I. INTRODUCTION

Most developing countries, facing persistent budget deficit and balance of payment crisis, adopted Structural Adjustment Programme (SAP hereinafter) in 1980s. Under the programme there has been a general shift away from the quantitative restrictions and price controls towards liberalisation and privatisation. Has this policy package resulted in the desired results of improving the economic conditions, structural imbalance and income distribution in Pakistan or not? This is an important question. Such a question may be answered by simulation *a priori* or actual trends against counter factual in the absence of such changes. A number of empirical studies, in 1990's, examined this question[1] and showed that in most countries the initial impact of the reforms was worsening growth rates and income distribution. However, in the long run, some countries were able to improve the economic growth and income distribution while the others were worse off even in the long run. In case of Pakistan, empirical studies suggest that distributional impact of SAP is unevenly distributed among the population, hurting the most vulnerable group the most.[2] None of the studies, however, compared the results with counter factual.

In late 80s and during 90s, Pakistan liberalised imports under SAP in order to enhance the capacity utilisation of the domestic industry and competitiveness of the commodity producing sectors. Before adjustment period, Pakistan's growth performance was satisfactory and income distribution improved but in 1990s growth rate fell and a large proportion of population fell below poverty lines as proportion of poor in population increased from 17.32 percent in 1987-88 to 32.6 percent in 1998-99.

Given the situation of persistent budget and trade deficit and rising poverty there is a need to explore, explicitly, the outcome of these policies, particularly the policies having direct bearing on trade deficit, using an appropriate quantitative framework.[3] McGillivary *et al.* (1995) evaluated

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[1]See for example, Kemal (1994), Amjad and Kemal (1997), Anwar (1998), Siddiqui and Iqbal (1999), Iqbal and Siddiqui (1999), Bourguignon *et al.* (1991), Lambert *et al.* (1991), and Robinson (1990).

[2]See Kemal (1994), Amjad and Kemal (1997), Anwar (1998), Siddiqui and Iqbal (1999) and Iqbal and Siddiqui (1999). While White (1997), citing the case of African countries, has argued that welfare indicators are expected to perform better in countries adopting adjustment policies than those which do not.

[3] See for example MCHD (1999).

various methodologies used to assess the impact of SAP and concluded that most appropriate method is econometric modelling. Because of the sensitivity of domestic resource allocation to the developments of the external sector, Computable General Equilibrium Models are very suitable for the analysis. In SAM based CGE framework, a simulation exercise can help to determine the impact of different policies and identify optimal policies leading to a better outcome.[4] For example changes in trade tax reforms (e.g., tariff reduction) affect the pattern of sectoral demand, which can be well captured by the disaggregation of production sector through CGE model which takes into account the whole economy. The specific question to be explored in this study is: whether trade liberalisation (tariff reduction) policies have improved income distribution and reduced poverty in Pakistan or not?

This paper intends to explore functional and households personal income distribution across four different income groups in both the urban and rural areas. Siddiqui and Iqbal (1999), using Social Accounting framework, come to the expected conclusion that poorer segment of population receives higher proportion of income from wages and salaries whereas the rich class receives highest share from capital income. The proportional change in the returns to labour and to capital will determine the beneficiaries of the change in policy. Another study by Iqbal and Siddiqui (1999b) shows that income distribution, under fiscal adjustment, has worsened in urban areas and improved in rural areas of Pakistan,[5] while in reality, reverse has happened[6]. In this paper three different simulation exercises are conducted to analyse the impact of trade liberalisation policies on the performance of the economy as a whole and on income accruing to households in different income groups from different sources, which ultimately affects consumption pattern and welfare of households.

Utilising the framework developed by Decaluwe *et al*. (1996), this study explores the impact of tariff reduction on income distribution. For this purpose the study by Siddiqui and Iqbal (1999) is extended in three directions. First, the households are disaggregated by four income categories in urban and rural areas. Second, the Cobb-Douglas production framework is replaced by Constant Elasticity of Substitution (CES) production function. Third, three simulation exercises are conducted for analysing the impact of 40 percent, 60 percent and 80 percent reduction in tariff duty on industrial imports.

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[4]For developing countries models, see Bourguignon *et al.* (1991), Lambert *et al.* (1991), Robinson (1990).

[5]There are some limitations of SAM based analysis [For details see Shoven and Whalley (1984) and Naqvi (1997)].

[6]In depth analysis is needed to explore the reasons. Our future study "Impact of Fiscal Adjustment on Income Distribution: A CGE-based Analysis" will be very helpful.

This study is organised as follows: Historical over view of trade policies, income distribution and poverty in Pakistan is presented in the following section. A brief description of SAM for the year 1989-90 is in Section III. The main building blocks of the CGE model for Pakistan are discussed in Section IV. The expected direction of the impact of trade liberalisation is discussed, briefly in Section V. The results of the simulation exercises are discussed in Section VI. Final section concludes the study.

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

Trade Policies

Pakistan's trade policy regime had been rather restrictive up to the early 1980s. However, Government of Pakistan is pursuing the policy of liberalisation of trade and production since mid eighties. Trade barriers are removed and tariff structure has been restructured. The tariff on non-competing machinery was removed and tariff rate on some other items, like raw material and machinery was reduced. 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 other restrictions to protect its industry. Nominal tariff rates still rank higher as compared to other countries in the world. In 1980-81, 41 percent of the industrial output was protected by import bans and 22 percent of value added by various forms of restrictions. [World Bank (1988).]

Following SAP, Government of Pakistan has reduced maximum import duty rate 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. As a result, average duty rate (un weighted) declined from 40.7 percent in 1987-88 to 25.5 percent in 1995-96. Excluding sports and automobiles the maximum import duty at present is 35 percent compared to 65 percent only three years ago. In recent years, the number of duty slabs has been reduced to 5 with tariff rates 10 percent, 15 percent, 25 percent, 35 percent, and 45 percent. A number of items have been removed from negative list i.e., 162 in 1988-89 to 5 in 1993-94. Similarly, a number of items subject to different kinds of restrictions have been reduced from 62 to 47 during 1990-91 to 1993-94. [Kemal (1993).]

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

Table 1

Historical Trend in Trade Deficit, Current Account Deficits and Budget Deficit in Pakistan (as Percentage of GDP)

Year	Exports	Imports	Trade Deficit	Current Account	Budget Deficit
1980-81	9.96	19.80	9.84	3.69	5.3
1981-82	7.55	18.78	11.23	4.99	5.3
1982-83	9.16	19.58	10.42	1.80	7.0
1983-84	8.57	19.25	10.68	3.20	6.0
1984-85	7.88	19.28	11.40	5.39	7.8
1985-86	9.23	18.77	9.54	3.88	8.1
1986-87	10.50	17.38	6.88	2.16	8.2
1987-88	11.37	18.03	6.66	4.38	8.5
1988-89	11.57	17.99	6.42	4.83	7.4
1989-90	12.34	18.57	6.23	4.74	6.5
1990-91	12.97	18.42	5.46	4.77	8.7
1991-92	13.87	18.45	4.59	2.76	7.4
1992-93	13.12	19.44	6.32	7.14	8.0
1993-94	12.82	16.66	3.84	3.77	5.9
1994-95	12.72	16.88	4.16	4.07	5.6
1995-96	13.03	18.83	5.80	7.17	6.4
1996-97	12.85	17.84	4.99	6.10	6.4
1997-98	13.31	16.26	2.95	3.03	5.6
1998-99	12.52	15.46	2.93	2.22	3.4

Source: GOP, Economic Survey, 1998-99.

Table 2

Historical Pattern of Tariff Structure

Year	Tariff Rate (%)		
	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.

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 share in GDP declined resulting in improvement in trade deficit. During this period remittances had declined which resulted in increase in current account deficit. During the 90's, despite fluctuations the share of exports in GDP has risen from 11.4 percent as percentage of GDP in 1987-88 to 13.3 percent of GDP in 1997-98. However, the share of imports in GDP exhibits a declining 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 from 0.3 percent to 19.5 percent and from –7.9 to 24.7 percent, respectively. After 1987-88, the growth rates of imports and exports have decelerated, respectively, from 19.5 percent and 24.7 percent in 1987-88 to -9.3 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 to reduce trade deficit.

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
Pre Adjustment Period				7.24		
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	–10.2	–9.3
Post Adjustment Period				4.53		

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

Note: ** For Gini Coefficient see Siddiqui and Iqbal (1999b).

Figures in parentheses are for 1997-98.

Poverty and Income Distribution

Empirical evidence shows that the incidence of poverty and patterns of income distribution were better before adjustment started. Table 3 shows that prior to 1987-88 Pakistan experienced impressive growth. The economy achieved a high growth rate of 7.24 percent during 1981-88 (see Table 3). 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. On the other hand since the launching of structural adjustment program, slower growth of real GDP was accompanied with rising inequality. Table 3 shows that GDP growth rate

declined from 7.24 percent during pre adjustment period (1980-81 to 1987-88) to 4.53 percent in post adjustment period (1988-89 to 1998-99). 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) in 1993-94 when GDP growth rate rose to 4.54 percent. Gini coefficient for 1999[7] shows an increase in income inequality once again (see Table 4). Overall trend of Gini coefficient shows that increase in income inequality was higher in post adjustment period as compared to pre adjustment period and the inequality is higher in urban areas as compared to rural areas. On the other hand poverty is more prevalent in rural areas than in urban areas. Furthermore, there was sharp increase in inequality of income in rural areas during 1987-88 to 1990-91 whereas the income inequality increased gradually in urban areas.

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). * See Qureshi and Arif (1999).

Table 4 shows that in pre-adjustment period poverty (population below poverty line) declined sharply 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. This was the period when changes were made only in trade policies. During the later period, when adjustment and stabilisation programs were implemented proportion of poor increased from 17.3 in 1987-88 to 23.6 in 1993-94 and GDP growth rate, on average went down to 4.8 percent. This is not surprising given the rising income inequality in Pakistan. Recently, Qureshi and Arif (1999) on the basis of household survey data of MIMAP study, show that the proportion of poor has increased sharply from 23.6 in 1993-94 to 32.6 in 1998-99 (see Table 4). 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.

It is clear from above that as compared to pre adjustment period income inequality and poverty have been rising during adjustment period. The question of interest in this study is: whether the trade liberalisation policies are responsible for this outcome?

[7]Based on MIMAP survey data.

III. 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 Siddiqui and Iqbal (1999) [see Appendix II]. It presents a comprehensive picture of the whole economy. It disaggregates production activities into five sectors; agriculture, Industry, education, health and other. These activities are then classified as traded goods i.e., agriculture, industry, health and other and non-traded goods i.e., education. The factors of production are disaggregated into labour and capital. The institutions are identified as households, firms, government and rest of the world.[8] 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) highlights the income receipt pattern of households from different sources and their uses on different items.

In this paper, as mentioned earlier, household sector is disaggregated by region, rural and urban areas of Pakistan. In each region households are categorised by four income groups: upto Rs 1500, Rs 1501-3000, 3001-5000, and 5001 and above. The production sector is disaggregated by traded and non-traded goods. This disaggregation allows to capture the effects of policy changes on sectoral demands and supplies. The mechanisms by which policy changes affect the distribution of income are as follows:

(a) Changes in factor rewards directly affecting household income distribution.
(b) Changes in relative production prices affecting households' real income as basket of consumption goods differs by income group.

Selection of macroeconomic closure rule (which is how adjustment takes place) and institutional characteristics (assumptions about the working of markets) determine the distributional outcome of policy change.[9] The changes in relative prices due to reduction in tariff will affect resource allocation, income distribution and poverty alleviation. Since the outcome of policy change will

[8]We have 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 illustrate 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 important to see the impact on income distribution. But in Siddiqui and Iqbal (1999a), aggregate household sector was included.

[9]The simulation exercise shows how important closure rules and institutional settings are to the distributive consequences of a shock.

vary with closure rule and institutional characteristics, the selection of adjustment policy is very critical.

The present CGE model is built on the following assumptions:

(1) Primary factor supplies are exogenous to the model.
(2) Capital is immobile across the sector. Supply of capital stock is fixed and it is sector specific. Change in demand for capital will change the price of capital not the allocation.
(3) Labour is assumed to be mobile among the different production activities. Wage rate is determined by labour demand equal to labour supply.
(4) World prices of imports and exports are given.
(5) Government consumption and its transfers to households and firms are also exogenous.

Closure: Since the economy has no impact on international markets, the world prices of imports and exports are exogenous to the model. The current account balance and the nominal exchange rate are also exogenous to the model. The predetermined foreign saving has to equal to the import surplus.

Difference in assumptions and closure rule play a very important role in market adjustment mechanism. Adjustment to external shock through price change, devaluation or fiscal retrenchment can be different for an economy with different degree of financial and trade liberalisation. Simulation exercises show that assumptions about the macro economic closure and behavioural parameters matter a great deal in determining the productive and distributive effects of a shock and a country's adjustment to that shock. These exercises also show the channels through which a country captures the effects of alternative adjustment packages on income distribution. For example, resistance to wage cut and to profit cut also has strong implications for the income distribution. Poverty is likely to increase when there is resistance because the economy is not operating at full capacity level. Changes in trade tax reforms (tariff) affect the pattern of sectoral demand, which can be well captured by the disaggregation of production sector through CGE model.

IV. COMPUTABLE GENERAL EQUILIBRIUM MODEL FOR PAKISTAN

Basic framework of the model is from Decaluwe *et al.* (1996). This neo-classical framework contains six blocks with more than two hundred equations. Exchange rate acts as numeraire. Its value is set equal to one. Mathematical equations of the model, specification of variables and symbols are given in Appendix I. The theoretical background of the equations in each block of CGE model is discussed below:

1. Production Sector: Domestic production is disaggregated into five sectors, viz., agriculture, industry, other, health and education. Like most empirical studies, we have assumed a technology in which gross output has separable production function for value added and intermediate consumption with CES production functions for value added and Leontief technology between intermediate and value added and also within intermediates are assumed. 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.

2. Factor Demand: Assuming perfect competition and market clearing, labour demand function for *i*th sector is derived from CES production function. Capital is sector specific and it is assumed to be given in the short run. Labour demand is specified in Equation 5. While price of capital is determined by equation 30 in price block. Changes in factor prices play important role in explaining the issue of functional income distribution.

3. Foreign Trade Sector: In this sector, the model has separate equations for exports and imports. We have assumed that domestic sales and exports with the same sectoral classification represent goods of different qualities. Constant Elasticity of Transformation CET function describes the possible shift of sectoral production between 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 Equations 6 and Equation 7 for export transformation and import aggregation, profit maximisation/cost minimisation gives desired exports and imports ratios as a function of relative prices (domestic to foreign prices). (see Equation 8 and Equation 9, respectively).

4. Income, Saving and Consumption: Institutions receive income from different sources. The endowment of primary factors and their rental values determine the institutional income from factors of production. All incomes of institutions is used for consumption and rest is saved. Relevant equations are given in income and saving block of the model.

5. Households: In this study, we analyse functional distribution of income among different income groups and institutions. All wage income accrues to households and the households also receive share of capital income 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, representing *h*th household represents total income of households from above mentioned sources. Dividends for the *h*th household 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. Different income groups spend this income on different commodities. Consumption of *i*th commodity by *j*th households and total household consumption are defined by Equation 24 and Equation 25, respectively. These equations describe how different goods are consumed by households in different income groups. It is defined with fixed value share of *i*th good. The sum of β_i^c, is equal to 1. In addition, savings of *h*th household is defined in Equation 15.

6. Firms: Firms receive income from operating surplus and transfers from government. Equation 17 presents firm's 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 *h*th households, and transfers to the rest of the world. While residual is saved.

7. Government: Third institution i.e., 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 *i*th commodity 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 *i*th good is the sum of expenditure by different household groups 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 demand for investment good by sector of origin. I is gross fixed capital formation in commodity i, β^Iij is fixed value share and its sum is equal to one. Gross saving from different household groups, firms, government and rest of the world serve as source of funding for gross investment.

8. Prices: Block 5 of the model presents 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. Over all price index i.e., GDP deflator is presented in Equation 37.

9. Equilibrium: Final block presents saving-investment equilibrium, goods market equilibrium, and labour market equilibrium by Equations 38, 39, and 40, respectively. Model is closed in Current Account Balance equation. Nominal exchange rate is numerair. Real exchange rate is implicit in the model calculated as follows.

$$er = e * (P^w / P_d)$$

V. THEORETICAL FRAMEWORK: IMPACT OF TRADE LIBERALISATION ON INCOME DISTRIBUTION

Changes in prices play crucial role in resource allocation, income distribution and poverty Alleviation. Changes in relative price structure, results from tariff reduction, affects production incentives, consumption and other economic indicators in an economy. Impact of tariff reduction on economy depends on the extent to which the imposition of tariff reduction affects the price of goods produced domestically. If these goods are substitutes to imported goods, then reduction in tariff leading to lower import price will reduce demand for domestically produced goods and increase demand for imported goods. Reduced demand causes decline in prices of domestically produced goods as well. Clearly the impact of these policies will depend on whether the imported goods are complements or substitutes to domestically produced goods and on the elasticity of supply of the product. Higher elasticity of supply requires smaller adjustment in domestic prices necessary to bring back equilibrium in the market. Furthermore, analysis of the impact of the changes in incentives and resource allocation, in response to price changes, is very important as they ultimately affect real income and welfare in the country.

There are three channels that affect income distribution in response to adoption of structural adjustment policies [Bourguignon *et al*. (1991)]. Firstly, changes in factor rewards directly affect households' income.[10] 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 can not be captured through this model. In this paper, we concentrate on the effects of tariff rationalisation on income distribution among households in urban and rural areas. We are utilising the multi-sector multi-factor CGE model in which distributional

[10]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.

shifts occur mostly through changes in relative prices, proposed by Decaluwe *et al.* (1996) to analyse the situation (see Appendix 1).

VI. COMPARISON OF BASELINE SOLUTION WITH SIMULATION RESULTS

This section discusses the impact of reduction in tariff rate on industrial imports on the macro aggregates in general and on income distribution and consumption of different income groups in particular. Model is simulated by reducing tariff rate on industrial imports by 40 percent, 60 percent, and 80 percent. The results of simulations are reported in Table 5.

The impact of tariff rate reduction depends on the interaction between the domestic economy and the foreign trade sector. The first impact of reduction in tariff rate is to lower price of industrial imports. This change in price affects the input use in the economy. Consequently, production, income distribution, consumption and saving change. We focus on the results of the third simulation, i.e., 80 percent reduction in tariff rate of industrial imports.

The immediate impact of tariff reduction by 80 percent on industrial imports is to lower import price of industrial imports by 16.37 percent. The reduction in import price leads to decline in domestic price of industrial goods. The resulting decline in domestic industrial goods prices leads to decline in supply of industrial products by 0.58 percent, and releases labour from industrial production. The results show that labour demand in industrial sector declined by 1.9 percent. The released labour is absorbed in other sectors. Demand for labour increases in agriculture, health and education sector by 1.21 percent, 3.52 percent and 3.16 percent, respectively. While decline in non traded sector is marginal. On the other hand demand for capital in agriculture, industry and others sectors declines but increases in health and education. Since capital is sector specific, the change in demand of capital affects prices in these sectors. The results show that the net impact of change in price of factor of production has resulted in change in share of labour and capital in GDP. However, this change is very little as the share of labour and capital changes from 0.28 and 0.72 to 0.27 and 0.73, respectively (see Table 6). This implies that benefits of reduction in tariff rate on industrial imports are a little high for rich people whose highest share of income comes from capital.[11] Thus reduction in tariff rate on industrial imports increases the income gap between rich and poor.

The results also show that contribution of different sectors to GDP has also changed with the change in factors' demand. The contribution of agriculture, health, and education to GDP has increased after the tariff adjustment, and share of industry and others sector has declined (See Table 7). But the change is very small.

[11]See Siddiqui and Iqbal (1999) for detail.

As mentioned earlier, in order to examine the distributional impact of tariff reduction, the present study has divided the households in four income groups;

Table 5

Simulation Results with Reduction in Tariff Rate on Industrial Imports

Variables	Base Year Values	%-Age Change 40% (Sim 1)	%-Age Change 60% (Sim 2)	%-Age Change 80% (Sim 3)
Prices				
Agriculture				
P_D	1.0	–2.19	–3.31	–4.45
P	1.0	–2.16	–3.27	–4.4
P_{VA}	1.0	–1.34	–2.01	–2.7
P_c	1.0	–2.11	–3.19	–4.29
P_M	1.0	0.0	0.00	0
P_E	1.0	0.0	0.00	0
P^*_{index}	1.0	–3.13	–4.74	–6.39
Industry				
P_D	1.0	–4.46	–6.76	–9.12
P	1.0	–3.76	–5.69	–7.64
P_{VA}	1.0	–2.91	–2.01	–5.8
P_c	1.0	–5.49	–8.30	–6.49
P_M	1.0	–8.18	–12.28	–16.37
P_E	1.0	0.0	0.0	0
Health				
P_D	1.0	–1.79	–2.71	–3.64
P	1.0	–1.79	–2.71	–3.64
P_{VA}	1.0	–0.33	–4.36	–0.66
P_c	1.0	–1.77	–2.67	–3.59
P_M	1.0	0.0	0.0	0
P_E	1.0	0.0	0.0	0
Others				
P_D	1.0	–3.23	–4.91	–6.63
P	1.0	–3.11	–4.73	–6.39
P_{VA}	1.0	–2.14	–0.50	–4.44
P_c	1.0	–3.14	–4.77	–6.45
P_M	1.0	0.0	0.0	0.0
P_E	1.0	0.0	0.0	0.0
Education				
P_D	1.0	0.0	0.0	0.0
P	1.0	–1.68	–2.54	–3.42
P_{VA}	1.0	–1.48	–3.27	–3.01
P_c	1.0	–1.68	1.41	–3.42
P_M	1.0	0.0	–2.54	0.0
P_E	1.0	0.0	0.0	0.0
Production Value Added				
Agriculture	212693	0.12	0.19	0.26
Industry	150037	–0.3	–0.44	–0.58
Health	5963	0.8	1.21	1.64
Others	361752	–0.02	–0.04	–0.06
Education	17332	1.21	1.85	2.51
Households Total Income				
Y_{HU1}	12034	–2.07	–3.14	–4.22
Y_{HU2}	76206	–2.02	–3.05	–4.11
Y_{HU3}	87569	–1.96	–2.97	–3.99
Y_{HU4}	154466	–1.75	–2.66	–3.57
Y_{HR1}	36566	–2.03	–3.07	–4.12
Y_{HR2}	95806	–1.98	–3.00	–4.03

Y_{HR3}	92099	–1.92	–2.91	–3.92
Y_{HR4}	130794	–1.91	–2.89	–3.89

Continued—

Table 5—(*Continued*)

Variables	Base Year Values	%-Age Change 40% (Sim 1)	%-Age Change 60% (Sim 2)	%-Age Change 80% (Sim 3)
Dividends				
Y_{HU1}	159	–2.02	–3.06	–4.12
Y_{HU2}	1540	–2.02	–3.06	–4.12
Y_{HU3}	5125	–2.02	–3.06	–4.12
Y_{HU4}	14569	–2.02	–3.06	–4.12
Y_{Hr1}	1094	–2.02	–3.06	–4.12
Y_{Hr2}	2790	–2.02	–3.06	–4.12
Y_{Hr3}	4631	–2.02	–3.06	–4.12
Y_{Hr4}	18968	–2.02	–3.06	–4.12
Households Saving				
S_{HU1}	–9159	–2.07	–3.14	–4.22
S_{HU2}	–12312	–2.02	–3.05	–4.11
S_{HU3}	–4300	–1.96	–2.97	–3.99
S_{HU4}	40883	–1.75	–2.66	–3.57
S_{Hr1}	–18355	–2.03	–3.07	–4.12
S_{Hr2}	–12605	–1.98	–3.00	–4.03
S_{Hr3}	9638	–1.92	–2.91	–3.92
S_{Hr4}	60053	–1.91	–2.89	–3.89
Demand				
(1) Households Consumption Agriculture				
Chu_1	7097	0.036	1.053	0.07
Chu_2	29128	0.095	0.143	0.19
Chu_3	28472	0.151	0.229	0.31
Chu_4	30005	0.363	0.553	0.75
CHr_1	19764	0.087	0.131	0.18
CHr_2	38457	0.131	0.198	0.27
CHr_3	28685	0.189	0.287	0.39
CHr_4	22290	0.206	0.313	0.42
Industry				
Chu_1	9025	3.61	5.625	7.81
Chu_2	37479	3.671	5.721	7.94
Chu_3	38391	3.729	5.811	8.06
Chu_4	42239	3.948	6.152	8.54
CHr_1	24282	3.663	5.708	7.92
CHr_2	48187	3.708	5.779	8.02
CHr_3	35363	3.769	5.872	8.15
CHr_4	29195	3.786	5.899	8.19
Health				
Chu_1	150	–0.310	–0.477	–0.65
Chu_2	611	–0.251	–0.387	–0.53
Chu_3	600	–0.195	–0.302	–0.42
Chu_4	765	0.016	–0.020	0.022
CHr_1	419	–0.259	–0.399	–0.55
CHr_2	818	–0.215	–0.332	–0.46
CHr_3	576	–0.157	–0.244	–0.34
CHr_4	610	–0.141	–0.219	–0.30
Others				
Chu_1	4775	1.098	1.712	2.38
Chu_2	20634	1.158	1.803	2.50
Chu_3	23115	1.214	1.891	2.62
Chu_4	37570	1.428	2.219	3.07
CHr_1	10152	1.150	1.791	2.48
CHr_2	20450	1.194	1.859	2.58

CHr_3	17309	1.253	1.949	2.70
CHr_4	95	1.269	1.975	2.74

Continued—

Table 5—(*Continued*)

Education				
Chu_1	95	–0.403	–0.615	–0.83
Chu_2	523	–0.344	–0.525	–0.71
Chu_3	861	–0.288	–0.440	–0.60
Chu_4	1882	–0.077	–0.119	–0.16
CHr_1	118	–0.352	–0.537	–0.73
CHr_2	405	–0.308	–0.471	–0.64
CHr_3	367	–0.250	–0.382	–0.52
CHr_4	421	–0.234	–0.357	–0.49
Investment				
Agriculture	1458	–11.02	–17.08	–23.57
Industry	96225	–7.84	–12.46	–17.66
Health	14	–11.33	–17.52	–24.12
Others	65347	–10.07	–15.71	–21.8
Education	8	–11.41	–17.63	–24.26
Labour Demand in				
Agriculture	45681	0.57	0.88	1.21
Industry	45415	–0.98	–1.45	–1.9
Health	2839	1.69	2.58	3.51
Others	101471	–0.07	–0.14	–0.22
Education	13883	1.52	2.32	3.16
Wage Rate*	1.0	–2.07	–3.13	–4.22
Returns to Capital				
Agriculture	1.0	–1.13	–1.70	–2.28
Industry	1.0	–3.27	–4.89	–6.49
Health	1.0	1.26	1.92	2.62
Others	1.0	–2.17	–3.32	–4.52
Education	1.0	0.92	1.41	1.93
Firms Income	212737	–2.26	–3.42	–4.61
Foreign Trade				
Imports				
Agriculture	12378	–3.16	–4.77	–6.39
Industry	166554	4.67	7.22	9.94
Health	122	–1.91	–2.88	–3.87
Others	18153	–4.02	–6.11	–8.25
Exports				
Agriculture	3867	1.89	2.89	3.93
Industry	102210	5.6	8.69	12.01
Health	9	3.57	5.47	7.45
Others	22386	3.85	5.94	8.17
Government Revenue				
Indirect Taxes				
Agriculture	1557	–2.04	–3.09	–4.15
Industry	40103	–4.05	–6.10	–8.18
Health	4	–1.01	–1.53	–2.06
Others	10265	–3.13	–4.76	–6.44
Import Duty				
Agriculture	857	–3.16	–4.77	–6.39
Industry	42844	–3.72	–57.11	–78.01
Health	0.0	0.0	0.0	
Others	3.0	–4.02	–6.11	–8.25
Total Government Revenue		–13.69	–20.97	–28.58
Demand for Composite Goods				
Agriculture	364322	–0.02	–0.02	–0.03

Industry	694971	0.22	0.32	0.41
Health	9032	0.76	1.15	1.56
Others	616472	–0.28	–0.44	–0.61

Table 6

Factors Share in GDP and Income Distribution

	Before Simulation	After Simulation
Factors Share in GDP		
Labour Share	0.28	0.27
Capital Share	0.72	0.73
Income Distribution		
Gini-coefficient		
Pakistan	0.3911	0.3913
Urban	0.3784	0.3791
Rural	0.4005	0.4008

Table 7

Share of Different Sectors in GDP

	Contribution to GDP	
Sectors	Before Simulation	After Simulation
Agriculture	0.2844	0.2852
Industry	0.2006	0.1995
Health	0.0080	0.0081
Others	0.4838	0.4835
Education	0.0232	0.0238

(1) up to Rs 1500 per month (lowest), (2) Rs1501-3000(low), (3) Rs 3001-5000 (medium), and (4) Rs 5001 and above(high), separately for rural and in urban areas of Pakistan. The percentage distribution of households in urban areas under these income groups is as follows 14.71 percent, 40.45 percent, 26.32 percent and 18.47 percent respectively. The percentage distribution of households in rural areas in these income groups is 30.12 percent, 38.42 percent, 20.18 percent and 11.22 percent, respectively. The base line results, for the year 1989-90 are from the SAM 1989-90 in Appendix II. It shows that in the base line scenario, in urban areas, the highest income group receives highest percentage of total income i.e., 46.8 percent and the lowest income group receives only 3.64 percent of total income. However, on per household basis, on average the lowest income group receives only 0.247 per household while the highest income group receives, on average, 2.53 per household. This shows that on average high income group receives 10-times more than the income of the lowest income group. On the other hand, distribution of total wages and salaries and total capital income from different activities show that higher percentage of

income from these sources goes to highest income group in urban areas, i.e., 36.2 percent and 46 percent, respectively.

In rural areas, lowest income group holds 30 percent of households and highest income group contain only 11 percent of households. While lowest income group receive 21 percent of wages and only 8 percent of returns to capital, the highest income group receives 18 percent of wages and 37 percent of capital income. Thus, it presents a clear picture of skewed income distribution by source, in rural and urban areas of Pakistan.

Assuming that the population shares across income groups remain the same, the simulation exercise for 80 percent reduction in tariff on industrial imports show that after the shock, in urban areas income share of the lowest income household has declined from 3.64 percent to 3.63 percent and the share of highest income group has increased from 46.77 percent to 46.90 percent. While in rural areas, income share of these groups changes from 10.29 percent and 36.82 percent to 10.27 percent and 36.84 percent after the change in policy. Gini-coefficents in table 6 show that income distribution has worsened after the shock as Gini-coefficients have increased from 0.3911, 0.3784, and 0.4005 to 0.3913, 0.3791, and 0.4008, for urban and rural areas as well as for Pakistan as a whole, respectively. Though this increase is very small, but we can say that distributional impact of tariff reduction does not seem to be working in the positive direction.

Post simulation results, given in Table 5, show that the consumption of all household groups has increased for agriculture, industrial and others goods in real terms over the base year consumption. This confirm the result of the study by Siddiqui and Iqbal (1999) that tariff reduction leads to increase in consumption. Increase in consumption of these goods is higher for higher income groups and low for lower income groups. This means the policy change benefits more to rich households as compared to poor households. The largest increase in consumption of each group of household is for industrial goods.

As expected, reduction in tariff rate results in significant loss of government revenue. With a 80 percent reduction in tariff rate, government revenue has declined by almost 28.58 percent. Reduction in Govt. revenue has reduced government savings and demand for goods for investment purposes. This released output is directed to the external market. So our exports from agriculture, industry, health and others sectors increased by 3.93 percent,12.01 percent, 7.45 percent, and 8.17 percent, respectively.

Results of three simulation exercises, presented in Table 5 reveal that as intensity of shock rises, i.e., as tariff reduction increases, the intensity of the impact of shock also increases.

VII. CONCLUSIONS

The study examines the impact of reduction in tariff on industrial imports across households and on other broad macro aggregates. The simulation exercises suggest that the impact of tariff rate reduction lowers the price of imported goods, which affect the domestic relative output price and input price structure. It affects supply and demand of all commodities.

The tariff reduction increases the gap between the rich and poor as the results show that share of capital and labour in GDP has increased and declined, respectively. Consequently, Gini coefficients show that income distribution has worsened. But impact on income distribution is very marginal.

The results also reveal that consumption of each household group has increased. This implies that tariff reduction has welfare enhancing impact on households. But increase in consumption of rich is greater than the increase in consumption of poor. This implies that the policy change favors rich class and benefits more to rich as compared to poor in terms of income as well as consumption.

Decline in government revenue is responsible for low investment, which ultimately affect economic activities adversely. This decline will have important policy implication regarding identification of new avenues of resource generation and reduction in fiscal deficit.

Appendices

APPENDIX I

I. CGE MODEL FOR PAKISTAN

Production Block

(1) $X_i^s = VA_i / v_i$ Production 5

(2) $VA_i = B_i [\ \delta_i K_I^{-\rho_i} + (1-\delta_I)(L^D_i)^{-\rho i}]^{-1/\rho_i}$ Production function(CES) 5

(3) $IC_i = io(i)*(VA_i / v_i)$ Intermediate Consumption of good I 5

(4) $IC_{ij} = a_{ij} * (X_i^s)$ Intermediate Consumption of good I in jth sector 25

(5) $L_i^D = [\{\delta_i/(1-\delta_i)\}\{r/w\}^{1/\rho+1}]* Ki$ Labour Demand 5

Foreign Trade

(6) $X_e^S = B^T_e [\delta_e^T EX^{\rho}{}_e^T + (1-\delta_e^T)D_e{}^{\rho}{}_e^T]^{1/\rho}{}_e^T$ Export transformation (CET) 4

(7) $Q_c = B^s_c [\delta_c^s M^{\rho}{}_c^s + (1-\delta_c^s)D_c^{-\rho}{}_c^s]^{1/\rho}{}_c^s)$
Import aggregation (Armington)(CES) 4

(8) $Ex = (P_e / P_e{}^D)^{\sigma T}{}_e [(1-\delta_e^T)/ \delta_e^T]^{\sigma T}{}_e * D_e$ 4

(9) $M_c = (P_c^D / P_c^M)^{\varpi}{}_c [(\sigma^s_c/1-\sigma^s_c]^{\varpi}{}_c * D_c)$ Import Demand 4

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

(11) $\Sigma P_c{}^{WM} * M_c - (1/\bar{e})T_{FR} - \Sigma P_e{}^W * EX - \bar{e} * T_{RH} - \bar{e} * T_{RG} = \bar{e} * \overline{CAB}$
Current Account Balance 1

Income and Saving

(12) $Y_H(h)=W\lambda_l\Sigma L_i^D+\lambda_\kappa\Sigma R_nK_n+DIV(h)+ \bar{e} *T_{RH}(h)+ PINDEX*T_{GH}(h)$
Household Income 8

(13) $YD_H(h) = (1 - t_y)*Y_H(h)$ Household Disposable Income 8

(14) $DIV(h)= dvr(h)*YF_K$ Dividends 8

(15) $S_H(h)= mps(h)*YD_H(h)$ Household saving 8

(16) $Y_{FK} = (1-\Sigma\lambda_\kappa)\ \Sigma(R_iK_i)$ Capital Income of Firms 1

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

(18) $S_F = Y_F - T_{FR} - \Sigma DIV(h) - t_k*Y_{FK}$ Firms Saving 1

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

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

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

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

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

Demand

(24) $C_i(h) = \beta_i^C(h)*CT_H(h)/ P_i^C$
Household Consumption for good I 40

(25) $CT_H(h)= YD_H(h)- S_H(h)$ Total Household Consumption 8

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

(27) $CG_i = \beta^{\Gamma}_i CT_G/P_i^c$ Government Consumption 5

(28) $C_i =\Sigma CT_H(h)+ CG_i$ Total Consumption of Good i 5

(29) $I_i = \beta_i^I*IT/P_i^c$ Investment 5

Prices

(30) $R_i = (P_i^{VA}*VA_i-W*L_i^D)/K_i$ 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) $P_n^{VA}*VA_n= (P_n*X_n^s) - \Sigma(P_j^C IC_{ji})$ 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) $P_n^C = (D_n/Q_n)* P_n^D + (M_n/Q_n) P_n^M$ Composite price for composite good 4

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

(37) $Pindex= \Sigma(\beta_i^X * Pi)$ Price Index 1

Equilibrium

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

(39) $Q_i = C_i + INTD_i + INV_i$ Goods Market Equilibrium 5

(40) $Ls = \Sigma(L_i^D)$ Labour Market Equilibrium 1

Total Equations **215**

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 (h)	Household h's Consumption of Good i	40
(4)	CT_H (h)	Total Consumption of household h	8
(5)	D_n	Domestic Demand for domestically produced good	4
(6)	DIV (h)	Dividends distributed to Households from firms	8
(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 (h)	Saving of Household h	8
(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 (h)	Total Income Household h	8
(33)	YD_H (h)	Disposable income of h Households	8
(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			**214**

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} (h)	Government Transfers to Households	8
(11)	T_{RG}	Foreign transfer payments to the Government	1
(12)	T_{RH} (h)	Foreign transfers to Households	8
Total Exogenous Variables			**36**

III. SYMBOLS

α_{ij}	:	Input Output Coefficients
$\beta_i^c(h)$	:	Percentage share of good i in hth household consumption
β_i^G	:	Percentage share of good i in Public consumption
β_i^I	:	Percentage share of good i consumed for investment purposes
β_i^x	:	Percentage share of good i in total Production
λ_l	:	Household Share of Labour Income
λ_k	:	Household Share of Capital Income
dvr(h)	:	Dividend rate for Household h from firms
io_i	:	Leontief technical coefficients (Intermediate Consumption of good i)
mps(h)	:	Households h marginal propensity to save
ty(h)	:	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)
σ_i	:	CES elasticity of substitution of value added
ρ_I	:	CES Substitution parameter of value added
δ_i	:	CET Distributive share of value added
B_i	:	CES scale parameter of value added.

Appendix II

Appendix II

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ABSTRACT

The study, based on SAM-based CGE model, examines the impact of reduction in tariff on industrial imports on urban and rural households and on other broad macroeconomic aggregates. Based on simulation exercises for 40 percent, 60 percent and 80 percent reduction in tariff on industrial imports, the results suggest that tariff reduction lowers price of imported goods, affects domestic relative price structure, and supply and demand of goods. The results show that the impact of these changes in relative prices is disproportionately higher for the low-income groups. The returns to labour and capital have declined in nominal terms. The share of capital in total GDP increases from 0.72 to 0.73 while the share of labour declines from 0.28 to 0.27. This has negative welfare implications as poor households receive higher percentage of their income from wages and salaries. Results also reveal that tariff reduction increases the gap between the rich and the poor. The Gini coefficient indicates worsening of income distribution, however, the difference between the pre- and post-reform Gini coefficient is very small.