calculated at 1980-81 constant price and expressed in Rs. million:

<u>Year</u>	<u>Exports</u>	<u>Imports</u>	<u>Trade Balance</u>
1980-81	35,707	62,129	- 26,422
1981-82	33,570	61,835	- 28,265
1982-83	41,819	68,703	- 26,884
1983-84	40,275	73,672	- 33,397
1984-85	40,130	80,241	- 40,111
1985-86	53,296	78,266	- 24,970
1986-87	59,868	79,825	- 19,957
1987-88	57,112	77,107	- 19,995
1988-89	64,879	83,524	- 18,645
1989-90	65,710	80,601	- 14,891

1990-91	87,700	74,639	+13,061
1991-92	99,821	97,660	+ 2,161
1992-93	101,136	112,157	- 11,021

In order to correct the situation, there is no way except to promote exports and/or curtail imports. Presently we find no scope to incorporate this feature in our model but to assume an exogenously given, minute and uniform growth rate for exports in the dynamic framework. Such a treatment seems plausible in that it allows us to compare the results projected by the conventional system versus the proposed Islamic system in terms of the time span till the B.O.T. is balanced at the margin.

The final shape of the intermediate input matrix is shown in Table-4.6 and that for components of value added is depicted Table-4.7 on the following pages, with minute adjustments for the sake of consistency.

TABLE - 4.5 International Trade Transactions

Sector	Exports (fob) #	Imports (fob)	Net Exp (+)	Imports (import duties)@	Imports (cif)	1	2	3	4	5	6	7	8	9	11	13	16	Total Interm Use	Private Consumption	Investment	
	1597	9,824	- 8227	2190	12014		6707											6707	5307		
	2271	1118	+ 1153	249	1367														1367		
	992	13002	-12010	2898	15900						10090	872	1048								3890
	8882	17309	-8427	3858	21167														21167		
	84883	3790	+81093	845	4635														4635		
	1663	42183	-40520	9403	51586	4785				6825	11988			661				12965	7853	6509	
	248	979	-731	218	1197										731				466		
	2714	90922	-88208	20267	111189							10476							34362	5620	71707
	2829	4688	-1859	1045	5733														5733		
	4	83	-79	18	101														101		
	63	4193	-4130	935	5128	571	816	1307	456	490		82	326						998		
13 *	27923	7195	+ 2792	1600	8795														3175	5620	
	9	102	-93	23	125														125		
	17	4	-10017	2234	12255														12255		
Total	134082	205409	-71327	45783	251192	5356	816	8014	7281	22568	872	11606	987	731	12965	23968	95164	68802	87226		

Notes: * Includes unspecified exports amounting to Rs. 5609 m and imports valuing 7195 m. Original exports of this sector amount to Rs.22314 m and imports are nil as shown in the I/O tables. @ Import duties are calculated at uniform rate of 22.29% . # Includes export duties amounting to Rs.4879 million.

TABLE 4.6 Inter-Industry Transactions (Final)

Sector /	Industry	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	R.O.W.	Interm	Demand
1		16,332	27,732	00	48,807	24,507	1,012	02	09	886	00	00	00	1,863	00	00	145	823	1,597	123,715	
2		4,878	913	155	10,971	7,496	1,349	346	09	1,034	00	00	23	62	00	01	31	5,386	2,271	34,925	
3		33,220	01	14	23	38	36	14,918	3,428	4,271	13	6,616	2,713	08	01	03	74	60	992	33,220	
4		33,829	11	5,652	19	8,857	555	1,407	48	511	02	152	733	808	01	540	215	5,323	8,882	33,829	
5		158,702	1,230	540	29	2,673	64,977	1,540	10	1,110	07	51	258	31	08	29	971	258	84,883	158,702	
6		83,377	18,266	2,189	1,552	2,712	5,567	9,657	2,583	2,015	3,672	7,119	901	16,729	07	815	3,580	1,679	1,663	83,377	
7		25,274	00	00	00	93	06	130	878	186	716	00	15,553	144	31	72,00	05	84	248	25,274	
8		59,436	4,126	432	494	1,369	1,552	891	256	17,000	1,925	4,082	8,584	327	22	77	6,967	1,568	2,714	59,436	
9		27,787	49	74	262	4,319	1,660	1,137	1,052	875	301	1,451	796	1,670	744	635	1,357	2,20	2,829	27,787	
10		39,278	5,030	1,041	171	3,512	9,223	3,219	3,083	1,578	2,009	3,596	1,316	458	498	632	1,830	2,071	04	39,278	
11		8,177	00	165	385	141	231	136	28	94	67	04	21	1,178	00	00	5,533	194	00	8,177	
12		114,163	14,843	20,779	439	33,383	14,400	17,003	605	2,398	6,439	78	202	202	84	397	2,491	239	63	114,163	
13		88,752	7,041	4,694	1,897	6,108	7,284	5,225	1,248	6,844	1,717	455	972	4,010	2,756	734	1,146	7,270	1,428	88,752	
14		9,363	00	00	261	686	3,090	474	161	790	594	67	157	1,207	288	1,463	09	06	00	9,363	
15		14,099	00	00	284	477	120	83	255	338	06	00	4,879	1,032	2,190	41	2,302	2,086	00	14,099	
16		468	00	12	03	18	58	23	02	08	01	00	03	00	01	02	222	106	09	468	
17		23,062	115	459	644	821	1,978	1,157	266	863	374	263	78	2,631	1,025	1,071	9,747	831	04	23,062	
R.O.W.	Imports	5,356	816	00	8,014	00	00	22,568	872	11,606	987	00	731	12,965	00	00	23,968	00	00	95,164	
Total	Interm	77,278	65,512	6,340	132,806	150,378	81,966	14,951	48,617	30,142	19,149	37,770	15,563	49,637	6,814	12,606	66,714	22,466	134,082	972,791	

TABLE - 4.7 Components of Value Added (Final)

Component of Value Added	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 # (ROW)	Total
Deprec	4343	4522	1709	3151	6278	2236	1425	2578	1548	4554	1505	2816	8891	714	6215	3194	4388	0	60067
Compen. of Employees	36742	8941	6677	5347	14615	4861	3412	7135	3844	1328	21980	4319	17927	11605	8266	61151	6200	0	224350
Operating Surplus	84027	75789	11758	17141	21142	8821	6325	9332	5957	22936	8726	89718	31506	10210	54277	5513	14868	71327	549373
Prim Factor Cost @	120769	84730	18435	22488	35757	13682	9737	16467	9801	24264	30706	94037	49433	21815	62543	66664	21068	71327	773723
Value Added (f.c)	125112	89252	20144	25639	42035	15918	11162	19045	11349	28818	32211	96853	58324	22529	68758	69858	25456	71327	833790
Comm. Taxes(dom)	2040	104	8100	11250	452	2252	5665	1456	849	2156	1515	4548	1100	30	406	136	759	0	42818
Customs *	58	83	36	323	3090	60	9	99	103	0	0	2	1016	0	0	0	0	45783	50662
Total Indirt Taxes	2098	187	8136	11573	3542	2312	5674	1555	952	2156	1515	4550	2116	30	406	136	759	45783	93480
Value \$ Added m.p.	127210	89439	28280	37212	45577	18230	16936	20600	12301	30974	33726	101403	60440	22559	69164	69994	26215	117110	927270

Notes: * Customs against column 18 (ROW) show tariffs on imports and entries in other columns show duties on exports.

Value added in this sector represents trade deficit.

@ Primary Factor Cost is equal to National Income if the entry against column 18 are excluded from total, i.e. 773,723 - 71,327 = 702,396.

\$ Value added (mp) will be equal to Rs. 855,943 million if trade deficit is excluded.

4.4 Expenditure on GDP - Aggregate Demand

The components of Aggregate demand shown in the subsection (b) of 4.1.2 above, may be adjusted slightly so as to ensure macro consistency, taking into account the modifications suggested in the preceding paragraphs. The revised figures will be as under:

Nominal Consumption	Rs. 16,936 million
Private Consumption	Rs. 617,719
Govt. Consumption	Rs. 129,562
Gross Fixed Investment	Rs. 155,075
Changes in stocks	Rs. 7,981
Exports	Rs. 134,081
(Less) Imports	Rs. 205,410
Aggregate Demand	Rs. 855,943

In this regards, the following points are note worthy:

(1) Private Consumption demand aggregates household expenditure and consumption by non-profit organizations. The changes in stocks is a volatile part of investment and often used as an accommodating element in the National Accounts. This may be lumped either with private consumption or with fixed investment to escape complications in the model. If treated with private consumption, the total expenditure under this head will amount to Rs. 625,700 million.

(2) We may pick up the N.A. figure of Rs. 129,562 million for Govt. Consumption and bifurcate it into non-market or general consumption of 120,806 m. as shown in subsection 4.2(f) above, and the remaining amount of 8,756 m. may be assumed as allocation to social insurance benefits or transfer payments discussed in the following section.

(3) Gross fixed capital formation as reported in the National Accounts for 1989-90 is detailed as under(reference Table 2-8 and 2-9 of Economic Survey 1993-94):

Public sector	Rs. 42,577 million	
General Govt.	Rs. 28,936	Fed: 9,165, Prov: 13,999, Local: 5,772
Private sector	Rs. 76,563	
Total Investment	Rs. 148,076	
Depreciation	Rs. 49,871	
Net Investment	Rs. 98,205	

The estimate of fixed investment given in the I/O tables is a little bit higher than the National accounts. However, net investment is somewhat comparable with N.A. We retain the investment estimates given in the N.A. under the General Govt. and Public sector enterprises and enhance the same for the private sector so that the gross estimates comply with I/O figures. The adjusted estimates will be as under:

Public sector	Rs. 42,577 million
General Govt.	Rs. 28,936
Private sector	Rs. 83,562
Total Investment	Rs. 155,075
Depreciation	Rs. 60,067
Net Investment	Rs. 95,008

So far as financing of gross investment is concerned, we have the following pieces of information:

Total investment in the general govt. & public sector	Rs. 71,513 m.
Self Financing by autonomous bodies	Rs. 15,463 m.
Financing by the Government	Rs. 56,050 m.
Current budget deficit	Rs. 10 m.
Overall deficit	Rs. 56,060 m.

Financed through:	External borrowing	Rs. 22,945 m.
	Domestic borrowing	Rs. 29,581 m.
	Bank borrowing	Rs. 3,534 m.
Foreign saving/capital inflow		Rs. 34,650 m.

If we assume that total savings are equal to planned investment, we derive:

Total resources required	Rs. 155,075 m.
Foreign resources/direct investment	Rs. 34,650 m.
Therefore, National Saving	Rs. 120,425 m.

National Saving can be further distributed as:

Private saving	Rs. 82,420 m
Corporate saving	Rs. 12,840 m.
Household saving	Rs. 69,580 m.
External borrowing	Rs. 22,945 m.
Bank borrowing	Rs. 3,534 m.
Resource gap	Rs. 11,524 m.

The available sources of information do not clarify the position as to how the resource gap during 1989-90 was filled in. Even if the gross investment figure of Rs. 148,076 m. is considered, the gap was nearly 7,000 m. Total borrowing by the public from the private sector figures to Rs. 45,044 m., since self financing by autonomous bodies means nothing but borrowing at the going rate of interest or floating of their bonds. This is nearly 55 % of the private saving (Rs. 82,420 m.) and hints to the volume of crowding out effects. We may accommodate the resource gap either with bank borrowing (in which case the latter should rise to Rs. 15,058 m. or about 6.8 % of total public expenditure), or with the foreign capital inflow (which will enhance to Rs. 46,174 m). The total contribution to the national savings from external sources will be Rs. 69,119 m. This is somehow comparable with the trade deficit. The final position may be summarized as under:

Gross investment	Rs. 155,075 m	Total resources	Rs. 155,075 m
Private sector	Rs. 83,562 m	Foreign saving	Rs. 71,327 m
Public sector	Rs. 71,513 m	National saving	Rs. 83,748 m
Fixed investment	Rs. 95,008 m	Private saving	Rs. 82,420 m
Depreciation	Rs. 60,067 m	Public saving	Rs. 1,328 m

In addition to the statistical discrepancies in the available data, we face a conceptual issue so far as the treatment of gross investment is concerned. It is the usual practice that investment is presented in the National Accounts on the expenditure/demand side, which is incurred during the accounting period in the concerned units (the sectors of destination). In contrast, the general equilibrium models require the allocation of commodities meant for investment on the supply side (from the sectors of origin). Therefore we have modified the figures according to our guess. The adjusted estimates of Aggregate demand are shown in Table- 4.8

(4) Net foreign demand which is the usual component of Aggregate demand has been treated in this model differently. It has been accommodated in the input-output structure as discussed under section 4.3.1 above and shown in Tables 4.6, 4.7.

Table 4.8 Aggregate Demand (Final)

Sector / Industry	Intermediate input cost	Value added at f.c.	Total Cost (Producer's Price)	Commodity Taxes	Total cost / Value of Output (m.p.)	Intermediate demand	Household consumption	Government consumption	Investment demand	Nominal consump	Total Economy Final Demand
1 Agriculture Crop	77,278	125,112	202,390	2,098	204,488	123,715	80,773				80,773
2 Agri. Non-Crop	65,512	89,252	154,764	187	154,951	34,925	117,736		2,290		120,026
3 Mining & Quarrying	6,340	20,144	26,484	8,136	34,620	33,220	1,400				1,400
4 Food Processing	132,806	25,639	158,445	11,573	170,018	33,829	136,189				136,189
5 Textile & Footwear	150,378	42,035	192,413	3,542	195,955	158,702	37,253				37,253
6 Chem & Petroleum	81,966	15,918	97,884	2,312	100,196	83,377	16,819				16,819
7 Cement & Ceramics	14,951	11,162	26,113	5,674	31,787	25,274	1,513		5,000		6,513
8 Machinery/Metal	48,617	19,045	67,662	1,555	69,217	59,436	3,341		6,440		9,781
9 Other Mfg.	30,142	11,349	41,491	952	42,443	27,787	14,656				14,656
10 Energy	19,149	28,818	47,967	2,156	50,123	39,278	10,845				10,845
11 Construction	37,770	32,211	69,981	1,515	71,496	8,177	9,202		54,117		63,319
12 Trade & commerce	15,563	96,853	112,416	4,550	116,966	114,163	2,803				2,803
13 Tpt. & Communc.	49,637	58,324	107,961	2,116	110,077	88,752	21,325				21,325
14 Finance Services	6,814	22,529	29,343	30	29,373	9,363	3,075			16,935	20,010
15 Housing	12,606	68,758	81,364	406	81,770	14,099	67,671				67,671
16 Public Admn./det.	66,714	69,858	136,572	136	136,708	468	15,434	120,806			136,240
17 Other Services	22,466	25,456	47,922	759	48,681	23,062	16,963	8,756			25,619
18 Foreign sector @	134,082	71,327	205,409	45,783	251,192	95,164	68,802		87,226		156,028
Total	972,791	833,790	1806,581	93,480	1900,061	972,791	625,700	129,562	155,073	16,935	927,270

@ Entries against this sector indicate: exports in 1st column, trade deficit in 2nd column, imports (Iob) in 3rd column, Import duties in 4th column and imports (cifi) in the 5th column. The remaining columns show disposal of imports.

CHAPTER 5
DATA CONSIDERATIONS : 2
(Public Finance, Household Income and Expenditure)

In continuation of the preceding chapter, we have to consider here the available data information regarding the accrual, distribution and allocation of income and the modes of expenditure. As usual, we propose certain modifications to the information at hand in order to ensure micro-consistency. We discuss the statistics in the following order:

- | | | |
|----|-------------------------------|--------------------------------|
| 1. | Public Finance Statistics | Available data and adjustments |
| 2. | Household Income | Allocation of Income |
| | | Sources of Income |
| | | Distribution of Income |
| 3. | Househol Expenditure | Final shape |
| 4. | The (derived) Correspondence | between Demand and Supply |

5.1 Public Finance Statistics

This seems to be a cumbersome job to some extent since the data from different official sources do not coincide. The consolidated figures of public revenues and expenditure for 1989-90 given in the National Accounts and presently taken from the Economic Survey of Pakistan, 1993-94 are reproduced below. All figures are expressed in Rs. million:

Summary of Public Finance for 1989-90

<u>S.NO.</u>	<u>Item</u>	<u>Total</u>	<u>Federal</u>	<u>Provincial</u>
1.	Total Receipts (2 + 3)	165,585	158,966	6,619
2.	Total Revenues	158,805	152,186	6,619
(a)	Tax Revenues	119,435	114,004	5,431
(b)	Non-tax Revenues	39,370	38,182	1,188
3.	Surplus of Autonomous bodies	6,780	6,780	-
4.	Total Expenditure	221,645	173,203	48,442
(i)	Current Expend.	165,595	129,953	35,642
(ii)	Development Expend.	56,050	43,250	12,800
5.	Overall deficit (4 - 1)	56,060	(6.5% of GDP)	
6.	Financing:			
	External Borrowing	22,945		
	Domestic borrowing (Non bank)	29,581		
	From Banking system	3,534		

Detail of Revenues and Expenditure:

	<u>Total Revenues</u>	<u>158,805</u>	<u>152,186</u>	<u>6,619</u>
a)	Tax Revenues	119,435	114,004	5,431
i)	Direct Taxes	15,741	14,942	799
	Personal Income tax	3,495	3,495	-
	Corporate profit tax	10,842	10,842	-
	Property tax	1,404	605	799
ii)	Indirect Taxes	103,694	99,062	4,632
	Excise Duty	23,322	23,082	240
	Sales tax	15,575	15,575	-
	Taxes on international trade	50,665	50,665	-
	Import duties	37,606		
	Iqra surcharge	8,180		
	Export duties	4,879		
	Surcharge on gas and petroleum	9,740	9,740	-
	Other indirect taxes	4,392	-	4,392
(b)	Non-Tax Revenues	39,370	38,182	1,188
	Interest receipts	10,680	10,503	177
	Dividends	1,603	1,603	-
	Trading Profits	2,181	2,181	-
	From post Office, T & T	6,597	6,597	-
	From Civil Administration	15,250	15,250	-
	Other Misc. receipts	3,059	2,048	1,011
	<u>Total Expenditure</u>	<u>221,645</u>	<u>173,203</u>	<u>48,442</u>
(i)	Current Expenditure	165,595	129,953	35,642
	Defence	58,708	58,708	-
	Debt servicing	46,713	45,575	1,138
	Current subsidies	9,044	7,092	1,952
	General Administration	11,927	6,543	5,384
	Social services	20,243	5,101	15,142
	Other services	18,960	6,934	12,026
(ii)	Development Expenditure	56,050	43,250	12,800
	Direct investment	54,880	42,080	12,800
	Development subsidies	1,170	1,170	-

In order to ensure micro-consistency, keeping in view the contents of Tables 4.7 and 4.8 in particular, a few minor modifications are inevitable. These are noted as under:

Modification and Rearrangement:

1.	Net interest payments (gross payments less gross receipts)	= Rs. 36,033 m (46,713 - 10,680)
2.	Total interest payments/debt servicing	= Rs. 46,713 m
a.	on foreign loans	= 24,510 m
b.	on domestic loans	= 22,203 m
c.	net domestic payments	= 11,523 m (22,203 - 10,680)

3.	Govt. Consumption (total current expenditure less debt servicing)	= Rs.129,562 m(165,595 - 36,033)
4.	Net Indirect Taxes (gross taxes less total subsidies)	= Rs. 93,480 m (103,694 - 10,214)
5.	Non-Tax Revenues	= Rs. 35,654 m
a.	Sale of services/from civil admn.	= 15,434
b.	Govt. share in profits	= 20,220
	Dividends	1,603
	Profits of Trading Corp.	2,181
	Surplus of Post Office, T&T	6,597
	Surplus of auton. bodies	6,780
	Other receipts/royalties etc	3,059
6.	Total Receipts	= Rs.144,875 m
i.	Direct taxes	= 15,741
ii.	Indirect taxes	= 93,480
iii.	Other receipts (non-tax revenues)	= 35,654
7.	Total outlays	= Rs.237,108 m
a.	Current expenditure	= 165,595
i.	Government consumption	129,562
ii.	Debt servicing	36,033
b.	Development expenditure	= 71,513
8.	Overall Resource gap	= Rs. 92,253 m
i.	Deficit on revenue account	= 20,720
ii.	Deficit on capital account	= 71,513
9.	Financing: Foreign borrowing	= Rs. 71,327 m (equal to trade deficit)
	Domestic borrowing	= Rs. 20,926 m

It may be noted that the adjusted figures for development expenditure of the government mentioned under item 7(b) above differ from the figures reported in the budget since the latter indicate the part of public sector investment portfolio financed during the fiscal year. However, these compromise with the figures reported in Tables 2-8 and 2-9 of the Economic Survey 1993-94 and discussed under section 4.3 of the previous chapter.

5.2 Household Income

The income generated in the economy accrues to the governments in the form of taxes and to the households as remunerations to their factor endowments. After dealing with the share of government, we turn to the private sector.

5.2.1 Allocation of Income:

We base these accounts on the HIES (1990-91), which is the latest source of information in this regard. The HIES estimates are based on information derived from various questionnaires filled in by sample households which are often not accurate. Therefore, the figures derived from the sources under reference have to be manipulated somehow to ensure consistency with the macro aggregates developed in the previous chapter. To start with, our point of reference may be the Private Consumption Expenditure, arrived at as residual, according to the set up shown in section 4.6. It amounts to Rs. 625,700 million and includes consumption by non-profit organizations as well as changes in stocks (the latter is generally considered as investment, but as noted earlier, there is no scope for such a treatment in the G.E. modelling).

The following figures (per household) are derived from HIES (1990-91), deflated for 1989-90 and aggregated over the entire population:

<u>Item</u>	<u>90-91 Monthly</u>	<u>90-91 Yearly</u>	<u>Deflated for 89-90</u>	<u>Aggregate</u>
	(Rs)	(Rs)	(Rs)	(Rs. million)
Foreign Remit.	97.57	1,171	1,039	17,663
Gross income	3,182	38,184	33,893	576,181
Taxes paid	14	168	149	2,533
Disp. Income	3,168	38,016	33,744	573,648
Consumption	2,826	33,912	30,101	511,717
Other Expend.	25	300	266	4,522
Total outlays	2,851	34,212	30,367	516,239
Saving	317	3,804	3,376	57,409

The figures for 1990-91 from HIES have been deflated through CPI, using an adjustment factor of 177.33/199.78, to arrive at deflated estimates for 1989-90. The total population for 1989-90 is estimated to be 110.36 million. The average household size is assumed to be 6.50, taking into consideration the HIES estimates for 1987-88 and 1990-91. Therefore, the total number of households is estimated to be 17 million. Our unit of reference in all the subsequent considerations will be the household and not the individual. The aggregates shown above have been calculated while using this figure. For the sake of convenience, we may compare the aggregate household expenditure with the reference figure of Rs. 625,700 million indicated above and adjust all the statistics accordingly. As such the adjusted yearly expenditure of the average household should be Rs. 36,806 (625,700 / 17); and the adjustment factor is 1.2120355 (36,806 / 30,367). The adjusted estimates are given below alongwith the figures derived from the National Accounts to facilitate comparison:

Allocation of Income - Adjusted Estimates (yearly)

<u>Item</u>	<u>Per Household</u> (Rs)	<u>Aggregate</u> (Rs. million)	<u>National Accounts</u> (Rs. million)
Gross Income	41,079	698,352	not given
Direct Taxes Paid	180	3,070	3,495
Dispos. Income	40,899	695,282	not given
Consumption	36,806	625,700	611,015
Saving	4,093	69,582	70,998

Private consumption expenditure is arrived at residually in the National Accounts and private savings are assumed to be round about 10% of GDP. The N.A. figure does not include consumption by non-profit organizations and changes in stocks. Therefore, our adjusted figure is somewhat higher than that of the National Accounts. If we consider the N.A. figure of Rs. 3,495 million against personal income tax, then the gross income (aggregate) should be Rs.698,777 million and the same per household should be Rs.41,104 instead of Rs. 41,079.

5.2.2 Sources of Income:

We may look into the matter from another angle. The sources of household income (average of all groups) as shown in the HIES (1990-91) are reproduced below:

<u>Item</u>	<u>90-91 Monthly</u> (Rs)	<u>90-91 Yearly</u> (Rs)	<u>Deflated for 89-90</u> (Rs)	<u>Aggregate</u> (Rs. million)
Gross income	3,182	38,184	33,893	576,181
Disposable income	3,168	38,016	33,744	573,648
<u>Sources</u>				
Wages/salaries	974	11,688	10,373	176,341
Self Employment	1,463	17,556	15,585	264,945
Property income	143.82	1,726	1,532	26,044
Ownership of dwell	285.44	3,425	3,040	51,680
Social insurance	45.34	540	480	8,160
Gifts/assistance	63.36	760	675	11,475
Foreign remittances	97.57	1,171	1,039	17,663
Domestic remittances	79.00	924	820	13,940
Other sources	16.47	225	200	3,400

If we consider a figure of Rs. 695,282 million for the disposable income (arrived at in the subsection 5.2.1 above) and update all the figures, using an adjustment factor of 1.2120355 (695282/573648), we get the following configuration:

<u>Item</u>	<u>Yearly Per Household (Rs)</u>	<u>Aggregate (Rs. million)</u>
Gross Income	41,105	698,777
Direct Taxes Paid	206	3,495
Dispos. Income	40,899	695,282
<u>Sources</u>		
Wages/salaries	12,725	213,732
Self Employment	19,118	321,123
Property income	1,879	31,566
Ownership rent	3,729	62,638
Social insurance	589	9,890
Gifts/assistance	828	13,908
Foreign remittances	1,274	21,408
Domestic remittances	1,006	16,896
Other sources	245	4,121

Even the above figures are not consistent with those derived from the national accounts and production statistics. The transfer payments /receipts on account of social insurance benefits, pensions etc. are a little bit higher than the above figures. The sources of gifts/assistance is not known. If we consider this item as the transaction within the households, then the average should be zero. The property income can be considered as the earning from the real estates and investment in bonds/shares. The imputed rental income on account of ownership of dwelling is much higher than that given in the N.A. It may include rent from land and commercial buildings as well as the interest receipts from different sources. We may treat the interest receipts from the government separate from other sources. Foreign remittances may be taken for granted and considered as labour income from abroad. Domestic remittances may be merged with income from wages and salaries.

The income from self employment as defined in the HIES 1990-91 consists of the operating surplus from crop and non-crop farming; other agricultural, commercial and industrial activities; rentals of machinery and equipment; and receipts from paying guests, boarders and lodgers staying at hotels and restaurants. Obviously, this income implicitly includes an element of labour effort. As such we may adjust all the figures once again should these conform to the public finance and production statistics. The final picture will be as under:

<u>Item</u>	<u>Yearly Per Household (Rs)</u>	<u>Aggregate (Rs. million)</u>
Gross Income	41,105	698,777
Direct Taxes Paid	206	3,495
Dispos. Income	40,899	695,282

Sources of income

Wages/salaries	13,197	224,350
Self Employment	17,108	290,843
Property income	5,237	89,024
Rental income	3,110	52,873
Interest receipts from govt.	678	11,523
Social insurance	515	8,756
Foreign remittances	1,259	21,408
Domestic remittances	1,006	16,896
Other sources	00	00

The final picture of National income and its components, that emerges from the above considerations will be as under:

National Income (f.c.)	702,396	(Rs. million)
Less Corporate Income tax	12,246	
Less Retained earnings	12,840	
Less government share in profits	20,220	
Plus Interest receipts from govt.	11,523	
Plus Foreign remittances	21,408	
Plus Social insurance benefits	8,756	
Equals Personal Income	698,777	
Less personal income tax	3,495	
Equals disposable income	695,282	
Personal Outlays	625,700	
Private savings	69,582	

The household classification is discussed in the following section. We reproduce the yearly household income (expressed in Rs.) and the aggregate income of the respective classes (expressed in Rs. million), received from various sources in Table-5.1 as under. The presentation is based on the information derived basically from HIES 1990-91, however inclusive of the modifications and adjustments proposed above.

Table - 5.1 Sources of Household Income

Sources of income	The Poor Class		The Lower-middle		The Higher-middle		The Rich Class		Average	
	Per H.H. Rs.	Aggregate Rs.m.	Per H.H. Rs.	Aggregate Rs.m.	Per H.H. Rs.	Aggregate Rs.m.	Per H.H. Rs.	Aggregate Rs.m.	Per H.H. Rs.	Aggregate Rs.m.
Foreign Remittance	128	900	661	4,220	1,845	4,808	11,806	11,480	1,259	21,408
Wages & Salaries	8,276	58,231	14,014	89,475	17,243	44,937	32,607	31,707	13,197	224,350
Self Employment	6,398	45,017	14,053	89,732	31,715	82,653	75,526	73,441	17,108	290,843
Capital Income	00	00	4,302	27,466	9,708	25,299	37,288	36,259	5,237	89,024
Property Income	1,131	7,959	2,465	15,738	4,906	12,786	16,855	16,390	3,110	52,873
Interest Receipts	00	00	188	1,202	1,742	4,540	5,945	5,781	678	11,523
Social Insurance	263	1,850	363	2,318	1,103	2,875	1,806	1,756	515	8,756
Gross Income	16,196	113,963	36,046	230,159	68,239	177,840	181,833	176,815	41,105	698,777
Transfers	800	5,630	751	4,795	- 1,308	- 3,410	- 7,214	- 7,015	00	00
Net Income	16,996	119,593	36,797	234,954	66,931	174,430	174,619	169,800	41,105	698,777

5.2.3 Distribution of Income:

The HIES 1990-91 divides the survey sample of households into eleven groups and provides the following monthly details on the average, the figures are in Rs.

Income Class	Population	Dispos. income	Expend.	Saving
upto 1000	9.47 %	688	1406	- 718
1001-1500	15.92 %	1262	1488	- 226
1501-2000	16.00 %	1745	1908	- 163
2001-2500	13.28 %	2241	2343	- 102
2501-3000	9.78 %	2747	2775	- 28
3001-3500	8.25 %	3247	3167	80
3501-4000	6.25 %	3753	3478	275
4001-5000	7.58 %	4463	3870	593
5001-6000	4.77 %	5426	4389	1037
6001-7000	2.98 %	6469	5245	1224
7000 & above	5.72 %	13398	7953	5445
Average	100	3168	2851	328

We may reclassify the households into the following four groups on the basis of some meaningful criteria. A plausible criterion may be the household budget position:

(a) The Poor/ Low income group, whose expenditure exceeds the income. In other words, they are persistently under the debt burden. The first three income groups in the HIES classification with income upto Rs. 2000 per month and comprising 7.0363 million households with 41.39 % share in the total population are poor under this criterion.

(b) The Lower-Middle income group, whose income and expenditure balance at the margin with only meager savings if not altogether zero. The next four groups with their income ranging from Rs. 2001 to 4000 per month and taken into aggregate will comprise this class. their population is 6.3852 million households out of a total 17 million and their population share is 37.56 % .

(c) The Higher-Middle income group, whose savings are considerable. The next three groups in the HIES classification with an income range of s. 4001 to 7000 per month and which comprise 2.6061 million of households or a share of 15.33 % in the total population will constitute this class in our scheme.

(d) The Rich/ High income group, with quite large savings. The last group in the HIES classification with monthly income exceeding Rs. 7000 and which comprise 0.7924 million of households or representing 5.72 % of the total population can be considered as rich.

If we consider the weighted average of their income and expenditure, with weights equal to the respective percentage of the group concerned in the total population, the following estimates are at hand. Monthly and yearly figures are expressed in Rs. and the aggregate figures are in Rs. million:

Overall Average : Population 17 million households

<u>Description</u>		<u>Gross income</u>	<u>Taxes</u>	<u>Disp. income</u>	<u>Expend</u>	<u>Saving</u>
H.H. monthly	Rs.	3,182	14	3,168	2,851	317
H.H. yearly	Rs.	38,184	168	38,016	34,212	3,804
Aggregate	Rs. m	576,181	2,533	573,648	516,239	57,409
Agg. Adjusted	Rs. m	698,777	3,495	695,282	625,700	69,582
Yearly Income	Rs.	41,105	206	40,899	36,806	4,093
(Per H.H. Adjusted)						

Description	Gross income	Taxes	Disp. income	Expend	Saving
1. <u>The Low income group: Population 7.0363 million (41.39 % share)</u>					
H.H. monthly	Rs. 1,317.38	00	1,317.38	1,631.60	- 314.22
H.H. yearly	Rs. 15,809	00	15,809	19,579	- 3,770
Aggregate	Rs. m 111,234	00	111,234	137,765	-26,531
2. <u>The Lower-Middle income group: Population 6.3852-million (37.56 % share)</u>					
H.H. monthly	Rs.		2,845.32	2,825.34	20
H.H. yearly	Rs.		34,144	33,904	240
Aggregate	Rs. m		218,015	216,484	1,531
3. <u>The Higher-Middle income group: Population 2.6061 million (15.33 % share)</u>					
H.H. monthly	Rs.		5,152.59	4,298.77	853.82
H.H. yearly	Rs.		61,831	51,585	10,246
Aggregate	Rs. m		161,138	134,436	26,702
4. <u>The High income group: Population 0.9724 million (5.72 % share)</u>					
H.H. monthly	Rs.		13,398	7,953	5,445
H.H. yearly	Rs.		160,776	95,436	65,340
Aggregate	Rs. m		156,338	92,802	63,536

We have assumed a sum of Rs. 30,000/- as the basic exemption limit per household for the purpose of personal taxation. As such, the effective income tax rate is merely 1.25 % of the taxable income as against the minimum of 10 % per individual admissible in practice. Some adjustment in the above configuration are inevitable for the sake of consistency. The modified picture (group-wise) for the disposal of income is shown in Table- 5.2 :

Table - 5.2 Disposal of (Yearly) Income by Households

Description	<u>The Poor group</u>		<u>The Lower-Middle</u>		<u>The Higher-Middle</u>		<u>The Rich group</u>		<u>Average</u>	
	Per H.H.	Aggregate	Per H.H.	Aggregate	Per H.H.	Aggregate	Per H.H.	Aggregate	Per H.H.	Aggregate
	Rs.	Rs. m	Rs.	Rs. m	Rs.	Rs. m	Rs.	Rs. m	Rs.	Rs. m
Gross Income	16,996	119,593	36,797	234,954	66,931	174,430	174,619	169,800	41,105	698,777
Personal taxes	00	00	85	542	460	1,200	1,803	1,753	206	3,495
Disposable Income	16,996	119,593	36,712	234,412	66,471	173,230	172,816	168,047	40,899	695,282
Transfer / Debts	4,072	28,647	00	00	00	00	- 4,072	- 28,647	00	00
Total Resources	21,068	148,240	36,712	234,412	66,471	173,230	168,744	139,400	40,899	695,282
Expenditure	21,068	148,240	36,482	232,944	55,507	144,658	102,692	99,858	36,806	625,700
Net Saving	00	00	230	1,468	10,964	28,572	66,052	39,542	4,093	69,582
Gross Saving	- 4,072	- 28,647	230	1,468	10,964	28,572	70,124	68,189	4,093	69,582

5.3 Household Expenditure

The HIES 1990-91 divides the household monthly expenditure into the following categories. Detailed information about the percentage distribution of expenditure by various income groups is provided in the document. We reproduce the same on the average (all Pakistan) basis as under:

Average expenditure per household	Rs. 2851/- per month
Consumption	2826/-
Other than consumption	25/-

The percentage distribution of expenditure towards different items is as under:

1.	Food, beverages and tobacco	48.75 % (of total consumption)
2.	Apparel, textile and footwear	7.79 %
3.	Transport and communication	4.23 %
4.	Cleaning, laundry and personal appearance	4.35 %
5.	Recreation and entertainment	0.58 %
6.	Education	1.53 %
7.	House rent (including owner occupied dwelling)	13.34 %
8.	Fuel and lighting	5.70 %
9.	Furniture and fixtures	2.51 %
10.	Miscellaneous (including medical care)	11.17 %

We modify the above classification slightly. We separate the expenditure on medical care from miscellaneous item on account of its importance and to ensure consistency with the production accounts. Further, we lump together the remaining miscellaneous expenditure with that incurred on recreation. Still further, we adjust the total yearly expenditure incurred by the four income groups in accordance with their budget shown in preceding sub-section 5.2. The picture is depicted in Table-5.3.

5.4 The Correspondence between Demand and Supply

After dealing with the production and consumption statistics at the micro level (industry and household), it is useful at this stage to derive a correspondence between the two sides of the economy since there are wider differences in the classification of commodities produced and consumed. This effort will complete the picture of the economy and enable us to comply with the requirements of general equilibrium modelling.

Table- 5.3 Household Consumption Expenditure (Yearly)

Item	Low income group (Rs)	Lower-middle income group (Rs)	Higher-middle income group (Rs)	High income group (Rs)	Average (all groups) (Rs)
Disposable Income	16,996	36,712	66,471	172,816	40,899
Expenditure	21,068 (100)	36,482 (100)	55,507 (100)	102,692 (100)	36,806 (100)
1. Food	11,433 (54.27%)	18,681 (51.20%)	26,261 (47.31%)	38,530 (37.52%)	17,943 (48.75%)
2. Apparel, f.wear	1,759 (8.39%)	2,955 (8.10%)	4,263 (7.68%)	6,553 (6.38%)	2,867 (7.79%)
3. Tpt & Communic.	558 (2.65%)	1,153 (3.16%)	2,350 (4.23%)	9,140 (8.90%)	1,556 (4.23%)
4. Laundry	1,011 (4.80%)	1,623 (4.45%)	2,336 (4.21%)	3,810 (3.71%)	1,601 (4.35%)
5. House rent	2,359 (11.20%)	4,637 (12.71%)	7,635 (13.75%)	17,510 (17.05%)	4,910 (13.34%)
6. Fuel & lighting	1,479 (7.02%)	2,202 (6.03%)	2,778 (5.00%)	4,221 (4.11%)	2,097 (5.70%)
7. Furniture / fixture	400 (1.90%)	875 (2.40%)	1,610 (2.90%)	3,101 (3.02%)	924 (2.51%)
8. Education	152 (0.72%)	476 (1.30%)	922 (1.66%)	3,050 (2.97%)	563 (1.53%)
9. Health / Medicare	640 (3.04%)	1,048 (2.87%)	1,707 (3.07%)	2,383 (2.32%)	1,061 (2.88%)
10. Others	1,267 (6.01%)	2,832 (7.76%)	5,645 (10.17%)	14,394 (14.02%)	3,284 (8.92%)

The input-output tables 1989-90 base the estimation of private consumption expenditure on the information provided in HIES 1987-88, after allowing correction for inflation and population growth. The tables have allowed considerable upward adjustment in the household statistics for consistency during manual balancing. The HIES 1990-91 provides the following information regarding the monthly consumption expenditure for an average household. We guess the most probable allocation (origination) of commodities demanded/ consumer goods to (from) the supply sectors/ producer goods. It should be noted that trade and transport margin of about 2% of the producer's price has been assumed in the I/O tables to arrive at the market cost of various commodities. The monthly consumption expenditure per average household, as already discussed, is Rs. 2826/- .

Nomenclature (10 composite goods)	% share in consumption Rs. 1377/- p.m. (equivalent to 100)	Sectoral Allocation (18 production sectors)
1. Food and Beverages	Rs. 1377/- p.m. (equivalent to 100)	
Cereals	19.17% (wheat, rice, wheat flour, other cereals)	1, 4, 18
Baked and fried food	1.46% (biscuits, bread, other bakery)	4, 18
Pulses	3.32% (gram, mash, moong, masoor, others)	1, 4
Milk products	23.91% (fresh and dried milk, butter, ghee, others)	2, 4, 18
Edible oils and fats	6.80% (vegt. ghee, mustard oil, others)	1, 4, 18

Meat and fish	7.86% (beef,mutton,fish)	2,4
Poultry	2.13% (chicken,eggs,others)	2,4
Fruits	4.06% (banana,orange,apple,mango,dry fruit etc)	1,4,17
Vegetables	9.91% (potatoes,tomatoes,onion, others)	1,4,17
Condiments	3.15% (spices,chillies,salt,others)	1,4
Sugar	7.16% (sugar,gur,sweets,others)	1,4,18
Drinks	3.47% (tea black,qahwa,coffee,soft drinks,juices)	4,18
Tobacco	4.24% (cigarettes,biri,pan,others)	1,4,17
Ready-made food	2.11% (all commodities from hotels,general stores)	4,17,18
Miscellaneous food	1.25% (other items not categorized)	4,17,18
2. Apparel and footwear	Rs. 220/- p.m. (equivalent to 100)	
Clothing and accessories	54.28% (cloth,thread,buttons,others)	5,17,18
Ready-made / used garments	24.85% (durables, tailoring services,others)	5,17,18
Footwear	20.87% (durables, repair services)	5,17,18
3. Transport and communic.	Rs. 120/- p.m.	2,13
4. Personal appearance	Rs. 123/- p.m.	6,8,17,18
cleaning, laundry, recreation etc		
5. Housing	Rs. 377/- p.m. (equivalent to 100)	
House rent (paid)	7.59%	15
Imputed (rent-free houses)	5.11%	15
Imputed (owner-occupied)	76.40%	15
Repair & improvement	9.84%	6,7,8
Insurance	0.05%	15
Water, conservancy charges	0.98%	17
6. Fuel and lighting	Rs. 161/- p.m. (equivalent to 100)	
Firewood	34.78%	1
Kerosine oil	11.72%	3
Charcoal, coal	0.21%	2,3
Dung cakes	8.14%	2
Gas	7.48%	10
Electricity	28.47%	10
Electrical appliances	3.69%	8
Agricultural waste	3.08%	1,2
Matches, candles etc.	2.39%	6
7. Furniture and fixture	Rs. 71/- p.m. (equivalent to 100)	
Furniture, fixture, furnishing	18.44%	9,17
Kitchen equipment	10.84%	8,9
Crockery, cutlery	15.12%	7,8,17
Other effects, beds etc	55.58%	9,17

8. <u>Education</u>	<u>Rs. 43/- p.m.</u>	6,9,16,18
9. <u>Health/Medicare</u>	<u>Rs. 82/- p.m.</u>	4,6,16,18
10. <u>Miscellaneous expend.</u>	<u>Rs. 25/- p.m.</u>	2,4,5,6,9,13,14,16,17,18

Keeping in view the above considerations, it is possible to derive a transformation matrix that will bridge up the ten (10) consumers and eighteen (18) producer goods. The aggregates should be in line with the contents of Tables 4.8 and 5.3. It may be noted, however, that this configuration is based entirely on our guess. The official matrix / bridging arrangement couldn't be obtained from the concerned quarters despite effort. The matrix is shown in Table- 5.4. All the figures are expressed in Rs. million for aggregate demand and supply.

5.5 Final Remarks

We have tried our best to compile the data for Pakistan economy pertaining to the year 1989-90 and modify the available information so that it conforms to the general equilibrium analysis. While doing so, we have resorted to assumptions and guess work at many instances due to inconsistencies and lacking information. The occurrence of errors and omissions cannot be ruled out. Anyhow, the ground is now levelled to a great extent for parameter estimation which we tackle in the next chapter.

Table- 5.4 The Correspondence between Demand and Supply

Commodities = Sectors/Industry †	Food and Beverages (1)	Clothing & Footwear (2)	Transpt. & Communic. (3)	Personal Appearance (4)	Housing (5)	Fuel and Lighting (6)	Furniture and Fixture (7)	Education / Training (8)	Health / Medicare (9)	Other Misc. Expenditure (10)	Total (Rs. million)
1. Agriculture (crop)	73,195					7,578					80,773
2. Agricul (non-crop)	91,691		4,975			14,702				6,368	117,736
3. Mining						1,400					1,400
4. Food processing	122,253								1,796	12,140	136,189
5. Textile & Footwear		36,300								953	37,253
6. Chemicals, Petrolm				6,189	1,710		380	495	7,185	1,240	16,819
7. Cement, Ceramics					1,133		846				1,513
8. Machinery, M. works					2,495		846	1,400			3,341
9. Other manufact.				3,893			8,802			561	14,656
10. Elect. / gas distrib.						10,845					10,845
11. Construction					9,202						9,202
12. Trade/Commerce	1,208	675				707	213				2,803
13. Tpt & Communic			21,325								21,325
14. Banking/Insurance										3,075	3,075
15. Housing					67,671						67,671
16. Public services								5,687	5,387	4,360	15,434
17. Other services	805	525		8,642	920		1,197			4,774	16,863
18. ROW/(Imports)	16,482	11,297		8,546		579	4,175	1,895	3,593	22,235	68,802
Total (Rs. million)	305,634	48,797	26,300	27,270	83,131	35,811	15,613	9,477	17,961	55,706	625,700

CHAPTER 6

ESTIMATION OF MODEL PARAMETERS

The model we have developed in chapter-3 requires complete information regarding the values of parameters used in the behavioural equations. Fortunately, most of the parameters can be readily calculated from the data set discussed in the previous two chapters. The remaining crucial parameters may be obtained exogenously, and for that end, we need a thorough search in literature and/or have to rely on our own efforts to estimate the values somehow. The entire set of parameter values ought to be selected such that the computer programme replicates the benchmark equilibrium data. This procedure has been termed as 'calibration' in the applied general equilibrium models. As explained by Shoven and Whalley (1992) pp 103, "calibration is most easily understood as the requirement that the entire model specification be capable of generating a base-year equilibrium solution. In effect the model is solved from equilibrium data for its parameter values, rather than vice versa. Only when the model is used to analyze counterfactual equilibria are computational methods used to derive such equilibria." After this brief introduction, we proceed as under:

- | | | |
|----|---|--|
| 1. | Production side parameters | Technical coefficients matrix
Parameters of the Value-added functions |
| 2. | Demand side parameters | Transformation matrix
Relationship b/w Producers/Consumers prices
Contemporaneous utility functions
Composite price index
Inter-temporal utility functions |
| 3. | Macroeconomic parameters | Public Expenditure and GDP ratio
Investment and saving ratio |
| 4. | Poverty and Income distribution indices | Extent of poverty
Inequality measures |
| 5. | Taxation parameters | Personal income tax
Corporation income tax
Retained corporate profits
Indirect taxes |
| 6. | Other parameters | Rate of return to investment
Capital-output ratio
Estimates of employment |

6.1 The Production Side Parameters

We have divided the production side of the economy into 18 sectors (17 domestic plus a foreign sector to capture transactions with the rest of the world). The production function in each sector consists of two parts; the input-output part represented by a fixed-coefficient function and the value-added part represented by Cobb-Douglas or CES relationships allowing factor substitution. The relevant parameters are estimated as under using the consistent data set developed in the previous chapters as well as going through a search in the available literature.

6.1.1 Technical Coefficient Matrix

We base the derivation of the technical coefficient matrix on the contents of Tables 4.6, given in Chapter-4. As discussed in Chapter-3 on model specification, the technical coefficient (denoted by $a_{ij} = X_{ij} / Q_j$) is the amount of an input X_i required per unit of output Q_j . The intermediate inputs are given in value terms. Dividing each entry in a column by the total cost at producer's price of the respective column, we get the technical coefficient matrix $[A]$. It does not contain the coefficients of primary inputs or the requirements of labour and capital per unit output. These are endogenously determined by the market forces via the value-added functions.

The Activity Analysis matrix given by $[I - A]$ is derived from the above matrix. The elements along the principal diagonal of this matrix indicate the net output of the sector and the off-diagonal elements with negative signs show the intermediate inputs per unit output of the sector concerned.

The Leontief inverse, given by $[I - A]^{-1}$ is obtained by inverting the activity analysis matrix and can be computed through packages available in most of the PC's. The three allied matrices are shown as Tables 6.1, 6.2 and 6.3 on the following pages. All the figures in these tables are rounded up to six decimal points. These coefficients will be used in model estimation throughout the subsequent analyses.

TABLE - 6.1 The Technical Coefficient Matrix | A |

Sector	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0.080695	0.179189	00	0.308037	0.127367	0.010339	0.000076	0.000133	0.021354	00	00	00	0.017256	00	00	0.001062	0.017173	0.007774
2	0.024102	0.005900	0.005852	0.069242	0.038958	0.013782	0.013250	0.000133	0.024921	00	00	0.000205	0.000574	00	0.000012	0.000227	0.112391	0.011056
3	0.000005	0.000090	0.000868	0.000239	0.000187	0.152405	0.131276	0.063123	0.000313	0.137928	0.038767	0.000071	0.000009	0.000102	0.000135	0.000542	0.001252	0.004829
4	0.000054	0.036520	0.000717	0.055900	0.002884	0.014374	0.001838	0.001670	0.012316	0.000042	0.002172	0.006520	0.007484	0.000034	0.006637	0.001574	0.111076	0.043240
5	0.006077	0.003489	0.001095	0.016870	0.337695	0.015733	0.000383	0.001433	0.026753	0.000146	0.000729	0.002295	0.000287	0.000273	0.000356	0.007110	0.005384	0.413239
6	0.090251	0.014144	0.058601	0.017116	0.028933	0.098658	0.098916	0.029780	0.064375	0.076552	0.101727	0.008015	0.154954	0.000238	0.010016	0.026213	0.035036	0.008096
7	00	00	00	0.000587	0.000031	0.001328	0.033623	0.002749	0.017257	00	0.222246	0.001281	0.000287	00	0.088491	0.000037	0.001753	0.001207
8	0.020386	0.002791	0.018653	0.008640	0.008066	0.009103	0.009803	0.251249	0.046395	0.085100	0.122662	0.002910	0.065301	0.000750	0.000946	0.051013	0.032720	0.013213
9	0.000242	0.000478	0.009893	0.027259	0.008627	0.011616	0.040286	0.007109	0.210890	0.006275	0.020734	0.007081	0.015468	0.025355	0.007804	0.009936	0.004591	0.013772
10	0.024853	0.006726	0.006457	0.022165	0.047933	0.032886	0.118064	0.023322	0.048420	0.074968	0.000100	0.011706	0.004242	0.016972	0.007767	0.013410	0.043216	0.000020
11	00	0.001066	0.014537	0.000890	0.001200	0.001390	0.001072	0.001390	0.001615	0.000083	00	0.000187	0.010911	00	00	0.040513	0.004050	00
12	0.073339	0.134263	0.016576	0.210691	0.074839	0.173705	0.023168	0.035440	0.155190	0.001626	0.002886	0.001797	0.000778	0.004021	0.004880	0.018240	0.004987	0.000306
13	0.034789	0.030330	0.071628	0.038550	0.037856	0.053379	0.047792	0.101150	0.041382	0.009486	0.013890	0.035671	0.025528	0.025014	0.014085	0.053232	0.029800	0.135938
14	00	00	0.009855	0.004330	0.016059	0.004842	0.006165	0.011676	0.014316	0.001397	0.002243	0.010737	0.002667	0.049858	0.000111	0.000044	0.002295	00
15	00	00	0.000227	0.001792	0.002479	0.001226	0.003178	0.003769	0.008146	0.000125	00	0.043401	0.009560	0.074634	0.000504	0.016855	0.043530	00
16	00	0.000077	0.000113	0.000114	0.000301	0.000235	0.000076	0.000118	0.000024	00	00	0.000027	00	0.000034	0.000025	0.001626	0.002212	0.000044
17	0.000568	0.002966	0.024317	0.005182	0.010280	0.011820	0.010186	0.012754	0.009014	0.005483	0.001115	0.006538	0.024370	0.034931	0.013163	0.071369	0.017341	0.000020
18	0.026464	0.005273	00	0.050580	0.037840	0.230558	0.033393	0.171529	0.023790	00	0.010446	00	0.120090	00	00	0.175497	00	00

18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Sector 1
-0.026464	-0.000568	00	00	00	-0.034789	-0.073339	00	-0.024853	-0.000242	-0.020386	00	00	-0.090251	-0.006077	-0.000054	-0.000005	-0.024102	0.919305
-0.005273	-0.002966	-0.000077	-0.000227	-0.009855	-0.030330	-0.134263	-0.01066	-0.006457	-0.000478	0.002791	00	00	-0.014144	-0.003489	-0.036520	0.000090	0.994100	-0.179189
00	-0.024317	-0.000113	-0.000227	-0.004330	-0.038550	-0.16576	-0.014537	-0.022165	-0.009893	-0.008640	-0.000587	-0.000031	-0.017116	-0.016870	0.994100	-0.000239	-0.005852	0.308037
-0.050580	-0.005182	-0.000114	-0.001792	-0.016059	-0.037856	-0.210691	-0.000890	-0.047933	-0.008627	-0.008066	-0.000031	0.901342	0.662305	-0.015733	-0.002884	-0.000187	-0.038958	-0.127367
-0.037840	-0.010280	-0.000301	-0.001226	-0.004842	-0.033379	-0.074839	-0.001200	-0.047933	-0.040286	-0.009103	-0.001328	-0.098916	-0.029780	-0.000383	-0.014374	-0.000187	-0.13782	-0.010339
-0.230558	-0.011820	-0.000235	-0.001226	-0.006165	-0.053379	-0.173705	-0.001390	-0.23322	-0.007109	0.748751	0.966377	-0.02749	-0.029780	-0.001433	-0.001838	-0.063123	-0.013250	-0.000076
-0.0333393	-0.010186	-0.000076	-0.003178	-0.006165	-0.047792	-0.23168	-0.001072	-0.118064	-0.040286	-0.009803	0.966377	-0.002749	-0.02749	-0.001433	-0.001838	-0.063123	-0.013250	-0.000076
-0.171529	-0.012754	-0.000118	-0.003769	-0.011676	-0.041382	-0.35440	-0.001390	-0.48420	0.789110	0.748751	-0.002749	-0.02749	-0.029780	-0.001433	-0.001838	-0.063123	-0.013250	-0.000076
-0.023790	-0.009014	-0.000024	-0.008146	-0.014316	-0.041382	-0.155190	-0.001615	-0.48420	0.789110	0.748751	-0.002749	-0.02749	-0.029780	-0.001433	-0.001838	-0.063123	-0.013250	-0.000076
00	-0.005483	00	-0.00125	-0.001397	-0.009486	-0.001626	-0.000083	-0.925032	-0.006275	-0.085100	00	00	-0.076552	-0.000146	-0.000042	-0.038767	-0.024921	0.021354
-0.010446	-0.001115	00	00	-0.002243	-0.013890	-0.02886	1.000000	-0.000100	-0.020734	-0.007081	-0.222246	-0.017257	-0.101727	-0.000729	-0.002172	-0.000071	00	00
00	-0.006538	-0.000027	-0.043401	-0.010737	-0.035671	-0.002886	-0.000187	-0.11706	-0.015468	-0.065301	-0.000287	-0.000287	-0.154954	-0.000287	-0.006520	-0.000009	-0.006574	00
-0.120090	-0.024370	00	-0.009560	-0.002667	-0.025014	-0.000778	-0.010911	-0.016972	-0.025355	-0.065301	-0.000287	-0.000287	-0.154954	-0.000287	-0.006520	-0.000009	-0.006574	00
00	-0.034931	-0.000034	-0.074634	0.950142	-0.025014	-0.000778	-0.010911	-0.016972	-0.025355	-0.065301	-0.000287	-0.000287	-0.154954	-0.000287	-0.006520	-0.000009	-0.006574	00
00	-0.013163	-0.000025	0.999496	-0.000111	-0.014085	-0.004880	00	-0.016972	-0.025355	-0.065301	-0.000287	-0.000287	-0.154954	-0.000287	-0.006520	-0.000009	-0.006574	00
-0.175497	-0.071369	0.998374	-0.016855	-0.000044	-0.053232	-0.018240	-0.040513	-0.013410	-0.009936	-0.051013	-0.000037	-0.000037	-0.026213	-0.007110	-0.006637	-0.000542	-0.112391	-0.001062
00	0.982659	-0.002212	-0.043530	-0.002295	-0.029800	-0.004987	-0.004050	-0.043216	-0.004591	-0.032720	-0.001207	-0.001207	-0.035036	-0.007110	-0.006637	-0.000542	-0.112391	-0.001062
1.000000	-0.000020	-0.000044	00	00	-0.135938	-0.000306	00	-0.000020	-0.013772	-0.013213	-0.001207	-0.001207	-0.035036	-0.007110	-0.006637	-0.000542	-0.112391	-0.001062

TABLE - 6.2 The Activity Analysis Matrix [1 - A]

Table - 6.3 The Leontief Inverse $|I - A|^{-1}$

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1.111069	0.221137	0.015225	0.399861	0.248516	0.074114	0.028159	0.049863	0.072609	0.014770	0.025520	0.007956	0.059625	0.008294	0.008899	0.045533	0.099101	0.141547
2	0.034448	1.018433	0.014402	0.095063	0.077022	0.039407	0.027809	0.021341	0.047920	0.008725	0.015619	0.003804	0.020386	0.007372	0.006039	0.024101	0.132084	0.051607
3	0.030770	0.014084	1.022417	0.028161	0.037297	0.196499	0.188707	0.116143	0.047447	0.180427	0.117978	0.007927	0.047712	0.008845	0.021995	0.030542	0.029243	0.032463
4	0.010099	0.045172	0.010138	1.075886	0.021104	0.042157	0.016317	0.026386	0.032262	0.008805	0.015794	0.010327	0.028620	0.007640	0.011555	0.027436	0.131611	0.060921
5	0.066146	0.035943	0.033676	0.109840	1.593060	0.230456	0.074202	0.197325	0.125637	0.045157	0.078753	0.014499	0.141896	0.011601	0.014430	0.165674	0.049687	0.689734
6	0.137654	0.057916	0.095451	0.101445	0.117648	1.183925	0.174136	0.117077	0.147345	0.126833	0.184845	0.023663	0.219011	0.018278	0.034560	0.084883	0.083239	0.098333
7	0.001864	0.002015	0.005155	0.004902	0.003938	0.006548	1.039090	0.008317	0.027615	0.002443	0.233595	0.006138	0.006768	0.008591	0.092582	0.013941	0.008797	0.004621
8	0.048320	0.022509	0.044656	0.050305	0.055356	0.057446	0.057591	1.379982	0.112508	0.140814	0.194561	0.012810	0.117034	0.013276	0.011945	0.106049	0.069500	0.062131
9	0.009040	0.008004	0.020007	0.049221	0.029455	0.037285	0.066704	0.031423	1.283652	0.018229	0.051016	0.012742	0.035036	0.037664	0.017616	0.028346	0.018387	0.037800
10	0.043206	0.022778	0.018667	0.056701	0.102980	0.068748	0.153364	0.059264	0.094418	1.096426	0.052515	0.018036	0.031559	0.027542	0.025406	0.039986	0.066261	0.052830
11	0.001736	0.002258	0.016382	0.003215	0.004295	0.006917	0.005749	0.006677	0.004822	0.003932	1.003789	0.000961	0.013610	0.000871	0.000956	0.043318	0.006068	0.004101
12	0.121239	0.178074	0.046537	0.305612	0.180902	0.254862	0.085409	0.103999	0.259305	0.042465	0.070864	1.013391	0.073789	0.018875	0.021752	0.067812	0.082696	0.108565
13	0.075795	0.062598	0.098566	0.108334	0.116694	0.157472	0.109092	0.219499	0.116676	0.060599	0.091524	0.046106	1.099531	0.038685	0.030296	0.124354	0.073491	0.210068
14	0.004597	0.003913	0.013535	0.012850	0.031757	0.016983	0.014199	0.024717	0.027887	0.007655	0.011789	0.012524	0.010237	1.054150	0.002242	0.007021	0.007092	0.016085
15	0.007301	0.009395	0.006137	0.018921	0.017127	0.017847	0.011445	0.016081	0.027082	0.004878	0.007919	0.046081	0.017493	0.082150	1.003240	0.026408	0.050466	0.011224
16	0.000090	0.000138	0.000230	0.000248	0.000599	0.000475	0.000239	0.000358	0.000199	0.000124	0.000169	0.000067	0.000212	0.000143	0.000090	1.001918	0.002352	0.000346
17	0.007837	0.008390	0.031181	0.016184	0.026602	0.029930	0.024671	0.032464	0.024661	0.016820	0.016240	0.010105	0.036026	0.041057	0.017036	0.082718	1.026053	0.017962
18	0.082038	0.039904	0.044629	0.116097	0.119948	0.316011	0.104040	0.301451	0.107387	0.063842	0.111047	0.015021	0.212353	0.013438	0.018589	0.239109	0.053001	1.092912

6.1.2 Parameters of the Value-Added Functions

Before we estimate parameters of the value added functions for various sectors of the economy and select the specific functional forms, it is necessary to have some information about factor substitution. We have considered two primary factors in our model, i.e. capital and labour. For CES (CRS or VRS) production function given by :

$$VA_j = B_j [d_j K_j^{\rho} + (1-d_j) L_j^{\rho}]^{-\nu/\rho}$$

the elasticity of substitution between capital and labour is represented by :

$$\sigma_j = 1 / (1 + \rho_j)^{-1}$$

(where VA_j , K_j , L_j are the value added, capital stock and labour force engaged in the j th industry respectively; B_j is the efficiency parameter, d_j is the distribution parameter, ν_j is the homogeneity parameter (which is unity in case of CRS), ρ_j is the substitution parameter in the said industry, and σ_j is the elasticity of substitution between factors).

It is clear that :

if	$\rho \Rightarrow -1,$	$\sigma \Rightarrow \infty,$ limiting case of perfect substitution.
	$-1 < \rho < 0,$	$\sigma > 1,$ CES case applies.
	$\rho = 0,$	$\sigma = 1,$ Cobb-Douglas specification, as a special case of CES
	$0 < \rho < \infty,$	$\sigma < 1,$ CES case applies.
	$\rho \Rightarrow \infty,$	$\sigma \Rightarrow 0,$ limiting case of zero substitution indicating a fixed - coefficient function.

The specification of the value added functions for various sectors primarily depends on the information about the elasticities of substitution. Such an information is not readily available in developing countries, particularly for Pakistan. The important contributions in the area are due to Kazi et al (1976), Kemal, A. R. (1981), Kazmi et al (1981, 1982), Naqvi et al (1983), Battese and Malik (1987, 1988, 1993), Malik et al (1989), Khan, A.H. (1989), Zafar, M. (1989), Zuberi, H.A. (1989), Zahid et al (1992), Khan and Rafique (1993) etc. A number of other works, dealing with the problems of the agriculture sector in Pakistan, employ simply the Cobb-Douglas function. The studies by Naqvi et al (1983) and Zuberi et al (1989) also assume the same functions in their analyses. Most of the studies in this area were conducted with the objective of exploring the possibilities or otherwise of substitution among primary factors in view of the industrial policies in vogue and unemployment problems. The following remarks of renowned researchers are worthwhile in this regards:

1. Kemal, A.R.(1981)- "Factor market distortions in Pakistan have reduced welfare by inducing 'wrong' specialization and adoption of capital intensive techniques ill suited to the country's factor endowments. --- Thus a systematic exploration of the possibilities of factor substitution should be of considerable significance for economic analysis and policy making. If elasticity of substitution is large, a small reduction in the relative prices of labour would lead to a rapid growth of employment. On the other hand, if it is low, the removal of distortions from the factor market will not have much effect on the choice of production techniques."
2. Khan, A.H.(1993)- "Studies (regarding estimation of P.F. and elasticities) pertaining to developing countries were primarily directed towards finding the degree of substitution between labour and capital. These efforts were ignited by the desire to explain the existence of high rate of unemployment, particularly in the urban areas. It has been argued that near zero elasticity of substitution between labour and capital has been responsible for the existence of high unemployment. On the other hand, higher values of elasticities could lead to the substitution of abundant or the faster growing labour for the scarce or slow growing capital."
3. Malik, S.J. (1993)- "In a labour surplus developing economy, where most of the labour is unemployed or underemployed, the absorption of this surplus force in the industrial sector is an important issue. In recent decades, there has been significant growth in the industrial sector in most developing countries, in terms of both investment and output, (however) this has not resulted in a similar rate of increase in labour absorption. This is often attributed to the adoption of inappropriate technologies."

We summarize the important features and findings of the most relevant works in Tables 6.4 and 6.5, before we proceed further. A comparison of the substitution elasticity estimates is difficult because of differences in the data base, classification, aggregation, scope and coverage and estimation methodologies adopted by various researchers. Due to these reasons, the construction of central tendency tables for the elasticity estimates found in the literature as suggested by Shoven and Whalley (1992, pp 119-20) will not be possible.

Table -6.4: Important features of studies regarding estimation of substitution elasticities in the large scale manufacturing sector.

<u>Study</u>	<u>Data and coverage</u>	<u>Functional forms</u>	<u>Main findings</u>
Kazi et al (1976)	uses time series and cross section data for 12 selected industries.	CES, uses indirect form	Time series data yield comparatively lower elasticity values than the cross section data, thereby suggesting greater substitution possibilities across industries.
Kemal A.R. (1981)	time series data for 16 L/S industries covering period 1960-70.	CES/VES, both CRS & VRS, uses loglinear form	Elasticities are quite low for a number of industries, however, it is both high and significant for the manufacturing sector as a whole. CES/VRS is the adequate functional form.
Battese and Malik (1987)	Large and small scale 12 mfg. industries, data from CMI for 1969-70, 70-71, 1975-76, 76-77	CES/VES, both CRS & VRS, uses indirect form (loglinear) and allows pooling of data	CES(CRS) is adequate representation. Elasticities are significantly different from zero but not very different from unity in most cases. However after pooling of cross section and time series data, the elasticities are positive and become significantly different from unity.
-do- (1988)	Firm level data for four types of food processing industries, uses CMI data for the year 1980-81.	-do-	CES(CRS) function is adequate, however since elasticities are significantly different from zero but not significantly different from unity, so C.D. applies.
Malik et al (1989)	Firm level data for L/S textile industries in Punjab and Sind, uses data from 1969-70 to 1980-81.	-do-	CES(CRS) applies in general. Elasticities significantly different from zero and also from unity. Therefore greater possibility for factor substitution in the textile industries.
Khan, A.H. (1989)	Uses data from Pak Eco. Surveys and Pak. Energy year book	CES two level nested function, capital + energy 1st nest and working capital + labour to constitute the 2nd nest.	Complementarity between capital and energy or very low substitutability. Elasticity of substitution between working capital and labour is positive, but low.
Zahid et al (1992)	Covers data for 1960 to 1986 taken from CMI and aggregated to 17 industries.	CES/VES functions, direct point estimation by non-linear Gauss iterative techniques.	Nearly CES(CRS) applies for all. Low elasticity of substitution between capital and labour.
Khan et al (1993)	Uses time series data for L/S mfg. industries, data taken from official sources.	CES three level nested structure capital & imports 1st nest, working capital & bank credit 2nd nest and extended working capital & labour in the 3rd nest. Uses loglinear forms.	Capital, imported raw material and bank credit are complementary, elasticity of substitution between working capital and labour is very low.
Battese and Malik (1993)	Uses time series and cross section data from CMI for 1969-70 to 1986-87.	CES/VES functions, both CRS/VRS. Uses Indirect loglinear form. Allows pooling of data	Elasticities are significantly different from zero but not much different from unity, so greater possibilities of factor substitution in food processing sector.

Table-6.5: Comparison of the elasticity of substitution estimates for selected studies.

<u>Study</u>	<u>Kazi, (1976)</u>	<u>Kemal, (1981)</u>	<u>Battese & Malik (1987)</u>		<u>Zahid et al (1992)</u>	<u>Remarks</u>
<u>Coverage</u>	<u>(1954-70)</u>	<u>(1960-70)</u>	<u>(1976-77)</u>	<u>(pooled)</u>	<u>(1960-86)</u>	
<u>Industry</u>						
Food	0.30	0.864	1.53	1.38	from .286 to .491	Battese and Malik (1988), (1993) give estimates of 0.82 and 1.31 respectively.
Tobacco	---	1.716	---	---	0.417	
Textile	0.18	0.519	1.72	1.20	0.424	Malik et al (1989) give estimates of 0.43, 0.45, 0.89, 1.28, 1.30, 2.37
Footwear	1.02	1.751	---	---	---	
Leather	0.46	0.563	1.72	1.36	---	
Rubber	1.35	0.788	---	---	0.535	
Chemicals	1.86	0.294	1.39	1.46	0.346	
Drugs/ Pharm.					1.325	
Fertilizers					0.107	
Petro products					0.204	
Cement					0.244	
Printing	1.73	2.655	1.33	1.24	---	
Min. products	1.64	---	0.96	1.34	---	
Basic metals	1.29	0.550	1.83	1.35	0.401	
Metal products	---	0.210	1.51	1.25	---	
Elect. Machin.	0.81	0.143	1.39	1.49	---	
Other Machin.	---	0.079	1.37	1.59	0.465	
Tpt. Equip.	---	0.168	2.04	1.36	0.298	
All Mfg.		0.582	1.74	1.31	---	Khan (1989), (1993) give estimates of 0.48 and 0.63 between capital and labour, however, poor fit regressions.

We have ignored some of the studies that are not much relevant to our work, however important otherwise. The production functions estimated by Khan (1989) and Khan et al (1993) are much sophisticated. The estimates are, however, of little relevance for our model since we have used imported raw material, energy etc as intermediate inputs separately for different sectors as against the concept of extended working capital employed in the studies. The works of Kazi et al (1976) and Kemal (1981) are valuable, being pioneers in this field, however the data used is (by now) too old and the estimates need thorough revision with fresh data. The work of Zafar, M. (1989) is unique, since he estimated a translog cost function with capital, labour, energy and imported raw material as arguments through "iterative seemingly unrelated equation" technique. He concluded that a high elasticity of substitution (2.42) exist between capital and labour which goes against the conventional wisdom. The comments by M. Nasir Khilji are important in this regards.

Keeping in view these considerations, there seems no escape except to resort to some guess work and to pick up the most probable elasticity values for different sectors upon which there is greater agreement in the literature. Although the classification and aggregation of industries in our model is somewhat different from that adopted in the studies under reference, and further that all the studies are confined only to the manufacturing sector, anyhow we base our guess work regarding substitution elasticities, mainly on the findings of Battese & Malik (1987) and (1988), Malik et al (1989) and (1993) and Zahid et al (1992), and to some extent on other works. The most probable position based on these assumptions is shown in Table-6.6.

Table-6.6 Parameters of the Value added Functions

Sector / Industry	Value-added at f.c.	Labour share/cost	Capital share/cost	Depreciation cost	Total Capital cost	Depreciation rate (δ)	Substitution parameter (ρ)	Distribution Parameter (d)	Efficiency parameter (B)	Elasticity of substitution (σ)	Functional Form assumed
1 Agriculture Crop	125,112	36,742	84,027	4,343	88,370	0.0517	0	0.695766	1.848564	1	C.D
2 Agri. Non-Crop	89,252	8,941	75,789	4,522	80,311	0.0597	0	0.894477	1.400812	1	C.D
3 Mining & Quarrying	20,144	6,677	11,758	1,709	13,477	0.1453	3.545455	0.929045	1.74339	0.22	CES
4 Food Processing	25,639	5,347	17,141	3,151	20,292	0.1838	0	0.762229	1.730650	1	C.D
5 Textile & Footwear	42,035	14,615	21,142	6,278	27,420	0.2970	-0.418605	0.553460	1.980496	1.72	CES
6 Chem & Petroleum	15,918	4,861	8,821	2,236	11,057	0.2535	-0.285714	0.604831	1.939550	1.40	CES
7 Cement & Ceramics	11,162	3,412	6,325	1,425	7,660	0.2253	3.166667	0.929019	1.723594	0.24	CES
8 Machinery / Metal	19,045	7,135	9,332	2,578	11,910	0.2762	-0.295775	0.547120	1.987436	1.42	CES
9 Other Mfg.	11,349	3,844	5,957	1,548	7,505	0.2600	-0.259259	0.580417	1.965407	1.35	CES
10 Energy	28,818	1,328	22,936	4,554	27,490	0.1985	1.083333	0.997363	1.111605	0.48	CES
11 Construction	32,211	21,980	8,726	1,505	10,231	0.1725	0.538462	0.194462	1.739532	0.65	CES
12 Trade & commerce	96,853	4,319	89,718	2,816	92,534	0.0314	0	0.954071	1.204842	1	C.D
13 Tpt. & Communc.	58,324	17,927	31,506	8,891	40,497	0.2822	1.500000	0.803715	1.831362	0.40	CES
14 Finance Services	22,529	11,605	10,210	714	10,924	0.0699	0	0.468027	1.995912	1	C.D
15 Housing	68,758	8,266	54,277	6,215	60492	0.1145	0	0.867835	1.477693	1	C.D
16 Public Admn./def.	69,858	61,151	5,513	3,194	8,707	0.5793	0	0.082698	1.330175	1	C.D
17 Other Services	25,456	6,200	14,868	4,388	19,256	0.2951	0	0.705715	1.832982	1	C.D
18 R.O.W.#	71,327	21,408	49,919	00	71,327	0.00	0	0.699861	1.842239	1	C.D

#Note: We assume Cobb-Douglas specification for sector- 18, representing transactions with the rest of the world. The net imports equal to the trade deficit is assumed to be the value added by the foreign sector. It hires labour services from the domestic economy equal to remittances from abroad (Rs. 21,408 m) and the difference is the value of capital services consumed over there (Rs. 49,919 m).

6.2 The Demand Side Parameters

We have specified a two-level nested demand function for consumer's behaviour. In the first level, the household concerned has to allocate the disposable income between present and future consumption. The outcome of this behaviour primarily depends on elasticity of saving to the rate of interest/return. In the second level, the household allocates the fraction of income devoted to consumption among different commodities, given the market prices and taxation structure. It is convenient to deal first with the lower nest.

6.2.1 Transformation matrix

Due to differences in the market and industrial goods classification, we deal with ten (10) "consumer's goods" which in turn are composites of eighteen (18) "producer's goods". Their inter-relationship has been discussed in Chapter-5 and the correspondance between demand and supply derived. Keeping in view the contents of Table-5.4, we derive the requisite transformation matrix, shown in Table 6.7 below, which is of (18 x 10) order. It is clear to note that the sum of coefficients across every row is unity.

6.2.2 Relationship between Producer and Consumer goods Prices

The households respond to the market prices of Consumer's goods which are the weighted composites of the after-tax Producer's goods. As noted earlier, it is customary in the G.E. modelling to define units of goods (and factors) such that each unit costs one unit of money at the benchmark equilibrium. Thus the number of units of goods equals total value at factor cost. In other words, the net-of-tax price of each unit of a commodity is unity at the benchmark. We follow the same convention and derive Producer's goods prices from Table-4.8 as under:

$$\text{Tax rate } (t_i) = \text{Gross commodity tax} / \text{Total cost of production.}$$

$$\text{Market Price of Producers good } (P_i) = 1 + t_i$$

This constitutes a vector of (1x18) prices (P_i), which when pre-multiplied to the transformation matrix (18x10) gives a vector of market prices of Consumers goods (P_c), with order (1x10). The weights associated with the prices of producers goods are given by the coefficients of the transformation matrix. The prices are shown as under:

Producer's prices (P_i)

<u>sector</u>	<u>price</u>
1. Agr (crop)	1.010366
2. Agr (non-crop)	1.001208
3. Mining	1.307204
4. Food processing	1.073041
5. Textile/Ft. wear	1.018408
6. Chem. Petrolm.	1.023620
7. Cement/ceramics	1.217286
8. Machinery/metal	1.022982
9. Other manufact.	1.022945
10. Elect. & gas	1.044948
11. Construction	1.021677
12. Trade/commerce	1.040475
13. Tpt/Communic.	1.019600
14. Banking/Insur.	1.001022
15. Housing	1.004990
16. Public services	1.000996
17. Other services	1.015838
18. Imports	1.222887

Consumer's prices (P_c)

<u>commodity</u>	<u>price</u>
1. Food	1.044282
2. Clothing	1.066027
3. Tpt/communic.	1.016035
4. Personal appr.	1.083502
5. Housing	1.010962
6. Fuel/Lighting	1.032039
7. Furniture	1.080125
8. Education	1.049799
9. Health/medicare	1.061637
10. Misc. expend.	1.108047

6.2.3 Parameters of the Contemporaneous Utility functions

We have assumed Cobb-Douglas utility functions in our model for four household groups, each consuming ten commodities. The percent share of each commodity in total outlay of the concerned group has been shown in Table-5.3. The relevant utility parameters (β_i) can be easily derived given that $\beta_i = P_i X_i / M$, where $M = P_0 C_0$ is the fraction of income devoted to current consumption expenditure. The results are shown in Table-6.8.

Table- 6.7 The Transformation Matrix

Commodity → Sector ↓	Food	Clothing Footwear	Transpt. Commun.	Personal Appearance	Housing	Fuel and Lighting	Furniture	Education	Health/ Medicare	Others Misc. Exp.
1. Agriculture (Crop)	0.239485					0.211611				
2. Agriculture (noncrop)	0.300003		0.189163			0.410544				0.114314
3. Mining/ Quarry						0.039094				
4. Food Process	0.400000								0.099994	0.217930
5. Textile & Footwear		0.743898								0.017108
6. Chem./ Petroleum				0.226953	0.020570			0.052232	0.400033	0.022260
7. Cement & Ceramics					0.013629		0.024338			
8. Machinery/ Metals					0.030013		0.054186			
9. Other Manufacturing				0.142757			0.563762	0.147726		0.010070
10. Energy (Elect./Gas)						0.302840				
11. Construction					0.110693					
12. Trade & Commerce	0.003952	0.013832				0.019743	0.013642			
13. Transp./ Commun.			0.810837							
14. Financial Services										0.055200
15. Housing / Dwellings					0.814028					
16. Pub Admin/ Def.								0.600084	0.299928	0.078268
17. Other Services	0.002633	0.010780		0.316905	0.011067		0.076667			0.085700
18. R.O.W. (imports)	0.053927	0.231510		0.313385		0.016168	0.267405	0.199958	0.200045	0.399150

Table- 6.8 Contemporaneous Utility Function Parameters

Parameters → Income Groups ↓	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9	β_{10}	$\Sigma \beta_i$
1. Low Income group	0.542671	0.083966	0.026485	0.047987	0.111971	0.070201	0.018986	0.007215	0.030378	0.060140	1
2. Lower- middle Income group	0.512061	0.081000	0.031604	0.044488	0.127104	0.060358	0.023984	0.013048	0.028726	0.077627	1
3. Higher- middle Income group	0.473111	0.076801	0.042337	0.042085	0.137550	0.050048	0.029005	0.016610	0.030753	0.101700	1
4. High Income group	0.375200	0.063812	0.089004	0.037102	0.170510	0.041103	0.030197	0.029700	0.023205	0.140167	1
5. Average (all groups)	0.487502	0.077895	0.042276	0.043498	0.133402	0.056974	0.025105	0.015296	0.028827	0.089225	1

6.2.4 The Composite Price Index

The composite price index for the consumption bundle of the household concerned is given by equation (19) of Chapter-3 and reproduced below:

$$P_o = (P_1 / \beta_1)^{\beta_1} \cdot (P_2 / \beta_2)^{\beta_2} \dots (P_m / \beta_m)^{\beta_m} = \prod_j (P_j / \beta_j)^{\beta_j}, \quad j=1,2,\dots,m$$

These prices are calculated for various households keeping in view their outlays in the benchmark position and shown below.

<u>Household group</u>	<u>Composite price index</u>
Group 1(Low. income)	5.184620
Group 2(Lower-middle)	5.578638
Group 3(Higher-middle)	6.045352
Group 4(High income)	6.917450
Average	5.885622

Similarly the composite price index for the saving/investment commodity can be calculated, using equation 20(a) of Chapter-3 reproduced below:

$$P_{inv} = P_1 e_1 + P_2 e_2 + \dots + P_n e_n = P_s, \quad \text{with } \sum e_i = 1, \quad n=1,2,\dots,18$$

where e_i is the share of the i th industry's output used for total investment outlay in the benchmark. We estimate these coefficients from the data shown in Table-4.8 as under:

$$e_2 = 0.014767, \quad e_7 = 0.032243, \quad e_8 = 0.041529, \quad e_{11} = 0.348977, \quad e_{18} = 0.562484$$

It is to be noted that only sectors 2,7,8,11,and 18 contribute to investment demand of the economy. The above coefficients comprise the weights in the composite price index of the saving/investment commodity, where the relevant producers prices are taken from 6.2.2 above. Consequently we get a single index to which all the households respond while making decision regarding present and future consumption.

$$\text{Thus } P_{inv} = 1.140913 = P_s$$

6.2.5 Parameters of the Inter-temporal Utility functions

The crucial parameter in these functions is the elasticity of substitution between consumption and saving, which in turn depends on the relevant APC's and the elasticity of savings w.r.t. the rate of return. Unfortunately, the estimates of these

elasticities are altogether scarce both for the developed and underdeveloped economies. The following remarks by Hassan Imam(1985) are worthwhile:

" The estimates of interest elasticities of saving are very scarce in general and particularly rare for LDC's. For India, only Gupta (1970) has estimated a saving function with interest rate as one of the argument. When the (relevant) elasticity is derived from that estimated function, it appears to be around 0.3, which is comparable to the interest elasticity of saving estimate for USA by Boskin(1978), Sumars (1980) and Evans (1983). Gupta(1971) has estimated the interest elasticity of the growth of bank deposits in India to be around 20. This may also shed some light on the interest elasticity of saving since bank deposit is the single most important component of private savings in India."

It is interesting to note that BSFW(1989) base their model for U.S. tax policies on a single estimate of 0.4 given by Boskin(1978). For Pakistan, we find only a few works which are summarized as under:

1. Qureshi, Zia M.(1981) - (Household savings in Pakistan: Some findings from time series data, PDR 20:4.). He estimated several saving functions separately (peace-meal estimation) with permanent and transitory income, per capita income, real rate of return on savings and the rate of inflation as arguments. The estimated functions which are relevant to our work are:

$$(a) \quad S = -289.363 + 0.116 Y + 54.118 r$$

$$(b) \quad S = -336.872 + 0.095 Y_p + 0.585 Y_T + 46.142 r$$

$$(c) \quad S_f = -742.460 + 0.075 Y + 28.785 r, \text{ where } S_f \text{ is the financial savings.}$$

Private savings consist of household and business savings compiled by himself. The real rate of interest is the average annual (quarterly average) rate of interest on scheduled banks time deposits for 6 to 12 months and corrected for inflation through CPI. He finds a fairly strong relationship between saving and the real rate of interest with elasticity ranging from 1.5 to 2.0; i.e. an increase in the real rate of interest by one percentage point tended to raise total savings by 1.5 to 2.0 percent, and financial savings by about 3.5 percent. He notes that the nominal rate of interest as a policy instrument is kept at a low level, which results into a very low level of real rate of return, some times negative. His

findings, according to his statement, support the repressionists complementarity hypothesis.

2. A.H.Khan (1988)¹ - (Financial Repression, Financial Development and Structure of Saving in Pakistan- PDR 27:4). He estimated a linear saving function with the permanent income, transitory income, real rate of return, rate of inflation etc as arguments. He uses data on national savings and the bank rate of interest corrected for inflation and finds the interest elasticity of financial savings ranging from 0.01 to 0.03. He notes that the government, for a variety of reasons, keeps the real interest rate low which impedes financial deepening, capital formation and growth. The money and capital markets remain less developed and the interest rate is not determined by the free play of market forces; rather it is administered by the monetary authority and therefore, it does not reflect the true cost of financial investment.
3. Khan et al(1992)- (Dependency ratio, Foreign capital inflows and the rate of savings in Pakistan, PDR 31:4). They estimate a linear saving rate function with many arguments like per capita income, growth rate of GDP, real rate of interest, foreign capital inflow, foreign aid, total volume of trade and dependency ratio (defined as the earners to the household size). The saving rate is defined as the ratio of national savings to the GDP and the real rate of interest is the rate of return on bank deposits for one to two years, corrected for inflation. He finds a strong and significant impact of the rate of interest on savings and shows that a 1% increase in real rate of interest is likely to increase saving rate by 0.07%².

¹ Financial repressionists argue that the low (or negative) real rate of return on deposits caused by arbitrarily set ceiling on nominal interest rate and high plus fluctuating inflation rate are the major impediments to savings, financial deepening, capital formation and growth (in LDC's). Financial structuralists assert that a widespread network of financial institutions and a diversified array of financial instruments will have a beneficial effect on the saving-investment process and hence, on growth. The absence of such a pre-requisite in LDC's is the major cause of underdevelopment. Mohammad Ahmed (1988)- Financial repression in the LDC's- PJAЕ Vol VII No.1, pp 19-41 provides a fairly detailed survey of issues and reappraisal.

² A serious problem with Khan (1988) and Khan et al(1992) is that they use National savings given by the macro identity : $S = I + X - M$, in their estimation. As such their estimates are of little importance for our model since we require the reponse of the households to the rate of return so for as the consumption-saving decisions are concerned.

In view of the vast disagreement among findings of various studies, we have tried to estimate saving functions (linear and Cobb-Douglas) with income and the rate of return as arguments, in the neoclassical fashion, for the period 1980-81 to 1993-94. We used different proxies for income, household saving and the rate of return in order to escape the multicollinearity problems. For instance:

- Variable S Proxy: Annual average (four quarterly average) flow of saving deposits (at constant prices of 1980-81) with the scheduled banks to represent household financial savings for the first regression; and flow of private savings (household plus corporate) for the second regression.³
- Variable Y Proxy: GDP(fc) at constant prices of 1980-81 as proxy for income, for both the regressions. We also tried lagged values of this variable.
- Variable r Proxy: The Scheduled Bank's weighted rate of interest on saving deposits for the first regression and same thing but on fixed deposits (3 to 4 years) for the second regression (averaged again on June to June figures). If adjusted for the rate of inflation through CPI, many figures turned negative.

The results of the regressions are as under:

(a). Function: $S = a_0 + a_1 Y + a_2 r + u$

(1) $S = -58713.050 + 0.2075875Y + 3921.7915r$

 S.E. (20705.300) (0.0096203) (2702.0402)

 T-Stat. (-2.8356531) (21.578031) (1.4514187)

R^2 (Adj) = 0.974859, D.W. Statistics = 1.1442250

Interest elasticity of saving at mean point = 0.58005

³

The data is derived from Malik et al (1994)- (its Appendix Table 12 pp 380 for 1980-81 to 1988-89)- The State Bank of Pakistan has started to provide data on different measures of savings from its Annual Report 1994-95 onwards. The data for 1989-90 to 1993-93 is derived from the later source.

- (2) $S = -39510.793 + 0.1670634 Y + 2317.4329 r$
 S.E. (36090.707) (0.0216903) (2689.0189)
 T-Stat. (-1.0947636) (7.7022342) (0.8618136)
 R^2 (Adj) = 0.826338, D.W. Statistics = 2.143198
 Interest elasticity of saving at mean point = 0.510268
- (b). Function: $\ln S = c_0 + c_1 \ln Y + c_2 \ln r + u$
- (1) $\ln S = -10.486301 + 1.6208126 \ln Y + 0.2271360 \ln r$
 S.E. (1.1598540) (0.0661234) (0.3686572)
 T-Stat. (-9.0410531) (24.511927) (0.6161170)
 R^2 (Adj) = 0.980373, D.W. Statistics = 1.052885
 Interest elasticity of saving (over the regression range) = 0.2271
- (2) $\ln S = -7.1844003 + 1.2947807 \ln Y + 0.5609655 \ln r$
 S.E. (2.9207438) (0.1596631) (0.5979657)
 T-Stat. (-2.4597845) (8.1094555) (0.9381232)
 R^2 (Adj) = 0.839123, D.W. Statistics = 2.049025
 Interest elasticity of saving (over the regression range) = 0.5609

None of the above results support any findings of studies conducted earlier. The differences may be attributed to model specification, relevance of data and the period to which the data pertains. Although our specifications are similar to those of Qureshi (1981), however there is a major difference in the periods under study. Qureshi (1981) considers data for 1959-60 to 1976-77. The banking sector in Pakistan during that period, particularly before 1970-71, was efficient, stable and reliable. Similarly, the price system was stable and the rate of inflation was very low during the period concerned. Therefore, the interest elasticity of saving remained high as the study reveals. Later on, the banking system had to face so many crisis (like nationalization, default cases, dacoitees, writing-off loans through political interference and over-staffing etc) and the banks were compelled to offer very low rate of return on private savings. This factor and the persistently high rate of inflation (which in fact has rendered the rate of return on bank deposits negative) have realized the common man to invest his saving in real estates and other formal and informal business instead of using the bank channel. This may be a possible explanation of the low interest elasticity of private savings.

Keeping in view the above discussion, we are bound to pick up some approximate figure for the interest elasticity of saving, although with temptation, and

to calculate other relevant parameters. The (household) elasticity of substitution between consumption and saving is related to the interest elasticity of saving, as given by equation (15) of Chapter-3 , and reproduced below:

$$\sigma = 1 + \eta_s / APC \quad (3.15)$$

We choose two experimental figures of 0.5 (0.3) for η_s and, keeping in view the contents of Table-5.2, we can calculate the APC and substitution elasticities for different households. Having known the crucial parameters, it is now straight forward to calculate the weighting parameters (a) in the intertemporal utility functions of the households, as given by equation 3.12 a. Again we get two values for each set because of the respective values of the substitution elasticities. These estimates are shown in Table-6.9 as follows:

Table-6.9 - Parametrs of the Intertemporal Utility Functions

Household Group	Dispos. Income	Financial Transaction	Total Resources	Net Saving	Personal Outlays	APC	Elasticity of Substitution	Weighting Parameters
Low income	16,996	+ 4072	21,068	00	21,068	1	1.5000 (1.3000)	1.000000 (1.000000)
Lower-mid. income	36,712	00	36,712	230	36,482	0.9937	1.5032 (1.3019)	0.997171 (0.996111)
Higher-mid. income	66,471	00	66,471	10,964	55,507	0.8350	1.5985 (1.3591)	0.932161 (0.902120)
High income	172,816	- 4,072	168,744	66,052	102,692	0.6086	1.8215 (1.4930)	0.872341 (0.790805)
Average	40,899	00	40,899	4,093	36,806	0.8999	1.5556 (1.3334)	0.957219 (0.939539)

6.3 Poverty and Income Distribution indices

The extent of poverty and the degree of inequalities in personal distribution of income has been a live topic of debate. The research in this area, which is normative in essence, falls within the premises of development economics . The conjugate pair of issues is widely discussed on socio-political forums particularly in the underdeveloped world. The economists are concerned with estimation of poverty lines and inequality coefficients to enable them measure the extent of poverty and the quality of income distribution respectively. These indicators are further used to verify the effectiveness

of various policies designed for the purpose of reducing the severity of the twin problems. We briefly discuss our own derivations and compare them with the estimates of relevant studies.

6.3.1 The Poverty line

We refer back to section 5.2.3 of the previous chapter where we have reclassified and aggregated the HIES 1990-91 scheme for the entire population. It consists of four household groups, defined as the low-income, lower-middle, higher-middle and high-income groups. The households whose monthly consumption expenditure (not merely food) exceeds disposable income and who are persistently under the debt burden have been defined as poor. The poor households, according to our calculations based on HIES 1990-91 data, constitute 41.39 % of total population. This figure is quite comparable to the findings of Jafri & Khattak (1995) stating that 41% of households out of total population were below the poverty line; and also in line with the estimation of Ahmad (1993)⁴ stating that 42.15% households were living below the poverty line. The yearly disposable income and consumption expenditure of this group amounts to Rs. 16,996 and Rs.21,068 respectively as shown in Table-5.2. The deficit is naturally financed through borrowing. Next we compare these figures with the findings of other independent works.

A number of studies have been conducted to estimate the extent and incidence of poverty in Pakistan. Two recent studies by Nasim et al (1995) and Jafri & Khattak (1995) are relevant to our purpose. Results of important studies carried earlier on income inequality and extent of poverty have been summarized by both.

1. Nasim et al (1995) have estimated poverty lines using grouped data from HIES 1984-85, 1987-88 and 1990-91. The study adopts Foster, Greer and Thorbeck (1984) measure based on estimated caloric expenditure function:

$$C = a + b \log E + u,$$

where C denotes the caloric intake per adult equivalent and E is monthly consumption expenditure per adult equivalent. The assumed cut-off point is

4

The study by Ahmad (1993) estimates an amount of Rs. 338.00 per capita as the poverty line for 1991-92 prices, using the basic needs approach and assuming an average household size of six persons, with two adults and four children. Referred to in Jafri & Khattak (1995) as Draft paper prepared for Ministry of Finance, Islamabad.

2550 calories per adult equivalent as established in Khan and Khan (1985)⁵. Table II.3 of the document shows poverty lines for 1984-85 [estimated by Ercelawn (1990)] and for 1987-88 and 1990-91 by the authors. An extract from the table is given below for ready reference. It shows the income required to maintain the minimum nutritional requirements of the household concerned for overall Pakistan. The figures are expressed in Rs. per month :

<u>1984-85</u>		<u>1987-88</u>		<u>1990-91</u>	
<u>per adult</u>	<u>per capita</u>	<u>per adult</u>	<u>per capita</u>	<u>per adult</u>	<u>per capita</u>
Rs.185	150	Rs.241.11	190.47	Rs.320.42	256.33

2. Jafri & Khattak (1995) have adopted the basic needs approach to estimate the poverty lines based on HIES data for 1990-91. This includes the cost of minimum expenditure on clothing, housing, health, education, transport, socialization, recreation etc., besides food. So far as the cost of nutrition is concerned, they take the minimum requirement of 2550 calories intake per adult per day which is equivalent to 2354 calories per capita in Pakistan⁶. Table 3 of the study shows per capita per month expenditure of an average household for rural and urban areas in Pakistan just sufficient to fulfill the minimum requirements. Assuming a share of 32% of urban and 68% of rural in total population, the estimated poverty lines are as under:

1985-86	Rs. 203.30	1986-87	Rs. 224.30
1987-88	Rs. 234.40	1990-91	Rs. 323.00

We are now in a position to compare our estimates with the above. If the per capita figures for 1990-91 in both the studies (i.e. Rs. 256.33 and Rs. 323.00) are deflated through CPI to conform to 1989-90 prices (and/or likewise the figures for 1987-88 are inflated), and considering an average household size of 6.5 for our base year, we get the following picture:

⁵ The estimates of calorie requirements by Khan and Khan (1985) are based on micronutrient data information, published by Planning and Development Division, Govt. of Pakistan (1980).

⁶ The authors refer to FAO/WHO (1985) report of a joint expert committee, Geneva, titled: "Energy and protein requirements".

	<u>Nasim et al (1995)</u>	<u>Jafri & Khattak (1995)</u>
Poverty line for 1990-91	Rs. 256.33 (food)	Rs. 323.00 (basic needs)
Deflated to 1989-90 prices	Rs. 230.00	Rs. 280.00
Min. income per H.H. p.m.	Rs. 1,495.00	Rs. 1,820.00
Min. income per H.H. p.annum	Rs. 17,940.00	Rs. 21,840.00

Both the figures for minimum resources (just sufficient to accomplish the basic needs per household) amounting approximately to Rs. 18,000.00 and Rs. 22,000 respectively are comparable to our calculation of Rs. 21068.00 as the actual expenditure per annum of the low income households. Keeping in view these considerations as well as our modelling objectives, it is fair to assume Rs. 20,000/- per annum per household as the adequate poverty line. As shown by the studies under reference, the poverty line may grow overtime at an annual rate of about 10%, partly due to inflation and partly because of rising living standards; although no explanation has been provided by the authors.

6.3.2 Inequality Measures

Inequalities in the personal distribution of income is generally measured by the Gini coefficient which is the ratio of the area between the line of equality and the Lorenz curve to the total area beneath the diagonal of the rectangle drawn with cumulative income shares along the vertical axis and cumulative population (recipients) share along the horizontal axis. A computable formula for the index in terms of the empirical Lorenz curve proposed by Atkinson (1973) is given by:

$$G = 1 - \sum_{i=1}^n P_i (z_i + z_{i-1}), \text{ with } z_0 = 0$$

where P_i is the population of the i th income class and z_i is its share in income.

The actual data for our base year (1989-90) reveals the following position:
(Ref:Table-5.2)

	17.000 million households, distributed as:	
1. Low income group	7.0363	41.39 % share
2. Lower-middle income	6.3852	37.56 %
3. Higher-middle income	2.6061	15.33 %
4. High income group	0.7924	5.72 %

Aggregate disposable income 695,282 Rs.million, distributed as:

1.	Low income group	119,593	17.200 % share
2.	Lower-middle income	234,412	33.715 %
3.	Higher-middle income	173,230	24.915 %
4.	High income group	168,047	24.170 %
	Ratio of High-income to Low-income group		1.4051

On the basis of this information, the Gini coefficient (G) is calculated as under:

Class	Income share	z_i (cumulative)	$(z_i + z_{i-1})$ $z_0 = 0$	p_i -----	$p_i(z_i + z_{i-1})$ -----
1.	0.17200	0.17200	0.17200	0.4139	0.071191
2.	0.33715	0.50915	0.68115	0.3756	0.255840
3.	0.24915	0.75830	1.43945	0.1533	0.220667
4.	0.24170	1.00000	2.43945	0.0572	0.139536
				$\sum p_i(z_i + z_{i-1}) = 0.687234$	$G = 0.312766$

Pakistan Economic Survey (96-97 and 97-98 editions) provides the following statistics on Household Income Distribution in Pakistan derived from HIES:

Year	Gini Coefficient	H.H. income Share (%)			Ratio of Highest to Lowest
		Lowest 20%	Middle 60%	Highest 20%	
1963-64	0.386	6.4	48.3	45.3	7.1
1966-67	0.355	7.6	49.0	43.4	5.7
1968-69	0.336	8.2	49.8	42.0	5.1
1969-70	0.336	8.0	50.2	41.8	5.2
1970-71	0.330	8.4	50.1	41.5	4.9
1971-72	0.345	7.9	49.1	43.0	5.4
1979-80	0.373	7.4	47.6	45.0	6.1
1984-85	0.369	7.3	47.7	45.0	6.2
1985-86	0.355	7.6	48.4	44.0	5.8
1986-87	0.346	7.9	48.5	43.6	5.5
1987-88	0.348	8.0	48.3	43.7	5.5
1990-91	0.407	5.7	45.0	49.3	8.6
1992-93	0.410	6.2	45.6	48.2	7.8
1993-94	0.400	9.2	50.6	40.2	4.4

The above trend reveals that inequality narrowed down during 1963 -1971 but the situation of distribution worsened thereafter till 1984-85. During the period 1985 - 1988 it remained more or less constant and improved but deteriorated again from 1990-91 onwards. Our calculation for income distribution in terms of Gini coefficient based on the data for 1989-90 show better position than the official statistics.

6.4 Macroeconomic indicators

In this section we discuss the behaviour of public expenditure overtime and the relationship of gross saving & investment expenditure.

6.4.1 Public Expenditure and GDP ratio

The public services like general administration and defence, health and education etc by the government, shown by sector 16 in our model, are assumed to be provided through a Cobb-Douglas value added function. The government is constitutionally obligated to provide a specific volume of these services to the society free of direct user charge. For the sake of simplicity, we assume that government consumption expenditure bears a constant ratio to the GDP over time. Although this may not be true always, however the factual data fairly supports our assumption. The following figures derived from official sources and expressed in Rs. million at constant prices of 1980-81, reveal the picture:

<u>Year</u>	<u>Govt. Consumption</u>	<u>GDP(m.p)</u>	<u>Ratio G/GDP</u>
1980-81	28,998	277,961	0.104324
1981-82	30,744	296,383	0.103731
1982-83	36,288	316,473	0.114664
1983-84	40,716	332,503	0.122453
1984-85	43,467	357,747	0.121502
1985-86	47,826	377,429	0.126715
1986-87	54,158	401,782	0.134794
1987-88	56,518	432,419	0.130567
1988-89	68,052	453,866	0.149939
1989-90	65,896	474,102	0.138991
1990-91	65,566	499,960	0.131142
1991-92	60,407	539,131	0.112045
1992-93	71,134	549,455	0.129463
1993-94	63,869	570,731	0.111907
1994-95	67,360 ^R	595,742 ^R	0.113069
1995-96	71,157 ^P	631,153 ^P	0.112741

Note: R stands for revised and P for provisional figures.

There is a steady growth of Govt. consumption from 1980-81 to 1988-89 along with the growth of GDP. However, there are fluctuations in the former probably due to changing governments and policies to curtail expenditure.

We have tried to fit a simple linear regression, with results as under:

$$GC = 1609.8773 + 0.1190888 \text{ GDP}$$

S.E. (6183.9671) (0.0135200)

T-STAT (0.2603308) (8.8083356), F-STAT = 77.58678, $R^2 = 0.847140$

The results reveal a strong correlation between the two variables, the regression has a high goodness of fit with the intercept insignificant and MPC (public) about 11.9%. As such, it is plausible to assume an average ratio of public consumption to GDP round about 12% (or 0.12).

6.4.2 Investment and saving ratio

The share of public sector in the gross investment is exogenously determined by the government which is an integral part of the ADP that in turn has roots in the Five-year plan/s. However, all this depends on the availability of foreign assistance. This behaviour considerably affects the level of gross investment in the economy. The time series on investment expenditure (gross fixed capital formation) and private savings depicts the following picture. All figures are in Rs. million reckoned at constant prices of 1980-81:

<u>Year</u>	<u>GDP(m.p)</u>	<u>Priv. Saving</u>	<u>G.F.C.F.</u>	<u>SAV/GDP</u>	<u>INV/GDP</u>	<u>INV/SAV</u>
1980-81	277,961	30,513	47,707	0.1098	0.1716	1.5635
1981-82	296,383	32,439	52,346	0.1094	0.1766	1.6137
1982-83	316,473	38,780	57,502	0.1225	0.1817	1.4828
1983-84	332,503	43,339	60,441	0.1303	0.1818	1.3946
1984-85	357,747	44,890	66,648	0.1255	0.1863	1.4847
1985-86	377,429	49,716	69,807	0.1317	0.1849	1.4630
1986-87	401,782	56,231	72,969	0.1399	0.1816	1.2976
1987-88	432,419	53,172	71,977	0.1230	0.1665	1.3536
1988-89	453,866	55,545	77,300	0.1224	0.1703	1.3916
1989-90	474,102	53,826	81,271	0.1135	0.1714	1.5098
1990-91	499,960	67,412	83,871	0.1348	0.1678	1.2441
1991-92	539,131	69,002	92,512	0.1280	0.1716	1.3407
1992-93	549,455	66,283	96,420	0.1206	0.1755	1.4547
1993-94	570,731	74,711	95,548	0.1309	0.1676	1.2789
1994-95	595,742 ^R	75,632	99,981	0.1269	0.1678	1.3219
1995-96	631,153 ^P	76,919	104,935	0.1219	0.1663	1.3642

Note: R stands for revised and P for provisional figures.

It is evident from the above that the average aggregate saving rate lies between 11 and 13 percent of GDP (the simple mean of the series being 0.1244) and that of investment lies within the range 16 to 18 percent (the simple mean of the series being 0.1743). Similarly the ratio of gross investment to private savings lies between the range of 1.2 and 1.6 (the simple mean being 1.41). This long-run position implies that the rate of investment is maintained nearly 140% higher than the rate of private savings in the economy. The latter includes both the household and business / corporate savings. So far as public savings are concerned, these have constantly been negative since 1980-81. We will therefore, consider the investment-saving ratio as 1.4 in our estimations.

6.5 Taxation Parameters

Next we focus attention on taxation side. We bifurcate income liable to taxation into personal income and corporate income (profit of business sector) in view of the usual practice. All taxes on physical holdings and rental income are lumped together as property tax. Similarly commodity taxes include the sales tax, central excise and custom duties. These items are considered as under:

6.5.1 Personal Income Tax rate

As dicussed in the previous chapter, the National Accounts consider an amount of Rs. 3,495 million on account of personal income tax for the base year 1989-90. This accounts to Rs. 206/- per annum for an average household. Keeping in view the basic rebate of Rs. 30,000/- , the effective income tax rate is merely 1.25% of the taxable income for all groups.

6.5.2 Corporate Income Tax and Property Tax

Part of the profits (operating surplus) in the corporate business is retained and reinvested and another part is paid out as tax on corporate income. The remainder is passed on to the shareholders (households and the government) as dividends. In this regards, the data picture for 1989-90 is as under:

Operating surplus	= Rs. 478,046 million
Corporate savings	=Rs. 12,840
Corporate income tax	=Rs. 12,246
Net profits	=Rs. 452,960
Share of the Govt.	=Rs. 20,220
Share of households	=Rs. 432,740

For the sake of simplicity, however without any loss of generality, we assume that 8 out of 17 domestic production sectors are incorporated where corporation income tax is admissible and a part of earnings can be retained for reinvestment. These include food processing, textile & footwear, chemicals & petroleum, cement & ceramics, machinery & metal works, electricity & gas distribution, transport & communications and financial services. The property tax is applicable to sector 15 (real estates and housing) only. Sector 16 (public administration & defence) is exclusively within state control. All the remaining sectors, namely agriculture, mining, other manufacturing, construction, trade & commerce and other services are neither liable to any taxation nor is there any provision for retained earnings. The accrual of income and its distribution will be as under:

<u>Sector</u>	<u>Cap. Income</u>	<u>Corp. Saving</u>	<u>Taxable Inc.</u>	<u>Income Tax</u>	<u>Dividends</u>
4.	17141	1727	15414	1459	13955
5.	21142	2130	19012	1799	17213
6.	8821	890	7931	750	7181
7.	6325	637	5688	538	5150
8.	9332	940	8392	794	7598
10.	22936	2311	20625	1952	18673
13.	31506	3175	28331	2681	25650
14.	10210	1030	9180	869	8311
<u>Subtotal</u>	<u>127413</u>	<u>12840</u>	<u>114573</u>	<u>10842</u>	<u>103731</u>
1.	84027	-	-	-	84027
2.	75789	-	-	-	75789
3.	11758	-	-	-	11758
9.	5957	-	-	-	5957
11.	8726	-	-	-	8726
12.	89718	-	-	-	89718
17.	14868	-	-	-	14868
<u>Subtotal</u>	<u>290843</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>290843</u>
15.	54277	-	54277	1404	52873
16.	5513	-	-	-	5513
<u>Grandtotal</u>	<u>478046</u>	<u>12840</u>	<u>465206</u>	<u>12246</u>	<u>452960</u>

In view of the above it is now easier to estimate the relevant parameters. The corporation income tax is calculated at a uniform rate of 0.094630, the property tax rate is 0.025867 and the corporate saving rate is 0.100775.

The dividends or the net capital income generated in the corporate sector may be distributed among the share holders as under. Please see Table 5.1 for reference:

<u>Group</u>	<u>Net dividends</u>	<u>Amount withheld</u>	<u>Gross capital income</u>
1.	00	00	00
2.	27466	6270	33736
3.	25299	5776	31075
4.	36259	8278	44537
Govt. share	14707	3358	18065
Total	103731	23682	127413

The capital income from sector 16 amounting to Rs. 5513 m. may be added to Rs. 14707 m. accrued from other sectors to arrive at the gross share of government in dividends given as Rs. 20220 m. discussed above.

The relationship between generation and distribution of capital income may be shown as : $(1-cw) \sum_i GCap_i = \sum_j Ncap_j + Ncap_g$,
 where $i =$ industries/sectors concerned and $j = 1, \dots, 4$ household groups. $g =$ govt.
 In the above relation, "cw" may be viewed as the rate of some sort of "withholding tax" which is equal to the sum of tax rate on capital income and the saving rate out of capital income. The symbols "GCap" is the gross and "Ncap" is the net capital income and the subscript g stand for government. The withholding rate is 0.185868 or about 18.6% of the gross corporate income. The rate of income tax and rate of savings in the corporate sector (from the households point of view) is given by:
 $tw = cw (10842/23682) = 0.085093$ $sw = cw(12840/23682) = 0.100775$.

Both the above treatments are equivalent in the sense that they yield the same results. However, the later one is more convenient for implementation of the programme on the computer.

The capital income from the informal sectors may be assumed to accrue to the households as earning through self employment. The case of rental income generated

in the housing sector (including the imputed rent of owner occupied dwellings) is also clear. The distribution (in aggregate) may be as under (reference Table-5.1):

<u>Source of income</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>	<u>Total</u>
Self employment	45017	89732	82653	73441	290843
Rental income (net)	7959	15738	12786	16390	52873
Rental income (gross)	8171	16156	13125	16825	54277

6.5.3 Commodity Taxes

To calculate the tax rates on various goods and services, we refer back to Table-4.8 for relevant information. However, since the taxes are included in producer's prices which have already estimated in section 6.2.2 above, there is no need for repetition. We just replace the significant figure "unity" by a "zero" in the the price concerned and get the relevant tax rate.

6.6 Other Parameters

We consider miscellaneous items in this section.

6.6.1 The rate of return to investment/financial capital (asset money)

We have observed that the gross capital income generated and accrued to the households is Rs. 109348 million (excluding Rs. 18065 m. as the share of government). If we consider 0.500 as the number of capital services (discussed in the following section) generated per unit of capital stock, then the book-value of total assets invested in business (value of working capital; considering 'investment' in the business sense) during the accounting period should be Rs. 218696 million, keeping in view that the price per unit of capital services is unity ($P_k = 1$) in the bench mark. This may be compared with saving and fixed deposits held with the banking system during the period concerned. The annual report of the State Bank shows the following position by end of period:

<u>Period</u>	<u>Saving deposits</u>	<u>Time deposits</u>	<u>Total deposits</u>
June 1989	Rs 100228.9 m	Rs 78137.6 m	Rs. 178546.5 m
June 1990	115732.4	91186.8	206919.2
Total	215961.3	169504.4	385465.7
Average	107980.6	84752.2	192732.8

At this stage we may incorporate the intermediation role of the financial system into the model. The amount of difference (218696-192733 = Rs.25963 m.) may be assumed as the bonds/shares purchased by the general public directly. The total income accrued to the system equals the hiring cost of capital. The system retains a sum of Rs. 16935 million as pure profits (interest charged on advances which we have discussed and shown as nominal consumption in Table-4.8) and passes on the remaining to the account holders. If this assumption is valid, then the bank margin is 0.154872 or about 15.5 % and the share passed on to account holders is 0.845128 or 84.5 %. In other words, the ordinary shares may be assumed to generate 0.422564 units of the capital services per unit of capital employed against an average of 0.500 (0.500 x 0.845128) and the preferred shares generating 0.681828 units, since the bank surplus is assumed to be redistributed among the households who own the financial business.

The above treatment is equivalent to the concept of hiring the services of capital assets from ordinary share holders at a fixed rate of interest. In general, we have total return on capital at the market rate as: $TR = \lambda \cdot P_k \cdot K$, which implies that the average rate of return is: $r = \lambda \cdot P_k$

This rate is variable and depends upon the two parameters, λ and P_k . Since, the ordinary share holders are entitled only to a fixed rate of return determined by the system, and which may be denoted as: $r^* = \lambda^* \cdot P_k$, therefore the bank margin can be calculated as: $(r - r^*) / r^* = (\lambda - \lambda^*) / \lambda^*$. The gross rate of return for preferred shares is then the sum of the fixed rate and share in bank profit: $r^{\wedge} = \lambda^{\wedge} \cdot P_k$.

We will follow a similar treatment in case of investment leading to fixed capital formation (taking 'investment' in the economist sense). The nominal value of investment goods acquired during the period is $P_i I_o$, where P_i is the price of composite commodity used for the purpose. The real addition to capital stock at the end of period is $\Delta K = I_o$.

Since the average rate of return on investment is given by: $AR = (\lambda \cdot P_k) / P_i$, therefore total return/profit admissible in future is: $(\lambda \cdot P_k) \cdot K^*$

where K^* stands for new capital. The financial system is again there to play its role, according to the scheme cited above.

The detail of capital ownership will be as under:

<u>Household</u>	<u>Stock of capital</u>	<u>Cap. Services</u>	<u>Capital income</u>
Group 1	00	0.422564	00
Group 2	79836	-do-	33736
Group 3	73540	-do-	31075
Group 4	65320	0.681828	27602} = 44537
Financial system	00		16935}
Total value	218696	0.500000	109348

We consider the introduction of all these details necessary since this not only provides a logical foundation for pure profits of the financial system but also helps in replacing the existing interest-based mechanism by an alternative Islamic system and introducing Zakah in the system as the analysis proceeds. Similar but much simpler treatment can be followed for estimation of capital endowments per household in case of self employment and housing.

6.6.2 The capital output ratio

This parameter is required for two purposes, first to have some information about the endowment points of the households or their capital assets / wealth indices and second to have some notion about the number of units of capital services generated per unit of the capital stock in different sectors. The latest available information is due to Kemal and Islam (1992)⁷ which provides time series data on capital stock, labour force, value added and input productivity (total and partial). As pointed out by the authors, studies of this nature are only few in Pakistan and they are either outdated or suffer from estimation errors. The study under reference is basically meant to examine the contribution of factor accumulation (via the adoption of capital intensive techniques) and technological development towards economic growth in Pakistan. It concentrates on the estimates of partial productivities of labour and capital inputs and total productivity in agriculture, manufacturing, other sectors and the economy as a whole. Although the estimates of value added given by the report do not strictly compare to our estimation due to difference in classification, however it serves our purpose to a considerable extent.

⁷ Report of the Sub-Committee on " Sources of Growth in Pakistan"- PIDE Islamabad , May 1992, prepared for the Eighth Five Years Plan (1993-98).

Following is the summary of information. All figures are in Rs. million at constant prices of 1980-81, pertaining to 1989-90.

<u>Sector</u>		<u>Value added</u>	<u>Value of Capital stock</u>	<u>K / V.A.</u>
Agriculture	Actual	108820	210677	1.936
	M. Average	109428	210472	1.923
Manufact.	Actual	53667	79229	1.476
	M. Average	54483	79387	1.457
Other sect.	Actual	260315	441329	1.695
	M. Average	262788	440104	1.675
Aggregate	Actual	422802	596520	1.410
	M. Average	426699	595121	1.395

Note: M. Average means estimates of 5-years moving average. Capital stock in agriculture includes equipment, machinery and working animals only. Cultivable land as an important factor is dealt with separately. Further the study intimates the capital-value added ratio as capital-output ratio, despite the fact that it differentiates between total production, net output and value added.

We may compare our own estimation of value added as reported in Table-4.7 with the above. However it needs some aggregation over different sectors and conversion of the nominal figures of 1989-90 to 1980-81 prices, using GDP deflator of 100/180.54. We estimate the relative capital stock in proportion to value added such that the capital-value added ratio conforms to the estimates of Kemal and Islam (1992). The figures within the brackets indicate the nominal value of capital stock at 1989-90 prices.

<u>Sector</u>	<u>Sub-Sectors</u>	<u>V.A. (nominal)</u>	<u>V.A. (80-81)</u>	<u>Capital Stock</u>
Agriculture	1,2	214364	118735	229872 (415012)
Kemal & Islam (1992)			108820	210677
Manufact.	4 to 9	125148	69318	102336 (184757)
Kemal & Islam (1992)			53667	79229
Other Sect.	3,10 to 17	422951	234270	397173 (717056)
Kemal & Islam (1992)			260315	441329
Aggregate	All 17 sectors	762463	422323	595844 (1075737)
Kemal & Islam (1992)			422802	596520

The above manipulation enables us to get some rough estimate of the aggregate stock of physical capital valuing Rs. 1075737 million at 1989-90 prices. The capital-value added ratio is then calculated as 1.410, which is the same as estimated by the study under reference. The total cost of capital including depreciation has been estimated as Rs. 538113 million (Table-4.7) which is the gross capital income. The share of capital in total income / value added (f.c.) is given by:

$$\pi = 0.705756... (538113/762463). \text{ Therefore } (1 - \pi) = 0.294244$$

which is the share of labour in the national income.

This treatment levels the ground to estimate the number of units of capital services generated per unit of capital (per year or the accounting period) that costs one monetary unit (Rs. 1.00). We note that $\pi = (\lambda \cdot P_k \cdot K) / VA$ and $v = K / VA$, therefore $\lambda = \pi / v$ (since $P_k = 1$ in the bench mark equilibrium). Thus $\lambda = 0.500536$.

The estimated capital stock is owned by the households and the government directly or indirectly (in the form of shares of business firms). The distribution of these assets among the agents should naturally be in proportion to the gross income received by them. We have estimated the same in the preceding section. The fresh picture will be as under:

<u>Group</u>	<u>Capt. income</u>	<u>Deprec.</u>	<u>Total Income</u>	<u>Capt. Endowments.</u>
1.	55958	7031	62989	125921 (111796)
2.	140282	17627	157909	315674 (280263)
3.	127362	16003	143365	286600 (254451)
4.	133104	16725	149829	299522 (265923)
Govt. share	21340	2681	24021	48020 (42634)
Total	478046	60067	538113	1075737 (955068)

Note: The figures in parentheses indicate capital endowments sufficient enough to generate the owners with income net of depreciation.

6.6.3 Estimates of employment

For the sake of completeness, we compare the estimates of employment as provided by HIES 1990-91 and that by Kemal & Islam (1992) below. The figures are in thousand (No. of workers engaged during the year 1989-90 in various activities)

<u>Sector</u>	<u>HIES 1990-91</u>	<u>Kemal & Islam (1992)</u>
Total	29301	30820
Agriculture	10868	15770
Manufacturing	4393	5170
Mining & quarrying	96	---
Elect. & gas distrib.	281	9880 all services
Construction	2444	
Commerce	4273	
Transp. & commun.	1817	
Finan. real estate, busin	328	
Other services	4800	

Both the estimates are quite close. The aggregate value of labour services (compensation of employees) as estimated for the domestic economy vide Table-4.7 is Rs. 224350 million. Assuming that labour force is homogeneous, the number of units of labour services generated per worker during the year is 7280 approx., whereas each unit of service costs Rs.1.00 in the benchmark.

CHAPTER 7 THE BENCHMARK EQUILIBRIUM

We specified the model in chapter 3, developed a consistent data set for the base year 1989-90 in chapters 4,5 and estimated the relevant parameters in chapter 6. We are now in a position to fit the model to the observed data for replication check; which is called calibration in the G.E. literature. In addition, we have to carry out the sensitivity analysis and a validation test of the model in this chapter.

As mentioned earlier, the dimensionality of the model is considerably reduced if various demand functions could be expressed in terms of factor prices instead of commodity prices. A money metric approach is used and the units of commodities and factors are selected such that a physical unit costs one monetary unit in the benchmark. Starting from the factor endowments of the households and government, we reach the excess demand functions. The algorithm follows a search process through the factor-price space and selects a set of prices such that the excess demand functions converge to zero (or approximately so) in equilibrium.

7.1 The Computation Procedure

Computation of general equilibrium has been discussed in chapter-3, section 3.4. The procedure involves the following steps:

1. Identification of endowment points of households and government (if any).
2. Initialization of prices of factor services and taxation subject to the normalization that their sum total be unity: $P_L + P_K + T = 1$
3. Estimation of the household incomes; given the relevant endowments, factor prices and taxation structure.
4. Determination of the demand for labour and capital services per unit output through cost minimization behaviour; given the value added functions and factor prices.
5. Calculation of producer's prices (equal to cost per unit output) involving the requirements of primary factors and intermediate goods, given the input-output information and using zero profit condition.
6. Calculation of market prices of producers goods, given the tariff structure.
7. Calculation of market prices of consumers goods using the transformation matrix.
8. Determination of the household demands for commodities, given their preferences, income levels and market prices.

9. Transformation of household demands into demand for producers goods.
10. Estimation of Investment demand for commodities, government consumption as well as aggregate or final demand.
11. Interaction of the final demand with the activity analysis (Leontief inverse) matrix and determination of gross activity level, value added and intermediate demand for commodities.
12. Fulfillment of the general equilibrium or market clearing condition i.e. Supply equals demand in commodity and factor markets.
13. Estimation of the derived demands for factors, given their per unit market rates initialized in the beginning.
14. Comparing the supply and demand for factor services, given the endowments of the households and factor prices.
15. Calculation of the excess demand functions for factor services.

The fixed- point algorithm works in the factor prices and taxation space via a systematic procedure. The objective is to find those values of factor prices for which the excess demands for factors and/or the aggregate excess demand becomes nearer to zero. This objective is achieved by comparing all the possible combinations of factor prices, given the normalization condition. A coarse grid size (the length of step taken or the jump taken from the initial value) is used in the beginning to get the first approximation. Afterwards, a successively finer grid size is used so that the algorithm search for factor prices is confined, within a limited range however, with greater precision. The process continues until the relevant excess demands hit the minimum acceptable criterion exogenously fixed. The final results regarding all the variables can then be obtained. A fairly comprehensive description of the algorithm is given in chapter 3 of Shoven and Whalley (1992).

We have developed the computer programme for the fixed-point algorithm in FoxPro-2.6 and tested its functioning against the results given in the reference cited above. The results were found to be quite satisfactory indicating that the programme is well suited for our purpose. The print out is appended as Annexure 1 showing the results we obtained for the numerical example given in the text (pp 44 to 47) which can be compared with the original.

7.2 The Benchmark Equilibrium

We applied the programme to the model specified in chapter-3 under the assumption that the factual public sector deficits (particularly the deficit on revenue account) remain intact. As such, the aggregate excess demands correspond to factors only. The computer print out is attached as Annexure 2 for ready reference. The results can be seen to be fair replicas of Pakistan economy for 1989-90 and compare well with the database we developed in chapter 4,5. As noted in chapter-6, we may consider either of the two values (0.3, 0.5) of the interest elasticity of savings for the households. We have assumed the first figure (0.3) in the simulation under reference. The results of the replication is summarized as under:

7.2.1 Equilibrium Prices

The equilibrium prices, all normalized with the price of labour, are shown below. It should be noted that the variable "T" is used as an index for taxation since the actual tax revenue is a very large number as compared to "P_l" (the wage rate) and "P_k" (the price of capital services) and therefore cannot be accommodated within the initial normalization. This index is positively related to the actual volume of tax revenue collected during the period concerned which in turn is a definite multiple of the index.

Equilib. Price	P _l (or W) = 0.199916	P _k (or R) = 0.199916	T = 0.600168
Normalized	(W/W) = 1.000000	(R/W) = 1.000000	(T/W) = 3.002102
Exc. Demds	Labour = -1.222156	Capital = 1.220438	Agg = 0.001718

	<u>Sector</u>	<u>Producers Price</u>	<u>Market Price</u>
1.	Agriculture(crop)	0.999997	1.010363
2.	(non-crop)	0.999997	1.001205
3.	Mining	0.999997	1.307201
4.	Manfg (Food processing)	0.999999	1.073040
5.	(Textile & Footwear)	0.999994	1.018402
6.	(Chem & Petroleum)	0.999999	1.023619
7.	(Cement & Ceramics)	0.999994	1.217279
8.	(Machinery & Metal)	0.999997	1.022979
9.	(Other manufacturing)	0.999998	1.022943
10.	Energy (Elect & Gas distrb)	0.999998	1.044946
11.	Construction	0.999997	1.021646
12.	Services (Trade & Commerce)	1.000001	1.040476
13.	(Tpt & Commun)	0.999995	1.019595
14.	(Banking & Finance)	0.999996	1.001018
15.	(Housing)	0.999998	1.004988
16.	(Public admn & def)	1.000008	1.001004
17.	(Other services)	1.000003	1.015841
18.	Rest of the world (imports)	0.999994	1.222880
	Market Price of Saving/Investment Composite commodity		1.140898

It is evident from the above that the producer prices i.e. prices at factor cost, in all the 18 sectors are very near to unity and conform to the convention adopted in the model. The market prices of producer's goods include tax rates as discussed earlier. These can be compared with the estimates derived in section 6.2.2 of the previous chapter. Next we look at the Consumer's goods prices.

Consumer Price (market prices of consumers goods)

1. Food	1.044280	6. Fuel & Light	1.032711
2. Apparels	1.066039	7. Furniture	1.080833
3. Tpt & Commun	1.016117	8. Education	1.049792
4. Persnl appearance	1.083503	9. Medicare	1.061639
5. Housing	1.010769	10. Misc expend.	1.107582

Each of the above prices is a weighted sum of the market prices of producer's goods whereas the weights are shown in the transformation matrix (Table-6.7). These also conform to the calculated prices shown in section 6.2.2 of chapter-6.

It may be noted that for the sake of convenience in all the subsequent analysis, the word 'Actual' will be used to represent the "observed data" for the base year and the word 'Model' for the "projected figures" replicated by the model and given in the computer print out. Next we focus on the pair-wise comparison of the observed and replicated values of the variables concerned so as to verify the accuracy of our model and reliability of the computer programme.

7.2.2 Government Revenue and Expenditure

A comparison of actual (observed) and model (replicated) values is as under. All the figures are expressed in Rs. million:

<u>Item</u>	<u>Actual*</u>	<u>Model</u>	<u>% Deviation**</u>
Gross Revenues	144875	144871.783	0.002220
Tax Revenues	109221	109217.242	0.003441
Commod. Tax	93480	93476.373	0.003880
Income Tax (personal)	3495	3495.018	-0.000514
Income Tax (corporate)	10842	10841.958	0.000387
Property Tax	1404	1403.891	0.007763
Non-Tax Revenues	35654	35654.541	-0.001517
Share in Profits	20220	20220.295	-0.001459
Sale of services	15434	15434.246	-0.001594

<u>Item</u>	<u>Actual*</u>	<u>Model</u>	<u>% Deviation**</u>
Current Expenditure	165595	165592.893	0.001272
Public consumption	129562	129560.073	0.001487
Debt servicing	36033	36032.819	0.000502
Current Deficit	20720	20721.110	-0.005357
Development budget	72651	72640.918	0.013877
Foreign Capital inflow/trade deficit	71327	71323.000	0.005608
Resource gap	1324	1317.918	0.045936
Overall Deficit	22044	22039.028	0.022554

* Reproduced from section 5.1 Public Finance Statistics.

** $[(\text{Actual} - \text{Model}) / \text{Actual}] \times 100$

In the above statistics the resource gap is the difference between capital budget and foreign capital inflow. The sum of current deficit and resource gap is shown as overall deficit. In the computer print out, the figure of (-) 20721.110 is shown as excess demand for government as well as the current deficit, the development budget is shown as 72640.919 indicating the difference between planned investment and domestic gross saving which is assumed to be the public saving. This item is negative in fact and partly compensated for by the inflow of foreign capital. It may be evident from the above that model replicas are very close to the observed information.

7.2.3 Gross Saving and Investment

Following is the comparison of observed and replicated figures on aggregate basis:

<u>Item</u>	<u>Actual*</u>	<u>Model</u>	<u>% Deviation</u>
Total resources	155073	155047.887	0.016194
Private saving	82422	82406.968	0.018237
Household saving	69582	69566.918	0.021675
Corporate saving	12840	12840.050	-0.000389
Public saving	- 20720	- 20721.110	-0.005357
Bank borrowing	22044	22039.028	0.022554
Foreign saving/borrowing	71327	71323.000	0.005608
Gross Investment	155073	155047.887	0.016194

* Derived from section 4.3 of Chapter-4.

It may be seen that deviations (plus/minus), whatever they may be, are very minute.

7.2.4 Household Income, consumption and saving

The figures can be compared for different household groups as under. These are expressed in Rs. per annum.

<u>Item</u>		<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
<u>Disposable Income</u>	a. Actual *	16996	36712	66471	172816
	b. Model	16996.10	36719.57	66463.42	172787.28
	c. % Deviation	-0.000623	-0.020622	0.011403	0.016617
<u>Expenditure</u>	a. Actual*	21068	36482	55507	102692
	b. Model	21068.00	36489.45	55500.16	102674.88
	c. % Deviation	0.000	-0.020434	0.012326	0.016666
<u>Saving</u>	a. Actual*	- 4072	230	10964	70124
	b. Model	- 4071.89	230.12	10963.26	70112.39
	c. % Deviation	0.002603	-0.050434	0.006731	0.016548

*Reproduced from Table-5.2.

The deviations are negligibly small as evident from the comparison.

7.2.5 Aggregate Consumption demand

The simulations for private consumption expenditure in respect of ten composite commodities are reproduced below. All figures are in Rs. million.

	<u>Commodity</u>	<u>Actual*</u>	<u>Model</u>	<u>% Deviation</u>
1.	Food	305634	305642.973	-0.029290
2.	Clothing/Footwear	48797	48799.049	-0.004199
3.	Transpt/Communic.	26300	26299.484	0.001962
4.	Personal appearance	27270	27270.432	-0.001591
5.	Housing	83131	83131.930	-0.001118
6.	Fuel and lighting	35811	35812.267	-0.003538
7.	Furniture	15613	15612.744	0.001639
8.	Education	9477	9477.375	-0.003956
9.	Health/Medicare	17961	17961.093	-0.000517
10.	Misc. expenditure	55706	55705.910	0.000161
	Govt. Consumption	129562	129560.073	0.001487
	Nominal Consumption	16935	16934.919	0.000478
	Investment demand	155073	155047.887	0.016194

*Reproduced from Tables-4.8 and 5.3.

It can be easily seen that the observed and replicated figures are quite comparable.

7.2.6 Final demand, Activity levels and Value added

The relevant figures in respect of seventeen (17) domestic sectors, alongwith a final sector for the 'composite commodity' of imported material (sector 18) can be compared as under. All figures are expressed in Rs. million:

(a) Final Demand (mp)

<u>Sector</u>	<u>Actual*</u>	<u>Model</u>	<u>Sector</u>	<u>Actual*</u>	<u>Model</u>
1.	80773	80775.177	10.	10845	10845.387
2.	120026	120028.767	11.	63319	63310.269
3.	1400	1400.045	12.	2803	2802.920
4.	136189	136193.180	13.	21325	21324.595
5.	37253	37254.532	14.	20010	20009.885
6.	16819	16819.196	15.	67671	67671.719
7.	6513	6512.197	16.	136240	136238.650
8.	9781	9780.014	17.	25619	25619.618
9.	14656	14655.930	18.	156028	156015.033

(b) Activity levels/Total output (mp)

1.	204488	204490.799	10.	50123	50122.639
2.	154951	154953.411	11.	71496	71487.454
3.	34620	34618.862	12.	116966	116966.145
4.	170018	170021.059	13.	110077	110073.800
5.	195955	195948.416	14.	29373	29371.797
6.	100196	100194.407	15.	81770	81770.390
7.	31787	31784.245	16.	136708	136706.034
8.	69217	69213.710	17.	48681	48680.669
9.	42443	42442.425	18.	251192	251177.760

(c) Value Added (fc)

1.	125112	125113.761	10.	28818	28817.778
2.	89252	89253.349	11.	32211	32207.136
3.	20144	20143.338	12.	96853	96853.105
4.	25639	25639.400	13.	58324	58322.273
5.	42035	42033.529	14.	22529	22528.084
6.	15918	15917.738	15.	68758	68758.354
7.	11162	11161.038	16.	69858	69856.926
8.	19045	19044.118	17.	25456	25455.808
9.	11349	11348.835	18.	71327	71323.000

*Reproduced from Table-4.8.

It is evident from the visual inspection that the observed and replicated values for all sectors in respect of the three variables shown above are approximately equal. The differences are negligible and may be attributed to aggregation and rounding up of the observed figures during compilation.

7.2.7 Factor shares in production/income

The shares of labour and capital in the national income are estimated as the cost of production in terms of compensation to employees and operating surplus respectively. These also represent factor demands by sectors concerned according to the convention applied in the model and data compilation. The treatment given to the foreign sector is a little bit different. As discussed in Chapter-4,5, the compensation of employees against sector 18 (rest of the world) indicates foreign remittances to domestic economy. The value added in this sector is held equal to the trade deficit of the domestic economy. The difference between the two is then the cost of capital services employed abroad by this sector. A comparison of the observed data and that replicated by the model is given below.

(i) Compensation to employees

<u>Sector</u>	<u>Actual*</u>	<u>Model</u>	<u>Sector</u>	<u>Actual*</u>	<u>Model</u>
1.	36742	36742.552	10.	1328	1327.999
2.	8941	8941.098	11.	21980	21977.362
3.	6677	6676.785	12.	4319	4319.034
4.	5347	5347.081	13.	17927	17926.434
5.	14615	14614.453	14.	11605	11604.527
6.	4861	4860.923	15.	8266	8266.030
7.	3412	3411.704	16.	61151	61150.062
8.	7135	7134.663	17.	6200	6199.947
9.	3844	3843.938	18.	21408	21406.814

(ii) Operating surplus

1.	84027	84028.144	10.	22936	22935.840
2.	75789	75790.179	11.	8726	8724.938
3.	11758	11757.614	12.	89718	89718.149
4.	17141	17141.285	13.	31506	31505.082
5.	21142	21141.275	14.	10210	10209.600
6.	8821	8820.848	15.	54277	54277.229
7.	6325	6324.456	16.	5513	5512.893
8.	9332	9331.571	17.	14868	14867.886
9.	5957	5956.914	18.	49919	49916.188

Note: * Reproduced from Table-4.7.

As evident from the above, all the values replicated by the model are very close approximations of the actual figures for key variables derived from 1989-90 data of the Pakistan economy. The differences, if any, are minute and may be attributed to inconsistencies in data compilation and taking resort to rounding the figures in manual calculations. Further the analysis provides sufficient proof that the computer programme developed for the purpose is satisfactory and reliable.

7.3 Sensitivity Analysis

As discussed in the above sub-section, we have assumed a value of 0.3 for the interest elasticity of savings (η_s) in computation of the benchmark equilibrium. It is advisable to pick up the second value of 0.5 for the same parameter and repeat the exercise to see if there is any significant difference in the results. The interest elasticity of savings affects the elasticity of substitution between present and future consumption (σ) directly and the distribution parameter in the utility functions of the households (a) indirectly. The effect is positive, however, as evident from the relation:

$$\sigma = 1 + \eta_s / APC \quad (3.15)$$

In a static framework, when the rate of return on savings is institutionally fixed, the elasticity of saving to the rate of return is not much effective except that it attributes an higher value to the elasticity of substitution which in turn implies that the households attach more weight to present as compared to future. Thus the present consumption may simply increase or savings may go down. On the other hand, if the rate of return is flexible, then a small increase in this parameter will lead to higher saving and investment due to higher value of the elasticity of substitution. In a dynamic set up, this will lead to higher rate of capital formation and higher level of income and consumption in the longrun as shown by Hasan Imam (1985). Anyhow and for the time being, we are concerned with the sensitivity of the model to the elasticity concerned in a static framework.

In the following analysis, we compare the results before and after the parametric change i.e. with $\eta_s = 0.3$ for the benchmark equilibrium and $\eta_s = 0.5$ for the revised case, after allowing due variations in the related parameters of the household utility functions. The computer print out for the revised case is appended to this chapter as Annexure 3. For simplicity, we use the abbreviations "Benchmark"

and " Revised " to facilitate comparison. The percent deviation of the revised case from the benchmark is also presented: $[(\text{Revised} - \text{Benchmark})/\text{Benchmark}] \times 100$

7.3.1 Government Revenue and Expenditure

We study the effects of parametric change on the public finance and compare the results of benchmark with the revised case as under. All figures are in Rs. million.

<u>Item</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% deviation</u>
Gross Revenues	144871.783	144604.023	- 0.185
Tax Revenues	109217.242	108848.584	- 0.337
Commod. Tax	93476.373	93097.230	- 0.405
Income Tax (personal)	3495.018	3506.679	0.333
Income Tax (corporat)	10841.958	10840.917	- 0.009
Property Tax	1403.891	1403.756	0.000
Non-Tax Revenues	35654.541	35755.439	0.283
Share in Profits	20220.295	20218.353	- 0.009
Sale of services	15434.246	15537.085	0.666
Current Expenditure	165592.893	165519.745	- 0.044
Public consumption	129560.073	129486.925	- 0.056
Debt servicing	36032.819	36032.820	0.000
Current Deficit	20721.110	20915.722	0.939
Development budget	72640.918	71013.761	- 2.240
Foreign Capital inflow/trade deficit	71323.000	70861.316	- 0.647
Resource gap*	1317.918	152.445	- 88.433
Overall Deficit	22039.028	21068.167	- 4.405

* The difference between capital budget and foreign capital inflow gives resource gap. The sum of current deficit and resource gap is shown as overall deficit.

There is a minute short fall in the gross revenues originating from commodity taxation. As a result, the current budget deficit has gone up by nearly 1%. It may be noted that a negative sign for the overall deficit implies an improvement.

7.3.2 Gross Saving and Investment

Following is the comparison of results before and after the parameter is changed. As expected, private (household) savings should decrease if elasticity of substitution of consumption for saving increases. All figures are in Rs. million.

<u>Item</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% deviation</u>
Total resources	155047.887	151574.813	- 2.240
Private saving	82406.968	80561.051	- 2.240
Household saving	69566.918	67722.234	- 2.651
Corporate saving	12840.050	12838.817	- 0.009
Public saving	- 20721.110	- 20915.722	0.939
Bank borrowing	22039.028	21068.167	- 4.405
Foreign saving/borrowing	71323.000	70861.316	- 0.647
Gross Investment	155047.887	151574.813	- 2.240

There is a decrease of 2.651% in the household savings which is quite significant. This has led to reduction in total investment by nearly the same volume.

7.3.3 Household Income, consumption and saving

The results of the two simulations can be compared for different household groups to see the effects of parametric change at micro level. All figures are expressed in Rs.

<u>Item</u>		<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
<u>Disposable Income</u>	a.Benchmark	16996.10	36719.57	66463.42	172787.28
	b.Revised	17033.68	36769.27	66607.28	173016.55
	c.% deviation	0.221	0.135	0.216	0.133
<u>Expenditure</u>	a.Benchmark	21068.00	36489.45	55500.15	102674.88
	b.Revised	21068.00	36525.00	55602.13	105278.32
	c.% deviation	0.000	0.097	0.183	2.535
<u>Saving</u>	a.Benchmark	- 4071.89	230.12	10963.26	70112.39
	b.Revised	- 4034.31	244.26	11005.15	67738.23
	c.% deviation	- 0.923	6.144	0.382	- 3.386

The consumption expenditure by all the groups has increased as expected. In particular, the consumption expenditure of the high income group has gone up significantly which has led to the corresponding reduction in savings. On the other hand, the disposable incomes of all the groups have slightly gone up probably due the fact that these mainly arise from labour services primarily engaged in sectors contributing to consumer goods production.

7.3.4 Aggregate Consumption demand

The comparative statistics for household consumption in respect of ten (10) commodities are as under. All figures are in Rs. million.

	<u>Commodity</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% deviation</u>
1.	Food	305642.973	306834.787	0.390
2.	Clothing/Footwear	48799.049	48999.391	0.410
3.	Transpt/Communic.	26299.484	26543.230	0.927
4.	Personal appearance	27270.432	27385.642	0.422
5.	Housing	83131.930	83628.996	0.598
6.	Fuel and lighting	35812.267	35943.324	0.366
7.	Furniture	15612.744	15702.342	0.574
8.	Education	9477.375	9559.939	0.871
9.	Health/Medicare	17961.093	18034.532	0.409
10.	Misc. expenditure	55705.910	56105.402	0.717

It is easy to understand that the demand for all consumer goods has increased. The impact is significant particularly in case of transport & communications, education, housing, furniture and miscellaneous goods/services, which may be taken as luxuries by the households when compared to food, clothing, personal appearance, fuel & lighting and medicare.

7.3.5 Final demand and Value added

The results of the simulations can be compared in respect of eighteen commodities, including one composite commodity of imported material (sector 18) as under. All figures are expressed in Rs. million.

(a) Final Demand (mp)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% deviation</u>
1.	80775.177	81088.332	0.387
2.	120028.767	120480.608	0.376
3.	1400.045	1405.168	0.366
4.	136193.180	136764.310	0.419
5.	37254.532	37410.400	0.418
6.	16819.196	16898.151	0.469
7.	6512.197	6409.170	- 1.582
8.	9780.014	9655.554	- 1.272

7.4 Validation Test of the Model

We summarize the targets achieved so far in this chapter. We fitted the model to the observed data for 1989-90, given the parameters concerned as well as the endowments of primary factors. The model reproduced the data of the base year to constitute the benchmark equilibrium. We compared the replicated figures to the actual data in section 7.2 and found that the two sets of values corresponding to different variables are very close to each other. The replication check revealed the fact that the model has a very good statistical fit. In the next section, we tested the model sensitivity to parametric change and found that a sizeable change of 2 percentage points (from 0.3 to 0.5 of the interest elasticity of savings) has no significant effects on the overall performance of the economy in a static framework.

Our next step is to subject the model and its parameters to a validation test so as to verify its long run reliability/ robustness before it could be used for forecasting and dynamic analyses. At present, we have sufficient information in terms of the actual data for the fiscal years published up to 1996-97. Thus we may run the model for five, six or seven years, starting from 1989-90, and compare the results of simulations with the historical data for the end year. However, some adjustments for price changes will have to be made through CPI or GDP deflator since the simulations will be based on 1989-90 prices. This methodology is in line with that followed in the PIDE model devised for the Eighth five-years plan.¹ An important point to note is that many governments (and their tax-expenditure policies) have elapsed over the period and it will be worthwhile to give some allowance for the fact in case the results do not correspond exactly to the actual data.

7.4.1 The Procedure

In this connection, we resort to the following assumptions;

1. The long-run ratio of Govt. consumption expenditure to GDP(mp) is assumed to be 0.13 or 13% (see chapter 6, section 6.5.1, 0.12)

¹ Please refer to Chapter 3,4 pp 21-31 of "The macro-econometric framework for the Eighth five years plan" by S.N.H. Naqvi et al, PIDE 1993. However, comparison of the validation test we intend with that under reference may not be possible since they have used the actual values of exogenous variables observed during the period concerned (1987-88 to 1991-92) whereas we don't change any crucial policy parameter. Further, they have applied the Theil Inequality Test and the Coefficient of Variations for comparing the projected simulations with the historical data as against our treatment of using the simple percentage variations for the purpose.

2. The long-run ratio of gross investment to domestic saving is 1.45 (see chapter 6, section 6.5.2, 0.41)
3. The prevailing (1989-90) structure of taxation and financial arrangement remain in tact during the entire period.
4. There is no change in institutional set up and consumers behaviour over the period concerned.
5. The current budget deficit is financed through bank borrowing and that on current account (trade deficit) is supported by borrowing from the private sector, domestic and international so that the stack of internal debt and external debt may grow over time in conformity with the factual position.
6. The present is connected to future through saving-investment behaviour that leads to capital formation. Investment in the public sector is primarily meant for infra structure and social sector development which is not directly productive. Only 5% of the public sector investment is assumed to be generating income in the following periods .
7. The effective labour force is assumed to grow at an exponential rate of 2.5% per annum, keeping in view the net growth rate of population and that of unemployment.

We get the historical data from Pakistan Economic survey 1995-96 and the Annual Report of the State Bank 1995-96. However, there are differences in the estimates of the two main official documents due to coverage, independent sources of collection and manipulation. In particular, the estimates on public finance and international transactions from the two sources never coincide. Further there are problems in classification of sectors and variables as noted in Chapter 4&5, on data. We deflate the observed data for 1993-94 to 1989-90 prices using the factor $180.54/275.57 = 0.655151$, where the numerator is the GDP deflator for 1989-90 with base year 1980-81 and the denominator is deflator for 1993-94. The percent difference of the projected figures over the actual figures is calculated using the relation : $[(\text{Actual}-\text{Projected})/\text{Actual}] \times 100$.

Since we intend to change a few parameters (assumptions 1 and 2 above), a disequilibrium may be created in the economy and the results may not tally with those obtained in the benchmark for the base year. We run the programme for five years starting from the base year 1989-90 and get the results for end year 1993-94. We use the conventions " Base-Year and End-Year" for the data replicated by the model for the base year 1989-90 and the end year 1993-94, and "Actual" for the observed data for the end year 1993-94 shown in the last column. It is deflated to 1989-90 prices

to facilitate comparison and shown as "Actual(deflated)" in the presentation. The computer print out is added to this chapter as Annexure 4. Lets examine the results.

7.4.2 Government Revenue and Expenditure

A comparison of actual (observed) and model (projected) values is as under. All figures are expressed in Rs. million, rounded up to the second decimal:

<u>Item</u>	<u>Base year</u>	<u>End year</u>	<u>Actual (def)</u>	<u>% difference.</u>	<u>Actual</u>
Gross Revenues	146305.38	201334.94	177371.69	- 13.55	270734
Tax Revenues	108345.36	151509.51	136540.05	- 10.96	208410
Commod. Tax	91221.78	125766.78	106019.18	- 16.62	161824
Income Tax (pers)	3863.31}	6371.18}			
Income Tax (corp)	11740.08}	16571.45}			
Property Tax	1520.18}	2800.10}			
Total direct taxes	17223.57	25742.73	30520.87	+ 15.65	46586
Non-Tax Revenues	37960.01	49825.43	40831.64	- 22.03	62324
Share in Profits	21895.30	29207.02	21117.48		32233
Sale of services	16064.71	20618.41	19714.15		30091
Current Expenditure	157662.81	206614.83	192260.65	- 7.46	293460
Public consumption	119918.41	158111.92	132707.41	- 19.14	202560
Debt servicing	37744.40	48502.91	59553.24	+ 18.55	90900
Budgetary gap	- 11357.43	- 5279.89	- 14889.00		- 22726
Development budget	41966.85	72717.96	85502.46	+ 14.95	130508
Foreign Capital inflow*	68412.89	97679.45	85753.39	- 13.91	130891
Overall gap	15088.61	19681.60	- 14638.04		- 22343

*Indicates trade deficit.

We note much variation in the above table at micro level. Anyhow, the variations are moderate and fall below 14 % for the crucial variables like gross revenues, tax revenues, current expenditure and development budget etc. These differences can be attributed, without hasitation, to the variations in fiscal policies that occurred during the period under reference.

7.4.3 Gross Saving and Investment

Following is the comparison of the actual and projected data on saving and investment. All figures are in Rs. million.

<u>Item</u>	<u>Base year</u>	<u>End year</u>	<u>Actual (def)</u>	<u>% difference</u>	<u>Actual</u>
Gross saving	93259.66	161595.46	134882.52	- 19.80	205880
H.hold saving	79355.96	141970.02	118966.27	- 19.33	181586
Corp. saving	13903.69	19625.44	15916.24	- 23.30	24294
Gross Investment	135226.50	234313.42	184016.88	- 27.33	280877
Resource gap *	- 41966.84	- 72717.96	- 49134.36	- 48.00	74997

*Public saving on capital account equal to the difference between planned investment and private saving according to our scheme.

In the above table, gross investment as projected by the model for the end year 1993-94 consists of the fixed capital formation only and excludes changes in stocks which has been counted towards private consumption, according to the scheme adopted in our model.

7.4.4 Aggregate Consumption demand

The results obtained for the end year 1993-94 for the aggregate household consumption expenditure in respect of ten (10) commodities are presented as under. The base year represents the figures for 1989-90. All figures are in Rs. million.

	<u>Commodity</u>	<u>Base year</u>	<u>End year</u>	<u>Actual (def)</u>	<u>% change</u>	<u>Actual</u>
1.	Food	316510.98	381289.76	N.A.		N.A.
2.	Cloth./Ft-wr	50557.17	61221.55	...		...
3.	Tpt/Commc.	27428.56	36886.53	...		...
4.	Pers. effect	28246.61	34260.34	...		...
5.	Housing	86402.70	109054.72	...		...
6.	Fuel & light	37033.93	44180.45	...		...
7.	Furniture	16241.61	20517.42	...		...
8.	Education	9898.44	13220.08	...		...
9.	Health	18613.72	22624.75	...		...
10.	Misc. exp.	58031.87	75375.05	...		...
	<u>Aggregate Consump</u>	<u>648965.60</u>	<u>798630.67</u>	<u>750739.00</u>	<u>- 6.38 %</u>	<u>1145902</u>

The National Accounts do not provide the detail of Aggregate consumption demand. The projected figures in aggregate for the end year deviate from the actual only by 6.4% which seems to be insignificant.

7.4.5 Final demand and Value added

The sector-wise comparison of the projected and actual data is as under. All the figures are in Rs. million.

(a) Final Demand /GDP(mp)

<u>Sector</u>	<u>Base year</u>	<u>End year</u>	<u>Actual (def)</u>	<u>% change</u>	<u>Actual</u>
1.	83636.42	100662.24	N.A.		N.A.
2.	123977.51	151580.19	...		...
3.	1447.80	1727.19	...		...
4.	141112.54	171204.73	...		...
5.	38602.18	46832.10	...		...
6.	17442.86	21437.75	...		...
7.	5932.98	9540.62	...		...
8.	9089.09	14115.62	...		...
9.	15235.44	19169.82	...		...
10.	11215.35	13379.61	...		...
11.	57755.11	93841.59	...		...
12.	2902.88	3505.82	...		...
13.	22240.09	29908.96	...		...
14.	21541.13	29349.00	...		...
15.	70334.22	88773.59	...		...
16.	127879.04	168045.12	...		...
17.	25608.70	32445.94	...		...
<u>Total demand</u>	<u>776158.62</u>	<u>995519.94</u>	<u>1030397.47</u>	<u>+ 3.38 %</u>	<u>1572763</u>

The aggregate values of the final demand (which is GDP at market prices) for the projected and observed data are quite close to each other. The difference is very small and may be attributed to the short comings in data compilation.

(b) Value Added (fc)

<u>Sector</u>	<u>Base year</u>	<u>End year</u>	<u>Actual (def)</u>	<u>% change</u>	<u>Actual</u>
<u>Agriculture</u>	...	272726.13	234494.32	- 16.30	357924
1.	127835.26	159205.68	N.A.		N.A.
2.	91503.12	113520.45	...		...
3. Mining	19743.35	26920.57	5676.22	- 374.36	8664
<u>Manufacturing</u>	...	166213.88	161730.61	- 2.77	246860
4.	26340.06	32518.38	N.A.		N.A.
5.	41220.01	56205.94	...		...
6.	15850.87	20944.42	...		...
7.	10493.33	15812.98	...		...
8.	18333.80	25724.39	...		...
9.	11422.24	15007.77	...		...
10. Elec/gas	28826.52	37444.89	26813.37	- 39.65	40927
11. Construc	29109.39	46905.41	36194.48	- 29.59	55246

<u>Services</u>	...	358040.92	391521.51	+ 8.55	597605
12.	97832.16	125085.69	...		229301
13.	57785.41	78192.69	...		149264
14.	23623.29	32043.80	...		47024
15.	70937.72	90157.98	...		62011
17.	25131.09	32560.76	...		110005
16.Pub.Admn	65577.64	86175.99	68986.10	- 24.92	105298
<u>V.A. dom. Eco</u>	<u>761565.31</u>	<u>994427.83</u>	<u>925416.71</u>	<u>- 7.46</u>	<u>1412524</u>
Exports	128603.88	183619.74	166336.32	- 10.39	253890
Imports	197016.77	281299.19	252089.71	- 11.58	384781
Trade deficit	68412.89	97679.45	85753.39	- 13.91	130891

The aggregate figures in both sets are fairly comparable. However large differences can be noted in case of sectors 3(mining), 10(electricity and gas distribution), 11(construction), and 16(public administration and defence) etc. However, as explained in chapter 4, these are primarily because of difference in classification and coverage of the official statistics as well as the scheme of aggregation followed in this study. Further, the deviations also depend on the accuracy of deflator chosen for the purpose.

7.4.6 National income

The National Accounts do not provide any proper information on the distribution of national income. However, we may compute the same from the projected figures for the end year to facilitate comparison:

<u>Income class</u>	<u>No.of Households</u>	<u>Agg.disp.Inc.(Base)</u>	<u>Agg.disp.Inc.(End Year)</u>
Group 1	7.0363 million	123705.33 Rs.(m)	131857.17 Rs.(m)
Group 2	6.3852	244910.19	263372.29
Group 3	2.6061	182154.63	244605.08
Group 4	0.9724	177551.41	300766.15
<u>Total</u>	<u>17</u>	<u>728321.56</u>	<u>940600.69</u>

In order to compute National Income for the end year 1993-94 from the above projections as well as other information discussed in this section, we proceed as under:

Disposable income	Rs. 940600.69 million
Plus Personal Income tax	6371.18
Personal income	946971.51
Less Social security benefits	3587.73
Less Interest receipts from Govt.	11522.96
Plus Govt. share in profits	29207.02
Plus Retained dividends/ corp. saving	19625.44
Plus Corporate, Property taxes	19371.55
National Income (projected)	1000064.83
GDP(mp) Actual/observed for 1993-94	Rs. 1572763 million
Less indirect taxes	161824
NNP (fc)	1410939
Plus foreign remittances	23988
National Income (Actual)	1434927
Deflated to 1989-90 prices	940093.86
Percent difference from the model	<u>- 6.38 %</u>

Thus we observe only a minor difference between the two estimates.

7.3.6 Public Debt outstanding

A comparison of the projected and actual figures is as under: (figures in Rs. million)

	<u>Permanent</u>	<u>Other</u>	<u>Total</u>
Internal debt by the end of June 1993-94	264173	446854	711027
Deflated to 1989-90 prices	173094.21	340540.35	513634.56
Projected figures	98740.00	319159.78	417899.78
Percent difference			18.64 %
External debt disbursed and outstanding	612816	(\$20322 million, Exch rate: 30.155300)	
Deflated to 1989-90 prices	401487.10		
Projected figures	458176.43		
Percent difference	- 14.12%		

Keeping in view the facts that our model is purely mathematical in nature and does not incorporate any stochastic estimation, that human behaviour is always probabilistic in nature, that three governments changed control of the country during the period under reference and all the policies (fiscal, monetary, commercial) have undergone drastic changes; therefore it will not be rational to attribute the deviations of the projected estimates from the factual data solely to inconsistency in the model or inaccuracy of its parameters. So far as the gross macro indicators are concerned, the projected estimates deviate by maximum (+/-) 10% and therefore fall within the 90% confidence interval of the historical figures. As such it can be safely concluded that the forecasting power of the model as well as the estimation procedure we adopted are satisfactory. After all, the edifice of economic analyses is always founded on assumptions and approximations.

Intermediate Result			
Fc.Prices:W,R; Absolute=	0.40000	0.60000	
Ex.Demands:Agg,Lab,Cap =	159.42562	1.99242	-1.32828
Intermediate Result			
Fc.Prices:W,R; Absolute=	0.42000	0.58000	
Ex.Demands:Agg,Lab,Cap =	-0.43511	0.11801	-0.08546
Intermediate Result			
Fc.Prices:W,R; Absolute=	0.42100	0.57900	
Ex.Demands:Agg,Lab,Cap =	-0.08452	0.02880	-0.02094
Intermediate Result			
Fc.Prices:W,R; Absolute=	0.42130	0.57870	
Ex.Demands:Agg,Lab,Cap =	-0.00425	0.00212	-0.00154
Intermediate Result			
Fc.Prices:W,R; Absolute=	0.42132	0.57868	
Ex.Demands:Agg,Lab,Cap =	-0.00063	0.00034	-0.00025
Intermediate Result			
Fc.Prices:W,R; Absolute=	0.42132	0.57868	
Ex.Demands:Agg,Lab,Cap =	-0.00003	-0.00001	0.00001

Final Results: Shoven-Whalley Example

Equilib Prices =	1.00000	1.37346	1.39911	1.09307		
HH-Incomes =	60.00000	0.00000	60.00000	0.00000	34.33662	34.33662
HH-Demands =	13.42784	37.70374	51.13158	11.51461	16.67447	28.18900
Fact Cost =	26.36550	8.53171	34.89720	33.63440	25.80501	59.43940
Fc.dd, Prod =	26.36550	6.21181	24.94245	33.63440	18.78826	54.37820

Table 3.2. Equilibrium solution for Shoven and Whalley's example given in Table 3.1

		Equilibrium prices							
						Manufacturing output			1.399
						Nonmanufacturing output			1.093
						Capital			1.373
						Labor			1.000
		A. Production							
	Quantity	Revenue	Capital	Capital cost	Labor	Labor cost	Total cost	Cost per unit of output	
Manufacturing	24.992	34.898	6.212	8.532	26.366	26.366	34.898	1.399	
Nonmanufacturing	54.378	59.439	18.788	25.805	33.634	33.634	59.439	1.093	
Total		94.337	25.000	34.337	60.000	60.000	94.337		
		B. Demand							
	Manufacturing	Non-manufacturing	Expenditure	Labor income	Capital income	Total income			
Rich households	11.514	16.674	34.337	0	34.337	34.337			
Poor households	13.428	37.704	60.000	60	0	60.000			
Total	24.942	54.378	94.337	60	34.337	94.337			

The Benchmark Equilib.

Dated: 28.8.1997

Intermediate results
small = 6.895447 0.200000 0.200000 0.600000
X-Demd= 6.895447 -3.887892 -3.007555 -20721.171

Intermediate results
small = 1.307146 0.199900 0.199900 0.600200
X-Demd= 1.307146 -0.716031 2.023177 -20721.098

Intermediate results
small = 0.076234 0.199915 0.199915 0.600170
X-Demd= 0.076234 -1.192012 1.268246 -20721.109

Intermediate results
small = 0.005820 0.199916 0.199916 0.600168
X-Demd= 0.005820 -1.223742 1.217922 -20721.110

Intermediate results
small = 0.001718 0.199916 0.199916 0.600168
X-Demd= 0.001718 -1.222156 1.220438 -20721.110

Final results
fsmall= 0.001718 0.199916 0.199916 0.600168
Normal= 1.000000 1.000000 3.002102
X-Demd= 0.001718 -1.222156 1.220438 -20721.110

Price-P = 0.999997 0.999997 0.999997 0.999999 0.999994 0.999999
dito--P = 0.999994 0.999997 0.999998 0.999998 0.999997 1.000001
dito--P = 0.999995 0.999996 0.999998 1.000008 1.000003 0.999994

Price-M = 1.010363 1.001205 1.307201 1.073040 1.018402 1.023619
dito--M = 1.217279 1.022979 1.022943 1.044946 1.021646 1.040476
dito--M = 1.019595 1.001018 1.004988 1.001004 1.015841 1.222880

Price-C = 1.044280 1.066039 1.016117 1.083503 1.010769
dito--C = 1.032711 1.080833 1.049792 1.061639 1.107582
Pr: Inv-AR= 1.140898 0.438251

TR-Tax-Gross=109306.129 109217.242 144871.783
Detail-Rev=93476.3735 3495.01798 10841.9586 1403.89151
Nontax-Rev=20220.2946 15434.2465 35654.5410
Budget-Dtser=129560.073 36032.8197 165592.893
Dbgt-Rev-Def=72640.9186 71323.0005 -1317.9181
Crnt-Dev-Gap=-20721.110 -1317.9181 -22039.028

Saving:HH =-4071.8942 230.115996 10963.2621 70112.3962
--dito--Agg= 0.000000 1469.33666 28571.3572 39526.2245
Saving -Agg=69566.9184 12840.0500 82406.9685 72640.9186
G. Income:HH=16196.0969 36045.4329 68239.8614 181836.085
Disp inc:HH=16996.1058 36719.5714 66463.4202 172787.282
Expend: HH=21068.0000 36489.4554 55500.1582 102674.885
Util-V-HH =4063.50349 6582.17385 10994.2997 24979.4220

Consump-Agg=305642.973 48799.0490 26299.4841 27270.4325 83131.9302
--dito-- =35812.2675 15612.7442 9477.37550 17961.0935 55705.9104

Final Demnd=80775.1771 120028.767 1400.04479 136193.180 37254.5317 16819.1962
--dito-- =6512.19707 9780.01448 14655.9303 10845.3871 63310.2692 2802.92013
--dito-- =21324.5948 20009.8856 67671.7189 136238.650 25619.6177 156015.033

Investm- DD=2289.59215 4999.20902 6438.98370 54108.1465 87211.9557 155047.887
NMC-Govt.DD=16934.9194 129560.073 120804.403 8755.66975

Activ (mp)=204490.799 154953.411 34618.8622 170021.059 195948.416

-dito-Act =100194.407	31784.2450	69213.7103	42442.4256	50122.6389
-dito-Act =71487.4540	116966.145	110073.800	29371.7975	81770.3901
-dito-Act =136706.034	48680.6698	251177.760		

P-178(b)
Annexure-7.

V.A (fc) =125113.761	89253.3492	20143.3386	25639.4003	42033.5296
-dito-VA =15917.7377	11161.0382	19044.1187	11348.8352	28817.7785
-dito-VA =32207.1360	96853.1056	58322.2727	22528.0844	68758.3540
-dito-VA =69856.9260	25455.8080	71323.0005		

Comp-Emp =36742.5519	8941.09868	6676.78523	5347.08149	14614.4534	4860.92383
dito-Emp =3411.70439	7134.66344	3843.93843	1327.99901	21977.3623	4319.03377
dito-Emp =17926.4639	11604.5269	8266.02989	61150.0617	6199.94733	21406.8146

Oprt-spl =84028.1439	75790.1796	11757.6142	17141.2854	21141.2747	8820.84837
dito-spl =6324.45590	9331.57105	5956.91469	22935.8400	8724.93809	89718.1490
dito-spl =31505.0821	10209.6007	54277.2296	5512.89303	14867.8860	49916.1877

P-178(b)
The Benchmark Equilibrium

Sensitivity Analysis-interest elasticity of saving = 0.5

Final results

fsmall=	0.000093	0.184353	0.184336	0.631311
Normal=	1.000000	0.999905	3.424461	
X-Demd=	0.467950	-464.58272	464.582630	-20915.693

TR-Tax-Gross=	124684.492	108848.584	144604.023	
Detail-Rev=	93097.2304	3506.67937	10840.9176	1403.75673
Nontax-Rev=	20218.3532	15537.0855	35755.4387	
Budget-Dtser=	129486.925	36032.8197	165519.745	
Dbgt-Rev-Def=	71013.7615	70861.3165	-152.44501	
Crnt-Dev-Gap=	-20915.722	-152.44501	-21068.167	

Saving:HH	=-4034.3119	244.264412	11005.1533	67738.2310
--dito--Agg=	0.000000	1559.67712	28680.5301	37482.0273
Saving -Agg=	67722.2345	12838.8172	80561.0517	71013.7615
G.Income:HH=	16232.3938	36094.5486	68388.4188	182077.899
Disp inc:HH=	17033.6881	36769.2705	66607.2818	173016.556
Expend: HH=	21068.0000	36525.0061	55602.1284	105278.325
Util-V-HH	=4063.80203	6591.56643	11018.9030	25014.3755

Consump-Agg=	306834.787	48999.3908	26543.2302	27385.6419	83628.9963
--dito--	=35943.3244	15702.3427	9559.93946	18034.5322	56105.4025

Final Demnd=	81088.3318	120480.608	1405.16832	136764.310	37410.4001	16898.1511
--dito--	=6409.16991	9655.55462	14739.1092	10885.0764	62153.2681	2814.21107
--dito--	=21522.2331	20030.3117	68076.3446	136273.285	25703.0893	154424.978

Investm- DD=	2238.30527	4887.22670	6294.75042	52896.1236	85258.4072	151574.813
NMC-Govt.DD=	16933.2934	129486.925	120736.199	8750.72642	926733.600	

Activ (mp)=	204950.478	155398.240	34504.2154	170557.437	195278.931
-dito-Act	=100123.444	31457.4634	68863.8243	42476.7400	50109.4690
-dito-Act	=70336.5283	117086.864	110003.075	29372.9555	82174.2329
-dito-Act	=136740.577	48752.3215	249551.850		

V.A (fc)	=125395.007	89509.5713	20076.6302	25720.2868	41889.9162
-dito-VA	=15906.4640	11046.2888	18947.8478	11358.0107	28810.2065
-dito-VA	=31688.6112	96953.0660	58284.7992	22528.9725	69097.9338
-dito-VA	=69874.5773	25493.2756	70861.3165	833442.781	

Exports/Imports=133206.476 204067.792

Comp-Emp	=36822.6862	8965.99607	6654.58415	5363.55777	14563.0989	4857.06014
dito-Emp	=3376.57728	7098.04816	3846.74315	1327.59224	21623.1502	4323.09533
dito-Emp	=17914.5072	11604.4629	8306.16153	61165.0273	6208.65214	21266.8161

Oprt-spl	=84219.4925	76008.5227	11718.7663	17195.7549	21070.4648	8815.02199
dito-spl	=6259.48317	9284.94702	5962.03390	22929.8714	8584.85283	89811.1415
dito-spl	=31485.2778	10210.5247	54545.9830	5514.77171	14890.1903	49594.5022

Final results: Status quo

fsmall= 0.000092 0.241646 0.261663 0.496691
 Normal= 1.000000 1.082838 2.055452
 X-Demd= 0.000092 3753.45683 -3753.4567 -11357.427

Validation Test

(Base Year)

End year = 1

Price-Mk= 1.070417 1.071445 1.377731 1.142177 1.077627 1.085365
 dito--Mk= 1.287534 1.078084 1.083842 1.118459 1.064021 1.120066
 dito--Mk= 1.075828 1.044143 1.074987 1.032633 1.077676 1.293587

Price-Cn= 1.111680 1.128233 1.074999 1.147965 1.077006
 dito--Cn= 1.101991 1.144596 1.095132 1.116884 1.172057
 Pi/Ps:AR= 1.201049 0.450789
 Comps-Po= 5.510634 5.927948 6.421787 7.343664

TR-Tax-Gross=74838.9817 108345.364 146305.380
 Detail-Rev=91221.7825 3863.31091 11740.0838 1520.18696
 Nontax-Rev=21895.3016 16064.7144 37960.0160
 Budget-Dtser=119918.410 37744.4000 157662.810
 Dbgt-Rev-Def=41966.8470 68412.8927 26446.0457
 Bgt-Dev-Rgap=-11357.430 26446.0457 15088.6162

Disp inc:HH=17581.0205 38355.9162 69895.4873 182590.921
 Agg Disp:HH=123705.335 244910.196 182154.630 177551.411

Cur Exp: HH=21068.0000 38114.8702 58334.8017 108316.989
 Consump-Agg=316510.982 50557.1695 27428.5581 28246.6085 86402.7066
 --dito-- =37033.9286 16241.6073 9898.44513 18613.7243 58031.8746
 Saving: HH=-3486.9795 241.046020 11560.6857 74273.9312
 -do-Agg. HH= 0.000000 1539.12704 30128.3029 47688.5370
 HH:CP:AG:PB=79355.9670 13903.6930 93259.6600 41966.8470

Final Demnd=83636.4192 123977.515 1447.80440 141112.540 38602.1866 17442.8653
 --dito-- =5932.97899 9089.09377 15235.4408 11215.3549 56755.1155 2902.88703
 --dito-- =22240.0898 21541.1323 70334.2224 127879.038 25608.7030 147495.918
 Investm- DD=1996.88983 4360.10826 5615.82161 47190.9407 76062.7466 135226.50
 NMC: Gvt DD=18337.7728 119918.410 111814.324 8104.08613

Activ (mp) =208938.928 158859.266 33931.4342 174667.303 192156.047
 -dito-Act =99773.5304 29882.7553 66632.1619 42716.9638 50137.8429
 -dito-Act =64611.6625 118148.516 109060.560 30799.7179 84362.1889
 -dito-Act =128331.721 48059.6935 240929.252

V.Add (fc) =127835.264 91503.1261 19743.3516 26340.0600 41220.0164
 -dito-VA =15850.8737 10493.3300 18333.8069 11422.2450 28826.5199
 -dito-VA =29109.3959 97832.1604 57785.4106 23623.2952 70937.7227
 -dito-VA =65577.6434 25131.0907 68412.8927

Inv self HH= 0.000000 408.431797 5889.89246 22497.0289 1747.09185
 Inv finc HH= 0.000000 102.107949 2141.77908 11248.5145 1641.32135
 Inv prop HH= 0.000000 170.179916 2677.22385 11248.5145
 Cap stock1 =12796.0000 28514.4318 69319.8925 173549.029 12773.0919
 Cap stock2 = 0.000000 12605.1079 30360.7791 78422.5145 37771.3213
 Cap stock3 =2322.00000 5230.17992 12749.2238 45854.5145
 Gross Labs =8614.10000 15041.8750 19559.0500 45523.3250
 Fixed Invt =112590.364 66072.2323 11576.2944 34941.8370

New:PWG,FWG,BKM= 0.000000 25782.0970 11357.4295
 Outstandg Debt =98740.0000 349477.097 293965.430
 EX:IM:FD:VT:PC =128603.881 197016.774 922449.305 829978.205 648965.605
 End year = 1

Final results: Status quo
 fsmall= 0.000092 0.241646 0.261663 0.496691
 Normal= 1.000000 1.082838 2.055452
 X-Demd= 0.000092 3753.45683 -3753.4567 -11357.427
 End year = 1

Validation Test
(End Year)

Final results: Status quo
 fsmall= 0.000041 0.443802 0.483222 0.072977
 Normal= 1.000000 1.088824 0.164435
 X-Demd= -0.000041 15760.5942 -15760.594 -9682.7392
 End year = 2

Final results: Status quo
 fsmall= 0.000082 0.263975 0.283776 0.452249
 Normal= 1.000000 1.075009 1.713224
 X-Demd= 0.000082 27553.1428 -27553.143 -8542.6074
 End year = 3

Final results: Status quo
 fsmall= 0.000076 0.283584 0.303583 0.412833
 Normal= 1.000000 1.070525 1.455771
 X-Demd= 0.000076 43061.3585 -43061.358 -6969.0116
 End year = 4

Final results: Status quo
 fsmall= 0.001050 0.303542 0.323365 0.373093
 Normal= 1.000000 1.065307 1.229132
 X-Demd= 0.001050 61453.9389 -61453.938 -5279.8627
 End year = 5

Price-Mk= 1.057808 1.056640 1.362856 1.127630 1.065220 1.072387
 dito--Mk= 1.272724 1.066545 1.071060 1.102938 1.055128 1.103254
 dito--Mk= 1.064000 1.035137 1.060235 1.026005 1.064685 1.278757

Price-Cn= 1.097499 1.115197 1.062607 1.134430 1.063054
 dito--Cn= 1.087391 1.131213 1.085623 1.105283 1.158516
 Pi/Ps:AR= 1.188428 0.448200
 Comps-Po= 5.442086 5.854490 6.342610 7.253985

TR-Tax-Gross=44752.6766 151509.515 201334.944
 Detail-Rev=125766.781 6371.18091 16571.4507 2800.10176
 Nontax-Rev=29207.0180 20618.4116 49825.4296
 Budget-Dtser=158111.919 48502.9150 206614.834
 Dbgt-Rev-Def=72717.9587 97679.4568 24961.4981
 Bgt-Dev-Rgap=-5279.8894 24961.4981 19681.6087

Disp inc:HH=18739.5606 41247.3053 93858.6717 309302.902
 Agg Disp:HH=131857.171 263372.294 244605.084 300766.142

Cur Exp: HH=21923.4453 40988.2365 78343.0550 183548.755
 Consump-Agg=381289.766 61221.5476 36886.5352 34260.3427 109054.720
 --dito-- =44180.4531 20517.4173 13220.0835 22624.7507 75375.0549
 Saving: HH=-3183.8846 259.068728 15515.6167 125754.147
 -do-Agg. HH= 0.000000 1654.20564 40435.2488 99880.5649
 HH:CP:AG:PB=141970.019 19625.4445 161595.464 72717.9587

Final Demnd=100662.249 151580.192 1727.19063 171204.731 46832.1033 21437.7502
 --dito-- =9540.62736 14115.6182 19169.8208 13379.6084 93841.5894 3505.82689
 --dito-- =29908.9675 29348.9952 88773.5957 168045.127 32445.9412 220725.595
 Investm- DD=3460.10631 7554.96768 9730.80212 81769.9952 131797.551 234313.42
 NMC: Gvt DD=25188.2922 158111.919 147426.715 10685.2035

Activ (mp) =260211.964 197083.719 46266.3857 215637.225 262016.169

-dito-Act	=131834.947	45031.9986	93492.4047	56126.1483	65127.7389
-dito-Act	=104111.976	151061.665	147575.987	41778.2476	107219.744
-dito-Act	=168641.518	62267.9075	343997.126		

V.Add (fc)	=159205.684	113520.457	26920.5691	32518.3783	56205.9375
-dito-VA	=20944.4236	15812.9871	25724.3897	15007.7758	37444.8910
-dito-VA	=46905.4131	125085.693	78192.6940	32043.7960	90157.9790
-dito-VA	=86175.9916	32560.7660	97679.4568		

Inv self HH=	0.000000	426.666368	7975.08582	47149.2319	3059.41797
Inv finc HH=	0.000000	106.666592	2900.03121	23574.6160	1948.86555
Inv prop HH=	0.000000	177.777653	3625.03901	23574.6160	
Cap stock1	=12796.0000	30193.6609	97872.9462	319361.706	22764.5951
Cap stock2	= 0.000000	13024.9152	40743.7077	151328.853	45096.5313
Cap stock3	=2322.00000	5929.85872	25727.8846	118760.853	
Gross Labs	=9508.35462	16603.4155	21589.5315	50249.2330	
Fixed Invt	=197162.491	119460.347	16513.7852	61188.3594	

New:PWG,FWG,BKM=	0.000000	49809.1368	5279.88939		
Outstandg Debt	=98740.0000	507985.574	324439.683		
EX:IM:FD:VT:PC	=183619.736	281299.193	1216245.53	1092107.28	798630.671
End year =	5				

P-181 (b)
Validation Test

CHAPTER 8

EVALUATION OF SELECTED FISCAL REFORMS

that Eliminate Deficits on Revenue Accounts

In background of the work done so far, we consider it useful at this stage to evaluate the conventional fiscal packages in the general equilibrium context. Each package is assumed to be targetted to elimination of fiscal deficit on Revenue Accounts in the short run. The exercise is rational, keeping in view the prevailing economic situation. In particular, the country faces two crucial problems, stated as under, that demand immediate attention:

1. *The problem of persistent deficit on revenue account of the Federal Budget.*
2. *The large stakes of Internal and external debt accumulated overtime.*

Both the problems are interrelated and reinforcing each other. The tax evasion practices on part of the elites, the inefficiency of the tax collection machinery, and leakages in the public expenditure can be identified as the important factors that compelled the governments in the past to rely on excessive borrowing and money creation. The outstanding national debt has grown overtime to an alarming volume such that the debt servicing absorbs about 40% of the revenues at the moment.

8.1 The Severity of Problems

A bird-eye view of the situation is shown to grasp the intensity of the problems. The relevant figures are reproduced from official sources as under:

(a) Consolidated Fiscal Deficit (Rs. million) - Historical trend.

<u>Year</u>	<u>Current Exp.</u>	<u>Dev Exp</u>	<u>Total Exp.</u>	<u>Revenues</u>	<u>R.A.Deficit</u>	<u>Overall</u>
1980-81	40318	23321	63639	47002	+ 6684	14618
1985-86	94686	39777	134463	89877	5809	41644
1986-87	116242	36160	152402	103873	12369	46710
1987-88	133645	46728	180373	117021	16624	57563
1988-89	153066	48110	201176	139108	13958	56879
1989-90	165595	56050	221645	158805	6790	56060
1990-91	195676	65293	260970	163857	31819	89193
1991-92	230120	91354	321474	216570	13550	104904
1992-93	272457	76196	348653	239528	32929	109125
1993-94	293460	71453	364913	270734	22726	94179
1994-95	345941	82343	428284	317932	28009	110342
1995-96	423866	94233	518507	368260	55606	55606

(b) Internal Debt outstanding by the end of period - (Rs. million at current prices)

<u>Year</u>	<u>Permanent</u>	<u>Floating</u>	<u>Unfunded</u>	<u>Total Debt</u>	<u>As % of GDP</u>
1980-81	13758	31688	12641	58087	20.9
1985-86	58229	87265	57625	203119	39.5
1986-87	68609	104886	74982	248477	43.4
1987-88	63791	127524	98782	290097	43.4
1988-89	78827	135238	119145	333210	43.3
1989-90	98703	144978	137630	381311	44.5
1990-91	157012	150929	140220	448162	43.9
1991-92	185070	197252	142754	525076	43.3
1992-93	245470	215820	150236	611526	45.6
1993-94	264173	257638	189216	711027	45.4
1994-95	290133	294232	223315	807680	42.9
1995-96	291270	361298	265952	918520	42.3

(c) External Debt disbursed and outstanding by the end of period - (\$ million)

<u>Year</u>	<u>Outstanding</u>	<u>Debt servicing</u>	<u>Debt servicing % of GNP</u>
1980-81	8765	603	2.1
1985-86	11108	906	2.8
1986-87	12023	1101	3.3
1987-88	12913	1117	2.9
1988-89	14190	1125	2.8
1989-90	15094	1232	3.1
1990-91	15471	1316	2.9
1991-92	17361	1513	3.1
1992-93	19044	1648	3.5
1993-94	20322	1820	3.6
1994-95	22117	2042	3.4
1995-96	22275	2136	3.3

A persistent deficit on the revenue account of the federal budget for the past three decades has posed serious problems for the economy as viewed today. Before 1969-70, there used to be some surplus on the revenue account, however small, available as the first source of finance for the capital budget. The resource gap could then be filled through extra taxation and/or borrowing. The situation went on worsening there-after and the governments had to resort to deficit financing and excessive borrowing both from domestic private sector and the foreign agencies. This behaviour resulted into the present situation of large stacks of debt and unbearable burden on the exchequer to honour debt servicing. In addition, the sovereignty of the country is at the verge of threat and the future of the economy is exclusively at the mercy of donor agencies.

8.2 Fiscal Reforms

The prime objective of fiscal and commercial policies should be to fill up the budgetary gap in the short run and to deal with the trade deficit at least in the long run. In view of the prevailing socioeconomic situation in the country when high rates of inflation and unemployment coexist, a monetary solution is out of question. Only a bold and cautiously framed fiscal policy, backed by strong political support and efficient administration, may solve the problem. The impacts of various fiscal options can be objectively studied in the context of a general equilibrium framework. We intend to undertake such an exercise in this section.

We reproduce the relevant information on budget deficit and outstanding debt from chapter-4 in respect of the base year (1989-90) of our model in some detail as ready reference for further analysis. All figures are in Rs. million.

(a)	<u>Public Revenues</u>		<u>Public Expenditure</u>	
	Total revenue	144875	Current Expenditure	165595
	Tax revenue	109221	Debt servicing	36033
	Pers. income tax	3495	Govt. Consumption	129562
	Corp. income tax	10842	Current deficit	20720
	Property tax	1404	Deficit as % of Revenues	(14.302)
	Commodity tax	93480	Develop. Expenditure	54880
	Non tax revenue	35654	Overall deficit	75600
(b)	<u>Internal Debt</u>		<u>External Debt</u>	
	Permanent	98703	Disbursed & Outstanding	323700 (\$ 15094)
	Floating	144978	Debt servicing	26420 (\$ 1232)
	Unfunded	137630	Principal Repaid	15890 (\$ 741)
	Total	381311	Interest paid	10530 (\$ 491)
	Debt servicing	11523	As % of GNP	(3.1%)
	Debt as % of GDP	44.5%	As % of GNP	(36.2%)
	Increase in Debt	48101*	Increase in Debt	19387 (\$ 904)*

* difference between 1988-89 and 1989-90 figures.

Total increase in domestic and external debt between 1988-89 and 1989-90 is Rs. 67488 million which corresponds to the overall deficit except for a difference of Rs.8112 million due to monetary expansion. Total servicing on internal and external debt touches a figure of Rs. 37943 million. The rate of interest on internal debt is about 11.675 % and that on external debt is about 3.25% in real terms (since the payment is in foreign exchange). The rate of debt retirement is nearly 5 %. However it is interesting to note that the new debt raised during the accounting period is much

higher than the amount returned; we may imagine this phenomenon from the trade deficit valuing Rs. 71327 million!

In case the short run objective of the policy is to eliminate deficit on the revenue account at the margin, then the relevant policy options may be, for example¹:

1. *An increase in the personal income tax rate.*
2. *An increase in the corporate tax rate.*
3. *A proportionate increase in the rates of direct taxes.*
4. *A proportionate increase in the rates of commodity taxes or widening its base.*
5. *An increase in both direct and indirect taxes.*
6. *A cut in the public consumption expenditure.*
7. *A proper mix of the above options.*

We may deal with the above set of policy options in the general equilibrium context and compare the results accordingly. The objective of this exercise is to choose an appropriate policy that should not only eliminate the deficit on revenue account at the margin but should be the least harmful to the general public at the same time. The welfare gain/loss can be studied in terms of Hicksian Equivalent Variations, which estimate the rate of change of utility due to policy change, given the original level of income. However, in the context of the data we have constructed, the case of poor households needs somewhat different treatment. The disposable income of an household falling in the low-income bracket falls short of the minimum consumption requirements and for that end the household concerned has to resort to borrowing; indicated as negative saving. A reduction in the debt burden of the household concerned as a result of the fiscal policy change may be treated as an increase in the utility of the household, although his consumption level remains the same unless there occurs a revolutionary change in policies leading to mass redistribution of productive assets. With this innovation, the welfare effects for the poor households may also be measured as under:

¹ Another option may be to ask the general public help the situation. The present ML(N) government, soon after it took charge in March 1997 appealed the nation for donations to retire the debts. As reported in the press, only the poor and middle income citizen responded with enthusiasm. However such a policy option is out of the scope of our analysis.

$$HEV = \frac{U^1 - U^0}{U^0} Y_0$$

$$HEV = (-) \left(\frac{D^1 - D^0}{D^0} \right) Y_0$$

(for ordinary households)

(for low-income households)

In the above relations, Y^0 is the original disposable income of the household concerned, U^1 refers to the post-policy-change utility level and U^0 is the original level, both estimated as the indirect utility. Similarly, D^0 and D^1 refers to the pre and post-policy-change debt levels.

It is important to note that a policy change leads to distortion at various points of the prevailing equilibrium. As the economy settles to a new equilibrium state, most of the variables undergo a change in magnitude. In particular, there may occur shortage and/or excess in demand and supply of the factors of production within the single period static framework.

Next we turn to the main task under consideration.

8.2.1 Fiscal Model-1: Increase in the Personal income tax rate

The effective income tax rate in our basic model is 0.012687 (or about 1.27%) of the household taxable income with Rs. 30,000/- as the basic rebate (RB). Each household group 'm' is supposed to pay tax at a uniform rate (t_y) according to the relation:

$$\text{Tax}_m = t_y (GY_m - RB) \text{ pop}_m, \text{ and Gross Tax} = \sum \text{Tax}_m,$$

where pop_m is the population of the group concerned with $m = 1, \dots, 4$.

To achieve the objective, i.e. elimination of the fiscal deficit at the margin, we proceed as under:

Gross revenue from personal income tax at prevailing rate :	Rs. 3495 m
Target revenue to accommodate the deficit of Rs. 20720 m.	Rs. 24215 m
The ratio of target revenue to the existing revenue:	6.928469 (24215/3495).
Proposed tax rate :	$0.012687 \times 6.928469 = 0.0879$ or roughly 8.8 % of the taxable income ²

² In effect the computer uses a multiple of 6.77 (instead of 6.93) implying a rate of 0.085891 that eliminates the deficit at the margin.

This implies an abrupt increase in the effective tax rate from 1.2687 % to 8.5891 % of taxable income (nearly 577 % enhancement) which doesn't seem feasible. However, efficiency in tax administration and eradication of corruption may lead to target achievement. Naturally, the disposable incomes will fall drastically thereby pulling the budget line of the households parallelly downward. This will lead to a fall in consumption demand, utility levels and household saving and eventually to a welfare loss, although the general price level will remain unchanged. The resulting deficit/surplus may not be exactly zero. The surplus if any, may be diverted to development budget or used for retiring the debt.

Let's examine the results shown in the computer print out(annexed as Fiscal- 1).

(i). Government Revenue and Expenditure

A comparison of model (benchmark) and revised (post policy) values is as under. All figures are expressed in Rs. million:

<u>Item</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
Gross Revenues	144871.783	166608.863	+ 15.004
Tax Revenues	109217.242	131070.714	+ 20.009
Commod. Tax	93476.373	93800.446	+ 0.346
Income Tax (personal)	3495.018	25024.417	+616.002
Income Tax (corporat)	10841.958	10841.958	00
Property Tax	1403.891	1403.891	00
Non-Tax Revenues	35654.541	35538.149	- 0.326
Share in Profits	20220.295	20220.295	00
Sale of services	15434.246	15317.855	- 0.754
Current Expenditure	165592.893	166553.941	+ 0.580
Public consumption	129560.073	129620.925	+ 0.047
Debt servicing	36032.820	36933.015	+ 2.498
Revenue account gap	- 20721.110	+ 54.923	- 100.265

The above figures show a healthy sign in that the deficit on revenue account has not only been 100% eliminated but there is a slight surplus even. The minor increase in revenues from commodity taxation may be attributed to increase in demand due to enhanced investment as given below.

(ii). Saving and Investment

Following is the comparison on aggregate basis:

<u>Item</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
Gross saving	82406.968	84011.291	+ 1.947
Household saving	69566.918	71171.241	+ 2.306
Corporate saving	12840.050	12840.050	00
Gross Investment	155047.887	158066.405	+ 1.947
Capital account gap	- 72640.918	- 74055.113	+ 1.947

Public saving	- 20721.110	+ 54.923	+ 100.265
Foreign capital (T.Deficit)	71323.000	71711.297	+ 0.544
Resource gap (overall)	- 22039.028	- 2288.893	- 89.614*

* The overall resource gap has been reduced by nearly 90%.

(iii) Household Income, consumption and saving

The figures can be compared for different household groups (expressed in Rs.) as under:

Item	Group 1	Group 2	Group 3	Group 4
1. <u>Disposable Income</u>				
a. Benchmark	16996.106	36719.571	66463.420	172787.282
b. Revised case	17633.631	37074.467	66039.819	165909.989
c. % Change	+ 3.751	+ 0.966	- 0.637	- 3.980
2. <u>Expenditure</u>				
a. Benchmark	21068.000	36489.455	55500.158	102674.885
b. Revised case	21068.000	36842.126	55146.431	98588.212
c. % Change	00	+ 0.966	- 0.637	- 3.980
3. <u>Saving</u>				
a. Benchmark	- 4071.894	230.116	10963.262	70112.396
b. Revised case	- 3434.369	232.340	10893.388	67321.777
c. % Change	+ 15.656	+ 0.966	- 0.637	- 3.980
4. <u>Utility levels</u>				
a. Benchmark	4063.503	6582.174	10994.300	24979.422
b. Revised case	4063.503	6645.787	10924.219	23985.177
c. HEV (Rs)	00	+ 354.874	- 423.658	- 6877.376
d. Aggregate HEV (Rs.m)	00	+ 2265.941	- 1104.095	- 6487.560
e. Social Welfare effects (overall) =	- 5525.714			

An increase in tax revenues leads to some increase in public spending on account of social security benefits. This item compensates the low income group absolutely and the lower-middle income group more than proportionately to reduction in their income due to increased taxation. This increases the incomes, expenditure and utility levels of the two groups. The indirect benefit of the poor group can be seen in terms of about 16 % reduction in their debts raised to fulfill basic consumption needs. The high income group suffers most from the policy change. The overall effect is, as expected, a welfare loss if the poorer group is excluded from consideration.

(iv) Aggregate Consumption demand

The results for household consumption in respect of ten (10) commodities are as under. All figures are in Rs. million.

	<u>Commodity</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% change</u>
1.	Food	305642.973	304868.935	- 0.253
2.	Clothing/Footwear	48799.049	48657.071	- 0.291
3.	Transpt/Communic.	26299.484	25977.933	- 1.222
4.	Personal appearance	27270.432	27184.379	- 0.315
5.	Housing	83131.930	82613.766	- 0.623
6.	Fuel and lighting	35812.267	35738.711	- 0.205
7.	Furniture	15612.744	15520.016	- 0.594
8.	Education	9477.375	9373.422	- 1.097
9.	Health/Medicare	17961.093	17905.217	- 0.311
10.	Misc. expenditure	55705.910	55229.958	- 0.854
	Total	625713.247	623069.48	- 0.422

As expected, there is a slight decrease in the production level of consumer goods on account of a short fall in the household disposable incomes.

(v) Final demand and Value added

The relevant figures in respect of eighteen (18) commodities, including one composite commodity of imported material (sector 18), all expressed in Rs. million can be compared as under:

Final Demand (mp)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
1.	80775.177	80574.241	- 0.249
2.	120028.767	119695.696	- 0.277
3.	1400.045	1397.169	- 0.205
4.	136193.180	135774.253	- 0.307
5.	37254.532	37140.772	- 0.305
6.	16819.196	16750.631	- 0.407
7.	6512.197	6600.204	+ 1.351
8.	9780.014	9884.794	+ 1.071
9.	14655.930	14571.219	- 0.578
10.	10845.387	10823.111	- 0.205
11.	63310.269	64306.305	+ 1.573
12.	2802.920	2795.180	- 0.276
13.	21324.595	21063.869	- 1.222
14.	20009.885	19983.613	- 0.131
15.	67671.719	67249.919	- 0.623
16.	136238.650	136178.998	- 0.044
17.	25619.618	25539.258	- 0.313
18.	156015.033	157363.397	+ 0.864
Total	927257.115	927692.630	+ 0.047

A small increase in demand from sectors 7,8,11 and 18 is due to increase in investment. In other cases there is only negligible fall in final demands.

Value Added (fc)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
1.	125113.761	124935.248	- 0.143
2.	89253.349	89067.458	- 0.208
3.	20143.338	20201.001	+0.286
4.	25639.400	25580.770	- 0.228
5.	42033.529	42159.305	+0.299
6.	15917.738	15926.483	+0.055
7.	11161.038	11256.952	+0.859
8.	19044.119	19124.396	+0.421
9.	11348.835	11336.501	- 0.108
10.	28817.778	28831.690	+0.048
11.	32207.136	32652.545	+1.383
12.	96853.105	96789.271	- 0.066
13.	58322.273	58310.942	- 0.019
14.	22528.084	22520.707	- 0.033
15.	68758.354	68404.005	- 0.515
16.	69856.926	69826.452	- 0.044
17.	25455.808	25416.570	- 0.154
18.	71323.000	71711.297	+0.544
Total	833777.575	834051.596	+0.033

An increase in the value added by sectors 3,6,7,8,11 and 18 is due to increase in the investment demand for their output. In other cases the value added has slightly gone down as expected.

8.2.2 Fiscal Model-2: Increase in the Corporate income tax rate:

The effective tax rate applicable to corporate income in our basic model is 0.085093 (or about 8.51%). To achieve the objective, we proceed as under:

Gross revenue from corporate income tax at prevailing rate :	Rs. 10842 m,
Target revenue to accommodate the deficit of Rs. 20720 m.	Rs. 31562 m
The ratio of target revenue to the existing revenue:	2.911086 (31562/10842),
Proposed tax rate :	0.085093 x 2.911086 = 0.247713 ³

This means a 230% increase in the prevailing effective tax rate, enhancing it from 8.51% to 28.15%. Apparently this rate is difficult to implement. However, as noted earlier, administrative reforms in tax collection may solve the problem even at the existing tax rates.

Let's examine the results shown in the computer print out(annexed as Fiscal- 2).

³ The computer uses a ratio/multiple 3.31 instead of 2.91 implying a tax rate of 0.28150 that eliminates the deficit at the margin.

(i) Government Revenue and Expenditure

A comparison of model (benchmark) and revised (post policy) values is as under. All figures are expressed in Rs. million:

<u>Item</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
Gross Revenues	144871.783	166639.089	+ 15.025
Tax Revenues	109217.242	134652.537	+ 23.288
Commod. Tax	93476.373	93957.610	+ 0.515
Income Tax (personal)	3495.018	3424.261	- 2.024
Income Tax (corporat)	10841.958	35866.773	+ 230.814
Property Tax	1403.891	1403.891	00
Non-Tax Revenues	35654.541	31986.552	- 10.287
Share in Profits	20220.295	16672.202	- 17.547
Sale of services	15434.246	15314.350	- 0.776
Current Expenditure	165592.893	166586.698	+ 0.600
Public consumption	129560.073	129653.682	+ 0.072
Debt servicing	36032.820	36933.015	+ 2.498
Revenue account gap	- 20721.110	+ 52.391	- 100.253

The above figures show a healthy sign in that the deficit on revenue account has not only been eliminated but there is some surplus even. The slight increase in revenues from commodity taxation may be attributed to increase in demand due to enhanced investment shown as under.

(ii) Saving and Investment

Following is the comparison on aggregate basis:

<u>Item</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
Gross saving	82406.968	84737.199	+ 2.828
Household saving	69566.918	71897.149	+ 3.349
Corporate saving	12840.050	12840.050	00
Gross Investment	155047.887	159432.193	+ 2.828
Capital account gap	- 72640.918	- 74694.994	+ 2.828
Public saving	- 20721.110	+ 52.391	+100.253
Foreign capital (T.Deficit)	71323.000	71911.045	+ 0.824
Resource gap	- 22039.028	- 2731.557	- 87.606*

* The overall resource gap has been reduced by nearly 88%.

(iii) Household Income, consumption and saving

The figures can be compared for different household groups (expressed in Rs.) as under:

<u>Item</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
1. <u>Disposable Income</u>				
a. Benchmark	16996.106	36719.571	66463.420	172787.282
b. Revised case	17580.542	36497.702	66590.482	168154.981
c. % Change	+ 3.438	- 0.604	+ 0.191	- 2.681

	<u>Item</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
2.	<u>Expenditure</u>				
a.	Benchmark	21068.000	36489.455	55500.158	102674.885
b.	Revised case	21068.000	36268.976	55606.261	99922.247
c.	% Change	00	- 0.604	+ 0.191	- 2.681
3.	<u>Saving</u>				
a.	Benchmark	- 4071.894	230.116	10963.262	70112.396
b.	Revised case	- 3487.458	228.725	10984.221	68232.734
c.	% Change	+ 14.353	- 0.604	+ 0.191	- 2.681
4.	<u>Utility levels</u>				
a.	Benchmark	4063.503	6582.174	10994.300	24979.422
b.	Revised case	4063.503	6542.393	11015.293	24309.705
c.	HEV (Rs.)	00	- 221.924	+ 126.908	- 4632.556
d.	Aggreg. HEV (Rs.m)	00	-1417.029	+ 330.735	- 4504.697
e.	Social Welfare effects (overall)	=	- 5590.991		

Although the utility level of the poor group remains apparently unchanged, their indirect benefits can be seen in terms of about 14 % reduction in their debt liabilities otherwise required to fulfill their basic consumption needs.

(iv) Aggregate Consumption demand

The results for household consumption in respect of ten (10) commodities are as under. All figures are in Rs. million.

	<u>Commodity</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
1.	Food	305642.973	304048.629	- 0.521
2.	Clothing/Footwear	48799.049	48535.450	- 0.540
3.	Transpt/Communic.	26299.484	26028.465	- 1.030
4.	Personal appearance	27270.432	27120.129	- 0.551
5.	Housing	83131.930	82534.629	- 0.718
6.	Fuel and lighting	35812.267	35631.115	- 0.506
7.	Furniture	15612.744	15506.172	- 0.682
8.	Education	9477.375	9384.102	- 0.984
9.	Health/Medicare	17961.093	17867.044	- 0.523
10.	Misc. expenditure	55705.910	55249.568	- 0.819
	Total	625713.247	606499.133	- 3.074

As expected, the production/consumption level of all these goods has gone down slightly due to reduction in the disposable incomes.

(v) Final demand and Value added

The relevant figures in respect of eighteen (18) commodities, including one composite commodity of imported material (sector 18), all expressed in Rs. million can be compared as under:

Final Demand (mp)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
1.	80775.177	80355.022	- 0.520
2.	120028.767	119437.398	- 0.493
3.	1400.045	1392.963	- 0.506
4.	136193.180	135446.587	- 0.548
5.	37254.532	37050.634	- 0.547
6.	16819.196	16720.145	- 0.590
7.	6512.197	6642.826	+2.006
8.	9780.014	9938.389	+1.619
9.	14655.930	14556.018	- 0.682
10.	10845.387	10790.527	- 0.506
11.	63310.269	64774.174	+2.312
12.	2802.920	2787.943	- 0.534
13.	21324.595	21104.842	- 1.030
14.	20009.885	19984.695	- 0.125
15.	67671.719	67185.499	- 0.718
16.	136238.650	136206.036	- 0.024
17.	25619.618	25517.383	- 0.399
18.	156015.033	158035.988	+1.295
Total	927257.115	927927.071	+0.072

A small increase in demand for the products of sectors 7,8,11 and 18 is due to increase in investment. In other cases there is only negligible fall in final demands.

Value Added (fc)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
1.	125113.761	124736.308	- 0.301
2.	89253.349	88917.167	- 0.376
3.	20143.338	20227.710	+0.419
4.	25639.400	25533.471	- 0.413
5.	42033.529	42214.922	+0.431
6.	15917.738	15932.477	+0.092
7.	11161.038	11307.252	+1.310
8.	19044.119	19166.910	+0.645
9.	11348.835	11339.031	- 0.086
10.	28817.778	28824.658	+0.024
11.	32207.136	32663.561	+1.417
12.	96853.105	96719.627	- 0.138
13.	58322.273	58384.616	- 0.107
14.	22528.084	22527.499	- 0.002
15.	68758.354	68350.445	- 0.593
16.	69856.926	69840.333	- 0.024
17.	25455.808	25411.063	- 0.175
18.	71323.000	71911.045	+0.824
Total	833777.575	834207.996	+0.051

An increase in the value added by sectors 3,6,7,8,11 and 18 is due increase in demand for their output for investment purpose. In other cases the value added has slightly gone down as expected.

8.2.3 Fiscal Model-3: Proportionate increase in direct taxes:

The effective tax rates applicable to personal, corporate and property income in our basic model are 0.012687, 0.085093 and 0.025867 respectively. To achieve the objective of bringing down the budget deficit, we proceed as under:

Revenue from personal income tax at prevailing rate :	Rs.3495 m,
Revenue from corporate income tax at prevailing rate :	Rs.10842 m,
Revenue from property tax at prevailing rate :	Rs. 1404 m,
Total revenue from direct taxes :	Rs. 15471 m,
Target revenue (20720 + 15471)	Rs. 36191 m
Ratio of target revenue to the existing revenue:	2.33915 (36191/15471) ⁴

Therefore all the existing tax rates should be raised by this multiple. As a result, the disposable incomes of the relevant household groups will fall, however, disproportionately depending upon their shares in business. This will lead to a fall of consumption demand, utility levels and household saving and eventually to a welfare loss, although the general price level will remain unchanged. As noted earlier, the resulting deficit/surplus on the revenue account may not be exactly zero. The surplus if any, may be diverted to development budget or used for retiring the debt.

Let's examine the results shown in the computer print out(annexed as Fiscal- 3).

(i) Government Revenue and Expenditure

A comparison of model (benchmark) and revised (post policy) values is as under. All figures are expressed in Rs. million:

<u>Item</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
Gross Revenues	144871.783	166616.499	+ 15.009
Tax Revenues	109217.242	133393.293	+ 22.135
Commod. Tax	93476.373	93879.353	+ 0.431
Income Tax (personal)	3495.018	8776.856	+151.125
Income Tax (corporat)	10841.958	27213.316	+151.000
Property Tax	1403.891	3523.768	+151.000
Non-Tax Revenues	35654.541	33223.205	- 6.819
Share in Profits	20220.295	17899.115	- 11.479
Sale of services	15434.246	15324.090	- 0.713
Current Expenditure	165592.893	166570.901	+ 0.590
Public consumption	129560.073	129637.885	+ 0.060
Debt servicing	36032.820	36933.015	+ 2.498
Revenue account gap	- 20721.110	+ 45.598	- 100.220

⁴ The computer uses a ratio/multiple of 2.51 instead of 2.34 so as to eliminate the deficit at the margin. Accordingly, the new tax rates are 0.031844, 0.213583, 0.064926 for personal income tax, corporate tax and property tax respectively. This means an increase of 151% in the prevailing/base year tax rates.

The above figures show a positive sign in that the deficit on revenue account has not only been eliminated by 100% but there is some surplus even. The slight increase in revenues from commodity taxation may be attributed to increase in demand due to enhanced investment given below.

(ii) Saving and Investment

Following is the comparison on aggregate basis:

<u>Item</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
Gross saving	82406.968	84367.243	+ 2.378
Household saving	69566.918	71527.193	+ 2.818
Corporate saving	12840.050	12840.050	00
Gross Investment	155047.887	158736.124	+ 2.378
Capital account gap	- 72640.918	- 74368.881	+ 2.378
Public saving	- 20721.110	+ 45.598	+ 100.220
Foreign capital (T.Deficit)	71323.000	71813.261	+ 0.687
Resource gap	- 22039.028	- 2510.022	- 88.611*

* The overall resource gap has been reduced by nearly 89%.

(iii) Household Income, consumption and saving

The results can be compared for different households (expressed in Rs.) as under:

<u>Item</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
1. <u>Disposable Income</u>				
a. Benchmark	16996.106	36719.571	66463.420	172787.282
b. Revised case	17553.304	36657.945	66495.135	167790.732
c. % Change	+ 3.278	- 0.168	+ 0.048	- 2.891
2. <u>Expenditure</u>				
a. Benchmark	21068.000	36489.455	55500.158	102674.885
b. Revised case	21068.000	36428.215	55526.641	99705.800
c. % Change	00	- 0.168	+ 0.048	- 2.891
3. <u>Saving</u>				
a. Benchmark	- 4071.894	230.116	10963.262	70112.396
b. Revised case	- 3514.696	229.729	10968.493	68084.932
c. % Change	+ 13.648	- 0.168	+ 0.048	- 2.891
4. <u>Utility levels</u>				
a. Benchmark	4063.503	6582.174	10994.300	24979.422
b. Revised case	4063.503	6571.127	10999.546	24257.084
c. HEV (Rs.)		- 61.627	+ 31.713	- 4996.545
d. Aggreg. HEV (Rs.m)		- 393.500	+ 82.647	- 4858.640
e. Social Welfare effects (overall)	=	- 5026.459		

As evident from the above, the poor households benefit from the policy change indirectly in terms of about 13.6% reduction in their debt liabilities, although their consumption level remains unchanged. The rich class naturally loses in this case.

(iv) Aggregate Consumption demand

The results for household consumption in respect of ten (10) commodities are as under. All figures are in Rs. million.

<u>Commodity</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>%Change</u>
1. Food	305642.973	304392.141	- 0.409
2. Clothing/Footwear	48799.049	48588.442	- 0.431
3. Transpt/Communic.	26299.484	26033.081	- 1.013
4. Personal appearance	27270.432	27148.822	- 0.446
5. Housing	83131.930	82599.436	- 0.640
6. Fuel and lighting	35812.267	35673.450	- 0.387
7. Furniture	15612.744	15518.185	- 0.605
8. Education	9477.375	9387.672	- 0.946
9. Health/Medicare	17961.093	17884.987	- 0.424
10. Misc. expenditure	55705.910	55277.894	- 0.768
Total	625713.247	622504.120	- 0.513

As expected, there is a slight fall in the volume of consumer goods.

(v) Final demand and Value added

The relevant figures in respect of eighteen (18) commodities, including one composite commodity of imported material (sector 18), all expressed in Rs. million can be compared as under:

Final Demand (mp)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
1.	80775.177	80446.246	- 0.407
2.	120028.767	119551.666	- 0.397
3.	1400.045	1394.618	- 0.387
4.	136193.180	135591.959	- 0.441
5.	37254.532	37090.539	- 0.440
6.	16819.196	16735.985	- 0.495
7.	6512.197	6621.558	+ 1.679
8.	9780.014	9912.078	+ 1.350
9.	14655.930	14567.699	- 0.602
10.	10845.387	10803.347	- 0.387
11.	63310.269	64538.436	+ 1.940
12.	2802.920	2791.033	- 0.424
13.	21324.595	21108.585	- 1.013
14.	20009.885	19986.259	- 0.118
15.	67671.719	67238.254	- 0.640
16.	136238.650	136201.047	- 0.027
17.	25619.618	25530.950	- 0.346
18.	156015.033	157703.751	+ 1.082
Total	927257.115	927814.012	+ 0.060

A small increase in demand from sectors 7,8,11 and 18 is due to increase in investment. In other cases there is only negligible fall in final demands.

Value Added (fc)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
1.	125113.761	124818.962	- 0.235
2.	89253.349	88983.141	- 0.302
3.	20143.338	20214.192	+ 0.352
4.	25639.400	25554.334	- 0.331
5.	42033.529	42186.488	+ 0.363
6.	15917.738	15929.779	+ 0.075

7.	11161.038	11282.714	+ 1.090
8.	19044.119	19146.236	+0.536
9.	11348.835	11339.119	- 0.085
10.	28817.778	28826.048	+0.028
11.	32207.136	32757.517	+1.709
12.	96853.105	96748.799	- 0.107
13.	58322.273	58359.375	+0.063
14.	22528.084	22525.704	- 0.010
15.	68758.354	68394.526	- 0.529
16.	69856.926	69837.760	- 0.027
17.	25455.808	25415.885	- 0.157
18.	71323.000	71813.261	+0.687
Total	833777.575	834133.843	+0.043

An increase in the value added by sectors 3,6,7,8,11 and 18 is due increase in demand for their output for investment purpose. In other cases the value added has slightly gone down as expected.

8.2.4 Fiscal Model-4: Proportionate increase in Commodity taxes:

The effective tax rates applicable to various commodities in our basic model are given in Chapter-6 (section 6.2.2) on parameter estimates. An increase in commodity tax rates, although administratively convenient, however leads to inflation. The tax burden falls on the poor sections of the society more than proportionately as compared to the well-to-do households. Such a policy cannot be recommended for its adverse social effects. However, we try to analyze its results as well since it is the most frequently exercised option in this country. To achieve the objective, we proceed as under:

Gross revenue from commodity taxation at prevailing rates :	Rs. 93480 m,
Target revenue to accommodate the deficit of Rs. 20720 m.	Rs.114200 m
The ratio of target revenue to the existing revenue:	1.221651 (114200/93480) ⁵

Therefore all existing tax rates should be raised by this multiple.

The possible consequences of this policy may be visualized in the form of reduced consumption and utility levels of the households. The revenue collection may not reach the target on account of a fall in the sales/demand. The relative prices remain unchanged, so only income effects can be guessed. As such, the policy doesn't seem to be practicable. However, widening of the tax base or bringing more and more items under the generalized sales tax nest may prove a viable alternative. anyhow, the results will remain more or less the same.

⁵ The computer uses a ratio/multiple 1.2745 implying 27.45% increase in tax rates of all commodities which eliminates the deficit at the margin.

Let's examine the results shown in the computer print out(annexed as Fiscal- 4).

(i) **Government Revenue and Expenditure**

A comparison of model (benchmark) and revised (post policy) values is as under. All figures are expressed in Rs. million:

<u>Item</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
Gross Revenues	144871.783	167583.893	+ 15.677
Tax Revenues	109217.242	131816.037	+ 20.691
Commod. Tax	93476.373	116021.672	+ 24.118
Income Tax (personal)	3495.018	3548.515	+ 1.530
Income Tax (corporat)	10841.958	10841.958	00
Property Tax	1403.891	1403.891	00
Non-Tax Revenues	35654.541	35767.856	+ 0.318
Share in Profits	20220.295	20220.295	00
Sale of services	15434.246	15547.561	+ 0.734
Current Expenditure	165592.893	167554.104	+ 1.184
Public consumption	129560.073	130621.088	+ 0.819
Debt servicing	36032.820	36933.015	+ 2.498
Revenue account gap	- 20721.110	+ 29.789	- 100.144

The above figures show positive signs in that the deficit on revenue account has not only been eliminated but there is a slight surplus even. The increase in revenues from commodity taxation is about 24%.

(ii) **Saving and Investment**

Following is the comparison on aggregate basis:

<u>Item</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
Gross saving	82406.968	83702.711	+ 1.572
Household saving	69566.918	70862.661	+ 1.862
Corporate saving	12840.050	12840.050	00
Gross Investment	155047.887	157485.814	+ 1.572
Capital account gap	- 72640.918	- 73783.103	- 1.572
Public saving	- 20721.110	+ 29.789	+100.144
Foreign capital (T.Deficit)	71323.000	68635.316	- 3.768
Resource gap	- 22039.028	- 5117.998	- 76.777*

* The overall resource gap has been reduced by nearly 88%.

(iii) **Household Income, consumption and saving**

The figures can be compared for different households (expressed in Rs.) as under:

<u>Item</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
1. <u>Disposable Income</u>				
a. Benchmark	16996.106	36719.571	66463.420	172787.282
b. Revised case	17165.489	36947.967	67117.694	173851.819
c. % Change	+ 0.996	+ 0.622	+ 0.984	+ 0.616
2. <u>Expenditure</u>				
a. Benchmark	21068.000	36489.455	55500.158	102674.885
b. Revised case	21068.000	36717.868	56115.067	103737.950
c. % Change	00	+ 0.626	+ 1.108	+ 1.035

	<u>Item</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
3.	<u>Saving</u>				
a.	Benchmark	- 4071.894	230.116	10963.262	70112.396
b.	Revised case	- 3902.510	230.098	11002.627	70113.868
c.	% Change	+ 14.159	- 0.007	+ 0.359	+ 0.002
4.	<u>Utility levels</u>				
a.	Benchmark	4063.503	6582.174	10994.300	24979.422
b.	Revised case	4013.859	6541.447	10963.107	24821.390
c.	HEV (Rs.)	- 207.642	- 227.201	- 188.570	- 1093.136
d.	Aggreg. HEV (Rs.m)	- 1461.031	- 1450.724	- 491.432	- 1062.962
e.	Social Welfare effects (overall)	= - 4466.149			

The increase in the disposable incomes of all household groups is primarily due to increase in factor prices (via Stolper-Samuelson effect) and partially due to social security transfer payments or compensatory allowance. The expenditure level of all groups has gone up due to enhanced taxation and cost of living accompanied by a fall in their utility levels. The lower-middle income group suffers most from the policy change. An indirect benefit to the poor group can be seen in terms of about 14 % reduction in their debt liabilities made possible due to increased social security transfers.

(iv) **Aggregate Consumption demand**

The results for household consumption in respect of ten (10) commodities are as under. All figures are in Rs. million.

	<u>Commodity</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
1.	Food	305642.973	307535.815	+ 0.619
2.	Clothing/Footwear	48799.049	49106.223	+ 0.629
3.	Transpt/Communic.	26299.484	26505.428	+ 0.783
4.	Personal appearance	27270.432	27441.111	+ 0.626
5.	Housing	83131.930	83713.993	+ 0.700
6.	Fuel and lighting	35812.267	36022.989	+ 0.588
7.	Furniture	15612.744	15725.420	+ 0.721
8.	Education	9477.375	9553.725	+ 0.805
9.	Health/Medicare	17961.093	18076.259	+ 0.641
10.	Misc. expenditure	55705.910	56126.996	+ 0.756
	Total	625713.247	629807.969	+ 0.654

Naturally the expenditure on all consumer goods has gone up. This may not be treated equivalent to increase in the level of real consumption.

(v) **Final demand and Value added**

The relevant figures in respect of eighteen (18) commodities, including one composite commodity of imported material (sector 18), all expressed in Rs. million can be compared as under:

Final Demand (mp)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
1.	80775.177	81273.075	+ 0.616
2.	120028.767	120806.230	+ 0.647
3.	1400.045	1408.283	+ 0.588
4.	136193.180	137053.600	+ 0.632
5.	37254.532	37490.242	+ 0.633
6.	16819.196	16929.336	+ 0.655
7.	6512.197	6601.478	+ 1.371
8.	9780.014	9904.834	+ 1.276
9.	14655.930	14759.337	+ 0.705
10.	10845.387	10909.202	+ 0.588
11.	63310.269	64225.480	+ 1.445
12.	2802.920	2820.347	+ 0.622
13.	21324.595	21491.582	+ 0.783
14.	20009.885	20033.129	+ 0.116
15.	67671.719	68145.534	+ 0.700
16.	136238.650	137341.277	+ 0.809
17.	25619.618	25804.873	+ 0.723
18.	156015.033	157852.924	+ 1.178
Total	927257.115	934850.765	+ 0.819

Except for sectors 7,8,11 and 18, where the increase in final demand is significant and primarily due to increase in investment, for all other cases there is only nominal increase in final demand. In other words, the expenditure incurred on commodities from these sectors has gone up due to commodity taxation.

Value Added (fc)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised case</u>	<u>% Change</u>
1.	125113.761	125633.493	+ 0.415
2.	89253.349	89834.243	+ 0.651
3.	20143.338	19097.210	- 5.193
4.	25639.400	25338.820	- 1.172
5.	42033.529	42214.307	+ 0.430
6.	15917.738	15950.320	+ 0.204
7.	11161.038	10766.016	- 3.539
8.	19044.119	19115.666	+ 0.375
9.	11348.835	11370.963	+ 0.195
10.	28817.778	28707.497	- 0.382
11.	32207.136	32460.029	+ 0.785
12.	96853.105	96557.840	- 0.305
13.	58322.273	58527.899	+ 0.352
14.	22528.084	22602.565	+ 0.330
15.	68758.354	69149.568	+ 0.569
16.	69856.926	70403.100	+ 0.782
17.	25455.808	25542.053	+ 0.339
18.	71323.000	68635.316	- 3.768
Total	833777.575	831906.908	- 0.224

An increase in the value added by many sectors is mainly due to increase in demand for consumer oriented products. In other cases the value added (f.c.) has slightly gone down as expected.

8.2.5 Fiscal Model-5: Tax policy-mix:

Under this option, we arbitrarily propose a 10% increase in commodity taxation (that seems to be practically feasible) and sufficient enough proportionate increase in direct taxes so as to achieve the objective. In this regards we have the following information:

Revenue from direct taxes at prevailing rates :	Rs. 15741 m,
Revenue from indirect taxes at prevailing rates:	Rs. 93480 m,
Total available revenues/resources:	Rs.109221 m,
Deficit on revenue account:	Rs. 20720 m,
Target revenue to accommodate the deficit:	Rs.129941 m,

Next we proceed as under after allowing a 10% increase in Commod. taxes:

Expected additional revenues from indirect taxes	Rs. 9348 m,
Remainder/deficit (20720 - 9348):	Rs. 11372 m,
Target revenue from direct taxes (15741 + 11372):	Rs. 27113 m,
Ratio of target to prevailing revenue:	1.722445 = (27113/15741) ⁶

Therefore all direct taxes should be raised by this ratio.

Let's examine the results shown in the computer print out(annexed as Fiscal- 5).

(i) Government Revenue and Expenditure

A comparison of model (benchmark) and revised (post policy) values is as under. All figures are expressed in Rs. million:

<u>Item</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
Gross Revenues	144871.783	166935.050	+ 15.229
Tax Revenues	109217.242	132761.745	+ 21.557
Commod. Tax	93476.373	102092.248	+ 9.217
Income Tax (personal)	3495.018	6841.521	+ 95.750
Income Tax (corporate)	10841.958	21096.283	+ 94.580
Property Tax	1403.891	2731.692	+ 94.580

⁶ The computer uses a multiple 1.9458 which implies personal income tax rate of 0.024686, corporation income tax rate of 0.165574 and property tax rate of 0.050332 at the new scale so as to eliminate the deficit at the margin. This means 94.5 % uniform increase in the existing (base year) rates of direct taxes.

Non-Tax Revenues	35654.541	34173.305	-	4.154
Share in Profits	20220.295	18766.406	-	7.190
Sale of services	15434.246	15406.899	-	0.177
Current Expenditure	165592.893	166934.304	+	0.810
Public consumption	129560.073	130001.288	+	0.340
Debt servicing	36032.820	36933.015	+	2.498
Revenue account gap	- 20721.110	+ 0.746	-	100.003

The above figures reveal that only 9.22% of additional revenues from commodity taxation could be realized as against 10% proposed. As usual, the deficit on revenue account has been eliminated by 100% along with a minor surplus.

(ii) Saving and Investment

Following is the comparison on aggregate basis:

<u>Item</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
Gross saving	82406.968	84117.588	+ 2.076
Household saving	69566.918	71277.538	+ 2.459
Corporate saving	12840.050	12840.050	00
Gross Investment	155047.887	158266.402	+ 2.076
Capital account gap	- 72640.918	- 74148.813	+ 2.076
Public saving	- 20721.110	+ 0.746	+100.003
Foreign capital (T.Deficit)	71323.000	70619.772	- 0.986
Resource gap	- 22039.028	- 3528.294	- 83.990*

* The overall resource gap has been reduced by nearly 84%.

(iii) Household Income, consumption and saving

The figures can be compared for different household groups (expressed in Rs.) as under:

<u>Item</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
1. <u>Disposable Income</u>				
a. Benchmark	16996.106	36719.571	66463.420	172787.282
b. Revised case	17408.244	36765.459	66727.607	170039.301
c. % Change	+ 2.425	+ 0.125	+ 0.397	- 1.590
2. <u>Expenditure</u>				
a. Benchmark	21068.000	36489.455	55500.158	102674.885
b. Revised case	21068.000	36535.489	55745.985	101197.556
c. % Change	00	+ 0.126	+ 0.443	- 1.439
3. <u>Saving</u>				
a. Benchmark	- 4071.894	230.116	10963.262	70112.396
b. Revised case	- 3659.756	229.869	10981.622	68841.745
c. % Change	+ 10.121	- 0.107	+ 0.167	- 1.812
4. <u>Utility levels</u>				
a. Benchmark	4063.503	6582.174	10994.300	24979.422
b. Revised case	4045.262	6560.511	10987.032	24469.951
c. HEV (Rs.)	- 76.295	- 120.850	- 43.937	- 3524.105
d. Aggreg. HEV (Rs.m)	- 536.834	- 771.651	- 114.504	- 3426.840
e. Social Welfare effects (overall)	= - 4849.829			

Although the income levels of the households except the high-income group have slightly gone up partly due to (indirect) increase in factor prices and partly due to compensatory transfers, the utility levels in all cases have been reduced. An indirect effect of the policy change on the poorer group can be seen in terms of about 10% reduction in their debt burden.

(iv) Aggregate Consumption demand

The results for household consumption in respect of ten (10) commodities are as under. All figures are in Rs. million.

	<u>Commodity</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
1.	Food	305642.973	305557.589	- 0.028
2.	Clothing/Footwear	48799.049	48780.391	- 0.038
3.	Transpt/Communic.	26299.484	26208.037	- 0.347
4.	Personal appearance	27270.432	27257.172	- 0.048
5.	Housing	83131.930	83012.465	- 0.143
6.	Fuel and lighting	35812.267	35803.025	- 0.026
7.	Furniture	15612.744	15594.996	- 0.113
8.	Education	9477.375	9449.186	- 0.297
9.	Health/Medicare	17961.093	17955.904	- 0.029
10.	Misc. expenditure	55705.910	55592.524	- 0.203
	Total	625713.247	625211.299	- 0.087

As expected, consumption expenditure on all commodities has slightly gone down.

(v) Final demand and Value added

The relevant figures in respect of eighteen (18) commodities, including one composite commodity of imported material (sector 18), all expressed in Rs. million can be compared as under:

Final Demand (mp)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
1.	80775.177	80752.773	- 0.028
2.	120028.767	120016.625	- 0.010
3.	1400.045	1399.683	- 0.026
4.	136193.180	136133.797	- 0.043
5.	37254.532	37238.712	- 0.042
6.	16819.196	16807.657	- 0.068
7.	6512.197	6613.911	+1.562
8.	9780.014	9909.129	+1.320
9.	14655.930	14638.725	- 0.117
10.	10845.387	10842.588	- 0.026
11.	63310.269	64420.233	+1.753
12.	2802.920	2801.900	- 0.036
13.	21324.595	21250.446	- 0.348
14.	20009.885	20003.626	- 0.031
15.	67671.719	67574.471	- 0.144
16.	136238.650	136622.700	+0.282
17.	25619.618	25632.406	+0.050
18.	156015.033	157755.488	+1.115
Total	927257.115	930414.875	+0.340

A small increase in demand from sectors 7,8,11,16,17 and 18 is due to increase in investment. In other cases there is only negligible fall in final demands.

Value Added (fc)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
1.	125113.761	125123.329	+ 0.007
2.	89253.349	88298.688	- 1.069
3.	20143.338	19791.448	- 1.747
4.	25639.400	25476.492	- 0.635
5.	42033.529	42197.650	+ 0.390
6.	15917.738	15937.931	+ 0.126
7.	11161.038	11088.533	- 0.649
8.	19044.119	19135.323	+ 0.479
9.	11348.835	11351.336	+ 0.022
10.	28817.778	28783.733	- 0.118
11.	32207.136	32647.038	+ 1.366
12.	96853.105	96683.601	- 0.175
13.	58322.273	58423.416	+ 0.173
14.	22528.084	22554.162	+ 0.115
15.	68758.354	68675.085	- 0.121
16.	69856.926	70046.962	+ 0.272
17.	25455.808	25463.330	+ 0.029
18.	71323.000	70619.772	- 0.986
Total	833777.575	833297.831	- 0.057

In this case we note a mixed response, however, small.

8.2.6 Fiscal Model-6: Expenditure-cut policy:

Under this option, we try to apply a cut in Govt. consumption expenditure (excluding debt servicing) sufficient enough to eliminate the deficit on revenue account at the margin. The said option has also been advised by the international donor agencies and it is being implemented under the notion of downsizing. The methodology we follow is simple and straight forward. In this regards we have the following information:

Govt. consumption expenditure (base year):	Rs. 129562 m,
Revenue account deficit:	Rs. 20720 m,
Target net expenditure to exclude the deficit:	Rs. 108842 m,
Percent expenditure cut: $15.9923 = (20720/129562)$ or 16% approx. ⁷	

Therefore, the proposed expenditure ought to be about 84% of the existing volume. This is too much and cannot be considered a viable option keeping in view the strategic political situation of the country. Further it will generate unemployment

⁷ The computer uses a multiple 0.827 which implies an expenditure cut of 17.3% of the existing volume.

of resources and hardships for the general masses particularly in the social sector. Anyhow, we examine this option for the sake of completion.

Let's examine the results shown in the computer print out(annexed as Fiscal- 6).

(i) Government Revenue and Expenditure

A comparison of model (benchmark) and revised (post policy) values is as under. All figures are expressed in Rs. million:

<u>Item</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
Gross Revenues	144871.783	147032.372	+ 14.491
Tax Revenues	109217.242	111088.002	+ 1.713
Commod. Tax	93476.373	95180.931	+ 1.823
Income Tax (personal)	3495.018	3661.221	+ 4.755
Income Tax (corporate)	10841.958	10841.958	00
Property Tax	1403.891	1403.891	00
Non-Tax Revenues	35654.541	35944.370	+ 0.813
Share in Profits	20220.295	20220.295	00
Sale of services	15434.246	15724.075	+ 1.878
Current Expenditure	165592.893	147028.379	- 11.211
Public consumption	129560.073	110095.364	- 15.023
Debt servicing	36032.820	36933.015	+ 2.498
Revenue account gap	- 20721.110	+ 3.993	- 100.019

The above figures reveal that only about 15% reduction in public expenditure could be effective as against 16% proposed and 17.3% implemented. However this is accompanied by nearly 14.5% increase in gross revenues, the major part of which is contributed by increase in personal income tax. This auxiliary increase in revenues may be the result of relieving part of scarce resources previously hired by the government and subsequently its efficient utilization in the private sector. This element has led to an increase in the household incomes, expenditure as well as to resultant revenues. As usual, the deficit on revenue account has been eliminated by 100% along with a minor surplus.

(ii) Saving and Investment

Following is the comparison on aggregate basis:

<u>Item</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
Gross saving	82406.968	88316.908	+ 7.171
Household saving	69566.918	75476.858	+ 8.495
Corporate saving	12840.050	12840.050	00
Gross Investment	155047.887	166167.379	+ 7.171
Capital account gap	- 72640.918	- 77850.471	+ 7.171
Public saving	- 20721.110	+ 3.993	+100.019
Foreign capital (T.Deficit)	71323.000	72768.544	+ 2.026
Resource gap	- 22039.028	- 5077.934	- 76.957*

* The overall resource gap has been reduced by nearly 77%.

(iii) Household Income, consumption and saving

The results for different households (expressed in Rs.) can be compared as under:

<u>Item</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
1. <u>Disposable Income</u>				
a. Benchmark	16996.106	36719.571	66463.420	172787.282
b. Revised case	17522.343	37429.146	68496.106	176094.565
c. % Change	+ 3.096	+ 1.932	+ 3.058	+ 1.914
2. <u>Expenditure</u>				
a. Benchmark	21068.000	36489.455	55500.158	102674.885
b. Revised case	21068.000	37194.583	57197.549	104640.163
c. % Change	00	+ 1.932	+ 3.058	+ 1.914
3. <u>Saving</u>				
a. Benchmark	- 4071.894	230.116	10963.262	70112.396
b. Revised case	- 3545.656	234.563	11298.557	71454.402
c. % Change	+ 12.923	+ 1.932	+ 3.058	+ 1.914
4. <u>Utility levels</u>				
a. Benchmark	4063.503	6582.174	10994.300	24979.422
b. Revised case	4063.503	6709.356	11330.510	25457.499
c. HEV (Rs.)	00	+ 709.502	+ 2032.477	+ 3306.947
d. Aggreg. HEV (Rs.m)	00	+ 4530.312	+ 5296.838	+ 3215.675
e. Social Welfare effects (overall)	= + 13042.825			

Due to relaxation in public consumption and alternative better utilization of the resources in the private sector, there is an auxiliary increase in revenues due to which the social security transfers have slightly gone up. These effects have lead to a rise in disposable incomes, saving, expenditure and the utility levels of all households. An indirect effect of the policy change on the poorer group can be seen in terms of about 13% reduction in their debt burden.

(iv) Aggregate Consumption demand

The results for household consumption in respect of ten (10) commodities are as under. All figures are in Rs. million.

<u>Commodity</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
1. Food	305642.973	310758.327	+ 1.673
2. Clothing/Footwear	48799.049	49625.423	+ 1.693
3. Transpt/Communic.	26299.484	26799.147	+ 1.900
4. Personal appearance	27270.432	27727.803	+ 1.677
5. Housing	83131.930	84638.513	+ 1.812
6. Fuel and lighting	35812.267	36383.962	+ 1.596
7. Furniture	15612.744	15906.742	+ 1.883
8. Education	9477.375	9666.356	+ 1.994
9. Health/Medicare	17961.093	18270.812	+ 1.724
10. Misc. expenditure	55705.910	56773.158	+ 1.916
Total	625713.247	636550.283	+ 1.737

The above figure depict a somewhat regular pattern of increase in consumption of consumer goods ranging from 1.6 to 1.9% .

(v) Final demand and Value added

The relevant figures in respect of eighteen (18) commodities, including one composite commodity of imported material (sector 18), all expressed in Rs. million can be compared as under:

Final Demand (mp)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
1.	80775.177	82121.204	+ 1.666
2.	120028.767	122178.815	+ 1.791
3.	1400.045	1422.395	+ 1.596
4.	136193.180	138502.877	+ 1.696
5.	37254.532	37887.528	+ 1.699
6.	16819.196	17111.514	+ 1.738
7.	6512.197	6898.411	+ 5.930
8.	9780.014	10302.943	+ 5.347
9.	14655.930	14925.633	+ 1.840
10.	10845.387	11018.519	+ 1.596
11.	63310.269	67357.484	+ 6.392
12.	2802.920	2849.864	+ 1.675
13.	21324.595	21729.741	+ 1.900
14.	20009.885	20068.797	+ 0.294
15.	67671.719	68898.120	+ 1.812
16.	136238.650	118379.194	-13.109
17.	25619.618	24602.189	- 3.971
18.	156015.033	163493.670	+ 4.793
Total	927257.115	929748.902	+ 0.269

It is evident from the above that there is somewhat uniform increase in the final demand of consumption oriented sectors ranging from 1.6 to 1.9%. A comparatively moderate increase in final demand for sectors 7,8,11 and 18 is due to increase in investment. As expected, the final demand from sectors 16, mainly contributing to public consumption has drastically gone down. Same is the case with sector 17.

Value Added (fc)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
1.	125113.761	127077.620	+ 1.569
2.	89253.349	90626.796	+ 1.539
3.	20143.338	20456.244	+ 1.553
4.	25639.400	26017.861	+ 1.476
5.	42033.529	42792.653	+ 1.806
6.	15917.738	16087.017	+ 1.063
7.	11161.038	11594.519	+ 3.884
8.	19044.119	19153.148	+ 0.572
9.	11348.835	11488.562	+ 1.231
10.	28817.778	29078.223	+ 0.903
11.	32207.136	33704.874	+ 4.650
12.	96853.105	97992.983	+ 1.177

13.	58322.273	58762.773	+ 0.755
14.	22528.084	22675.767	+ 0.655
15.	68758.354	69543.031	+ 1.141
16.	69856.926	60716.742	-13.084
17.	25455.808	24371.128	- 4.261
18.	71323.000	72768.544	+ 2.027
Total	833777.575	834908.488	+ 0.135

The above simulations highlight the common economic wisdom, which is true both for individuals and the society as a whole, that expenditure should be within the means and resources and that a balanced budget is the best economic policy. However, adopting of a balanced budget policy may not be always feasible due to extra ordinary circumstances like those in which this indebted nation is trapped.

8.2.7 Fiscal Model-7: Tax cum Expenditure policy-mix:

Under this option, we propose a 5% cut in public consumption, 10% increase in commodity taxation, 50% increase in personal income tax and sufficient enough proportionate increase in other direct taxes so as to achieve the objective. All these proposals seem feasible from social point of view as well as convenient to administer.

In this regards we have the following information:

Govt. Consumption (excluding debt servicing) Rs. 129562 m,

Revenue from personal income taxation :	Rs. 3495 m,
Revenue from indirect taxes at prevailing rates:	Rs. 93480 m,
Revenue from other direct taxes :	Rs. 12246 m
Total available revenues:	Rs. 109221 m,
Deficit on revenue account:	Rs. 20720 m,

Next we proceed as under:

Expected saving due to expenditure cut of 5%	Rs. 6478.1 m,
Expected additional revenue from indirect taxes:	Rs. 9348.0 m,
Expected additional revenue from income tax (p):	Rs. 1747.5 m,
Total additional revenues:	Rs.17573.6 m,
Gap/difference (20720 - 17573.6):	Rs. 3146.4 m,
Target revenue from other direct taxes :	Rs.15392.4 m,
Ratio of target to prevailing revenue: (15392/12246) = 1.26 approx. ⁸	

Therefore other direct taxes should be raised by this ratio.

⁸ The computer uses a multiple 1.52 which implies a revised rate of corporation income tax equal to 0.129341 and of property tax equal to 0.039318 so as to eliminate the deficit at the margin. The existing rate of personal income tax is raised by a multiple 1.50 to give the new rate of 0.019031 or about 1.9%.

The first two options are not only feasible but have in fact been administered by the present and past governments from time to time. The PPP Government (1993-96) introduced a generalized sales tax on commodity of daily use and tried to reduce the budget deficit. The present ML Government (March 1997 onwards) is following restrictive policy towards the size of public sector via privatization and down sizing. Other ingredients of the policy will demand bold administrative measures. The real issue, however, is that of control on corruption and inefficiency in the administration.

Let's examine the results shown in the computer print out(annexed as Fiscal- 7).

(i) Government Revenue and Expenditure

A comparison of model (benchmark) and revised (post policy) values is as under. All figures are expressed in Rs. million:

<u>Item</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
Gross Revenues	144871.783	161394.374	+ 11.405
Tax Revenues	109217.242	126452.520	+ 15.780
Commod. Tax	93476.373	102495.265	+ 9.648
Income Tax (personal)	3495.018	5343.563	+ 52.891
Income Tax (corporate)	10841.958	16479.777	+ 52.000
Property Tax	1403.891	2133.915	+ 52.000
Non-Tax Revenues	35654.541	34941.854	- 1.999
Share in Profits	20220.295	19420.948	- 3.953
Sale of services	15434.246	15520.906	+ 0.561
Current Expenditure	165592.893	161378.119	- 2.545
Public consumption	129560.073	124445.103	- 3.948
Debt servicing	36032.820	36933.015	+ 2.498
Revenue account gap	- 20721.110	+ 16.255	- 100.078

The above figures reveal that 9.65% of additional revenues could be realized from commodity taxation which is nearer to the proposed target of 10% . Similarly, factual revenues from personal income taxation increased by 53% as against 50% proposed, while that from corporate and property income is exactly 52%. On the other hand, actual reduction in public consumption expenditure is nearly 4% as compared to 5% proposed. As usual, the budget deficit has been eliminated altogether along with a minor surplus which is a positive sign.

(ii) Saving and Investment

Following is the comparison on aggregate basis:

<u>Item</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
Gross saving	82406.968	85243.095	+ 3.441
Household saving	69566.918	72403.045	+ 4.077
Corporate saving	12840.050	12840.050	00
Gross Investment	155047.887	160384.030	+ 3.441

Capital account gap	- 72640.918	- 75140.935	+ 3.441
Public saving	- 20721.110	+ 16.255	+ 100.078
Foreign capital (T.Deficit)	71323.000	70887.775	- 0.610
Resource gap	- 22039.028	- 4236.905	- 80.775*

* The overall resource gap has been reduced by nearly 81%.

(iii) Household Income, consumption and saving

The results for different households (expressed in Rs.) can be compared as under:

<u>Item</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
1. <u>Disposable Income</u>				
a. Benchmark	16996.106	36719.571	66463.420	172787.282
b. Revised case	17399.363	36983.377	67298.310	172413.074
c. % Change	+ 2.372	+ 0.718	+ 1.256	- 0.216
2. <u>Expenditure</u>				
a. Benchmark	21068.000	36489.455	55500.158	102674.885
b. Revised case	21068.000	36752.145	56222.765	102610.289
c. % Change	00	+ 0.720	+ 1.302	- 0.063
3. <u>Saving</u>				
a. Benchmark	- 4071.894	230.116	10963.262	70112.396
b. Revised case	- 3668.636	231.232	11075.545	69802.785
c. % Change	+ 9.903	+ 0.485	+ 1.024	- 0.441
4. <u>Utility levels</u>				
a. Benchmark	4063.503	6582.174	10994.300	24979.422
b. Revised case	4045.262	6599.412	11080.994	24811.546
c. HEV (Rs.)	- 76.295	+ 96.164	+ 524.088	- 1161.229
d. Aggreg. HEV (Rs.m)	- 536.834	+ 614.026	+ 1365.825	- 1129.179
e. Social Welfare effects (overall)	= +313.838			

The income levels of the households except the high-income group have slightly gone up partly due to (indirect) increase in factor prices and partly due to compensatory transfers. A mixed reaction from various groups regarding consumption and utility levels has been observed. The middle income group is benefitting most from the policy change. An indirect benefit to the poorer households can be seen in terms of about 10% reduction in their debt burden. The overall welfare effect is positive, however, much smaller as compared to all previous policies.

(iv) Aggregate Consumption demand

The results for household consumption in respect of ten (10) commodities are as under. All figures are in Rs. million.

<u>Commodity</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
1. Food	305642.973	307369.253	+ 0.565
2. Clothing/Footwear	48799.049	49075.534	+ 0.566
3. Transpt/Communic.	26299.484	26426.632	+ 0.483
4. Personal appearance	27270.432	27421.976	+ 0.556
5. Housing	83131.930	83593.446	+ 0.555
6. Fuel and lighting	35812.267	36005.175	+ 0.538

7.	Furniture	15612.744	15705.698	+ 0.595
8.	Education	9477.375	9528.675	+ 0.541
9.	Health/Medicare	17961.093	18065.732	+ 0.582
10.	Misc. expenditure	55705.910	56018.831	+ 0.562
	Total	625713.247	629210.952	+ 0.561

As expected, consumption expenditure has slightly gone up for all composite goods due to commodity taxation whereas the increment is very much uniform.

(v) Final demand and Value added

The relevant figures in respect of eighteen (18) commodities, all expressed in Rs. million can be compared as under:

Final Demand (mp)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
1.	80775.177	81229.417	+ 0.562
2.	120028.767	120764.475	+ 0.613
3.	1400.045	1407.586	+ 0.538
4.	136193.180	136962.350	+ 0.565
5.	37254.532	37465.562	+ 0.566
6.	16819.196	16914.587	+ 0.567
7.	6512.197	6692.802	+ 2.773
8.	9780.014	10020.507	+ 2.459
9.	14655.930	14740.697	+ 0.578
10.	10845.387	10903.807	+ 0.538
11.	63310.269	65223.547	+ 3.022
12.	2802.920	2818.643	+ 0.561
13.	21324.595	21427.691	+ 0.483
14.	20009.885	20027.159	+ 0.086
15.	67671.719	68047.406	+ 0.555
16.	136238.650	131556.010	- 3.437
17.	25619.618	25368.550	- 0.980
18.	156015.033	159405.191	+ 2.173
Total	927257.115	930975.991	+ 0.401

A moderately small increase in demand from sectors 7,8,11, and 18 is due to increase in investment. In other cases there is only negligible increase in final demands except in case of sector 16 and 17 where it has gone down due to reduction in public consumption.

Value Added (fc)

<u>Sector</u>	<u>Benchmark</u>	<u>Revised</u>	<u>% Change</u>
1.	125113.761	125765.869	+ 0.521
2.	89253.349	89766.700	+ 0.575
3.	20143.338	19858.977	- 1.412
4.	25639.400	25607.592	- 0.124
5.	42033.529	42370.303	+ 0.801
6.	15917.738	15982.739	+ 0.408
7.	11161.038	11175.879	+ 0.133
8.	19044.119	19137.587	+ 0.491
9.	11348.835	11393.887	+ 0.397
10.	28817.778	28855.430	+ 0.130

11.	32207.136	32916.653	+ 2.203
12.	96853.105	97036.962	+ 0.190
13.	58322.273	58538.846	+ 0.371
14.	22528.084	22596.971	+ 0.306
15.	68758.354	69002.413	+ 0.355
16.	69856.926	67454.148	- 3.439
17.	25455.808	25166.968	- 1.134
18.	71323.000	70887.775	- 0.610
Total	833777.575	833515.703	- 0.031

The above figures reveal a mixed reaction towards the policy in terms of value added. In most cases it has slightly increased whereas in a few cases it has gone down. In particular the fall in value added in sectors 16 and 17 is due to expenditure cut in public consumption.

8.3 An Appraisal of Fiscal Reforms

We tried a few fiscal options with the unique objective of eliminating the deficit on the revenue account of the federation at the margin. The fiscal models at hand can be evaluated and compared in terms of their impacts on micro and macro indicators. Since all the policies succeed in attaining the basic objective, there is need to set criteria for value judgement on the basis of which we may choose the best one. We had pointed out to this aspect at the very beginning. A policy may be regarded as the best which is the least pinching; in other words, which has the minimum welfare costs and at the same time it is feasible to implement. In this connection we may compare the fiscal policies under considerations in terms of their impacts (percent change) on a few micro and macro indicators like household incomes, welfare effects, change in investment, value added and feasibility etc. with benchmark figures as the departure point.

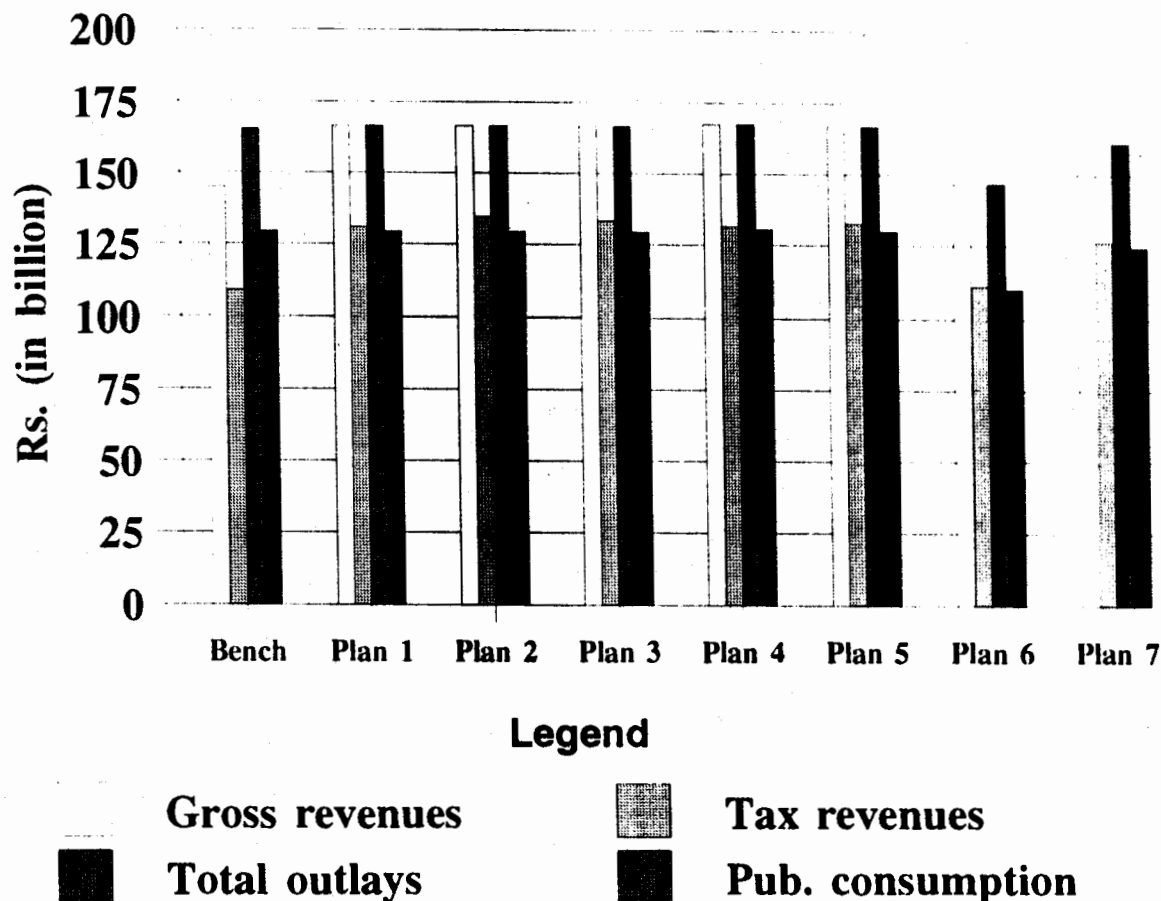
8.3.1 Fiscal indicators

Following is an account of the key budgetary variables under different plans/fiscal models to facilitate comparison at a glance. The relevant values are expressed in Rs. million while their percent deviations from the benchmark are shown in parentheses:

<u>Variable</u>	<u>Bench</u>	<u>Fiscal 1</u>	<u>Fiscal 2</u>	<u>Fiscal 3</u>	<u>Fiscal 4</u>	<u>Fiscal 5</u>	<u>Fiscal 6</u>	<u>Fiscal 7</u>
Gross revenues	144872	166609 (15.00)	166639 (15.02)	166616 (15.01)	167584 (15.67)	166935 (15.23)	147032 (14.49)	161394 (11.40)
Tax revenues	109217	131071 (20.01)	134652 (23.29)	133393 (22.13)	131816 (20.69)	132762 (21.56)	111088 (1.71)	126452 (15.78)

Total outlays	165593	166554	166587	166571	167554	166934	147028	161378
		(0.58)	(0.60)	(0.59)	(1.18)	(0.81)	(- 11.21)	(- 2.54)
Public consump	129560	129621	129654	129638	130621	130001	110095	124445
		(0.05)	(0.07)	(0.06)	(0.82)	(0.34)	(- 15.02)	(- 3.95)

Figure 8.1 Behaviour of Fiscal Indicators



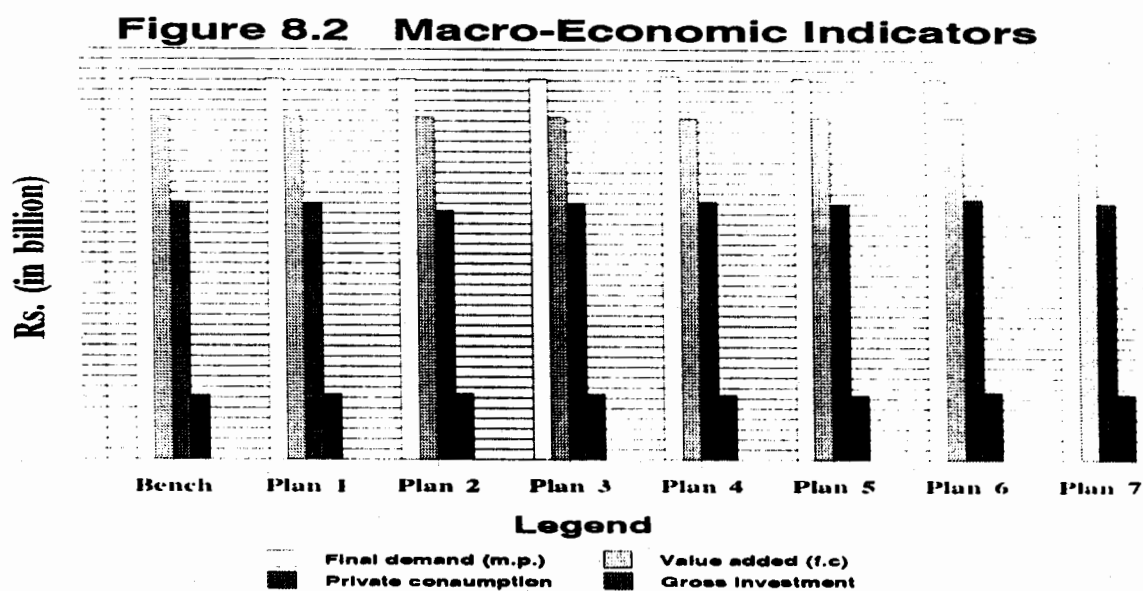
From the above statement, as also depicted in Figure - 8.1, we get an indication that Fiscal model-4 (which advises to increase commodity taxation proportionately) seems to fetch highest revenues, although it may not be efficient and/or feasible as noted earlier. It is therefore advisable to look into other socioeconomic indicators to evaluate the desirability of a policy.

8.3.2 Macro-economic indicators

Next we compare the alternative policy options in terms of their effects on key macro indicators. As before, all the figures are expressed in Rs. million whereas those in parentheses represent the percent deviations of the variable from the reference/benchmark values.

Variable	Bench	Fiscal 1	Fiscal 2	Fiscal 3	Fiscal 4	Fiscal 5	Fiscal 6	Fiscal 7
Private consump	625713	623069	606499	622504	629808	625211	636550	629211
		(- 0.42)	(- 3.07)	(- 0.51)	(0.65)	(- 0.08)	(1.73)	(0.56)
Gross investment	155048	158066	159432	158736	157486	158266	166167	160384
		(1.95)	(2.83)	(2.38)	(1.57)	(2.07)	(7.17)	(3.44)
Final demand (mp)	927257	927692	927927	927814	934851	930415	929749	930976
		(0.05)	(0.07)	(0.06)	(0.82)	(0.34)	(0.27)	(0.40)
Value added (fc)	833778	834052	834208	834134	831907	833298	834908	833516
		(0.03)	(0.05)	(0.04)	(- 0.22)	(- 0.06)	(0.13)	(- 0.03)

The comparative position of the alternative schemes is shown in Figure-8.2.



As evident from the above, Model 6 (which proposes a drastic reduction in the public consumption expenditure) guarantees better performance. This is due to the fact that scarce resources released on account of reduction in public consumption are better utilized towards alternative ends in the private sector. This result highlights the significance of privatization and denationalization policies. However, as noted earlier, an abrupt and massive reduction in public expenditure may not be socially advisable. This may become clear from the next section.

8.3.3 Micro-economic indicators

In this section we compare the disposable income, consumption expenditure, saving and utility levels of the households under various policy options to assess the

efficiency and feasibility of the policies. All figures are expressed in terms of percent deviation from the benchmark values.

<u>Variable</u>	<u>Fiscal 1</u>	<u>Fiscal 2</u>	<u>Fiscal 3</u>	<u>Fiscal 4</u>	<u>Fiscal 5</u>	<u>Fiscal 6</u>	<u>Fiscal 7</u>
<u>Disposable income</u>							
Group 1	3.75	3.44	3.28	0.99	2.42	3.09	2.37
Group 2	0.97	- 0.60	- 0.17	0.62	0.12	1.93	0.72
Group 3	- 0.64	0.19	0.05	0.98	0.39	3.06	1.25
Group 4	- 3.98	- 2.68	- 2.89	0.62	- 1.59	1.91	0.21
<u>Consumption Expenditure</u>							
Group 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Group 2	0.97	- 0.60	- 0.17	0.63	0.12	1.93	0.72
Group 3	- 0.64	0.19	0.05	1.11	0.44	3.06	1.30
Group 4	- 3.98	- 2.68	- 2.89	1.03	- 1.44	1.91	0.06
<u>Household Saving</u>							
Group 1	15.65	14.35	13.65	14.16	10.12	12.92	9.90
Group 2	0.97	- 0.60	- 0.17	- 0.01	- 0.11	1.93	0.48
Group 3	- 0.64	0.19	0.05	0.36	0.17	3.06	1.02
Group 4	- 3.98	- 2.68	- 2.89	0.00	- 1.81	1.91	0.44
<u>Utility levels (HEV)</u>							
Group 1	0.00	0.00	0.00	- 207.64	- 76.29	0.00	- 76.29
Group 2	354.87	- 221.92	- 61.63	- 227.20	- 120.85	709.50	96.16
Group 3	- 423.66	126.91	31.71	- 188.57	- 43.94	2032.5	524.09
Group 4	- 6877.4	- 4632.5	- 4996.5	- 1093.1	- 3426.8	3306.9	- 1161.3
Agg. welfare effects	- 5525.7	- 5591.0	- 5026.4	- 4466.1	- 4849.8	13042.8	313.84

A superficial inspection of the table reveals that Fiscal model- 6 provides better results since all the entries are positive for all groups. However, as noted before, a drastic expenditure cut to a degree of nearly 17% in the public sector may not be socially feasible and economically viable. On the other hand, all the preceding plans (from 1 to 5) are inefficient so far as their welfare effects are concerned. A careful examination of the statement however, shows that tax expenditure mix policy, with 5% cut in public consumption, a 10% increase in commodity taxation and nearly 50% increase in direct taxes (Plan 7), is the second best. It not only succeeds in achieving the target of eliminating budget deficit at the margin but is the least costly

Figure 8.3(a)

Income and Consumption Patterns (Rs per annum)

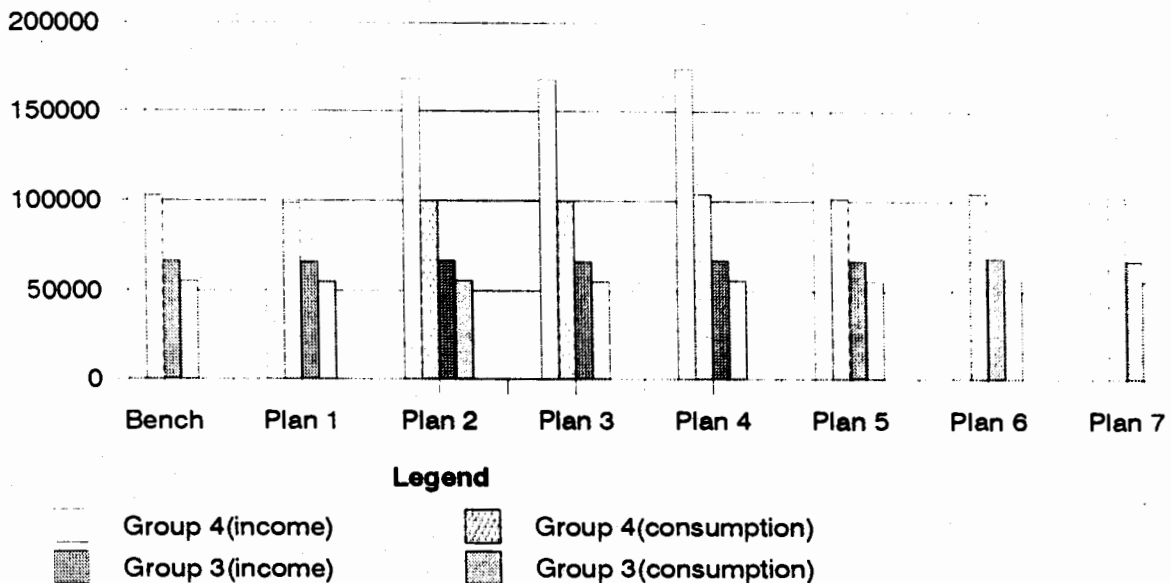
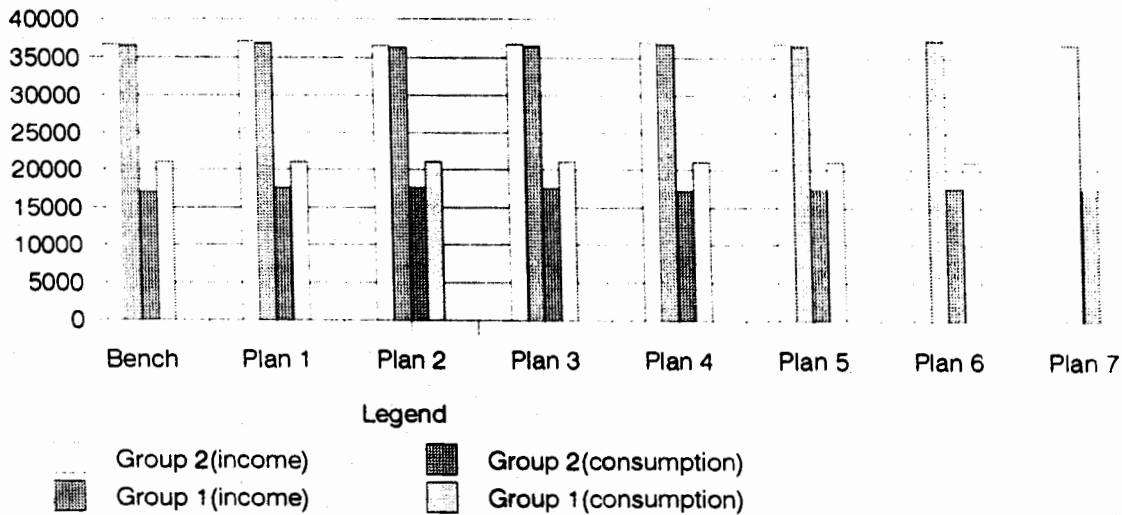


Figure 8.3(b)

and more likely to be feasible. It promises a respectable increase in the revenues, private consumption, gross investment and final demand/ GDP. There is a tolerable reduction in the volume of public expenditure and a negligibly small decrease in the value added (fc). Further it leaves a favourable effect on the income and utility levels of the poor and middle-income groups. Although the high income group is hurt a bit little, however it bears a moderate but positive welfare effect on the society as a

whole. Figure 8.3 further clarifies the position in terms of household income and consumption. The comparative statement, in summary form, is shown in Table- 8.1.

8.4 Concluding Remarks

Any government, whether secular in traditions or oriented to some ideology, cannot cope for long with persistent budget and trade deficits. In particular, the deficit on the revenue account of the annual budget cannot be tolerated. In developing countries, foreign assistance may be advisable to finance the development projects and to build up the infra structure. In other words, borrowing from domestic and international sources for short or medium terms may be essential to fill the saving-investment gap/ to finance the capital budget. Even this exercise cannot be carried out for ever. Eventually the debt burden will reach a level which may not be sustainable any more.

The foreign indebtedness of Pakistan has reached this level by now and the situation is posing sever problems as discussed in the introductory chapter. Sooner or later, the government will be compelled to take bold steps and devise appropriate policies so as to mend the situation and to save the nation from bankruptcy. The fiscal models we have proposed in this document indicate the possible short-run measures to eliminate the deficits on revenue account at least. In fact, the government has started to work in this direction. However, the emphasis is on down sizing and enhancement of commodity taxation since 1997. This has resulted into widespread unemployment along with high inflation leading to unrest in the society. Although, the government has introduced taxation on agriculture in some parts of the country, yet the outcome is not clear. No effective measures have so far been taken to extract sizeable revenues from personal and corporate incomes, properties and capital assets, since the business community enjoys social and political power and often involved in money laundering and tax evasion practices. As such, there is urgent need for very bold and strict measures to mend the situation.

So far as the matter of outstanding foreign debt is concerned, it needs passionate and effective measures in the long run including self reliance and mobilization of domestic savings, curtailment of luxurious imports and encouragement of value-added exports. However, the picture of the economy in the long run may be different under different perspectives and socio-political states. This is the subject of our concern in the next chapter.

Table-8.1 Evaluation of Fiscal Policies that Eliminate Deficit on Revenue Budget

Indicators	Fiscal-1	Fiscal-2	Fiscal-3	Fiscal-4	Fiscal-5	Fiscal-6	Fiscal-7
Policy statement	Total Increase in personal income tax	Total Increase in corporate income tax	Proportionate increase in all direct taxes	Total increase in commodity taxes	Tax policy mix, increase in all taxes, direct and indirect.	Total cut in public consumption expenditure	Tax-Expenditure policy mix @
H.Hold Incomes group-1	+ 3.751	+ 3.438	+ 3.278	+ 0.996	+ 2.425	+ 3.096	+ 2.372
group-2	+ 0.966	- 0.604	- 0.168	+ 0.622	+ 0.125	+ 1.932	+ 0.718
group-3	- 0.637	+ 0.191	+ 0.048	+ 0.984	+ 0.397	+ 3.058	+ 1.256
group-4	- 3.980	- 2.681	- 2.891	+ 0.616	- 1.590	+ 1.914	- 0.216
HEV group-1	00	00	00	- 207.642	- 76.295	00	- 76.295
group-2	+ 354.874	- 221.924	- 61.627	- 227.201	- 120.850	+ 709.502	+ 96.164
group-3	- 423.658	+ 126.908	+ 31.713	- 188.570	- 43.937	+ 2032.477	+ 524.088
group-4	- 6877.376	- 4632.556	- 4996.545	- 1093.136	- 3524.105	+ 3306.947	- 1161.229
Aggr. welfare	- 5525.714	- 2028.918	- 5026.459	- 4466.149	- 4849.829	+ 13042.825	+ 313.838
Total Revenue	+ 15.004	+ 15.025	+ 15.009	+ 15.677	+ 15.229	+ 14.491	+ 11.405
Total Budget	+ 0.580	+ 0.600	+ 0.590	+ 1.184	+ 0.810	- 11.211	- 2.545
Gross Investmt	+ 1.947	+ 2.828	+ 2.378	+ 1.572	+ 2.076	+ 7.171	+ 3.441
Value added(tc)	+ 0.033	+ 0.051	+ 0.043	- 0.224	- 0.057	+ 0.135	- 0.031
Remarks	Difficult to implement	Difficult to implement	Difficult to implement	Inflationary and costly	Feasible but more costly	Best policy, not feasible	Feasible, least costly

Note: All the figures are shown in terms of percent deviations from the benchmark configuration of 1989-90.

@ : Indicates an increase of about 50% in all direct taxes and 10% in commodity taxes alongwith an expenditure cut of 5% .

Intermediate results
 small =6286.46474 0.100000 0.100000 0.800000
 X-Demd=6286.46474 -2075.1601 -4211.3046 -344.78102

Intermediate results
 small =799.575714 0.085000 0.085000 0.830000
 X-Demd=799.575714 57.684441 -857.26015 0.000000

Intermediate results
 small = 81.852241 0.083000 0.083000 0.834000
 X-Demd= 81.852241 400.310073 -318.45783 0.000000

Intermediate results
 small = 8.197490 0.083200 0.083200 0.833600
 X-Demd= 8.197490 365.306252 -373.50374 0.000000

Intermediate results
 small = 0.787997 0.083180 0.083180 0.833640
 X-Demd= 0.787997 368.799059 -368.01106 0.000000

Intermediate results
 small = 0.110746 0.083182 0.083182 0.833636
 X-Demd= 0.110746 368.449703 -368.56045 0.000000

Intermediate results
 small = 0.001594 0.083182 0.083182 0.833637
 X-Demd= 0.001594 368.493372 -368.49178 0.000000

Final results
 fsmall= 0.001594 0.083182 0.083182 0.833637
 Normal= 1.000000 1.000000 10.021868
 X-Demd= 0.001594 368.493372 -368.49178 0.000000

Price-M = 1.010363 1.001205 1.307201 1.073040 1.018402 1.023619
 dito--M = 1.217279 1.022979 1.022943 1.044946 1.021646 1.040476
 dito--M = 1.019595 1.001018 1.004988 1.001004 1.015841 1.222880

Price-C = 1.044280 1.066039 1.016117 1.083503 1.010769
 dito--C = 1.032711 1.080833 1.049792 1.061639 1.107582
 Pr:Inv-AR= 1.140898 0.438251

TR-Tax-Gross=364892.785 131070.714 166608.863
 Detail-Rev=93800.4464 25024.4175 10841.9586 1403.89151
 Nontax-Rev=20220.2946 15317.8549 35538.1495
 Budget-Dtser=129620.925 36933.0155 166553.941
 Dbgt-Rev-Def=74055.1133 71711.2971 -2343.8161
 Crnt-Dev-Gap= 54.922803 -2343.8161 -2288.8933

Saving:HH =-3434.3692 232.340072 10893.3884 67321.7774
 --dito--Agg= 0.000000 1483.53783 28389.2595 41298.4441
 Saving -Agg=71171.2414 12840.0500 84011.2914 74055.1133
 G.Income:HH=16811.3609 36894.9513 70782.7958 186061.921
 Disp inc:HH=17633.6308 37074.4668 66039.8197 165909.989
 Expend: HH=21068.0000 36842.1267 55146.4314 98588.2120
 Util-V-HH =4063.50349 6645.78743 10924.2195 23985.1767

Consump-Agg=304868.935 48657.0710 25977.9329 27184.3791 82613.7662
 --dito-- =35738.7113 15520.0157 9373.42184 17905.2175 55229.9580

Final Demnd=80574.2413 119695.696 1397.16918 135774.253 37140.7719 16750.6309
 --dito-- =6600.20425 9884.79426 14571.2193 10823.1113 64306.3053 2795.18007
 --dito-- =21063.8691 19983.6131 67249.9189 136178.998 25539.2579 157363.397

Investm- DD=2334.16660 5096.53508 6564.33972 55161.5397 88909.8236 158066.405
 NMC-Govt.DD=16934.9194 129620.925 120861.143 8759.78212 927692.630

V.A (fc) =124935.248 89067.4583 20201.0015 25580.7702 42159.3047
 -dito-VA =15926.4834 11256.9523 19124.3963 11336.5010 28831.6899
 -dito-VA =32652.5448 96789.2713 58310.9422 22520.7075 68404.0048
 -dito-VA =69826.4522 25416.5705 71711.2971 834051.596

Exports/Imports = 134806.286

Intermediate results						
small =5999.50278	0.100000	0.100000	0.800000			
X-Demd=5999.50278	-1741.6007	-4257.9020	-1.016075			

Intermediate results						
small =212.332335	0.085000	0.085000	0.830000			
X-Demd=212.332335	496.240382	-708.57272	0.000000			

Intermediate results						
small = 15.958412	0.084500	0.084500	0.831000			
X-Demd= 15.958412	584.518138	-568.55973	0.000000			

Intermediate results						
small = 6.992166	0.084550	0.084550	0.830900			
X-Demd= 6.992166	575.643378	-582.63554	0.000000			

Intermediate results						
small = 0.109843	0.084535	0.084535	0.830930			
X-Demd= 0.109843	578.304704	-578.41455	0.000000			

Intermediate results						
small = 0.004883	0.084535	0.084535	0.830931			
X-Demd= 0.004883	578.349067	-578.34418	0.000000			

Final results						
fsmall= 0.004883	0.084535	0.084535	0.830931			
Normal= 1.000000	1.000000	9.829455				
X-Demd= 0.004883	578.349067	-578.34418	0.000000			

Price-M = 1.010363	1.001205	1.307201	1.073040	1.018402	1.023619	
dito--M = 1.217279	1.022979	1.022943	1.044946	1.021646	1.040476	
dito--M = 1.019595	1.001018	1.004988	1.001004	1.015841	1.222880	

Price-C = 1.044280	1.066039	1.016117	1.083503	1.010769		
dito--C = 1.032711	1.080833	1.049792	1.061639	1.107582		
Pr:Inv-AR= 1.140898	0.438251					

TR-Tax-Gross=357887.136	134652.537	166639.089				
Detail-Rev=93957.6103	3424.26164	35866.7733	1403.89151			
Nontax-Rev=16672.2021	15314.3499	31986.5520				
Budget-Dtser=129653.682	36933.0155	166586.698				
Dbgt-Rev-Def=74694.9938	71911.0450	-2783.9488				
Crnt-Dev-Gap= 52.391232	-2783.9488	-2731.5575				

Saving:HH =-3487.4577	228.725572	10984.2212	68232.7342			
--dito--Agg= 0.000000	1460.45853	28625.9789	41810.7118			
Saving -Agg=71897.1493	12840.0500	84737.1993	74694.9938			
G. Income:HH=16794.4964	35833.9854	68371.0712	176950.431			
Disp inc:HH=17580.5423	36497.7017	66590.4825	168154.981			
Expend: HH=21068.0000	36268.9761	55606.2613	99922.2470			
Util-V-HH =4063.50349	6542.39292	11015.2927	24309.7056			

Consump-Agg=304048.629	48535.4502	26028.4648	27120.1296	82534.6291		
--dito-- =35631.1153	15506.1725	9384.10243	17867.0446	55249.5683		

Final Demnd=80355.0218	119437.398	1392.96282	135446.587	37050.6339	16720.1454	
--dito-- =6642.82589	9938.38883	14556.0182	10790.5270	64774.1741	2787.94234	
--dito-- =21104.8423	19984.6955	67185.4991	136206.036	25517.3832	158035.928	

Investm- DD=2354.33520	5140.57220	6621.05955	55638.1684	89678.0577	159432.193	
NMC-Govt.DD=16934.9194	129653.682	120891.686	8761.99583	927927.071		

V.A (fc) =124736.308	88917.1673	20227.7098	25533.4713	42214.9225		
-dito-VA =15932.4776	11307.2518	19166.9099	11339.0308	28824.6578		
-dito-VA =32863.5615	96719.6269	58384.6158	22527.4994	68350.3456		
-dito-VA =69840.3327	25411.0627	71911.0450	834207.996			

Exports/Imports=135179.776	207090.821					

Intermediate results
 small =6222.27662 0.100000 0.100000 0.800000
 X-Demd=6222.27662 -1930.9942 -4291.2824 -95.379082
 P-221
 Annexure 8.3
 (Fiscal -3)

Intermediate results
 small =513.689357 0.085000 0.085000 0.830000
 X-Demd=513.689357 279.369482 -793.05884 0.000000

Intermediate results
 small = 60.626875 0.084000 0.084000 0.832000
 X-Demd= 60.626875 454.795171 -515.42205 0.000000

Intermediate results
 small = 8.264557 0.083850 0.083850 0.832300
 X-Demd= 8.264557 481.469918 -473.20536 0.000000

Intermediate results
 small = 0.935205 0.083870 0.083870 0.832260
 X-Demd= 0.935205 477.907772 -478.84298 0.000000

Intermediate results
 small = 0.015426 0.083868 0.083868 0.832264
 X-Demd= 0.015426 478.263910 -478.27934 0.000000

Intermediate results
 small = 0.007569 0.083868 0.083868 0.832264
 X-Demd= 0.007569 478.272814 -478.26524 0.000000

Intermediate results
 small = 0.000670 0.083868 0.083868 0.832264
 X-Demd= 0.000670 478.270143 -478.26947 0.000000

Final results
 fsmall= 0.000670 0.083868 0.083868 0.832264
 Normal= 1.000000 1.000000 9.923504
 X-Demd= 0.000670 478.270143 -478.26947 0.000000

Price-M = 1.010363 1.001205 1.307201 1.073040 1.018402 1.023619
 dito--M = 1.217279 1.022979 1.022943 1.044946 1.021646 1.040476
 dito--M = 1.019595 1.001018 1.004988 1.001004 1.015841 1.222880
 Price-C = 1.044280 1.066039 1.016117 1.083503 1.010769
 dito--C = 1.032711 1.080833 1.049792 1.061639 1.107582
 Pr:Inv-AR= 1.140898 0.438251

TR-Tax-Gross=361314.644 133393.293 166616.499
 Detail-Rev=93879.3535 8776.85618 27213.3160 3523.76770
 Nontax-Rev=17899.1150 15324.0903 33223.2052
 Budget-Dtser=129637.885 36933.0155 166570.901
 Dbgt-Rev-Def=74368.8812 71813.2608 -2555.6204
 Crnt-Dev-Gap= 45.598085 -2555.6204 -2510.0223

Saving:HH =-3514.6961 229.729795 10968.4935 68084.9318
 --dito--Agg= 0.000000 1466.87069 28584.9909 41475.3316
 Saving -Agg=71527.1932 12840.0500 84367.2432 74368.8812
 G.Income:HH=16757.3996 36105.3829 69018.3307 179441.915
 Disp inc:HH=17553.3039 36657.9454 66495.1351 167790.732
 Expend: HH=21068.0000 36428.2156 55526.6417 99705.8003
 Util-V-HH =4063.50349 6571.12724 10999.5464 24257.0839

Consump-Agg=304392.141 48588.4424 26033.0812 27148.8224 82599.4365
 --dito-- =35673.4500 15518.1847 9387.67175 17884.9873 55277.8937

Final Demnd=80446.2464 119551.666 1394.61786 135591.959 37090.5393 16735.9850
 --dito-- =6621.55816 9912.07776 14567.6989 10803.3476 64538.4359 2791.03308
 --dito-- =21108.5855 19986.2591 67238.2541 136201.047 25530.9499 157703.751

Investm- DD=2344.05635 5118.12886 6592.15251 55395.2565 89286.5302 158736.124
 NMC-Govt.DD=16934.9194 129637.885 120876.957 8760.92827 927814.012

V.A (fc) =124818.962 88983.1410 20214.1926 25554.3344 42186.4877
 -dito-VA =15929.7789 11282.7138 19146.2365 11339.1189 28826.0487
 -dito-VA =32757.5169 46748.7993 58359.3748 22525.7645 68394.5266

Exports/Imports = 134995.959 206809.220

Intermediate results

small =650.862199 0.150000 0.150000 0.700000
 X-Demd=650.862199 -469.23766 -181.62454 -1.595361

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Annexure 8.4
 (Fiscal - 4)

Intermediate results

small = 95.421270 0.145000 0.145000 0.710000
 X-Demd= 95.421270 -181.32561 276.746881 0.000000

Intermediate results

small = 18.484830 0.145500 0.145500 0.709000
 X-Demd= 18.484830 -211.00727 229.492095 0.000000

Intermediate results

small = 3.160951 0.145600 0.145600 0.708800
 X-Demd= 3.160951 -216.91913 220.080084 0.000000

Intermediate results

small = 0.098701 0.145620 0.145620 0.708760
 X-Demd= 0.098701 -218.10053 218.199233 0.000000

Intermediate results

small = 0.022155 0.145621 0.145621 0.708759
 X-Demd= 0.022155 -218.13006 218.152219 0.000000

Intermediate results

small = 0.000808 0.145621 0.145621 0.708759
 X-Demd= 0.000808 -218.13892 218.138114 0.000000

Final results

fsmall= 0.000808 0.145621 0.145621 0.708759
 Normal= 1.000000 1.000000 4.867158
 X-Demd= 0.000808 -218.13892 218.138114 0.000000

Price-M = 1.013208 1.001537 1.391528 1.093090 1.023455 1.030102
 dito--M = 1.276923 1.029288 1.029241 1.057284 1.027589 1.051586
 dito--M = 1.024976 1.001299 1.006358 1.001278 1.020188 1.284062

Price-C = 1.056436 1.084163 1.020542 1.106425 1.013725
 dito--C = 1.041691 1.103023 1.063459 1.078559 1.137114
 Pr: Inv-AR= 1.179576 0.423881

TR-Tax-Gross=177212.791 131816.037 167583.893
 Detail-Rev=116021.672 3548.51478 10841.9586 1403.89151
 Nontax-Rev=20220.2946 15547.5614 35767.8560
 Budget-Dtser=130621.088 36933.0155 167554.104
 Dbgt-Rev-Def=73783.1027 68635.3158 -5147.7869
 Crnt-Dev-Gap= 29.788956 -5147.7869 -5117.9979

Saving:HH =-3902.5106 230.098251 11002.6273 70113.8687
 --dito--Agg= 0.000000 1469.22335 28673.9471 40719.4905
 Saving -Agg=70862.6609 12840.0500 83702.7110 73783.1027
 G. Income:HH=16359.5660 36271.1409 68915.4921 182958.845
 Disp inc:HH=17165.4894 36947.9669 67117.6943 173851.819
 Expend: HH=21068.0000 36717.8686 56115.0670 103737.950
 Util-V-HH =4013.85934 6541.44718 10963.1072 24821.3900

Consump-Agg=307535.815 49106.2233 26505.4286 27441.1116 83713.9929
 --dito-- =36022.9893 15725.4203 9553.72490 18076.2591 56126.9963

Final Demnd=81273.0756 120806.230 1408.28274 137053.600 37490.2420 16929.3367
 --dito-- =6601.47838 9904.83405 14759.3376 10909.2021 64225.4798 2820.34688
 --dito-- =21491.5822 20033.1296 68145.5342 137341.277 25804.8727 157852.924

Investm- DD=2325.59301 5077.81509 6540.22835 54958.9268 88583.2504 157485.814
 NMC-Govt.DD=16934.9194 130621.088 121793.715 8827.37315 934850.765

V.A (fc) =125633.493 89834.2432 19097.2102 25338.8199 42214.3071
 -dito-VA =15950.3197 10766.0166 19115.6662 11370.9634 28707.4973
 -dito-VA =32460.0290 96557.8405 58527.8987 22602.5654 69149.5687
 -dito-VA =70403.1002 25542.0533 68635.3158 831906.908

Exports/Imports=129021.997 197657.313

Intermediate results

small =105.428813 0.100000 0.100000 0.800000
 X-Demd=105.428813 173.534599 -278.96341 -2.635440

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Annexure 8.5
 (Fiscal - 5)

Intermediate results

small = 57.349790 0.099500 0.099500 0.801000
 X-Demd= 57.349790 236.476153 -179.12636 0.000000

Intermediate results

small = 7.957573 0.099700 0.099700 0.800600
 X-Demd= 7.957573 211.223774 -219.18135 0.000000

Intermediate results

small = 0.191515 0.099675 0.099675 0.800650
 X-Demd= 0.191515 214.374780 -214.18327 0.000000

Intermediate results

small = 0.028493 0.099676 0.099676 0.800649
 X-Demd= 0.028493 214.311744 -214.28325 0.000000

Intermediate results

small = 0.004111 0.099676 0.099676 0.800649
 X-Demd= 0.004111 214.299137 -214.30325 0.000000

Final results

fsmall= 0.004111 0.099676 0.099676 0.800649
 Normal= 1.000000 1.000000 8.032546
 X-Demd= 0.004111 214.299137 -214.30325 0.000000

Price-M = 1.011399 1.001326 1.337921 1.080344 1.020243 1.025981
 dito--M = 1.239007 1.025278 1.025237 1.049441 1.023811 1.044523
 dito--M = 1.021555 1.001121 1.005487 1.001104 1.017425 1.245169

Price-C = 1.048708 1.072641 1.017729 1.091853 1.011846
 dito--C = 1.035983 1.088917 1.054771 1.067803 1.118340
 Pr:Inv-AR= 1.154989 0.432905

TR-Tax-Gross=292463.885 132761.745 166935.050
 Detail-Rev=102092.248 6841.52170 21096.2830 2731.69211
 Nontax-Rev=18766.4060 15406.8995 34173.3055
 Budget-Dtser=130001.288 36933.0155 166934.304
 Dbgt-Rev-Def=74148.8130 70619.7720 -3529.0410
 Crnt-Dev-Gap= 0.746612 -3529.0410 -3528.2944

Saving:HH =-3659.7559 229.869236 10981.6222 68841.7447
 --dito--Agg= 0.000000 1467.76104 28619.2055 41190.5719
 Saving -Agg=71277.5384 12840.0500 84117.5885 74148.8130
 G.Income:HH=16608.6017 36167.1094 68979.2840 180754.956
 Disp inc:HH=17408.2441 36765.3588 66727.6070 170039.301
 Expend: HH=21068.0000 36535.4896 55745.9848 101197.556
 Util-V-HH =4045.26184 6560.51076 10987.0322 24469.9513

Consump-Agg=305557.589 48780.3910 26208.0377 27257.1718 83012.4650
 --dito-- =35803.0255 15594.9963 9449.18628 17955.9038 55592.5243

Final Demnd=80752.7732 120016.625 1399.68348 136133.797 37238.7122 16807.6569
 --dito-- =6613.91149 9909.12897 14638.7256 10842.5882 64420.2328 2801.90003
 --dito-- =21250.4467 20003.6267 67574.4709 136622.700 25632.4067 157755.488

Investm- DD=2337.11995 5102.98358 6572.64539 55231.3340 89022.3186 158266.402
 NMC-Govt.DD=16934.9194 130001.288 121215.801 8785.48704 930414.875

V.A (fc) =125123.329 89298.6886 19791.4487 25476.4922 42197.6510
 -dito-VA =15937.9311 11088.5329 19135.3228 11351.3363 28783.7331
 -dito-VA =32647.0379 96683.6009 58423.4157 22554.1619 68675.0847
 -dito-VA =70046.9625 25463.3301 70619.7720 833297.831

Exports/Imports=132752.416 203372.188

Intermediate results

small =2541.86813 0.100000 0.100000 0.800000
 X-Demd=2541.86813 -5973.0311 3431.16294 -98.256146

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Annexure 8.6

(Fiscal - 6)

Intermediate results

small =862.105291 0.095000 0.095000 0.810000
 X-Demd=862.105291 -5335.6673 4473.56205 -30.683677

Intermediate results

small = 45.874621 0.092500 0.092500 0.815000
 X-Demd= 45.874621 -4991.1464 5037.02102 0.000000

Intermediate results

small = 8.614106 0.092600 0.092600 0.814800
 X-Demd= 8.614106 -5005.2844 5013.89852 0.000000

Intermediate results

small = 0.688451 0.092625 0.092625 0.814750
 X-Demd= 0.688451 -5008.8141 5008.12569 0.000000

Intermediate results

small = 0.055568 0.092623 0.092623 0.814754
 X-Demd= 0.055568 -5008.5318 5008.58740 0.000000

Intermediate results

small = 0.000234 0.092623 0.092623 0.814754
 X-Demd= 0.000234 -5008.5530 5008.55277 0.000000

Final results

fsmall= 0.000234 0.092623 0.092623 0.814754
 Normal= 1.000000 1.000000 8.796437
 X-Demd= 0.000234 -5008.5530 5008.55277 0.000000

Price-M = 1.010363 1.001205 1.307201 1.073040 1.018402 1.023619
 dito--M = 1.217279 1.022979 1.022943 1.044946 1.021646 1.040476
 dito--M = 1.019595 1.001018 1.004988 1.001004 1.015841 1.222880

Price-C = 1.044280 1.066039 1.016117 1.083503 1.010769
 dito--C = 1.032711 1.080833 1.049792 1.061639 1.107582
 Pr:Inv-AR= 1.140898 0.438251

TR-Tax-Gross=320277.209 111088.002 147032.372
 Detail-Rev=95180.9312 3661.22079 10841.9586 1403.89151
 Nontax-Rev=20220.2946 15724.0753 35944.3699
 Budget-Dtser=110095.364 36933.0155 147028.379
 Dbgt-Rev-Def=77850.4712 72768.5442 -5081.9270
 Crnt-Dev-Gap= 3.992815 -5081.9270 -5077.9342

Saving:HH =-3545.6565 234.562792 11298.5573 71454.4020
 --dito--Agg= 0.000000 1497.73034 29445.1702 44533.9575
 Saving -Agg=75476.8580 12840.0500 88316.9080 77850.4712
 G. Income:HH=16703.9595 36746.6582 70338.8975 185324.253
 Disp inc:HH=17522.3435 37429.1459 68496.1061 176094.565
 Expend: HH=21068.0000 37194.5831 57197.5488 104640.163
 Util-V-HH =4063.50349 6709.35590 11330.5102 25457.4992

Consump-Agg=310758.327 49625.4235 26799.1479 27727.8036 84638.5136
 --dito-- =36383.9624 15906.7425 9666.35583 18270.8126 56773.1580

Final Demnd=82121.2046 122178.815 1422.39463 138502.877 37887.5285 17111.5140
 --dito-- =6898.41141 10302.9436 14925.6328 11018.5192 67357.4845 2849.86412
 --dito-- =21729.7407 20068.7977 68898.1200 118379.194 24602.1893 163493.670

Investm- DD=2453.79369 5357.73481 6900.76509 57988.5935 93466.4922 166167.379
 NMC-Govt.DD=16934.9194 110095.364 102655.119 7440.24468 929748.902

V.A (fc) =127077.620 90626.7957 20456.2441 26017.8616 42792.6528
 -dito-VA =16087.0174 11594.5195 19153.1483 11488.5622 29078.2227
 -dito-VA =33704.8743 97992.9833 58762.7729 22675.7672 69543.0315
 -dito-VA =60716.7422 24371.1286 72768.5442 83498.488

Exports/Imports = 136791.720 209560.264

Intermediate results

small =925.972098 0.100000 0.100000 0.800000
X-Demd=925.972098 -990.19654 1916.16864 0.000000

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Annexure 8.7
(Fiscal - 7)

Intermediate results

small =610.774728 0.105000 0.105000 0.790000
X-Demd=610.774728 -1581.0071 970.232384 -6.359872

Intermediate results

small = 13.979844 0.103000 0.103000 0.794000
X-Demd= 13.979844 -1351.5661 1337.58627 0.000000

Intermediate results

small = 1.237121 0.102950 0.102950 0.794100
X-Demd= 1.237121 -1345.7159 1346.95299 0.000000

Intermediate results

small = 0.285241 0.102955 0.102955 0.794090
X-Demd= 0.285241 -1346.3012 1346.01591 0.000000

Intermediate results

small = 0.019220 0.102954 0.102954 0.794092
X-Demd= 0.019220 -1346.1841 1346.20332 0.000000

Intermediate results

small = 0.003997 0.102954 0.102954 0.794092
X-Demd= 0.003997 -1346.1900 1346.19395 0.000000

Final results

fsmall= 0.003997 0.102954 0.102954 0.794092
Normal= 1.000000 1.000000 7.713071
X-Demd= 0.003997 -1346.1900 1346.19395 0.000000

Price-M = 1.011399 1.001326 1.337921 1.080344 1.020243 1.025981
dito--M = 1.239007 1.025278 1.025237 1.049441 1.023811 1.044523
dito--M = 1.021555 1.001121 1.005487 1.001104 1.017425 1.245169

Price-C = 1.048708 1.072641 1.017729 1.091853 1.011846
dito--C = 1.035983 1.088917 1.054771 1.067803 1.118340
Pr:Inv-AR= 1.154989 0.432905

TR-Tax-Gross=280831.714 126452.520 161394.374
Detail-Revn =102495.265 5343.56302 16479.7770 2133.91510
Nontax-Revn =19420.9480 15520.9065 34941.8545
Budget-Dtser=124445.103 36933.0155 161378.119
Dbgt-Rev-Def=75140.9357 70887.7749 -4253.1607-
Crnt-Dev-Gap= 16.255639 -4253.1607 -4236.9051

Saving:HH =-3668.6364 231.232359 11075.5449 69802.7856
--dito--Agg= 0.000000 1476.46486 28863.9777 42062.6023
Saving -Agg=72403.0448 12840.0500 85243.0948 75140.9357
G.Income:HH=16593.3874 36347.7405 69351.0678 182412.702
Disp inc:HH=17399.3636 36983.3773 67298.3097 172413.074
Expend: HH=21068.0000 36752.1449 56222.7648 102610.289
Util-V-HH =4045.26184 6599.41192 11080.9943 24811.5457

Consump-Agg=307369.253 49075.5346 26426.6320 27421.9766 83593.4466
--dito-- =36005.1753 15705.6981 9528.67537 18065.7324 56018.8316

Final Demnd=81229.4168 120764.475 1407.58632 136962.350 37465.5622 16914.5871
--dito-- =6692.80266 10020.5075 14740.6976 10903.8073 65223.5472 2818.64339
--dito-- =21427.6910 20027.1589 68047.4062 131556.010 25368.5504 159405.191

Investm- DD=2368.39098 5171.26229 6660.58840 55970.3378 90213.4510 160384.030
NMC-Govt.DD=16934.9194 124445.103 116035.103 8410.00008 930975.991

V.A (fc) =125765.869 89766.7007 19858.9768 25607.5922 42370.3028
-dito-VA =15982.7393 11175.8789 19137.5874 11393.8870 28855.4304
-dito-VA =32916.6535 97036.9624 58538.8467 22596.9711 69002.4131
-dito-VA =67454.1482 25166.9683 70887.7749 833515.703

CHAPTER 9

THE IMPLICATIONS OF ISLAMIZATION PROCESS

The term "Islamization" is in common usage since 1980"s. Technically, it refers to restructuring of the prevailing socio-economic system according to the tenets of Islam. A series of reforms have so far been initiated in Pakistan for the purpose. However, due to inefficiency of administrative machinery and inadequacy of the relevant procedures, the outcomes have failed to come at par to the expectations of the people. As a result, the general masses are disappointed and certain quarters are skeptical about the viability of the Islamic system. The present chapter is devoted to an appraisal of the 'expected' economic profiles under alternative policy regimes. Keeping in view the discussion contained in section 3.5, and assuming that the policies concerned will operate in full swing, we can better analyze their long run impacts within the general equilibrium framework. We consider the following *four scenarios / plans* for the purpose. The results of the first plan will serve as the baseline for the comparison. It should be noted that the exercise considers only a few parametric changes in the model and leaves the basic structure in tact.

1. *Maintaining the status-quo, i.e. if the existing (base year 1989-90) policies and allocation/distribution mechanism prevails.*
2. *Administering Zakah as an instrument of redistribution of assets among different sections of the society according to the norms of Shariah, while retaining all other institutions in tact.*
3. *Substituting the interest-based transactions by profit sharing scheme in saving-investment behaviour while keeping all other things unaltered.*
4. *Combining the above two options simultaneously in the models to study the consequences of full scale 'Islamic' economic policies.*

For the purpose of comparison among different sequences of equilibria, we shall focus on the following indicators, briefly discussed in the Appendix:

- a. Efficiency and economic welfare in terms of Hicksian Equivalent variations.
- b. Income distribution in terms of the Gini coefficient and/or Atkinson measure.
- c. Poverty state in terms of the poverty gap or the disparities between the poverty line and the disposable incomes of the poor and low income households.
- d. Economic stability in terms of the comparative growth rates of capital and labour endowments over time with the target of attaining steady state path.

- e. Fiscal stability in terms of the behaviour of fiscal deficit and outstanding foreign debt over time.
- f. Economic growth in terms of the behaviour of major macro indicators like GDP, private consumption and investment over time.

9.1 Assumptions

In this connection, all the assumptions discussed under section 7.2 shall be valid, which we reproduce for ready reference:

1. The prevailing (base-year 1989-90) structure of taxation and fiscal arrangement remains intact during the plan period. Likewise there is no change in the institutional set up concerning the behaviour of consumers, business and other agents during the plan.
2. The long-run ratio of Govt. consumption expenditure to GDP(mp) is assumed to be 0.13 or 13 % (Ref: chapter-6, section 6.5.1)
3. The long-run ratio of gross investment to domestic saving is 1.45 (Ref: chapter 6, section 6.5.2). As such the gap between planned investment and private saving has to be filled by the government somehow.
4. The fiscal deficit (current budget deficit) every year is financed through bank borrowing and the trade deficit (deficit on the current account of BOP) is supported through borrowing from the private sector, domestic and international sources. Surplus on the revenue account, if any, is diverted to finance part of the development expenditure.
5. The present is connected to the future through saving-investment behaviour that leads to capital formation. Investment in the public sector is primarily meant for infra structure and social sector development which is not directly productive. Only 5% of the public sector investment is assumed to be directly productive in the sense that it generates revenues in the periods that follow.
6. The effective labour force is assumed to grow at an exponential rate of 2.5% per annum, keeping in view the net growth rate of population and the rate of unemployment. However the total number of households remains unchanged. In other words, only the household size grows over time.

At this stage, we may add a few more conditions as under, which are essential for dynamic analysis:

7. The poverty line assumed for the base year (Rs. 21068/-) may not be stationary but moving overtime with an average growth rate of 2% per annum keeping in view the growth rate of real GNP per capita during the past decade. Similarly the basic exemption limit (Rs. 30000/- in the benchmark) used for personal income tax estimation will grow annually at a minimal rate of 0.5 % .

8. The exemption limit for Zakah implementation is assumed to be Rs.15000/00, keeping in view the value of gold per 77 grams at 1989-90 prices. Initially, this amount exceeds the value of financial assets of the households of the poor and lower-middle income groups¹.
9. For the purpose of initialization of the programme, an arbitrarily fixed Zakah fund is introduced as the basic reservoir for incoming and out-flowing revenues. This will keep the revenues and expenditure concerned separate from the routine fiscal bill².
10. Government continues to honour its contractual obligations regarding domestic and international debt transactions. In simple words it continues to pay interest at a rate of 12% on permanent domestic debt and at 3% on outstanding foreign debt³.

9.2 Comparative Dynamic Analysis

Keeping in view the above considerations, we initiate the programme, with the base-camp equilibrium obtained for the *base year (1989-90)* in the validation test discussed in chapter 7 as our starting point, and run the model for ten periods/years to get the projected values for selected variables under the four distinct simulations in terms of the final equilibria for the *end year (1998-99)*. Following is the presentation and comparison of the results:

9.2.1 Fiscal position and National indebtedness

We may compare the results of simulations in terms of the behaviour of budget deficit and outstanding debt over time.

¹ As discussed earlier, our unit of address in all relevant considerations is the household (or its head) and not the individual.

² The low-income households whose disposable incomes fall below the poverty line are assumed to be entitled to Zakah to the extent that their basic needs are fulfilled at the margin in each period. In other words, they are paid an amount equal to their current debt obligations every year. Similarly households in the lower-middle income group may be paid Zakah equal to the difference between their financial assets and the exemption limit for Zakah with the intention that they become well-to-do (Sahib-e-Nisab) at the margin by the end of the accounting period.

³ This manipulation can be justified on the ground that permanent domestic debt is in the nature of a dead-weight obligation with no real assets held in parallel that should generate income such that the creditors be accommodated in some profit-loss sharing arrangement. Same is the case with outstanding foreign debt as well as fresh contracts signed for the purpose. This interest based transaction mechanism may continue to operate in compulsion (*Idhterar*) till there is an alternative arrangement.

(a) **The Behaviour of Fiscal deficit overtime**

The projected figures shown by the final equilibria as under. All figures are in Rs. million. A negative sign indicates a deficit on the revenue account and a positive sign shows a surplus.

Period	Scenario 1	Scenario 2	Scenario 3	Scenario 4
1. (89-90)	- 11357.43	- 11357.43	- 7371.41	- 7371.41
2	- 9804.62	- 8250.55	- 6040.83	- 3787.32
3.	- 8794.29	- 6605.50	- 4603.12	- 2378.23
4.	- 7361.80	- 4772.52	- 3083.46	- 10.02
5.	- 5807.33	- 3114.07	- 1614.07	+ 1631.03
6.	- 4125.21	- 1343.42	- 292.68	+ 3533.44
7.	- 2276.81	+ 404.88	+ 2208.88	+ 6576.01
8.	- 236.67	+ 2342.76	+ 4557.26	+ 8640.85
9.	+ 2022.96	+ 3554.35	+ 7311.83	+10937.07
10.(98-99)	+ 4713.74	+ 4816.78	+10521.09	+13771.14

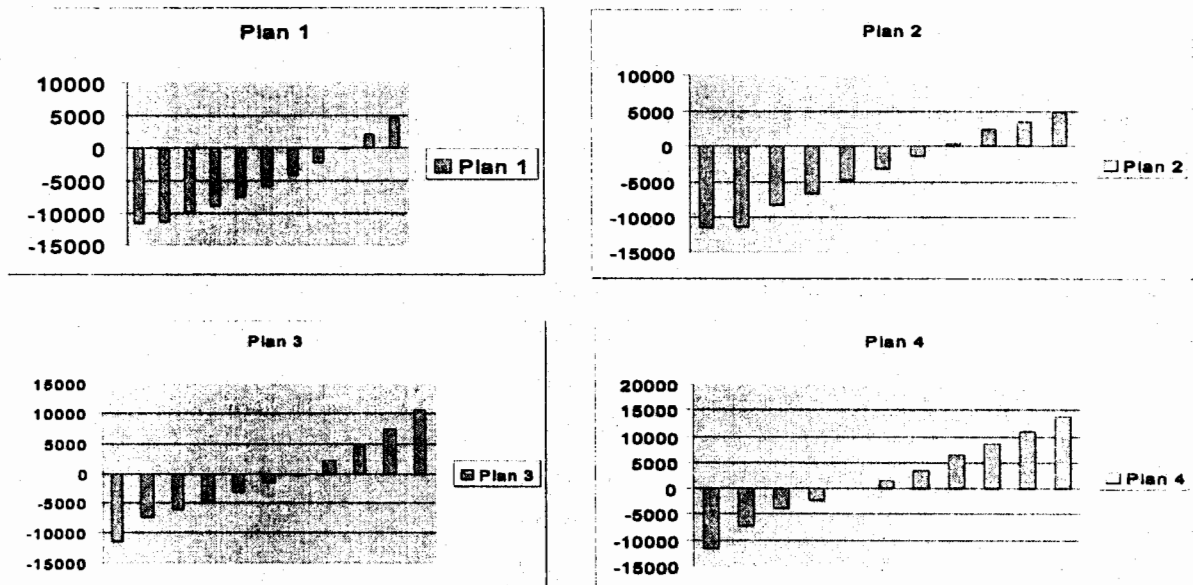


Figure 9.1(a)

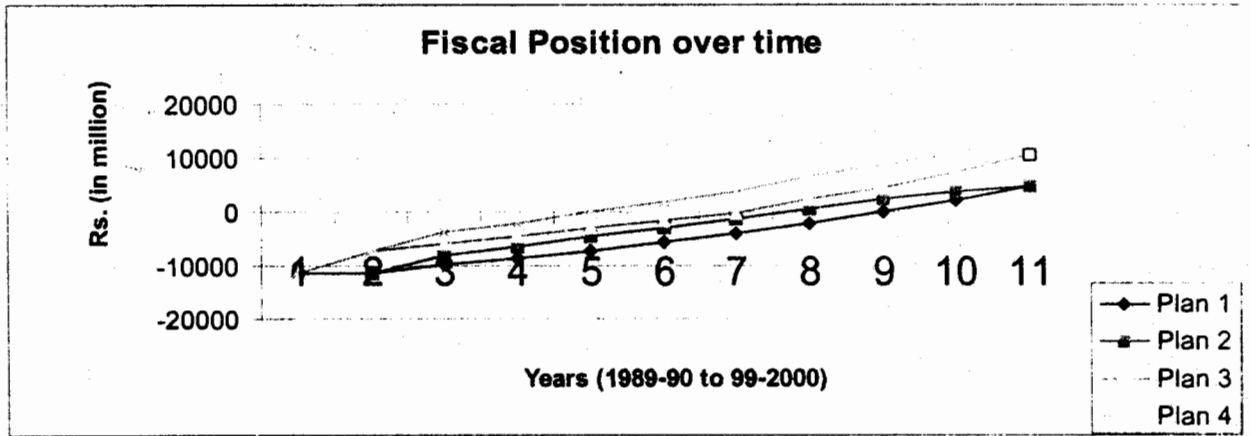


Figure 9.1(b)

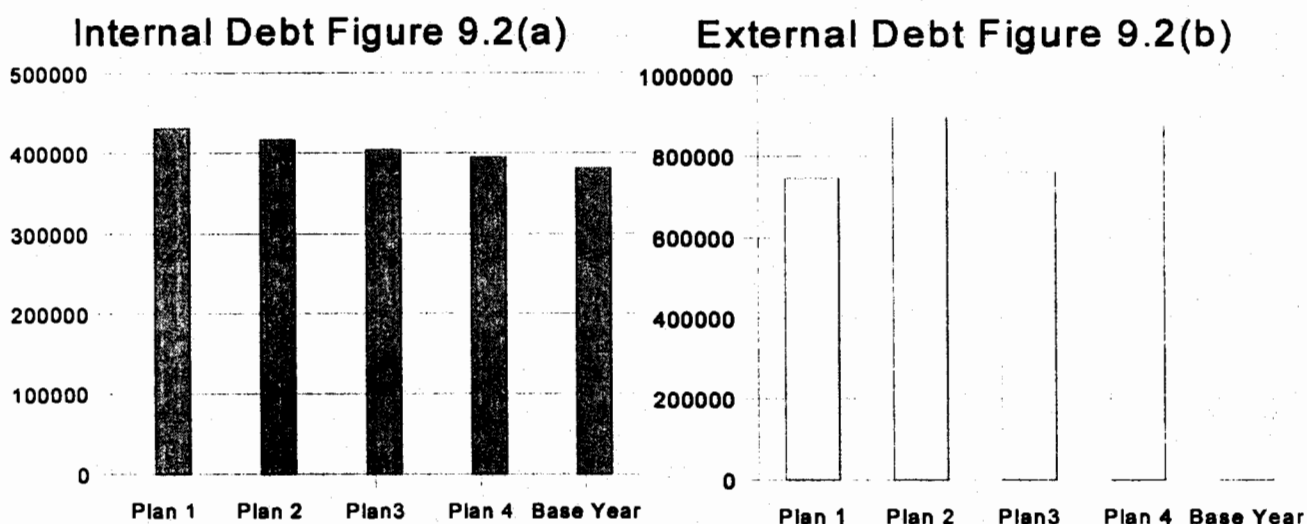
As evident from the above, the alternative plans show better results as compared to the original scheme of maintaining the status quo. In particular, the full scale Islamization programme exhibits the best performance. Figure 9.1 further adds to the clarity of exposition. It is interesting to note that even the existing taxation structure is capable to generate revenues sufficient enough to eliminate fiscal deficit within a decade. However, the terrestrial realities do not support the image projected above. In fact the fiscal system in Pakistan is diverging from equilibrium/balance over time. The problem then lies with inefficiency of the tax collection system and to administrative machinery making wasteful demands on public exchequer.

(b) The State of outstanding debt

The outstanding debt, both internal and external, by end of simulation period (10 years) under the four scenarios is as under. All the figures are expressed in Rs. million. The annual growth rates are shown in parentheses.

Scenario	Internal debt	External debt	Total
Base year (1989-90)	381348	323695	705043
1. Status quo (by End)	431112	744803	1205915
	(0.0123)	(0.0912)	(0.0551)
2. Zakah 'only'	416792	896234	1313026
	(0.0089)	(0.1072)	(0.0641)
3. Profit sharing 'only'	404354	760558	1164912
	(0.0059)	(0.0892)	(0.0515)
4. Islamic 'full scale'	394895	874701	1269596
	(0.0035)	(0.1045)	(0.0606)

The above statistics show that internal debt goes on decreasing across the scenarios from 1 to 4 due to improving fiscal position of the government overtime. On the contrary, external debt goes on increasing under the alternative plans. This is primarily due to increasing investment requirements of the economy which is a healthy sign for a developing country. Anyhow, this phenomenon of increasing foreign debt seems temporary since the credit-worthiness or repayment potential of the economy under the alternative plans is getting improved over time which will eventually diminish the burden in the long run. This will become clear from the comparisons regarding growth prospects of the concerned variables in the next section. The situation is shown in Figure 9.2.



9.2.2 Growth prospects of the Economy

The long-run performance of the economy in terms of various macroeconomic indicators under the alternative scenarios may be judged as under:

(a) Public Revenues and Expenditure

The behaviour of key financial variables under the respective plans across the simulation period is shown below. The values pertain to the End year of the plan period and expressed in Rs. million. Their average growth rates per annum are shown in parentheses. The terms 'Plan' and 'Scenario' are synonymously used.

It may be carefully noted that the values for the base year against Plan 1 and 2 are the same but slightly different from those shown against plan 3 and 4. This is because of the operation of profit sharing system substituting interest from the very beginning of the period in contrast to the implementation of Zakah which become operative only at the end of the accounting period. in view of this phenomenon, we shall discuss the results of simulations in two sets.

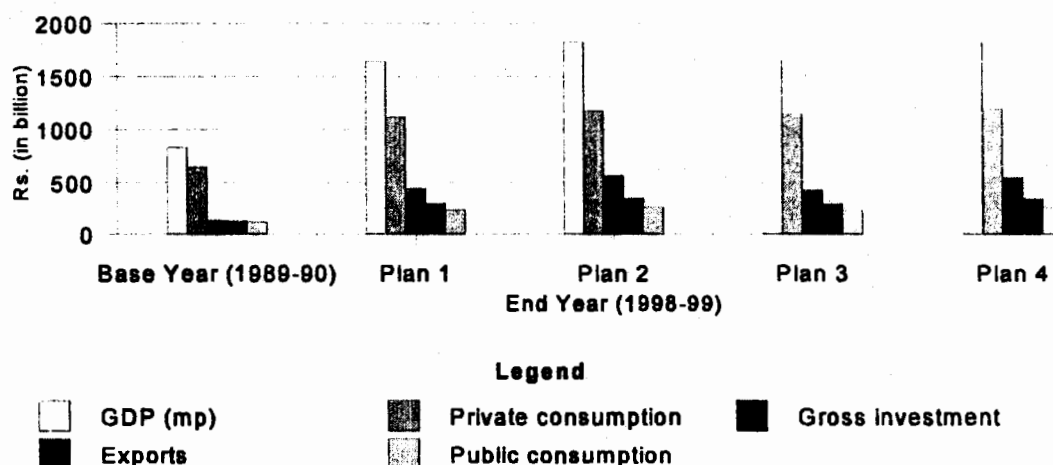
Set 1: Maintaining status quo and Introducing Zakah only.

<u>Item</u>	<u>Base Year</u>	<u>Plan 1 (Status-quo)</u>	<u>Plan 2 (Zakah only)</u>
Gross Revenues	146305.38	318558.69 (0.0809)	356103.04 (0.0930)
Tax Revenues	108345.36	244871.19 (0.0849)	279037.30 (0.0992)
Commodity taxes	91221.78	199804.61 (0.0815)	229463.89 (0.0966)
Other taxes	17123.58	45066.58 (0.1016)	49573.41 (0.1121)
Revenue Account	157662.81	313844.95 (0.0713)	351286.27 (0.0837)
Govt. consumption	119918.41	240011.90 (0.0718)	267738.75 (0.0836)
Development budget	41966.85	138729.00 (0.1270)	175890.05 (0.1541)

Set 2: Profit sharing only and Introducing full-scale Islamic system.

<u>Item</u>	<u>Base Year</u>	<u>Plan 3 (Profit only)</u>	<u>Plan 4 (Full Scale)</u>
Gross Revenues	150448.06	319281.77 (0.0781)	357425.76 (0.0904)
Tax Revenues	111029.21	242688.41 (0.0813)	276146.21 (0.0954)
Commodity taxes	93035.33	199033.20 (0.0790)	227662.78 (0.0936)
Other taxes	17993.88	43655.21 (0.0927)	48483.43 (0.1042)
Revenue Account	157819.49	308760.70 (0.0694)	343654.62 (0.0809)
Govt. consumption	120075.09	236067.22 (0.0699)	261829.69 (0.0811)
Development budget	42951.93	134703.70 (0.1211)	171456.28 (0.1484)

The fiscal position improved even from the very beginning after introducing the interest free mechanism as evident from the base year figures in scenarios 3 and 4. The growth rates are highest under Plan 2 followed by somewhat modest performance under the full scale Islamic financial system. The comparative position of public finance under the perspective plans is shown in Figure 9.3.

Figure 9.4 Macroeconomic Screen

Set 2: Profit sharing only and Introducing full-scale Islamic system.

Item	Base Year	Plan 3 (Profit only)	Plan 4 (Full Scale)
Private consumption	665177.74	1145787.47 (0.0559)	1199772.80 (0.0607)
Public consumption	120075.09	236067.22 (0.0699)	261829.69 (0.0811)
Gross investment	138400.67	434045.26 (0.1211)	552470.24 (0.1484)
Exports	131258.44	299154.33 (0.0858)	349002.03 (0.1027)
Less Imports	201083.47	458294.27 (0.0858)	534659.24 (0.1027)
GDP (mp)	853828.47	1656760.01 (0.0685)	1828415.52 (0.0791)
Less Indirect taxes	93035.33	199033.20 (0.0790)	227662.78 (0.0936)
GDP (fc)	744475.84	1457726.81 (0.0695)	1600752.74 (0.0795)
Private savings	95448.73	299341.56 (0.1211)	381013.96 (0.1484)
Fixed investment	111635.30	355594.28 (0.1228)	455846.64 (0.1510)

The above results convey the message that the performance of the economy will be much improved in all the revised plans as compared to status quo (plan 1). The key macro indicators like private consumption, public consumption, GDP (mp), value added (fc) (overall as well as in important sectors), saving and investment perform better in the full scale Islamization system or plan 4. The comparative position is illustrated in Figure 9.4.

(c) Value Added and its Components

It is beneficial to see the performance of the economy in terms of the value added and its components over the simulation period of ten years under various plans. As before, we carry out the exercise in two sets because of the difference in the base year

values. All the figures are expressed in Rs. million. The (annual) average growth rates are shown in parentheses. The percent shares of important sectors in the value added are also indicated.

Set 1: Maintaining status quo and Introducing Zakah only.

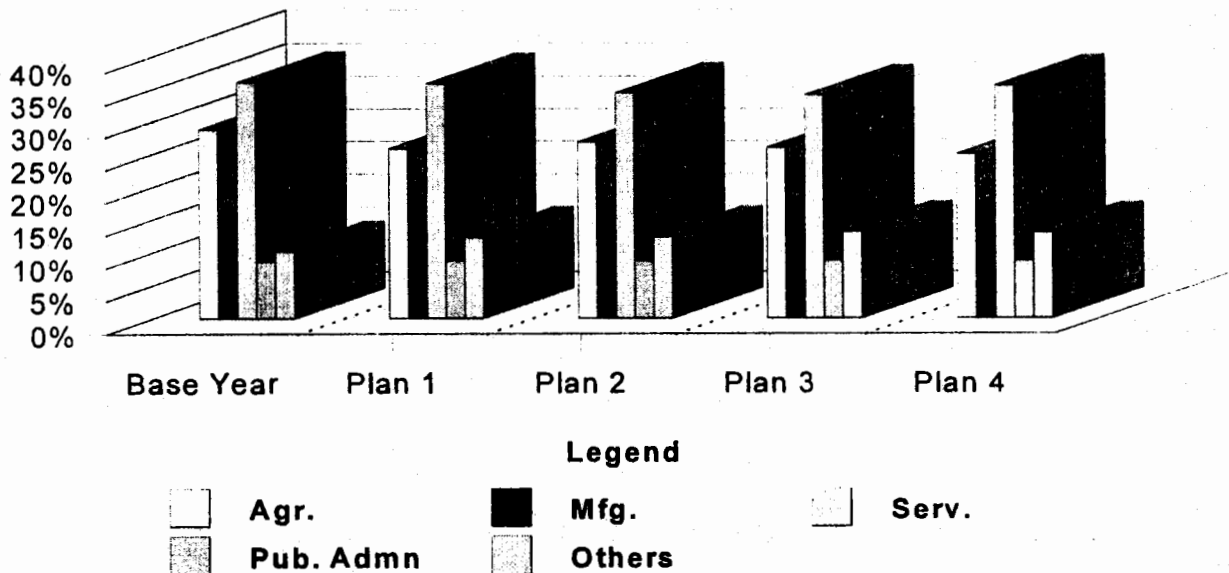
Item	Base Year	Plan 1 (Status quo) Growth		Plan 2 (Zakah only) Growth	
<u>Value Added (fc)</u>	<u>761565.31</u>	<u>1493744.14</u>	<u>0.0697</u>	<u>1654879.63</u>	<u>0.0807</u>
Agriculture	219338.39	386072.56	0.0582	414242.04	0.0656
% share	(28.80 %)	(25.84%)		(25.03%)	
Manufacturing	123660.33	257300.39	0.0760	290936.42	0.0893
% share	(16.24%)	(17.22%)		(17.58%)	
Services	275309.68	536636.75	0.0690	589592.65	0.0791
% share	(36.15%)	(35.92%)		(35.62%)	
Pub Admn. & def.	65577.64	130424.67	0.0712	144699.95	0.0823
% share	(8.61%)	(8.73%)		(8.74%)	
Elect. & gas distrib.	28826.52	55868.30	0.0684	61934.20	0.0795
% share	(3.78%)	(3.74%)		(3.74%)	
Construction	29109.39	85135.03	0.1133	105187.10	0.1371
% share	(3.82%)	(5.70%)		(6.35%)	
Mining	19743.35	42306.44	0.0792	48296.27	0.0936
% share	(2.59%)	(2.85%)		(2.92%)	

Set 2: Profit sharing only and Introducing full-scale Islamic system.

Item	Base Year	Plan 3 (Profit only) Growth		Plan 4 (Full Scale) Growth	
<u>Value Added (fc)</u>	<u>760291.96</u>	<u>1466324.15</u>	<u>0.0679</u>	<u>1614344.73</u>	<u>0.0782</u>
Agriculture	224687.95	394085.35	0.0578	419822.43	0.0645
% share	(29.55 %)	(26.88%)		(26.00%)	
Manufacturing	126089.79	257345.51	0.0739	289547.45	0.0867
% share	(16.58%)	(17.55%)		(17.93%)	
Services	264621.56	505019.36	0.0667	550644.68	0.0760
% share	(34.80%)	(34.44%)		(34.11%)	
Pub Admn. & def.	65838.97	128757.04	0.0694	142023.40	0.0799
% share	(8.66%)	(8.78%)		(8.79%)	
Elect. & gas distrib.	29219.04	55813.01	0.0668	61496.10	0.0772
% share	(3.84%)	(3.80%)		(3.81%)	
Construction	29736.24	83174.27	0.1083	102922.33	0.1322
% share	(3.91%)	(5.67%)		(6.37%)	
Mining	20098.40	42129.61	0.0768	47888.32	0.0907
% share	(2.64%)	(2.87%)		(2.96%)	

The direction of change (measured in percentage points) in the shares of various sectors in value added is same for all the plans. However, the share of Agriculture goes down and that of manufacturing goes up more speedily under the 4th plan which is desirable for a developing country. The comparative position is shown in Figure 9.5 that will further facilitate the comparison.

Figure 9.5 Composition of Value Added (f.c.)



9.2.3 Welfare Implications

As discussed in Chapter 3, any parametric change brought about by a public policy will alter the relative prices of commodities and thereby the relative position of the households/ consumers when the economy adjusts to a new equilibrium. Some individuals may benefit while some others may hurt. Different policies may therefore be compared in terms of their possible effects on the income levels, consumption patterns and utility gains of different households in order to assess their desirability from economic and social point of view. In this context, we compare the projected values obtained under the four plans of our presentation and see the implications of the policies concerned.

(a) Effects on incomes

The disposable incomes of the households belonging to various groups/classes show the following variations. The percent deviation over the simulation period under each plan and for each group is also computed. All figures are expressed in Rs. It is noted once again that the base year values for Plan 1 and 2 are the same but slightly different from those given for Plan 3 and 4.

Plan	Period	<u>Disposable Incomes per Household</u>			
		<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
	<u>Base year</u>	<u>17581</u>	<u>38356</u>	<u>69895</u>	<u>182591</u>
Status quo	End year	20811	45520	134219	624411
	% change	18.372	18.677	92.029	241.972
Zakah only	<u>Base year</u>	<u>17821</u>	<u>40127</u>	<u>73619</u>	<u>177452</u>
	End year	28173	47423	131072	711626
	% change	60.247	23.639	87.527	289.738
Profit sharing only	<u>Base year</u>	<u>17821</u>	<u>40127</u>	<u>73619</u>	<u>177452</u>
	End year	21310	48607	149979	579405
	% change	19.578	21.133	103.723	226.513
Full scale system	<u>Base year</u>	<u>17821</u>	<u>40127</u>	<u>73619</u>	<u>177452</u>
	End year	28570	49549	143081	675148
	% change	60.316	23.480	94.353	280.468

It is evident from the above that the disposable incomes of all groups of the households increase more than proportionately in the three alternative plans as compared to the original plan of maintaining the status quo over the stipulated period of 10 years. Further, an increase in the income level of the poor and lower-middle income households during the alternative plan periods is easy to understand, but it is very interesting to note that the incomes of the higher-middle and the rich classes (group 3 and 4) also increase over the planning period under the revised schemes (specifically plan 2 & 4) despite the fact that Zakah is deducted from their financial assets. This statistical proof, arrived at in the context of general equilibrium modelling, confirms the Quranic claim⁴ that prosperity accompanies with abandoning interest based practices and promoting charities in the society. We have already shown in section 9.2.2 above that private saving and investment increases with introduction of

⁴ Please refer to verse 276, Chapter 2(Surah Al-Baqarah) which states that Allah condemns Riba(interest) and flourishes Sadaqat (charities, alms) and He doesn't like those who are ungrateful and wicked.

profit sharing scheme in financial transactions and enforcement of Zakah as an instrument of redistribution. These results categorically reject the apparent frustration of some people in this regards⁵.

(b) Effects on consumption

The level of spending on general commodities may also be a fair candidate for assessment of household welfare. The consumption expenditure of households should change following a change in public policies. The projected figures available by the end of planning period (10 years) under different scenarios reveal the following picture. All figures relate to household units and expressed in Rs:

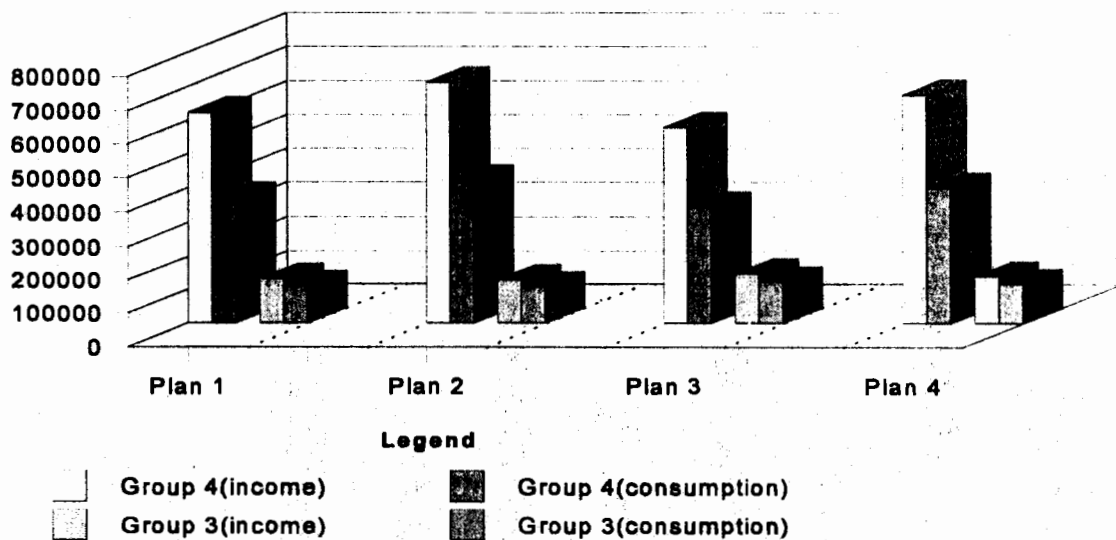
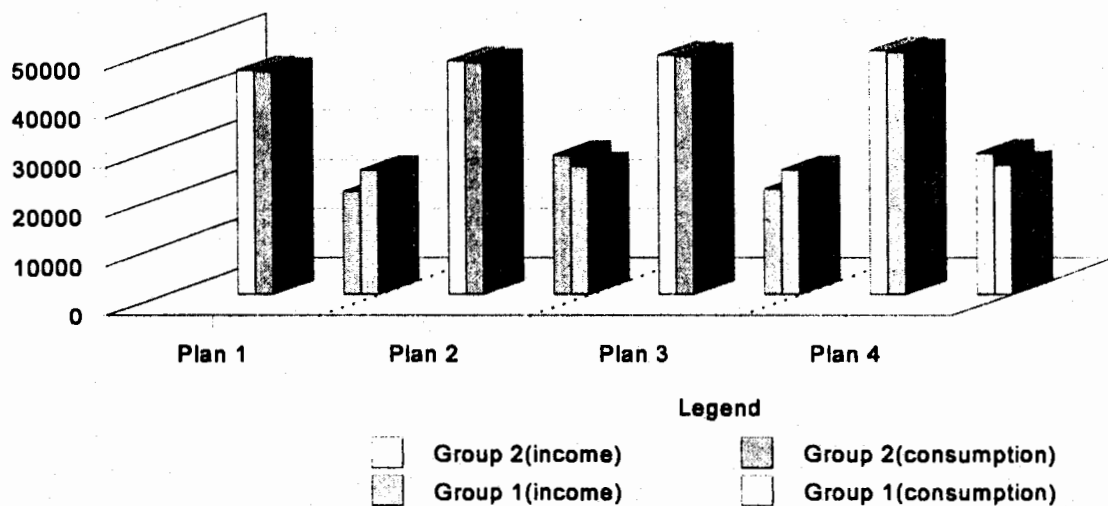
Plan	Period	Consumption expenditure per Household			
		Group 1	Group 2	Group 3	Group 4
	<u>Base year</u>	<u>21068</u>	<u>38115</u>	<u>58335</u>	<u>108317</u>
Status quo	End year	25178	45235	112049	370727
	% change	19.508	18.680	92.078	242.261
Zakah only	End year	25915	47026	109452	422867
	% change	23.006	23.379	87.626	290.397
	<u>Base year</u>	<u>21068</u>	<u>39874</u>	<u>61423</u>	<u>105160</u>
Profit sharing only	End year	25178	48301	125152	343535
	% change	19.508	21.134	103.754	226.678
Full scale system	End year	26272	49237	119405	400395
	% change	24.701	23.481	94.398	280.748

The increase in consumption of the poor households (group 1 & 2) by the end of plan 2 and 4 is clear. A slight reduction in consumption level of the higher-middle income class (group 3) by the end of plan 2 as compared to plan 1 reveals the fact that their financial assets reach a level where Zakah becomes admissible and as a result, both their disposable income and consumption level fall. However, with introduction of profit sharing scheme, they are compensated and their position improves considerably as evident from the results of plan 3 & 4. The expenditure level

⁵ Please refer to the Quranic verse 268 Chapter 2 (Surah Al-Baqarah) which states that the evil forces (symbolically the Devil) threatens you of destitute/poverty (Faq'r) and ordains you to lewdness/obscenity, and (in contrast) Allah promises you forgiveness from Himself and bounty/prosperity (in case you follow His commands).

of the high income group gets improved in all the three revised cases as compared to the original case (status quo). Figure 9.6 illustrates the comparative position.

Figure 9.6 Income and Consumption Patterns (Rs per annum)



In addition to above, we may use a simple index composed of the real value (at base year prices) of the household consumption as a rough measure of welfare to facilitate the layman comparison among different policies. For this purpose we

compute the aggregate household consumption expenditures of the groups concerned in the end year of relevant plan and deflate it by the true cost of living indices (P_0 as discussed in chapter 3) to get the present value and then compare the inter-plan figures. The comparison is shown as under:

Plan	Period		<u>Consumption expenditure of Households</u>				
	End year		<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>	
1.	Per HH	Rs.	25178	45235	112049	370727	
	Aggregate	Rs.m	177160	288834	292011	360495	
	Real value	Rs.m	171845	280201	283327	349876	Ref. point
2.	Per HH	Rs.	25915	47026	109452	422867	
	Aggregate	Rs.m	182346	300270	285243	411196	
	Real value	Rs.m	171560	282575	268518	387315	
	% change		- 0.165	+ 0.847	- 5.227	+ 10.700	Over Ref. point
3.	Per HH	Rs.	25178	48301	125152	343535	
	Aggregate	Rs.m	177160	308411	326158	343053	
	Real value	Rs.m	173931	302810	320264	336911	
	% change		+ 1.214	+ 8.069	+ 13.037	- 3.705	Over Ref. point
4.	Per HH	Rs.	26272	49237	119405	400395	
	Aggregate	Rs.m	184857	314388	311181	389344	
	Real value	Rs.m	179965	306100	303018	379225	
	% change		+ 4.725	+ 9.243	+ 6.950	+ 8.388	Over Ref. point

The above analysis is quite interesting. The poor households naturally gain from introduction of full scale Islamic distribution system. The lower-middle income group is also much better under this plan. The higher middle income group loses a bit little under the second plan due to enforcement of Zakah but gains much more under the third plan which eradicates the exploitative interest based system. Another interesting feature to note is that the rich class is hurt only by losing the privileged position it enjoys in the interest based system and not by payment of Zakah as evident from results of plan 3 and 4. Therefore this class may try its best to maintain the status quo; in other words to resist and prevent any change that will disturb their status. However, on close examination, one can see that this class will definitely reap the benefits of full scale Islamic system along with masses as clear from the results.

(d) Effects on Utility levels

As discussed in the Appendix to this chapter, the most popular measures of welfare effects faced by an household due to price and income changes as a result of policy change are the Compensating and Equivalent Variations. The model projects all the necessary information in this regards under different policy options. The money metric utility i.e. the indirect utility function expressed in nominal terms and the true cost of living index are computed for the base and end years from which we calculate the equivalent variations for different household groups. The symbols P_o , V_h and EV denote the true cost of living index in the base year, the indirect (money metric) utility and the equivalent variations respectively for the household groups concerned. The EV's for the household group concerned are calculated according to the relation:

$$EV_h = [V_h(\text{end}) - V_h(\text{base})] \cdot P_o$$

The results of our simulations are summarized as under:

Plan	Period	Index	Welfare measures for Households			
			Group 1	Group 2	Group 3	Group 4
Status quo	Base year	P_o	5.5106	5.9279	6.4218	7.3437
		V_h	3823.15	6429.69	9083.89	14750
	End year	V_h	4710.34	7865.85	17983.05	55014.66
	<u>Ref. point</u>	<u>EV</u>	<u>4888.95</u>	<u>8513.41</u>	<u>57148.62</u>	<u>273660.48</u>
Zakah only	Base year	P_o	5.5106	5.9279	6.4218	7.3437
		V_h	3823.15	6429.69	9083.89	14750
	End year	V_h	4998.32	8429.71	18105.44	61133.05
		EV	6475.89	11855.92	57934.59	340623.20
% change over Ref. point		EV	32.46	39.26	1.37	24.47
Profit sharing	Base year	P_o	5.7214	6.1538	6.6652	7.6193
		V_h	3682.33	6479.64	9215.46	13801.72
	End year	V_h	4482.43	7994.24	19122.49	45909.23
		EV	4577.69	9320.54	66032.33	244636.75
% change over Ref. point		EV	- 6.37	9.48	15.54	- 10.60
Full scale sys	Base year	P_o	5.7214	6.1538	6.6652	7.6193
		V_h	3682.33	6479.64	9215.46	13801.72
	End year	V_h	4716.70	8217.79	18397.30	53952.00
		EV	5818.04	10696.23	61198.80	305917.03
% change over Ref. point		EV	21.05	25.64	7.08	11.79

The above statistics convey the message that there is a welfare gain for the poor households in all the alternative plans as compared to the original (status quo) except plan 3 since they don't have any investable funds. Both the middle-income groups are better off under the three alternative plans. The gain in welfare to lower-middle income group is nominal only in case of the third plan when compared to the higher-middle income group which is much better under the same circumstances. The high income group is specifically hurt under the third plan due to their forgone position of preferential treatment in the interest based financial mechanism which is now replaced by the more equitable profit sharing system. Their welfare gain is positive under the second and fourth plans even after deduction of Zakah from their assets. Apparently, this result seems contrary to the conventional wisdom but as we have pointed out earlier, enforcement of Zakah not only redistributes resources but also stimulates investment and the well-to-do class can reap its benefits more than proportionately as compared to the general masses. In the final analysis, however, the poor households are the most beneficiaries of the full scale Islamization schedule and no body else is hurt at all. This is a very strong proof of Pareto-improvement as evident from the percent change of equivalent variations in the relevant plan over the status quo.

9.3 Income distribution and poverty state

The social impacts of various alternative policy regimes can be judged in different manners. We have discussed many aspects above. Next we explore the effects of the four plans on the income distribution across the households and on the state of poverty.

(a) Effects on income distribution

The most commonly used indicator in this regards is the Gini coefficient which measures the area falling between the line of equality (representing the ideal distribution) and the Lorenze curve (representing the actual distribution) if cumulative income shares are measured along the vertical axis and population shares along the

horizontal axis. The relevant formula for computation of the index in the context of our information will be as under:

$$G = 1 - \sum_{i=1}^n P_i (z_i + z_{i-1}), \text{ with } z_0 = 0$$

where P_i is the population share of the i th income class and z_i is its share in income.

The actual data for our base year (1989-90) reveals the following picture*:

Total population		
	17.000 million households, distributed as:	
1.	Low income group	7.0363 41.39 % share
2.	Lower-middle income	6.3852 37.56 %
3.	Higher-middle income	2.6061 15.33 %
4.	High income group	0.7924 5.72 %

* Please refer to Table-10 in Chapter 5 on data.

Aggregate disposable income is Rs.695,282 million, distributed as:

1.	Low income group	119,593	17.200 % share
2.	Lower-middle income	234,412	33.715 %
3.	Higher-middle income	173,230	24.915 %
4.	High income group	168,047	24.170 %

In the light of this information, the Gini coefficient is calculated as under:

Class	Income share	z_i (cumulative)	$(z_i + z_{i-1})$ $z_0 = 0$	p_i	$p_i (z_i + z_{i-1})$
1.	0.17200	0.17200	0.17200	0.4139	0.071191
2.	0.33715	0.50915	0.68115	0.3756	0.255840
3.	0.24915	0.75830	1.43945	0.1533	0.220667
4.	0.24170	1.00000	2.43945	0.0572	0.139536

$$\sum p_i (z_i + z_{i-1}) = 0.687234, \quad G = 0.312766$$

However, on the basis of information projected by our model in the base camp equilibrium (which we have been using in this analysis), the index is calculated for the base year as under:

Class	Income share	z_i (cumulative)	$(z_i + z_{i-1})$ $z_0 = 0$	p_i	$p_i (z_i + z_{i-1})$
1.	0.169850	0.169850	0.169850	0.4139	0.070301
2.	0.336266	0.506116	0.675966	0.3756	0.253893
3.	0.250102	0.756218	1.432184	0.1533	0.219554
4.	0.243782	1.000000	2.432184	0.0572	0.139121

$$\sum p_i (z_i + z_{i-1}) = 0.682869, \quad G = 0.317131$$

Thus the Gini coefficients for the actual/observed data and that projected by the model are very close to each other.

Next we compute the index for the *final years* of simulation under the four plans on the basis of projected figures and compare the results.

Plan 1. Maintaining the Status quo

Class	Income share	z_i (cumulative)	$(z_i + z_{i-1})$ $z_0 = 0$	p_i -----	$p_i(z_i + z_{i-1})$ -----
1.	0.105041	0.105041	0.105041	0.4139	0.043476
2.	0.208496	0.313537	0.418578	0.3756	0.157218
3.	0.250915	0.564452	0.983030	0.1533	0.150698
4.	0.435548	1.000000	1.983030	0.0572	0.113429
$\Sigma p_i(z_i + z_{i-1}) = 0.464821$, $G = 0.535179$					

The above results show that income distribution will further deteriorate if the existing system prevails for a decade. Apart from the official 'misleading' statistical show, the factual position supports this result, i.e. the poor are becoming poorer and the already well-to-do becoming still richer.

Plan 2. Introducing Zakah only

Class	Income share	z_i (cumulative)	$(z_i + z_{i-1})$ $z_0 = 0$	p_i -----	$p_i(z_i + z_{i-1})$ -----
1.	0.129176	0.129176	0.129176	0.4139	0.053466
2.	0.197317	0.326493	0.455669	0.3756	0.171149
3.	0.222588	0.549081	1.004750	0.1533	0.154028
4.	0.450919	1.000000	2.004750	0.0572	0.114672
$\Sigma p_i(z_i + z_{i-1}) = 0.493315$, $G = 0.506685$					

The results show an improvement in the distribution over the final situation under the first plan by 5.324 %, however the time span of 10 years seems too short to mend the problem of acute inequality with merely introducing Zakah in the system.

Plan 3. Introducing Profit sharing system only

Class	Income share	z_i (cumulative)	$(z_i + z_{i-1})$ $z_0 = 0$	p_i -----	$p_i(z_i + z_{i-1})$ -----
1.	0.105998	0.105998	0.105998	0.4139	0.043872
2.	0.219404	0.325402	0.431400	0.3756	0.162034
3.	0.276308	0.601710	1.033110	0.1533	0.158376
4.	0.398290	1.000000	2.033110	0.0572	0.116294
$\Sigma p_i(z_i + z_{i-1}) = 0.480576$, $G = 0.519424$					

The above results show a little bit improvement over the first plan by about 2.944 % but still portrays a deteriorated situation.

Plan 4. Introducing system in full scale

Class	Income share	z_i (cumulative)	$(z_i + z_{i-1})$ $-z_0 = 0$	p_i -----	$p_i(z_i + z_{i-1})$ -----
1.	0.129963	0.129963	0.129963	0.4139	0.053792
2.	0.204538	0.334501	0.464464	0.3756	0.174453
3.	0.241066	0.575567	1.040031	0.1533	0.159437
4.	0.424433	1.000000	2.040031	0.0572	0.116690
		$\sum p_i(z_i + z_{i-1}) = 0.504372$, $G = 0.495628$			

Under this plan of full scale Islamization programme, the situation regarding income inequalities seems much improved as compared to the first plan. The improvement in the coefficient is about 7.390 % which indicates that reducing of income inequalities under this plan will be more accelerated. However, as noted above, the ambitious results cannot be expected within a few years.

There is however, one problem with the Gini coefficient recognized in the literature. In case the Lorenze curves under two or more than two distribution schemes intersect one another, then the comparison renders meaningless. To see whether the curves intersect one another, we may compare the cumulative income shares of the respective groups under different plans as under:

<u>Income shares</u> <u>Cumulative</u>	<u>Plan 1</u>	<u>Plan 2</u>	<u>Plan 3</u>	<u>Plan 4</u>	<u>Population</u> <u>Shares</u>
Group 1	10.50	12.92	10.60	12.99	41.39
Group 2	31.35	32.65	32.54	33.45	78.95
Group 3	56.44	54.91	60.17	57.55	94.28
Group 4	100	100	100	100	100

As noted earlier, our point of reference is plan 1. It is now evident from the above that meaningful comparison is possible between plan 1 versus 3 and plan 1 versus 4. The cumulative income shares of respective groups under both plan 3 and 4 are continuously higher than those under plan 1. Thus income distribution under these plans is comparable (and better as shown above) with the reference plan. The factual position is depicted in the Figure 9.7 that renders the comparison clearer.

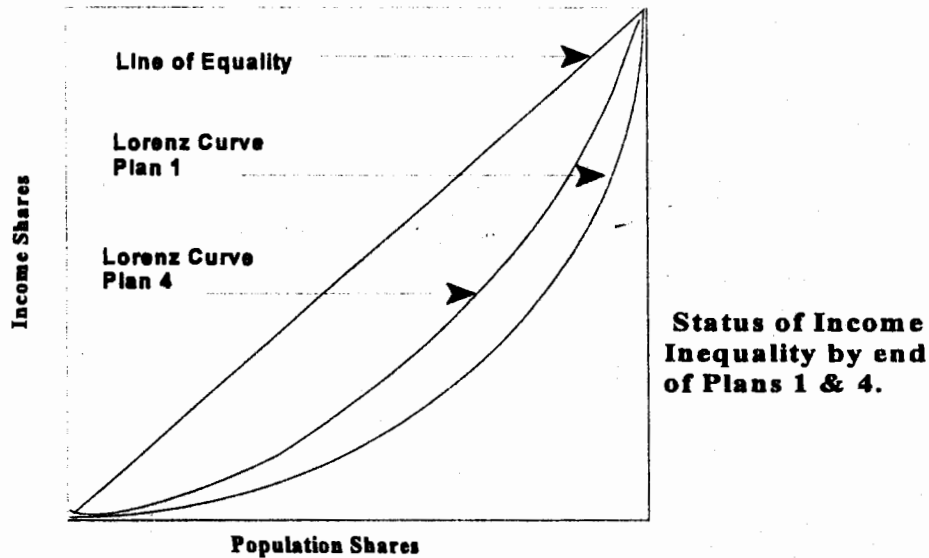


Figure 9.7

(b) Effects on poverty states:

The two phenomena of mass poverty and inter-class income disparities are closely related. They coexist and reinforce each other (like symbiosis in biological science) such that one cannot be treated in isolation from the other. A simple measure often used for poverty incidence, called the head count, is to estimate the number of people living below the poverty line, which approximates the amount necessary to finance the basic needs of an average household at the margin. An equally good measure, useful for our present analysis, is to estimate the deviation of the disposable income of various groups from the poverty line. As mentioned earlier, the poverty line assumed for the base year amounts to Rs. 21,068/00 in 1989-90 prices. We have assumed a growth rate of 2% for the poverty line in our analysis so that it grows to Rs. 25682/00 by the end of simulation period under all the plans. We will compare the projected disposable incomes of the poor and lower-income groups with the poverty line and see the deviation under various schemes. All figure expressed in Rs.

<u>Item (Disposable Income)</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Poverty line</u>
Base year actual	16996	36712	21068
Deviation from Pov.Line	- 4072	15643	
Final year projected			25682
Plan1 End year Income	20811	45520	
Deviation from Pov.Line	- 4871	19838	Reference point
Plan2 Income	28173	47323	
Deviation from Pov.Line	+ 2491	21641	
% improvement over Ref.pt.	51.13	9.09	
Plan3 End year Income	21310	48607	
Deviation from Pov.Line	- 4372	22925	
% improvement over Ref.pt.	10.24	15.56	
Plan4 End year Income	28570	49549	
Deviation from Pov.Line	+ 2888	23867	
% improvement over Ref.pt.	59.29	20.31	

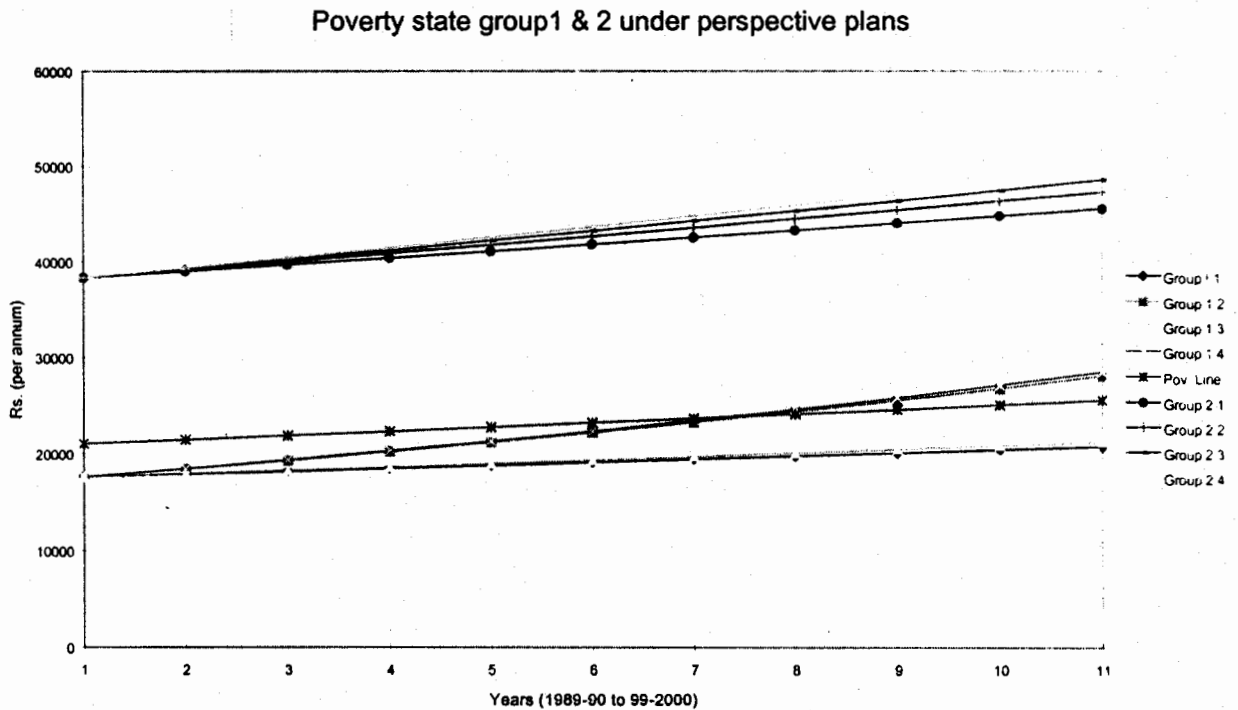


Figure 9.8

The above statistics indicate that the position of poor household is considerably improved by the end of Plan 2 and 4 due to the simple fact of getting some remunerations from Zakah administration which enables them to raise their living standards. Similarly the position of the lower-income group also get much improved under Plan 3 and 4 on account of receiving due share in their investment. The relative position is shown in Figure 9.8.

9.4 The relative position of Capital and Labour factors:

An interesting aspect of our model is the capability that enables us to see the impact of different policy options on the relative position of capital and labour in the functional distribution. This can be guessed either from the rental-wage ratio at equilibrium over time under various regimes or from their relative shares of the factors in GDP. The picture is as under:

Behaviour of Rental-Wage ratio (P_k / P_w) over time

<u>Year</u>	<u>Plan 1</u>	<u>Plan 2</u>	<u>Plan 3</u>	<u>Plan 4</u>
1 1989-90	1.0828	1.0828	1.1371	1.1371
2	1.0815	1.0818	1.1353	1.1316
3	1.0763	1.0735	1.1335	1.1257
4	1.0723	1.0682	1.1310	1.1188
5	1.0680	1.0625	1.1240	1.1155
6	1.0631	1.0569	1.1212	1.1125
7	1.0579	1.0510	1.1189	1.1061
8	1.0524	1.0420	1.1162	1.1034
9	1.0466	1.0000	1.1133	1.1008
10 1998-99	1.0406	0.9999	1.1102	1.0980

From the above configuration we note that the position of labour relative to capital is getting improved under all the plans due to accelerated investment. However the speed of improvement is much faster under plan 2 when compared to plan 1. Similarly, the labour position is getting better under plan 4 when compared to plan 3. The following table further clarifies the picture.

Relative income shares of Capital and Labour

<u>Period</u>	<u>Capital share</u>	<u>Labour share</u>	<u>Relative share ($\Pi/1-\Pi$)</u>	
Base case 89-90	0.676195	0.323805	<u>2.088278</u>	Ref. point
<u>End case 98-99</u>				<u>% change over base case</u>
Plan 1	0.667656	0.332344	2.008930	- 3.7997
Plan 2	0.669298	0.330702	2.023870	- 3.0843
Plan 3	0.663745	0.336255	1.973933	- 5.4755
Plan 4	0.660597	0.339403	1.946350	- 6.7964

As evident from the above, the position of labour as compared to capital is getting improved under all the plans. However this change is much stronger and accelerated under the 4th plan concerned with full scale Islamization scheme.

9.5 Summary of Policy Analyses

We summarize the findings of the above exercise in Tables-9.1 & 9.2 to facilitate a bird's eye view comparison and to deduce inferences readily. The first table refers to growth prospects of key macroeconomic variables under different scenarios whereas as the second is reserved for microeconomic comparisons of policies concerned. It is evident from the tables that the full scale Islamization model, in general, guaranties best performance of the economy both at micro and macro levels even within a short span of time.

Table- 9.1 Effect of Alternative policies on the economy (Macro-economic indicators)

Variable	Indicator	Plan 1 Status quo	Plan2 Zakah only	Plan 3 Profit sharing only	Plan 4 Full scale model	Remarks (Plan duration 10 years)
Gross Revenues	growth rate	0.0809	0.0930	0.0781	0.0904	Modest & efficient 4th plan
Tax Revenues	- do -	0.0849	0.0992	0.0813	0.0954	- do -
Current Pub. Expend.	- do -	0.0713	0.0834	0.0694	0.0809	- do -
Public Consumption	- do -	0.0718	0.0836	0.0699	0.0811	- do -
Development Budget	- do -	0.1270	0.1541	0.1211	0.1484	- do -
Private Consumption	-do -	0.0599	0.0615	0.0559	0.0607	-do -
Private Saving	- do -	0.1270	0.1541	0.1211	0.1484	- do -
Fixed Investment	- do -	0.1299	0.1600	0.1228	0.1510	- do -
Exports /Imports	- do -	0.0890	0.1062	0.0858	0.1027	- do -
GDP (mp)	- do -	0.0701	0.0813	0.0685	0.0791	- do -
Value Added (fc)	- do -	0.0697	0.0807	0.0679	0.0782	- do -
Agriculture	share in VA*	- 2.96	- 3.77	- 2.67	- 3.54	- do -
Manufact.	- do -	+0.98	+1.34	+0.97	+1.35	- do -
Services	- do -	- 0.23	- 0.53	- 0.35	- 0.68	- do -
Fiscal deficit position	turning point	9th year	7th year	7th year	5th year	Speediest 4th plan
External debt outstand	growth rate	0.0912	0.1072	0.0892	0.1045	Slowest 3rd plan
Internal debt outstand	- do -	0.0123	0.0089	0.0059	0.0035	Slowest 4th plan

* Change in share / VA expressed in percentage points during the plan period.

Table- 9.2 Effect of Alternative policies on the economy (Micro-economic indicators)

Variable	Indicator	Plan 1 Status quo	Plan2 Zakah only	Plan 3 Profit sharing only	Plan 4 Full scale system	Remarks						
Gp1	Gp2	% change base year	over	18.372	18.677	60.247	23.639	19.578	21.133	60.316	23.480	4th plan efficient
Gp3	Gp4			92.029	241.972	87.527	226.738	103.723	226.513	94.353	280.468	
HH Dispos.	Income											
Gp1	Gp2	--- do ---		19.508	18.680	23.006	23.379	19.508	21.134	24.701	23.481	4th plan mild but efficient-
Gp3	Gp4			92.078	242.261	87.626	290.397	103.754	226.678	94.398	280.748	
HH Consumption												
Gp1	Gp2	% change over Plan 1 (status quo)-		-----	-----	-0.166	0.847	1.214	8.069	4.725	9.243	--- do ---
Gp3	Gp4					-5.227	10.700	13.037	-3.705	6.950	8.388	
Real value of consump												
Gp1	Gp2	Equivalent variations % change over plan1		-----	-----	32.46	39.26	-6.37	9.48	21.05	25.64	4th plan mild but efficient
Gp3	Gp4					1.37	24.47	15.54	-10.60	7.08	11.79	
Welfare measures												
Income distribution		Gini coefficient by end of plan period		0.535179		0.506685		0.519424		0.495628		4th plan leads to equitable distribution
Gp1	Gp2	Deviation of disposable income from pov. line (Rs)		-4871	19838	+2491	21641	-4372	22925	+2888	23867	4th plan better to reduce poverty
Poverty state by end of plan period												
Relative position of Capital to Labour		Relative shares (I/I)- I) in Funct. distrib.		2.008930		2.023870		1.973933		1.946350		4th plan labour friendly

Appendix

Indices for comparison

As noted by Shoven & Whalley (1992 pp), the applied general equilibrium models are based on two crucial assumptions ,

- i. the economy is in equilibrium in the benchmark (static equilibrium) and
- ii. it is on a steady state path (dynamic equilibrium) at the same time.

The original equilibrium is disturbed as a result of changes in the policies and/or parameters concerned and the economy may settle down to a new equilibrium through various adjustments overtime (the transition period) or undergo further distortions.

Any change in the fiscal, monetary or income policy will effect different economic agents differently. Once implemented, the policy change is followed by a change in prices of commodities and factors, quantity of goods produced and consumed, income levels of the households as well as in the revenues and expenditure of the state. As a result, some agents may gain while some others may lose (although not necessarily). There may be an improvement or otherwise in welfare of the society and income distribution. The social states before and after the policy change need to be compared in some logical manner so as to weigh the usefulness of the policy options in concrete terms. We discuss some of the statistics or indicators which are used in this exercise.

1. Economic Efficiency and Welfare

As explained in Boadway and Bruce (1984), a good deal of welfare economics is based on the concept of economic efficiency. The concept is used to order different social states on the basis of some minimal value judgements. In this context, two main value judgements are involved. The first is based on the assumption of individualism and requires that social ordering ought to be based on individual preferences. The second value judgement is based on the Pareto principle, which ranks a social state 'A' higher than 'B' if at least one person is better off in A as compared to B with all other members of the society indifferent between the two states of affairs. A welfare

change measure for an individual involves obtaining an estimate in nominal terms resulting from a change in the bundle of commodities consumed by the individual due to change in the price vector faced by the individual or a change in his income. In this regards, the expenditure function is an invaluable and convenient device. Given the set of prices, it corresponds to the money value associated with each utility level. Therefore it is an indirect way of measuring utility and often referred to as the money metric of utility.

The most widely used cost-of-living indices, which make use of the expenditure function, are the compensating Variations (CV) and the Equivalent Variations (EV), both introduced by J. R. Hicks (Value and Capital, 1939) and further developed by a number of theorists. Both CV and EV attempt to ascertain how a households real income is changed when his nominal income and the prices faced by him are changed. The CV refers to the change in expenditure that would just compensate the household such that he maintains the initial level of utility if the household were to face a new set of prices resulting from a policy change. On the other hand, the EV refers to the change in expenditure that would have an effect on household utility equivalent to that of the policy change itself if the household were to face the initial set of prices. In other words it is the amount of additional income that would enable the household to attain the new utility level as a result of policy change at the old prices. Thus both the measures are very close to each other, the difference lies only in the reference prices and utility levels.

Let the symbols m , p , u refer to money income, price and utility levels and the superscripts 0,1, refer to the pre and post policy situation, then

$$CV = m^1 - e(p^1, u^0) \quad (1)$$

$$\text{and } EV = e(p^0, u^1) - m^0 \quad (2)$$

Where $e(p, u)$ is the expenditure function.

The above equations may be rewritten as:

$$\begin{aligned}
 CV &= m^1 - m^0 - e(p^1, u^0) + m^0 \\
 &= \nabla m - e(p^1, u^0) + e(p^0, u^0), \text{ since } m^0 = e(p^0, u^0) \\
 &= e(p^0, u^0) - e(p^1, u^0) + \nabla m \quad (3)
 \end{aligned}$$

$$EV = e(p^0, u^1) - e(p^1, u^1) + \nabla m \quad (4)$$

The first step in deriving CV and EV is to solve for the expenditure function that corresponds to the current consumption level of the households. As discussed in Chapter-3, substitution of ordinary demands (Marshallian) in the consumer's utility function gives the indirect utility function with consumer's income and commodity prices as its arguments. Therefore its calculation is straight forward since all the relevant information is computed by the model. The expenditure function is just the inverse of indirect utility function. It is nothing but the amount of money required to finance current consumption, and generally given by:

$$e(p, u) = \sum p_j x_j^c(p, u), \quad (5)$$

where $x_j^c(p, u)$ is the compensated demand (Hicksian) function. For Cobb Douglas preferences, it is specifically shown as:

$$E_h = M = V_h \prod (P_j / \beta_j)^{\beta_j} \quad (6)$$

This is in fact $e(p^0, u^0)$ given above. Now if the prices undergo a change, one can get the new expenditure level $e(p^1, u^0)$ by substituting the value of indirect utility function, already calculated, in the above relation, however, now with a different set of prices P_j^1 . This is some thing like the old wine in new bottle and often referred to as the 'Money metric utility' or 'Equivalent income' in the welfare literature. For a different set of policies, the calculation of indirect utility function and its inverse is not difficult. This time one readily gets $e(p^1, u^1)$, but will have to calculate $e(p^0, u^1)$ as the money metric. The calculation of both CV and EV is then straight forward.

In the context of the model we have specified, the consumer allocates his disposable income between consumption and saving to maximize his intertemporal utility function: $Y^d = P_o C_o + P_s S_o$, where P_o and P_s denote the composite prices

of consumption and saving or investment goods. However we are concerned with present consumption expenditure P_0C_0 , the general price level P_0 before and after the policy change, and the contemporaneous utility function $C_0 = c(X_1, X_2, \dots, X_m)$ to calculate CV and EV;

$$CV = C(X_0)P_A - C(X_A)P_A = [C(X_0) - C(X_A)]P_A \quad (7)$$

$$EV = C(X_A)P_0 - C(X_0)P_0 = [C(X_A) - C(X_0)]P_0 \quad (8)$$

The subscripts O and A in the above relations refer to the values of variables under the original and alternative policy regimes. If the preferences are linearly homogeneous, the two indices can be written as the rate of change in utilities, given the reference income. As such

$$CV = \frac{U^A - U^O}{U^A} Y_0 \quad \quad \quad EV = \frac{U^A - U^O}{U^A} Y_0 \quad (9,10)$$

where Y denotes the income allocated to consumption and U refers to the utility level estimated as the indirect utility.

However, all this is relevant for static analysis while comparing different tax/subsidy policies. In case of dynamic analysis, the welfare gains should be measured in the benchmark prices to avoid price differentials across equilibria. As noted by Shoven and Whalley (1992 pp 193), the present value of the welfare gain (loss) to the j th household incurred in the i th period can be measured as the constant dollar difference between the revised case consumption and the benchmark consumption expenditure while using the composite price vector of the benchmark equilibrium which remains unchanged. This is nothing but equivalent variations for that period with unchanged prices and might be regarded as the present value of EV. As such, we have:

$$PVWG = PV \{ [C(X_A) - C(X_0)] P_0 \} = P_0 [PV \{ C(X_A) \} - PV \{ C(X_0) \}] \quad (11)$$

where PV is the operator for present value. For aggregate welfare gains(losse), we may use the arithmetic sum of PVWG across the households.

Although CV and EV are widely used in welfare analyses, some economists are not satisfied with these indices. As an alternative measure, it is suggested to use the current consumption expenditure of the households by the end period of the respective policy regime deflated with the price vector of the benchmark equilibrium to assess the welfare gain/loss associated with the policy. It is somewhat rough but a convenient measure which can sufficiently serve the purpose.

2. Income distribution and the extent of Poverty

The most commonly used index for measuring the disparities in the distribution of income across the households is the Gini coefficient. It is also called the Lorenze ratio. If income distribution in terms of cumulative shares of the individuals/households is measured along the vertical axis and the population of the respective households, again in terms of cumulative shares, along the horizontal axis of a square, then the graph obtained by joining the locus of all points is called the Lorenze curve. If the distribution is supposed to be equal, then the Lorenze curve will be congruent upon the diagonal or the line of equality. Now Gini coefficient denotes the ratio of the area falling within the Lorenze curve and the line of equality to the total area of the triangle beneath the line of equality or half the area of the square. It is zero for an almost equal distribution and unity for an absolutely unequal state when whole of the income accrues to a single individual or household only. Within the two extremes, there is a wide range for the index; the nearer is the ratio to zero, the more equitable will be the distribution and vice versa.

Since the area beneath the Lorenze curve may not be regular, in the geometrical sense, therefore an approximation is applied in practice. The Gini coefficient is generally expressed as:

$$G = \frac{1}{2 P^2 Y} \sum_i \sum_j |Y_i - Y_j| \quad (12)$$

where P denotes the total number of individuals/households, \bar{Y} is the mean income, Y_{ij} is the income of the i th and j th household and double summation implies that their absolute differences have to be summed over the entire population. A computable formula for the index in terms of the empirical Lorenz curve proposed by Atkinson (1973) is given as under:

$$G = 1 - \sum_{i=1}^n P_i (z_i + z_{i-1}), \text{ with } z_0 = 0 \quad (13)$$

where P_i is the population of the i th income class and z_i is its share in income.

Many useful indices for measuring the extent of poverty are found in the literature like the Head count, Foster-Throbeck index and the Poverty gap. The Poverty gap is particularly useful for our purpose. It measures the disparity between the disposable income of the household and the poverty line, the latter indicates the expenditure required to finance the minimum basic needs for life sustenance at the going price level. The poverty line may be assumed to grow overtime so as to accommodate the inflation, if any, and also to account for the growth of real per capita income or enhancement of the standard of living. The index is convenient to use in dynamic sequences and serves the purpose well.

3. Stability and Growth

The term 'stability' basically refers, in mathematical sense, to the inherent ability of the economy of returning to equilibrium after getting a shock or confronting to a policy change. The term has, however been extensively applied to economic phenomena and in different contexts. For instance, internal and external stability generally refer to the relative stability of the general price level in the domestic market and that of the foreign exchange value of the currency in the international markets respectively. The goals may be achieved in the short/long run, depending upon the scope and nature of the stabilization policies. Most of the fiscal, monetary and commercial policies are often concerned with the short run stabilization of the economy with reference to budget, money supply, general price level and balance of payments. The long run stability of the economy is defined in the growth literature as the attainment and

maintenance of the steady state at which the labour and capital factors grow at the same rates and the tax-expenditure policies are unchanging. In simple words, an ideal situation at which there is no shortage or excess of resources in any market is the steady state path.

In the context of our model, fiscal stability over time may be noticed easily from the behaviour of budget deficit or excess demand in the public sector. Another indicator may be to note the behaviour of outstanding debt, both internal and external, through different sequences. So far as the case of steady state stability is concerned, one can observe the growth rates of labour and capital endowments in aggregate and see if these are converging over time or otherwise.

However, it should be noted that steady state stability is attained only in the long run with appropriate public policies and sound socio-political environment conducive to economic growth. In other words, a time span of two or three decades may be too short for the purpose keeping in view the present social conditions of our country. Secondly, the governments in the developing countries including Pakistan, have to invest heavily in physical and social sectors to provide the basic infra structure and other facilities. Thus the ratio of gross investment to real savings is always greater than unity. In the terminology of development literature, imbalances are intentionally created through indicative planning and the economy has to respond and adjust accordingly. The objective is to pull the economy out of the low-level equilibrium trap which is impossible without a heavy dose of investment. Development budget in these countries is often financed through borrowing or extra money creation, public savings are negligible, rather negative and private savings are insufficient. It may then be possible only in the long run that ex-anti investment equilibrate ex-post savings and the economy is eventually launched on the balance path. Therefore, deriving inferences from the relative growth rates of capital and labour within a short span of time may be misleading and as such the information may be carefully used.

Given the values of macro indicators like the GDP(fc), value added in the crucial sectors like agriculture and manufacturing, gross fixed capital formation, private consumption and revenues of the government etc for the base and the end years under different policy options, the average annual growth rates of these variables can be easily calculated and compared accordingly. For instance, if we have the value of GDP for the base year (o) and the projected figure for the end year (n) with a gap of (t) years, the annual growth rate (gr) can be calculated using the relation:

$$GDP_{(n)} = GDP_{(o)} (1 + gr)^t \quad \text{and} \quad gr = [GDP_{(n)} / GDP_{(o)}]^{1/t} - 1 \quad (14,15)$$

Similarly, the average value of the variable concerned for any intermediate year (k) may be calculated readily, once the annual growth rate is at hand:

$$GDP_{(k)} = GDP_{(o)} (1 + gr)^k \quad (16)$$

4. The Relative position of Factors

We are using two primary factors in our model, namely the capital and labour. Their services are hired by the production sectors and their remunerations accrue mainly to the households with a small fraction going to the government for its share in the business. Both the factors are assumed to be homogeneous and mobile across sectors, in particular, the capital is assumed to be divisible and malleable. Their services are valued according to the routine procedure discussed in the model (Chapter-3) and uniquely determined in each equilibrium. Since we normalize all prices with that of labour, the relative position of capital to labour can be judged from the rental-wage ratio (r/w). Alternatively, we may use the relative shares of capital and labour in the functional distribution, given by $\{\Pi/(1-\Pi)\}$, as a strong indicator. In case this ratio is declining over time through various sequences, it implies that the position of labour relative to capital is getting improved and vice versa. This is a convenient and fairly reliable test of the desirability or otherwise of public policies from social point of view. It also sheds light on the capital labour ratio (K/L). Any gradual decline in the rental-wage ratio implies an improvement in capital intensity over time.

Final results: Status quo*** fsmall= 0.000092

P-260

Factor price:w,r,t=	0.241646	0.261663	0.496691			
Normalized price =	1.000000	1.082838	2.055452			
X-Demd function =	0.000092	3753.45683	-3753.4567	-11357.427		
Inv GR:FX/PV,CR,PB=	135226.507	112590.364	66072.2323	11576.2944	34941.8370	
End year =	1					

Annexure 9.1
(Base Year)

Detailed Results: Status quo

Price-Mk=	1.070417	1.071445	1.377731	1.142177	1.077627	1.085365
dito--Mk=	1.287534	1.078084	1.083842	1.118459	1.064021	1.120066
dito--Mk=	1.075828	1.044143	1.074987	1.032633	1.077676	1.293587

Price-Cn=	1.111680	1.128233	1.074999	1.147965	1.077006	
dito--Cn=	1.101991	1.144596	1.095132	1.116884	1.172057	
Pi/Ps:AR=	1.201049	0.450789				
Comps-Po=	5.510634	5.927948	6.421787	7.343664		

TR-Tax-Gross=	74838.9817	108345.364	146305.380			
Detail-Rev=	91221.7825	3863.31091	11740.0838	1520.18696		
Nontax-Rev=	21895.3016	16064.7144	37960.0160			
Budget-Dtser=	119918.410	37744.4000	157662.810			
Dbgt-Rev-Def=	41966.8470	68412.8927	26446.0457			
Bgt-Dev-Rgap=	-11357.430	26446.0457	15088.6162			

G. Income:HH=	16736.8095	37660.7864	71783.9568	192175.913		
Disp inc:HH=	17581.0205	38355.9162	69895.4873	182590.921		
Agg Disp:HH=	123705.335	244910.196	182154.630	177551.411		

Cur Exp: HH=	21068.0000	38114.8702	58334.8017	108316.989		
Util-V-HH =	3823.15384	6429.69036	9083.88925	14749.7203		
Consump-Agg=	316510.982	50557.1695	27428.5581	28246.6085	86402.7066	
--dito-- =	37033.9286	16241.6073	9898.44513	18613.7243	58031.8746	
Saving: HH=	-3486.9795	241.046020	11560.6857	74273.9312		
-do-Agg. HH=	0.000000	1539.12704	30128.3029	47688.5370		
HH:CP:AG:PB=	79355.9670	13903.6930	93259.6600	41966.8470		

RA, RB, Det 1 21489.36 30150.00 3486.9794
Cap, Lab share 521038.62 249506.11

Final Demnd=	83636.4192	123977.515	1447.80440	141112.540	38602.1866	17442.8653
--dito-- =	5932.97899	9089.09377	15235.4408	11215.3549	56755.1155	2902.88703
--dito-- =	22240.0898	21541.1323	70334.2224	127879.038	25608.7030	147495.918
Investm- DD=	1996.88983	4360.10826	5615.82161	47190.9407	76062.7466	135226.50
NMC: Gvt DD=	18337.7728	119918.410	111814.324	8104.08613		

Activ (mp) =	208938.928	158859.266	33931.4342	174667.303	192156.047	
-dito-Act =	99773.5304	29882.7553	66632.1619	42716.9638	50137.8429	
-dito-Act =	64611.6625	118148.516	109060.560	30799.7179	84362.1889	
-dito-Act =	128331.721	48059.6935	240929.252			

V.Add (fc) =	127835.264	91503.1261	19743.3516	26340.0600	41220.0164	
-dito-VA =	15850.8737	10493.3300	18333.8069	11422.2450	28826.5199	
-dito-VA =	29109.3959	97832.1604	57785.4106	23623.2952	70937.7227	
-dito-VA =	65577.6434	25131.0907	68412.8927			

Inv self HH=	0.000000	408.431797	5889.89246	22497.0289	1747.09185	
Inv finc HH=	0.000000	102.107949	2141.77908	11248.5145	1641.32135	
Inv prop HH=	0.000000	170.179916	2677.22385	11248.5145		
Cap stock1 =	12796.0000	28514.4318	69319.8925	173549.029	12773.0919	
Cap stock2 =	0.000000	12605.1079	30360.7791	78422.5145	37771.3213	
Cap stock3 =	2322.00000	5230.17992	12749.2238	45854.5145		
Gross Labs =	8614.10000	15041.8750	19559.0500	45523.3250		

New:PWG,FWG,BKM=	0.000000	25782.0970	11357.4295			
Outstandg Debt =	98740.0000	349477.097	293965.430			
EX:IM:FD:VT:PC =	128603.881	197016.774	922449.305	829978.205	648965.605	

Detailed Results: Status quo

P-261(a)
Annexure 9.1(II)

Final results: Status quo*** fsmall= 0.000092
 Factor price:w,r,t= 0.241646 0.261663 0.496691
 Normalized price = 1.000000 1.082838 2.055452
 X-Demd function = 0.000092 3753.45683 -3753.4567 -11357.427
 Inv GR:FX/PV,CR,PB=135226.507 112590.364 66072.2323 11576.2944 34941.8370
 End year = 1

Final results: Status quo*** fsmall= 0.001489
 Factor price:w,r,t= 0.444624 0.484424 0.070952
 Normalized price = 1.000000 1.089514 0.159577
 X-Demd function = 0.001489 15556.8599 -15556.858 -9804.6247
 Inv GR:FX/PV,CR,PB=152236.384 126249.278 74473.4494 12595.0182 39180.8104
 End year = 2

Final results: Status quo*** fsmall= 0.000175
 Factor price:w,r,t= 0.262164 0.282163 0.455673
 Normalized price = 1.000000 1.076287 1.738122
 X-Demd function = -0.000175 26890.5009 -26890.501 -8794.2926
 Inv GR:FX/PV,CR,PB=172637.294 144304.648 85858.6521 13661.7948 44784.2011
 End year = 3

Final results: Status quo*** fsmall= 0.000456
 Factor price:w,r,t= 0.276354 0.296337 0.427309
 Normalized price = 1.000000 1.072306 1.546235
 X-Demd function = 0.000456 41628.9244 -41628.924 -7361.7989
 Inv GR:FX/PV,CR,PB=196086.169 164298.676 98372.1698 14937.2616 50989.2441
 End year = 4

Final results: Status quo*** fsmall= 0.000626
 Factor price:w,r,t= 0.296400 0.316560 0.387040
 Normalized price = 1.000000 1.068016 1.305805
 X-Demd function = 0.000626 58952.6226 -58952.622 -5807.3289
 Inv GR:FX/PV,CR,PB=223389.225 187661.785 113019.822 16402.0992 58239.8644
 End year = 5

Final results: Status quo*** fsmall= 0.000174
 Factor price:w,r,t= 0.316378 0.336342 0.347279
 Normalized price = 1.000000 1.063102 1.097670
 X-Demd function = -0.000174 79264.4286 -79264.429 -4125.2069
 Inv GR:FX/PV,CR,PB=255249.510 215067.110 130234.606 18087.5386 66744.9652
 End year = 6

Final results: Status quo*** fsmall= 0.000759
 Factor price:w,r,t= 0.344467 0.364422 0.291111
 Normalized price = 1.000000 1.057932 0.845106
 X-Demd function = -0.000759 103153.260 -103153.26 -2276.8149
 Inv GR:FX/PV,CR,PB=292475.285 247210.505 150454.867 20035.1362 76720.5015
 End year = 7

Final results: Status quo*** fsmall= 0.001084
 Factor price:w,r,t= 0.381564 0.401584 0.216851
 Normalized price = 1.000000 1.052468 0.568322
 X-Demd function = 0.001084 131243.728 -131243.73 -236.67591
 Inv GR:FX/PV,CR,PB=336038.683 284984.087 174249.525 22291.2243 88443.3373
 End year = 8

Final results: Status quo*** fsmall= 0.001263
 Factor price:w,r,t= 0.424553 0.444356 0.131091
 Normalized price = 1.000000 1.046643 0.308774
 X-Demd function = 0.001263 164269.478 -164269.48 2022.95638
 Inv GR:FX/PV,CR,PB=387096.803 329464.157 202306.124 24910.5361 102247.497

End year = 9

P-251 (b)
Annexure 9.1(I)
(End Year)

Final results: Status quo*** fsmall= 0.001593
 Factor price:w,r,t= 0.483714 0.503378 0.012908
 Normalized price = 1.000000 1.040652 0.026685
 X-Demd function = -0.001593 203156.659 -203156.66 4713.74499
 Inv GR:FX/PV,CR,PB=447015.671 381874.749 235401.390 27960.5056 118512.853
 End year = 10

Detailed Results: Status quo

Price-Mk= 1.039986 1.035766 1.341892 1.107097 1.047658 1.054056
 dito--Mk= 1.251845 1.050207 1.052990 1.081078 1.042554 1.079582
 dito--Mk= 1.047301 1.022365 1.039433 1.016625 1.046330 1.257781
 Price-Cn= 1.077483 1.096752 1.045119 1.115300 1.043374
 dito--Cn= 1.066804 1.112293 1.072174 1.088887 1.139380
 Pi/Ps:AR= 1.170582 0.444502
 Comps-Po= 5.345300 5.750767 6.230808 7.127351

TR-Tax-Gross=971.613098 244871.193 318558.692
 Detail-Rev=199804.607 11823.7565 27636.8064 5606.02309
 Nontax-Rev=43150.3981 30537.1012 73687.4993
 Budget-Dtser=240011.895 73833.0542 313844.949
 Dbgt-Rev-Def=138729.001 165197.017 26468.0160
 Bgt-Dev-Rgap=4713.74297 26468.0160 31181.7589

G. Income:HH=18332.8201 43346.0791 138188.856 658142.109
 Disp inc:HH=20811.2931 45520.3668 134218.812 624411.136
 Agg Disp:HH=146434.501 290656.646 349787.646 607177.388

Cur-Exp: HH=25178.2102 45234.6948 112048.974 370726.789
 Util-V-HH =4710.34602 7865.85396 17983.0567 52014.6636
 Consump-Agg=517451.431 83701.5894 58268.7208 47015.3808 158182.765
 --dito-- =59302.2397 29646.5810 20603.9006 31024.3040 113302.661
 Saving: HH=-4366.9172 285.671956 22169.8384 253684.347
 -do-Agg. HH= 0.000000 1824.07257 57776.8158 215955.720
 HH:CP:AG:PB=275556.608 32730.0620 308286.670 138729.001

Final Demnd=136470.862 210158.607 2318.36176 234774.866 64203.8269 29933.1468
 --dito-- =17290.5377 24918.0828 27610.0801 17959.0903 173507.913 4777.97122
 --dito-- =47246.4348 46970.8370 128765.200 254328.992 47117.7270 377892.808
 Investm- DD=6601.08042 14413.1263 18564.1138 155998.188 251439.163 447015.67
 NMC: Gvt DD=40716.5301 240011.895 223791.891 16220.0038

Activ (mp) =368961.949 278350.634 72708.9441 302496.163 411525.178
 -dito-Act =200523.614 77610.6867 151167.187 84902.9278 97171.5048
 -dito-Act =188967.022 221234.059 230921.202 66191.7118 156738.137
 -dito-Act =255233.673 92800.8841 565172.933

V.Add (fc) =225742.270 160330.297 42306.4418 45616.8209 88277.5995
 -dito-VA =31856.8909 27252.9940 41593.5781 22702.5040 55868.3055
 -dito-VA =85135.0304 183191.518 122352.906 50768.8529 131796.562
 -dito-VA =130424.673 48526.8896 160483.274

Inv self HH= 0.000000 452.258532 11557.1542 103546.706 5925.64266
 Inv finc HH= 0.000000 113.064633 4202.60152 51773.3528 2409.32847
 Inv prop HH= 0.000000 188.441055 5253.25190 51773.3528
 Cap stock1 =12796.0000 32403.4755 148031.875 689013.081 45066.2556
 Cap stock2 = 0.000000 13577.3689 58983.3182 336154.541 56195.3525
 Cap stock3 =2322.00000 6850.61480 48527.3978 303586.541
 Gross Labs =10757.8305 18785.2407 24426.5733 56852.3949

New:PWG,FWG,BKM= 0.000000 95275.0996 0.000000
 Outstandg Debt =98740.0000 870078.277 332372.209

301679.57 462162.84
 1024693.23 510068.06
 1846245.34 1654227.41 1118499.57
 Exports, Imports
 Cap, Lab share
 FD, VT, PC

Det 1
 RB
 31534.2040
 4366.91717
 PoD
 25681.7744

Final results: Zakah system*** fsmall= 0.000092
 Factor price:w,r,t= 0.241646 0.261663 0.496691
 Normalized price = 1.000000 1.082838 2.055452
 X-Demd function = 0.000092 3753.45683 -3753.4567 -11357.427
 Inv GR:FX/PV:CR:PB=135226.507 112590.364 66072.2323 11576.2944 34941.8370
 End year = 1

Final results: Zakah system*** fsmall= 0.000031
 Factor price:w,r,t= 0.455638 0.495654 0.048708
 Normalized price = 1.000000 1.087824 0.106900
 X-Demd function = 0.000031 23818.9426 -23818.943 -8250.5481
 Inv GR:FX/PV:CR:PB=166813.777 138477.435 81528.9444 13972.7348 42975.7557
 End year = 2

Final results: Zakah system*** fsmall= 0.000757
 Factor price:w,r,t= 0.275358 0.295598 0.429044
 Normalized price = 1.000000 1.073504 1.558128
 X-Demd function = 0.000757 39811.9131 -39811.912 -6605.5008
 Inv GR:FX/PV:CR:PB=198661.573 166336.391 99198.8412 15515.9109 51621.6385
 End year = 3

Final results: Zakah system*** fsmall= 0.000097
 Factor price:w,r,t= 0.296165 0.316366 0.387469
 Normalized price = 1.000000 1.068211 1.308289
 X-Demd function = 0.000097 59622.8496 -59622.849 -4772.5260
 Inv GR:FX/PV:CR:PB=232648.069 195416.702 117530.024 17240.1154 60646.5626
 End year = 4

Final results: Zakah system*** fsmall= 0.000558
 Factor price:w,r,t= 0.320036 0.340036 0.339928
 Normalized price = 1.000000 1.062494 1.062155
 X-Demd function = -0.000558 81574.4800 -81574.481 -3114.6224
 Inv GR:FX/PV:CR:PB=269974.026 227557.808 137999.479 18936.9395 70621.3885
 End year = 5

Final results: Zakah system*** fsmall= 0.000147
 Factor price:w,r,t= 0.355396 0.375616 0.268987
 Normalized price = 1.000000 1.056894 0.756865
 X-Demd function = 0.000147 107632.813 -107632.81 -1343.4253
 Inv GR:FX/PV:CR:PB=312383.186 264204.994 161275.280 20935.0609 81994.6532
 End year = 6

Final results: Zakah system*** fsmall= 0.001589
 Factor price:w,r,t= 0.396468 0.416642 0.186889
 Normalized price = 1.000000 1.050884 0.471384
 X-Demd function = 0.001589 137245.681 -137245.68 404.885829
 Inv GR:FX/PV:CR:PB=360554.072 306072.474 188040.672 23043.7933 94988.0092
 End year = 7

Final results: Zakah system*** fsmall= 0.001863
 Factor price:w,r,t= 0.463796 0.483275 0.052929
 Normalized price = 1.000000 1.041998 0.114122
 X-Demd function = 0.001863 174446.337 -174446.34 3554.35043
 Inv GR:FX/PV:CR:PB=434555.725 370921.635 230251.513 25556.5114 115113.611
 End year = 8

Final results: Zakah system*** fsmall= 0.000338
 Factor price:w,r,t= 0.059556 0.059557 0.880887
 Normalized price = 1.000000 1.000003 14.790786
 X-Demd function = -0.000338 207315.495 -207315.50 2342.75938
 Inv GR:FX/PV:CR:PB=491899.227 431150.044 269310.427 28034.4311 133805.186
 End year = 9

Final results: Zakah system*** fsmall= 0.001839 P-262 (b)
 Factor price:w,r,t= 0.062044 0.062044 0.875913 Annexure 9.2
 Normalized price = 1.000000 0.999997 14.117638 (End Year)
 X-Demd function = 0.001839 258383.890 -258383.89 4816.78676
 Inv GR:FX/PV:CR:PB=566756.828 496764.702 311085.498 31510.8479 154168.356
 End year = 10

 Detailed Results: Zakah system

Price-Mk=	1.010360	1.001202	1.307198	1.073037	1.018400	1.023616
dito--Mk=	1.217276	1.022977	1.022940	1.044943	1.021645	1.040473
dito--Mk=	1.019593	1.001017	1.004985	1.001003	1.015838	1.222877
Price-Cn=	1.044277	1.066036	1.016114	1.083500	1.010766	
dito--Cn=	1.032709	1.080831	1.049790	1.061637	1.107579	
Pi/Ps:AR=	1.140896	0.438251				
Comps-Po=	5.184675	5.578623	6.045244	6.917166		

 TR-Tax-Gross=514023.138 279037.302 356103.039
 Detail-RevN =229463.892 12936.0398 30356.1822 6281.18863
 Nontax-RevN =44548.0127 32517.7241 77065.7368
 Budget-Dtser=267738.752 83547.5160 351286.268
 Dbgt-Rev-Def=175890.050 192558.496 16668.4459
 Bgt-Dev-Rgap=4816.77147 16668.4459 21485.2174

 G. Income:HH=25434.3631 44924.5360 134939.777 750126.965
 Disp inc:HH=28172.7404 47322.7273 131072.436 711625.963
 Agg Disp:HH=198231.854 302165.078 341587.876 691985.087

 Cur Exp: HH=25914.6990 47026.1629 109451.802 422867.464
 Util-V-HH =4998.32649 8429.70748 18105.4392 61133.0523
 Consump-Agg=541942.033 87778.8071 62993.5717 49369.2285 167931.067
 --dito-- =62101.6984 31354.0356 22183.9570 32478.7000 120920.617
 Saving: HH=2258.04147 296.564334 21620.6343 288758.499
 -do-Agg. HH=15888.2572 1893.62258 56345.5350 280788.765
 HH:CP:AG:PB=354916.180 35950.5983 390866.778 175890.050

 Final Demnd=142928.390 222187.986 2427.80380 246376.718 67367.1889 31501.7937
 --dito-- =21325.7674 30275.9092 29218.8346 18806.8784 216373.891 5009.71696
 --dito-- =51077.5187 52652.6271 136700.590 282162.691 50737.5390 452397.015
 Investm- DD=8369.29808 18273.9404 23536.8443 197785.098 318791.648 566756.82
 NMC: Gvt DD=45977.8090 267738.752 249644.967 18093.7848

 Activ (mp) =396677.422 297816.381 83003.2190 322184.060 469817.617
 -dito-Act =223969.252 93087.0050 175165.469 93879.1267 107721.901
 -dito-Act =233454.921 242048.575 260057.858 74364.7515 167799.413
 -dito-Act =283169.593 101813.446 661168.845

 V.Add (fc) =242699.450 171542.590 48296.2708 48585.7818 100782.099
 -dito-VA =35581.6648 32687.5034 48196.6936 25102.6826 61934.2065
 -dito-VA =105178.097 200426.851 137790.875 57037.5509 141097.669
 -dito-VA =144699.957 53239.6850 (187741.725)

 Inv self HH=1534.07791 494.603141 11373.9431 135983.071 7708.41778
 Inv finc HH=236.011987 123.650785 4135.97933 67991.5355 2372.51284
 Inv prop HH=590.029967 206.084642 5169.97416 67991.5355
 Cap stock1 =18202.3056 32834.0217 146393.620 843515.131 53069.8499
 Cap stock2 =10442.0122 14866.8870 49309.3526 373450.729 56092.1737
 Cap stock3 =4401.34832 7030.00902 47782.7362 380837.565
 Gross Labs =10757.8305 18785.2407 24426.5733 56852.3949

 New:PWG,FWG,BKM= 0.000000 126261.581 0.000000
 Outstandg Debt =98740.0000 1022495.53 318052.076
 EX:IM:FD:VT:PC =352920.532 540662.256 2059528.86 1842621.35 1179053.72
 Cap:Lab shares =1144081.79 565295.190

31534.20
 373343.56
 25661.77
 0.80000
 Pdo, RB
 Det, ZKFA

Final results: Profit sharing*** fsmall= 0.001577
Factor price:w,r,t= 0.437640 0.497638 0.064722
Normalized price = 1.000000 1.137094 0.147890
X-Demd function = 0.001577 6045.85540 -6045.8538 -7371.4144
Inv GR:FX/PV,CR,PB=138400.665 111635.306 65213.1054 11776.7609 34645.4398
End year = 1

Final results: Profit sharing*** fsmall= 0.000715
Factor price:w,r,t= 0.443596 0.503615 0.052789
Normalized price = 1.000000 1.135300 0.119003
X-Demd function = 0.000715 16819.8590 -16819.858 -6040.8367
Inv GR:FX/PV,CR,PB=155405.897 125480.662 73911.3755 12627.0118 38942.2743
End year = 2

Final results: Profit sharing*** fsmall= 0.000568
Factor price:w,r,t= 0.464158 0.526158 0.009685
Normalized price = 1.000000 1.133575 0.020865
X-Demd function = -0.000568 29419.4170 -29419.418 -4603.1215
Inv GR:FX/PV,CR,PB=174984.033 141428.621 83953.5149 13583.4648 43891.6409
End year = 3

Final results: Profit sharing*** fsmall= 0.000057
Factor price:w,r,t= 0.458400 0.518400 0.023200
Normalized price = 1.000000 1.130890 0.050611
X-Demd function = 0.000057 44016.4499 -44016.450 -3083.4652
Inv GR:FX/PV,CR,PB=197605.960 159958.593 95658.5051 14657.7661 49642.3221
End year = 4

Final results: Profit sharing*** fsmall= 0.000030
Factor price:w,r,t= 0.322456 0.362434 0.315110
Normalized price = 1.000000 1.123980 0.977220
X-Demd function = 0.000030 60523.8281 -60523.828 -1614.0693
Inv GR:FX/PV,CR,PB=223948.724 182005.813 109668.691 15852.5594 56484.5627
End year = 5

Final results: Profit sharing*** fsmall= 0.000015
Factor price:w,r,t= 0.179796 0.199796 0.620409
Normalized price = 1.000000 1.111238 3.450634
X-Demd function = -0.000015 79066.3612 -79066.361 -292.67856
Inv GR:FX/PV,CR,PB=254823.240 208636.288 126706.916 17180.1790 64749.1929
End year = 6

Final results: Profit sharing*** fsmall= 0.000040
Factor price:w,r,t= 0.336236 0.376234 0.287531
Normalized price = 1.000000 1.118959 0.855146
X-Demd function = -0.000040 104069.474 -104069.47 2208.88038
Inv GR:FX/PV,CR,PB=289892.006 236284.665 144133.319 18821.6217 73329.7236
End year = 7

Final results: Profit sharing*** fsmall= 0.000195
Factor price:w,r,t= 0.344446 0.384462 0.271093
Normalized price = 1.000000 1.116175 0.787041
X-Demd function = -0.000195 131311.865 -131311.86 4557.25944
Inv GR:FX/PV,CR,PB=330875.972 270126.177 165676.236 20617.6789 83832.2618
End year = 8

Final results: Profit sharing*** fsmall= 0.000214
Factor price:w,r,t= 0.356235 0.396596 0.247169
Normalized price = 1.000000 1.113297 0.693836
X-Demd function = -0.000214 163116.243 -163116.24 7311.83627
Inv GR:FX/PV,CR,PB=378538.338 309556.057 190815.279 22671.6570 96069.1210
End year = 9

Final results: Profit sharing*** fsmall= 0.001522
 Factor price:w,r,t= 0.364464 0.404621 0.230915
 Normalized price = 1.000000 1.110179 0.633574
 X-Demd function = 0.001522 200226.394 -200226.39 10521.0948
 Inv GR:FX/PV,CR,PB=434045.263 355594.285 220212.323 25025.1150 110356.847
 End year = 10

Detailed results: Profit sharing

Price-Mk= 1.089978 1.094472 1.400875 1.164775 1.096846 1.105512
 dito--Mk= 1.310570 1.095955 1.103665 1.142628 1.077813 1.146251
 dito--Mk= 1.094200 1.058064 1.097928 1.042902 1.097838 1.316579

Price-Cn= 1.133708 1.148432 1.094251 1.168962 1.098696
 dito--Cn= 1.124696 1.165351 1.109873 1.134883 1.193069
 Pi/Ps:AR= 1.220619 0.454760
 Comps-Po= 5.617091 6.042028 6.544743 7.482927

TR-Tax-Gross=23068.3963 242688.415 319281.772
 Detail-Revnn =199033.205 12048.4712 25792.7328 5814.00592
 Nontax-Revnn =45633.4617 30959.8946 76593.3563
 Budget-Dtser=236067.218 72693.4769 308760.695
 Dbgt-Rev-Def=134703.702 169661.013 34957.3102
 Bgt-Dev-Rgap=10521.0766 34957.3102 45478.3868

G. Income:HH=18909.4739 46546.8071 154463.609 610675.010
 Disp inc:HH=21309.7917 48607.1357 149979.123 579405.523
 Agg Disp:HH=149942.087 310366.283 390860.593 563413.930

Cur_Exp: HH=25178.2102 48301.4007 125151.794 343535.413
 Util-V-HH =4482.42906 7994.23701 19122.4914 45909.2289
 Consump-Agg=533713.191 86222.9909 57979.9228 48342.6014 160860.175
 --dito-- =61106.3438 30308.2301 20641.2918 32023.3728 114589.353
 Saving: HH=-3868.4186 305.734968 24827.3289 235870.109
 -do-Agg. HH= 0.000000 1952.17892 64702.5020 202140.741
 HH:CP:AG:PB=268795.421 30546.1395 299341.561 134703.702

Final Demnd=140747.078 215678.771 2388.89140 241659.879 66101.5051 30719.6931
 --dito-- =16924.9265 24495.6439 28191.0434 18505.4451 169277.909 4921.75836
 --dito-- =47012.2667 6325.33226 130944.687 251073.690 47532.3735 373400.785
 Investm- DD=6409.54640 13994.9214 18025.4657 151471.814 244143.516 434045.26
 NMC: Gvt DD= 0.000000 236067.218 220113.796 15953.4226

Activ (mp) =376565.168 284185.526 72405.0365 309432.292 411533.644
 -dito-Act =201094.812 76159.8117 149709.567 84218.9922 97075.3243
 -dito-Act =184614.884 223674.105 229395.525 25396.5190 155723.511
 -dito-Act =251970.221 91488.0475 560442.107

V.Add (fc) =230394.154 163691.201 42129.6101 46662.7983 88279.4155
 -dito-VA =31947.6363 26743.5192 41192.5145 22519.6240 55813.0069
 -dito-VA =83174.2681 185211.983 121544.530 19479.0572 130943.393
 -dito-VA =128757.045 47840.3888 159139.936

Inv self HH= 0.000000 524.565868 12612.3926 91222.8728 5517.84235
 Inv finc HH= 0.000000 131.141467 4586.32460 45611.4364 2482.66233
 Inv prop HH= 0.000000 218.569112 5732.90575 45611.4364
 Cap stock1 =12796.0000 33065.1774 153957.407 637739.652 43623.1693
 Cap stock2 = 0.000000 13742.7944 61138.0572 310517.826 56655.5936
 Cap stock3 =2322.00000 7126.32392 51220.8215 277949.826
 Gross Labs =10757.8305 18785.2407 24426.5733 56852.3949

New:PWG,FWG,BKM= 0.000000 86154.7028 0.000000
 Outstandg Debt =98740.0000 846713.163 305613.733
 EX:IM:FD:VT:PC =299154.335 458294.271 1815901.68 1625464.08 1145787.47
 PoDo, RB, Det1 =25681.7744 31534.2040 3868.41858

Cap, Lab Shares 1001054.84 507157.68

Final results: Profit sharing Plus Zakah system*** fsmall= 0.001577
 Factor price:w,r,t= 0.437640 0.497638 0.064722
 Normalized price = 1.000000 1.137094 0.147890
 X-Demd function = 0.001577 6045.85540 -6045.8538 -7371.4144
 Inv GR:FX/PV,CR,PB=138400.665 111635.306 65213.1054 11776.7609 34645.4398
 End year = 1

Final results: Profit sharing Plus Zakah system*** fsmall= 0.000820
 Factor price:w,r,t= 0.455764 0.515747 0.028489
 Normalized price = 1.000000 1.131608 0.062508
 X-Demd function = -0.000820 24382.2044 -24382.205 -3787.3251
 Inv GR:FX/PV,CR,PB=172110.709 139263.218 81801.4710 14242.1279 43219.6195
 End year = 2

Final results: Profit sharing Plus Zakah system*** fsmall= 0.000905
 Factor price:w,r,t= 0.182204 0.202204 0.615592
 Normalized price = 1.000000 1.109765 3.378576
 X-Demd function = -0.000905 38909.7880 -38909.789 -2378.2365
 Inv GR:FX/PV,CR,PB=203733.636 166950.417 99602.8226 15535.3958 51812.1983
 End year = 3

Final results: Profit sharing Plus Zakah system*** fsmall= 0.000186
 Factor price:w,r,t= 0.336444 0.376424 0.287131
 Normalized price = 1.000000 1.118830 0.853429
 X-Demd function = -0.000186 59605.7016 -59605.702 -10.018994
 Inv GR:FX/PV,CR,PB=235815.121 192222.072 115558.745 17008.2005 59655.1257
 End year = 4

Final results: Profit sharing Plus Zakah system*** fsmall= 0.001051
 Factor price:w,r,t= 0.344563 0.384366 0.271071
 Normalized price = 1.000000 1.115519 0.786711
 X-Demd function = 0.001051 80936.9521 -80936.951 1631.03148
 Inv GR:FX/PV,CR,PB=271170.836 221467.609 134413.096 18323.1862 68731.3269
 End year = 5

Final results: Profit sharing Plus Zakah system*** fsmall= 0.001875
 Factor price:w,r,t= 0.355576 0.395576 0.248848
 Normalized price = 1.000000 1.112495 0.699847
 X-Demd function = 0.001875 106081.456 -106081.45 3533.44549
 Inv GR:FX/PV,CR,PB=310951.835 254404.959 155582.735 19868.9610 78953.2631
 End year = 6

Final results: Profit sharing Plus Zakah system*** fsmall= 0.001076
 Factor price:w,r,t= 0.378464 0.418622 0.202915
 Normalized price = 1.000000 1.106108 0.536154
 X-Demd function = -0.001076 136538.152 -136538.15 6576.01635
 Inv GR:FX/PV,CR,PB=373230.314 306500.762 189981.912 21397.9239 95120.9261
 End year = 7

Final results: Profit sharing Plus Zakah system*** fsmall= 0.000355
 Factor price:w,r,t= 0.384622 0.424402 0.190976
 Normalized price = 1.000000 1.103426 0.496529
 X-Demd function = -0.000355 171956.106 -171956.11 8640.85110
 Inv GR:FX/PV,CR,PB=424758.287 349365.748 217577.529 23364.3662 108423.853
 End year = 8

Final results: Profit sharing Plus Zakah system*** fsmall= 0.000671
 Factor price:w,r,t= 0.398466 0.438624 0.162910
 Normalized price = 1.000000 1.100780 0.408842
 X-Demd function = -0.000671 212434.909 -212434.91 10937.0699
 Inv GR:FX/PV,CR,PB=483905.083 398634.306 249449.311 25470.8999 123714.095
 End year = 9

Final results: Profit sharing Plus Zakah system*** fsmall= 0.000174 P-264 (b)
 Factor price:w,r,t= 0.403816 0.443417 0.152767 Annexure9.1
 Normalized price = 1.000000 1.098065 0.378309
 X-Demd function = 0.000174 259843.915 -259843.91 13771.1461 (End Year)
 Inv GR:FX/PV,CR,PB=552470.239 455846.636 286337.708 28039.2829 141469.646
 End year = 10

Detailed results: Profit sharing and Zakah system

Price-Mk= 1.081327 1.084279 1.390629 1.154776 1.088350 1.096600
 dito--Mk= 1.300373 1.088056 1.094898 1.131925 1.071714 1.134654
 dito--Mk= 1.086071 1.051914 1.087774 1.038362 1.088920 1.306413
 Price-Cn= 1.123961 1.139502 1.085732 1.159675 1.089096
 dito--Cn= 1.114646 1.156173 1.103355 1.126922 1.183775
 Pi/Ps:AR= 1.211965 0.453010
 Comps-Po= 5.569991 5.991556 6.490345 7.421315

TR-Tax-Gross=13774.2299 276146.216 357425.760
 Detail-Revn =227662.780 13070.1737 28694.4605 6718.80133
 Nontax-Revn =48475.2496 32804.2939 81279.5436
 Budget-Dtser=261829.688 81824.9283 343654.616
 Dbgt-Rev-Def=171456.281 199428.357 27972.0763
 Bgt-Dev-Rgap=13771.1432 27972.0763 41743.2195

G. Income:HH=25897.7602 47242.3935 147340.995 711654.079
 Disp inc:HH=28569.7638 49548.8841 143081.654 675148.153
 Agg Disp:HH=201025.429 316379.535 372885.098 656514.064

Cur.Exp: HH=26271.9928 49237.3446 119404.859 400394.779
 Util-V-HH =4716.70290 8217.78913 18397.3050 53951.9997
 Consump-Agg=554608.859 89731.1930 62659.5780 50398.8474 169848.929
 --dito-- =63530.3477 31832.8658 22168.1421 33251.2546 121742.785
 Saving: HH=2297.77102 311.539506 23676.7947 274753.374
 -do-Agg. HH=16167.8063 1989.24206 61704.0945 267170.181
 HH:CP:AG:PB=347031.324 33982.6338 381013.958 171456.281

Final Demnd=146264.223 226394.431 2483.65541 251699.875 68833.6305 32101.4420
 --dito-- =20902.9173 29766.1081 29641.7092 19239.5305 211600.494 5121.51968
 --dito-- =50806.7043 6720.20172 138261.784 276939.532 50847.2895 446449.476
 Investm- DD=8158.32801 17813.2979 22943.5365 192799.406 310755.670 552470.23
 NMC: Gvt DD= 0.000000 261829.688 244135.238 17694.4503

Activ (mp) =401939.801 301914.819 82302.1151 327154.790 467708.438
 -dito-Act =223397.772 91300.4606 172923.590 92565.9787 106959.910
 -dito-Act =228447.986 243112.446 257345.812 28156.2693 165593.015
 -dito-Act =277931.715 99719.7135 653827.837

V.Add (fc) =245919.135 173903.295 47888.3264 49335.3744 100329.653
 -dito-VA =35490.8747 32060.1583 47579.8417 24751.5552 61496.1033
 -dito-VA =102922.330 201307.783 136353.906 21595.7777 139242.373
 -dito-VA =142023.396 52144.8429 185657.214

Inv self HH=1464.36171 568.926559 11943.3145 120016.795 7073.48229
 Inv finc HH=225.286416 142.231640 4343.02347 60008.3976 2470.21515
 Inv prop HH=563.216041 237.052733 5428.77934 60008.3976
 Cap stock1 =19039.2898 33560.9489 151159.491 782873.206 51313.2746
 Cap stock2 =8044.39937 14903.4082 50885.5724 344760.821 56579.7699
 Cap stock3 =4723.26530 7332.89538 49949.0413 350516.603
 Gross Labs =10757.8305 18785.2407 24426.5733 56852.3949

New:PWG,FWG,BKM= 0.000000 113950.058 0.000000
 Outstandg Debt =98740.0000 988651.662 296155.020
 EX:IM:FD:VT:PC =349002.029 534659.243 2014074.52 1800001.94 1199772.80

cap/lab shares 1103105.10 566755.31
 P.o.p, R.B 25681.77 31534.24
 Def, Zz Fd 8.000000 54865.78

CHAPTER 10

SUMMARY AND CONCLUSIONS

We have undertaken this exercise under the motivation of seeking a plausible framework for testing the hypothesis that an economic system founded on the eternal principles of Islam can provide satisfactory answers to the present day socioeconomic issues and that this is the last resort in particular, which can guarantee to pull the economies of the underdeveloped Islamic world out of the gravities and shocks within a finite time span. The analytical tool adopted for the purpose is the CGE framework and the body selected for operation is the economy of Pakistan as exhibited by the observed comprehensive data for 1989-90. The explicit objective was to demonstrate the future prospects of the economy in concrete numerical terms under specific assumptions and to evaluate its performance by comparing and contrasting the results obtained under different plans. In the following paragraphs, we summarize the procedures and main findings of the study and finally attend to the limitations and scope for further research.

10.1 Summary of Procedures

We presented a general equilibrium model for Pakistan economy in Walrasian tradition by partially adopting from the specifications followed in Sera Puche (1979), Hassan Imam (1983) and BSFW (1985). We have deviated from the models under reference where necessary and introduced innovations to incorporate Zakah as an instrument for redistribution and to substitute the institution of interest by the profit sharing scheme in the saving-investment portfolios.

Next we developed a consistent data set based on the information provided in the official statistics for the year 1989-90 after going through necessary modifications, checks and balances. Likewise, we attended to estimate the parameters of the model that required, besides the process of calibration used in the

applied modelling, a search through the available literature.

A very important task in this exercise was to develop an appropriate programme since the computer packages available in the market were not suitable for our purpose. We tested the reliability of the programme as well as the consistency of the model against the observed data. The model replicated the entire set of values which were found to be in line with the observed data. This information constituted the benchmark equilibrium which could be used as the basis for further analyses.

We found it useful to analyze the short run impacts of different fiscal options, assuming that all the options have the common objective of eliminating the budgetary deficit at the margin, while keeping all other parameters unchanged. We used various indicators to judge the desirability of options at hand. The results provide fair basis for the appraisal of existing policies.

Finally we examined the performance of the economy in dynamic framework. We compared and contrasted the simulations obtained under different scenarios, (the secular, semi-Islamic and full scale Islamic) in terms of key micro and macro indicators. This part of the study is crucial as it dismisses the skeptics and brings to fore the critical angle for policy switch-over needed to Islamize the economy.

10.2 Findings and Conclusions

For the analysis of fiscal reforms, the unique target fixed for the purpose was elimination of the fiscal deficit (on revenue account) at the margin. The point of reference was the benchmark equilibrium or the basic tax-expenditure structure of the economy as observed in 1989-90. Seven different packages were tested and it was found that the tax-expenditure policy mix gives the best results. It proposes the following amendments in the base-year tax-expenditure structure:

- (i) 5% cut in the non-development expenditure of the federation (or its equivalent in the form of administrative measures to prevent leakages from the public exchequer).
- (ii) 10% increase in the rates of commodity taxation (or equivalently widening the tax base to bring revenues to the desirable extent).

- (iii) 50% increase in the effective rates of direct taxes , like personal and corporate income tax and property tax etc (or promoting efficiency in the collection of revenues at the prevailing rates as an equivalent alternative).

It was shown (Table-8.2) that such a fiscal policy framed on the above lines will be socially desirable and technically feasible in achieving the target in the short run.

The objective of dynamic analysis was to find the *would be* or the future scenario of the economy by the end of the specified period. The economy was supposed to operate under four prospective plans of 10-year duration each with the base year (1989-90) as the point of departure. The proposed plans or schemes of analyses were:

- (i) Maintaining the status quo or allowing the base line (1989-90) structure of taxation, distribution and transactions to operate as usual.
- (ii) Introduction of *Zakah* in the system according to the provisions of *Shariah* while keeping all other parameters in tact.
- (iii) Incorporation of the profit sharing system to replace the institution of interest in the financial transactions or allowing the modes of business otherwise permissible in *Shariah*. Again all other phenomena to remain undisturbed.
- (iv) Enforcement of *Zakah* and profit sharing mechanism to operate simultaneously in the system. This is termed as the full-scale Islamic plan.

The results of the counterfactual equilibria under the four scenarios were compared and contrasted in terms of key micro and macro indicators. It was found that the full scale Islamic portfolio gives outstanding performance particularly in terms of eradication of poverty, reducing of inequalities, elimination of fiscal deficits, retirement of debt and improvement of the over all economic situation and welfare of the society. The results were shown in summary Tables-9.2 and 9.3.

10.3 Scope further Research

We have tried to develop an analytical framework to evaluate the impact of the Islamization programme in a developing economy facing a number of socioeconomic problems. The nature and scope of this study is unique and comprehensive. No such attempt has so far been made in the past with reference to Pakistan. We have resorted

to certain assumptions the validity of which may be questioned. Anyhow this practice is common to all models and the critiques can be dealt with accordingly. Further the results projected by the model are based on the available information regarding the variables and parameters. Every possible effort has been made to fit the model as accurately as possible to the data at hand and necessary tests have been carried out to ascertain the consistency of the model and procedures. Yet, human efforts are imperfect and there remain certain corners unexplored that ought to be identified and rectified. Despite the shortcomings in the available information, we are satisfied on one particular account. If the analysis and its results are valid for the base year structure and its continuation in the longrun, they are valid for the alternative plans as well. We have tried to provide empirical support to the theoretical work of Islamic economists by establishing the efficiency of a system, otherwise non-existent in the contemporary world. As such, the present study is an attempt to push the Islamic economic paradigm a step forward. How far we have been successful in our objective is left to the judgement of the readers.

One point must be clarified. The economic system proposed by Islam is not confined to enforcement of *Zakah* and elimination of *Riba* only. Rather it suggests revolutionary reforms at all levels and on every aspect of the economy. The State has to shoulder the heavy responsibility to implement the affirmative and prohibitive measures advised by Shariah to keep the society on the right track. The present study highlights a limited area where appropriate fiscal and monetary policies have direct relevance and hence prepares a case for the State to intervene and initiate the programme. Once the economy is launched on a cautiously framed plan, it will start moving, no matter slowly, but in the right direction, towards the destination. Practical hurdles may appear during execution but these can be handled accordingly and with the passage of time.

Hopefully, this exercise may prove useful for the economists and the policy makers should it invoke incentive to make necessary arrangements and

encouragement to take a bold start in the right direction¹. The nation will positively support such a Programme and one need not care much about the reservations of certain quarters who question the viability of the Islamic system in wake of the complexity of economic affairs. Revolutions have always swept such tiny things and paved way through obstacles².

For the academicians and general readers the exercise may be interesting since a hypothesis well supported by empirical evidence is always stronger in influence than pure theoretical intuitions. It may open new avenues for research within the comprehensive framework we have adopted. For instance, there is scope of evaluating the impacts of *Usher* (introduced in 1980's but ill implemented) versus the Agricultural income tax (implemented in 1998 and much advocated) provided one has access to micro data on the land holdings and actual produce in the sector concerned. The benefits of trade among Muslim countries can be explored in the general equilibrium context. Likewise the implications of self reliance may be seen and compared to the results of depending on foreign assistance.

¹ The case of elimination of Riba from financial transactions is under discussion before the Shariah Appellate Bench of the Supreme Court of Pakistan since Feb, 1999. The final verdict, yet awaited, may bear far reaching impacts on the shape of the economy in future.

² At the time we are writing these lines, the nation is proudly and vigorously celebrating the bold action of testing nuclear weapons on 28th May, 1998 besides patiently facing the difficulties that may arise due to financial sanctions proposed by the Western World as punishment.

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