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Tariff Reduction and Functional Income Distribution in Pakistan: A CGE Model

RIZWANA SIDDIQUI
Research Economist, PIDE, Islamabad

and

ZAFAR IQBAL
Economist, IMF, Islamabad

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PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS
ISLAMABAD, PAKISTAN

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Pakistan Institute of Development Economics
Quaid-i-Azam University Campus, P O Box No. 1091
Islamabad 44000, Pakistan.
Tel: 92-51-9206610-27
Fax: 91-51-9210886
E-mail: pide@isb.paknet.com.pk

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I. INTRODUCTION

In recent empirical literature, there is ample evidence that most protectionist policies, i.e., import control (tariff and non-tariff barriers), discrimination against exports and over valued exchange rate, result in inefficient use of resources. While economic theory also suggests that reduction of impediments to free trade would make the structure of production in LDC's more consistent with their comparative advantage, resulting in a higher rate of economic growth. In particular, comparative advantage promotes specialisation in goods and services that use abundant local resources (for example, labour in most developing countries) more intensively. This would increase the productive employment, which is most effective and efficient instrument for poverty reduction. This hypotheses is confirmed by East Asian Countries' experiences [Khan (1997)][1]. Thus, integration with the global economy is expected to have positive impact on economic growth, improve income distribution, and reduce poverty.

In late eighties and during nineties, Pakistan liberalised imports under structural adjustment programme (SAP hereinafter) in order to enhance the capacity utilisation of the domestic industry and competitiveness of the production sector. During this period, Pakistan's growth performance was satisfactory, but a large proportion of its population still lives in abject poverty. A few studies[2], analysing the impact of SAP, have shown that impact of these policies is unevenly distributed among the population, hurting the most vulnerable group the most. While White (1997) have argued, citing the example of African countries, that welfare indicators are expected to perform better in countries adopting adjustment policies than in those which do not. Thus, there is a need to explore explicitly the outcome of these policies, using an appropriate quantitative framework. The specific question to be explored in this study is: whether or not

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[1]There are some controversies about their development policies but still evolution of efficiency and equity outcome of their export-oriented strategy of integration with the global economy has not been seriously challenged.

[2]See Kemal (1994), Amjad and Kemal (1997), Anwar (1998) and Iqbal and Siddiqui (1999).

trade liberalisation (tariff reduction) policies improve income distribution and reduce poverty in Pakistan?

It is widely accepted that because of the sensitivity of domestic resource allocation for the developments of the external sector the issue of foreign trade is particularly well suited for general equilibrium analysis. In this framework, one can compare the outcome of ultimate policies through simulations, which help to determine the optimal policies leading to a better outcome than any other framework.[3] This paper intends to explore functional income distribution with aggregate household sector using Computable General Equilibrium (CGE) framework.[4] A simulation exercise is conducted to show the impact of trade liberalisation policies on the performance of the economy as a whole and on income that accrues to households from different sources, which ultimately affects consumption pattern and welfare of households. For example, Siddiqui and Iqbal (1999), using Social Accounting framework, show that poor segment of population receives higher proportion of its income from wages and salaries whereas the rich class receives highest share from capital income. Another study by Iqbal and Siddiqui (1999) shows that income distribution, under fiscal adjustment, has worsened in urban areas but improved in rural areas of Pakistan.[5]

This report is organised as follows. The next section presents historical view of trade policies, income distribution and poverty in Pakistan. Theoretical aspects of impact of trade liberalisation on income distribution, characteristics of SAM for the year 1989-90, and the main building blocks in CGE model for Pakistan are discussed in the third section. In the fourth section, Results of the simulation exercises are discussed. Final section concludes the study. Appendix 1 presents Social Accounting Matrix for Pakistan 1989-90. CGE model for Pakistan is presented in Appendix 2.

II. HISTORICAL VIEW OF TRADE POLICIES, POVERTY AND INCOME DISTRIBUTION IN PAKISTAN

[3]For details see, two studies by Bourguignon *et al.* (1991), Lambert *et al.* (1991), Robinson (1990) for developing countries models.

[4]This analysis will be extended to the disaggregated households i.e., four groups for urban and rural areas of Pakistan.

(a) Trade Policies

During seventies, Pakistan's economy relied more on indirect taxes i.e., 85 percent of tax revenue and import taxes accounted for over half of this amount. At that time 41 percent of the domestic industrial output was protected by import restrictions. Since mid 1980's, government of Pakistan aimed to remove trade barriers and structure of tariff has been changing as tariff on non-competing machinery was removed. At the same time, tariff rate was increased on some other items like raw material and machinery. The number of tariff slabs was reduced from 17 to 10. Sales tax at the rate of 12.5 percent was also imposed. These changes resulted in reduction in un-weighted tariff rate by almost 11 percent i.e., from 77 percent to 66 percent. In spite of all these reforms, Pakistan still depends heavily on import bans and restrictions to protect its industry. Nominal tariff rates still rank higher as compared to other countries in the world.

Table 1 shows that exports as percentage of GDP declined from 9.96 percent in 1980-81 to 7.88 percent in 1984-85 and imports declined marginally from 19.8 percent of GDP in 1980-81 to 19.3 percent of GDP in 1984-85. As a result deficit in trade balance increased from 9.8 percent to 11.4 percent. During 1984-85 to 1987-88, exports share increased but imports shares in GDP declined and in result trade deficit improved. Following SAP, during 1987-88 to date, Government of Pakistan has been changing the rate of import duty on duty able imports. The maximum import duty rate has been reduced from 250 percent in 1987-88 to 128.6 percent in 1989-90 and further to 110 percent in 1995-96 (see Table 2). On the other hand, minimum import duty rate has declined from 13.3 percent in 1987-88 to 10 percent in 1989-90. Subsequently, it declined to 0.5 percent in 1995-96. In result, average duty rate (un weighted) declined from 40.7 percent in 1987-88 to 25.5 percent in 1995-96.

Table 1

Historical Trend in Components of Balance of Payments in Pakistan
(Percentage of GDP)

Year	Exports	Imports	Trade Deficit	Current Account Deficit
1980-81	9.96	19.80	9.84	3.69
1981-82	7.55	18.78	11.23	4.99

[5]However, there are some limitations of SAM based analysis [see Shoven and Whalley (1984) and Naqvi (1997)].

1982-83	9.16	19.58	10.42	1.80
1983-84	8.57	19.25	10.68	3.20
1984-85	7.88	19.28	11.40	5.39
1985-86	9.23	18.77	9.54	3.88
1986-87	10.50	17.38	6.88	2.16
1987-88	11.37	18.03	6.66	4.38
1988-89	11.57	17.99	6.42	4.83
1989-90	12.34	18.57	6.23	4.74
1990-91	12.97	18.42	5.46	4.77
1991-92	13.87	18.45	4.59	2.76
1992-93	13.12	19.44	6.32	7.14
1993-94	12.82	16.66	3.84	3.77
1994-95	12.72	16.88	4.16	4.07
1995-96	13.03	18.83	5.80	7.17
1996-97	12.85	17.84	4.99	6.10
1997-98	13.31	16.26	2.95	3.03
1998-99	12.52	15.46	2.93	2.22

Source: GOP, Economic Survey, 1998-99.

Table 2

Historical Pattern of Tariff Structure

	Tariff Rate (%)		
Year	Minimum	Maximum	Average
1987-88	13.3	250.0	40.7
1988-89	16.1	155.2	36.0
1989-90	10.0	128.6	39.7
1990-91	12.6	151.2	39.0
1991-92	12.1	181.0	32.6
1992-93	17.7	270.1	35.3
1993-94	13.4	166.7	34.7
1994-95	0.3	128.6	21.6
1995-96	0.5	110.3	25.5

Source: CBR Year Book, 1995-96.

Recently, the number of duty slabs has been reduced to 5 with tariff rates 10 percent, 15 percent, 25 percent, 35 percent, and 45 percent. Table 1 shows, during this period, despite fluctuations exports have risen from 11.4 percent as percentage of GDP in 1987-88 to 12.52 percent of GDP in 1997-98. Similarly total imports also exhibit a rising trend from 18.0 percent of GDP in 1987-88 to 16.3 percent of GDP in 1997-98. From 1984-85 to 1987-88 growth

rates of imports and exports reported in Table 3 increased, respectively from 0.3 percent to 19.5 percent and from –7.9 to 24.7 percent. After 1987-88 growth rates of imports and exports have decelerated, respectively, from 19.5 percent and 24.7 percent in 1987-88 to –11.1 percent and –10.2 percent in 1998-99. It seems that despite all the efforts for trade liberalisation, the external sector remained under pressure during last few years and did not achieve a sustainable growth rate in the trade sector. In order to achieve sustainable high economic growth, improvements are necessary in foreign trade performance, which require sustained improvement in export expansion and efficient import substitution.

(b) Poverty and Income Distribution

After almost a decade of start of Structural Adjustment Programme, the important question arises: Whether Structural Adjustment Policies produced expected result of increased economic growth and equal income distribution in Pakistan? Documented statistics show that incidence of poverty and patterns of income distribution were better before adjustment period as compared to the period thereafter. Table 3 shows that prior to 1987-88 Pakistan experienced impressive growth. The economy achieved a high growth rate of 8.7 percent in 1984-85, which declined to 6.4 percent in 1987-88. This impressive growth rate was accompanied by reduction in income inequalities, as Gini coefficient has fallen from 0.37 in 1984-85 to 0.35 in 1987-88 for Pakistan as a whole. For urban areas of Pakistan, Gini coefficient also shows a declining trend but for rural areas it remained almost constant during this period. But since the launching of structural adjustment programme, slower growth of real GDP was accompanied with rising inequality. Table 3 shows that GDP growth rate declined from 6.4 percent in 1987-88 to 2.27 percent in 1992-93. This slower growth was accompanied by rising income inequality as Gini coefficients rose to 0.41 for Pakistan as a whole and to 0.37 and 0.42 for rural and urban areas, respectively. Gini coefficients improved marginally (i.e., 0.40) for Pakistan as a whole in 1993-94 when GDP growth rate rose to 4.54 percent. While Gini coefficient for 1999 shows that income inequality has increased again. Overall trend of Gini coefficient shows that income inequality was higher in post adjustment period as compare to in pre adjustment period.

Table 3

Trends of Gini Coefficients and Growth Rates of GDP

	Gini Coefficients			Growth Rates		
Year	Pakistan	Rural	Urban	GDP	Imports *	Exports *
1984-85	0.37	0.34	0.38	8.71	0.3	–7.9
1985-86	0.36	0.33	0.35	6.36	–0.4	19.7

1986-87	0.35	0.32	0.36	5.81	–3.2	18.9
1987-88	0.35	0.31	0.37	6.44	19.5	24.7
1990-91	0.41	0.41	0.39	5.57	13.1	19.8
1992-93	0.41	0.37	0.42	2.27	11.7	0.3
1993-94	0.40	0.35	0.40	4.54	–13.6	–1.4
1998-99	0.41	0.37	0.41	3.11	-9.3	–10.2

Source: Pakistan Economic Survey, 1997-98, 1998-99.

Table 4 shows that in pre-adjustment period poverty (population below poverty line) sharply went down from 24.47 percent in 1984-85 to 17.32 percent in 1987-88 when growth rate of GDP was on average 6.2 percent. During adjustment period proportion of poor increased from 17.3 in 1987-88 to 23.6 in 1993-94 when GDP growth rate, on average, was 4.8 percent. Most recently, Qureshi and Arif (1999) calculated proportion of poor from the data of household survey held under MIMAP project, which show that proportion of poor has increased sharply from 23.6 in 1993-94 to 32.6 in 1998-99 in Pakistan. The same trend is found in rural and urban areas of Pakistan. Growth rate of GDP has also declined from 4.54 percent in 1993-94 to 3.1 percent in 1998-99. This phenomenon confirms the presence of negative correlation between growth and poverty. The similar trend is found in rural and urban areas of Pakistan (see Table 4). World Bank (1995) also presents some estimates of consumption poverty. It shows that consumption poverty reduced by 18.6 percent during 1985-88 pre adjustment period, because growth and better income distribution helped to alleviate poverty. On the other hand, during 1988-91 (slow growth period), consumption poverty reduced by only 9.1 percent as income inequality exhibits rising trend in this period. All these estimates show that income inequality and poverty has been rising during adjustment period as compared to in pre adjustment period. Now the main question arises: whether the trade liberalisation policies are responsible for this outcome, or we need more policies to complement trade liberalisation policies to reverse the present trend of rise in income inequality.

Table 4

Trends in Proportion of Poor (%)

Year	Pakistan	Rural	Urban
1984-85	24.47	25.87	21.17
1987-88	17.32	18.32	14.99
1990-91	22.11	23.59	18.64
1992-93	22.40	23.53	15.50
1993-94	23.6	26.3	19.4

1998-99	32.6	34.8	25.9

Source: Amjad and Kemal (1997) and Qureshi and Arif (1999).

III. THEORETICAL FRAMEWORK

(a) Impact of Trade Liberalisation on Income Distribution

Prices change with variation in import duties. The changes in prices play crucial role to affect resource allocation, income distribution and poverty alleviation. Tariff reduction changes relative prices, which ultimately changes production incentives. When we introduce imperfect substitution, impact of tariff reduction on economy depends on the extent to which the imposition of tariff reduction affect the price of goods produced domestically. If domestically produced goods are substitutes of imported goods it will affect the whole price system. Reduction in tariff reduces domestic import price, which will reduce demand for domestically produced goods and increases demand for imported goods. Reduced demand causes price decline of domestically produced goods as well. Clearly the impact of these polices will depend on whether the goods are complement or substitutes and the elasticity of supply of the product. Higher elasticity of supply requires smaller adjustment in domestic price necessary to bring back equilibrium in the market. Analysis of the impact of the changes in incentives and resource allocation is very important as they ultimately affect real income and welfare in the country.

There are three channels to affect income distribution in response to adoption of structural adjustment policies [Bourguignon *et al.* (1991)]. First, changes in factor rewards directly affect households' income.[6] Secondly, changes in relative product prices affect households' real income differently because consumption expenditure is specified at the household level. If we assume similar preference function for all consumers in the economy then we can compare the aggregate consumption with the consumption in the base line solution. If more of every single commodity is consumed after policy shock that indicates improvement. Thirdly, capital gains and losses affect households' wealth distribution. In this paper, we concentrate on the mechanism by which tariff rationalisation affects functional distribution of income of households (income from different sources i.e., labour, capital, dividend etc.).

[6]Generally poor households supply labour services and receive highest share of their income from wages and salaries, as shown in Siddiqui and Iqbal (1999). While rich class receive higher percentage of their income from capital. These channels affect income distribution.

(b) Structure of SAM 1989-90 for Pakistan

Every economy wide model, particularly CGE model requires a consistent data base. For this paper data arranged in Social Accounting Matrix (SAM) framework provides the best consistent data set. The latest SAM for the year 1989-90 is given in Appendix 1. It presents a comprehensive picture of the whole economy. It disaggregates production activities into five sectors; agriculture, Industry, education, health and others. These commodities are then transformed into traded goods, i.e., exportable and non-traded goods, i.e., goods for the domestic market. Similarly, factors of production are disaggregated into labour and capital. Four types of institutions are identified as households, firms, government and rest of the world.[7] In accordance with the orientation of analytical interest and policy problems related with the field of distribution of income and consumption, classifications in the SAM-1989-90 (in the present form) high-light the income receipt pattern of aggregate household from different sources and their uses on different items.

(c) Computable General Equilibrium Model for Pakistan

The CGE Model for Pakistan is in line with the framework given in Decaluwe *et al.* (1996). It is neoclassical type of model. Model contains six blocks of equation with 145 equations and 144 endogenous variables. Exchange rate acts as numeraire. Its value is set equal to one. Mathematical equations of the model are given in Appendix 2. Here, we describe the theoretical background of the equations in each block of CGE model.

1. ***Production Sector.*** Domestic production is disaggregated into five sectors. Like other modelers, we adopted technology in which gross output has separable production function for value added and intermediate consumption with Cobb-Douglas functions for value added and Leontief technology between intermediate and value added and also within intermediates. Equations for gross output, value added (specified as a function of labour (L) and capital (K)) and intermediate demand (aggregate as well as disaggregated) are specified in Equations 1 to 4.

[7]We distinguished household group in our earlier study [Siddiqui and Iqbal (1999)] into four income groups for rural and urban areas of Pakistan separately. This disaggregation is carried out to make an example how the SAM framework and the related CGE model can combine the macro economic features with microeconomic issues. Although disaggregation of the household sector is of much importance to see the impact on income distribution. But in this paper we just keep the household sector aggregate.

2. *Labour Demand.* Assuming perfect competition, labour demand function for ith sector is derived from Cobb Douglas production function with constant returns to scale in which every input is paid equal to its marginal product. Equating labour demand equal to labour supply, which determines wage rate, clears labour market. Capital is assumed to be given in the short run by sector specific. Price of capital is determined by sector specific. Changes in factor prices play important role in explaining the issue of functional income distribution. Labour demand is specified in Equation 5. While price of capital is determined by Equation 30 in price block.

3. *Foreign Trade Sector*. In this sector, the model has equations for exports and imports. Constant Elasticity of Transformation (CET) function gives the function for transformation of out put into different goods for domestic market and for exports. In this specification, we assume that domestic sales and exports with the same sectoral classification represent goods of different qualities. CET function describes the possible shift of sectoral production between the domestic and external markets. For import function, we assume that domestically produced goods sold in the domestic market are imperfect substitute of imports (Armington assumption). Constant Elasticity of Substitution (CES) import aggregation function presents demand for composite goods (imported and domestically produced goods). In addition to two Equations 6 and 7 for export transformation and import aggregation, profit maximisation together with cost minimisation gives desired exports and imports ratios as a function of relative prices (domestic to foreign prices). These functions are presented by Equations 8 and 9, respectively.

4. *Income, Saving and Consumption.* Institutions receive income from different sources and save or dissave some amount. Each institution has various sources of income. The endowment of primary factors and their rental values determine the institution income. All income and saving of institutions are used for consumption and investment purposes. Relevant equations are given in income and saving block of model.

(a) Household. In this study, we analyse functional distribution of income among the institutions from different sources. All wage income accrues to households. Similarly households receive share of capital income (lambda) from total capital income from different activities. They also receive income from firms as dividends, transfers from

government as social security benefits, and Transfers from the rest of the world. Equation 12 presents total income of households from above mentioned sources. Dividends are determined by Equation 14. Transfers from the government and from the rest of the world are assumed to be exogenous. Households pay taxes to government. Subtracting taxes from the total income we get disposable income of households. In addition, households' saving is defined in Equation 15.

Consumption of ith commodity by households and total households consumption are defined by Equations 24 and 25, respectively. These equations describe how total households consumption expenditure (CT_h) is allocated among different goods. It is defined with fixed value share of good i with sum of $?_i^c$, which is equal to 1.

(b) Firms. Firms receive income from retained profits and transfers from government. Equation 17 presents its total income. Income from capital (retained profit) is presented in Equation 16. Transfers from the government are given exogenously. Its expenditure includes tax payments to the government, dividends to households, and transfers to the rest of the world. While residual is saved by the firms.

(c) Government. Third institution, government, receives income from the following sources, i.e., direct taxes (income tax from households, corporate taxes from firms), Indirect taxes (from production sector), Import duties (tariff), Export duties (Subsidies), and transfers from the rest of the world. Total government revenue is given by Equation 22. Equations for indirect taxes, taxes from imports and from exports are presented in Equations 19, 20, and 21, respectively. Government total current expenditure is given in value. Government total expenditure on commodity i is fixed share calculated through Equation 27. Government saving is calculated as a residual after subtracting consumption expenditure from total revenue.

Total consumption expenditure on good i is the sum of expenditure by households on good i and by government on good i. In addition to consumption expenditure, there is a demand for good i for the investment purposes. Equation 29 converts aggregate investment into demands for investment good by sector of origin, as I is gross capital formation in commodity i, $?^I$i fixed value share where sum of shares is equal to one. Gross saving from households, firms, government and rest of the world serve as source of funding for gross investment.

5. *Prices.* Block 5 of the model presents prices. There are seven different prices associated with each tradable good, as price of aggregate output, price of composite goods, price of domestic sale, domestic price of imports, domestic price of exports, world price of imports, and world price of exports. World prices of exports and imports are exogenously determined. All prices are defined in Equations 30 through 36. Price index i.e., GDP deflator is presented in Equation 37.

6. *Equilibrium.* Final block presents saving investment equilibrium, goods market equilibrium, and labour market equilibrium by Equations 38, 39, and 40, respectively.

7. *Closure Model.* Model is closed in Current Account Balance equation.

IV. SIMULATIONS USING TARIFF REDUCTION

Computable General Equilibrium model for Pakistan is given in Appendix 2 which is based on the following assumptions on the exogenous accounts:

(1) Total labour supply is equal to total labour demand.
(2) Capital is sector specific.
(3) Government total consumption is fixed.
(4) Households' remittances and transfers from government are fixed.
(5) Current Account Balance is exogenously determined.
(6) Government transfers to households and to firms are given.
(7) World import and export prices are given.

This Neo-classical type open economy model for Pakistan is calibrated using Social Accounting Matrix for Pakistan for the year 1989-90. Under the above-mentioned assumptions, CGE model given in Appendix 2 is used to perform simulation exercises. In the present experiment, we assume that the government introduces tariff rate reduction on industrial imports, which changes the import inflow of industrial goods. In this exercise, tariff rate is reduced by 80 percent. Due to reduction in tariff, relative prices of input and output change which ultimately affect rewards to households in terms of labour and capital income. In order to assess the effects of tariff change the deviation of the variables from the base line values are

calculated. Where base line solutions are the values of original SAM values. The results of simulation are given in Table 5.

(a) Output Price Effect

Exchange rate is fixed, and current account balance is exogenous. Due to this rigidity, all prices must reduce. Simulation results reported in Table 5 also show that producer prices decline for all goods.When tariff rate is reduced by 80 percent on industrial imports, price of imports declines by 16.37 percent. As a result, prices of composite goods decline which tends to increase the demand for imports. If domestic industry can not compete, imports will overwhelm the economy. That will not be beneficial for the country as a whole.

(b) Labour Demand

Table 5 shows that labour demand increases in agriculture, health, and education (nontraded) sectors but declines in industry and other sector. If we calculate the over all impact on employment it shows that overall labour demand has increased.

Table 5

Simulation Results (Tariff Reduction on Industrial Imports by 80 %)

	Percentage Change in Variables in Industries				
Variables	AGR	IND	HE	other	EDU
VA	0.35	–0.66	2.36	-011	2.93
L^D	1.63	–2.17	5.02	-0.4	3.68
C_H	0.51	8.07	0.32	2.65	-0.13
INV	-23.62	–17.87	–23.76	–21.99	–24.1
X^S	0.35	–0.66	2.36	-0.11	2.93
P^D	–4.63	–9.1	-4.34	–6.64	0
P	–4.57	–7.62	–4.33	–6.4	–3.85
P^{VA}	–2.95	–5.63	–1.68	–4.45	–3.48
R	–2.62	–6.25	0.64	–4.56	–0.65
P^C	-4.46	–11.15	–4.28	–6.46	–3.85
P^M	0	–16.37	0	0	0
P^E	0	0	0	0	0
M	–6.57	9.88	–4.23	–8.31	0
EX	4.18	11.89	9.39	8.13	0
TXs	–4.24	–8.24	–2.08	–6.5	0
C	0.51	8.07	2.32	4.37	2.98
Q	0.05	0.34	2.26	-0.66	0
Variables	Total				
Y_G	–28.63	–	–	–	–
W	–4.17	–	–	–	–
IT	–27.03	–	–	–	–

Y_H	−3.98	–	–	–	–
YK_F	−4.23	–	–	–	–
DIV	−4.23	–	–	–	–
Y_F	−4.91	–	–	–	–
S_H	−3.98	–	–	–	–
S_F	−7.76	–	–	–	–
S_G	87.61	–	–	–	–
Pindex	−6.43	–	–	–	–

Note: – not applicable.

(c) Output Effect

Simulations result shows that output has increased in agriculture, health and education sectors but not in industry and other sector as labour demand in agriculture, health, and in education sectors has increased but it has declined in industrial sector and other sector. It seems that resources shift to agriculture, health and other sectors after tariff changes. Table 6 shows that percentage share of industry in GDP has declined but share of agriculture, health and education in GDP has increased. However, Table 6 also shows that the percentage share of labour and capital changes only marginally. From this we can infer that reduction in tariff leads to higher increase in income of poor as compare to income of rich as SAM 1989-90 [Siddiqui and Iqbal (1999)] shows that the highest share of income from wages and salaries accrue to the poor households while highest share of income from capital goes to the rich households. Disaggregation of the household sector will be very useful to see the exact impact on income distribution.

Table 6

Percentage Share in GDP

	Before Simulation	After Simulation
Agriculture	0.2844	0.2884
Industry	0.2006	0.1966
Health	0.0080	0.0084
Others	0.4838	0.4820
Education	0.0232	0.0246
Total	1.0000	1.0000
Labour	0.2799	0.2800
Capital	0.7201	0.7200
Total	1.00	1.00

(d) Households Income

The simulation results help to explain changes in household income from different sources i.e., labour and capital. Due to decline in returns to labour and capital, income of households decline by 3.98 percent in nominal terms. Price index decline by 6.43 percent. In real terms household income increases by 2.6 percent. This implies that tariff reduction increases overall household income in real terms.

(e) Consumption

For the present analysis, we assume consumption of agriculture commodities is food consumption. Manufactured group of commodities include items defined as durable and non-durable. In addition, expenditure on education and health is shown separately. Rest are included in the others sector. Households' consumption changes due to change in relative price. Tariff reduction results in decline of composite goods prices. This price effect ultimately leads to increase in consumption of commodities. Results show that consumption of all traded goods has increased but it has reduced for non-traded goods. The results show the highest increase in consumption of manufactured goods is followed by health and agriculture goods.

(f) Trade

Due to tariff reduction, industrial imports increased by 10 percent but imports in all other sectors has declined. Due to tariff reduction Government revenue decline by 28.63 percent. This decline in revenue leads to reduced demand for goods for investment purposes. This released out put is directed to the external sector. Exports have increased by 4.18 percent, 11.89 percent, 9.38 percent, and 8.13 percent in agriculture, industry, health, and others sectors, respectively.

V. CONCLUSIONS

This paper analyses impact of one of the major trade liberalisation policies of Structural Adjustment reforms, tariff rate reduction, on functional income distribution to households in Pakistan through CGE modelling, that is well known for this type of analysis. Using SAM-based CGE model, simulation exercises are undertaken to describe the impact of key adjustment policy i.e., reduction in tariff rate by 80 percent on industrial imports. Simulation results of CGE model simply show the direction of change in various variables as a result of tariff reduction. The main conclusions are as follows.

The results show the impact on income of households through change in factor prices. It shows that real income of households' has increased due to decline in prices. The percentage share of labour in GDP has increased while of capital has declined. The study by Siddiqui and Iqbal (1999) shows that higher percentage of income from capital goes to rich and higher percentage of wages and salaries goes to poor segment of population). This implies that the gap between the rich and poor has reduced. The study shows that consumption of all goods but education has increased and consumption of non-food items increases more as compared to food items. This implies that tariff reduction has welfare enhancing impact on households. Indeed the analysis with disaggregated households sector will give the relatively better picture.

Due to decline in import prices, industrial imports have increased by 10 percent while all other imports have declined. All exports increase. But industrial exports increases more as compare to exports from all other sectors.

APPENDIX 1

Social Accounting Matrix 1989-90 for Pakistan

		Factors of Production		Agents				Total Production				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Labour	(1)							45681	45415	13883	2839	101471
Capital	(2)							167012	104622	3449	3124	260281
Households	(3)	209289	436842		48559	9225	47410					
Firms	(4)		101646			45308						
Government	(5)			3409	24588		11544	1557	40103	0	4	10265
Rest of World	(6)				20713							
Agriculture	(7)											
Industry	(8)											
Education	(9)											
Health	(10)											
Other Sectors	(11)											
Agriculture	(12)			203898		0		49893	103486	175	0	7826
Industry	(13)			264161		0		37381	227552	505	2110	149984
Education	(14)			4673		14137		0	82	33	0	112
Health	(15)			4549		4231		12	31	0	176	23
Other Sectors	(16)			151006		102438		55832	149439	999	670	101008
Agriculture	(17)						3867					
Industry	(18)						102210					
Health	(19)						9					
Other Sectors	(20)						22386					
Accumulation	(21)			119629	53094	-40165	30494					
Total	(22)	209289	538488	751325	146954	135174	217920	357368	670730	19044	8923	630970

Continued—

Appendix 1— (*Continued)*

	Goods for Domestic Market				Goods for Exports Market					Accumulation	Total
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Labour											209289
Capital											538488
Households											751325
Firms											146954
Government	857	42844	0	0	3						135174
Rest of the World	12378	166554	0	122	18153						217920
Agriculture	353501					3867					357368
Industry		568520					102210				670730
Education			19044								19044
Health				8914				9			8923
Other Sectors					608584				22386		630970
Agriculture										1458	366736
Industry										96225	777918
Education										7	19044
Health										14	9036
Other Sectors										65348	626740
Agriculture											3867
Industry											102210
Health											9
Other Sectors											22386
Accumulation											163052
Total	366736	777918	19044	9036	626740	3867	102210	9	22386	163052	5777183

APPENDEX 2

I. CGE MODEL FOR PAKISTAN

Production:

(1) $X_i^S = (L_i, \overline{K_i}\ IC_i\ io, V_i)$ Production

5

(2) $VA_i = CD(\overline{K_i}, L_i^D; A, ?_i)$ Value Added 5

(3) $IC_i = LF^*(X^S_i)$ Intermediate Consumption of good I

5

(4) $IC_{ij} = a_{ij}(IC_j)$ Intermediate Consumption of good I in jth sector 25

(5) $L_i^D = CD^*(P_i^{VA}/W, VA_i)$ Labour Demand

5

Foreign Trade:

(6) $X_n^S = CET(Ex_n, D_n)$ Export transformation 4

(7) $Q_n = CES(D_n, M_n)$ Import aggregation (Armington) 4

(8) $Ex_n = CET^*(Pn^E, P_n^D, D_n)$ Export supply 4

(9) $M_n = CES^*(P_n^M, P_n^D, D_n)$ Import Demand 4

(10) $Q_{NT} = X_{NT}$ Demand for non traded good 1

(11) $?\ P_n^{WM}*M_n+(1/\bar{e})T_{FR}-?\ P_n^{WE}*EX_n-\bar{e}*T_{RH}-\bar{e}*T_{RG} = \bar{e}*\overline{CAB}$ Current Account Balance

1

Income and Saving:

(12) $Y_H = W\ ?\ L_i^D + ?\ ?\ R_n\overline{K}_n + DIV + \bar{e}*T_{RH} + PINDEX*T_{GH}$ Household Income

1

(13) $YD_H = (1-t_y)*Y_H$ Household Disposable Income 1

(14) $DIV = dvr*YF_K$ Dividends 1

(15) $S_H = mps*YD_H$ Household saving 1

(16) $Y_{FK} = (I-?)\ ?\ (R_i\overline{K}_i)$ Capital Income of Firms 1

(17) $Y_F = Y_{FK} + PINDEX*T_{GF}$ Firms Total Income 1

(18) $S_F = Y_F - tk*Y_{FK} - DIV - T_{FR}$ Firms Saving 1

(19) $TXS_i = tx_i * P_i * X_i^S$ Indirect taxes 5

(20) $TXM_n = tm_n * \bar{e} * P_n^{WM} M_n$ Taxes on Imports 4

(21) $TXE_n = te_n * \bar{e} * P_n^E EX_n$ Taxes on exports 4

(22) $Y_G = ty*Y_H + tk*Y_{FK} + ?\, TXS_i + \bar{e} * T_{RG} + ?\, TXM_n + ?\, TXE_n$ Government Revenue 1

(23) $S_G = Y_G - Pindex*T_{GH} - Pindex * T_{GF} - CT_G$ Government Saving 1

Demand:

(24) $C_{Hi} = ?_i^C * CT_H / P_i^C$ Household Consumption for Good i 5

(25) $CT_H = YD_H - S_H$ Total Household Consumption 1

(26) $INTD_i = ? \ a_{ij} IC_j$ Intermediate Demand 5

(27) $CG_i = ?_i CT_G / P_i^c$ Government Consumption 5

(28) $C_i = CH_i + CG_i$ Toatl Consumption of Good i 5

(29) $I_i = ?_i^I * IT / P_i^c$ Investment 5

Prices:

(30) $R_i = (P_i^{VA} * VA_i - W * L_i^D) / \overline{K_i}$ Returns to Capital 5

(31) $P_n(1+tx_i) * X_n^s = D_n^s * P_n^D + (EX_n) * P_n^E$ Value of output
4

(32) $P_n^{VA} * VA = (P_n * X_n^s) - ?? (P_j^C IC_{ji})$ Value of Value Added 4

(33) $P_n^M = (1+tm_n) * \bar{e} * P_n^{WM}$ Import Price 4

(34) $P_n^E = \bar{e} * P_n^{WE} / 1+te_n)$ Export Price 4

(35) $P_n^C = (P_n / Q_n) * P_n^D + (M_n / Q_n) P_n$ Composite price for composite good 4

(36) $P_{nt}^C = P_{nt}$ Price for non traded good 1

(37) $Pindex = ? (?_i^X * Pi)$ Price Index 1

Equilibrium:

(38) $IT = S_H + S_F + S_G + \bar{e} * \overline{CAB}$ Saving Investment equilibrium 1

(39)	$Q_i = C_i + INTD_i + INV_i$	Goods Market Equilibrium	5
(40)	$Ls = ?\ (L_i^D)$	Labour Market Equilibrium	1
Total Equations			**145**

II. VARIABLES

Endogenous Variables		Definition	Number of Variable
(1)	C_i	Total Consumption of Good	5
(2)	CG_i	Public final Consumption of Good i	5
(3)	CH_i	Household Consumption of Good i	5
(4)	CT_H	Total Household Consumption	1
(5)	D_n	Domestic Demand for domestically produced good	4
(6)	DIV	Dividends distributed to Households from firms	1
(7)	EX_n	Exports of nth good (FOB)	4
(8)	M_n	Imports of nth good (CAF)	4
(9)	IC_i	Total Intermediate Consumption of Good by ith sector	5
(10)	ICJ_{ij}	Intermediate Consumption of Good J by ith sector	25
(11)	$INTD_I$	Intermediate Demand of Good I	5
(12)	INV_i	Consumption of Good by I for investment in sector i	5
(13)	IT	Total Investment	1
(14)	L_i^D	Labour Demand in sector i	5
(15)	P_n	Producer price	4
(16)	P_i^C	Price of Composite good	5
(17)	P_n^D	Price of domestically produced and consumed good	4
(18)	P_n^E	Domestic price of Exports	4
(19)	P_n^M	Domestic Price of Imports	4
(20)	P_n^{VA}	Value Added Price	5
(21)	PINDEX	Producer price Index	1
(22)	Q_i	Domestic Demand for Composite Good i	5
(23)	R_n	Rate of Return on capital in branch n	5
(24)	S_F	Firms Saving	1
(25)	S_G	Government Saving (Fiscal Deficit)	1
(26)	S_H	Household Saving	1
(27)	TXE_I	Taxes on Imports of nth sector	4
(28)	TXM_i	Taxes on Exports of nth sector	4
(29)	TXS_I	Indirect taxes on ith sector production	5
(30)	VA_I	Value Added of sector i	5
(31)	X_i^s	Production of ith sector	5
(32)	Y_H	Total Household Income	1
(33)	YD_H	Disposable income of Households	1
(34)	Y_F	Firms total income	1
(35)	Y_G	Government Revenue	1
(36)	YK_F	Firms Capital Income	1
(37)	W	Wage rate	1
Total Endogenous Variables			**144**

Exogenous Variables		
(1) CAB	Current Account Balance	1
(2) CT_G	Government final consumption	1
(3) e	Exchange Rate	1
(4) K_i	Branch I's Capital Stock	3
(5) L^S	Total Labour Supply	3
(6) P_n^{WE}	World Price of Exports	4
(7) P_n^{WM}	World Price of Imports	4
(8) T_{FR}	Firms transfers to the rest of world	1
(9) T_{GF}	Government transfers to Firms	1
(10) T_{GH}	Government Transfers to Households	1
(11) T_{RG}	Foreign transfer payments to the Government	1
(12) T_{RH}	Foreign transfers to Households	1
Total Exogenous Variables		**22**

III. SYMBOLS

A_i : Cobb- Douglas Scale Coefficients

a_{ij} : Input Output Coefficients

$?_i^G$: Cobb Douglas elasticities

$?_i^c$: Percentage share of good i in household consumption

$?_i^G$: Percentage share of good i in Public consumption

$?_i^I$: Percentage share of good i consumed for investment purposes

$_i^x$: Percentage share of good i in total Production

? : Household Share of Capital Income

dvr : Dividend rate for Households from firms

io_i : Leontief technical coefficients(Intermediate Consumption of good i)

mps : Households marginal propensity to save

ty : Income tax rate of households

tk : Capital Income tax rate of firms

tx_i : Indirect tax rate on branch ith Production

v_i : Leontief technical coefficients(value added).

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