Institute of
Social Studies

Graduate School of Development Studies

IMPACT OF TRADE LIBERALISATION ON PRODUCTION, INCOME DISTRIBUTION AND ON BALANCE OF TRADE IN PAKISTAN: A COUNTERFACTUAL ANALYSIS USING A COMPUTABLE GENERAL EQUILIBRIUM MODEL

A Research Paper presented by

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In Partial Fulfillment of the Requirements for Obtaining the Degree of

MASTER OF ARTS IN DEVELOPMENT STUDIES
Specialization:
ECONOMICS OF DEVELOPMENT

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The Hague, December, 1999

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Acknowledgement

In the course of completing the dissertation it is of great pleasure for me to offer my thanks to my supervisors Dr. J. Alarcon and Dr. Howard Nicholas for their intellectual comments and their excellent supervision. I must say it is their constructive remarks and encouragement that made it possible to complete this study.

I also want to express my gratitude to Prof. Dr. Graham Pyatt for his thought provoking lectures about SAM and CGE models during the course of study. I found his lectures very convincing and informative which helped me a lot while working with CGE model for Pakistan. I am also extremely grateful to Dr. Rob Vos for his guidance and comments regarding this research which I believe helped me a lot in giving it final shape.

I owe a lot to my dear friend Bushra Kazmi from Pakistan for her constant encourgement and support without which I would not have been able to finish this paper. In fact she remained a constant source of inspiration during the completion of this research. I wish her all the best in future. Besides that I am thankful to Putri and Veronica for their help and cooperation.

K.H. Naqvi

Chapter One

INTRODUCTION

Pakistan initiated structural adjustment reforms since 1980 as advocate by International Monetary Fund (IMF) and World Bank (WB) and trade liberalisation remains an important part of such reform policies. Most of the studies have focused their attention on individual elements of trade liberalisation such as devaluation by using econometric techniques. Similarly still others have used a "compactor country" approach to assess the macroeconomic impact of adjustment programmes. However this approach requires each country to have similar economic structure and a same external environment. It also requires that each country exhibit highly similar performance in the pre-adjustment period. Satisfying both of these requirements in practice would seem a difficult and necessarily problematic task. (Mark McGILLIVRAY 1995). Moreover these studies fail in taking into account the general equilibrium effects of a policy change on different sectors of the economy. In general there is a lack of adequate quantitative methodology to assess the impact of liberalisation with particular focus on trade liberalisation and its economy wide impacts. A general equilibrium framework is therefore required to capture the impact of trade liberalisation on different sectors of the economy. This study presents a Computable General Equilibrium(CGE) model for Pakistan that will be used for more detailed analysis of such policies.

1.2 Statement of Research Problem

Pakistan is a low income but rapidly developing country with per capita income of US $ 500 in 1997 and a population growth rate averaged 2.5 percent per annum. During the past 50 years the economy has undergone a transformation from an agrarian economy to a semi-industrialised country with a significant modern sector. The 1960s were a period of rapid growth, with emphasis on import substitution industrialisation and reliance mainly on private sector. The GDP growth was the result of rapid increase in agriculture productivity (the Green Revolution) and from high manufacturing growth (Vos, 1997:159).

But the policies adopted resulted in capital-intensive mode of production and due to overvalued exchange rate Pakistan's competitiveness continue to decline. As a result of this and because of protective tariffs inefficiencies emerged out and the growth process become slowing down in the end of decade. Then after experiencing little growth in industry and agriculture during 1972-77 mainly because of inconsistent domestic policies coupled with adverse external conditions, economy saw considerable revival of growth in both large scale manufacturing (10%) and agriculture (4.1%) during 1977-82. (Viqar and Rashid, 1984)

However despite high rates of growth during 1980s (6.2%), a number of structural weakness undermine the sustainability of its growth and heightened its vulnerability to external shocks. In this regard the government was seeking to prioritise the role of market determined prices in the resource allocation process. The key reform area during 1982 when Pakistani rupee was de-linked from the US dollar and it then followed by a wide-ranging deregulation of administered prices. Both external and internal prices were deregulated. Moreover measures were taken to liberalise the trade structure to enhance exports. However despite these efforts economy continued to suffer from anti export bias. And a number of structural weaknesses undermined the sustainability of its growth and heightened its vulnerability to external shocks. These weaknesses included a narrow and fragmented tax base, distortionary administrative pricing of key commodities, excessive involvement of the public sector in domestic production and trading and a restrictive trade and payments regime.

1.3 Trade and Industrial Policy Reforms 1988-89

Therefore to overcome these weaknesses government embarked on the policy of openness of economy and to liberalise trade regime so as to move from relatively inward looking to an outward oriented economy. In order to remedy this situation, the government embarked on both a stringent financial recovery programme and a comprehensive structural adjustment programme of macroeconomic and structural reform in 1989/90 that calls for substantial policy reform. In order to improve the economic performance government undertook some important trade measures during

1989 for liberalisation of the economy. The main policy measures consisted of liberalisation of exchange rate, improving the tariff structure, reducing the number of items banned on restricted lists, creating a better set of export incentives and streamlining import requirements (Baysan, 1992).

The structural reforms contributed to strong GDP and export growth but macroeconomic imbalances continue to persist. Pakistan's domestic and external imbalances were aggravated in 1992/93 and GDP growth reduced to 2.7 percent per annum. In response to continuing domestic and external imbalances, government intensified its medium-term adjustment and structural reforms in 1993/94. Its aim was to strengthen the country's external position, develop the supply side of economy, reduce vulnerability to external shocks and improve its social indicators. The trade policy component of the programme emphasises the removal of non-tariff barriers in the course of a thorough revamping of the tariff system. It includes reduction of maximum tariffs to 35 percent by 1996/97, simplification of tariff structure, and a simultaneous reduction in exemptions and concessions. It also requires that exchange rate continues to be managed responsively and rupee was devalued by 10 percent in 1993/94.

As a result the openness of the economy has increased from as low as 18 percent in 1970 to 31 percent in 1990s and there are structural changes that have taken place as reflected in the changing pattern of composition of exports. For example the share of primary exports have declined from 39 percent in 1980 to 8.4 percent in 1997. Where as the share of cotton based manufactured exports in total exports have increased from 25.5 percent in 1980 to as high as 57 percent in 1997. In case of 'other traditional exports' their share has declined from 18 percent to 14 percent. However the share of leather has risen from 10.2 percent in 1982 to 17 percent in 1997. But one of the main traditional exports i.e. carpet has drastically decreased from 91 percent to 54 percent.

This change in production structure has implications for income distribution and employment and for the balance of trade. Especially as the share of traditional exports has declined it could have serious impact on the income of the large number of small producers as a result changing pattern of production. Besides this the change

in production structure has affected the external trade, as the trade liberalisation has resulted in enhancing the exports of manufactured significantly while the exports of traditional items have declined, especially the share of primary exports has seen drastic reduction. Unlike exports the composition of imports have not changed significantly over time. Similarly the imports continue to grow and balance of trade has remained around $ 2699 million or 5.43 percent of GDP. Therefore opening of the trade regime has had several implications for the economy. But it is worthwhile to note that under structural adjustment programme there are other policies such as deregulation of economy and reforms in public sector may also have impacted the production structure, balance of trade and income distribution among different classes.

1.4 Purpose of Research

The purpose of this study is to analyse in a general equilibrium framework the effects of the policies of trade liberalisation that could be envisaged within the framework of these programmes. This is done through a series of comparative static counter factual simulations carried out with a computable general equilibrium (CGE) model of the Pakistan economy, which has been built along the lines already followed in an increasing number of countries. The analysis is carried out is that involve counterfactual simulations in which different policy instruments import tariffs, subsidies and exchange rate devaluation are manipulated to know that how the opening of the trade would have impacted on Pakistan economy. The main research questions are to investigate the implications of trade liberalisation on production, income distribution between urban and rural households, and policy of liberalisation with respect to trade balance. In this regard this study will try to assess weather or not trade liberalisation has positive effect on production, income distribution and on balance of trade.

The research hypotheses to be tested are that liberalisation has adversally affected the production structure inter alia there is a worsening of income distribution among households and consumption has decreased. Second is that trade balance has not improved as a result of trade liberalisation.

1.5 Methodology

This study uses a computable General Equilibrium (CGE) Model to see the impact of policy of trade liberalisation through counterfactual simulations which carried out by assuming a reduction in import tariffs and subsidies and through the policy of exchange rate adjustment i.e. devaluation. The model has been built around the social Accounting Matrix (SAM) 1991 constructed by Siddiqui and Iqbal (1999) and is reproduced in table-1.6 in Appendix. The assumptions and complete model is presented in subsequent chapters. The analysis is comparative static as it includes several policy simulation scenarios of the counterfactual type in which it is simulated that what would have been to production, income distribution and balance of trade had policies of opening of trade been differently applied with respect to base year.

1.6 Organisation

The rest of the study is organised as follows. Chapter two gives insight about the theoretical benefits associated with the concept of trade liberalisation as supposed under neo-classical school of thought. Chapter three presents the process of trade liberalisation that has taken place in Pakistan since mid 1980s and economic performance during this era. Chapter four then gives the theoretical basis and the construction of CGE model that is to be used for the counterfactual analysis of the process of trade liberalisation on Pakistan. Chapter five develops different counterfactual simulations based on CGE by using policy instruments to analyse the trade liberalisation. The last chapter then summarises the results of the research and gives suggestions for further research.

CHAPTER TWO

THEORETICAL EFFECTS OF TRADE LIBERALIZATION

2.1 INTRODUCTION

This chapter gives an insight about the theoretical benefits associated with the concept of free trade as supposed under neo-classical school of thought. It then presents a theoretical analysis of tariffs and subsidies within neo-classical general equilibrium framework with reference to 'small country' case. After that it establishes the basis of removing the restrictions from trade and hence presents a case for free trade to improve the welfare gains for developing countries.

2.2 Concept of Free Trade

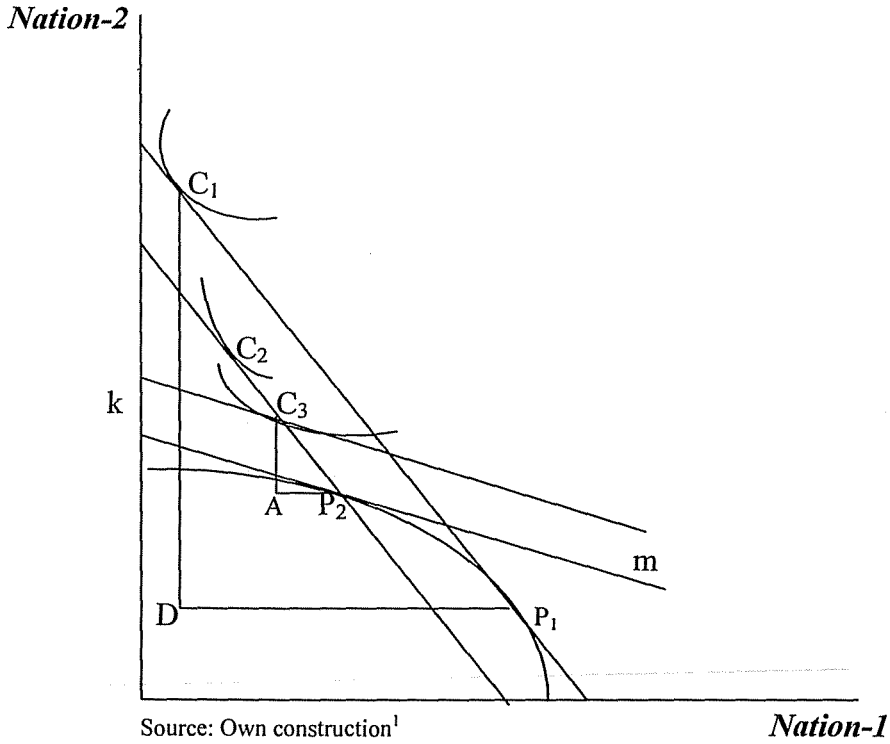
The theory of free trade postulated by Adam Smith & David Ricardo could best be understood as a reaction to mercantilists' views on trade and role of government. Before the publication of *The Wealth of Nations* by Adam Smith in 1776 a group of bankers, government officials and even philosophers wrote essays that advocate an economic philosophy known as mercantilists. They advocated strict government control of all economic activity and preached economic nationalism because they believed that a nation could gain in trade only at the expense of other nations. Adam smith believed that all nations would gain from free trade and strongly advocated the policy of laissez-fair. Free trade would cause world resources to be utilised efficiently and would maximise world welfare.

2.3 Theoretical Analysis of Tariff and Subsidy In a Small Country

This section gives a theoretical vision about the imposition of tariff by a small country and its economy wide impacts within neo-classical framework. Besides this the case of providing a subsidy is also considered and is compared to tariffs. And then it establishes that how by removing these distortions and moving towards free trade, welfare of the economy can be improved.

While trade increases welfare, most nations impose restrictions on trade. The most important type of restriction historically is tariff, a tax or duty on imports or exports. When a small nation imposes an import tariff, four effects could be envisaged. The consumption effect of tariff i.e. reduction in the domestic consumption of importable as domestic price of importable has increased, the production effect i.e. expansion of domestic production resulting from tariff, thus tariff causes resources to shift towards the protected industry which the trade effect, the decline in trade because of reduced imports and revenue effect which implies that government collects revenue. Let us analyse the effects of imposition of tariff within the general equilibrium framework. It is assumed that there are two countries Nation 1 & Nation 2. It is also assumed that Nation 1 is a labour abundant country and exports L-intensive goods while Nation 2 is a capital abundant country, which exports K-intensive goods to Nationl. Under the assumption of same technology and taste the production possibility frontier for Natoinl can be drawn as,

Figure-1



Source: Own construction[1]

The diagram shows that in case of free trade Nation-1 is producing and consuming at point P_1 and C_1 respectively. The economy is exporting DP_1 and

[1] The diagram has been constructed based on lecture notes of Professor S. Sideri, Institute of Social Studies, The Hague, The Netherlands.

importing an amount equal to distance DC_2. Now let us suppose that Nation-1 imposes a import tariff, since it is a small country so international terms of trade remains same but its domestic price of importable increases by the amount of tariff. Now its point of production is denoted by point P_2 and its consumption is at C_3, which is lower than free trade point of consumption. The diagram shows that after the imposition of tariff by Nation-1 its production of importable has increased which is called production effect. On the other hand consumption of imported good has decreased as denoted by point C_3. The tariff has caused the imports to decline as indicated by distance $AC_3<DC_1$. The reductions in imports are equal to the increase in domestic production of importable and decrease in domestic consumption that is called trade effect. It also indicates that the openness of the economy has reduced as the trade triangle $\Delta C_3AP_2<\Delta C_1DP_1$. Another important point is that tariffs forces a drastic reorganisation of production structure of the small country. "Not only do resources shift from one industry to another but also optimal factor proportions, and the marginal productivities of both factors in both industries and thus the internal distribution of income all change with the tariff" (Chacholiades, 1990:151). The essence of this complex reorganisation is captured in *Stopler-Samuelson Theorem*, which postulates that an increase in the relative price of a commodity raises the real wages of the factor used intensively in its production. The implication of this is that in Nation-1 with the imposition of tariff on imports, the resources shift from exportable to importable and the demand for capital, scarce factor of production, increases which raises the price of capital relative to labour. Thus there is a change in the income distribution and the factor used intensively by the import competing industry become better off.

Another possibility is that instead of imposing tariff, Nation-1 can give subsidy. In case a subsidy is provided, the domestic terms of trade and international terms of trade will remain same. As a result Nation-1 will consume at a higher level which is denoted by point C_2. Since C_2 is greater than C_3 implying that openness of the Nation-1 will be higher as compared to tariff. However still it is much lower than free trade point of consumption C_1.

Thus from the above it can be deduced that according to neo-classical general equilibrium model trade liberalisation would be expected to result in actually higher level of income, consumption, trade and production. And as a result economy's openness would increase.

2.4 Free Trade and Economic Development

After establishing a case for free trade, this section presents the literature review that how free trade can be helpful in improving the welfare of the developing countries. Salvatore (1998) has quoted *Haberler* wherein he has mentioned the benefits of free trade and its likely benefits for the developing countries. It points out that free trade can lead to optimal utilisation of its resources and thereby economy can move from an inefficient production point inside its production frontier to a point on its production frontier. Secondly by expanding the size of market trade results in economies of scale and division of labour as is taken place in production of light manufactures in economies such as Taiwan, Hong Kong and Singapore. Besides this free trade brings with it new technology, new managerial skills and new ideas that play a vital role in the development of countries. Another benefit associated with free trade is that it stimulates efficiency among domestic producers because of foreign competition, which is particularly important to keep cost of production low. Similarly trade facilitate international flow of capital from developed to developing countries.

Starting in 1980s many developing countries took initiatives to liberalise trade, in general reforms involved reduction and simplification of tariff rates. These in turn resulted in a much higher degree of openness, as measured by the sum of exports plus imports as a ratio of GDP and higher growth rates for liberalising countries (Salvatore, 1998: 347). The major component of faster growth was the rapid increase of manufacturing exports consequent upon the pursuit of export-oriented strategies. The main advantage of such policies is that they give the greatest encouragement to those industries in which developing countries have the lowest relative costs. By encouraging resources to shift into those industries, they improve the use of the country's scarce resources. On the other hand when a developing country gets locked into a virtuous path of rapid growth feeding through into fast domestic growth, beneficial spillover effects may be created for the entire local economy. A policy of

lowering tariffs and reducing or eliminating other kind of import barriers exposes local producers to increased competition and forces them to cut prices and seek out new, lower cost methods of production. Another advantage associated with the policy of trade liberalisation is that it creates the necessary conditions for a country to exploit the advantages obtainable from the dynamics of evolving comparative advantage. In 1987 World Bank published the results of a study carried out on the trade policies pursued by some forty-one developing countries over the significant element in its new programme of structural adjustment lending. Although the structural adjustment loans contained many different elements, almost 80 percent have had trade policy reforms as a condition. Key elements were the removal of quantitative restriction on imports, the lowering of tariffs and devaluation of exchange rates and export promotion (Salvatore 1998).

Salvatore (1998) has given the recent development in endogenous growth theory, which provides a more rigorous theoretical basis for the positive relationship between international trade and long-term economic growth and development. The new endogenous growth theory probes deeper and seeks to spell out more rigorously and in greater detail the channels through which freer trade can lead to faster growth in the long run. According to Salvatore (1998) new studies have generally shown that openness leads to faster growth. In this respect he cited the example of Dynamic Asian Economies (DAEs). The data shows that real GDP grew at an average rate of 7.8 percent in DAEs during 1980-90 and 7.6 percent in the 1990-94 period. The export growth for the same period was about 13.7 and 15.8 percent. These rate of growth are much higher when compared with the corresponding figures for the developing countries as a whole. The real GDP grew at an average of 3.1 and 1.9 percent and exports by 7.3 and 5.2 percent for the period 1980-90 and from 1990-94 respectively. Thus it establishes a case for lowering of trade barriers and hence for trade liberalisation.

2.5 Summary

It is therefore can be concluded that traditional theory which finds its basis on theory of comparative advantage suggests a case for free trade for developing countries so as to maximise welfare gains. The general aim of the neo-classical

approach is to recommend policies that will facilitate the development of the market system and greater international integration of the economies. The Washington Consensus is essentially a worldview of a neo-liberal model of market led development where these institutions overwhelmingly work within a neo-classical economic paradigm. This model of liberalisation, with trade and financial openness, outward orientation, with a liberal economy with minimal government intervention is meant to take an economy from 'illiberalism' to 'liberalism' i.e. to laissez faire(Zaidi (1994)).

CHAPTER THREE
TRADE LIBRALISATION AND ECONOMY OF PAKISTAN

3.1 INTRODUCTION

This chapter provides the concept and measures undertaken by Pakistan for trade liberalisation since 1980s. Then it describes an analysis of the major trends in economy that how economy has performed after trade liberalisation.

3.2 Defining Trade Liberalisation

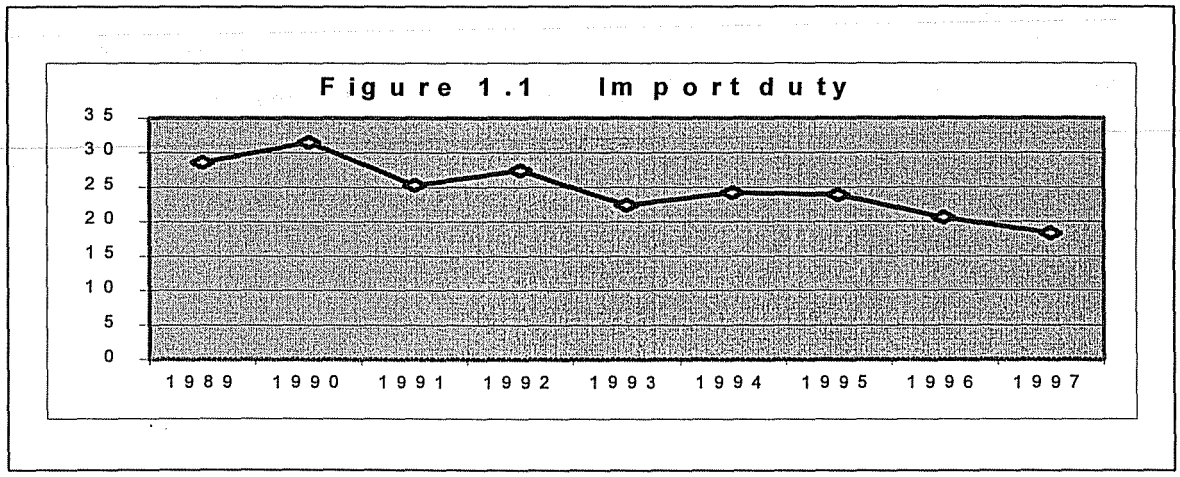
Trade liberalisation is defined as policies that diminish restrictions to the free international movement of goods and services. More particularly, it includes the diminishing of import quota and the lowering of import tariffs, and the diminishing of restrictions to exports and the lowering of export taxes. These policies have in common that they result in a decrease of the price of importable and in an increase in the price of exportables. Thus a broad definition of trade liberalisation include any reform that brings the relative incentives for production of exportables and importable in an economy more closely into line with relative world prices. Trade liberalisation often includes subsidies to exportables as a part of export reforms package. The rational is that removing protection will reduce the return to importable but this alone may not guarantee that resources are redirected towards exportables. Hence, a temporary export promotion may ensure that resources do not go to non-tradable. Besides this devaluation of the exchange rate so as to bring the exchange rate closer to its equilibrium level is also included in trade liberalisation programme. More generally, the 'correct' real exchange rate is required to keep relative domestic incentives in line with relative world prices for importable and exportables (Morrissey 1995).

3.3 Trade Liberalisation and Pakistan

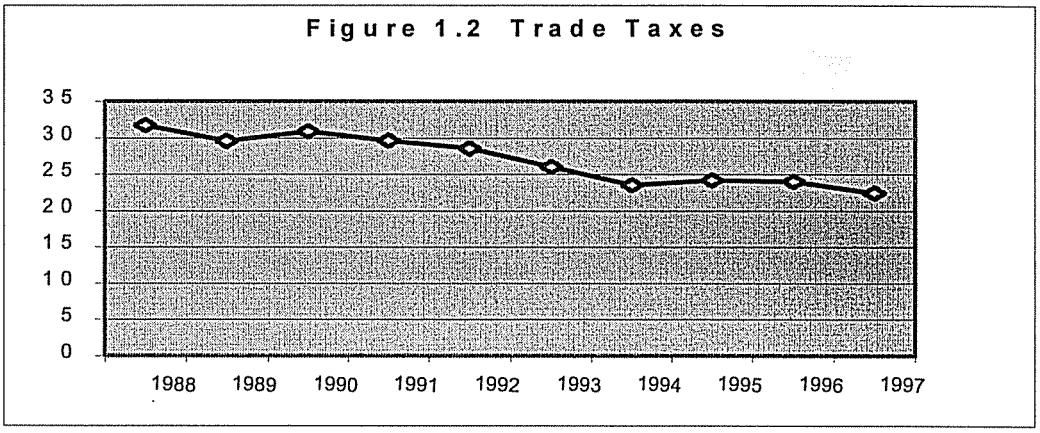
Despite achieving high rates of economic growth in 1980s (6.2%) however a number of structural weaknesses undermined the sustainability of its growth and

heightened its vulnerability to external shocks. To address these weaknesses and to put its economy on the path to high-sustained growth and improved external sector performance, Pakistan embarked on a programme of macroeconomic and structural reform. Trade liberalisation effort start in late 1980s when government took several measures and seeks to establish an incentive system that is compatible with Pakistan's comparative advantage. In the foreign trade policy, the emphasis was on the removal of non-tariff barriers (NTBs) and their replacement by tariffs, with the objective of reducing the number of banned categories from about 400 to 80 by 1991. The main policy measures for liberalising trade consisted of improving the tariff structure, reducing number of items in the banned and restricted lists, creating a better set of incentives for exports. In conjunction with this measure authorities reduced the average level and narrowed the dispersion of duty rates on imported raw materials, which now range from 20 to 50 percent ad valorem. In all tariffs rates were decreased for a total of 1134 items and increased for 462 items, out of a total more than 3200 tariff lines. Beside this liberalisation of exchange rate the main policy tool to maintain its competitiveness. Towards these ends, Pakistan received over three billion US dollars in IMF and World Bank adjustment loans. These loans have been contingent on a number of policy reforms including liberalising foreign trade (Mark McGILLIVREY et. al. 1994).

As mentioned above Pakistan took various measures to liberalise its economy and to increase its openness. The main policy measure included simplification of tariff structure and thereby reduction in import tariffs. This reduction in import tariff was also meant to help industrial activity and hence increase in exports.



As the figure 1.1 shows that after 1989 import duties have registered a downward trend. The figure suggests that overall there is a tendency for import tariff to fall. After 1995 this reduction seems to be more pronounced as Pakistan had signed the WTO agreement on January 1995. During this period there is also an overall tendency of reduction in trade taxes as shown in the following graph. In all tariff rates were decreased for a total of 1134 items. Greater rationalisation of the tariff structure was also accomplished by consolidating the duty rates on all items with similar degree of processing within narrow range.



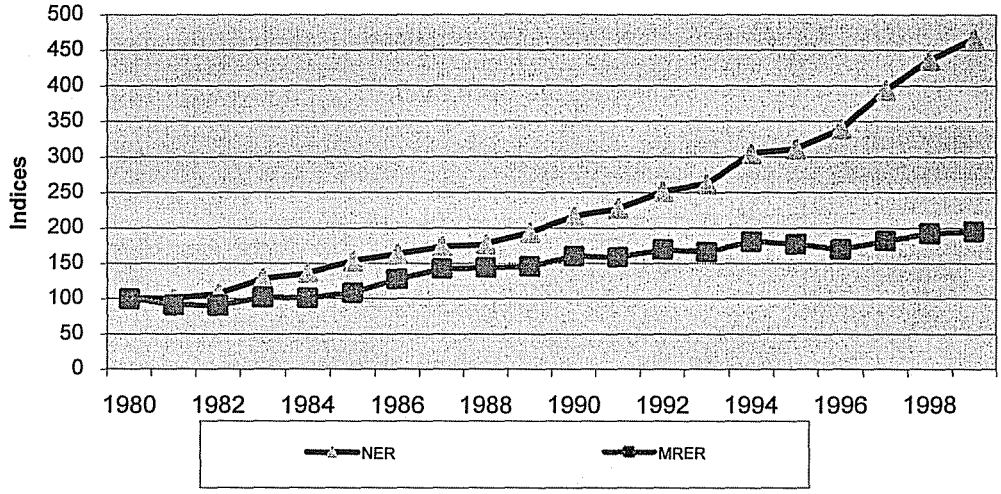
Source: CD ROM WB 1999

3.4 Exchange Rate Adjustments

Exchange rate policy to improve external competitiveness is the centrepiece of any adjustment effort. It is expected that a nominal devaluation will result in expenditure switching, increased production of tradable, higher exports, and in an improvement of the external accounts of the country in question. As discussed above devaluation of the exchange rate remained an important tool to contain imports and boost exports. Pakistan has pursued a fixed exchange rate policy for a long time until January 1982 when a change in exchange rates regime took place. And in an effort to liberalise the economy the Pakistan rupee was de-linked from US dollar in 1982. Beginning from January Pakistan has pursued a managed floating exchange rate policy to maintain external competitiveness. The cumulative depreciation of Pak rupee since the introduction of managed float system, has been of the order of 79

percent in nominal terms and about 49 percent in real terms[2]. The tendencies in terms of both nominal and in real terms are given in the following graph. Here exchange rate is defined as the price of foreign exchange i.e. Pak rupee per US dollar.

Figure 1.3 Exchange Rate Movements (1980=100)



Source: Own computations based on IMF's Direction of Trade Statistics 1999

Depreciation is therefore an increase in the exchange rate as reflected by upward trend in the graph. According to figure1.3, while Nominal Exchange Rate (NER) shows depreciation over time, the Multilateral Real Exchange Rate (MRER) depicts somewhat lower depreciation. It is due to the fact that real exchange rate takes into account not only the movements in the nominal exchange rate of major trading partners but also their inflation rate. Since trade liberalisation government often took devaluation as an instrument to correct balance of trade and in 1994 rupee was devalued by 10 percent. This is evident from the graph that both nominal and real exchange rates have depreciated significantly over time.

3.5 Major Trends in Economy

In this section some of the major trends in economy have been analysed see the performance under trade liberalisation.

[2] The depreciation in real terms has been worked out by computing Multilateral Real Exchange Rate (MRER). Where as MRER is defined as, $MRER = [(\Sigma W_i * BNER_i * P_i)/P]$, and $W_i = [(Xi + Mi) / \Sigma (X_i+M_i)]$, where X_i and M_i are trading partener i's exports and imports from/to the domestic country.

3.5.1 Growth Rates and Sectoral Composition of Output

As mentioned earlier that Pakistan embarked on the path of liberalisation and reform in an effort to have sustained growth and to overcome the persistence problem of high external deficits. An analysis of the economy shows that GDP growth in real terms during 1970s was about 4.1 percent increased to 6.9 percent in 1980s but in 1990s the increase in growth could not be sustained and it slashed down to 4.3 percent per annum.

The data shows that during 1990s small scale manufacturing sector registered highest growth of 8.4 percent where as large scale manufacturing grew by 3.84 percent. The manufacturing sector as a whole increased by 5.3 percent as compared to 8.2 percent in 1980s. Services sector, which grew at an annual average of 6.62 percent in 1980s, has in fact declined to 4.68 percent in 1990s. Agriculture depicts a growth of 4.11 percent per annum, however its rate of growth remains erratic as it depends on vagaries of Nature which cause considerable fluctuation in its output. The data shows that during 1992-93 it declined by 5.3 percent where as in 1996-97 it shows a marginal increase of 0.12 percent over the last year.

As far as sectoral composition in GDP is concerned the data shows some improvement in it. While the share of agriculture has reduced from 34 percent in 70s to 26 percent during 1990s, share of industrial sector after remaining stagnant during 70s and 80s at 23 percent showed a slight improvement and it reaches at 25 percent in 1990s. The share of services sector has increased from 43 percent in 70s to 49 percent in1990s (Economic Survey, 1998-99).

3.5.2 Trends In Exports and Imports

An analysis of exports shows that the growth patterns exhibited a fluctuating trend, increasing as high as by 23.8 percent in 1990-91 and then falling as sharply as by 4.4 percent during in 1996-97. The sharp fluctuations in exports are mainly due to the concentration of Pakistan's exports in few items (Economic Survey, 1998-99).

BNER is the bilateral nominal exchange rate of trade partners and P_i and P stands for the consumer price indices of trade partners and that of Pakistan respectively.

The trends in exports, imports and in trade balance may be seen in the figure 1.4 given below,

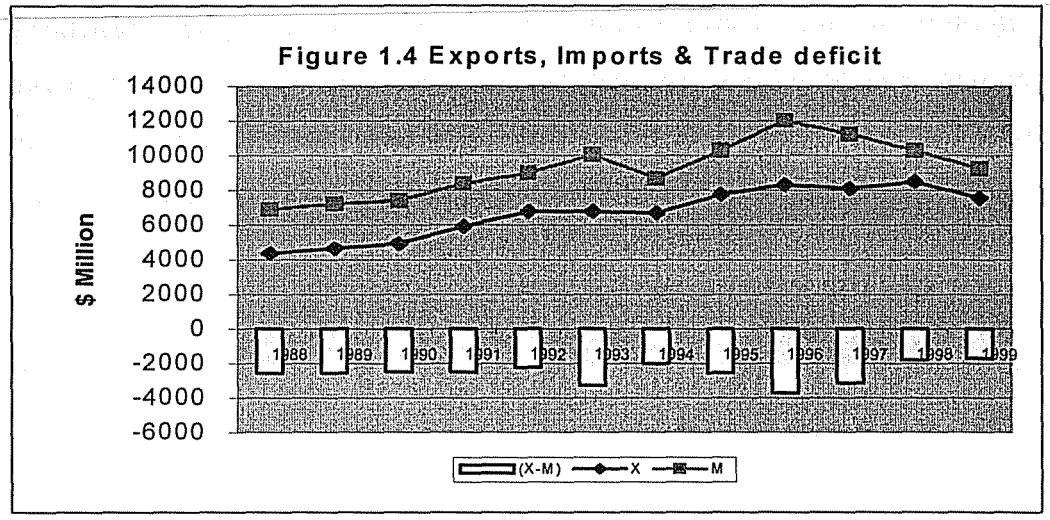


Figure 1.4 shows that after trade liberalisation the exports growth remain erratic and could not be sustained. Since variables in nominal terms conceal price effect, it would therefore be more appropriate to analyse them in real terms. The table-1 shows that though in nominal term export have increased by 6.5 percent per year but after removing the price effect it shows a decline of about 1 percent.

Table 1

Growth Rates in Export and Imports

(Percent)

	Nominal		Real[3]	
Year	**Exports**	**Imports**	**Exports**	**Imports**
1987-88	24.7	19.5	11.80	14.63
1988-89	6.2	4.2	5.03	0.12
1989-90	6.3	2.8	-0.48	-5.43
1990-91	19.8	13.1	21.10	16.26
1991-92	14.6	7.3	17.09	5.38
1992-93	0.3	11.7	-2.15	6.06
1993-94	-1.4	-13.6	-12.77	-22.42
1994-95	16.1	18.5	-7.88	1.15
1995-96	7.1	16.7	-5.21	6.09
1996-97	-2.6	-6.4	-11.86	-13.97
1997-98	4.9	-8.4	-12.49	-7.05
1998-99	-11.1	-10.2	-14.94	-18.59
Average	**6.53**	**4.25**	**-0.98**	**-1.37**

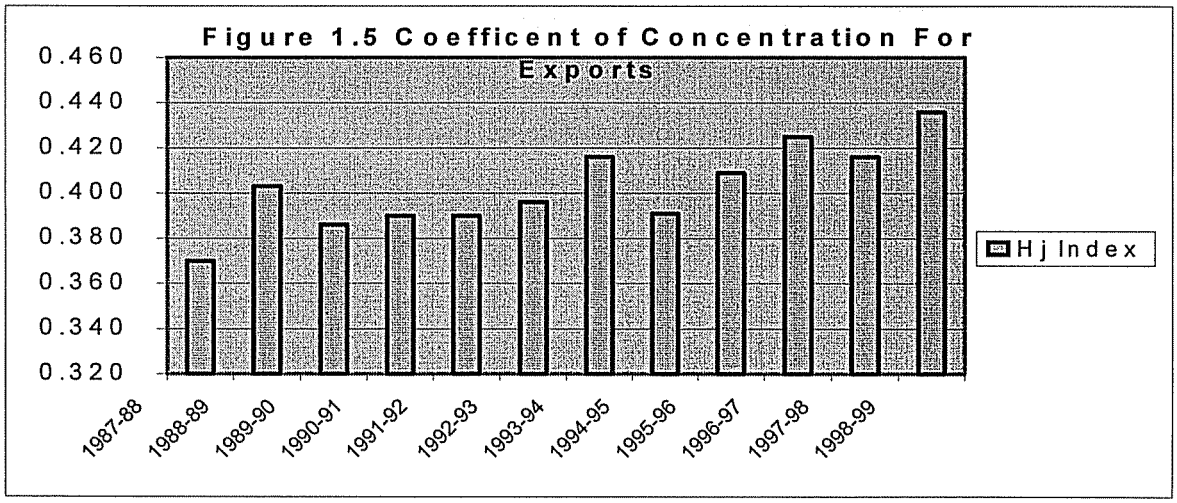
Source: WB CD-ROM 1999 and Economic Survey 1998-99

Similar calculation for imports reveals that imports have risen by 4.3 percent in nominal terms where as in real terms it declined by about 1.4 percent. A further

look on growth rates indicates that after attaining high growth rates in 1990-91 and 1991-92 exports actually continue to decline in real term in subsequent years.

3.5.3 Concentration of Exports

Despite efforts for trade liberalisation one of the major structural problems Pakistan's exports is that its exports base is not only narrow but it is also undiversified and concentrated in relatively low value added products (Economic Survey, 1998-99). The commodity concentration is often regarded as the major cause of export earnings instability. It is assumed that because of high concentration, fluctuations in some exports in one direction may not be offset by counter-fluctuations by other commodities in the other direction. Thus a country having high concentration is expected to have unstable export earnings. For this study Hirschman's coefficient[4] of concentration has been computed for which 21 commodities have been selected which constitute about 80 percent of total export earnings. The results of the index are reproduce here in a figure 1.5 for exports.



Source: Own calculation based on data from Economic Survey 1998-99

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[3] The growth in real terms have been computed as, $g_{real} = [(1+\%\Delta P_i Q_i/1+\%\Delta P_i)-1]*100$, where the numerator is the percent change in value for exports and imports and denominator measures percentage change in prices. In this regard export price index and import price index have been used to measure changes in the prices of exports and imports.

[4] Hirschman index is defined as, $H_j = \left[\sqrt{\sum_{i=1}^{n}(xi/X)2} - \sqrt{1/n}\right] / \left[1 - \sqrt{1/n}\right]$, where X_i is the value of exports of commodity i, and $X = \sum_{i=1}^{n} xi$, n is the number of commodities. The value of this index ranges between 0 and 1, an index closer to 1 suggests high degree of concentration. Details can be seen at annex.

The coefficient of concentration has been computed and is graphed above for major exports of Pakistan. The results suggests that the value of the index has rather increased indicating that after liberalisation Pakistan's exports have become even more concentrated. The index, which was 0.37 during 1988, has increased to 0.436 in 1999 and the average for the 1990s is around 0.402 (See Table-1.1, 1.2 & 1.3 in Appendix). It points out that after opening of trade exports become more vulnerable. Thus coefficient of concentration explains a large portion of the instability in total export earnings. The data points out that Pakistan is still facing the problem of export diversification. The composition of exports has changed significantly over the decade of 1990s. The principal changes have been the drastic decline in the shares of primary and semi-manufactured exports and equally sharp increase in the share of manufactured exports. The shares of primary and semi-manufactured exports have declined from 19 to 13 percent and from 24 to 17 percent respectively during 1990-98. The share of manufactured exports has increased from 57 percent to 70 percent during the same period. A look on Pakistan's exports suggests that about 84 percent of total exports in 1990s are concentrated on few commodities namely cotton, leather, rice, and synthetic textiles and sports goods. More interestingly, cotton group alone accounted for 60 percent of total exports earnings during 1990s. Thus such a high degree of concentration is a main source of instability in exports earnings. A poor cotton crop alone seriously affect the total export earnings (Economic Survey, 1998-99).

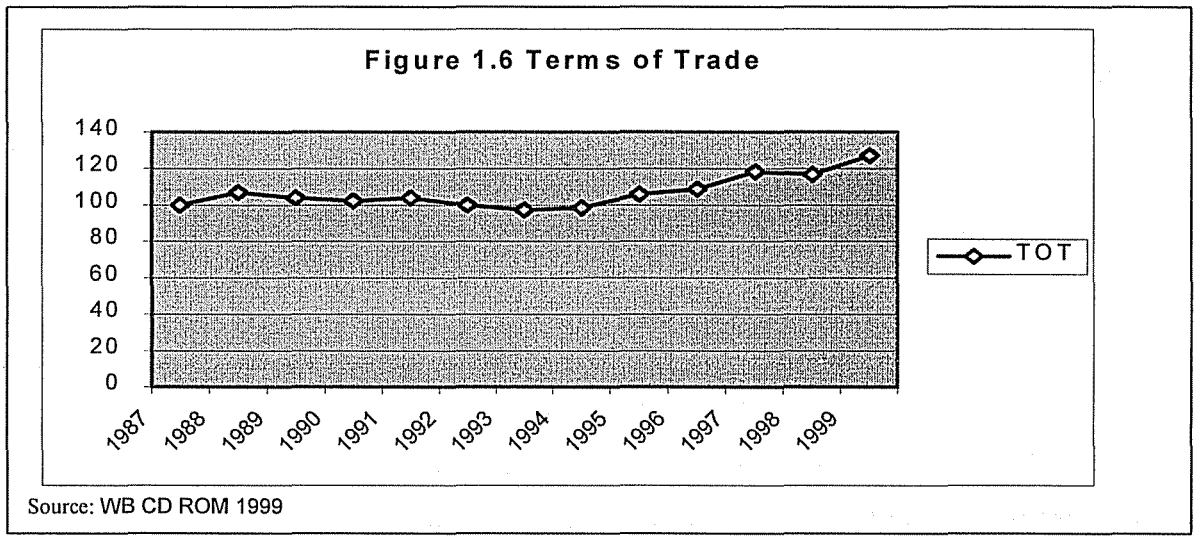
Unlike exports the composition of imports remained more or less stagnant during the 1990s. The share of capital goods imports in total imports remained almost unchanged with few fluctuations. Similar trends observed in case of industrial raw materials and consumer goods. The share of capital goods remained at about 36 percent and those of consumer goods around 15 percent during 1990s. On the other hand the share of raw material for capital goods and for consumer goods remained around 6 percent and 43 percent respectively (see table 1.4 in Appendix).

The trade deficit has exhibited a divergent trend during 1990s. It amounted to $ 2557 million or 6.6 percent or GDP in 1987-88 and remained at about $ 2.5 billion until 1990-91. After declining to around $ 2000 million in 1993-94 it again surged up to as high as $ 3704 million, highest in 1990s, or 5.7 percent of GDP in the 1995-96. However in 1997-98 & 1998-99 it reduced to about $ 1806 and $ 1699 million mainly

because of the import compression policy pursued in the wake of economic sanctions of donors (See Table-1.5 in Appendix). Thus with the exception of these last two years the average trade deficit remained around $ 2699 million or 5.43 percent of GDP.

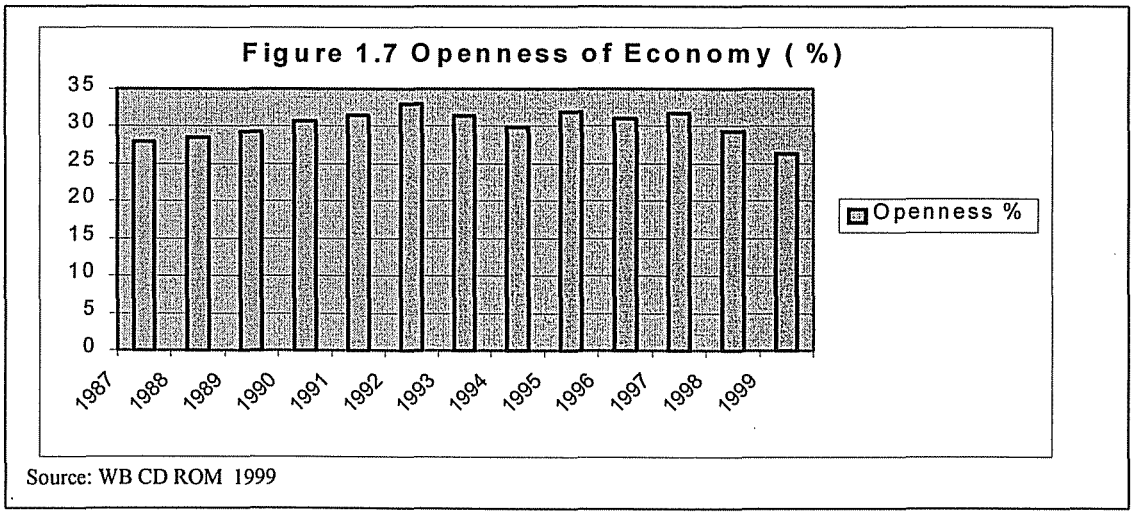
3.5.4 Terms of Trade and Openness of Economy

An analysis of the terms of trade (TOT) for Pakistan is given in the following figure where base year is taken as 1987. The result shows that terms of trade deteriorated until 1993 and thereafter it shows some improvement.



Source: WB CD ROM 1999

The openness of the economy often measured as the ratio of sum of exports plus imports as a ratio to GDP. The data shows that after structural reform the openness of the economy has increased indicating that now economy is more outward looking. The figure 1.7 shows the trend in the degree of openness.



Source: WB CD ROM 1999

As explained above trade (exports plus imports) as a ratio of GDP is used as an index to capture the openness of the economy. The data indicates that during 1987 the degree of openness was 28 percent, which increased to 33 percent in 1992. Thereafter it shows a somewhat downward trend but remain at about 31 percent. However in the last two years it has again decreased to 29 percent (See Table-1.5 in Appendix).

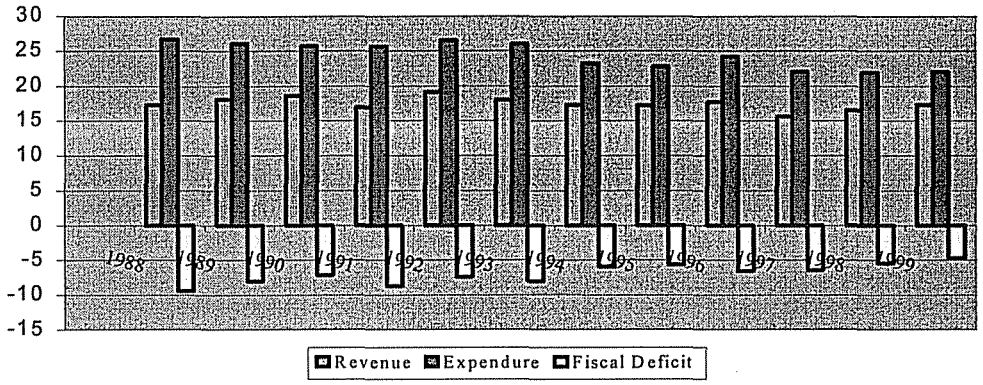
3.5.6 Fiscal Development

Fiscal consolidation and financial discipline lie at the heart of the structural reforms. Reducing fiscal deficit through broadening tax base and rationalising the tax rates on the one hand, and containing the growth of unproductive expenditure on the other have been the critical elements of the policies adopted by government to achieve fiscal consolidation. The large and persistence fiscal imbalances are the main underlying cause of the macroeconomic instability.

However the data shows that during the period under reforms fiscal consolidation were not very successful despite imposition of new taxes and curtailing non-essential expenditures. The tax to GDP ratio remained in the neighbourhood of 12 to 14 percent over the last one decade. The low and stagnant tax to GDP ratio compelled the government to generate resources through surcharges and non-tax revenue. Consequently, the total revenue to GDP ratio hovered around 15 to 19 percent over the last decade. On the expenditure side the main head are debt servicing and defence and almost 90 percent of the current expenditures of the federal government is devoted to debt servicing and defence.

After reforms although the total expenditure to GDP ratio exhibits a declining trend in the 1990s, this decline has occurred primarily at the cost of development expenditure which has declined from 6.4 percent of GDP in 1990-91 to around 3.6 percent of GDP in 1998-99.

Figure 1.8
Fiscal Indicators As % of GDP



Source: Economic Survey 1998-99

As a consequence of the relative upward inflexibility of revenues and relative downward inflexibility of expenditure the overall fiscal deficit remained on average around 7 percent of GDP during 1988-99. The behaviour of fiscal deficit, expenditures and that of revenues as percent of GDP is given in figure 1.8 Percent of GDP during 1997-99(See Table1.6 in Appendix).

3.5.7 Uruguay Round and Pakistan

The economic ideology of the IMF/WB is based on neo-liberal/neo-classical school of thought. " In fact, a remarkable consensus has developed on the virtues what is variably called Washington consensus, the market oriented model, and the neo-liberal approach" (Rodrik, 1999: 9). Besides the policies of IMF/WB regarding trade liberalisation Pakistan has also signed World Trade Organisation (WTO) in January 1995. The fundamental objective of General Agreement of Tariffs and Trade (GATT) is to free trade through reductions in tariff and non-tariff barriers on the basis of non-discrimination, reciprocity and national treatment. Thus WTO deals with establishing discipline about trade policy instruments such as tariffs, quotas and subsidies. Therefore it will result in further opening up of economy and thereby the expected gain of free trade could be achieved in terms of high consumption and increased production. The long-run benefits will also derive from greater efficiency and productivity.

3.6 Summary

The overview of the economy suggests that Pakistan economy has embarked on the path of liberalisation since 1980s. Its openness has considerably increased but the results regarding trade deficits indicates that reforms have not been able to improve it. Exports are mainly concentrated on low value added cotton and cotton based manufactured and coefficient of concentration has rather increased pointing towards that exports are mainly concentrated in mostly low value added products. It thus points towards instability in export earnings. The composition of imports has not changed much as imports continue to concentrate on industrial raw material for capital goods and consumer goods. Similarly fiscal imbalance has not been reduced and it remained high. Despite these reforms, Pakistan 's current nominal tariff rates are still high. There is indication that after signing WTO there will be further reduction in tariffs therefore it has its implications for opening of the economy.

CHAPTER FOUR
CGE MODEL FOR PAKISTAN

4.1 INTRODUCTION

This chapter provides the theoretical basis and the construction of CGE model that is to be used for the counterfactual analysis of the process of trade liberalisation on Pakistan. Besides this it also presents the general structure of the CGE models and the methods to calibrate the model for SAM 1991.

4.1.1 The General Structure of CGE Models

Computable General Equilibrium (CGE) models have become a useful tool in analysing a number of trade issues. These models have been used to study the economic effects of trade policies, such as tariff reduction and policy of exchange rate adjustment. The CGE models have generated a large literature since the pioneering works of Johansen (1960) and, more recently, of Adelman and Robinson (1978). Computable general equilibrium models simulate the functioning of an economy by explicitly capturing the behaviour of the various agents, households, firms, government, rest of the world, the institutional framework and the market clearing processes.

CGE models are in the tradition of economy wide multi-sector models that have been used for development planning over the last two decades. In contrast with traditional input-output and programming models that are best suited for planning in centralised economies, CGE models have been developed for policy simulation in mixed economies, in which relative prices vary in response to supply and demand decisions by individual agents, and where the government can affect the outcome of these decisions, either indirectly through fiscal and incentive policies, or directly through intervention in some sectors of the economy (Gilles, 1984).

A CGE model is designed to provide a description of the evolution of the economy over a number of periods, given the value of exogenous parameters and

policy instruments. Its structure can be separated into a static general equilibrium model, which solves within each period, and a dynamic between periods model, which links two successive periods.

Within each period, the model provides a set of equilibrium prices, which leads to a balance of supply and demand on each market, given the behavioural rules of the agents, exogenous parameters and the way markets operate. CGE models are therefore basically simulation models, designed to investigate the impact of policies that work through market system, such as taxes, tariffs or subsidy changes, or to analyse the impact of direct government intervention in the economy (Gills, 1984).

Therefore a CGE model works by simulating the interaction of various economic actors across markets. Optimising behaviour of individual actors is assumed and is incorporated in equations describing their behaviour, which essentially describe various first-order conditions for profit and utility maximisation. Neo-classical general equilibrium theory provides the analytical underpinnings. The body of mainstream neo-classical theory provides a powerful framework of analysis, with its systematic accumulation of useful taxonomies and formal analytical results (Robinson, 1989).

However, modellers working on developing countries have extended the models in a variety of ways in order to capture "Structuralists" features of developing countries. Within the framework of the CGE models, three kinds of Structuralists models can be identified namely, "elasticity Structuralists ", "Micro Structuralists" and " Macro Structuralists". The first type assumes a limited elasticity of substitution in a variety of important relations but within the neo-classical framework. Whereas second type of models consider neo-classical disequilibrium in one or more important market. It assumes restriction on factor mobility, rigid prices, rationing and that markets don't work properly or not present at all. On the other hand the third type of models focus on question of achieving equilibrium among various macro aggregates; in particular, savings and investment, exports and imports, and government expenditures and revenues (Robinson, 1989).

4.1.2 The Treatment of Foreign Trade in CGE Models

The treatment of foreign trade has been given particular attention in CGE models. Two different approaches have been used in the literature for the treatment of foreign trade. On the one hand, classical trade theory is built on the small country assumption. So that each country is a price taker on international markets. These assumption makes strong distinction between traded goods, which are considered perfectly substitutable for imports whose prices are fixed on the international market, and non-traded goods, whose prices are entirely determined on the domestic market. Along with constant returns to scale in production, this theory leads to extreme specialisation among countries, and it rules out two-way trade.

On the other hand, the Structuralists school assumes that imports are non-competitive, so that the degree of substitutability between domestic goods and imports is zero. Imports are treated as perfect complement of domestic goods. This approach results in a rigid framework in which trade policy has no role to play in closing the foreign exchange gap (Dervis 1982).

In this paper it is assumed that imports are neither complete substitute nor full complements of domestic production. In other words two-way trade at sectoral level as well as price differentiation between domestic and import prices is allowed. Armington who introduced the notion of composite good, that is an aggregate of imported and domestic goods, made the original formulisation of these ideas. In this approach agents do not demand either domestic or imported good but an aggregate of the two. The composition of the aggregate good depends on the relative price of domestic and imported goods, which may differ. In stead of strong distinction between traded and non-traded goods this approach implies that sectors are characterised by different degree of tradability depending on their trade substitution elasticities (Robinson, 1989).

4.1.3 Closure Mechanism in CGE Models

The selection of "closure" rule is important as they serve to typify the complete model or the modules within it. It is crucial in introducing definitional

equations in a consistent manner and to understand the way model works (Alarcon, 1999).

4.1.4 neo-classical Closure

The *neo-classical closure* considers perfect competition, full factor mobility and full capacity utilisation. In this case prices adjust to clear the markets and factor income depends on marginal productivity. Here one of the prices, GDP deflator, Producer or Consumer Price Index (CPI), exchange rate or wage rate is set equal to unity and treat as numeraire. Total investment id determined endogenously and is equal to savings. Besides this a balance of payments constraints is considered for foreign exchange market equilibrium. The equilibrium is assured through excess demand equations across product and factor market as by Walras Law the sum of excess demand is equal to zero.

On the other hand "Johansen closure" total investment is defined exogenously and the adjustment between savings and consumption takes endogenously. In this case to guarantee the investment –savings equilibrium, often marginal propensity to consume or foreign savings is introduced as equilibrating variable.

Whereas "Fisherian closure" defines both aggregate investment and savings functions explicitly. In this regard financial market with interest rate as equilibrating factor must be introduced (Alarcon, 1999).

4.1.5 Structuralists Closures

Structuralists closures on the other hand postulates the existence of institutional constraints such as" unlimited supply of labour", supply rigidities, low domestic savings and foreign exchange constraints resulting from inelastic supply and demand for exports. These models introduce structural rigidities by assuming fixed nominal wages and existence of mark-up pricing due to supply constraints. Structuralists' closure assumes in general non-homogeneity and an aggregate price index as numeraire.

Keynesian closure for example assumes that production activities define their corresponding demand for labour. In this case sectoral capital stock is fixed exogenously and there is no need for a separate equation for capital stock. The equilibrium of savings-investment arrives through an increase in exogenous investment with fixed savings rates. Since wages are fixed thus aggregate price level becomes the equilibrating variable in labour market. Therefore an increase in price level reduces the real wages and firm hires more labour to increase output which in turn leads to an increase in higher level of income and savings. However here a rationing function can also be incorporated in the labour market for an alternate specification.

The Kaleckien Closure on the other hand, is characterised by price and quantity adjustment that clears the markets. It assumes in some commodity markets flex-price whereby demand adjust to a fixed supply and in others fixed–price whereby demand determines supply. Prices in the supply-constrained sectors are fully flexible, while those in the demand constrained sectors are set through a mark-up rule. It also assumes that savings adjust in the face of exogenous investment and capital stocks are exogenously fixed thus sectoral rental rates are endogenously determined. Here sectoral wages equations may include labour productivity growth rates and sectoral output can be assumed linked to sectoral output via labour-output coefficients (Alarcon, 1999).

4.2 Structure of CGE Model for Pakistan

This section provides a description of the behavioural equations for the different sectors of the economy that are to be used in formulating the CGE model. Firstly it discusses the database that is used to calibrate the model. The details regarding parameters, elasticities and the coefficients used in calibrating the model may be seen in Table 1.7 at Appendix. Besides this complete set of equations of the model and the list of endogenous and exogenous variables used in CGE model are listed in tables 1.8, 1.9 & 1.10 Appendix.

4.2.1 Assumptions

In order to calibrate CGE for Pakistan it is assumed that there are market imperfections and there are rigidities in the economy that prevent the markets to work

in contrast to what is assumed under perfect competition. In this paper it is assumed that imports are neither complete substitute nor full complements of domestic production. Thus agents demands what is called a 'composite good' that is composed of the domestically produced good and imported good, this is what is called Armington assumption. It is also assumed that a 'composite goods' is produced through a CES aggregation of both imports and domestic good. The composition of the aggregate good depends on the relative price of domestic and imported goods, which may differ. In stead of strong distinction between traded and non-traded goods this approach implies that sectors are characterised by different degree of tradability depending on their trade substitution elasticities (Robinson, 1989). On the export side the 'small country' assumption is considered for Pakistan as its trade share in world market is about 0.18 percent. It implies that it takes world prices as given irrespective of the quantity exported. The model incorporate the assumption that savings equal to investment, product market equilibrium is assured through equality of supply and demand and balance of payments constraints is assumed to be zero assuming that infinite foreign exchange is available to finance imports.

4.2.2 Database for CGE

Computable General Equilibrium (CGE) models are calibrated to what are known as benchmark equilibrium dataset. A consistent and convenient means of compiling a benchmark equilibrium dataset is the Social Accounting Matrix (SAM). A SAM is a form of single accounting entry and they record transactions between accounts in a square matrix format. The utility of SAM is that they can provide a comprehensive and consistent record of interrelationships of economy at the level of individual production sectors, factors, and general public and foreign institutions. The fundamental law of economics shows that the corresponding rows and column totals of a SAM, the income and expenditure for each account, must be equal. As a consequence of this, SAM satisfies a variant of Walras's Law. If all account but one balance, then the last account must also be balance. This property hints at the relationship between SAM and general equilibrium models (Reinert et. al. 1997).

The model has been built around SAM for 1990 constructed by Siddiqui and Iqbal (1999). This SAM presents four types of accounts: factors account, institutions

account, production account and capital account (see Table-1.11 in Appendix). Factors of production has been disaggregated into labour (L) and capital (K) accounts. Institutions account consists of households, firms, government and rest of the world. Where as households have been further disaggregated into urban and rural with four categories of each on the basis of their incomes. Both urban and rural households are distinguished into four income groups namely lowest income group having monthly income upto RS 2500, low income group RS. 2501-4000, middle income groups RS. 4001-7000 and high income group RS. 7001 & above. The complete SAM 1990 is presented in appendix-1 as a 28 x 28 matrix. Production account is disaggregated into agriculture (AG), Industry (IND), education (EDU), health (HLT) and other services (OS). The education sector is treated as home goods as it does not involve in trade. Further disaggregation of production account is also made on the basis of goods for domestic market and for export market. Finally it represents a consolidated capital accounts.

The notable feature of SAM 1990 is that there are discrepancies between the three measures of GDP. Thus GDP measures at expenditure approach, income approach and at sectoral value added is equal to RS. Million 843410. And the share of agriculture, industry, education, health and services sector is 25.5, 27.6, 2.1, 0.7 and 44.11 percent respectively which is exactly equal to the historical data as contained in Economic Survey 1998-99. Thus while making different counterfactual simulation, comparison is made with respect to base year values of 1990. The growth rates of these sectors and those of GDP in real term are given in table-1 .12 in the Appendix.

4.2.3 Factor market and Supply of Commodities

CGE model for Pakistan retained the assumption of fixed coefficient technology for the intermediate inputs and for the composition of capital goods. In contrast the production technology for primary factors is described by neo-classical production function that allows smooth substitution among several factors of production. "For most purposes in economy-wide modelling, it can reasonably be argued that the use of CES production functions with realistic substitution elasticities will capture most of the interactions one wants to analyse" (Dervis et.al. 1982:139).

Thus production technology is modelled by using a constant elasticity of substitution (CES) production function specified as

$$X_i = \gamma_i (\beta_i L_i^{-\rho} + (1-\beta_i)K_i^{-\rho})^{(-1/\rho)} \quad \text{——————(1)}$$

Where X_i denotes gross output of ith sector, L_i is labour used in sector i, K_i is capital used in sector i, and ρ_i is the CES substitution parameter for ith sector and its range is between - ∞ and 0 and is determined outside the model. Where as σ i is the elasticity of substitution between Ki and Li and is equal to $1/(1-\rho)$. The γ_i and β_i are the respective intercept and share parameter that allow the CES production function to be calibrated for each sector. The parameters β_i is calibrated by the procedure as outlined in Shoven and Whalley (1992:115),

$$\beta_i = [\{K_i/L_i\}^{1/\sigma i} / \{1+ (K_i/L_i)\}^{1/\sigma i}]$$

In case of CGE for Pakistan the parameter σi is derived from ρi and the latter is borrowed from Vos (1994) which has also used the same functional form for CGE model for Pakistan. Therefore the parameter ρ for agriculture, health and other services assumes the value of 0.5 where as for industry it is taken from a study of Kemal (1992) and for education it is based on best guess estimate. And scale parameter is obtained by the following relationship by assuming zero-order profit conditions,

$$\gamma_i = Xi / [\{\beta_i K_i^{-\rho} + (1-\beta_i)^{-\rho}\}^{-1/\rho}]$$

Table-2

CES PRODUCTION FUNCTION PARAMETERS					
	Agriculture	**Industry**	**Education**	**Health**	**Others**
ρ_I	-0.500	-0.138	-0.089	-0.500	-0.500
σ_I	0.667	0.879	0.918	0.667	0.667
γ_I	2.818	9.935	1.759	3.156	3.720
$1-\beta_I$	0.865	0.668	0.140	0.497	0.749
β_I	0.135	0.332	0.860	0.503	0.251

Source: Own computation based on calibration procedure

The table-2 shows the results of the parameters of the CES production functions for the sectors including agriculture, industry, education, health and other services. These computations are based on the process of calibration as explained above.

Domestic output is equal to domestic absorption (Xdi) and exports (Ei) for all productive sectors as specified in models by Jansen & Jameio(1993) and in Vos (1994) as given below,

$$Xi = XDi + Ei \text{ ----------(2)}$$

The domestic absorption specification is defined as,

$$XD_i = \Sigma V_{ij} + C_i + Z_i \text{ ----------(3)}$$

Because it is assumed a Leontief input-output technology for intermediate inputs, it therefore does not require a separate aggregation function for an intermediate goods aggregate. Given that the shares among different intermediate inputs in a sector and the ratios of intermediate inputs to output are fixed, the demand for intermediate input can be written as,

$$V_{ij} = a_{ij} X_j$$

Where as a_{ij} are the input-output coefficients derived from SAM, the aggregate intermediate demands to get total intermediate demand by sectors of origin can be written as,

$$V_i = \Sigma V_{ij} = \Sigma a_{ij} X_j \text{ ----------(4)}$$

Labour demand function is derived from CES production and it takes the form as in Vos (1994),

$$L_i = \beta_{lb}(W/PD_i)^{-\rho} * X_i \text{ ----------(5)}$$

Where β_{lb} is the labour output ratio calculated from SAM and ρ is the substitution parameter of CES function. In case of CGE for Pakistan it is assumed that labour supply is in infinitely elastic at a fixed real wage given by,

$$Ws = \overline{W}s \Sigma P_i \Omega^w \text{ ----------(6)}$$

Where the Ω^w are the weights in the price index that define the real wage $\overline{Ws}$. "This formulation creates no complication because with fixed capital stocks the transformation set will still be strictly convex" (Dervis st. al. (1982).

Following Dervis (1982) each of the sectors in the economy is treated as made up of many similar firms maximising profits and bidding for the scarce factors. The assumption of the perfect competition in the product markets implies that firms take commodity prices as given. Under these circumstances each sector can be treated as one large price-taking firm. The aggregate sectoral profits function can be written as,

$$\Pi_i = Pi\ (1\text{-}td)\ X_i - \Sigma\ a_{ij}\ X_j\ -(\Sigma W + \phi^*\ X_i + tm^* M_i + M_i)$$

The profit function can be written as ,

$$\Pi_i = PN_i X_i - (\Sigma W_i + \phi i^*\ X_i + tm^* M_i + M_i) \text{----------} (7)$$

Where

$$PNi = Pi\ (1\text{-}td)\ X_i - \Sigma\ a_{ij}\ X_j$$

PN_i is the net price or value-added coefficient, net of indirect taxes. And ϕi is the depreciation rate for ith sector and tm represents the import tariffs.

4.2.4 Income Generation and Demand for Commodities

The decision making units include different categories of household that demand consumer goods, the government which also demand consumer goods, and the firms themselves, which demand intermediate and capital goods. For simplicity it is assumed that each household category is characterised by a single type of factor that it owns and supplies. Thus there are m+1 categories of households, the first m categories supplying labour and the last category being the owners of capital receive the residual value added. It is also assumed that government does not own any capital

and receives its income only through direct and indirect taxes. Given these assumptions the income of the various categories can be written as below.

4.2.5 Income Distribution to Institutions

Households' gross incomes include labour income (W), capital income (RKhh) from five production activities. In addition to these incomes, households also receive income from other institutions such as dividends from firms (DIVhh), transfers from the government (TGhh) and transfers from the rest of the world (TRhh). This can be written as,

$$GYhhi = \varpi h,lb*Ylb + \varpi h,k*RKhh + \Sigma DIV\ hh + \Sigma TGhh + \Sigma\ TRhh \text{-------(8)}$$

Where as $\varpi h,lb$ and $\varpi h,k$ are the share of household's income in labour and profit income of the firms. The dividends from the firms are distributed to household according to a fixed proportion (π_i)of the aggregate profits from all the sectors. This can be written as,

$$DIVhh_i = \pi_i * \Sigma\ \Pi \text{ ----------(9)}$$

Similarly transfers from the government to household are computed from the base year SAM as a fixed proportion (τg) of government income (GRV). In equation it can be written as follows,

$$Tghhi = \tau g * GRV \text{ ----------(10)}$$

And income from the rest of the world to households is determined by the following equation,

$$Trhhi = \tau r * Rr \text{ ----------(11)}$$

τr is the share of rest of the world's income to each household category and Rr is the income of the rest of the world.

Finally disposable income of the household can be computed by deducting taxes from the gross income as shown below,

$$Ydhhi = Gyhhi*(1-tdi) \text{ ----------(12)}$$

Where Ydhhi stands for the disposable income of the household and tdi id the diect tax rate lwevied on ith household category computed from the base year SAM.

4.2.6 Firm's Income

The firms' gross income (GYF) includes capital income (RKf) and transfers from the government (TGf). The income of the firms is defined as such that it depends on the profits of all the sectors. Thus income of the factor capital can be written as,

$$Yk = \Sigma\Pi + TGf \text{ ----------(13)}$$

And firms' income is then calculated as follows,

$$GYF = Yk - \Sigma DIVhh - TRrow \text{----------(14)}$$

Where as ΣDIVhh is the sum of dividends by firms to households and TRrow is the amount of transfers paid to the rest of the world. Capital income paid to abroad is defined as fixed proportion (Ψk)of gross capital income,

$$TRrow = \Psi k * Yk \text{ ----------(15)}$$

Finally disposable income of the firms is then defined by subtracting direct taxes paid to the government by the firms from the gross income as follows,

$$YDf = Yk*(1-tdf) \text{ ----------(16)}$$

4.2.7 Government's Income

As it is already mentioned that government does not own capital and receives its income from direct and indirect taxation. In the SAM for Pakistan as indicated that government also receives transfers from the rest of the world so its also in calculating the total income of the government. This is shown in the following equation,

$$GRV = td_i * \Sigma GYhh_i + \Sigma Itax * Xi + \Sigma tdf * GYf + \Sigma tmi * Mi + TRG \text{-----(17)}$$

Where tdi, and tdf, are direct tax rate levied on household and firms respectively. Itax stands for the indirect taxes levied on agriculture, industry, education, health and other services and tmi is the import tariff rate and TRG is amount received as transfers from the rest of the world.

The government expenditures (GEX) are defined as follows,

$$GEX = \Sigma TG_{hh} + TG_f + \Sigma sub + \Sigma DG \text{ ----------(18)}$$

Where as ΣTG_{hh} is the sum of transfers from government to households which is defined as fixed proportion (τg) of government income and is represented by,

$$TG_{hh} = \tau g * GRV$$

And transfers from government to firms are determined by the following relation wherein a fixed share of government income (ν) goes to firms,

$$TG_f = \nu * GRV$$

Since government also gives production subsidies to different sector which are shown in the following equation,

$$\Sigma sub = \phi_{ind} * X_{ind} + \phi_{edu} * X_{edu} + \phi_{os} * X_{os} \text{----------(19)}$$

Where ϕ_{ind} , ϕ_{edu} and ϕ_{os} are the rate of subsidy calculated from base year SAM for industry, education and other services sector respectively. The government expenditure on the final consumption of agriculture, industry, education, health and other services. This is given in the equation given below,

$$\Sigma DG = \mu_{edu} ** GRV + \mu_{hlt} * GRV + \mu_{os} * GRV \text{----------(20)}$$

Where μ_{edu}, μ_{hlt} and μ_{os} are proportion of government expenditure on the final consumption of education, health and other services respectively. These expenditure

share parameters are derived from the base year SAM were it is assumed that government demands a fixed amount of consumer goods.

4.2.8 Savings and Consumption Behaviour

The government and the capitalist and labour households must now decide how to spend their incomes. Following Dervis (1982), it is assumed that prior to any decision they make, the various household groups and the government decide on the proportion of their income that will be saved. It is also assumed that households and firms save a fixed proportion of their disposable income. The government savings are defined below. In this regard it is mentioned that government savings are defined as the difference between its income and expenditures. Thus savings of the government may be written as,

$$GS = GRV - GEX \text{ ----------} (21)$$

Total savings denoted by TS is withdrawn from the system may be written as follows,

$$TS = \Sigma s_{hh} * YDhh + \Sigma s_f * YDf + s_g * GRV + Sf \text{ ----------} (22)$$

Where as s_{hh}, s_f and s_g are the savings rates of households, firms and government respectively. And Sf is the exogenous foreign savings that is added to get the total savings.

After describing the savings behaviour of economic agents this leaves each spending group with a reduced amount of income to be spent on consumer goods. As defined above that government demands a fixed proportion of consumer goods. The consumption equations for household's category are defined below.

4.2.9 Consumption Function for Households

"Many CGE models rely on the Cobb-Douglas and CES functional form for both production and consumption. The limitation for using these functional form for consumption however is that they imply unitary elasticities of demand. Some CGE

practitioners feel that this fail to account for the way changes in income affect the structural adjustment of the economy to policy changes and exogenous shocks. One easily demand function that does not imply unitary income elasticities is Linear expenditure System (LES), introduced by stone" Blonigen et. al. (1997: 223). It is therefore for each household group consumption function is described by the Stone-Geary Linear expenditure system (LES) as given below,

$$C_i = \Phi_i + \beta_i / P_i \ (Y - \Sigma P_j \Phi_j) \text{ ----------(23)}$$

Where Y is the total nominal expenditure for the group, Φ_i are the committed expenditures or "subsistence minima" in physical terms, and β_i are the marginal budget shares that determine the allocation of supernumerary income that is expenditures above that required for purchasing the subsistence minima. Where as subsistence minima Φ_i is defined as below,

$$\Phi_i = (Y/Pi)*(\alpha + \beta i/\omega) \text{ ----------(24)}$$

α is the average budget shares that are derived from SAM and is related to marginal budget share as ,

$$\beta i = \varepsilon i * \alpha i$$

Where as εi is the expenditure elasticities which are borrowed from Burney & Khan (1991) to be used in CGE model for Pakistan. The estimation of the "Frisch parameter", ω, is taken from the survey of literature. For this model it is taken from Naqvi, Farzana (1997: 160) wherein she has quoted the work of Lluch et al. (1977) regarding the estimation of Frisch parameter and it established the following relationship between per capita income (x) and Frisch parameter,

$$\omega = 36\ X^{-.36}$$

According to their study, the Frisch parameter rises from –7.5 to-2.0 as per capita income rises from US $100 to US $ 3000. This relationship has been used in various other CGE models, using this relationship Naqvi, Farzana(1997) has

calculated values for the Frisch parameter for urban and rural household for Pakistan which are reproduced here for CGE model.

Table-3

Frisch Parameter for Pakistan

Household Category	Frisch Parameter	
	Rural	Urban
Low Income Group	-5.90	-5.93
Middle Income Group	-4.74	-4.54
High Income Group	-2.82	-2.62

Source: Naqvi, Farzana (1997)

Based on the above mentioned relationships and using the values of 'Frisch parameter', the consumption function for different households categories have been calculated. The details regarding subsistence minima, marginal budget shares and those of expenditure elasticities may be seen in table 1.13 in Appendix. This leads to aggregate demand function for each commodity, which is composed of consumption demand by households and government.

4.2.10 Treatment of Investment

It remains to discuss what happens to the total savings withdrawn from the flow of funds. Assume that all savings are spent on investment goods, total investment is thus determined by savings behaviour and thus also a function of the distribution of income among the different households and the government. Thus total net investment can be written as,

$$TINV = TS \text{ or}$$

$$TINV = \Sigma s_{hh} * YDhh + \Sigma s_f * YDf + s_g * GRV + Sf \text{----------(25)}$$

Thus after determining the level of total net investment its sectoral allocation is determined by the following equation as given in Dervis et. al (1982: 252),

$$Ii = \varphi i * TINV \text{ ----------(26)}$$

Where Ii is the is the net investment in sector i, and φ i is the fixed net investment share computed from SAM. Now adding rate of depreciation we can obtain gross

investment by sector. The equation for the gross investment by sector can be written as,

$$Igi = Ii + \psi i * Xi \text{ ----------(27)}$$

Where Igi is the gross investment by ith sector and ψi is the rate of depreciation.

4.2.11 Product Differentiation and Treatment of Imports

In this model it is assumed that for any traded good, imports (Mi) and domestically produced goods (Di) are imperfect substitutes. In case of CGE for Pakistan, composite goods have been defined for sectors including agriculture, industry, health and other services. While education sector is treated as non-traded sector. Thus domestic consumers are assumed to demand a 'composite good', Qi, which is a CES aggregation function of Mi and Di,

$$Q_i = \gamma_i\{\delta_i M_i^{-\rho} + (1-\delta_i)D_i^{-\rho}\}^{-1/\rho} \text{ ----------(28)}$$

Where γ_i , δ_i, and ρ are the CES parameters and Mi and Di are like inputs"producing" the aggregate output. The elasticity of substitution is given by $\sigma_i = 1/\ 1+\rho_i$. "Thus demands for imports and domestically produced goods become derived demands, in just the same way as the demands for factor inputs is a derived demand in a traditional production model" (Dervis et. al. (1882: 222).

This formulation implies that consumers will choose a mix of Mi and Di, depending on their relative prices. As explained by Dervis (1982), letting PDi denote domestic good price and PMi the domestic currency price of imports, the familiar first-order conditions for cost minimisation yield,

$$M_i/D_i = (PD_i/PM_i)^{\sigma}_i * (\delta_i/1-\delta_i)^{\sigma}_i \text{ ----------(29)}$$

The magnitude of σi determines the responsiveness of domestic demand to changes in the relative price of imported goods brought about by trade and exchange

rate policy or exogenous events. From equation (29) the demand function for imported goods can be written as,

$$M_i = [(PD_i/PM_i)^{\sigma}{}_i * (\delta_i/1-\delta_i)^{\sigma}{}_i] * D_i \text{ ----------(30)}$$

Where parameters γ_i and δ_i are calibrated by the formulation given by Francois & Reinert (1997: 178),

$$\delta_i = [(PMo/PDo)*(Mo/Do)^{1+\rho}] / [1+ (PMo/PDo)*(Mo/Do)^{1+\rho}] \text{ --------(31)}$$

Given the base year values of the imports (Mo) and domestic good (Do) and the base year prices PDo, PMo for domestically produced goods and for imported goods respectively, the share parameter δ_i is calibrated by using the above relationship. In this regard it is mentioned that the parameter ρ is determined outside the model and is related to elasticity of substitution (σi) as $\rho i = 1-\sigma/\sigma$.

4.2.12 The Elasticity of Substitution (σi) Between domestic and Imported goods

The estimate for the elasticity of substitution between domestic and imported goods is taken from a survey of literature for other developing countries since no econometrically estimated values are available for Pakistan. Naqvi, Farzana (1997) has reported the values for the (σi) for selected developing countries and arrived on elasticity value of 0.5 for Pakistan by using best guess estimate keeping in view the values available for other developing countries. Moreover it is also assumed that the elasticity of substitution between imported and domestically produced goods is same for all the traded goods. Following Naqvi, Farzana (1997) this study also assumed the value for (σi) as 0.5 which is same for agriculture, industry, health and other services sector. Thus the parameter (ρi) is then derived from (σi) which is used to compute share parameter of CES function from equation (31). Similarly the scale parameter (γi), the constant term for CES function, is derived from zero-profit conditions for each industry and is given by the following relation (Francois & Reinert (1997: 178),

$$\gamma i = Qo / [\{\delta_i M_i^{-\rho} + (1-\delta_i)^{-\rho}\}^{-1/\rho}] \text{ ——————————(32)}$$

Thus by making use of equations (31) and (32) the parameters for the 'composite good' based on the Armington assumption have been calibrated for agriculture, industry, health and other services and are shown in table-4,

Table-4

Calibration of Armington function				
Parameters	**Agriculture**	**Industry**	**Health**	**Other services**
ρ_I	-0.800	-0.800	-0.800	-0.800
σ_i	0.5	0.5	0.5	0.5
β_i	0.0029	0.1724	0.0004	0.0018
α_i	1.09	1.74	1.030	1.066

Source: own computations based on calibration procedure

As explained by Dervis (1982) that it is convenient to work with the ratio of domestic goods in total composite commodity use defined as"domestic use ratio" (di). Since the aggregation function is linearly homogenous in Mi and Di, it can be written as,

$$Q_i = f_i(m_i,1)D_i \quad \text{----------(33)}$$

From equation (33) then domestic use ratio (di) can be derived as,

$$d_i = D_i/Q_i = f_i^{-1}(m_i,1) \quad \text{----------(34)}$$

Where as mi stands for the ratio of Mi to Di as defined in equation (29) which implies that it is function of PDi/PMi only inter alia as per equation (34) di will also depend uniquely on PDi/PMi. The demand for composite good Qi itself will of course depend on the whole relative price system (Dervis 1982: 223).

According to Dervis (1982) using this di one can go from composite commodity demand to the derived demand for the domestically produced commodity. If Vi, Ci and Zi denote respectively intermediate demand, consumption demand and investment demand for composite commodity then the demand function for domestically produced components will be,

$$V^d_i = d_i V_i \text{ ----------} (35)$$

$$C^d_i = d_i C_i \text{ ----------} (36)$$

$$Z^d_i = d_i Z_i \text{ ----------} (37)$$

These domestically produced goods combine with imports to produce the aggregate good Qi. Total demand for domestic production is obtained by adding exports demand.

4.2.13 Treatment of Exports

As far as exports are concerned, following *Robinson et. al (1997)* the assumption of product differentiation on export side is also maintained for the present study. Similarly imperfect substitutability is assumed on export side. Under small country assumption on the export side assumes that a country's share in the world market is very small so that export prices are fixed in the world market independently of the quantities exported. Thus exports by commodity are determined through a constant price elasticity of supply (Vos 1994).

$$E_i = E_i o * (PE_i/PD_i)^{\eta i} \text{ ----------} (38)$$

Where E_i is the export of ith commodity, $E_i o$ is the base year exports of ith commodity taken from the SAM and PEi and η_i are prices of exports in domestic currency and export elasticity by activity respectively.

4.2.14 Price Equations and Normalisation Rule

As Dervis 91982) has explained that when a general equilibrium model is opened to trade, the chain of causality it embodies usually changes dramatically. Whereas in a closed economy the basic technology and demand variables determine the price system, the situation is quite different in standard models of international trade. Whenever domestic market is "small" in relation to world market, prices are determined in the international market and chain of causality runs from these world prices to domestic factor prices and production patterns.

Thus in an open economy general equilibrium models domestic economy has to adjust to the given prices, producing only those goods that can earn a normal profits

and exporting a fraction of it to pay for imports. Thus CGE model for Pakistan assumes that domestic prices of trade able goods are determined by the world prices which are taken as given. Under these circumstances it implies that prices of traded goods can be written as,

$$PD_i = PW_i * ER \text{ ----------(39)}$$

In this equation PDi is the domestic price of traded goods and it depends on the world prices in dollars, which are set exogenously. Since economy also produces non-traded good, education, for which price is determined through price normalisation equation, which is explained below.

$$P_H = [\overline{(P}/\Omega_H) - (\Sigma P_i*\Omega_i / \Omega_H)*ER] \text{ ----------(40)}$$

It implies that,

$$\partial P_H/\partial ER = - [(\Sigma P_i*\Omega_i / \Omega_H)] < 0$$

Given the normalisation rule, an increase in ER that is a devaluation, will lead to a fall in absolute price of home good so as the overall price index be remained at its predetermined level. Dervis (1982) explains that smaller the weight of home goods in the commodity basket defining the price level, the larger must be decline in P_H.

Where as P_i is the price of composite commodity, which is determined under the assumption of, cost minimisation by the users of imports and domestic goods. Thus the dual price equation correspond to equation (28) implies that price for the composite good can be written as,

$$P_i = 1/\gamma_i \ [\ \delta_i{}^{\sigma i} PM_i{}^{1-\sigma i} + (1-\delta_i)^{\sigma i} PD_i{}^{1-\sigma i}]^{1/1-\sigma i} \text{ ----------(41)}$$

Where as γ_i, δ_i and σi are the parameters of equation (28) as explained above and PM_i is the price of imports in domestic currency defined below,

$$PM_i = PW_i*(1+tm_i)*ER \text{ ----------(42)}$$

In this equation tm_i is the import tariff rate which government can use as policy instruments to affect the domestic prices of imports and those of import competing goods. And in this way the imposition of tariff has production effect, revenue effect, and volume of trade effect and income distribution effect.

On the other hand export prices are linked with world prices through the following equation,

$$PE_i = PWE_i * (1+te_i)*ER \text{ ----------(43)}$$

Where te_i is the rate of subsidy and PWEi is the world dollar price of exports. As pointed out by Dervis (1982), if PEi > PDi no domestic sales would take place and whatever is produced domestically would be exported. This would exert upward pressure on domestic prices until PEi=PDi and PDi would have no more function in model. Assuming that such extreme behaviour can be ruled out then the following constraints on the export side of the model may be written as,

If PEi = PDi; Ei>=0 and

If PEi < PDi; Ei =0

4.2.15 The General Equilibrium Solution

After defining the complete CGE model excess demand function for product market requires that demand function for the domestically produced good is defined as,

$$X^{Di} = d_iV_i + d_iC_i + d_iZ_i + E_i \text{ ----------(44)}$$

Which implies that by combining supply and demand, the excess demand function can be written as,

$$EX_i = X^{Di} - X^{Si} = 0 \text{ ----------(45)}$$

Thus the solution of equation (47) provides equilibrium prices. Similarly for the foreign exchange market balance of payments constraints may be defined as,

$$EF = \Sigma PWi*M_i - \Sigma PW_i*E - F = 0 \text{ ----------(46)}$$

Where Mi and Ei stand for imports and exports respectively and F stands for the value of net foreign resource inflow. Where as

$$F = \Sigma PWi*M_i - \Sigma PW_i*E \text{ ----------(47)}$$

This implies that country has no constraint to obtain foreign exchange to finance imports. In all there are n+1 equations in n+1 variables bur again by Walras Law excess demand equations are not independent and a price normalisation equation is required to close the system.

For price normalisation this model incorporates an aggregate price index as explained by Dervis (1982),

$$\Sigma P_i\Omega_i = \overline{P} \text{ ----------(48)}$$

Where the Ω_i are the weights defining the index $\overline{P}$ that is to hold constant. Here it is also assumed that the aggregate price level is explicitly treated as exogenous. This index is composed of both traded and non-traded goods. Let us define Ω_i and Ω_H as the weights of ith traded good and home good (education) respectively, then by using equation (39) we may write it follows,

$$\Sigma P_i*\Omega_i + P_H* \Omega_H = \overline{P} \text{ ----------(49)}$$

Where as P_H and P_i are prices of home good and for composite commodity as explained in equation (40) and (41) respectively. The normalisation closes the system and in principal allows solving the model for n domestic commodity prices and the exchange rate as a function of the exogenous parameters and government policy variables.

4.3 Summary

This chapter has presented the main methodology that is dealt with the construction of CGE model for Pakistan. Thus after constructing the model it was run on Excel and base run equilibrium was tested. Then a new equilibrium was achieved

through changes in policy instruments that are used to make different counterfactual simulations. The results of these simulations are presented in next chapter.

CHAPTER FIVE
COUNTERFACTUAL SIMULATION EXPERIMENTS

5.1 INTRODUCTION

After constructing the CGE model it was run on Excel programme through iteration process and a new equilibrium was achieved after changing the policy variables. This section first describes that how model works when a policy instrument is changed. Then it analyses the implications of the opening of trade in Pakistan with various policy simulation scenarios of counterfactual type.

While making policy simulation scenarios 30 percent reduction in imports and a 10 percent devaluation of Pak rupee against US dollar is presumed as it is roughly equal to the average variation in actual variables during trade liberalisation. Thus our counterfactual experiments deal with the analysis of different alternate policies where tariffs were reduced by 30 percent individually for each sector and then simultaneously to assess the implication of trade liberalisation with respect to1990. Similar simulations were done for devaluation and for subsidies. Thus these simulations are of counterfactual type hence they are to indicate that what would have happened production, consumption, income distribution and to external sector, if the import tariff and subsidies were reduced by 30 percent and currency were devalued by 10 percent.

5.2 Working of Model

Before doing counter factual simulations a brief description of the way model works is provided here. The impact of a change in import tariffs directly affect the price of importable that will then affect the imports demand and price of composite good. It will directly affect government revenues. The change in imports affects the balance of trade, government income and profits. Profits affect the income of factor capital and thereby the incomes of households and firms. Now the income of these two agents will change the tax base on which direct tax are levied, therefore a change in government income is expected. Since composite price is composed of import

prices and those of domestic prices. On the other hand a change in composite good price will affect the real wages in sectors which directly affect the income of the households and profits. Profits affect the income of the factor capital and consequently income of households and firms' income are impacted. This again changes the taxation base and the government revenues. Since investments is assumed to be equal to savings therefore a change in savings will directly change the investment too. It will then have its impact on production in economy. This will again Thus a change in import tariffs directly affect the government revenues and profits. Government income is affected as the change in import tariffs leads to a taxation effect. Profits change as they are defined residually in the model and this variation affects the household's income and firms income.

A change in income of agent then affects the consumption and savings. Since model assumes that savings equal investment, the change in income affects total investment. Therefore domestic a change in absorption leads to changes in imports and domestic demand. Thus a change in sectoral demand have its influence on sectoral supply which consequently changes intermediate demand, government revenues and profits. This again leads to changes in firm, households' income and government revenues as well as described earlier. Similarly the effect of devaluation will have its impact on the relative prices of exportable and importable which will affect the profits of the firms. The change in profits will further affect the households' income and thereby through taxation effect, government revenues will also change. Besides this it will affect the demand for imports and supply of exports and thus balance of trade will be affected. A change in export subsidy will directly affect the price of export and thus export which will affect the base on which export subsidy is levies. The change in export price affects the total demand. It will affect the tax base for levying indirect taxes and intermediate demand that will affect profits. Profits of the firm and as mentioned above ultimately affect the income of all agents. A change in income impacts on savings, investment and consumption. Thus a change in domestic absorption will impact the imports and total supply. The change in import thus affects. The change in output supply will again affect the income of the agents. Thus a change in policy instruments will have a chain of effect that will have its impacts on the economy as captured through model equations.

After understanding the way model works the next section gives an analysis of different simulations carried out through CGE model for Pakistan. The next section analyses application of different policy simulation scenarios. The policy instruments are listed below which were applied in different sectors separately and also simultaneously to assess the implications of opening of the economy.

(i) 30 percent Reduction in Import Tariffs
(ii) 10 percent devaluation of Pak rupee against US dollar
(iii) 30 percent reduction in production subsidies

5.3 30 Percent Reduction in Import Tariffs

First we consider the impact of reduction in import tariffs on different sectors of the economy. These are analysed in the following headings. The results are based on four policy simulation scenarios. The first scenario assumes an overall reduction of import tariff on all the sectors at once and it is given scenario I. Where as scenario II, III and IV have been carried out by assuming a reduction in import tariffs only individually for industry, agriculture and services sector respectively.

5.3.1 Impact on Production and Consumption

In this experiment a 30 percent reduction of imports tariffs were assumed and model was run, which after achieving a new equilibrium gives the following results. The results are reported here as percentage deviation from the base year values after changing the policy variable. Thus these scenarios will tell us that what would have happen to production, income distribution and to balance of trade if the opening of trade policies had been differently applied with respect to the situation in 1990.

The results of the first scenario showed in Table-4 reveals that there is a decrease in the production of all the sectors. Since production depends on domestic demand in the model thus a change in agents' income would have its impact on production. The results show that income change in such a way that the decline in institutional income has lead to reduction in saving and thereby investment. As a result the production of all sectors has shown decline. The scenario-I shows that

reduction in import tariffs in all tradable sectors led to a decrease in domestic demand and final consumption in all the sectors. Since the decline in disposable income leads to decline in savings thus with fixed savings rates, total savings tend to fall in investment as well. Thus reduced amount of investment has caused the production of various sectors to decline (see table-1.14 in Appendix).

Table -5

Production & Consumption

	Percent change from base year				
Production	**Base Values 1990**	**Scenario I**	**Scenario II**	**Scenario III**	**Scenario IV**
Agriculture	357368	-2.41	-0.32	-0.76	-1.32
Industry	675472	-4.20	-1.42	-0.93	-1.85
Education	19046	-1.68	-1.07	-0.28	-0.32
Health	8923	-6.29	-1.10	-2.57	-2.61
Services	634504	-3.22	-0.60	-1.30	-1.32
Consumption					
Urban Household					
Agriculture	94701	-2.39	-0.20	-1.00	-1.19
Industry	127134	-9.32	-7.44	-0.17	-1.72
Education	3362	-10.27	-4.21	-0.55	-5.52
Health	2126	-2.15	0.16	-1.14	-1.16
Services	86093	-2.26	-0.47	-0.89	-0.91
Rural Household					
Agriculture	109197	-1.51	-0.09	-0.62	-0.80
Industry	137027	-7.08	-5.53	-0.17	-1.38
Education	1311	-9.96	-4.31	-0.51	-5.14
Health	2423	-1.97	0.06	-1.25	-0.78
Services	64913	-1.39	-0.36	-0.51	-0.52

Source: Derived from CGE model for Pakistan

Simulation I assumes reduction in import tariffs for all the sectors
Simulation II assumes reduction in import tariffs for industry only
Simulation III assumes reduction in import tariffs for agriculture only
Simulation IV assumes reduction in import tariffs for services only

The Scenario-II shows that the output of industrial sector has decreased more as compared to other sectors. Similarly the most affected sector in Scenario -III and IV are those for which tariff has been reduced. The detailed results shows that a reduction in import tariffs has resulted in reduced domestic demand. (see tables 1.15, 1.16, 1.17 and 1.18 in Appendix).

A comparison of the results with those of the historical data reveals that output of all of these sectors shows an increase of varying degrees during 1998-90. (see table

1.12 in Appendix). Let us remember that while implementing first phase of reforms, first Structural Adjustment Programme (SAP) with IMF in 1998-89, the main objective were to restore external viability while maintaining satisfactory growth in the context of declining inflation. In this regard emphasis was on removal of Non Tariff Barriers (NTBs) and their replacement with tariffs. Besides this simplification of tariffs regimes and reducing the number of banned commodities from the existing 400 to 80 by 1991 were other main objectives. It was also required by the government to reduce maximum tariffs from 125 percent to 100 percent by 1991 and further reduction to 45 percent and 35 percent in 1993 and 1994 respectively. However Pakistan government could not comply with the policy of tariffs reduction and IMF unilaterally cancelled Pakistan's Enhanced Structural Adjustment Facility (ESAF) mainly because of the failure to reduce tariff barriers to trade as was agreed. The overall objective for the GDP was a sustainable growth of 5 percent per annum for the next three years.

The actual data shows that the GDP growth was at par with the target during 1993-90. The analysis shows that before SAP of 1990 agriculture and industry were growing at 3.8 and 9.0 percent, but after reforms it increased by 3.0 and 6.5 percent respectively. On the other hand the education, health and services sectors have registered significantly lower rates of growth after reforms. The actual data indicates that before SAP the growth of education, health and services sectors was 13.6, 13.65 and 7.24 compared with 4.1, 4.0 and 5.5 after reforms. Therefore one can see that there is overall a slowing down in growth rates of different sectors. Similarly GDP growth which was 6.5 percent before reforms has goes down to 4.56 percent per annum. It is worth mentioning that after the first phase of reforms however the pace of GDP could not be sustained as was envisaged and it slash down to 2.3 percent in 1992. Thereafter Pakistan initiated second phase of reforms in 1993/94-1996/97. Its efforts aimed at strengthening the country's external position, develop the supply side of the economy, reduce vulnerability to external shocks and improve its social indicators. The main objective include among others sustaining annual economic growth of 6.5 percent, raising gross reserves to about three months of exports, reduction in budget deficits. It also included further liberalisation of exchange rate regime, and payments systems and further privatisation and deregulation of the economic activities. The actual data shows that growth rates of industry, health,

education and those of services further slowed down where as those of agriculture showed slight increase resulting in overall growth of GDP to the tune of 3.9 percent well below the target (see table1.12 in Appendix). Therefore outcome of model suggests that had tariffs been reduced by 30 percent the production of different sectors would have declined with respect to situation in 1990. This can be supported from the above analysis where further reforms under second phase has actually resulted in lower growth of GDP and of different sectors as well.

5.3.2 Income Distribution And Profits

The next table-6 presents the results of reduction in import tariffs on profits of the sectors and as result of this income distribution between urban and rural households. Besides this firm's income which depends on profits and government revenue that depends on mainly tax revenues is also given.

Table-6

Impact on Income and Profits

		Percentage change from base year			
	Base Values 1991	Scenario I	Scenario II	Scenario III	Scenario IV
Income					
Urban Household					
HHU1	59696	-2.905	-1.432	-0.73308	-0.74004
HHU2	79272	-2.540	-1.244	-0.64371	-0.65234
HHU3	87984	-1.975	-0.857	-0.55374	-0.56481
HHU4	101579	-0.411	0.527	-0.45964	-0.47827
Rural Household					
HHR1	104062	-2.244	-1.211	-0.51327	-0.51981
HHR2	83649	-2.020	-1.395	-0.30904	-0.31596
HHR3	83909	-0.600	-0.122	-0.23542	-0.24232
HHR4	81981	-0.928	-0.559	-0.17788	-0.19059
Profits					
Agriculture	135045	-1.196	-0.82	-0.24126	-0.13241
Industry	41250	-7.706	-5.20	-1.25261	-1.24865
Education	4097	-2.790	-1.66	-0.56648	-0.56307
Health	5520	-2.551	-1.42	-0.56414	-0.56913
Services	133988	-4.637	-2.32	-1.1604	-1.637
Firms' Income	131647	-3.465	-1.37	-1.1489	-1.84125
Government Income	143452	-2.587	-1.63	-0.39831	-0.86

Source: Derived from CGE model for Pakistan
Simulation I assumes reduction in import tariffs for all the sectors
Simulation II assumes reduction in import tariffs for industry only
Simulation III assumes reduction in import tariffs for agriculture only
Simulation IV assumes reduction in import tariffs for services only

The scenario-I shows that the most affected sector is industry for which profits have declined by 7.7 percent followed by services where the decline is about 4.6 percent. The profits of health and agriculture have reduced by 2.5 percent and 1.2 percent respectively.

Since profits are residually determined thus a decrease in import tariffs imports increases and thus reduce the profits. The reduction in profits has resulted in reducing the disposable income of firms as firms' income directly depends on the income of capital. Thus sharp increase in industrial sector's imports has caused the trade balance of this sector to deteriorate and profits to decline rapidly. This has lead to a fall in the income of firms and households. Since government income depends on taxes and tariffs, therefore a reduction in tariffs leads to a fall in government revenues. Besides that because of the reduced income of firms and households, government revenues have further reduced as now tax base has reduced. The simulation also shows that profits are mainly concentrated in industry. As explained before reduction in profits produce a chain effect that ultimately affect the institutional income of agents. Profits in education sector have also reduced by 2.8 per cent because of the price effect through a change in composite price. Thus change in domestic price of non-traded good and composite price affected labour demand and a change in profits. The scenario-I shows that firms' income has decreased by 3.5 percent and government income by 2.6 percent, which results in increasing the fiscal deficits. Similarly the profits of other tradable sector such as services has reduced.

The scenario -I shows that because of reduced income of firms, incomes of both urban and rural households have declined but its impact are more strong for lowest income groups as compared to middle and high income group. The disposable income of the HHU1 and HHU2 has decreased by 2.9 and 2.5 percent, while that of HHR1 and HHR2 experienced decline of 2.2 and 2.0 percent respectively. The urban households belonging to middle income group also experienced a decline of about 2 percent in its income but income of the high-income group (HHU4) declined marginally by 0.4 percent. On the other the decline in income for middle and high income group of rural areas is not significant.

The scenario-II reveals that as profits and income declines its impact is not same for all agents. It is again lowest income group both in urban and rural households, which are worst, affected. The middle income and high-income group also experienced a reduction in their incomes but its impact is lower as compared with lower income group. Thus the distribution of income has become more skewed as result of trade liberalisation. It is also clear that government revenue has declined by 1.6 percent and that of firm's income by 1.4 percent respectively.

The results of scenario-III and IV suggest that though the profits and income of households have declined but its impact is not so strong as compared to scenario -I and II. The scenario -III however points out that profit of industry and services have reduced by 1.2 and 1.16 percent respectively. The reduction in profits has resulted in reducing firms' income by 1.14 percent. On the other hand, in scenario -IV, the most affected sector is services itself as its profits have declined by 1.6 percent. The firm's income has reduced by 1.8 percent. It implies that a reduction in import tariff had not only reduced the profits and income but also lead to increasing income gap between urban and rural households.

A comparison of these scenarios with those of the comparable figures for actual data during 1990s reveals that after the reforms fiscal deficits remained high. The SAP of 1988 was aimed at bringing down the budgetary deficit to 4.8 percent of GDP by 1990-91. In fact, during 1988-93, fiscal deficit averaged around 8.1 percent of the GDP, declined to slightly above 6 percent of GDP during 1993-97 and further to around 5 percent of GDP during 1997-99. Similarly data shows that income inequalities have increased after reforms. The Gini coefficient, which was 0.348 in 1988, has increased to 0.41 in 1993-93. Besides this the ratio of highest 20% to lowest 20% of households income groups indicate that it has worsened during reforms as it has risen by 5.5 in 1988 to 7.8 in 1993 (Economic Survey 1998-99).

Thus the results of model suggests that had tariffs been reduced by 30 percent it would have negatively impacted the profits of the sectors and thereby worsening of the income with respect to the situation of 1990.

5.3.3 Impact on Balance of Trade

The next section gives a picture of the external sector performance when tariffs are reduced. It is given in table-7,

Table-7

Impact on Balance of Trade

Sectors	Base Value 1991	Scenario –I		Scenario -II		Scenario -III		Scenario -IV	
		Values	% Change	Values	% Change	Values	% Change	Values	% Change
Agriculture	-8511	-8846	3.942	-8504.68	-0.07	-8822.16	3.66	-8541.64	0.36
Industry	-64344	-71949	11.820	-68996.07	7.23	-65077.52	1.14	-66563.87	3.45
Health	-113	-114	1.094	-113.13	0.11	-113.75	0.66	-113.36	0.32
Services	4233	4117	-2.740	4189	-1.04	4231.2	-0.05	4163.4	-1.65
Total	**-68735**	**-76793**	**11.4**	**-73425**	**6.7**	**-69782**	**1.5**	**-71055**	**3.38**

Source: Derived from CGE model for Pakistan
Simulation I assumes reduction in import tariffs for all the sectors
Simulation II assumes reduction in import tariffs for industry only
Simulation III assumes reduction in import tariffs for agriculture only
Simulation IV assumes reduction in import tariffs for services only

The reduction in import tariffs leads to an increase in imports since now imports become cheaper. Scenario-I shows that the trade deficit of the industrial sector has increased sharply by 11.8 percent and the trade surplus of services sectors has declined 2.4 percent. The reason being that industrial sector depends on imported raw materials for its survival. And as the actual data shows that composition of imports remain almost same thus a decrease in import tariffs has caused imports to increase. The least affected sector is health for which the trade deficit has increased by 1 percent, agriculture on the other hand experienced a deterioration of about 4 percent as a result of liberalisation. Again in case of health and agriculture though Pakistan is a net importer but its imports are not significant. The overall trade deficit has deteriorated which shows that reduction in import tariffs increase imports rapidly as compared to exports. The scenario-IV shows that when import tariffs are reduced from services sector only, its trade surplus reduced by 1.6 percent. Whereas health and agriculture are least affected sectors but its impact on industrial sector is significant. The trade deficit of industrial sector has increased by 3.5 percent. The overall trade deficit has surged by as high as 3.4 percent.

As section 3.5.3 shows that Pakistan's exports base is narrow and there is high degree of concentration. On the other hand composition has not changed much and

still major chunk of foreign exchange goes towards industrial raw material for capital goods (around 44%) and imports of capital goods (33%). It points out that where as exports are supply constrained import demand is inelastic thus a reduction in import tariffs has resulted in increasing more imports. The trade deficit shows that it remained $ 2.5 billion during 1988-93 until it reaches at its highest level of $ 3.7 billion or 5.7 percent of GDP in 1995-96 when Pakistan again agreed with the IMF to implement the reforms and tariffs maximum had to reduced to 35 %. Therefore the results of our simulation also seems to support that a reduction in tariffs had negative implications for trade deficit. It implies that had tariff been reduced by 30 percent in 1990, the balance of trade would have been deteriorated when compared with base year.

5.4 Exchange Rate Devaluation

In this experiment the policy of devaluation has been analysed. Here it is pointed out that though exchange rate adjustment remains an integral part of any reform of IMF/WB it was not used as policy instrument during SAP of 1990. It was only in the second phase of reforms during 1993/94-1996/97 when rupee was devalued by 12 percent in 1993/94 followed by 8.13 percent devaluation of 1995-96 as part of reform package. Therefore here it is assumed that what would have happened to trade deficit had rupee been devalued by 10 percent in with respect to the situation in 1990, the result of this counterfactual analysis are given below.

5.4.1 Impact on Production and Consumption

The table-8 shows the counterfactual simulation in response to devaluation. The results show that health and services sector depicts an increase in output by 7.5 and 1.5 percent respectively. On the other hand agriculture, industry and education have registered a decline in production by 0.34, 0.63 and 1.5 percent respectively.

Table-8

Impact on Production

Sectors	Base Value 1990	Scenario	% Change
Agriculture	357368	356149	-0.341
Industry	675472	671220	-0.629
Education	19046	18752	-1.541
Health	8923	9597	7.553
Services	634504	644268	1.539

Source: computed from CGE Model for Pakistan

As devaluation leads to change the relative prices of exportable importable thereby affecting the price of 'composite good'. As explained in section 5.2 it has implications for price of non-traded good also and for the demand for labour in each sector. The devaluation has caused the price to change in such a way that profits of non-traded and all the tradable sectors except health have declined which have implications for lower level of profits and investment (see table1.19 in Appendix).

The impact on consumption can be seen in the following table where Simulation-I, II, III and IV stands for the impact on consumption demand for agriculture, industry, education, health and services sectors respectively.

Table-9

Impact on Consumption

	Percentage change from Base Year				
	Scenario-I	Scenario -II	Scenario -III	Scenario -IV	Scenario -V
Household Urban Total	**-2.381**	**-4.207**	**-0.976**	**-0.124**	**-2.015**
HHU1	-5.326	-6.359	-1.154	-0.256	-1.456
HHU2	-2.357	-2.659	-1.046	-0.146	-0.667
HHU3	-0.866	-1.236	-0.953	-0.022	-3.556
HHU4	-0.046	-7.896	-0.898	-0.056	-2.222
Household Rural Total	**-2.414**	**-2.818**	**-0.624**	**-0.271**	**-0.975**
HHR1	-4.266	-3.492	-0.859	-0.350	-0.888
HHR2	-1.149	-1.236	-0.590	-0.125	-0.667
HHR3	-0.876	-2.365	-0.486	-0.255	-1.111
HHR4	-0.658	-4.875	-0.446	-0.333	-1.545

Source: Computed from CGE Model for Pakistan
Simulation-I , II, III and IV are for agriculture, industry, education, health and Services sectors respectively

This scenario shows that the consumption of industry, agriculture and those of services sector has declined significantly. Thus higher prices and lower income of the households has reduced their consumption demand. The worst affected sector is industry for which consumption has declined more sharply. The agriculture consumption has decreased by 2.38 and 2.41 percent for urban and rural households

respectively. The industrial consumption has declined to the tune of 4.2 and 2.8 percent for urban and rural households respectively. It also points out that the decline is stronger for high-income group both in case of urban and rural households.

The historical data shows that after successive devaluation of 1993-94 (12%) and of 1995-96 (8.13%) the overall pattern of growth in real output remain erratic. While GDP surged from 2.3 percent in 1993 to 4.5 percent in 1994 but then after remaining at about 5.2 percent in the following two years it again reduced to as low as 1.3 percent in 1997. The growth rates slowed down considerably for all sectors when compared with before reforms (see table–1.12 in Appendix). Therefore the counterfactual analysis shows that had rupee been devalued by 10 percent, it would have impacted output negatively with respect to the situation in 1990.

5.4.2 Income Distribution And Profits

The impact of devaluation on income and profits of the sectors is summarised in table-10.

Table-10

Impact on Income and Profits

	Base Value 1990	Scenario	% Change
Profits			
Agriculture	135045	134998	-0.035
Industry	41250	39450	-4.363
Education	4097	4008	-2.178
Health	5520	5653	2.419
Services	133988	132526	-1.091
Income			
Household Urban			
HHU1	59696	58312	-2.318
HHU2	79272	78345	-1.169
HHU3	87984	87256	-0.827
HHU4	101579	100794	-0.773
Household Rural			
HHR1	104062	97899	-5.922
HHR2	83649	83261	-0.463
HHR3	83909	83607	-0.360
HHR4	81981	81719	-0.320
Firms' Income	107059	106836	-0.208
Government Income	143452	142355.3	-0.765

Source: Computed from CGE Model for Pakistan

The scenario show that while profits of all the sectors experienced a decline as compared to base value, but its impact on agriculture is insignificant. Since devaluation leads to increase in import prices and imports are mainly concentrated on capital goods for which demand is inelastic. Thus industrial sector is adversely affected by devaluation as its profits have declined by 4.4 percent. The profits of the services and education have also declined but health sector shows an improvement in profits. Since income of the households also depends on profits therefore it has also reduced. Once again the lowest income group experienced relatively sharp decline in disposable income. The income of HHU1 and HHU1 has decreased by 2.3 and 1.2 percent, and HHU3 and HHU4 have registered a decline of 0.8 and 0.7 percent. However in case of rural households, it is lowest income group (HHR1) which is adversely affected as its income has reduced by 5.9 percent as compared to other income groups. The decline in profits and income of households has resulted in reduction in government revenues by about 0.77 percent as tax base is reduced. It can be inferred that impact of devaluation is more severe for fixed income group thus it has implications for income distribution. Once again it can be compare with the actual data, which shows that under reforms Gini coefficient has increased.

5.4.3 Impact on Balance of Trade

Exchange rate policy to improve external competitiveness has now become the centrepiece of any adjustment effort. It is expected that a nominal devaluation will result in expenditure switching, increased production of tradable, higher exports, and in an improvement of the external accounts of the country in question. In order to know the impact of devaluation a counterfactual experiment has carried out by using CGE model for which results are shown in table-10.

Table-11

Impact on Balance of Trade

	Base Value 1990			10 % Devaluation Scenario			
Sectors	**Exports**	**Imports**	**Balance**	**Exports**	**Imports**	**Balance**	**% Change**
Agriculture	3867	12378	-8511	3867	12341	-8474	-0.438
Industry	102210	166554	-64344	102225	166504	-64279	-0.100
Health	9	122	-113	9	120	-111	-1.770
Other Services	22386	18153	4233	22395	18146	4249	0.370
Total	**128472**	**197207**	**-68735**	**128496**	**197111**	**-68615**	**-0.174**

Source: Derived from CGE model for Pakistan

The scenario shows that policy of devaluation alone could do not prove to be effective in reducing trade deficits as claimed under structural adjustment programmes. The results reveal that after devaluation, there is not any significant change in trade deficit for either of the sectors. The trade deficit, which was 8.15 percent of GDP in base year, has shown a slight reduction of 0.2 percentage point to 8.13 percent of GDP. Therefore overall trade deficit remained almost at the base year level and could not be reduced significantly.

The actual data (see table-1 chapter three) that after the devaluation of 1993-94, while exports in real terms have declined imports on the other hand have rather increased in the following two years. Similarly after the devaluation of 1995-96 though import growth has slowed down but exports continue to decline at a greater pace thus resulting in deteriorating the trade balance in real terms. It points out that the policy of devaluation may not necessarily be successful in reducing trade deficits. It thus seems to support the findings of this study where trade deficit has actually increased albeit marginally.

Therefore it suggests that had rupee been devalued by 10 percent as a part of policy of trade liberalisation, the trade deficit would have been deteriorated with respect to the situation in 1990.

5.5 Reduction in Subsidies

The most fundamental problem affecting Pakistan's export prospectus is the narrow export base. As mentioned in chapter three that even until recently exports are mainly concentrated on few low value added products mainly cotton and cotton based manufactured and leather products. Thus export diversification remain one of the most important goal of any export promotion efforts. In this context to promote the non-traditional export such as industrial high value added products and those of services, government provides them tax holidays and subsidies. For new non-traditional exports a 25 percent subsidy was introduced for the year 1990 to 1993 (Economic Survey 1993-94).

A counterfactual simulation has been carried out that what would happen if it had been reduced for industry and services sector with respect to the situation in 1990 by 30 percent.

5.5.1 Impact on Production and Consumption

The experiment of reducing subsidies to industry and services shows that as a result production of these both sectors has decreased significantly. The production of industry and services has in fact decline by 2.4 and 2.6 percent as compared to base value. This implies that as subsidy is removed from tradable sectors, the profits of these sectors fall and it then affect the institutional income and investments. It thus also affects production of different sectors. Table-12 shows the performance of different sectors under this simulation.

Table-12

Impact on Production

	Base Year 1990	Simulation	% Change
Agriculture	357368	352487	-1.366
Industry	675472	659492	-2.366
Education	19046	18800	-1.291
Health	8923	8921	-0.025
Services	634504	618089	-2.587

Source: Derived from CGE model for Pakistan

Thus reducing subsidies has resulted in decline in production of the sectors particularly, for which it has been reduced but it has also impacted the other sectors because of low investment and reduction in consumption. See table 1.23 in appendix for consumption detailes.

5.5.2 Income Distribution And Profits

The impact of removing subsidies from industry and services has resulted in shrinking the profits of all the sectors. Its impact is more strong for the sectors from which subsidy has been removed. The results are shown in table-13.

Table-13

Impact on Income and Profits

	Base Value 1990	Simulation	% change
Income			
Urban Household			
HHU1	59696	58801	-1.50
HHU2	79272	78028	-1.57
HHU3	87984	87386	-0.68
HHU4	101579	100538	-1.03
Rural Household			
HHR1	104062	101617	-2.35
HHR2	83649	81482	-2.59
HHR3	83909	83099	-0.97
HHR4	81981	80968	-1.24
Profits			
Agriculture	135045	132899	-1.59
Industry	41250	40273	-2.37
Education	4097	4052	-1.09
Health	5520	5467	-0.96
Services	133988	131456	-1.89
Firms income	131647	130020	-1.24
Government Income	143452	141805	-1.15

Source: Computed from CGE Model for Pakistan

The profits of the industry and those of services have decreased by 2.4 and 1.9 percent respectively. The overall profits have declined in such a way that the disposable income of households and those of firms have shown significant reduction. This has lead to decrease in government revenues because of taxation effect. The results indicate that the income of the lowest income groups both in rural and urban have declined more sharply compared with other groups.

5.5.3 Impact on Balance of Trade

This section provides a description of the removal of subsidies on balance of trade of trade of different sectors. The details are given in table-14.

Table-14

Impact on Balance of Trade

	Base Year 1991			Reduction in Subsidies			
	Exports	**Imports**	**Balance**	**Exports**	**Imports**	**Balance**	**% change**
Agriculture	3867	12378	-8511	3855	12395	-8540	0.34
Industry	102210	166554	-64344	101222	166570	-65348	1.56
Health	9	122	-113	8	122	-114	0.87
Services	22386	18153	4233	22315	18165	4150	-1.96
Total	**128472**	**197207**	**-68735**	**127400**	**197252**	**-69852**	**1.63**

Source: computed from CGE Model for Pakistan

The removal of subsidies has resulted in low profits, low households savings which in turn leads to smaller level of investment (table 1.19 in Appendix). As a result not only domestic output but also exports have declined by about 1 percent. Similarly the trade surplus of the services sector has also decreased by about 2 percent. Thus after removal of subsidies these sectors could not compete and their profits have declined. The overall result is that trade deficit has in fact deteriorated by 1.6 percent.

The results shows that removal of subsidies has in fact resulted in reduction in profits and households income in such a way that tax base has decreased. It has rather lead to decline in government revenues and in increasing fiscal deficit. Similarly the lower income of households has caused the savings and investment to fall thereby reducing the output level. Thus it can be concluded that a further reduction of subsidies with respect to the situation in 1990 would have negatively impacted the production, profits and thereby institutional income of different agents.

5.6 Complete Trade Liberalisation

In this section counterfactual simulations have been carried out so as to know what would have happen had government opted for a policy of complete trade liberalisation. In this context it is pointed out that complete liberalisation implies a policy mix of 10 percent devaluation, 30 percent reduction in import tariffs and a 30 percent removal of subsidies simultaneously with respect to the situation in1990. *This simulation is carried out and denoted by 'original experiment' to differentiate it from*

other two simulations that also are based on same policy mix but incorporate either high or low trade elasticity. These are used for the sensitivity analysis. Here it is worthwhile to note that during the SAP of 1990government did not opt for devaluation or removal of subsides. As far as tariffs are concerned it was required to replace NTBs with the equivalent of tariffs and thereby simplification of tariff system. It was in second phase of reforms in 1993/94 when maximum tariffs were reduced and subsidies were lowered. Besides that two successive devaluation of 12 percent in 1993/94 and another to the tune of 8.13 percent were undertook in 1995/96. Thus this counterfactual analysis is carried out that what would happen to production, income distribution and balance of trade had Pakistan been opted for such policy mix simultaneously.

Besides this, a sensitivity analysis has also been carried out by assuming a relatively high and low trade elasticities. The role of the trade elasticities in adjustment is very important as these elasticities determine the extent of export and import movements following changes in relative prices, it is therefore important to assess the sensitivity of the preceding results to the value of these elasticities. As explained earlier this study uses elasticities of substitution for CES production function and those for 'composite good', which have been borrowed from other studies. The sensitivity analysis assumes a 10 percent lower and 10 percent higher values of elasticities as compared with the borrowed estimates.

5.6.1 Impact on Production and Consumption

The results of this simulation are shown in table-15, which describe the impact of policy mix on production.

Table-15

Impact on Production

Sectors	Base Value 1990	Percentage change from base Value		
		Original experiment	High Elasticity	Low Elasticity
Agriculture	357368	-1.248	-1.202	-1.001
Industry	675472	-2.409	-2.367	-2.258
Education	19046	-4.365	-4.627	-4.236
Health	8923	-0.959	-0.784	-0.961
Services	634504	-2.099	-2.125	-1.986

Source: computed from CGE Model foe Pakistan

The result shows that such a policy has caused the production to fall in every sector significantly with respect to base value. The production of agriculture, industry, education and services decline by 1.3, 1.4, 4.4 and 2.1 percent respectively. As already explained this could be the result of reduced domestic demand and low investment after liberalisation as explained in section 5.2.

A comparison of the results shows that the results for both the higher and lower elasticities are very similar to those of the previous simulations. There is no significant difference in terms of percentage changes in production. Since the results of the consumption behaviour for both higher and low elasticity do not reveal any change either in magnitude or pattern when compared with original experiment. Hence the detailed can be seen at in table-1.20 and table 1.21 in Appendix, here the results of the original experiment are summarised in the following table.

Table-16

Impact on Consumption

	Percentage change from Base Year				
	Scenario-I	Scenario -II	Scenario -III	Scenario -IV	Scenario -V
Household Urban Total	**-9.431**	**-14.630**	**0.418**	**-8.960**	**-8.918**
HHU1	-9.658	-14.969	-0.759	-9.326	-9.357
HHU2	-9.569	-14.757	-0.369	-9.157	-9.366
HHU3	-8.814	-14.659	-0.322	-8.757	-8.369
HHU4	-9.789	-13.897	1.659	-8.370	-8.699
Household Rural Total	**-9.093**	**-14.295**	**-0.046**	**-8.890**	**-8.675**
HHR1	-8.890	-14.876	-0.366	-9.369	-9.368
HHR2	-9.690	-13.896	-0.237	-8.569	-8.570
HHR3	-9.237	-13.590	-0.367	-8.690	-8.690
HHR4	-8.108	-14.237	1.459	-8.236	-6.966

Source: Computed from CGE Model for Pakistan

Simulation-I , II, III and IV are for agriculture, industry, education, health and services sectors respectively

The data shows that as a result of trade liberalisation the domestic demand has reduced, consumption of the entire sector has declined considerably. Similarly investment has reduce in all sectors (see table 1.22 in Appendix)

5.6.2 Income Distribution And Profits

This section gives a description of the impact of complete trade liberalisation on profits and thereby its impact on disposable income of firm and households. The

results of the other two simulations using high and low trade elasticities are also given for comparison purpose. The results of these simulations are summarised in table-17.

Table-17

Impact on Profits and Income

		Percentage change from Base Year		
	Base Value1990	Original experiment	High Elasticity	Low Elasticity
Profits				
Agriculture	135045	-2.897	-3.257	-3.147
Industry	41250	-5.290	-5.259	-4.988
Education	4097	-2.459	-2.552	-2.015
Health	5520	-0.916	-0.836	-0.927
Services	133988	-4.287	-4.370	-4.259
Income				
Household Urban				
HHU1	59696	-2.357	-2.236	-2.221
HHU2	79272	-1.789	-1.898	-1.659
HHU3	87984	-0.327	-0.590	-0.134
HHU4	101579	1.715	1.884	2.026
Household Rural				
HHR1	104062	-2.257	-2.366	-1.880
HHR2	83649	-1.746	-1.690	-1.659
HHR3	83909	-0.357	0.424	-0.346
HHR4	81981	1.174	1.258	1.146
Firms	107059	-1.550	-1.659	-1.582
Government	143452	-1.752	-1.927	-1.692

Source: Computed from CGE Model for Pakistan

The counterfactual simulation shows that there is a reduction in profits of all the sectors. The profits fell in industry, services and agriculture by 5.3, 4.3 and 2.9 percent respectively. Whereas in health and education the decline is to the tune of about 1 and 2.5 percent respectively. The overall impact of decline in profits has resulted in reducing the disposable income of firms and those of the households. It has resulted in reducing the income of firms and government revenue by 1.6 and 1.8 percent respectively. Once again the sensitivity analysis show almost the similar pattern of. This also suggest that opening up of economy has fiscal cost for the government as decline in government revenues points towards increase in fiscal deficit. It could be compared with the presentation in chapter three regarding fiscal consolidation where fiscal deficit remained high after reforms.

5.6.3 Impact on Balance of Trade

This section presents the counterfactual analysis of the process of complete liberalisation and its impacts on balance of trade. The result of the complete liberalisation is summarised in the following table-18.

Table-18

Impact on Balance of Trade

Sectors	Base Value Trade Balance	Percentage change from base year		
		Original experiment	High elasticity	Low elasticity
Agriculture	-8511	1.37	1.48	1.26
Industry	-64344	15.57	12.62	14.02
Health	-113	1.33	1.11	1.24
Other Services	4233	-3.69	-3.27	-3.47
Total	**-68735**	**14.98**	**12.20**	**13.49**

Source: Computed from CGE Model for Pakistan

The original simulation shows that after complete liberalisation, the trade deficit of industrial sector has increased sharply (15.6%) because of surge in imports and those of agriculture and health have increased by 1.4 and 1.3 percent respectively. The trade surplus of the services sector has also scaled down by 3.7 percent. As a result of this the overall trade deficit has increased by 15 percent. The other two simulations using high and low trade elasticity shows that trade deficit has deteriorated by 12 and 13.5 percent respectively.

These results can be compared with the performance eof economy after second phase of reform when maximum tariffs were reduced to 35%, Rupee was devalued by (12% & 8.13%) and subsidies were further reduced. The data indicates that the trade deficit, which was $ 3.3 billion during 1993, reduced to $ 2 billion in next year, but again surged to its highest level in the 1990s that is $ 3.7 billion in 1996. It remained around $ 3.1 billion in the following year until it reduced to $1.7billion in 1998/99 mainly because of slowing down of economic activity as a result of sanction imposed by the donors in then wake of nuclear explosion. Therefore the result of the simulation suggests that had the policy mix been

implemented, the trade deficit would have deteriorated compared with the situation in 1991.

5.7 Comparison with Other Studies

After having analysed different counterfactual simulations, in this section results of the other studies regarding adjustment have been compared with the one obtained from CGE model in this study.

Kemal (1994) has quoted the work of Firoze (1986) that structural adjustment programmes have resulted in accumulating structural problems rather than alleviating them. Therefore these liberalisation has adverse impact on employment and income distribution.

Kemal (1994) argued that after trade liberalisation in Pakistan there is rising income inequalities and poverty. In fact Gini coefficient increased from 0.34 to 0.41 and the proportion of poor has increased from 13 percent in 1987-88 to 14 percent in 1990-91. This result can be compared with the CGE model for Pakistan where it is found that trade liberalisation has resulted in increasing income gap between urban and rural households.

Iqbal (1996) has quoted a recent study by Noman (1995) where he concludes that the aggregate performance of the Pakistan economy has been worse during reforms than it was before. He further argues that income distribution has sharply deteriorated during liberalisation. It also support our study where counterfactual simulations suggests that income gap has increased after liberalisation. As the income of all groups except the higher income group has declined.

Mark McGILLIVRAY and Howard White (1995) have analysed the impact of opening of economy on macroeconomic performance of Pakistan. They used an error correction model by using a time series data and found that adjustments had little positive effect on Pakistan macroeconomic performance. It seems to support the results obtained from this study where trade liberalisation has resulted in increasing the gap between export and imports and by reducing government revenues it has lead

to an increase in fiscal deficits. Moreover our results suggests a decline in output which seems to support that liberalisation has had little positive impact on macroeconomic performance.

Hasan and Khan (1994) have examined the policy of devaluation for Pakistan by specifying exports, imports and price level equations. By estimating the equations simultaneously they concluded that devaluation might improve the trade balance. Similar results were found by another study conducted by Iqbal (1996) which has employed a three-gap model approach for Pakistan. However in sharp contrast to these studies, this study by taken into account the macroeconomic interaction of different variables suggests that policy of exchange rate devaluation was not successful in improving trade balance. This is also supported by Vos (1994) which has employed CGE model on Pakistan and indicates that additional exchange rate depreciation would mainly produce cost-push inflationary tendencies, erosion of real incomes and contractionary effect on the economy as a whole. Similar results were obtained in our counterfactual scenarios when as a result of devaluation, whereas trade deficit could not improve but output of agriculture and industry contracted.

Regarding subsidies a study by Iqbal (1996) points towards an improvement in fiscal deficit particularly when subsidies were reduced as suggested by World Bank/IMF reform programmes. The results of our study show that removal of subsidies has in fact resulted in reduction of production in such a way that because of reduced tax base government revenues have rather decreased. It has cause fiscal deficit to increase.

5.8 Summary

The counterfactual simulations based on the CGE model for Pakistan were carried out to investigate the impact of trade liberalisation on production, income distribution, and consumption and on balance of trade. While trade is directly affected by a change in relative prices because of trade liberalisation, the changes in income of different agents then has its impact on domestic demand and consequently on total supply through a chain effect. From the results presented above it is clear that liberalisation has resulted in reducing the production, and disposable income of

households. Of particular importance is the result regarding income distribution, which points out that although income has decreased for all categories of households, but its impact is not same. It is the lowest income group that experienced a sharp reduction in income, both in case of urban and rural households, as compared to middle and high-income group. The result also indicate that trade deficit has in fact deteriorated after trade liberalisation. The outcome of the model suggest that opening of trade has resulted in changing the relative price which then produce a chain effect through out the economy.

CHAPTER SIX
SUMMARY AND CONCLUSIONS

This paper presents a computable general equilibrium model designed to examine the policies of trade liberalisation on the economy of Pakistan. In this regard three policy variables were used to make various counterfactual simulations including reduction in import tariffs and subsidies and policy of devaluation. The next section provides a brief summary of the paper and its main findings.

Chapter two gives an insight about the theoretical benefits associated with the concept of free trade for developing countries. It presents a theoretical analysis of tariffs and subsidy for 'small country' case and argues that by liberalising trade developing countries can maximise their welfare. Thus it argues that trade liberalisation has positive impacts on production, consumption and for the trade balance.

The next chapter describes the concept of trade liberalisation and the measures taken by Pakistan under reform programmes of IMF/WB. It also presents an analysis of the major trends in economy after liberalisation. It points out that after trade liberalisation fiscal deficits remained high, and balance of trade could not be improved. While exports remain concentrated on few low value added products, composition of imports on the other hand has not changed and country still depends on the imports of industrial raw material for capital goods and for consumer goods. It also suggests that after signing WTO in January 1995 there will be further reduction in tariffs, which would have its implications for the income distribution and balance of trade.

Chapter four presents the construction of CGE model that has been used to make different policy scenarios of counterfactual type. The chapter provides the complete model and its explanation. This construction of CGE model was one of the main tasks of this study.

Chapter five then analyses the results and makes a comparison of the outcome of model with actual data. Here different policy scenarios have been presented by changing the policy variables. Since analysis is counterfactual type, therefore it was focused on what would have happened had the opening of trade had been larger with respect to the situation in 1990. It also provides a case of complete liberalisation where all the policy variables were changes simultaneously besides a sensitivity analysis was also carried out. The next section gives a summary of the main results.

The main focus of this study as mentioned in section 1.4 was to see the implication of opening of trade on production, consumption, income distribution and on balance of trade. The main findings of the study and some of the suggestions for the government are presented below.

As far as production is concerned, it points out that reduction in import tariffs has negatively impacted output. As pointed out in chapter five, that main policy tool in SAP 1990 were removal of NTBs and their rplacement with tariffs equivalent and simplification of tariffs. Thus our counterfactual experiments deal with the analysis of different alternate policies where tariffs were reduced by 30 percent individually for each sector and then simultaneously to assess the implication of trade liberalisation with respect to1990. Similar simulations were done for devaluation and for subsidies. The results suggets that policy of devaluation was not successful in containing trade deficit and its overall impact was contractionary. The policy scenario about removing subsides has also shown its adverse impact on output particularly for sectors from which it was withdrawn. Then the policy mix under 'complete liberalisation' reveals that it has caused output in every sector to fall. Thus the research hypothesis regarding production has pointed out that after trade liberalisation, output has declined. Therefore in the wake of further liberalisation government should opt for a more cautious approach to avoid the adverse implications of opening of economy. In this regard it is also pointed out that in the absence of any sound industrial base further removal of subsidies may even aggravate the situation. Thus state should remain to play its active role for the long run development.

Similarly the hypothesis regarding consumption has proved to be true, that opening of trade has resulted in reducing consumption in contrast to what was assumed under neo-classical trade model. This study also indicates that liberalisation has resulted in increasing the income gap between rural and urban households. As mentioned earlier other studies have also supported this finding. It is therefore suggested that mere liberalisation may not prove to be beneficial for economy, therefore structural programmes should be accompanied with targeted social welfare programme.

The research hypothesis about trade balance has also proved to be correct as it is deteriorated after liberalisation. It is also supported by actual data that also shows the same trends. In this regard it is also worth mentioning that policy of devaluation has not proved to combat the yawing gap between exports and imports. The trade deficit even exacerbated when 'policy mix' was used in an effort to know the consequence of 'complete liberalisation'. As mentioned in chapter two, that after reforms, trade deficit actually remained high and showed a divergent trend. It amounted to $ 2557 million or 6.6 percent or GDP in 1987-88 and remained at about $ 2.5 billion until 1990-91. After declining to around $ 2000 million in 1993-94 it again surged up to as high as $ 3704 million, highest in 1990s, or 5.7 percent of GDP in the 1995-96.

Thus efforts should be towards diversification of exports and to move from low value added towards high value added products. It again requires on the part of government to create better incentives for non-traditional exports. Therefore efforts should be made to remove the supply constraints by moving towards more value added products. It implies that government should design such policies that would support macroeconomic stability and domestic economy.

Therefore one can conclude from the above that the gains that derive from openness have to be viewed in their proper perspective. As Roderic (1999) has nicely argued that countries that have done well are those that have been able to formulate their own domestic investment strategy and those which have had the appropriate institutions to handle external shocks, not those that have had relied on reduced barriers to trade and capital flows. Therefore for further opening of the economy

policy makers should not let the international economic integration to dominate their thinking on development.

6.1 Extension of Work

The CGE model for Pakistan was used for counterfactual simulations however there is considerable room for its improvement that could pave the way for further research. Some of the suggestions in this regard are given below.

It is suggested to have a dynamic model so as know about the long run impacts of different policies economy wide. In this context explicit behaviour of the labour force growth in each sectors can be considered in particular rural-urban composition of the labour force. Similarly investment dynamic equation for investment allocation be another extension. Similarly for agriculture and non-agriculture sector different price equations can be incorporated. For example as far as agriculture is concerned flexible prices and for industry mark-up price rule can be incorporated.

Since this study uses estimates of the trade elasticities that are borrowed from other studies, the econometric estimation of these parameters could also improve the model in capturing the behaviour of the economy. Similarly the assumption of infinite availability of foreign exchange to finance import can be replaced by more realistic closure rule.

Besides this consumption behaviour of different agents could be improved by explicitly modelling the equations that incorporate parameters reflecting the propensities to consume of imported good and domestically produced good separately. This requires a more detailed SAM that give information about the expenditure shares for different households in detail. In this regard construction of a new SAM to reflect the current behaviour of the economy may also be useful another step.

The purpose of the study was to investigate the implications of opening of trade on production, consumption, income distribution and on balance of trade. The

study was successful in analysing the research hypothesis by using a CGE model, which was built around SAM 1990. It provides a more systematic analysis compared to other studies regarding trade liberalisation and its impact on Pakistan economy. However having incorporating the suggestions mentioned above it could give us further insight about long run implications of trade liberalisation. Therefore for future research a dynamic CGE model could be a more useful tool of analysing such type of policies.

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Appendix

Table -1.1

COEFFICIENT OF CONCENTRATION OF EXPORTS (COMMODITY-WISE)
(% Shares)

COMMODITIES	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99
Rice	8.2	6.6	4.8	5.7	6.0	4.6	3.6	5.6	5.8	5.7	6.6	6.9
Cotton	13.7	20.0	9.0	6.9	7.5	4.0	1.2	0.8	5.9	0.4	1.5	0.0
Cotton Yarn	12.1	12.9	16.8	19.3	17.0	16.5	18.5	18.8	17.7	17.0	13.4	12.0
Cloth	10.9	9.9	11.3	11.0	11.9	12.7	12.1	13.3	14.7	15.2	14.5	14.2
Textile Made-ups	8.5	9.5	10.2	6.2	7.7	9.0	6.5	4.8	4.4	4.3	4.0	5.7
Garments	10.9	10.7	13.5	13.5	15.0	15.9	16.5	16.3	15.5	17.1	16.7	17.9
Leather	6.4	5.2	5.6	4.5	3.5	3.3	3.3	3.3	3.0	2.9	2.4	2.2
Leather Manufactures	3.1	3.2	4.0	4.4	4.8	5.8	4.8	4.8	4.8	4.8	4.8	4.8
Carpets	5.7	4.9	4.6	3.6	3.3	2.6	2.2	2.4	2.4	2.4	2.3	2.4
Fish & Fish Prep.	2.8	2.3	1.9	1.9	1.7	2.7	2.3	1.9	1.6	1.8	2.0	1.6
Surgical Instruments	1.3	1.4	1.4	1.4	1.3	1.5	1.4	1.4	1.5	1.5	1.5	1.5
Sports Goods	1.5	1.5	2.2	2.2	2.0	1.9	2.9	3.3	2.8	3.7	4.4	3.2
Synthetic Textiles	4.4	2.5	4.3	5.6	6.1	7.4	9.5	7.1	5.2	6.2	7.2	5.2
POL & Products	0.6	0.4	0.2	1.6	1.2	1.2	0.8	1.0	0.8	1.0	0.4	0.5
Raw Wool	0.4	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.0
Cotton Waste	0.2	0.3	0.6	0.9	0.9	0.7	0.9	0.8	0.7	0.5	0.5	0.4
Guar & Products	1.2	0.8	0.8	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4
Drugs & Chemicals	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.5	0.5	0.4	0.5	0.5
Footwears	0.5	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5
Fruits & Vegetables & J	1.1	1.0	1.1	0.8	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.7
Tarpaulin & Canvas Go	0.7	0.9	0.6	1.3	0.7	0.6	0.4	0.4	0.4	0.4	0.4	0.4
Others	5.5835299	4.8013484	5.8204736	7.8385451	7.1333737	7.4824322	10.998107	11.911238	10.571894	13.139326	15.53832	19.176691
Total	100	100	100	100	100	100	100	100	100	100	100	100
Hirshmann's Coeff. of Concentration	**0.37**	**0.403**	**0.386**	**0.39**	**0.39**	**0.396**	**0.416**	**0.419**	**0.409**	**0.425**	**0.416**	**0.436**

Source: Own calculations based on Table-1.2 and Table-1.3

Appendix

Table -1.2

COEFFICIENT OF CONCENTRATION OF EXPORTS (COMMODITY-WISE)
(Share)^2

COMMOD	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99
Rice	66.65	43.78	23.34	32.17	36.25	21.53	12.68	31.18	33.82	32.18	43.32	47.00
Cotton	188.11	399.80	80.46	47.68	56.81	15.64	1.34	0.59	34.94	0.15	2.16	0.00
Cotton Yarn	147.59	166.74	283.19	371.79	288.53	271.75	343.31	353.00	313.23	288.33	179.45	143.18
Cloth	118.52	98.43	127.03	120.70	140.73	160.54	145.51	176.54	215.61	230.17	209.34	201.96
Textile Made-ups	72.38	90.05	104.20	38.27	59.77	81.27	42.64	22.86	19.52	18.61	16.25	32.06
Garments	117.99	115.50	181.43	182.05	226.12	252.93	271.33	267.12	240.02	291.41	279.26	322.03
Leather	41.31	27.18	31.78	19.98	12.17	10.62	10.86	11.19	8.76	8.21	5.78	5.01
Leather Manufactures	9.91	10.29	16.18	19.26	23.29	34.08	23.12	23.12	23.12	23.12	23.12	23.12
Carpets	32.11	24.36	21.38	13.08	11.05	6.53	4.97	5.93	5.85	5.78	5.45	5.62
Fish & Fish Prep.	7.77	5.40	3.61	3.47	2.76	7.15	5.11	3.59	2.54	3.18	3.90	2.52
Surgical Instruments	1.62	1.83	1.99	1.89	1.72	2.26	1.88	1.96	2.12	2.31	2.10	2.11
Sports Goods	2.13	2.30	4.71	5.02	4.19	3.74	8.60	10.57	8.07	13.91	19.77	10.38
Synthetic Textiles	19.66	6.17	18.31	31.85	36.70	54.58	91.06	49.93	27.43	37.98	51.31	26.53
POL & Products	0.37	0.15	0.05	2.59	1.42	1.46	0.62	0.99	0.58	0.97	0.17	0.28
Raw Wool	0.14	0.16	0.12	0.02	0.01	0.01	0.01	0.02	0.02	0.03	0.01	0.00
Cotton Waste	0.04	0.07	0.31	0.82	0.74	0.52	0.84	0.60	0.43	0.25	0.24	0.15
Guar & Products	1.38	0.72	0.71	0.22	0.13	0.14	0.20	0.13	0.24	0.15	0.14	0.14
Drugs & Chemicals	0.08	0.09	0.20	0.06	0.10	0.12	0.13	0.24	0.27	0.19	0.26	0.24
Footwears	0.23	0.16	0.22	0.27	0.34	0.31	0.31	0.36	0.34	0.38	0.25	0.22
Fruits & Vegetables & I	1.27	1.00	1.18	0.68	0.64	0.67	0.52	0.37	0.30	0.27	0.23	0.44
Tarpaulin & Canvas Go	0.46	0.77	0.34	1.72	0.55	0.34	0.15	0.15	0.15	0.15	0.15	0.15
Others	31.175806	23.052946	33.877913	61.442789	50.88502	55.986791	120.95836	141.8776	111.76493	172.64189	241.43939	367.74546
$\Sigma (xi/x)^2$	**29.34**	**31.91**	**30.57**	**30.90**	**30.90**	**31.34**	**32.96**	**33.20**	**32.39**	**33.62**	**32.93**	**34.51**

Appendix

Table -1.3

Exports Commodity Wise

(RS. Million)

COMMODITIES	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99
Rice	6404	5967	5144	7846	10340	8214	7319	14026	17141	18453	24562	19439
Cotton	10759	18032	9550	9553	12944	7001	2383	1924	17421	1239	5483	116
Cotton Yarn	9530	11645	17917	26675	29170	29183	38076	47191	52164	55239	49988	33928
Cloth	8540	8947	12000	15199	20372	22430	24789	33373	43279	49354	53991	40295
Textile Made-ups	6674	8558	10868	8558	13276	15959	13419	12010	13021	14032	15043	16054
Garments	8521	9692	14341	18666	25823	28154	33850	41051	45663	55533	62359	50882
Leather	5042	4702	6002	6184	5991	5769	6772	8401	8726	9322	8970	6346
Leather Manufactures	2470	2893	4282	6071	8287	10334	9880	12076	14171	15640	17941	13632
Carpets	4445	4451	4923	5003	5709	4524	4583	6116	7131	7820	8709	6723
Fish & Fish Prep.	2186	2096	2024	2576	2852	4733	4644	4760	4702	5798	7374	4498
Surgical Instruments	998	1221	1502	1901	2253	2661	2819	3513	4293	4941	5411	4121
Sports Goods	1145	1369	2311	3099	3515	3423	6028	8165	8375	12131	16593	9134
Synthetic Textiles	3478	2240	4556	7807	10403	13078	19610	17748	15436	20049	26729	14605
POL & Products	479	352	235	2228	2048	2137	1621	2493	2242	3212	1526	1494
Raw Wool	298	358	367	196	204	155	181	331	431	528	293	108
Cotton Waste	162	240	597	1255	1482	1281	1878	1952	1931	1632	1812	1088
Guar & Products	923	763	896	653	616	658	919	901	1447	1253	1409	1051
Drugs & Chemicals	216	267	476	350	555	620	730	1222	1544	1435	1907	1378
Footwears	376	365	504	724	997	979	1135	1514	1723	2014	1865	1317
Fruits & Vegetables	885	904	1158	1141	1371	1450	1479	1531	1618	1704	1791	1877
Tarpaulin & Canvas Go	534	791	619	1813	1270	1039	783	957	1123	1240	1422	1080
OthersOthersOthers - -	43804380	43304330	61976197	10844	12250	13246	22601	29918	31160	42744	57983	54374
Total Exports	**78445**	**90183**	**106469**	**138342**	**171728**	**177028**	**205499**	**251173**	**294741**	**325313**	**373160**	**283540**

Source:Economic Survey 1998-99

Appendix **Table 1.4**

Economic Classification of Imports

RS. Million

	Capital Goods		Consumer Goods		Industrial Raw Material for				Total Value
					Capital Goods		Consumer Goods		
	Value	Share	Value	Share	Value	Share	Value	Share	
1981	14882	28	7775	15	4055	8	26832	50	53544
1982	17504	29	8407	14	4861	8	28710	48	59482
1983	21135	31	9593	14	4040	6	33383	49	68151
1984	24419	32	10746	14	4525	6	37017	48	76707
1985	28968	32	14372	16	4859	5	41579	46	89778
1986	33195	36	16432	18	4966	5	36353	40	90946
1987	33841	37	16213	18	6150	7	36227	39	92431
1988	40350	36	16027	14	5021	4	48153	43	112551
1989	49498	36	23359	17	9929	7	53055	39	135841
1990	48420	33	28432	19	10439	7	61562	41	148853
1991	56303	33	26900	16	11621	7	76290	45	171114
1992	96453	42	29478	13	15167	7	88791	39	229889
1993	108993	42	36056	14	14304	6	99290	38	258643
1994	97301	38	34966	14	15692	6	110291	43	258250
1995	112305	35	43414	14	16754	5	148419	46	320892
1996	140405	35	54090	14	22541	6	180539	45	397575
1997	169774	37	70589	15	22259	5	202379	44	465001

Source: Economic Survey 1998-99

Appendix

Table -1.5
Major Trade Statistics

Years	X fob	Mfob	XPI	MPI	Xreal	Mreal	X	M	Xreal	Mreal	Trade deficit	GDP	Tradedeficit/GDP	TOT	Trade(X+M)	Openness %
1980	2798	5563	130.8	103.2	2139.6	5392.7					-2765	28.10	9.84	126.77	8361	29.75
1981	2319	5769	119.2	100.0	1945.0	5769.0	-17.1	3.7	-9.1	7.0	-3450	30.72	11.23	119.23	8088	26.32
1982	2627	5616	111.5	96.8	2355.2	5799.1	13.3	-2.7	21.1	0.5	-2989	28.69	10.42	115.18	8243	28.73
1983	2669	5993	111.5	95.8	2392.9	6256.4	1.6	6.7	1.6	7.9	-3324	31.15	10.67	116.44	8662	27.81
1984	2457	6009	106.4	94.7	2309.0	6342.8	-7.9	0.3	-3.5	1.4	-3552	31.15	11.40	112.32	8466	27.18
1985	2942	5984	96.2	91.6	3059.7	6534.3	19.7	-0.4	32.5	3.0	-3042	31.90	9.54	105.00	8926	27.98
1987	3498	5792	100.0	100.0	3498.0	5792.0	18.9	-3.2	14.3	-11.4	-2294	33.35	6.88	100.00	9290	27.85
1988	4362	6919	111.5	104.2	3910.8	6639.4	24.7	19.5	11.8	14.6	-2557	38.47	6.65	107.03	11281	29.32
1989	4634	7207	112.8	108.4	4107.4	6647.2	6.2	4.2	5.0	0.1	-2573	40.17	6.40	104.06	11841	29.47
1990	4926	7411	120.5	117.9	4087.5	6286.1	6.3	2.8	-0.5	-5.4	-2485	40.01	6.21	102.22	12337	30.83
1991	5902	8385	119.2	114.7	4950.1	7308.0	19.8	13.1	21.1	16.3	-2483	45.63	5.44	103.92	14287	31.31
1992	6762	8998	116.7	116.8	5796.0	7701.0	14.6	7.3	17.1	5.4	-2236	48.88	4.57	99.85	15760	32.24
1993	6782	10049	119.6	123.0	5671.4	8167.6	0.3	11.7	-2.2	6.1	-3267	51.82	6.30	97.19	16831	32.48
1994	6685	8685	135.1	137.1	4947.1	6336.6	-1.4	-13.6	-12.8	-22.4	-2000	52.15	3.84	98.59	15370	29.47
1995	7759	10296	170.3	160.6	4557.1	6409.6	16.1	18.5	-7.9	1.2	-2537	60.47	4.20	105.99	18055	29.86
1996	8311	12015	192.4	176.7	4319.7	6799.7	7.1	16.7	-5.2	6.1	-3704	64.79	5.72	108.88	20326	31.37
1997	8096	11241	212.6	192.2	3807.6	5849.8	-2.6	-6.4	-11.9	-14.0	-3145	63.05	4.99	110.65	19337	30.67
1998	8495	10301	254.9	189.5	3332.1	5437.2	4.9	-8.4	-12.5	-7.1	-1806	63.40	2.85	134.57	18796	29.65
1999	7551.6015	9250.4453	266.4	209.0	2834.2	4426.6	-11.1	-10.2	-14.9	-18.6	-1699	62.95	2.70	127.50	16802.0	26.7

Source: WB CD ROM 1999 and Economic Survey 1998-9

Appendix

Table -1.6

Fiscal Dfeficit and Inflaton

years	*As % of GDP*			Inflation %
	Revenue	*Expendure*	*Fiscal Deficit*	
1988	17.30	26.70	-9.40	6.30
1989	18.10	26.10	-8.00	10.40
1990	18.60	25.70	-7.10	6.04
1991	16.90	25.60	-8.70	12.66
1992	19.10	26.50	-7.40	10.58
1993	18.00	26.00	-8.00	9.83
1994	17.30	23.20	-5.90	11.27
1995	17.20	22.80	-5.60	13.02
1996	17.70	24.20	-6.50	10.79
1997	15.60	22.00	-6.40	11.80
1998	16.50	21.90	-5.40	7.81
1999	17.30	22.00	-4.70	6.09

Source: Economic Survey 1998-99

Appendix

Table -1.7
CGE Model Parameters

Input output coefficents

	Agriculture	Industry	Education	Health	Other Services
Agriculture	0.1396	0.1532	0.0092	0.0000	0.0123
Industry	0.1046	0.3369	0.0265	0.2365	0.2364
Education	0.0000	0.0001	0.0017	0.0000	0.0002
Health	0.0000	0.0000	0.0000	0.0197	0.0000
Other Services	0.1562	0.2212	0.0525	0.0751	0.1592

Labor-output ratio, Price weights and Export Elasticities

	Agriculture	Industry	Education	Health	Other Services	
Labor output ratio	0.1278	0.0672	0.7289	0.3182	0.1599	
Ω=weights	0.2550	0.2762	0.0205	0.0071	0.4411	1.0000
ηi (export elasticity)	0.2000	0.7500		0.2000	0.2000	

Taxes and Subsidies

	Agriculture	Industry	Education	Health	Other Services
Import Tariffs (tm)	0.069236	0.257238	0.000000	0.000000	0.000165
Subsidies (te)	0.000000	0.006096	0.000105	0.000000	0.005639
Indirect Taxes (ts)	0.004357	0.066391	0.000105	0.000448	0.021748

Investment And Depreciation

	net I share	Dep Rtae
Agriculture	-0.0940	0.0256
Industry	0.9204	0.0308
Education	-0.0101	0.0439
Health	-0.0036	0.0346
Other Services	0.1873	0.0788

Savings and direct Taxes

	Direct Tax R	**Savings Rate**
Husehlds Urban		
HHU1	0.00211	-0.30836
HHU2	0.00413	-0.10058
HHU3	0.00722	0.06002
HHU4	0.00635	0.35652
Husehlds Rural		
HHR1	0.00244	-0.28638
HHR2	0.00152	0.02879
HHR3	0.00243	0.21703
HHR4	0.01299	0.58443
Firms	0.18677	0.35295

Appendix **Table 1.8**

List of Variables, Parameters and Coefficients

Endogenous Variables

Variable	No of Cases	Name of the Variables
X_i	5	Gross output of ith sector
XDi	5	Domestic absorption
Ei	4	Exports by activities
Vij	5	Total intermediate demand
Li	5	Employment by activity
Ws	5	Nominal wage bill
Πi	5	Aggregate sectoral profits
PNi	5	Net price per activity
GYhhi	8	Gross income of ith households
Divhhi	8	Dividend from firms to ith household
TG_{hhi}	8	Transfers from government to ith household
Trhhi	8	Transfers from rest of world to ith household
Ydhhi	8	Disposable income of ith households
TRrow	1	Transfers to rest of world from firm
Yk	1	Income of factor capital
GYF	1	Gross income of firm
YDf	1	Disposable income of firm
TRrow	1	Transfers paid to rest of world
GRV	1	Income of government
GEX	1	Expenditure of government
TG_f	1	Transfers from government to firm
TS	1	Total savings
DG	3	Government consumption
Ci	40	Consumption of ith households
TINV	1	Total investment net depreciation
Ii	5	Net investment of ith sector
Ig	5	Gross investment of ith sector
Qi	4	Composite good production function
mi	4	Import to domestic good ratio
Mi	4	Imports of the ith sector
di	4	Domestic use ratio
$V^d i$	4	demand for domestically produced intermediate inputs
$C^d i$	4	demand for domestically produced final good
$Z^d i$	4	demand for domestic investment
$X^D i$	5	demand for domestically produced good
PDi	4	domestic price of ith traded good
P_H	1	price of non-traded good
Pi	4	composite good price
PMi	4	price of imported good
PEi	4	price of exported good
EXi	5	excess demand for product market
EF	1	balance of payments constraints
F	1	net foreign capital flows

Table1.9
PARAMETERS & elasticites

Variable	No of Cases	Name of the Variables
aij	25	Input-output coefficients
βlb	5	Labour-output ratio
ρi	5	Substitution parameter in CES production function
σi	5	Elasticity of substitution between K and L
γi	5	Scale parameter for CES production function
βi	5	Share parameter in CES production function
Ω^{w}	5	Weights in price index
ϖh,lb	8	Share of households income in labour income
ϖh,k	8	Share of households income in capital profit of firm
πi	8	Proportion of Dividends from firms to households
τg	8	Coefficient of transfers from government to households
τr	1	Coefficient of transfers from rest of world to households
Ψk	1	Share of capital income to rest of world from firms
ν	3	Coefficient of government transfers to firms
μi	40	Proportion of government consumption on ith good
Φi	6	Subsistence minima for ith good
ω	40	'Frisch Parameter'
εi	40	expenditure elasticities for ith good
αi	5	average budget shares
φ i	5	sectoral net investment shares
ψ i	4	rate of depreciation of ith sector
γi	4	scale parameter for CES aggregation of composite good
δ i	4	share parameter for CES aggregation of composite good
ρ i	4	substitution parameter for composite good
σ i	4	elasticity of substitution between imported and domestic good
η i	4	export elasticity for ith good
Ω i	1	weights of traded good
Ω_{H}		weight of non-traded good

Exogenous Variables

Variable	No of Cases	Name of the Variables
FS	1	Foreign savings
PWMi	4	World price of imports
PWXi	4	World price of exports
ER	1	Exchange rate
Ws	5	Real wage bill
tdi	9	Direct tax rate on household
Itax	5	Indirect tax rate
tmi	4	Import tariff rate
TRG	1	Transfers from rest of world to government
ϕi	3	Subsidy rate
tdf	1	Direct tax rate for firm

Table 1.10

CGE Model Equations

Factor Market and Supply of Commodity

Equations	**No. of Cases**
$X_i = \gamma_i [\beta_i L_i^{-\rho} + (1-\beta_i)K_i^{-\rho}]^{(-1/\rho)}$	(5)
$XD_i = \Sigma V_{ij} + C_i + Z_i$	(5)
$V_i = \Sigma V_{ij} = \Sigma a_{ij} X_j$	(5)
$L_i = \beta_{lb}(W/PD_i)^{-\rho} * X_i$	(5)
$Ws = Ws \Sigma P_i \Omega^w$	(5)
$\Pi_i = PN_iX_i-(\Sigma W_i+\phi i* X_i+tm*M_i+M_i)$	(5)
$PNi = Pi (1-td) X_i - \Sigma a_{ij} X_j$	(5)

Income Distribution to Institutions

$GYhhi = \varpi h,lb*Ylb + \varpi h,k*RKhh + \Sigma DIV\ hh + \Sigma TGhh + \Sigma TRhh$	(8)
$DIVhh_i = \pi_i * \Sigma \Pi$	(8)
$TGhhi = \tau g * GRV$	(8)
$Trhhi = \tau r * Rr$	(8)
$Ydhhi = Gyhhi*(1-tdi)$	(8)
$Yk = \Sigma\Pi + TGf$	(1)
$GYF = Yk - \Sigma DIVhh - TRrow$	(1)
$TRrow = \Psi k * Yk$	(1)
$YDf = Yk*(1-tdf)$	(1)
$GRV = td_i *\Sigma GYhh_i + \Sigma Itax * Xi + \Sigma tdf*GYf + \Sigma tmi*Mi+TRG$	(1)
$GEX = \Sigma TG_{hh} + TG_f + \Sigma sub + \Sigma DG$	(1)
$TG_{hh} = \tau g * GRV$	(8)
$TG_f = \nu * GRV$	(1)
$\Sigma sub = \phi_{ind}* X_{ind} + \phi_{edu}* X_{edu} + \phi_{os}*X_{os}$	(1)
$\Sigma DG = \mu_{edu} **GRV + \mu_{hlt}*GRV + \mu_{os}*GRV$	(1)

Savings, Investment and Consumption Behaviour

$TS = \Sigma s_{hh}*YDhh + \Sigma s_f*YDf + s_g *GRV + Sf$	(1)
$C_i = \Phi_i + \beta_i / P_i (Y - \Sigma P_j \Phi_j)$	(40)
$TINV = \Sigma s_{hh}*YDhh + \Sigma s_f*YDf + s_g *GRV + Sf$	(1)

$$Ii = \varphi i * TINV \quad (5)$$

$$Igi = Ii + \psi i * Xi \quad (5)$$

Product Differentiation and Treatment of Imports

$$Q_i = \gamma_i\{\delta_i M_i^{-\rho} + (1-\delta_i)D_i^{-\rho}\}^{-1/\rho} \quad (4)$$

$$mi = M_i/D_i = (PD_i/PM_i)^{\sigma}_i * (\delta_i/1-\delta_i)^{\sigma}_i \quad (4)$$

$$M_i = [(PD_i/PM_i)^{\sigma}_i * (\delta_i/1-\delta_i)^{\sigma}_i] * D_i \quad (4)$$

$$d_i = D_i/Q_i = f_i^{-1}(m_i,1) \quad (4)$$

$$V^d_i = d_i V_i \quad (4)$$

$$C^d_i = d_i C_I \quad (4)$$

$$Z^d_i = d_i Z_i \quad (4)$$

Treatment of Exports

$$E_i = E_i o * (PE_i/PD_i)^{\eta i} \quad (4)$$

Price Equations and Normalisation Rule

$$PD_i = PW_i * ER \quad (4)$$

$$P_H = [(P/\Omega_H) - (\Sigma P_i * \bar{\Omega}_i / \Omega_H) * ER] \quad (1)$$

$$P_i = 1/\gamma_i [\delta_i{}^{\sigma i} PM_i{}^{1-\sigma i} + (1-\delta_i)^{\sigma i} PD_i{}^{1-\sigma i}]^{1/1-\sigma i} \quad (4)$$

$$PM_i = PW_i * (1+tm_i) * ER \quad (4)$$

$$PE_i = PWE_i * (1+te_i) * ER \quad (4)$$

The General Equilibrium Solution

$$EX_i = X^{Di} - X^{Si} = 0 \quad (5)$$

$$EF = \Sigma PWi * M_i - \Sigma PW_i * E - F \quad (1)$$

$$F = \Sigma PWi * M_i - \Sigma PW_i * E \quad (1)$$

$$\Sigma P_i * \Omega_i + P_H * \Omega_H = P \quad (1)$$

Table -1.11

SAM FOR PAKISTAN 1990

		Factors of Production		Agents											Total Production					Goods & Domestic Market					Goods & Export Market				Accumaltion	
		Labour	Capital	HU1	HU2	HU3	HU4	HR1	HR2	HR3	HR4	Firms	Governmen	Rest of Wo	Agriculture	Industry	Education	Health	Other Servi	Agriculture	Industry	Education	Health	Other Servi	Agriculture	Industry	Health	Other Servi	Accumaltio	Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Labour	1														45681	45415	13883	2839	101471											209289
Capital	2														157847	83837	2613	2815	210285											457397
HU1	3	32446	25252									680	681	763																59822
HU2	4	37200	35573									3403	445	2980																79601
HU3	5	34383	41347									5150	884	6860																88624
HU4	6	29121	41005									11842	2191	18069																102228
HR1	7	38959	59032									2719	786	2821																104317
HR2	8	17847	57223									4325	419	3962																83776
HR3	9	13040	60586									6231	263	3993																84113
HR4	10	6293	51040									14209	3556	7962																83060
Firms	11		86339										45308																	131647
Governmen	12			126	329	640	649	255	127	204	1079	24588		11544	1557	44845	2	4	13799	857	42844	0	0	3							143452
Rest of Wo	13											20713								12378	166554	0	122	18153							217920
Agriculture	14												0							353501					3867						357368
Industry	15												4742								568520					102210					675472
Education	16												2									19044									19046
Health	17												0										8914					9			8923
Other Servi	18												3534											608584					22386		634504
Agriculture	19			25837	27784	24995	16085	47929	28600	22050	10618		0		49893	103486	175	0	7826											1458	366736
Industry	20			33485	36436	34039	23174	59768	35334	28120	13805		0		37381	227552	505	2110	149984											96225	777918
Education	21			406	742	851	1363	404	366	337	204		14137		0	82	33	0	112											7	19044
Health	22			556	606	637	327	1004	594	549	276		4231		12	31	0	176	23											14	9036
Other Servi	23			17820	21677	22181	24415	24758	16347	14642	9166		102438		55832	149439	999	670	101008											65348	626740
Agriculture	24													3867																	3867
Industry	25													102210																	102210
Health	26													9																	9
Other Servi	27													22386																	22386
Accumulati	28			-18408	-7973	5281	36215	-29801	2408	18211	47912	37787	-40165	30494	9165	20785	836	309	49996												163052
Total	29	209289	457397	59822	79601	88624	102228	104317	83776	84113	83060	131647	143452	217920	357368	675472	19046	8923	634504	366736	777918	19044	9036	626740	3867	102210	9	22386	163052	

Source: Pakistan Institute of Development Economics, research Report No. 171

Appendix

Table 1.12

Growth Rates of GDP (Real)

	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-9: 1995-96	1996-97	1997-98	1998-99	Average Groeth % 1990-99
GDP	6.4	7.56	6.79	3.97	8.71	6.36	5.81	6.44	4.81	4.58	5.57	7.71	2.27	4.54	5.24	5.19	1.3	5.44	3.75	4.56
Agriculture	3.66	4.72	4.4	-4.82	10.92	5.95	3.25	2.73	6.87	3.03	4.96	9.5	-5.29	5.23	6.57	5.8	0.06	5.9	4.24	4.00
Industry	10.63	13.75	7.03	7.89	8.09	7.55	7.53	9.98	3.96	5.72	6.25	8.05	5.35	5.48	3.6	3.02	1.19	4.96	3.22	4.68
Education	5.85	6.11	17.28	11.14	19.43	35.10	9.36	4.94	4.29	-3.94	-1.02	11.89	1.67	3.43	2.26	2.02	2.12	-6.63	1.07	1.29
Health	5.69	6.11	9.46	21.56	6.16	5.73	49.72	4.94	-6.14	-18.49	3.69	6.80	1.67	5.45	3.78	3.68	-13.13	17.53	3.86	1.48
Services	6.58	7.9	9.24	7.61	8.21	5.77	5.86	6.77	3.81	4.48	5.21	6.76	4.63	4.2	4.8	3.35	2.1	3.1	3.29	4.19

Composition of GDP (%)

	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-9: 1995-96	1996-97	1997-98	1998-99
GDP	99.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture	30.8	31.6	30.3	27.9	28.5	27.6	26.3	26.0	27.0	25.5	25.7	26.2	24.8	25.3	26.0	25.8	24.0	23.7	23.3
Industry	22.6	22.3	22.1	22.7	22.5	23.3	24.0	24.4	23.9	27.6	25.8	25.4	25.3	24.9	24.4	24.5	25.8	26.0	26.2
Education	1.4	1.4	1.5	1.6	1.8	2.3	2.4	2.4	2.4	2.05	2.1	2.2	2.2	2.2	2.4	2.4	2.6	2.3	1.4
Health	6.0	6.0	6.0	6.0	7.0	7.0	7.0	1.0	1.0	0.7	7.0	7.0	7.0	7.0	6.0	8.0	8.0	7.0	6.0
Other Services	38.65	38.78	40.17	41.77	40.20	39.74	40.33	46.20	45.76	44.11	39.47	39.16	40.69	40.56	41.17	39.29	39.57	41.03	43.09

Appendix Table -1.13

LES Consumption Function Calculations

Expenditure Shares

Agriculture	Industry	Education	Health	Other Services
Urban Households				
HHU1	0.43281	0.56093	0.00680	0.00931	0.29851
HHU2	0.35049	0.45963	0.00936	0.00764	0.27345
HHU3	0.28409	0.38688	0.00967	0.00724	0.25210
HHU4	0.15835	0.22814	0.01342	0.00322	0.24035
Urban Households				
HHR1	0.46058	0.57435	0.00388	0.00965	0.23792
HHR2	0.34190	0.42241	0.00438	0.00710	0.19542
HHR3	0.26278	0.33512	0.00402	0.00654	0.17450
HHR4	0.12952	0.16839	0.00249	0.00337	0.11181
Governmei	0.00000	0.00000	0.09855	0.02949	0.71409

Expenditure Elasticities

Agriculture	Industry	Education	Health	Services
Huseholds Urban				
HHU1	0.635	0.5	1.377	1.215	1.595
HHU2	0.666	0.79	1.203	1.06	1.754
HHU3	0.619	1.63	1.365	1.309	1.5
HHU4	0.573	0.87	1.105	1.124	1.486
Huseholds Rural				
HHR1	0.7	0.91	0.851	0.883	1.935
HHR2	0.735	0.75	0.689	0.801	1.815
HHR3	0.585	1	0.776	0.812	1.674
HHR4	0.461	0.87	0.569	0.802	1.643

Source: Burney and Khan (1991)

Marginal Budget Shares

Agriculture	Industry	Education	Health	Services
Huseholds Urban				
HHU1	0.27483	0.28046	0.00937	0.01132	0.47613
HHU2	0.23343	0.36311	0.01126	0.00810	0.47963
HHU3	0.17585	0.63061	0.01320	0.00948	0.37815
HHU4	0.09073	0.19848	0.01483	0.00362	0.35717
Huseholds Rural				
HHR1	0.32241	0.52266	0.00330	0.00852	0.46037
HHR2	0.25130	0.31681	0.00301	0.00569	0.35469
HHR3	0.15373	0.33512	0.00312	0.00531	0.29211
HHR4	0.05971	0.14650	0.00142	0.00270	0.18370

Source: own computations based on LES Function

Subsistence Minima for Different Commodities (ϕ_i)

	Agriculture	Industry	Education	Health	Services
Huseholds Urban					
HHU1	23070	29899	312	442	13027
HHU2	23708	31091	545	465	13302
HHU3	19090	25997	408	319	9482
HHU4	12567	18106	788	187	10567
Huseholds Rural					
HHR1	42243	50550	346	854	16679
HHR2	24165	29743	313	494	9812
HHR3	17476	18148	244	391	5287
HHR4	8882	9546	163	198	3418

Source: own computations based on LES Function

Appendix

Table 1.14

Impact of 30% reduction of import Tariff on Investment

	Base Value	Simulation I		Simulation II		Simulation III		Simulation IV	
		Value	% change	Value	% change	Value	% change	Value	% change
Agriculture	1458.036	1416.220	-2.868	1447.001	-0.757	1441.628	-1.125	1443.664	-0.986
Industry	96224.644	94535.766	-1.755	95295.239	-0.966	96095.154	-0.135	95594.661	-0.655
Education	7.004	6.894	-1.571	6.917	-1.237	6.997	-0.099	6.987	-0.235
Health	14.001	13.747	-1.819	13.951	-0.357	13.906	-0.685	13.893	-0.777
Services	65347.927	63412.485	-2.962	64863.536	-0.741	64607.535	-1.133	64637.269	-1.088

Source: Derived from CGE model for Pakistan

Appendix

Table 1.15

Impact of a 30% reduction in Industrial sector import tarrif on Household Consumption

	Agriculture			Industry			Education			Health			Services		
	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change
Total Coı	**203898**	**203606**	**-0.143**	**264161**	**247129**	**-6.448**	**4673**	**4475**	**-4.233**	**4549**	**4554**	**0.106**	**151005**	**150364**	**-0.424**
Househol	94701	94507	-0.21	127134	117675	-7.44	3362	3221	-4.20	2126	2129	0.16	86093	85687	-0.47
HHU1	25837	25714	-0.475	33485	30789	-8.05	406	386	-5.004	556	555	-0.189	17820	17677	-0.800
HHU2	27784	27735	-0.175	36436	33977	-6.75	742	707	-4.700	606	608	0.350	21677	21521	-0.720
HHU3	24995	24963	-0.130	34039	31663	-6.98	851	812	-4.600	637	638	0.120	22181	22103	-0.350
HHU4	16085	16095	0.060	23174	21246	-8.32	1363	1316	-3.450	327	328	0.450	24415	24386	-0.120
Househol	109197	109099	-0.09	137027	129453	-5.53	1311	1255	-4.31	2423	2425	0.062	64913	64677	-0.363
HHR1	47929	47882	-0.098	59768	55674	-6.85	404	384	-4.847	1004	1003	-0.110	24758	24710	-0.191
HHR2	28600	28575	-0.088	35334	33285	-5.80	366	349	-4.676	594	595	0.240	16347	16306	-0.250
HHR3	22050	22033	-0.078	28120	27063	-3.76	337	324	-3.740	549	549	0.039	14642	14537	-0.720
HHR4	10618	10610	-0.080	13805	13432	-2.70	204	197	-3.500	276	277	0.350	9166	9124	-0.456

Source: Computed from CGE Model for Pakistan

Appendix

Table 1.16

Impact of a 30% reduction in agricultural import tarrif on Household Consumption

	Agriculture			Industry			Education			Health			Services		
	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change
Total Col	**203898**	**202273**	**-0.797**	**264161**	**263709**	**-0.171**	**4673**	**4648**	**-0.542**	**4549**	**4494**	**-1.199**	**151005**	**149904**	**-0.729**
Househol	94701	93754	-1.00	127134	126917	-0.171	3362	3343	-0.55	2126	2102	-1.143	86093	85325	-0.89
HHU1	25837	25630	-0.803	33485	33403	-0.246	406	402	-0.925	556	546	-1.744	17820	17697	-0.690
HHU2	27784	27444	-1.225	36436	36391	-0.125	742	738	-0.532	606	599	-1.202	21677	21437	-1.105
HHU3	24995	24717	-1.111	34039	33983	-0.165	851	846	-0.549	637	631	-0.876	22181	21968	-0.959
HHU4	16085	15963	-0.757	23174	23140	-0.146	1363	1357	-0.455	327	325	-0.530	24415	24222	-0.790
Househol	109197	108519.01	-0.62	137027	136792.76	-0.171	1311	1304	-0.51	2423	2393	-1.25	64913	64580	-0.513
HHR1	47929	47627	-0.631	59768	59676	-0.155	404	402	-0.521	1004	990	-1.355	24758	24677	-0.325
HHR2	28600	28356	-0.852	35334	35247	-0.246	366	365	-0.355	594	583	-1.856	16347	16240	-0.652
HHR3	22050	21945	-0.476	28120	28082	-0.135	337	335	-0.659	549	544	-0.877	14642	14518	-0.847
HHR4	10618	10591	-0.255	13805	13788	-0.125	204	203	-0.545	276	275	-0.289	9166	9144	-0.239

Source: Computed fro CGE Model for Pakistan

Appendix **Table 1.17**

Impact of a 30% reduction in Servies sector import tarrif on Household Consumption

	Agriculture			Industry			Education			Health			Services		
	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change
Total Co	**203898**	**201903**	**-0.979**	**264161**	**260081**	**-1.544**	**4673**	**4420**	**-5.411**	**4549**	**4506**	**-0.956**	**151005**	**149880**	**-0.745**
Househol	94701	93578	-1.19	127134	124941	-1.72	3362	3176	-5.52	2126	2101	-1.162	86093	85306	-0.913
HHU1	25837	25432	-1.566	33485	33101	-1.15	406	385	-5.269	556	548	-1.356	17820	17707	-0.634
HHU2	27784	27518	-0.956	36436	35298	-3.12	742	697	-6.126	606	600	-0.957	21677	21578	-0.457
HHU3	24995	24686	-1.236	34039	33544	-1.46	851	803	-5.689	637	630	-1.144	22181	21887	-1.326
HHU4	16085	15941	-0.896	23174	22999	-0.76	1363	1293	-5.156	327	323	-1.246	24415	24135	-1.148
Househol	109197	108325	-0.80	137027	135140	-1.38	1311	1244	-5.14	2423	2404	-0.78	64913	64573	-0.523
HHR1	47929	47375	-1.157	59768	58772	-1.67	404	380	-5.856	1004	995	-0.900	24758	24648	-0.444
HHR2	28600	28499	-0.355	35334	34502	-2.35	366	345	-5.689	594	591	-0.426	16347	16297	-0.302
HHR3	22050	21886	-0.742	28120	28073	-0.17	337	323	-4.216	549	542	-1.256	14642	14521	-0.823
HHR4	10618	10565	-0.496	13805	13793	-0.09	204	195	-4.246	276	276	-0.126	9166	9106	-0.649

Source: Computed from CGE Model for Pakistan

Appendix

Table 1.18

Impact of a 30% reduction in import tarrif of all sectors on Household Consumption

	Agriculture			Industry			Education			Health			Services		
	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change
Household Urbai	94701	92440	-2.388	127134	115286	-9.32	3362	3016	-10.277	2126	2080	-2.15	86093	84151	-2.26
HHU1	25837	24912	-3.580	33485	30026	-10.33	406	351	-13.650	556	546	-1.850	17820	17601	-1.230
HHU2	27784	26978	-2.901	36436	33066	-9.25	742	656	-11.650	606	591	-2.450	21677	21363	-1.450
HHU3	24995	24625	-1.480	34039	30928	-9.14	851	765	-10.157	637	623	-2.250	22181	21591	-2.660
HHU4	16085	15925	-0.995	23174	21267	-8.23	1363	1246	-8.600	327	321	-1.900	24415	23597	-3.350
Household Rural	109197	107552	-1.51	130666	121417	-7.08	1311	1180	-9.96	2423	2375	-1.97	64913	64013	-1.39
HHR1	47929	46875	-2.200	56910	53171	-6.57	404	359	-11.250	1004	980	-2.360	24758	24547	-0.850
HHR2	28600	28266	-1.168	33706	31313	-7.10	366	331	-9.660	594	583	-1.850	16347	16177	-1.040
HHR3	22050	21863	-0.850	26838	24812	-7.55	337	305	-9.500	549	541	-1.500	14642	14347	-2.012
HHR4	10618	10549	-0.650	13212	12122	-8.25	204	186	-8.680	276	271	-1.750	9166	8941	-2.450

Source: Computed from CGE model for Pakistan

Appendix **Table1.19**

Impact of a 10 % devaluation on Investment

	Base Value	Simulation	% Change
Agriculture	1458	1438	-1.35
Industry	96225	95147	-1.12
Education	7	6.85	-2.14
Health	14	13.85	-1.1
Services	65348	64793	-0.85

Source:Computed from CGE model for Pakistan

Impact of 30% reduction in Subsidies on Investment

	Base Value 199	Simulation	% Change
Agriculture	1458	1441.1	-1.2
Industry	96225	93945.7	-2.4
Education	6.999999988	6.9	-2.0
Health	14	13.9	-1.0
Services	65348	64244.27228	-1.689

Appendix

Table 1. 20

Impact of trade libralisation on Household Consumption

High Trade Elasticity

	Agriculture			Industry			Education			Health			Services		
	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change
Total Consumption	**203898**	**185495**	**-9.026**	**264161**	**225422**	**-14.665**	**4673**	**4698**	**0.541**	**4549**	**4146**	**-8.855**	**151005**	**137868**	**-8.700**
Household Urban	94701	86166	-9.013	127134	108520	-14.642	3362	3384	0.663	2126	1938	-8.8595	86093	78680	-8.6104
HHU1	25837	23320	-9.740	33485	28345	-15.350	406	403	-0.667	556	503	-9.5826	17820	16123	-9.5234
HHU2	27784	25181	-9.368	36436	30970	-15.001	742	740	-0.258	606	550	-9.2101	21677	19685	-9.1890
HHU3	24995	22792	-8.814	34039	29109	-14.482	851	854	0.352	637	582	-8.6553	22181	20280	-8.5689
HHU4	16085	14872	-7.540	23174	20095	-13.286	1363	1387	1.755	327	303	-7.3782	24415	22592	-7.4680
Household Rural T	109197	99329	-9.037	137027	116903	-14.686	1311	1314	0.228	2423	2209	-8.8515	64913	59189	-8.8179
HHR1	47929	43435	-9.376	59768	50798	-15.008	404	403	-0.266	1004	911	-9.2174	24758	22483	-9.1897
HHR2	28600	26041	-8.947	35334	30173	-14.606	366	367	0.206	594	542	-8.7879	16347	14899	-8.8569
HHR3	22050	20095	-8.864	28120	24035	-14.529	337	338	0.297	549	501	-8.7054	14642	13366	-8.7124
HHR4	10618	9757	-8.108	13805	11897	-13.819	204	206	1.130	276	254	-7.9475	9166	8441	-7.9124

Source: Computed from CGE Model for Pakistan

Appendix

Table 1.21

Impact of trade libralisation on Household Consumption

Low Trade Elasticity

	Agriculture			Industry			Education			Health			Services		
	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change
Total Col	**203898**	**185258**	**-9.142**	**264161**	**225132**	**-14.775**	**4673**	**4692**	**0.398**	**4549**	**4141**	**-8.971**	**151005**	**137574**	**-8.894**
Househol	94701	86027	-9.159	127134	108345	-14.779	3362	3379	0.501	2126	1935	-9.005	86093	78423	-8.908
HHU1	25837	23281	-9.893	33485	28297	-15.493	406	403	-0.835	556	502	-9.735	17820	16171	-9.256
HHU2	27784	25142	-9.511	36436	30921	-15.135	742	739	-0.414	606	549	-9.353	21677	19649	-9.356
HHU3	24995	22757	-8.953	34039	29065	-14.612	851	853	0.200	637	581	-8.794	22181	20024	-9.725
HHU4	16085	14848	-7.693	23174	20062	-13.431	1363	1385	1.586	327	302	-7.532	24415	22580	-7.514
Househol	109197	99230	-9.127	137027	116786	-14.771	1311	1313	0.134	2423	2206	-8.941	64913	59151	-8.876
HHR1	47929	43381	-9.488	59768	50735	-15.114	404	402	-0.390	1004	910	-9.331	24758	22458	-9.289
HHR2	28600	26019	-9.026	35334	30147	-14.680	366	366	0.119	594	541	-8.867	16347	14899	-8.857
HHR3	22050	20081	-8.929	28120	24017	-14.589	337	338	0.226	549	501	-8.770	14642	13373	-8.670
HHR4	10618	9749	-8.184	13805	11887	-13.891	204	206	1.046	276	254	-8.024	9166	8421	-8.125

Source: computed from CGE Model for Pakistan

Table 1.22

Appendix

Complete liberalisation
Investment

	Base Value	Original % Change	High elasticities % Change	Low Elasticities % Change
Agriculture	1458	-3.55	-2.66	-2.98
Industry	96225	-2.46	-2.57	-2.36
Education	7	-1.33	-1.37	-1.29
Health	14	-7.36	-7.69	-8.50
Services	65348	-3.17	-3.26	-2.66

Source: Computed from CGE model for Pakistan

Appendix

Table 1.23

Impact of a 30% decrease in subsidies on Household Consumption

	Agriculture			Industry			Education			Health			Services		
	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change	Base Year	Simulation	% Change
Total Co	**203898**	**200518**	**-1.657**	**264161**	**257906**	**-2.368**	**4673**	**4646**	**-0.579**	**4549**	**4540**	**-0.197**	**151005**	**148923**	**-1.379**
Househol	94701	93211	-1.57	127134	123956	-2.50	3362	3345	-0.50	2126	2121	-0.25	86093	84868	-1.42
HHU1	25837	25515	-1.245	33485	32260	-3.659	406	405	-0.169	556	555	-0.189	17820	17600	-1.235
HHU2	27784	27127	-2.366	36436	35745	-1.897	742	739	-0.358	606	604	-0.327	21677	21166	-2.357
HHU3	24995	24756	-0.958	34039	33401	-1.875	851	847	-0.461	637	636	-0.126	22181	21907	-1.237
HHU4	16085	15813	-1.689	23174	22551	-2.689	1363	1354	-0.688	327	326	-0.459	24415	24195	-0.900
Househol	109197	107308	-1.73	137027	133950	-2.25	1311	1301	-0.79	2423	2419	-0.150	64913	64056	-1.320
HHR1	47929	46794	-2.368	59768	58647	-1.88	404	399	-1.125	1004	1006	0.157	24758	24419	-1.367
HHR2	28600	28221	-1.325	35334	34180	-3.27	366	364	-0.459	594	593	-0.159	16347	16145	-1.236
HHR3	22050	21861	-0.856	28120	27454	-2.37	337	335	-0.699	549	548	-0.256	14642	14477	-1.124
HHR4	10618	10431	-1.759	13805	13669	-0.99	204	202	-0.897	276	273	-1.034	9166	9014	-1.659

Source: Computed fromCGE Model for Pakistan