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# **Modelling Gender Dimensions of the Impact of Economic Reforms on Time Allocation among Market Work, Household Work, and Leisure**

**Rizwana Siddiqui**

Research Economist,

*Pakistan Institute of Development Economics, Islamabad*

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## I. INTRODUCTION

Gender has been largely ignored at the theoretical, empirical and policy design levels, thereby perpetuating gender biases in the actual working of economies, promoting gender inequality and poverty.<sup>1</sup>

Women and men face different constraints and respond differently to policy change. These constraints emanate from the different 'traditional' roles related to women and men as well as discrimination attached to them because of their biological differences. First major factor that determines gender differences in the impact is the division of labour. Females, roughly half of the population of Pakistan, contribute to the economy and fight against poverty through their multiple roles at home and in the market. They are heavily involved in household activities, such as food preparation, child rearing, taking care of elderly and farm animals, and fetching water and fuels etc., [Cagatay (1995), Sathar and Kazi (1997), Siddiqui, *et al.* (2003)]. These activities called 'social reproductive activities' occur in non-marketed sphere and are often over looked in policy formulation and in standard macroeconomic models. Thus, from the perspective of the economic planner, household work remains unrecognised and invisible. In addition women are also involved in market activities, although their participation in the market is very low in Pakistan. This market work leads to large working hours for working women. Majority of men do not involve in household activities but are major participants in the market economy [Siddiqui, *et al.* (2003)] etc. Men as a breadwinners receive both nutritional and educational priority and women remain relatively illiterate and malnourished. In presence of differentiated roles and constraints, policies associated with free market economy potentially have profound and wide-ranging effects on the lives of women.<sup>2</sup> Their response to policy change differs from men and they bear different effects of policy change.

For example, trade liberalisation leads to expand employment opportunities in export-oriented industries, where women are concentrated and lead to increase female paid employment. But the rise in female employment may not be accompanied by a reduction in their unpaid reproductive household work, which is predominantly considered for females. Thus, rise in women's paid employment squeeze their leisure time and affect their welfare [Fontana and Wood (2000)]. The point is that even the females who may be making gains in

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<sup>1</sup>Cagatay (1995), Elson (1995), Fontana and Wood (2000), World Bank (2001) etc.

<sup>2</sup>Cagatay (1995), Elson (1995).

some dimensions such as employment and income but may be losing in other dimensions, such as leisure time.

Not only policies, but also the models<sup>3</sup> used to analyse the impact of these policies have been gender blind until recently. These macro models focus on market economy only and individual behaviour has not been distinguished by gender. Thus, studies exploring the impact of adjustment policies through market economy using national aggregates hide the cost of adjustment in terms of workload of home production (necessary for the survival and maintenance of households) or in terms of leisure, especially of females. For a comprehensive analysis, successes of adjustment policies must be evaluated on the basis of gender-disaggregated data. Not only through market-based criteria, such as: whether trade liberalisation maximises flows of goods and services, but also includes factors like; unpaid household work and leisure.

Like in other developing countries, gender relations in Pakistan have been analysed in a framework, which takes rest of the economy as given or through market economy<sup>4</sup> using national aggregates. Development of gender sensitive strategies for equity and poverty reduction requires analysing the impact of different policies in presence of inter relationship and linkages among different actors, factors and sectors, especially between the paid and unpaid economies [World Bank (2001)].

The principle focus of this study is on the development of gender computable general equilibrium model (GCGE) that incorporates different dimensions of social and economic lives of men and women. First it extends existing Social Accounting Matrix by incorporating monetised (market) and non-monetised (social reproduction and leisure) part of the economy and disaggregates variables by gender. Second, on the basis of Gendered Social Accounting Matrix (GSAM), GCGE model is developed. The model captures the effects of policy change on time allocation of men and women among market, households and leisure activities by taking into account all direct and indirect linkages<sup>5</sup> between households and market economies as well as with in the market economy.

Then GCGE is used to simulate the impact of macroeconomic shocks to answer the questions such as: How does trade liberalisation in absence/presence of fiscal adjustment change employment pattern for men and women? How do they affect time allocation of both men and women among; market work, households' work and leisure? Does the gender gap in wages reduce or increase after shock? How the policy shock contributes to welfare?

The plan of the study is as follows. Section II gives overview of employment by gender. Section III briefly discusses existing literature on the subject. Data and methodological issues in the development of GSAM and

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<sup>3</sup>RMSM, CGE, or MACRO-Econometric model.

<sup>4</sup>Siddiqui and Kemal (2002a), Kemal, *et al.* (2001), etc.

<sup>5</sup>Fontana and Wood (2000).

Gendered Computable General Equilibrium Model are discussed in Section IV. Section V and VI discuss policy shocks and results, respectively. Final section presents summary and concluding remarks.

## II. EMPLOYMENT

Pakistan is one amongst the most populous countries. Population, growing with average growth rate of 2.6 percent during the intercensal period 1981–1998 and by 2.3 percent since 1998, has reached to 146 million in 2002. With the addition of 3.1 million persons every year, labour force<sup>6</sup> has grown to 40.7 million in 2002 [Pakistan (2002)]. Labour force participation rate is very low and remains around 41 percent during the last decade. One most important reason for low participation rate is low participation of female in labour force as well as underestimation of female participation.

A comparison by gender indicates wide gap in male and female economically active population, though high growth of female labour force is observed compared to male during the adjustment period [see, Lim (1996), Moser (1989)]. Some studies<sup>7</sup> for Pakistan indicate that increase in poverty forces women to enter in the labour market.<sup>8</sup> In result, share of females in total labour force has increased from 2.8 million in 1984-85 to 4.5 million in 1999-00 [Pakistan (Various Issues)]<sup>9</sup>.

Despite a rise in the inflow of females into the labour market, female labour force participation rate is still very low, 13.7 percent compared to 70.4 percent for males in 1999-2000 (see Table 1). There are many reasons for low rate of female participation, like marriage at early age, strong social and cultural influence on outside home movement of women, low human capital, and non-availability of suitable jobs for females. Most important of all, females perform disproportionately large amount of unpaid work like cleaning, sewing, cooking, fetching water and collecting woods for fuel etc. that constrain them from availing themselves of training and education and from participating in market economy especially in high paid jobs. Besides, female participation is underestimated significantly. On the basis of new definition of work adopted in 1990-91, fourteen activities are classified as economically active work [Pakistan (1990-91)]. The women who reported doing nothing were probed by asking further questions about the activities such as harvesting, sowing, picking cotton, drying seeds, maize and rice husking, engaged in live stock and poultry farming activities, construction work, collection of fire wood and cotton sticks, fetching water, making cloths, sewing, knitting, shopping, marketing and preparation of

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<sup>6</sup>The work force comprises population of 10 years of age and above.

<sup>7</sup>Siddiqui, *et al.* (2001), Siddiqui (2002).

<sup>8</sup>These studies did not include Households reproduction and leisure in the analysis.

<sup>9</sup>But a larger inflow of female into labour market resulted in higher unemployment rate, which has increased from 10 percent in 1990-91 to 17.3 percent in 2000 for females.

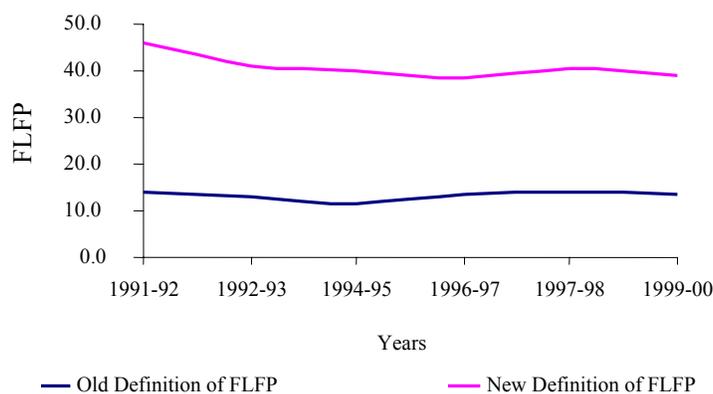
Table 1

*Labour Force Participation Rate and Literacy Rate*

Year	Labour Force Participation Rate (Refined)				Literacy Rate		
	Female (OLD)	Female (New)	Male	Both	Female	Male	Both
1984-85	8.68	–	77.1		–	–	–
1987-88	10.24	–	73.8		21.91	51.12	37.08
1990-91	11.79	–	69.9	42.0	25.67	52.93	39.83
1991-92	14.0	46.0	70.3	42.9	26.3	52.8	39.9
1992-93	13.2	41.2	69.2	42.4	27.2	54.3	41.3
1994-95	11.4	39.8	69.1	41.3	22.6	57.0	43.3
1996-97	13.6	38.4	70	43.0	31.2	57.4	44.9
1997-98	13.9	40.7	70.5	43.3	32.0	57.0	45.0
1999-00	13.7	39.2	70.4	42.8	33.3	59.0	46.5
2001-02	14.4	37.7	70.3	43.3	36.9	62.2	50.0

Source: Labour Force Surveys [Pakistan (Various Issues)].

other goods and material for sale etc. If they are doing anyone of these activities they were included in the work force. Participation rate calculated on the basis of this definition is called 'Improved Female Participation Rate'. Female participation rates based on old and new definitions are given in Table 1. It shows that female participation rate rose to 46 percent from 14 percent in 1991-92 and to 37.7 percent from 14.4 percent in 2001-02. Graph 1 shows that female participation rate with new definition shifted upward. The gap between the two lines shows under estimation of female participation rate with old definition.



**Graph 1. Labour Force Participation Rate of Females.**

The distribution of employed labour force by gender in various sectors of the economy is also an important indicator of socio-economic status of men and women. Over the period of 1991-93, the impact of SAP on females' employment and earnings is specified as declining share in manufacturing but increasing share in agriculture and services sector. While men's employment share rises only in services sector over the same period. Disaggregation of data by manufacturing industries reveals that female employment in industrial sector drops but drop is larger in import competitive industries. In result, share of female employment during the period of market-led economic restructuring in export oriented industries, textile, rose to 78.5 percent in 1993-94 from 74.9 percent in 1990-91 (see Table 2). Siddiqui, *et al.* (2002) disaggregating labour force survey data by urban/rural regions indicate that female employment during the 1990s has occurred largely in textile and services in urban area in spite of over all declines in female employment in industries.

Table 2

*Structure of Employment by Gender*

Sectors	1990-91			1993-94			1996-97		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Agriculture	33.46	59.02	36.95	35.38	67.74	39.57	32.07	66.67	36.05
Other Manufacturing	9.79	4.33	9.04	6.79	2.22	6.20	6.64	2.85	6.21
Textile*	5.35	12.92	6.38	5.29	8.09	5.65	4.44	6.15	4.64
	(35.35)	(74.88)	(41.37)	(30.66)	(78.48)	(47.7)	(40.08)	(68.35)	(42.78)
Total Manufacturing	15.14	17.25	15.42	12.08	10.31	11.85	11.08	9.00	10.84
Other Traded (Service-1)	28.15	19.25	26.94	30.11	18.30	28.58	31.92	21.45	30.71
Non-Traded (Service-2)	23.25	4.48	20.69	22.44	3.65	20.00	24.93	2.89	22.40
Total Services	51.40	23.73	47.63	52.54	21.95	48.58	56.85	24.34	53.11
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Labour Force Surveys [Pakistan (Various Issues)].

\*Figures in the parentheses show the percentage share of textile industry within manufacturing sector.

Another more recent survey<sup>10</sup> of export-oriented industries [textiles, sports, surgical instruments and fisheries] reveals that more females are working as temporary/casual workers. Survey indicates that 76 percent of total employees in these export-oriented industries are employed in textile and garment industries and they are concentrated in stitching activities. The share of females in employed labour force in these industries is 22 percent in garment, 20 percent in surgical, 17.4 percent in sports and 5.3 percent in fisheries. However, employed females are mainly concentrated in textile and garment industry i.e., 86 percent of the total employed females [Siddiqui, *et al.* (2002)].

<sup>10</sup>Gender Planning Network, Siddiqui, *et al.* (2001).

Investment in human capital is another major factor affecting female employment status in the country. A comparison of literacy rate of both sexes is presented in Table 1. It shows that the country's literacy rate has increased during the last two decades, but gender gap in education is still evident i.e., 37 percent literacy rate among females and 62 percent among males in 2002, that is still lower relative to other countries in the region. This also indicates heterogeneity of labour force by gender.

Employment is a major source of income generation. The data suggest that female labour force as well as female employment has increased during the adjustment period. But gap between men and women wages has widened during 1990-91 to 1999-00. Ratio of female wage to male wage has fallen from 65.7 percent in 1990-91 to 60.5 percent in 1999-2000 (see Table 3). However, wages of both, male and female, has increased in real term during 1991-97 by 14.5 percent and 4.4 percent, respectively. But decline thereafter by 10.3 percent and 9.3 percent for men and women respectively. Over the entire period female wages has fallen by 5.3 percent but male wages has risen by 2.8 percent. In result gender wage gap has widened. Wage differentials reflect structural factors such as gender segregation of job market by occupations and by skills, under-representation of females in higher paying occupations and skill grades, which may be a result of economy wide disparities in education and training [Siddiqui, *et al.* (2001)]. Besides, 20 percent of wage differential is due to discrimination in labour market [Siddiqui and Siddiqui (1998)].

Table 3  
*Average Monthly Wage and Wage Gap by Gender*  
*(at Real Prices of 1980-81)*

	Female	Male	Both	Female/Male
1990-91	484.0	736.8	711.8	65.69
1992-93	410.8	641.5	616.6	64.04
1996-97	505.2	844.0	802.6	59.86
1999-00	458.4	757.4	718.5	60.52

*Source:* Pakistan (Various Issues) *Labour Force Surveys*.

Women in Pakistan as compared to men take many burdens on their shoulders. They work in the market as well as at home. Few studies analysing the allocation of time among households' work and market work show that women's working hours (market +households work) are larger than of men's as they are over burdened by households work. Females' contribution to household production ranges from 2.5 to 14 times that of males in household sector. The imputed value of home production activities represents 38 percent to 60 percent of total households' income.

Like in other countries, females in Pakistan are largely involved in households' activities. Ignoring household sector underestimates females' work. A disaggregation of working and non-working females shows that working females spend less time on households' activities, whereas non-working females spend more time on these activities [Siddiqui, *et al.* (2002)]. The results of these studies are based on primary data, they conclude that on average, husbands of females participating in market activities spend relatively more time on domestic chores compared to those of non-working females.

### III. REVIEW OF LITERATURE

Some studies have explored the impacts of economic reforms in the SAM based computable general equilibrium (CGE) framework<sup>11</sup> which take into account all forward and backward linkages. The analysis in these studies is focused on the impact of globalisation on poverty, welfare, and on macroeconomic aggregates. These studies include households aggregated by different socio-economic characteristics. Poverty analysis is done on the basis of beta distribution [Decaluwe, *et al.* (1999)] or log normal distribution or actual distribution based on micro data from the nationally representative households survey [Siddiqui and Kemal (2002)]. Some studies slot in micro data of households into a CGE model [Cockburn (2002)] and simulate how each individual household is affected by macroeconomic shocks such as trade liberalisation. The results of these studies, focusing on market economy only, overestimate or under estimate macroeconomic effects as these models assume that male and female labour are homogeneous and perfect substitute. Exclusion of households work and leisure from the analysis hides cost in terms of household work and leisure time.

Recently, a very few models are built to address these issues. Each model has its own advantages as well as limitations. The reason for lack of research in this area is difficulties involved in collecting gender-based data especially on time allocation among different activities. Generally, researchers analyse the direct and the indirect effects of specific policy measures on males and females in partial setting and take rest of the economy as given.

Fontana and Wood (2000) were the first to develop a gendered CGE model for Bangladesh incorporating households' work and leisure in addition to market economy with inputs and out puts. Two other papers by Fontana (2003) and Fofana, *et al.* (2003) also have analysed gender issue in CGE framework. They found that expansion of the females' paid employment has been accompanied by a reduction in their leisure time. In this study, we intend to incorporate these factors in CGE framework for a comprehensive assessment of gendered impact of macroeconomic shocks in Pakistan.

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<sup>11</sup>Decaluwe, *et al.* (1999), Siddiqui and Kemal (2002 and 2002a), Kemal, *et al.* (2001).

#### **IV. DATA AND METHODOLOGICAL ISSUES IN THE DEVELOPMENT OF GENDERED COMPUTABLE GENERAL EQUILIBRIUM MODEL**

In this paper we treat gender as distinct groups rather than studying gender undifferentiated averages. The main concern in this study is how gender concerns can be incorporated into a CGE model overcoming existing shortcomings in the analysis of economic reforms.

Model can be made gender aware in three steps. First, disaggregate variables by gender. Second, it requires incorporation of missing sectors of the economy important for gender analysis: non-monetised sectors of the economy. Third, relating values of the key parameters to the degree of gender inequalities in the country.

##### **(a) Extension of SAM**

Gender awareness in Computable General Equilibrium (CGE) model requires construction of a consistent data set in the form of social accounting matrix (SAM). Traditional SAM presents accounting framework of market economy, which is insufficient database for the present model. It does not contain information on the households' unpaid work and leisure, which is focus of the present model. SAM is extended by incorporating gender features for the year 1989-90.

First, gendered time use analysis requires disaggregation of labour force in different activities by gender. Labour force surveys provide this information. Aggregate data for market sectors are taken from existing SAM [Siddiqui and Iqbal (1999)]. Data for time used in households' reproductive activities is taken from different sources [Siddiqui, *et al.* (2002), Pakistan (1991)].

Second, multiple roles of males and females are associated with their labour use in different activities, market, households (Reproduction), and leisure. There are difficulties in choosing market work, households-work and leisure activities. For example, sometime collecting wood is considered as market activity and knitting a sweater as a leisure time. Following Fontana and Wood (2000) methodology, we include all these activities in households' production sectors.<sup>12</sup> Reproduction activities are the activities which are defined as 'economic' but not 'productive'; i.e., preparing meal for households. Reproduction sector aggregate time allocated to activities such as cooking, cleaning, washing clothes, look after children and elder people etc. On the other hand any time used to produce goods for sale as well as goods produced for own consumption is included in market sector. All these goods are included in national gross domestic product. Minimum time used for personal care

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<sup>12</sup>For detail see Fontana and Wood (2000).

(sleeping, eating, personal hygiene etc.) is ten hours a day [Fontana and Wood (2000)]. This time is not included in SAM. After subtracting 10 hours from total of 24 hours we have 14 hours, which are used for productive, reproductive and leisure activities in SAM. Subtracting time for market and household work, rest of the time can be used for sleeping and other leisure activities such as playing games or attending a party or watching movies, etc.

Third, valuation of non-monetised work related to the measurement of domestic production need special attention.<sup>13</sup> The value of these activities should be equal to the cost of resources used. Like Fontana and Wood (2000), opportunity cost of labour is used to evaluate domestic production. Incorporating the above-mentioned information, a Gendered Social Accounting Matrix (GSAM) is constructed.

Table 4 shows that 52.1 percent of men hours are allocated to market work, 4.7 percent to household reproductive work and 43.2 percent of their time in leisure activities. On the other hand, women spend 35.2 percent, 37 percent and 27.8 percent on these activities, respectively. Table shows long working-hours for a woman than man and reverse is true for leisure.

Table 4

*Distributive Share by Gender among Market Work, Household, and Leisure Activities*

	Men	Women
Market Work	52.12	35.20
Reproductive Household Work	4.70	37.01
Leisure	43.18	27.79
Total	100.00	100.00

*Source:* Gendered Social Accounting Matrix.

Table 5 presents structure of the GSAM for the year 1989-90 with five market sectors, agriculture, textile, other manufacturing, services-1 and services-2. First four sectors are tradable sectors while service-2 is non-tradable. Two non-market sectors are 'Households reproduction' and 'Leisure'. Labour is disaggregated by gender in each sector. Institutions are households, government, firms, and rest of the world. Market sectors produce goods for domestic and foreign market. All traded sectors import as well as export. Manufacturing sector is divided into two sectors; export oriented 'Textile' and import competing 'Other manufacturing'. Table 5 shows that about 84 percent of total

<sup>13</sup>Two other methods are, (1) Use market price of goods produced at home, (2) Wage of specialised persons in these activities in the market for example for cooking food—chef's wage.

Table 5

*Structure of Gender Social Accounting Matrix (GSAM)*

Sectors	Men(Lm)	Women(Lw)	L/K	GDP	Mi/M	EXi/EX
Agriculture	21.23	30.68	27.56	28.64	6.34	3.01
Textile	6.19	13.32	53.75	5.38	1.71	60.88
Other Manufacturing	15.55	7.77	43.44	14.10	83.65	18.68
Other Traded (Service-1)	16.96	26.65	21.01	28.68	8.30	17.43
Non-Traded (Service-2)	40.07	21.58	90.65	23.19	–	–
All Market Sectors	<b>100.00</b>	<b>100.00</b>		<b>100</b>	<b>100.00</b>	<b>100.00</b>
Reproduction	9.81	57.11		3.34		
Leisure	90.19	42.89		18.34		
Total Non-marchand	<b>100.00</b>	<b>100.00</b>		<b>121.68</b>		

*Source:* Gender Social Accounting Matrix.

imports are of other manufacturing sector and 61 percent of exports are from textile sector. ‘Agriculture’ and ‘Textile’ are less import intensive sectors, while exports from ‘other manufacturing’, is small. Exports are agro-based manufacturing. So agriculture is main provider of intermediate inputs for export sector. Tariff is very low on agriculture and very high on manufacturing sectors, while other traded sector is unprotected tradable sector with no tariff on its imports.

For the analysis of macro policies (trade liberalisation and fiscal adjustment), sectors are distinguished by intensity of factors of production. Table 5 reveals that agriculture sector is the largest employer of women, it employ 30.7 percent of total employed females. Men are concentrated in non-traded sector; 40 percent of men are employed in that sector. Labour-Capital ratio reveals that textile is more labour intensive compared to other manufacturing sector. Table also shows that within the manufacturing sector 13.3 percent of female labour time is concentrated in export oriented sector, i.e., textile and 7.8 percent in import competing sector i.e., ‘Other Manufacturing’. Import competing sector is male labour intensive employing 15 percent of male labour. Excluding time for market work and ten hours per day as minimum time required for personal care for each, rest of time is distributed between households’ work and leisure activities. Data reveals that men spent 90 percent of this available time in leisure activities and 9 percent in households work compared to 43 percent and 57 percent of women available time in these activities, respectively.

Pakistan economy is characterised as agrarian economy; its share in GDP was 28.6 percent in 1989-90. Textile and other manufacturing sectors contribute to GDP by 5.4 percent and 14.1 percent, respectively. Services sector contributes about 50 percent to GDP. If we include households’ production and leisure in GDP, then it rises by 21 percent.

### **(b) Theoretical Background**

Adjustment processes is generally analysed in terms of switches from the non-tradable to tradable in result of trade liberalisation. These changes in sectoral output lead to reallocation of factors of production (mobile), which affect factor remuneration. Contraction in import substituting sectors reduces employment, which results in unemployment for males. This induces women to increase their paid work to compensate for loss in households income. In addition, increase in wage employment in export-oriented industries also leads to rise in demand for female labour. Rise in female paid work in market economy increase workload on females, as reproduction work is predominantly considered for females. Increase market work reduces their leisure time. Other characteristics such as rigidities like mobility can be incorporated in the model by keeping low elasticity of substitution. Who gains or losses depends on all these factors.

On the other hand, tariff reduction results in loss of government revenue. To compensate for loss in revenue, government increases taxes by expanding tax base or raising tax rates or reducing expenditure. In presence of fiscal adjustment, impact of policy change, trade liberalisation, may deviate from the expected outcome. However, tariff reduction and effort to increase taxes may work in opposite direction. Which effect dominate depend on many direct and indirect linkages. Computable General Equilibrium Model is the best tool for this type of analysis.

The paper focuses on time allocation across market work, households work and leisure after policy shock. The loss of employment reduces income but increase leisure time. On the other hand gain in employment increase income but reduce leisure.

### **(c) CGE Model**

The model given in Appendix 1 is made gender aware in three steps. First, disaggregation of variables by gender. Second, by incorporating monetised and non-monetised sectors of the economy. Third, relating the values of the key parameters to the degree of gender inequalities in the country. These features are necessary for the gender impact analysis of macro policies.

Primary factors of productions are labour (male and females) and capital. As a first step, it is assumed that men and women are imperfect substitute. Both type of labour; men and women, is aggregated in to composite labour by CES function. The ratio of male and female labour depends on the share parameter and varies with their wage rates, and can be substituted one for the other on the basis of elasticity of substitution.

For time use analysis, following, Fontana and Wood (2000), model is made gender aware. It is assumed that households consume three types of goods, market goods ( $C_i$ ), home produce goods ( $C_h$ ), and leisure time for male ( $LE_m$ )

and for females ( $LE_w$ ) and face two constraints, income constraint and time constraint.

Households maximise utility function

$$U = f(C_i, C_h, LE_m, LE_w) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

subject to income and time constraints. Households earn income from paid work of men and women, capital, and other sources. Total households income ( $Y_H$ ) from market sector is:

$$Y_H = f(Y_{Lm}, Y_{Lw}, Y_K, Y_O) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

Where  $Y_{Lm}$  and  $Y_{Lw}$  are men labour income and women labour income respectively.  $Y_K$  is capital income.  $Y_O$  is receipt from other sources.

Total available time of 14 hours a day of an individual can be allocated to different activities; paid work, unpaid household work and leisure. Time constraint for individuals can be written as follows:

$$TL_s = f(LM_s + LH_s + LE_s) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$

$s = m$  and  $w$ .  $m$  stands for men and  $w$  for women. Where  $TL$  is total available labour time,  $LM$  is time used in market,  $LH$  is time used in households' reproduction activities, and  $LE$  is leisure time. Time used in different activities; market, home, and leisure is separable. Labour productivity is same in the market and households activities.

In the market, five types of goods are produced, agriculture, textile, other manufacturing, tradable sector (service-1) and non-tradable sector (service-2). Equations for market production are given in appendix.

Household sector produces single composite good using male and female labour. It does not use capital and intermediate inputs. CES production function for household production is defined over male and female labour.

$$X_h = CES(LH_w, LH_m) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (4)$$

Unpaid work of male and female is evaluated at its opportunity cost of labour used. Average wage rate in the market is opportunity cost of labour used in home production. The price of home produced goods ( $P_H$ ) is a weighted average value of time devoted to home production by males and females.

$$P_H = \frac{(W_w * LH_w + W_m * LH_m)}{C_h} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (5)$$

Total income of a household is defined as income through market production ( $Y_H$ ) and non-market production ( $P_h * C_h$ ) and leisure ( $W_w LE_w + W_m LE_m$ ) as follows:

$$Y_T = Y_H + W_w * LE_w + W_m * LE_m + P_h * C_h \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (6)$$

Households consume market produced goods, home produced goods and leisure. Maximising Stone-Geary utility function;

$$U_H = (C_H - \overline{C_H})^{\beta_H} (LE_w - \overline{LE_w})^{\beta_{Lw}} (LE_m - \overline{LE_m})^{\beta_{Lm}} \pi (C_i - \overline{C_i})^{\beta_i} \dots \quad (7)$$

s.t constrains of total income  $Y_T$  in Equation 6.

Total income of a household can be defined as income through market production and non-market production and leisure. This utility maximisation framework gives following demand function for market goods ( $C_i$ ), and Household produced good ( $C_h$ ),

$$C_i = \overline{C_i} + \frac{\beta_c^m (Y_H - \sum P_i C_i)}{(1 - \beta_m^h - \beta_w^h - \beta^h) * P_i} \dots \dots \dots \quad (8)$$

$$C_h = \overline{C_h} + \frac{\beta^h (Y_H - \sum P_i C_i)}{(1 - \beta_m^h - \beta_w^h - \beta^h) * P_i} \dots \dots \dots \quad (9)$$

and male and female labour for market sectors ( $LM_{s,h}$ ) as follows

$$LM_{s,h} = \overline{LM_{s,h}} - LH_{s,h} - \left[ \frac{\beta^h (Y_H - \sum P_i C_i)}{(1 - \beta_m^h - \beta_w^h - \beta^h) * P_i} \right] \dots \dots \dots \quad (10)$$

Home produced good ( $X_H$ ) is a one level CES production function with men and women time used in it.

$$X_h = CES(LH_s) \dots \dots \dots \quad (11)$$

And demand for labour in this production can be derived as in market production. Households consume all goods produced at home. So total home production is equal to household consumption of this good,

$$X_h = C_h \dots \dots \dots \quad (12)$$

Following equilibrium condition holds for labour market. Total labour demand is equal to total household labour supply.

Demand:

$$TLM_{s,h} = \sum LM_{s,i} \dots \dots \dots \quad (13)$$

Supply:

$$TLM_{s,h} = LM_{s,h} \dots \dots \dots \quad (14)$$

Average wage is defined as

$$W = \frac{[W_w * \sum LM_{w,i} + W_m * \sum LM_{m,i}]}{[LM_w + LM_m]} \dots \dots \dots \quad (15)$$

Other equation of the model remains the same [for detail discussion see Siddiqui and Kemal (2002)]. The model is calibrated to the parameters calculated from gendered SAM. Some extraneous elasticities are used. Rigidities or flexibilities as theoretical or empirical studies suggest, are introduced in the model by keeping high or low elasticities.

**(d) Other Characteristics of the Model**

- (a) Three primary factors of production, female labour, male labour, and capital are used in market production.
- (b) Capital is immobile.
- (c) Both type of labour, male and female, is mobile.
- (d) Male labour and female labour are imperfect substitute in the market and the household economies.
- (e) Household supply of male and female labour is endogenous.
- (f) Home produced goods are imperfect substitutes of the market goods.
- (g) Household produce a single composite good.
- (h) Home production does not consume intermediate consumption.
- (i) CES production function for the output of reproductive activities is defined over male and female labour.
- (j) Gender time used in various activities is perfectly separable.
- (k) Hours have the same productivity whether it is used in the market, home production or in leisure activities.
- (l) Goods with same sectoral classification are different in qualities for domestic markets and foreign markets and have different prices.
- (m) Imports and domestically produced goods are imperfect substitutes with separate prices.
- (n) CES and CET functions describe substitution and transformation possibilities reflecting empirical realities.
- (o) All households are aggregated into one group with disaggregated men and women labour income.
- (p) Model is calibrated to GSAM data using econometrically estimated or existing elasticities.
- (q) Model is solved using GAMS software.

**V. POLICY SHOCKS**

Over the last twenty years, policy-emphasis has been shifted from restricted economy to free market economy. Policies directed more towards import liberalisation through rationalisation of tariff structure. Trade liberalisation reduces government revenue through tariff reduction and constrains government expenditure on one hand and increase fiscal deficit on the other. Government reduces expenditure by reducing subsidies, or increase revenue

through increase in taxes, which compensate the loss in revenue but increase the cost of living. These changes in policies have a big impact on household's budget, particularly to those who are poor and allocate small proportion of their income to non-food items. In this study, variables related to trade liberalisation; tariff rates and variables related to fiscal adjustment; taxes on market production, reduction in fiscal deficit through increase in government revenue or through reduction in government expenditure (current) and subsidies are chosen as policy variables. The gendered CGE model (GCGEM) developed in the previous section is used to analyse gender dimension of the impact on time allocation of the following macroeconomic shocks.

- *Tariff reduction on imports.*
- *Tariff reduction on imports with tax rate adjustment.*
- *Bring fiscal deficit to 4 percent of GDP.*
  - *By reducing government expenditure.*
  - *By increasing government revenue.*
- *Reduction in subsidies.*

The magnitude of the imposed shock is decided on the bases of historical evidence in case of first two shocks while 3rd and 4th exercises represent counterfactual analysis on the basis of targeted values of SAP, which are not achieved yet.

## VI. RESULTS

First task is to use gendered computable general equilibrium model to produce base scenario, which is 1989-90. Percentage variation over the base values after policy shock give impact of policy change. The focus of the results is how economic reforms affect production activities, time allocation across market work, household work and leisure of men and women, their wages, and welfare of households.

### **(a) Tariff Reduction on Imports**

Like in other developing countries, manufacturing sector has been the most protected sector and agriculture the least protected sector in Pakistan. Since 1990, tariff rate has been reduced on imports of agriculture, textile and other manufactured goods by 63 percent, 83 percent and 44 percent, respectively. In this experiment, the actual reduction in tariff rates is applied as policy shock. This gives exclusively the impact of trade liberalisation through tariff reduction.

A direct, first effect of the reduction in tariff on all imports is drop in domestic price of imports and rise in the volume of imports. This effect leads to many other indirect effects. For instance, consumers switch demand to imported goods from domestically produced goods, as they are relatively

cheaper now. Import competing sectors becomes relatively less profitable compared to export oriented sectors, change in relative prices boost production in textile and agriculture sectors. As a result, production pattern changes. Table 6 shows that output of import competing sector 'other manufacturing' and of non-trading sector falls and production of export oriented sector 'textile' and 'agriculture' sector rise. Factors of production move towards 'agriculture' and 'textile' from import competing sectors 'other manufacturing' and from non-traded sector.

Table 6

*Simulation Results: Percentage Changes from the Base Year Values*

	Trade Liberalisation	Trade Liberalisation with Tax Rate Adjustment	Reduce Fiscal Deficit to 4% of GDP by Reducing Govt. Expenditure	Reduce Fiscal Deficit to 4% of GDP by Increasing Govt. Revenue	Reduction in Subsidies by 50%
<b>Output</b>					
Agriculture	7.86	-2.42	-1.31	0.43	-2.11
Other Manufacturing	-3.89	-1.64	0.39	-0.43	0.57
Textile	5.25	6.02	0.42	-0.8	-0.73
Other Traded Sector	0.1	-0.07	-0.14	-0.02	-0.09
Non-Traded Sector	-13.2	2.92	0	-1	2.91
<b>Time Allocation</b>					
<b>Female</b>					
Agriculture	31.77	-10.41	-6	1.99	-8.04
Other Manufacturing	-19.41	-4.84	1.18	-1.42	3.84
Textile	12.3	17.83	1.18	-2.28	-1.48
Other Traded Sector	-2.14	-0.24	-0.81	-0.14	0.13
Non-Traded Sector	-28.49	6.4	-0.03	-2.1	6.89
Total	3.16	0.12	-1.81	-0.29	-0.8
Home Production	-0.59	-0.11	0.84	0.39	0.2
Leisure	-3.22	-0.01	1.18	-0.15	0.8
Wages	-2.75	-2.78	0.85	-0.43	-0.97
<b>Male</b>					
Agriculture	41.77	-10.85	-5.92	1.39	-9.57
Other Manufacturing	-12.23	-5.37	1.28	-2.13	1.83
Textile	15.78	17.59	1.22	-2.51	-2.17
Other Traded Sector	0.89	-0.45	-0.77	-0.38	-0.57
Non-Traded Sector	-26.28	6.19	0	-2.35	6.15
Total	-2.44	0.35	-1.11	-1.20	0.5
Home Production	0.63	-0.20	0.86	0.50	-0.1
Leisure	2.18	-0.40	1.25	1.39	-0.6
Wages	-2.24	-2.38	0.78	-0.97	0.42
Welfare	0.27	0.91	2.0	-0.51	0.36

Agriculture is the most female labour intensive sector among market sectors, about 40 percent of females are employed in 'agriculture' sector. Within the manufacturing sector, 'textile' is female-intensive sector employing above 70 percent of the total employed females in manufacturing sector. It is expected to produce gender biased results because expanding sectors are more female-intensive and contracting sectors are male-intensive.

After trade liberalisation, rise in production of expanding sectors 'agriculture' and 'textile' by 7.8 percent and 5.2 percent, respectively, and fall in production of contracting sectors 'Other manufacturing' and 'Non-traded' by 3.8 percent and 13.2 percent respectively lead to change in structure of employment. Labour from contracting sectors of production move towards agriculture and textile after reduction in tariff rates. Demand for labour rises for both, women and men, in the expanding sectors and falls in the contracting sectors. However, aggregate demand for female labour rises in market sectors by 3.2 percent (see Table 6). This increase in demand is fulfilled by increase supply of female labour from household through reduction in their leisure time. Table shows that female leisure time drops by 3.2 percent and labour demand in households' production by very small amount 0.6 percent. This is what we expect as household activities are predominantly considered as women's responsibility. The results show that female work time for households' activities drops but not as much as increase work time in paid work. Women reduce their leisure time for more paid work.

On the other hand male participation in paid work reduces by 2.4 percent. Trade liberalisation does not show any significant change in households' production. In households' production men participation increases by 0.6 percent, which compensate for the drop in female labour in this sector. Men-labour rises in household's production but not as much as drop in market sectors. Drop in men employment in market sectors lead to rise in their leisure time by 2.2 percent. Nominal wage rate for both men and women falls by 2.2 percent and 2.8 percent, respectively. In result gender wage gap increases after the policy shock.

The results show that import competing sectors contract after trade liberalisation. In result men paid employment reduce after trade liberalisation and increase their leisure time. This results in loss in household income. While export oriented sectors expands and increase demand for female labour. Women increase their paid employment to compensate for loss in households income that result in increase working hour of women and reduce their leisure time, which is expected to lead to deterioration of their health. Equivalent Variation (EV) shows a little improvement in terms of welfare of household, i.e., 0.3 percent over the base run.

**(b) Tariff Reduction on Imports in the Presence of Compensatory Measure (Increase in Taxes on Production)**

In this experiment we fix government revenue and let tax rate on production to adjust to compensate for loss in government revenue due to tariff

reduction. A direct, first effect of reduction in tariff on all imports is increase in sales taxes to compensate for loss in government revenue. The combined effect of tariff reduction and increase in sales tax lead to change in domestic prices. After adjustment in prices, domestic price of imports do not reduce as much as in the previous exercise. Change in relative prices boost production in textile and non-trading sectors 'service-2'. Table 6 shows that output of export oriented sector 'textile' and non-trading sector rise by 6 percent and 2.9 percent, respectively and production of 'other trading sector' does not show any significant change. On the other hand, output of import competing sector 'other manufacturing' drops by 1.6 percent. In 'Agriculture' sector, output drops by 2.4 percent where tariff reduce relatively by higher percentage. Factors of production move towards 'textile' and 'non-traded' sectors.

After trade liberalisation, changes in structure of production lead to change in structure of employment. Demand for labour rises for both, women and men, in the expanding sectors and falls in the contracting sectors. However, aggregate demand for female rises in market sectors by only 0.1 percent and for men by 0.4 percent (see Table 6). This increase in demand is fulfilled by increase supply of labour for both men and women from household sector and reduction in their leisure time. Table shows that female labour in households' production drops by 0.1 percent but drop in leisure time is not significant; 0.01 percent. On the other hand rise in demand for male labour in marketed sectors, 0.4 percent is four time of the rise in demand for female labour in market sectors. This increase in demand for male labour in market sectors is fulfilled by increase supply of male labour from households' production where demand for their labour reduced by 0.2 percent and their leisure time by 0.4 percent.

The results show that trade liberalisation in presence of increase in sales taxes leads to rise in labour force participation of both men and women in paid work. Nominal wage rate for both women and men drops by 2.8 percent and 2.4 percent, respectively. In result gender wage gap increases after the policy shock.

This exercise shows that both women and men gain from trade liberalisation in terms of paid employment. Contrary to first exercise, men paid employment rise by higher percentage and reduce their leisure time by higher percentage compared to the changes in female paid work and their leisure time. Equivalent Variation (EV) increases by 0.9 percent. This implies that rise in male paid employment add more to the welfare of households. But this need to be explored with disaggregated data for gendered impact.

### **(c) Change in Fiscal Policies**

A successful structural adjustment programme requires a stable environment. In case of Pakistan, improved fiscal policy is the key. Under the rubric of SAP, Bank and Fund recommended to bring fiscal deficit to the level of 4 percent of GDP. In order to achieve the objective of reduced ratio of fiscal deficit

to GDP to 4 percent, the government needs to reduce the overall fiscal deficit through additional resource mobilisation or expenditure restraint. First government expenditure is reduced. Second the impact of the increase in government revenue is simulated. Third is retrenchment through reduction in subsidies.

*(c1) Reduce Government Expenditure to Bring Fiscal Deficit to 4 Percent of GDP*

In this exercise we reduce government expenditure by 8 percent to bring fiscal deficit to 4 percent of GDP from 5.4 percent in Pakistan in 1989-90-SAM. This lead to reduction in government expenditure in sectors: services-1 and services-2 by 7.8 percent and 8.01 percent respectively.

These effects lead to many other indirect effects. Resources move from services and agriculture sectors to manufacturing sectors, 'textile' and 'other manufacturing'. In manufacturing sectors demand for both male and female labour rise. However, aggregate demand drops by 1.8 percent for female labour and by 1.1 percent for male labour in market sectors (see Table 6). Households substitute household produced goods for market goods. This leads to an increase in demand for female labour in households' production by 0.8 percent and also increases their leisure time by 1.2 percent. On the other hand, demand for male labour in households production increase by 0.9 percent and also increase their leisure time by 1.2 percent. This again shows that leisure time for male rises more than female leisure time. Although, the difference is very small.

The results show that nominal wage rate for men increases by 0.78 percent and for women by 0.85 percent. In result gender wage gap reduces after the policy shock. Household's welfare increases by 2 percent.

*(c2) Increase Government Revenue to Bring Fiscal Deficit to 4 Percent of GDP*

In this exercise we increase government revenue by 7.5 percent to bring fiscal deficit to 4 percent of GDP. Let tax rate to adjust in all market sectors of the economy. We fix government expenditure and let tax rate to adjust. Tax rate increase by 0.61 percent that led to rise in domestic prices of domestically produced goods as well as imports.

These effects lead to many other indirect effects. Resources move towards agriculture sector where price rise by higher percentage from manufacturing and services sectors. Demand for labour rises for both, women and men, in the expanding sectors 'agriculture' and falls in all other sectors. Agriculture is female intensive sector. Demand for female-labour rises by a larger amount 2 percent compared to 1.4 percent for male-labour. In all other sectors demand for both male and female labour drops. However, aggregate demand for female drops by 0.3 percent and for male labour by 1.2 percent in market sectors (see Table 6). In result, household demand for household

produced good rise as household substitute it for market goods. This leads to an increase in supply of female labour for household production by 0.4 percent and reduce their leisure time by 0.2 percent. On the other hand, demand for male labour in household production increase by 0.5 percent and their leisure time by 1.4 percent.

The results show that nominal wage rate for male-labour falls by 1 percent and for female-labour by 0.4 percent. In result gender wage gap reduces after the policy shock. Household's welfare reduces by 0.5 percent.

(c3) *Reduction in Subsidies*

In this exercise we reduce subsidies by 50 percent on other manufacturing, textile and other-traded sectors. Immediate direct effect is tax rate increase in all these sectors and prices rise. In result government deficit reduces by 5 percent. In presence of tariff and increase in domestic tax, price in import competing sector other manufacturing increase. This sector becomes more profitable, resources shift towards this sector. Production of export oriented sector decline. The drop in production of textile leads to drop in intermediate demand, of which significant part comes from agriculture. So production of agriculture also decline. Resources move from these sectors to other manufacturing and services sectors.

Demand for labour drops for both, women and men, in 'agriculture' and 'Textile' and rises in 'Other manufacturing' and 'non-traded sectors'. Former are female labour-intensive sectors and later are male labour-intensive sectors. Aggregate demand for female labour drops by 0.8 percent. But aggregate demand for male labour rises by 0.5 percent (See Table 6). The results show that nominal wage rate for men rise by 0.4 percent and for women it drops by 1 percent. In result gender wage gap increases after the policy shock.

Female household reproduction activities and leisure rise by 0.2 percent and 0.8 percent, respectively. On the other hand, demand for male labour in household production drops by 0.1 percent and their leisure time by 0.6 percent. Household's welfare rises by 0.4 percent.

To some extent women empowerment is linked with their income. Some studies report that as women income rise women's role in decision-making at households level increase. Table 7 shows that women wage income relative to men wage income and women's share in household labour income increases only in first simulation. In all other simulation women's share decline. From this we can conclude that trade liberalisation benefit to women in terms of income as well as in terms of empowerment. But in depth analysis require including more variables than just income. This needs to be explored further.

Table 7

*Women's Labour Income Shares*

	Women Wage Income/ Men Wage Income	Women Wage Income/ Households Wage Income
Base	6.72	6.30
Simulation 1	7.07	6.60
Simulation 2	6.64	6.22
Simulation 3	6.72	6.30
Simulation 4	6.66	6.24
Simulation 5	6.42	6.04

**VII. SUMMARY AND CONCLUSION**

In this paper we analyse gender dimensions of the impact of change in macro policies on time allocation in CGE framework. For this purpose we developed gendered CGE model. Model is made gender responsive by disaggregating labour in all sectors of activities as well as labour income of households by gender. Traditional SAM is extended by incorporating two additional sectors: household reproduction work and leisure. These sectors are very important for gender analysis as the impact of adjustment policies on women through market economy hide the cost of adjustment in terms of workload of home production (necessary for the survival and maintenance of households) on them or in terms of their leisure.

On the basis of GSAM, GCGE model is developed with five market sectors, one household sector, and leisure. Policy simulations in this framework show that how time allocation of men and women changes after policy shocks. The simulation results reported here point out that the effects of policy shocks are not gender neutral. It also points out how important institutional setting and closure are to the gendered consequences of a shock.

The results show that import competing sectors contracts after trade liberalisation. In result men paid employment reduce after trade liberalisation and increase their leisure time. This results in loss in household income. While export oriented sectors expands and increase demand for female labour. Women increase their paid employment to compensate for loss in households income that result in lose in terms of their leisure time, which is expected to lead to deterioration of their health. Households show a little improvement in terms of welfare.

In second exercise, taxes are increased to compensate for loss in tariff revenue. Trade liberalisation in presence of increase in sales taxes leads to a rise in labour force participation of both men and women in paid work. This exercise shows that paid work of both men and women increase after trade liberalisation but reduce leisure time. Women are more affected group of population as they are already have less time to rest.

In the next three exercises, we simulated impact of fiscal policies. First, government expenditure is reduced to bring fiscal deficit to 4 percent of GDP. In

result, aggregate demand drops for both female labour and male labour in market sectors. Households substitute household produced good for market produced goods. This experiment shows that both men and women loose in terms of paid employment. Their households work and leisure time increase.

Second, government revenue is increased to bring fiscal deficit to 4 percent of GDP from 5.4 percent in Pakistan in 1989-90-SAM. This experiment shows that both men and women loose in terms of their paid employment. Women unpaid work of households production increase. In this exercise women's leisure time also reduces. Because increase prices lead to increase the demand for households goods. This results in increase working hours of females in household production. Men loose in terms of their paid employment but gain in terms of their leisure time.

Third, reduction in subsidies leads to increase paid work for men but reduce for women. This leads to increase female households' work.

The results of all exercises indicate that trade liberalisation in absence as well as in presence of compensatory measure increase female paid employment. Increase in demand for female labour in market work does not lead to significant decline in their household work. Instead rise in demand for female labour in market lead to drop in female leisure time. As households work does not change significantly. So trade liberalisation results in increase work load on women. In the exercises with fiscal adjustment, female paid employment drops but households work increase as household substitute household produced goods for market goods.

Trade liberalisation in the absence of compensatory measure lead to reduce men's paid employment and increase their leisure time. Men gain, when tax increase on production, which lead to expand sector where men are concentrated.

Results also reveal that gender wage gap increases after trade liberalisation. Gender wage gap reduces only when fiscal deficit is reduced to 4 percent of GDP by reducing expenditure or by increasing revenue. But increase in revenue through increase in taxes lead to reduction in households welfare.

### **Future Agenda**

Gender impact on time allocation as well as on other aspects may differ by rich and poor group of households. Households will be distinguished as rich and poor households that will make clearer how policies affect women in rich and poor households. Existing literature suggest that women are discriminated in the market as well as at home. In South Asia, intra-households allocation of households resources tends to favour boys against girls [White and Edoardo (2002)] Men as a breadwinners receive both nutritional and educational priority and females remain relatively illiterate and malnourished. Allocation of resources across the member of households depends on the bargaining power. Different consumption pattern for male and females is needed to be modelled.

## APPENDIX 1

## Computable General Equilibrium Model for Pakistan

Model contains six blocks of equations; foreign trade, income and saving, production, demand, prices, and market equilibrium [For detail discussion see Siddiqui and Kemal (2002)].

**A. Foreign Trade Statistics**

1.  $X_n^S = B_n^T [\delta_n^T EX_n^T + (1 - \delta_n^T) D_n^{\rho_n^T}]^{1/\rho_n^T}$  Export Transformation
2.  $Q_n = B_n^S [\delta_n^S M_n^{-\rho_n^S} + (1 - \delta_n^S) D_n^{\rho_n^S}]^{1/\rho_n^S}$  Constant Elasticity of Substitution between imports and domestic goods
3.  $Q_{NT} = X_{NT}$  Domestic Demand for non-traded goods
4.  $EX_n = (P_n^E / P_n^D)^{\sigma_n^T} [(1 - \delta_n^T) / \delta_n^T]^{\sigma_n^T} D_n$  Export Supply (CET)
5.  $M_n = (P_n^D / P_n^M)^{\sigma_n^S} [\delta_n / (1 - \delta_n)]^{\sigma_n^S} D_n$  Import Demand
6.  $\sum P_n^{WM} M_n + (1/e) \overline{TR}_{FR} - \sum P_n^{WE} EX_n - \overline{TR}_{RH} - \overline{TR}_{RG} = \overline{e^* CAB}$  Equilibrium in Foreign Market

**B. Income and Saving**

7.  $Y_H = \lambda_{LH} \sum L_i^D + \lambda_K \sum R_i K_i + DIV_H + \overline{e^* TR}_{RH} + \overline{TR}_{GH}$  Households' Income (R) from Market Sector.  
*Dividends*
8.  $DIV_H = dvr_H * Y_{FK}$
9.  $YD(H) = (1 - t_{yh}) * Y_H$  Households Disposable Income
- 10a.  $S_H = aps_H * sav * YD_H$  Households' Saving
- 10b.  $TS_H = \sum S_H$  Total Households' Saving
11.  $Y_{FK} = (1 - \sum \lambda_k) \sum (R_i K_i)$  Firms' Capital Income
12.  $Y_F = Y_{FK} + \overline{TR}_{GF}$  Firms' Total Income
13.  $S_F = Y_F - \overline{TR}_{FR} - \sum DIV_H - t_k * Y_{FK}$  Firms' Saving
14.  $TXS_i = tx_i * P_i * X_i^S$  Taxes on Production
15.  $TXM_n = tm_n * \overline{e^*} P_n^{WM} M_n$  Taxes on Imports
16.  $TXE_n = te_n * \overline{e^*} P_n^{WM} X_n$  Taxes on Exports
17.  $Y_G = \sum (t_{yH} * Y_H) + t_k * Y_{FK} + \sum TXS_i + \overline{e^*} \overline{TR}_{RG} + \sum TXM_n + \sum TXE_n$  Government Revenue
18.  $S_G = Y_G - \overline{TR}_{GF} - \sum \overline{TR}_{GH} - \sum C_{Gt}$  Government Saving

**C. Structure of Production**

19.  $X_i^S = (VA, IC_i)$  Output
20.  $IC_i = io(i) * (X_i)$  Intermediate Consumption from ith sector

Continued—

## Appendix 1—(Continued)

21. $IC_{ij} = a_{ij} * X_i$	Intermediate Demand of ith sector from jth Sector
22. $VA_i = B_i[\delta_i K_i^{\sigma_i} + (1 - \delta_i)(L_i^D)^{-\sigma_i}]^{-1/\sigma_i}$	Production Function (CES)
23. $L_i^D = [\{\delta_i/(1 - \delta_i)\} \{R_i/w\}^{1/\rho+1}] * K_i$	Labour Demand
23a. $L_i^D = B_i^L[\alpha_i L_i^{\sigma_L} + (1 - \alpha_i)(L_m^D)^{-\sigma_L}]^{-1/\sigma_L}$	Composite labour demand
23b. $L_w^D / L_m^D = [\{\alpha_i/(1 - \alpha_i)\} \{W_m / W_w\}^{\sigma}]$	Ratio of female labour to male labour
24. $R_i = (P_i^{VA} * VA_i - w * L_i^D) / K_i$	Return to Capital
<b>D. Demand</b>	
25. $CT_H = YD_H - S_H$	Total Households Consumption
26. $C_i(h) = \{P_{ci} \gamma_i + \beta^c h_i (CT_H - \sum P_c^i \gamma_i)\} / P_c^i$	Households demand function (LES)
27. $CG_i = \beta^G CT_G / P_i^c$	Government Consumption
28. $C_i = \sum CT_{Hi} + CG_i$	Total Private and Public Consumption
29. $INTD_i = \sum a_{ij} IC_j$	Intermediate demand
30. $I_i = \beta^I * IT / P_i^c$	Investment Demand
31. $Cgr_i = CT_G / P_g$	Government Total Consumption in Real term
31a. $I_r = IT / P_i^I$	Real Investment
<b>E. Prices</b>	
32. $P_n^M = (1 + tm_n) * (1 + tx) * \bar{e} * P_n^{WM}$	Domestic Price of Imports
33. $P_n^E = (1 + te_n) * \bar{e} * P_n^{WE}$	Domestic Price of Exports
34. $P_i X_i^S = (P_i^D * D_i^S + EX_i * P_i^E)$	Producer Price
35. $P_i^{VA} * VA_i = (P_i^c * X_i^S) - \sum (P_i^c IC_{ji})$	Value Added Price
36. $PD_i = P_i^c * (1 + tx_i)$	Domestic Price after paying taxes
37. $P_n^C = (D_n / Q_n) * P_n^D + (M_n / Q_n) * P_n^M$	Composite Price of traded goods (consumer prices)
38. $P_{nt}^C = PD_{nt}$	Composite Price of non- traded goods
39. $Pindex = \sum (\beta_i^X * P_i)$	GDP Deflator
40. $P_g = \Pi (P_i^c / \beta_i^g)^{\beta_i^g}$	Deflator for Government Consumption
40a. $P_I = \pi (P_i^c / \beta_i^I)^{\beta_i^I}$	Deflator for Investment
<b>F. Equilibrium</b>	
41. $IT = TS_H + S_G + S_F + \bar{e} * CAB$	Saving-Investment Equilibrium
42. $Q_i = C_i + INTD_i + I_i$	Commodity Market Equilibrium
43. $L_S = \sum (L_i^D)$	Labour Market Equilibrium

Sources : Siddiqui and Kemal (2002).

### VARIABLES

Endogenous Variables			Exogenous Variables		
1	$C_i$	Total Consumption of $i$ th Good	1	$CAB$	Current Account Balance
2	$CG_i$	Government final Consumption of Good $i$	2	$CT_{GR}$	Government final consumption in real terms
3	$CT_G$	Total Government Consumption	3	$e$	Nominal Exchange Rate
4	$CH_i$	Household Consumption of Good $i$		$K_i$	$i$ th Branch Capital Stock
5	$CT_H$	Total Consumption of Household	5	$L^S$	Total Labour Supply
6	$D_i$	Domestic Demand for domestically produced good	6	$P_n^{WE}$	World Price of Exports
7	$DIV_H$	Dividends distributed to Households from firms	7	$P_n^{WM}$	World Price of Imports
8	$EX_n$	Exports of $n$ th good (FOB)	8	$TR_{FR}$	Firms' transfers to the rest of world
9	$IC_i$	Total Intermediate Consumption of Good by $i$ th sector	9	$TR_{GF}$	Government transfers to Firms
10	$IC_{ij}$	Intermediate Consumption of Good $J$ by $i$ th sector	10	$TR_{GH}$	Government Transfers to Households
11	$INTD_i$	Intermediate Demand of Good $i$	11	$TR_{RG}$	Foreign transfer payments to the Government
12	$I_i$	Consumption of Good for investment in $i$ th sector	12	$TR_{RH}$	Foreign transfers to Households
13	$I_r$	Real Investment			
14	$IT$	Total Investment			
15	$L_i^D$	Labour Demand in sector $i$			
16	$M_n$	Imports of $n$ th good (CAF)			
17	$P_g$	Price deflator for government consumption			
18	$P_i$	Producer Price			
19	$P_I$	Price deflator for Investment			
20	$P_t$	Domestic price without taxes			
21	$P_i^C$	Price of Composite good			
22	$P_n^D$	Price of domestically produced and consumed good including taxes			
23	$P_n^E$	Domestic price of Exports including all taxes			
24	$P_n^M$	Domestic Price of Imports including all taxes			
25	$P_n^{VA}$	Value-added Price			
26	$P_{INDEX}$	GDP deflator			
27	$Q_i$	Domestic Demand for Composite Good $i$			

SYMBOLS		
1	Symbols	Variable names
2	$a_{ij}$	Input Output Coefficients
3	$B_i$	CES scale parameter of value added
4	$B_e^T$	CET scale parameter of export transformation function
5	$B_e^S$	CES scale parameter of Import aggregation function
6	$\beta_{hi}^c$	Percentage share of good $i$ in $h$ th household consumption
7	$\beta_i^c$	Percentage share of good $i$ in Public consumption
8	$\beta_i^I$	Percentage share of good $i$ consumed for investment purposes
9	$\beta_i^X$	Percentage share of good $i$ in total Production
10	$\gamma_i$	Subsistence expenditure by household
11	$\lambda_1$	Household Share of Labour Income
12	$\lambda_k$	Household Share of Capital Income

*Continued—*

## Variables—(Continued)

28	$R_i$	Rate of Return on capital in branch $i$	13	$io_i$	Leontief technical coefficients (Intermediate Consumption of good $i$ )
29	$sav$	Adjustment in household saving rate	14	$mps_h$	Households marginal propensity to save
30	$S_G$	Government Saving (Fiscal Deficit)	15	$Tk$	Capital Income tax rate of firms
31	$S_H$	Household Saving			
32	$S_F$	Firms Savings	16	$v_i$	Leontief technical coefficients (value-added)
33	$TS_H$	Total Households Savings	17	$\sigma_i$	CES elasticity of substitution of value added
34	$TXE_n$	Taxes on Exports of $n$ th sector	18	$\rho_i$	CES Substitution parameter of value added
35	$TXM_n$	Taxes on Imports of $n$ th sector	19	$\delta_i$	CES Distributive share of value added
36	$TXS_i$	Indirect taxes on $i$ th sector production	20	$\sigma_e^T$	CET elasticity of transformation of export
37	$VA_i$	Value Added of sector $i$		$\rho_e^T$	CET Substitution parameter of export transformation
38	$W$	Wage rate		$\delta_e^T$	CES Distributive share of exports and domestic production
39	$X_i^s$	Production of $i$ th sector	23	$\sigma_c^T$	CES elasticity of substitution of imports
40	$Y_H$	Total Income of Household	24	$\rho_c^T$	CES Substitution parameter of imports
41	$YD_H$	Disposable income of Household	25	$\delta_c^T$	CES Distributive share of imports and domestically produced goods
42	$Y_F$	Firms total income			
43	$Y_G$	Government Revenue			
44	$Y_{FK}$	Firms Capital Income			

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### ABSTRACT

Considering the existing system of gender inequality in Pakistan, the paper uses a SAM-based Computable General Equilibrium model to analyse gender dimensions of the impact of economic reforms on time allocation among different activities; market, household, and leisure. For this purpose, it develops a Gendered Social Accounting Matrix (GSAM), with market and household economies and disaggregated variables by gender. On the basis of the GSAM, the Gendered Computable General Equilibrium Model (GCGE) is developed. The Model is used to simulate the impact of economic reforms: trade liberalisation through tariff reduction in the absence/presence of compensatory measures, and fiscal measures such as reduction in fiscal deficit through (1) increased government revenue, (2) reduction in government expenditure, and reduction in subsidies. The results of the study indicate that trade liberalisation in the absence as well as in the presence of compensatory measures increase female paid employment. While fiscal adjustment reduces female paid employment, the rise in demand for female labour in the market leads to a drop in female leisure time, as household work does not change significantly. In exercises with fiscal adjustment, female paid employment drops but household work rises, as households substitute household-produced goods for market goods.

Trade liberalisation in the absence of compensatory measures leads to a reduction in men's paid employment and increases their leisure time. Resultantly, women are induced to increase their paid work to compensate for the loss in income of households. Tax increase on production leads to expand sectors where men are concentrated and men gain in terms of paid employment.

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