Does Trade Liberalisation Leave Women Behind in South Africa: A Gendered CGE Analysis

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Abstract

Despite the general presumption in favor of trade liberalization, the question of how to implement it in a way to ensure equitable income distribution and sustainable poverty alleviation in developing countries is at the core of the current trade debate. We build a macroeconomic framework that integrates both market and non-market activities, while distinguishing male and female workers throughout, in order to evaluate impacts of tariffs elimination on the well-being of men and women in South Africa. Our study reveals a strong gender bias against women with a decrease in their labor market participation, while men participate more in the market economy. This strong result is due to the fact that female workers are concentrated in contracting sectors which were initially among the protected sectors, and which benefit little from the fall in input prices. In contrast, male workers are more concentrated in the expanding export-intensive sectors. Female market participation drops particularly for black African women, as they are more concentrated in contracting female-intensive sectors. As male labor market participation and real wages increase more than for their female counterparts, their income share increases within the household. This is likely to reduce the bargaining power of women in their households although this is not modeled explicitly in this study. Women will continue to suffer from heavy time burden within the households with trade liberalization. Therefore, Government should design complementary fiscal policies to reduce the time burden of women through measures promoting the consumption of time saving technologies and improving their productivity, and to increase female market participation and employment to ensure equitable income distribution among men and women, thus contributing to poverty reduction.

Keywords: South Africa, trade, gender, leisure, home production, and computable general equilibrium.

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Introduction

Over the past decade, developing countries especially in Sub-Saharan Africa have committed themselves to meet targets in various international and national conventions including the millennium development goals (MDGs). And, many countries have implemented policy reforms aimed at achieving these goals. These policy reforms, among others trade liberalisation, will have significant repercussions on the economy of these countries and on income distribution and poverty reduction.

Although the principal argument in favor of openness to trade has been the benefit brought to all nations, its partisans recognize that it creates winners and losers in all countries. The problem of distribution of gains from trade in the developing countries, where national income is already unequally distributed, is at the core of the current trade debate.

Gender poverty and inequality has become an important issue in developing countries because several studies has showed that, compared to men, women are more vulnerable to chronic poverty, because of gender inequalities in the distribution of income, access to productive inputs such as credit, asset management, and the labor market. Many studies have focused on several gender issues including the impact of trade liberalization on gender inequalities. Most of these studies[2] note a significant increase in female labor market participation during the last decade, corresponding to the period of liberalization in the majority of the developing countries. The feminization of work in export sectors is stronger in the industrial sector and semi-industrialized economies, than in agricultural sectors economies. In semi-industrialized countries, some reservations have been expressed for several reasons, mostly, concerning the conditions under which female work grows. In agricultural economies, many studies[3] mention that market opportunities benefit men more than women, because of the difficulties for women to access to productive assets (loans, land, new technologies, knowledge, etc.).

Recently, gendered macroeconomic models[4] have been used to analyse the economy-wide impact on trade liberalisation on men and women welfare. These studies conclude that trade liberalization expands female work and income more than men counterparts in economies where they have been applied. Although, the expansion of female market work is seen as enhancing their negotiating power within the household, it could constitute for them a burden if there is not a similar reduction in their domestic work. Its perverse effects on female leisure and domestic work leave some sceptical of its benefits for women, children and other household dependents.

Fiscal policy is a key policy instrument in influencing men and women's welfare and their prospects for economic empowerment. It can contribute to narrowing or widening gender gaps in time use, incomes, health, education, nutrition etc. There are also increasing concern on how gender inequality can constrain the outcomes of macroeconomic policy. Recent works[5] show that economic reforms with decreased incentives can reduce women's output or restricted access to education, and hinder women's ability to develop their human resources.

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[2] Elson and Pearson (1981); Standing (1989); Wood (1991); Cagatay and Ozler (1995); Joekes (1995 and 1999); Ozler (2000 and 2001).
[3] Gladwin 1991; Fontana et al 1998.
[4] Fontana and Wood (2000), Fontana (2001 and 2002) for Bangladesh and Zambia; Fofana, Cockburn and Decaluwe (2003 and 2004) for Nepal; Siddiqui (2005) for Pakistan.
[5] Haddad et al, 1995, Çagatay, Elson and Grown (eds.), 1995; World Bank, 1995; Palmer, 1995.

They also observe that ignoring household non-market work may affect macro-economic policy by constraining labor mobility and supply response, as well as affecting the demand for close market substitutes to home produced commodities[6]. Therefore, interactions between male and female work on the one hand, and market and non-market activities on the other hand, may play key roles in policy impact analysis.

Therefore, the analysis of the impact of trade reform policy on income distribution and poverty reduction in South Africa, and its differentiated impacts on women and men is of crucial importance.

Conventional economics and most economic statistics ignore the enormous volume of unpaid work and the undeniably valuable output of services by the household or "care" economy. Households devote a large proportion of their time to produce "home" commodities, which can neither be purchased nor sold on the market and which, therefore, are consumed entirely by the household themselves. Although, many of these commodities have their equivalents in the market economy, economics is generally blind to the unpaid work and production of women (and men) within households.

Advances in economic theory have stressed that important productive activities occur within the household, and more attention is devoted to distinguishing domestic work activities from leisure activities, as it is not likely that home production and leisure activities will be affected in the same way by changes in technology, wage rates or socioeconomic variables.

Although these gender-related development issues have prompted serious debate, the absence of appropriate gender-aware macroeconomic analytical tools has penalized quantitative analyses. A related constraint is the inadequate data and statistical indicators for effective policy-making, monitoring and evaluation[7].

We address this deficiency by developing a gender-aware Computable General Equilibrium (CGE) for South African economy that integrates both market and non-market activities, while distinguishing male and female workers throughout, in order to evaluate impacts of trade liberalisation on men and women time allocation between work (at the market and at home) and leisure, and its welfare impact on households. CGE models are powerful tools to capture, in a general equilibrium framework, all direct and indirect effects of macroeconomic shocks (wherever the shock occurs in the economy) on sectoral production and factor demands.

1. Scope of the issue

South Africa is member of World Trade Organization (WTO) since 1995 and since 1969 participates to the Southern Custom Union. The pace of trade liberalization quickened after South Africa became a signatory to the Marrakech Agreement. Initial progress in rationalizing the very complex tariff regime and with lowering the overall level of nominal and effective protection was relatively fast. Between 1990 and 1999, the number of tariff lines was reduced from 12500 in 200 tariff bands to 7743 in only 47 tariff bands. In fact, if the considerable number of zero tariffs is ignored, the number of tariff lines had been reduced to fewer than 2500 by 1999. At the same time the maximum existing tariff has been reduced

[6] Elson (1995), Sinha (1999; Sinha 2000) and Fofana et al (2003)
[7] Latigo, A.A.R (2004)

from almost 1400% to 55% and the average economy-wide tariff fell from 28 to 7.1% (**Error! Reference source not found.**).

South Africa has also a number of bilateral trade ties, mainly in the form of free trade areas (FTA). The European Union–South Africa FTA was agreed in 2000. It is asymmetric in nature. The agreement is that EU liberalizes 95 percent of its imports from South Africa between 2000 and 2003, and that by 2010 almost all its imports from South Africa should be liberalized. There are certain exceptions including certain agricultural products, wines and spirits and some aluminum products. On the other hand South Africa liberalizes 86 percent of tariffs on imports (effectively 73% of all industrial sector tariff lines) from the EU over a twelve year period. Exempted products can be found in the sectors of clothing and textiles, footwear and automotive products where tariffs are scaled down but not completely removed. The Southern Africa Development Corporation (SADC) Protocol came into effect in August 1996. According to this FTA, 97 percent of imports from SADC will generally qualify for duty free access into South Africa by 2005. It is envisaged that 85% of the FTA will be in effect by 2008 will full liberalization set for 2012. South Africa is also a dominant member of the Southern Africa Customs Union (SACU). There are other planned FTAs with India, Brazil and the United States of America.

Consequently, there is increasing need for South African government to assess impacts of it trade reform policy to ensure transparency and accountability, and moreover, to contribute achieving the MDGs.

To understand the likely distributional impacts of it trade reform policy on income distribution and poverty reduction, one needs an appropriate macroeconomic analytical tool. Analysts generally rely on Computable General Equilibrium (CGE) Models, which simulate the working economy by taking into account the structure of the economy and interactions between sectors and agents, as well as the direct and indirect effects of policy measures.

Standard CGE models, which are widely used in OECD countries, among others in Africa and other developing countries for policy orientation, provide interesting insights on the likely impacts of macroeconomic shocks and policies on income distribution and poverty. However, these frameworks generally ignore gender dimensions of the economy, as well as non-market production occurring within the households, which requires an important amount of time from household members. They consider men and women as identical, in terms of job opportunities, wage earnings, access to production factors, etc. However, it has become clear that men and women can be affected very differently by macro shocks and policies, as they generally have different work activities and work in different sectors.

The limitation of using such macroeconomic models can be illustrated in analyzing effects of policies and shocks on the first three MDGs: (i) eradicating extreme poverty and hunger; (ii) achieving universal primary education; and (iii) promoting gender equality and empowering women. Generally, results drawn from a standard CGE model will only be able to assess whether the policy is pro or anti -poor (first goal). The second and third goals will be ignored. Therefore, based on results from a standard CGE model, policy advisers would recommend a pro-poor policy to policymakers, which would not necessarily contribute to achieving the other two MDGs.

The contribution of a Gender-Aware CGE model comes at this point. It assesses the impacts of policy measures on poverty, as does the standard CGE model. Furthermore, it tells us

whether the policy contributes to narrow gender inequalities and provides insights on the likely impacts on (boys and girls) education, at least on the demand side.

2. Overview of South African socioeconomic characteristics

South Africa was reintegrated back into the world economy following a credible transition to democracy symbolized by the elections in 1994. The new South African government immediately adopted the Reconstruction and Development Programme (RDP), which set the broad framework of the new government's economic and social policy. This was followed in 1996 by the launching of the Growth, Employment, and Redistribution (GEAR) programme, which defined policy instruments and objectives for the five years until 2001. However, despite the implementation of these economic reform initiatives, the country has since not yet been able to achieve stable and sustained macroeconomic performance. As well, little is known about how these policies have contributed to the existing gender disparities that coexist with the negative developments in most macroeconomic fundamentals. In light of the above, the main objective of this section is to provide a macroeconomic and gender overview in South Africa.

During the apartheid years, monetary and exchange rate policy were strongly influenced by the interests of the gold mining industry, especially during the period 1976-1989. The interests of the mining sector, in particular gold mining are evident in exchange rate policy. From 1971 to the late 1980s exchange rate policy was designed to benefit the gold mining industry. As the gold price fell, the value of the Rand was allowed to fall; for example in 1975 it was devalued by 17.85 percent. Upon coming into power the new ANC-led South African government immediately focused its attention on reversing gross domestic product growth decline, large fiscal deficit and high inflation. The macroeconomic policies adopted in the early phase of majority rule included (i) creation of credible and prudent fiscal stance, WTO-linked program for trade liberalization and (iii) re-unification of the dual exchange rate system (Hartzenberg and Stuart, 2002). In 1996, government adopted the GEAR (Growth, Employment and Redistribution) macroeconomic framework as successor to the RDP (Hartzenberg and Stuart, 2002). The new framework emphasized fiscal tightening, continued exchange rate controls liberalization, acceleration in tariff reduction and privatization and restructuring of state owned assets. It also stressed greater labor market efficiency.

Government’s policy stance has not changed much since adoption of GEAR and substantial stabilization has been attained.

Table 1: Growth, Employment, and Redistribution (GEAR) macroeconomic framework

Policy	Policy measures	Expected outcome
Fiscal policy	• Deficit reduction • Income tax revision • Decrease government consumption expenditure • Decrease tax to GDP ratio	• Contain debt service • Counter inflation • Free resources for investment by decreasing government dissaving • Promote redistribution • Correct fiscal drag
Monetary policy	• Tight monetary policy • Relaxation of exchange controls • Relax access to domestic credit by foreign investors • Doubling limit for institutional investors to obtain foreign assets via asset swaps	• Reduce inflation • Stabilize REER • Increase domestic saving and investment • Promote higher economic growth • Increase employment opportunities • Promote equitable income distribution
Trade policy	• Accelerate tariff reform • Tax incentives • Competition policy • Offset import cost against exports • Replace quantitative restrictions with tariffs • Phase out GEIS • Accelerated depreciation for new manufacturing investments • Promote SMMEs	• Contain input prices • Facilitate industrial restructuring • Stimulate new investment • Rise in non-gold exports • Rise in private investment • Rise in manufacturing • Increase foreign fixed investment • Develop SMMEs
Labour market policy	• Increase labour market flexibility • Reduce indirect wage cost • Increase incentives for more shifts, job-sharing, and increase job flexibility • Productivity linked wage increases • Wage moderation • Flexible regulatory labor market framework	• Rise in competition and labour intensive growth path • Accelerate investment and employment • Lower inflation pressures • Flexible collective bargaining structures • Wage and salary rises limited by productivity growth

Source: South Africa Human Development Report 2003, p. 189.

Trade Policy Response

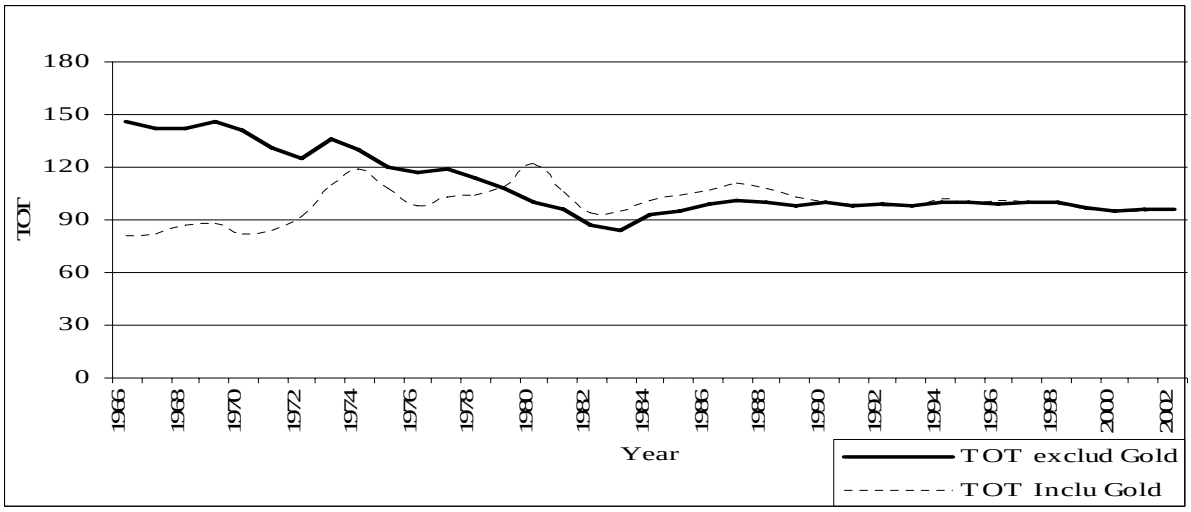
Trade liberalization emerges as one of the key policy issues of the GEAR agenda discussed in previous sub-section. The aggregate response of trade to the opening up has been quite dramatic. The trade ratio as measured by the sum of export and import values to GDP's (in current prices) average annual growth rate was 5.5% between 1993 and 1996, 0.8% between 1997 and 1999 and 9.8% between 2000 and 2002 (Davies and van Seventer, 2003). Closer inspection shows that the trade ratio started to grow in 1992, perhaps reflecting the post apartheid reintegration. The slowdown in 1997-99 was probably related to the Asian crisis, but may also reflect the ending of the impetus provided by the ending of apartheid. The acceleration after 1999 reflects both world recovery and domestic liberalization policies starting to make an impact.

A broad look at the performance of exports in the apartheid, transition and liberalized periods suggests that the reforms may have stimulated export growth. During the pre-democracy

period (1981-90) the value of exports declined by an average of 2.6 percent. Between 1991 and 1996 export growth has averaged 6.4 percent per year. During the liberalized period (1997-2002) exports have grown by only 3.7 per cent per annum. However, this latter figure masks a sharp downturn in mining sector in recent years. As to the composition of exports, the share of manufacturing products increased from 41.2 per cent in 1991-96 to 53.3 per cent in 1997-2001, while the share of mining diminished from 42.3 percent in 1991-1996 to 26.9 percent in 1997-2001. Gold, the main South African export product, still accounted for more than 20 per cent of total exports in 1997-2001, down from more than 35 per cent in 1991-96 (TIPS 2002). The performance of imports in the transition and liberalized periods also suggests that the reforms may have also stimulated import growth, albeit marginally. TIPS (2002) shows that in the transition period imports grew by an average of 11.7 percent between 1991 and 1996 but grew only by 0.1 percent between 1997 and 2001. The relatively low growth in the latter years is puzzling given that tariffs were falling in this period although GDP growth was muted. Imports, just as exports, are dominated by manufactured and mining imports, accounting for over 86 percent of imports over the two periods.

In terms of trade competitiveness, South Africa has on average experienced a 50% decline in terms of trade with the exclusion of gold (Ndhlela and Nkala (2003)). Although the terms of trade inclusive of gold have increased by about 20% during the same period, the overall decline in the terms of trade reflects a critical weakness in the structure of the country's trade composition (Figure 1).

Figure 1: Terms of Trade Developments: 1960-2002



Source: Statistics South Africa; Legend: TOT=Term of trade

As Ndhlela and Nkala (2003) point out, the main structural weakness in South Africa's trade composition is the fact that the country is a major exporter of primary and intermediate commodities to industrialized country markets. Like all developing countries, a large proportion of exports consists of unprocessed raw materials, with the mining industry contributing the greatest proportion to the country's total exports. The proportion of manufactured goods in exports has however experienced a significant rise with a higher proportion of raw materials being processed before export. Major export commodities are gold, diamonds, platinum, wool, sugar, manganese and chrome ores, asbestos, atomic energy materials and base minerals such as coal, antimony, copper and iron ore. Exports of chemicals, metal products, machinery, transport equipment and manufactured goods have increased, particularly to Africa, in recent years.

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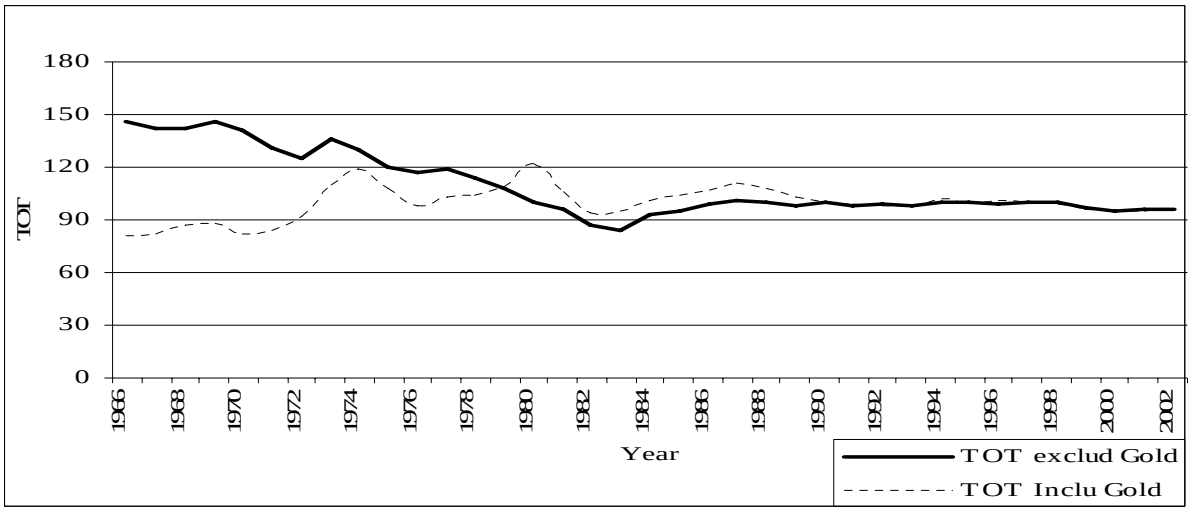

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GDP Structure and Performance

South Africa's economy is very diverse as illustrated in Table 2. The services (tourism, transport and business services) and manufacturing sectors are the two most important sectors respectively. The increasing contribution of transport, financial services and commerce reflect the growing contribution of the services sector. Moreover, the South African economy has experienced significant transformation in the past four decades with agriculture's declining contribution in total value added towards the end of the 1990s the most noticeable (SSA, 2002). Although the mining industry has historically occupied a dominant role in the development structure of the economy, its importance in terms of contribution to overall output in the past decade has declined from about 20 percent between 1975 and 1989 to current levels of about 10 percent of GDP. This sophisticated industrial structure developed alongside an underdeveloped "informal" economy. The "informal" sector represents both untapped potential and a developmental challenge for South Africa (SAPC, 1999).

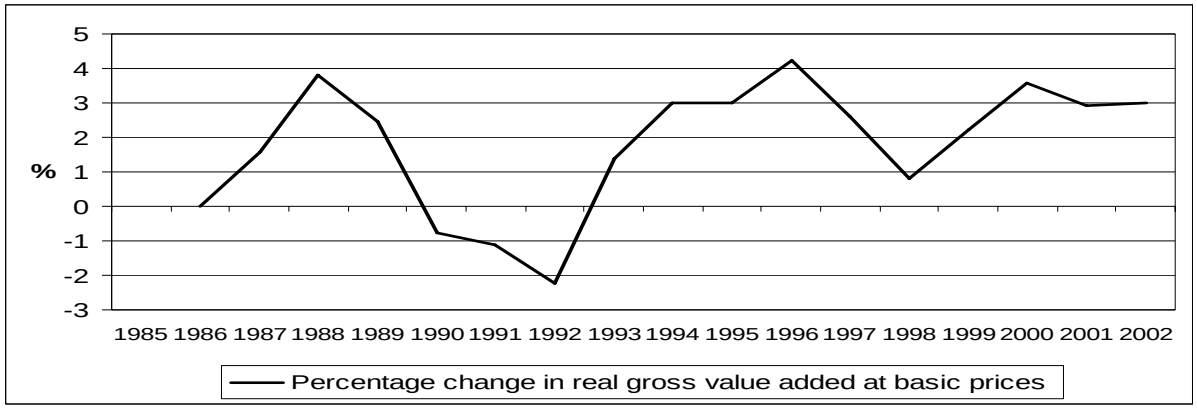
Table 2: South African Economy: GDP Contribution by Sector: (1993-2002)

Sector	Percentage contribution
Agriculture and Forestry	7
Mining and Quarrying	10
Manufacturing	33
Electricity and Water	6
Construction	5
Wholesale/Retail/Hotel and Restaurants	22
Transport and Communication	16

Source: Statistics South Africa

In principle, the globalization and liberalization documented above that the country has gone through should lead to an acceleration of growth and productivity through greater allocative efficiency and better resource allocation. In practice, however, as Figure 2 shows, despite the significant trade liberalization and stabilization, real GDP growth record (adjusted for inflation) has not been impressive. Growth in GDP has fallen from an average of 4.9 percent per annum for the period 1960 to 1975 to 2.3 percent during the period 1976 to 1989 and to 1.3 percent during the 1990s. After an impressive average real growth rate of 3.3 percent in 1995-1996, the economy experienced a sudden slowdown. In 1997 growth declined to 1.7 percent before sliding back to 0.5 percent in 1998. According to Hartzenberg and Stuart (2002), the short-lived recovery between 1994 and 1996 raises an important question of sustainability and the role of inherent structural weaknesses in the economy. In particular, the negative growth rates recorded in the early 1990s raise a key consideration in the design of policies to ensure the achievement of a stable growth pattern. Given a sustained population growth in excess of 2.2 per cent per annum, growth in per capita income was negative for the total period of the 1980s and the first half of the 1990s, only improving marginally during the latter half of the 1990s.

Figure 2: Economic growth rate



Source: South African Reserve Bank, Quarterly Bulletin, various issues.

Employment and Unemployment Performance

Unemployment, currently averaging about 25 percent to 35 percent of the economically active population, constitutes one of the major economic policy challenges to the South African economy. According to the ECA (2002) report, in 1995, industry accounted for 32 percent of formal employment in South Africa. Between 1995 and 2001, it fell by around 14 percent, compared with a drop in total non-agricultural employment of around 10 percent. In the construction sector and mining sectors, employment fell by 37 percent and 30 percent respectively, mainly reflecting a shift towards casual labor in the former (ECA, 2002). Figure 3 shows that employment performance has been poor since the mid-1960s and the picture has not altered much since 1994. In the first half of the democratic decade, we notice that the brief economic recovery was sufficient to temporarily reverse the decline in formal employment occurring throughout the 1990s. In the latter half, 1996-2002, the employment rate actually declined. Non agricultural employment declined by 21 percent while public sector employment declined by 1.5 percent. Overall, employment declined by 15.4 percent in the 1990s. This suggests that the liberalized economy was not really creating jobs. A look at Figure 3 suggests that a proximate cause for the poor employment performance may have been poor economic growth. Importantly, the relationship between GDP and employment has changed since the 1980s. During the 1980s, employment appears to have increased during some years, despite negative GDP growth (with the average annual labor productivity growth between 1980 and 1990 at only 0.2 per cent). In the 1990s, by contrast, employment growth was always below GDP growth. This is indicative of what has now become known as the jobless growth phenomenon, indicated by the increase in the gap between the economic growth and the growth in employment during the latter years.

Figure 3: Economic growth and formal employment

Source: South African Reserve Bank, Quarterly Bulletin, various issues.

Based on the so-called "narrow" definition of unemployment, rates of unemployment were quite low in the early 1970s for all classes of labor. However, since 1976 unemployment rates for unskilled and semi-skilled labor have increased, reaching a climax in 1995 and continuing to rise in the latter 1990s. Note that in sharp contrast the unemployment rate for highly skilled workers has been negligible throughout the period. The unemployment rate for skilled labor has even begun to rise in recent times.

Job creation in the past three decades has been poor and has contributed the most to the employment problem. As pointed out in Arndt and Lewis (2001) total employment (formal sector and informal sector) of unskilled and semi-skilled laborers in 1999 was only 92% of the level present in 1970. This entire decline has been due to decline in formal sector employment of unskilled and semi-skilled laborers since employment in the informal sector and that of skilled labor has been growing. The trend towards reductions in formal sector employment of unskilled and semi-skilled labor appears unaffected by the demise of apartheid.

Arndt and Lewis (2001) contribute another explanation to the dismal employment performance. This is the large differences in remuneration trends across labor classes. In 1999, real remuneration per highly skilled worker was at 90 percent of the 1970 level while real remuneration per skilled worker increased to 110 percent of the 1970 level. In contrast, real remuneration per unskilled and semi-skilled worker in 1999 had grown to 250 percent of the 1970 level. Based on these data, Arndt and Lewis conclude that it's the cost of unskilled and semi-skilled labor that has contributed to the resulting employment fall. Contrary to the skilled employment case where employment growth has been associated with slow wage growth, slow employment growth within the unskilled ranks has been associated with substantial real remuneration growth.

Income distribution and Poverty

South Africa has one of the worst income distributions in the world. The Gini coefficient, which measures the degree of income inequality, was 0.56 in 1995 and 0.57 in 2000, implying that the income distribution has been getting worse across the country. In addition, the Gini coefficient not only takes high values for the country as a whole, but also for individual population categories, suggesting a high degree of inequality within each major ethnic group. The Gini coefficient is higher for Africans than for Whites. More significantly,

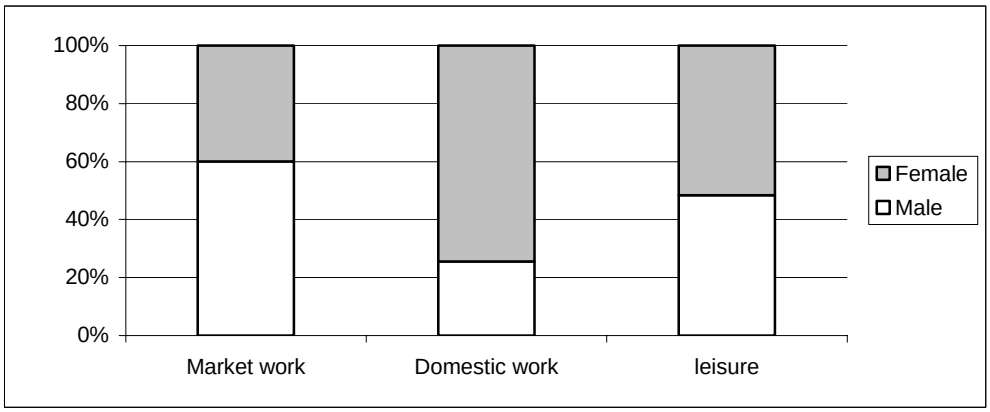
according to ILO (1999), income distribution *within* population groups worsened between 1990 and 1995 while inequality decreased between groups. This may reflect the fact that the end of apartheid-based discrimination has created new employment opportunities for highly skilled Africans. Income is also unevenly distributed among rural and urban areas.

There is general agreement that poverty has grown worse since liberalization. The World Bank (1999) notes that extreme poverty is concentrated mainly in rural areas where over 75 per cent of the households cannot meet the minimum food requirements. In urban areas poverty is much less acute, with only about 10 per cent of the households below the poverty line. The same study argues that poverty has a strong gender dimension, showing that female headed households have a 50 percent higher poverty rate than male headed households. In addition, unemployment figures have shown that females suffer more from unemployment than males. Although no concrete evidence is available, there is a general consensus that this pattern has persisted over time. The UNDP (2000) gives the rate of poverty as 45%. This is despite the fact that South Africa is classified as an upper middle- income country. Poverty differs greatly by region and by race, with the majority of the poor being Black Africans. According to Klassen and Woolard (1998), there is a strong correlation between unemployment and poverty. They estimate that the unemployment rate among the 20 per cent poorest households is 53 per cent compared to 4 per cent in the case of the richest 20 per cent households. The problem is not restricted to persons with low levels of formal education. Although education reduces the likelihood of unemployment, rates are extremely high amongst African women, irrespective of whether or not they have completed secondary education. It should be noted, however, that significant differences exist in the quality of education that has been provided to different population groups. This is a legacy of deliberate discrimination under the apartheid system. Only tertiary education seems to substantially reduce the risk of unemployment for both men and women.

3. Gender in South African economy

Male and female time allocation is presented in Figure 4. At the national level, men are more active in the labour market than women and contribute roughly at 60 per cent of the total market labour. Women, meanwhile perform more than 75 per cent of the domestic unpaid work.

Figure 4: Gender time allocation in 2000



Source: South Africa Time use Survey, 2000.

Looking at employment in formal versus informal sectors, we note that in broad terms, women are concentrated in informal services and informal trade (Figure 10). In 1995 33% of

the economically active African women were own account workers compared to 6% of African men. Women are generally concentrated within the low profit activities, generally earn less and tend to have smaller activities in the informal sector, (Baden *et al* (1998)). Although in general more women than men worked in the informal sector, the sectoral distribution of men and women in the informal sector as well as the occupations are very similar to the formal sector. Valodia (2000) gives more corroborating evidence validating this.

A broad look at the participation of women in formal employment in the apartheid, transition and liberalized periods suggests that female participation rates have been on a general increase. Standing *et al* (1996) show that this trend started in the apartheid era with female labor force participation increasing from 23 percent to 41 percent between 1960 and 1991. According to the World Bank (2002), female labor force as a percentage of total labor force has moved from 37 percent in 1990 to 38 percent in 2000. According to Casale and Posel (2002), the post-apartheid period 1995 to 1999 has witnessed a continued feminization of the labor force in South Africa. In 1995, 38 percent of all females between the ages of 15 and 65 were either working or actively looking for work, by 1999, this had increased to 47 percent.

A gender segregated labor market in South Africa may be explained by discrimination against women in education and training during the apartheid period, which was removed after 1994. However, the evidence in the post apartheid education primary and secondary enrolment and literacy ratios suggest a dramatic improvement in these indicators for women (World Bank, 2004). Men and women tend to work in different sectors. Some sectors are male-oriented (i.e. mining, food, beverage and tobacco heavy manufacturing and construction), while others are female-oriented (i.e. textile, privates services). Women are engaged primarily in tertiary activities, while men are spread throughout primary and secondary activities of the economy. This trend between men and women has not changed much as seen in the 2001 census data represented in Figure 5 and Figure 6.

Figure 5 : Employment by sector and gender

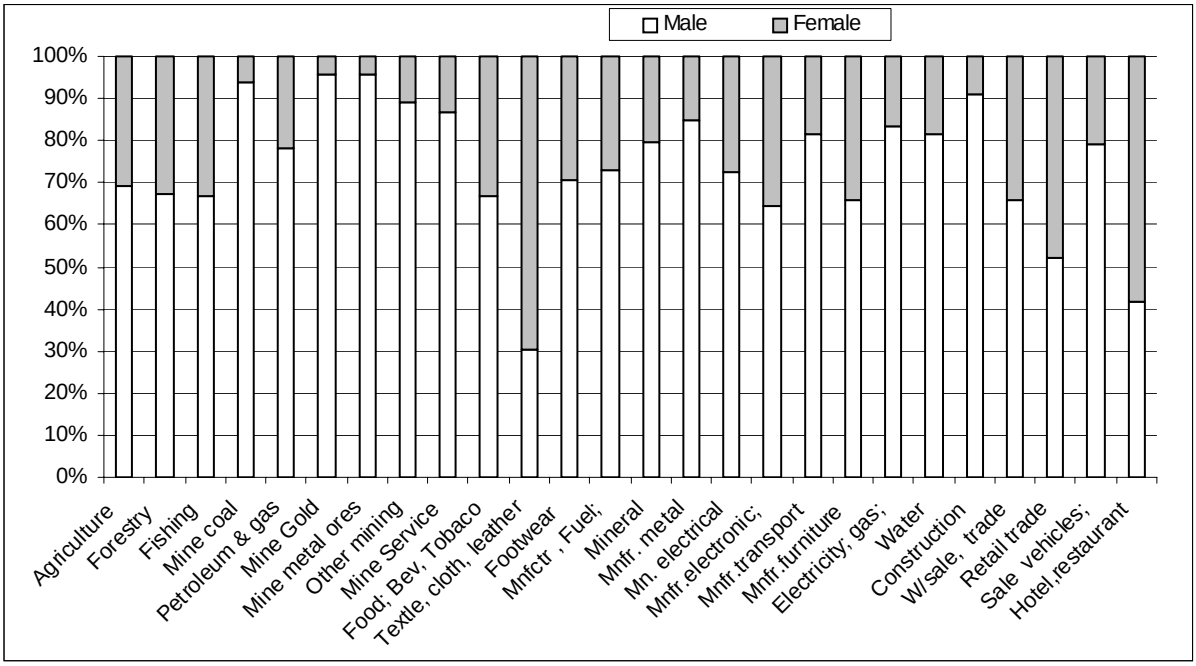
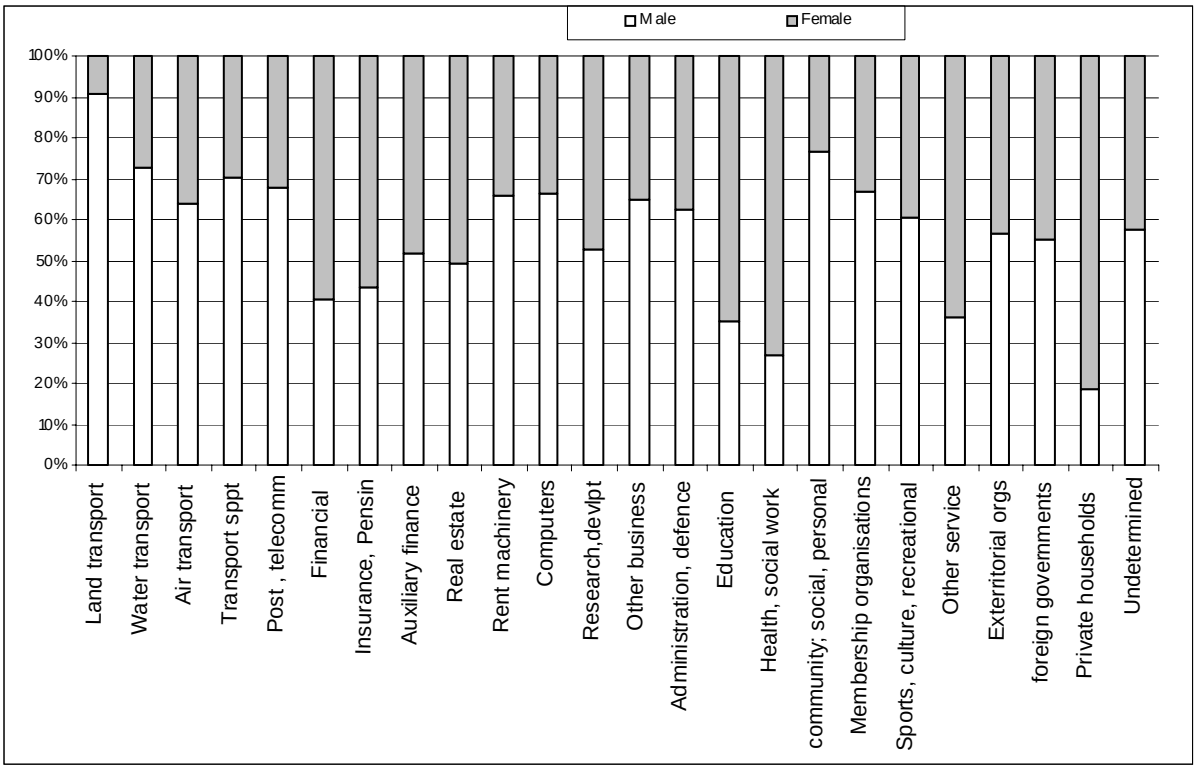


Figure 6: Employment by sector and gender (continue)



Source: Calculation from the 2001 Census

As shown in Table 3, unemployment rates for women are much higher than for men, for all population groups, and especially in urban areas where they were estimated at over 28 per cent in 2001, compared to the male unemployment rates of 24.1 per cent. Higher female unemployment may be explained, inter alia, by lower school enrolments and literacy rates. Since access to formal employment is restricted to a few occupations, in situations of declining demand during the liberalized and deflationary period, women were pushed into the informal sector small-scale activities.

Table 3: Unemployment (official definition) by race and gender (2001)

Population group and area	Unemployed rate in per cent	
	Male	Female
All population groups	24.8	28
Urban	24.1	28.6
Non urban	26.4	26.9
African	30	32.3
Urban	31	35.7
Non urban	28.6	27.9
Coloured	21.1	22.8
Urban	23.9	23.7
Non urban	8.8	17.1
Indian/Asian	13.9	23
Urban	13.5	22.9
Non urban	31.4	30.1
White	5.6	7.8
Urban	5.7	8
Non urban	4.9	5.4

Source: Statistics South Africa, Labor force survey, September 2001

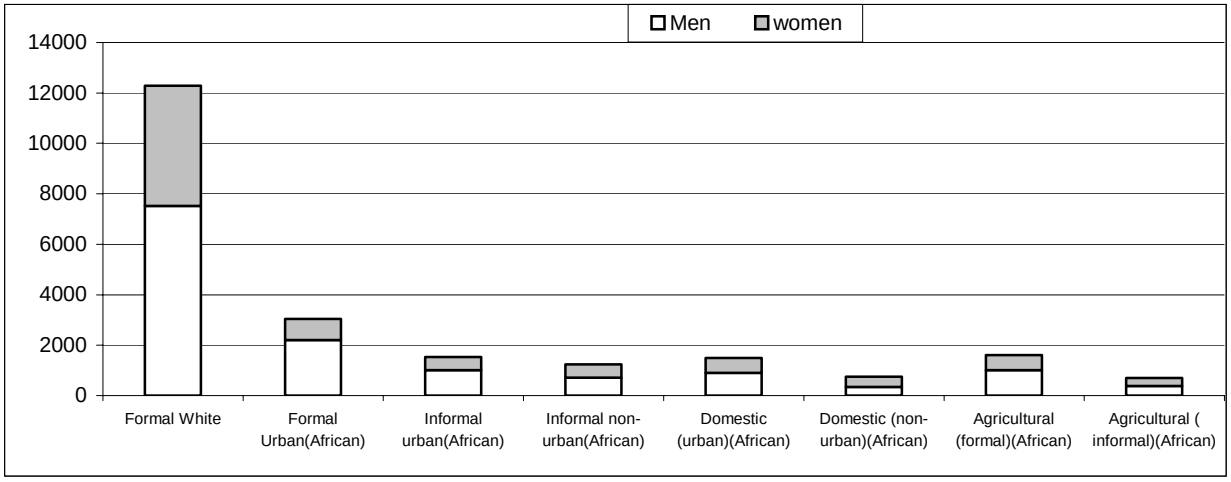
Overall, it appears that the post apartheid period and associated globalization have been associated with higher female participation rates in the labor force. Looking closer, however, we notice the disturbing trend that the continued feminization of the labor force is associated particularly with an increase in female unemployment. Where employment has grown, this seems to have been mostly in self-employment in the informal sector. Accordingly, given that there has been no appreciable increase in the demand for female labor in the formal sector, these findings may reflect an increasing number of women who are "pushed" into the labor market (Casale and Posel (2002)).

Data on earnings distribution by gender in the apartheid period are sparse but are generally thought to confirm discrimination along racial lines. Fallon and Lucas (1998) find that while education and experience are important determinants of earnings, other factors such as discrimination by race and gender and barriers to mobility (i.e. geographic location and formal/informal economic activity) are associated with larger differentials than usually found in studies for other countries. In a recent study, Rospabe (2002) shows that black Africans earn the least in income followed by Coloureds and Indians while Whites have the highest earnings.

According to the 1997 October Household Survey, African workers earned, on average, 63 per cent less than White workers. As later surveys have shown, this racial wage gap, though still significant, is smaller in community, social and personal services than in other sectors. The gap has tended to narrow in the long run though data should be interpreted with caution due to methodological changes (see Hofmeyr (1993) and Crankshaw (1997)). According to ILO (1999), during the last few years the gap seems to have remained unchanged. The continuing increase of the relative wages of African workers in community services may be due to policy changes in the public sector after the end of apartheid.

The same narrowing in the globalized era has not been perceived in the gender wage gaps from the available anecdotal evidence. There is a growing literature showing gender differences are also seen in terms of earnings. According to Figure 9, there are substantial monthly earning differentials by gender. Mean incomes per industry are in favor of men as opposed to women as seen in the figure below.

Figure 9: Mean monthly income by gender (1999)

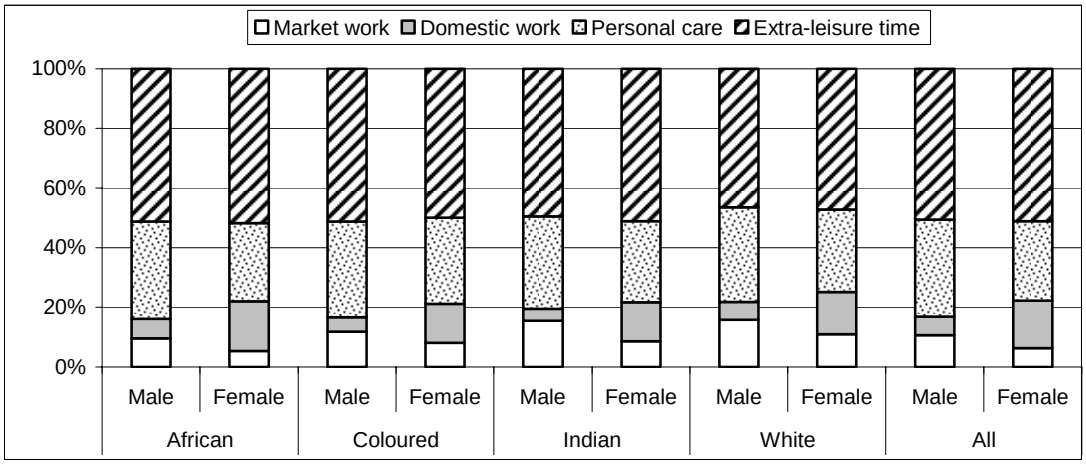


Source: Statistics South Africa, October Household Survey 1999

Women generally earn less than men in formal sector employment in the globalized era. Women's earnings were estimated to be 65-95 percent of men's (Valodia, 1996). Using the October household survey for 1999, Rospabe (2002) shows that the cumulative earnings distribution of female workers is first order dominated by the distributions of income for male workers. Further, it was found that women's manufacturing earnings were more severely affected than other sectors with women's earnings being overall 73% percent of men's in metropolitan areas. This is mainly because of the lower positions of women (Pillay, 1993 cited in Bundlender, 1995). Bundlender (1997) also found that even for those with the same qualification, there was substantial discrimination in earnings between men and women. Rospabe (2002) estimated the average earnings gap between males and females to be about 20 percent. These differences are attributed to differences in productivity between the two genders and to labor market discrimination against women, (Rospabe, 2002).

The 2000 South African survey of time use shows that men are more likely to be producing market goods and services and take more leisure time. Women, meanwhile, do the work of rearing and caring for children, caring for other household members, cooking, and cleaning (Figure 7)[8].

Figure 7: Household and gender time allocation



4. Model and Data

The study uses a computable general equilibrium model based on the neoclassical-structuralist specification presented in Decaluwe, Martens and Savard (2001). The model seeks to explain production, consumption and prices in a whole economy in which agents respond to relative prices as a result of profit and utility maximizing behaviours in determining levels of production and consumption, and markets simultaneously adjusting relative prices in order to reconcile endogenous supply and demand decisions.

The model[9] explicitly treats the trade and transportation margins for commodities that enter the market sphere. A constant trade and transportation margins coefficient is added to each transaction, included in the price, and the corresponding revenues generated are a source of demand for the trade and transportation outputs.

[8] Details on household allocation of time between market and non market activities are noted in Appendix 2.
[9] Full technical aspect is given by Fofana et al. (2004)

Computable General Equilibrium models differ primarily in the choices of macroeconomic closure that specifies (i) factors, commodities, and foreign exchange market-clearing rules, (ii) the government budget constraint conciliation, and (iii) the savings and investment equilibrium mechanism.

According to the characteristics of the labor market in South Africa we assume that the employment decisions in public administration are exogenously determined, as government hiring possibility is limited. Therefore, public employees receive an economy-wide indexed wage rates.

Our model explicitly treats unemployment as a consequence of labour market imperfections in South Africa. The total demand for workers is not equal to the total supply; consequently, there is an excess supply of labour which is unemployed. Consequently, the market clearance assumption is extended to incorporate unemployment. Markets are not cleared in a strict sense of the microeconomic theory, since at an equilibrium wage rate, the quantities offered and supplied are not equal. Therefore, market clearance must be understood in a broad sense, since the unemployment rate which results from the interaction between supply and demand must be compatible with the equilibrium wage rate.

The relationship between the wage rate and the unemployment rate is represented by a wage curve[10]. The concept results from a series of empirical studies carried out with data compiled from several countries, which show a downward slope relation between the rate of unemployment and the rate of wage in the local labour market.

Household labour supply is elastic through a market-non market activity choice. It specification takes into account the existence of unemployment in each labour market. The wage rate that equilibrates each labour market is compatible with a given rate of unemployment. Workers, regardless to the household they belong to, have the same opportunity in the labour market but each household contribute differently to the unemployment according to its own labour supply pattern and the rate of market unemployment.

Capital is sector-specific and exogenously set at the base year level. The capital endowed by agents is also sector-specific so that the same factor might have different returns according to market activities they are performing.

All commodity markets follow the neoclassical market-clearing price system in which simultaneously determined producer and consumer prices vary only by given tax and margins rates. Each market is cleared when the total endogenous demand equals the total endogenous supply.

The foreign exchange market equilibrates via adjustments of the real exchange rate. The current account balance is exogenous and pre-specified at the base year level. Hence, with fixed foreign capital transfers, higher imports of some good will require higher exports and/or lower imports of other goods in order to keep the current account balanced. Therefore, pressures to change export or import quantities - demand and supply of foreign currency - are balanced by adjustments in the real exchange rate.

[10] Blanchflower and Oswald (1995); and Card, D. (1995).

The model solves for one-period equilibrium and faille to counter for second period effect of savings and investment. In order to prevent a positive EV associated with decreasing investment situation, real investment is kept fixed at its benchmark value. Indeed, savings is investment driven. Savings are generated in a fixed proportion of households' revenues; savings of firm and government are residual revenues after payment for taxes and subsidies, and transfers; foreign savings - the current account balance - are exogenous.

Government is passive in our model, i.e. it does not optimize an objective function. It role is limited to regulate the economy and redistribute revenues. It earnings comprise revenues raised from indirect and direct taxes, and transfers in. Its expenses consist of subsidies, current expenditures on the services provided by the public sector, investment and transfers out. Government current expenditures on public services, investment expenditure and, transfers are fixed; its deficit is covered by borrowing on the domestic credit market.

The relationship between the rest of the world and the domestic economy is determined by an imperfect substitutability between imported and domestic goods on the consumption side (Armington hypothesis), and the domestic market and the international market on the sectoral production side. Allocations between the domestic and international markets for demand and supply occur in response to the relative prices of foreign goods defined by exogenous international prices, the real exchange rate, and government fiscal policies (taxes, subsidies, and tariffs).

The model is homogenous of degree one in all prices and nominal values. Our numeraire is the global factor (or value added) price at its initial level, and all nominal values are thus measured in real terms relative to this price. Fixed wages in this context should be interpreted in terms of factor cost. Real incomes are computed with households' consumer price indices which unlike the global factors price index include the prices of imported goods, taxes, and subsidies. Results have to be interpreted in comparative static terms as the model solves for one-period equilibrium.

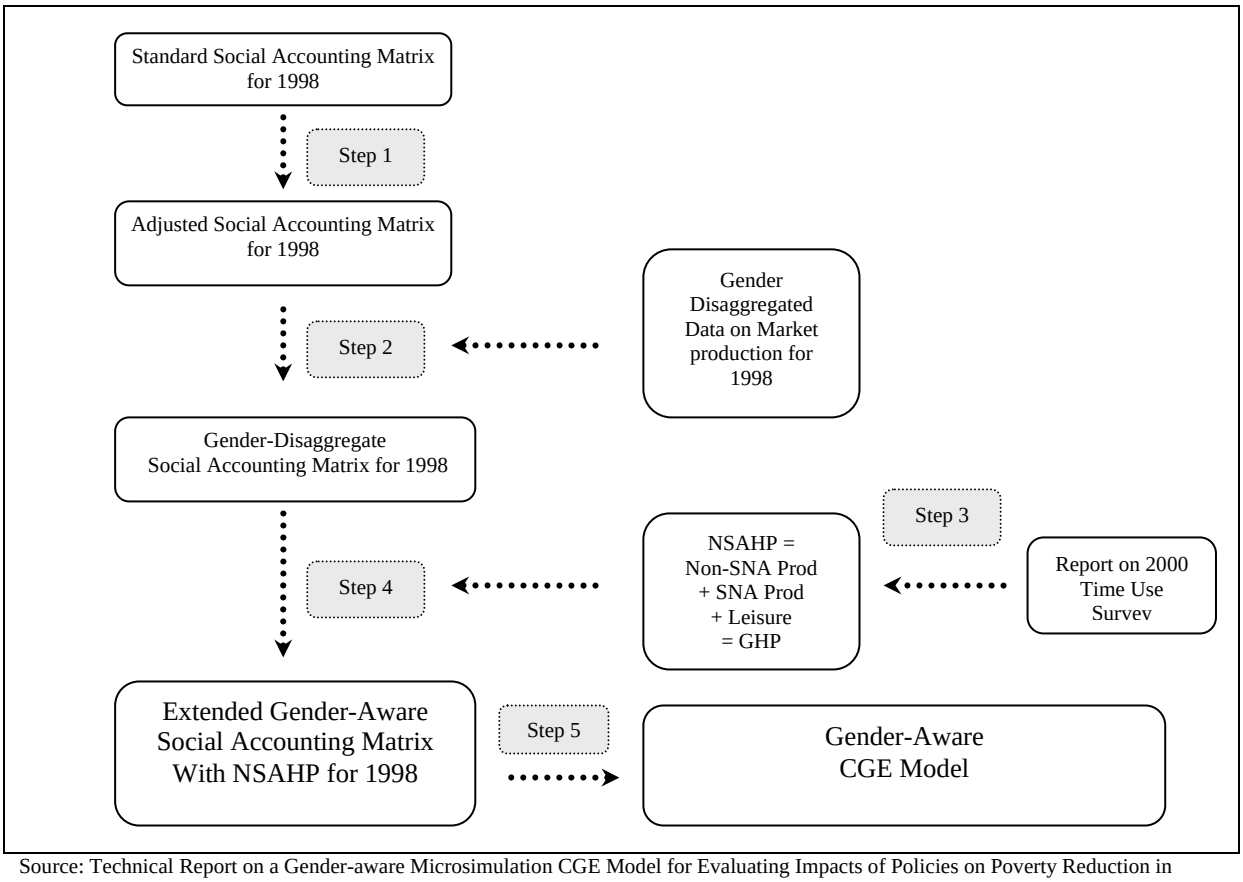
Gendering a standard CGE model

CGE models are traditionally limited to the market sphere of the economy. The gender dimension and the non-market sphere of the economy are incorporated into a standard CGE model in different steps.

We first construct a macroeconomic data framework called Extended Gender-Aware Social Accounting Matrix (SAM) that brings together market and non market activities. Information related to non market activities are drawn from the South Africa Time Use Survey for the year 2000. Non market work and leisure time are valuated using one of the methods developed in the literature (the opportunity cost approach). The concept of National Satellite Account of Household Production (NSAHP) is used to incorporate non market activities (household production of services and leisure activities) into the standard SAM as recommended by the 1993 System of National Accounts of the United Nations. Figure 8 summaries the procedure of building of an extended gender-aware Social Accounting Matrix (SAM)[11].

[11] The detailed procedure on building an Extended Gender-Aware Social Accounting Matrix with NSAHP is given by Fofana et al. (2004a).

Figure 8 : Building of an Extended Gender-Aware CGE Model



Source: Technical Report on a Gender-aware Microsimulation CGE Model for Evaluating Impacts of Policies on Poverty Reduction in Africa: The Case for South Africa, October 2005.

The labour market is then segmented into male and female labour markets and workers are separated by gender. They are considered as different factors of production in the same way analysts separate labour market and workers according to skill or geographical location. The motivation for this decomposition is double. First, there is growing recognition that there is a gender bias against women in the labour market in term of wage earnings and job opportunities. Second, male and female workers tend to occupy different jobs in different sectors and are thus affected differently by macro shocks and policies. Employment surveys in Africa shows significant gender bias in the labour market. The 2002 report on men and women in South African shows that the unemployment rate is higher for women than for men within each population group, and in both urban and rural areas. Formal sector work is far more common for men than for women. Employed women tend to cluster into a small number of industries compared to men; women are significantly more likely than men to be employed in clerical jobs on the one hand, while men are far more likely than women to be employed as operators on the other hand; and mean hourly earnings are higher for men than women across all population groups. Therefore, the first step of the modeling exercise will consist in the segmentation of the labour market into male and female workers to highlight the gender bias observed in the South African economy.

Therefore, male labour (LD_i^{mal}) and female labour (LD_i^{fem}) are imperfect substitute in the aggregate sector *i* labour demand (LD_i). The conditional demand of male and female labour depends on its initial sectoral share, their wage rates, and their degree of substitution in sectoral production.

$$LD_i = f(LD_i^{mal}, LD_i^{fem})$$

The gross earnings of male and female workers are equal to the volume of labour service required by productive sectors valued at the market wage rates. Household labour income (Y_h) consists of male and female wage incomes. Assuming labour market imperfections and the presence of unemployment, only a proportion of the total hours supply by household to the labour market is hired. LS_h is household h labour supply, w and u the rate of wage and the rate of unemployment, respectively.

$$Y_h = f(LS_h^{mal}, LS_h^{fem}, w^{mal}, w^{fem}, u^{mal}, u^{fem})$$

We finally introduce non market activities into the model with the recognition that women are more likely to perform household work while men are more active in the labour market and have more leisure time. Furthermore, modeling non market activities alongside market activities makes it possible to assess (i) the importance of household production of services which are intensive in female work. These services, which are not sold in the market and therefore entirely consumed by the household, enter in competition with their market substitutes[12]; (ii) the impact of constraints faced by women at the household level (because of their involvement in family tasks) that may negatively affect their labour market participation and the performance of the overall economy; (iii) the impacts on female leisure time. Increased female participation in the labour force will not necessary improve their welfare if they still perform most of the domestic work and must therefore reduce their leisure time; (iii) the impact on child education at the household level. If children, especially girls, are required to assume household tasks of female adults who have entered the labour market, their education and leisure time could be negatively affected.

Men and women substitute their time devoted to leisure and to domestic work which are imperfect substitutes for market goods[13]. Male labour (LZ_h^{mal}) and female labour (LZ_h^{fem}) are imperfect substitute in home goods production (Z_h) which, by assumption, does not require either intermediate goods or capital[14].

$$Z_h = f\left(LZ_h^{mal}, LZ_h^{fem}\right)$$

The relative demand for male and female labour in home production depends on their relative share (α_h^{mal} and α_h^{fem}) in home production, male and female expended wage rates (w^{mal} and w^{fem}), and the degree of trade-off between men and women in home production represented by the elasticity of substitution[15] (ε_h).

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[12] Whereas we observe some complementarity between market and non-market productive activities.

[13] Gronau (1977) and Solberg and Wong (1992) assume that home goods are perfect substitutes for market goods. However, in other versions of Gronau's model these goods are imperfect substitutes. For other assumptions to simplify the modeling aspects, see Fofana et al (2003a).

[14] Domestic paid labour, capital goods and intermediate goods are included in the household utility function and indirectly substitute to domestic unpaid labour which is referred here as home goods.

[15] We assume that there are very limited substitution possibilities between men and women in the production of home goods, reflected by a low elasticity of substitution (0.5) between male and female domestic work.

$$\frac{LZ_h^{mal}}{LZ_h^{fem}} = f\left(\alpha_h^{mal}, \alpha_h^{fem} w^{mal}, w^{fem}, \varepsilon_h\right)$$

The value of home produced goods is equal to the value of the labour devoted to its production where non-market labour is valued at its opportunity cost as measured by the expected market wage rates.

An extended linear expenditure system is specified to derive household demands for home goods subject to a full income; where ℓ_h^{mal} and ℓ_h^{fem} represent male and female leisure time respectively; C_h^z and $C_{h,i}^m$ are home produced goods and market goods consumptions, respectively.

$$U_h = f\left(C_{h,i}^m, C_h^z, \ell_h^{mal}, \ell_h^{fem}\right)$$

The household entirely consumes the goods it produces at home, as there is no market for these goods. Men and women allocate their total available time in two steps. First, the total exogenous time (hours) available for market and non market activities are allocated to domestic activities (according to home goods production requirement and the degree of substitutability among men and women in home production), to leisure activities (the demand for male and female leisure is derived from the utility function), and to market activities as residuals. Second, the available hours supply to the market is allocated between work and unemployment[16].

5. Simulations and results

Our simulation involves the elimination of all import tariffs with revenue neutral for the Government. Trade liberalization emerges as one of the key policy issues of the GEAR agenda discussed in previous sections. Although other policy measures against free trade are still in place, tariff barrier constitute the principal protectionist measure in South Africa. Government tariff revenue cut is compensated for an alternative source of revenue, through an endogenous uniform increase in indirect taxes.

The removal of tariffs in South Africa modifies the relative prices of all goods and services. The impact on households depends on their factor endowments and their consumption patterns. Trade liberalisation also differently impacts on men and women depending on sectors where they are intensively employed.

Through the gender decomposition of labor, combined with the hypothesis of imperfect substitution, we note that trade liberalization in South Africa would have a much more negative effect on female labor market participation than on male labor market participation. A complete elimination of import tariffs appears to generate a strong gender bias against women with a real wage reduction that is more than of their male counterparts. Thus, our results indicate that the gender bias in labor market would increase. This is due to the fact that male workers are intensively used in sectors where labor demand increases. Women workers are more concentrated in sectors where value added prices and production fall and

[16] For details on technical aspect refers to Fofana et al. (2004b).

consequently, labor demand. Indeed, the export-oriented sectors and the intensive input-used sectors, where male workers dominate, experience the greatest increase in labor demand as a result of trade liberalization.

Furthermore, we find that workers adjust primarily by reducing their leisure time, although domestic work time also falls. As male workers increase their labor market participation proportionately more, they also reduce their domestic work participation, which accentuates the existing gender bias toward women performing domestic work. At the same time, men also experience an increase in their pure leisure activities.

These results suggest a slightly direct welfare loss for "White" and "Indian" population groups resulting from the fall in leisure time and the increase in market work time. While "Black" and "Colored" households do not observe a significant change in their welfare. As male labor market participation and real wages increase more than for their female counterparts, their income share increases within the household. This is likely to reduce the bargaining power of women in their households although this is not modeled explicitly in this study. Finally, at the household level, we note that trade liberalization brings about revenue losses for government that, in this case, we assume to be compensated through an increase in indirect taxes, which explains the very small net negative impact on welfare.

The following sections trace in details the impacts of the policy simulation as it channels through import prices and the resulting sectoral reallocation of production and inputs, factor price adjustments and, finally, household income, consumer prices and welfare.

Trade and output effects (Appendix 3)

In 1998 South Africa had a very discriminatory trade regime. Although the average overall observed[17] tariff rate is 3.9%, average tariff rates in specific sectors range up to 26.4% (footwear). High initial tariff rates also apply to other non-metallic mineral products (15.0%) and electric machinery (10.6%). We refer to these three sectors as the highly protected sectors hereon. Consequently, the initial impact of the removal of all tariffs is a fall in import prices that is particularly high in these sectors. Local consumers react by increasing their imports of these goods roughly in the same proportion to the fall in import prices. Imports of footwear, for example, increase by 19.5%.

Of course, this import surge comes at the expense of domestic competitors who experience a decline in the volume and price of their sales on the local market. Given the imperfect substitution between local and imported goods (CES), as well as the relatively small initial import intensities (imports/domestic consumption), the changes here are proportionally much smaller. The sectors with the most substantial reductions in local sales are again the highly protected sectors: footwear (-5.4%), electric machinery (-2.5%) and other non-metallic mineral products (-2.4%). These sectors are also among those experiencing a reduction in domestic prices, however they are joined by a number of other sectors, in particular radio and communication manufacturing (-0.5%), transport and equipment manufacturing (-0.4%), textile (-0.2%), construction (-0.2%)[18] and, finally, real estate service (-0.1%).

[17] The "observed" tariff rates are derived from actual duty collections and may differ from official tariff rates as listed in the customs law due, for example, to tariff exemptions.
[18] Due primarily to the trade liberalization-induced reduction in input costs for these input-intensive sectors.

Given a fixed current account balance, the 1.2% increase in total imports leads to a real exchange rate depreciation by 2.4% and, a corresponding 1.8% increase in exports. Exports increase most in the export-intensive sectors, i.e. sectors with high export ratio (Exports/Output). Mining constitute the first export-oriented activity in South Africa and, therefore, should benefit most from export expansion. However, mining activity is highly depending on exogenous foreign investments; consequently, we maintain its exports at the base year volume. Indeed, exports increase most in other export-intensive sectors, mostly heavy manufacturing (basic iron and steel, electrical machinery, radio and communication, transport equipment, other manufacturing) and agriculture[19]. Export prices are assumed to be constant and determined in the international market.

Variations in exports and domestic sales determine the changes in output. The three highly protected sectors also experience the strongest output declines, as the fall in domestic demand is only marginally offset by increases in exports. They are also among the sectors with the strongest output price reductions, although they are joined by a sector in which we earlier noted substantial domestic price reductions: textile (-1.1%). The big winners from trade liberalization in terms of output volumes are basic iron and steel manufacturing (1.3%), radio and communication manufacturing (0.9%), transport services (0.6%), hotel and restaurant (0.5%), and agriculture (0.3%), given their strong positive export response, the large initial export shares in these sectors, and the large input cost reduction.

Factor Effects (Appendix 4)

We are primarily interested in how trade liberalization and its ensuing trade and output effects channel into factor and consumer prices and, ultimately, household income and welfare. In this sub-section, we examine how the trade and output effects studied above influence factor prices.

We first note that factor prices are tied primarily to value-added prices (net of input costs) rather than output prices, as the former drive factor demands. While the strong output price reductions carry through to value added prices in the three highly-protected sectors, the other sectors with strong output price reductions have moderate declines or increases in their value added prices, as their input costs fall even more than output prices. The aggregate value added prices does not change as it is arbitrary set for the numeraire. The winners in term of value added price increase still remain basic iron and steel manufacturing (0.47%), radio and communication equipment manufacturing (0.14%), transport services (0.16%), hotel and restaurant (0.39%), and agriculture (0.36%). They are joined by electricity (0.12%), coal (0.15%) and other mining (0.17%)[20], benefiting from high reduction of their input cost.

Male and female labors are assumed to be sector-specific in the agriculture and government sectors, and mobile within the non-agricultural sectors. We observe that male employment increases while female employment falls in aggregate (0.07% and -0.02%) and in the non-agricultural labor market in particular[21]. This is due to the fact that male workers are intensively used in expanding sectors where labor demand increases. In contrast, female workers are more concentrated in textiles and certain service sectors (trade, health and social work and other activities) where value added prices and production fall and, consequently,

[19] While construction exports also increase substantially, the amounts involved are insignificant given their small initial level.
[20] The two mining sectors partially sale their output on local market.
[21] Both male and female labor employment increase in agriculture sector, but men are still the big winners.

labor demand fall[22]. As a consequence, male wage rates increase with their employment opportunity and labor participation, while female counterparts decrease. Male unemployment decreases (-0.39%) with higher sectoral demand for male labor, and despite the increase of male labor market participation (0.08%). Female unemployment also decreases (0.42%), but in contrast with male unemployment, induces by less female participation to the labor market (-0.01%).

Finally, there are no significant changes in male and female wage rates in aggregate (resp. 0.00% and -0.01%) and in the non-agricultural labor market compare to the base year. Wages increase in the agricultural sector (0.17% for men and 0.14% for women), where labor is assumed to be sector-specific and given its low initial tariff rates and the consequent minimal output effects from trade liberalization. However, male real wage increase more than its female counterpart in that sector. This is due to the fact that men are more intensively use in that activity than women. Finally, the wage rates in the government sector are indexed to the economy-wide value-added price index and thus remain unchanged.

Capital is assumed to be sector-specific because of the short-term prospective. As a result, variations in the rates of returns to capital closely follow changes in the value-added prices of their respective sectors. These rates fall most in the three highly protected sectors although these sectors play a minor role in determining the aggregate rate of return to capital, as they employ a relatively small share of all capital (share in total capital returns). In contrast rates of return to capital increase in the expanding sectors. On average, this rate of return shows no significant change from the base year (-0.01%).

Income, consumption and welfare effects (Table 4)

Factor price changes affect household income differently according to each household category's endowments of agricultural labor, non-agricultural labor, government sector labor and capital (Appendix 5). We have seen that, in aggregate and for non-agriculture sectors, factor rates of return do not significantly change from base year level with trade shock. Household will be differently affected depending on their income share of agriculture and non-agriculture factors, and on their members (male and female) labor market participation. We observe a slightly weaker gross income increases for all households due to their greater market participation, particularly for "White" households.

In addition to its income effects, trade liberalization influences household welfare by changing import prices and, in the face of this increased import competition, domestic prices. On the consumer side, our model predicts that the removal of all import tariffs would lead to a 0.2% increase in consumer prices in South Africa due to the depreciation (2.4%) of trade balance. Assuming the current account balance is exogenous, with fixed foreign transfers, higher imports of some goods will require higher exports and/or lower imports of other goods in order to keep the current account balanced. Pressures to change export or import quantities are balanced by adjustments in the real exchange rate.

Of course, households are affected differently by consumer price reductions according to their consumption patterns (Appendix 6). In this respect, we note that "White" households have a slightly higher consumer price reduction given their smaller consumption of the

[22] Note that the larger reduction in value added prices in these service sectors is primarily due to their lower input intensity and consequent input cost savings from trade liberalization.

initially protected goods although, once again, the difference is marginal. Although consumer prices increase slightly, only "White" households observed a slightly weaker welfare lost from tariff reduction, while other households welfare remain unchanged.

Table 4: Income, consumer price and welfare effects

	African	Colored	Indian	White	All
Change in nominal income	0.02	0.02	0.01	0.07	0.04
Initial direct tax rate	11.78	9.67	14.31	14.25	-
Change in direct tax rate	0.00	0.00	0.00	0.00	-
Change in net nominal income	0.02	0.02	0.01	0.07	0.04
Share of transfers out	0.99	28.42	4.98	2.59	4.35
Change in disposal income	0.02	0.02	0.01	0.07	0.04
Propensity to save	1.20	0.39	0.44	0.69	0.89
Change in total consumption	0.02	0.02	0.01	0.07	0.04
Change in consumer price index	0.02	0.03	0.04	0.17	0.19
Change in welfare (EV/nominal income)	0.00	0.00	0.00	-0.01	0.00

Legend: EV=Equivalent Variation

Time allocation (Table 5)

Households respond to the changes in real wage rates for male and female workers by changing the number of hours supply to the market. As a result, men increase their labor supply in aggregate (0.08%) and, for all households (from 0.04% to 0.10%). In contrast, women labor supply decreases in aggregate (-0.01%) and, for "Black", "Colored" and "Indian" population groups. We note that only "White" population group increases both male and female labor participations, due to a greater fall in its real income (with low agriculture income share). Given rigidities in home production activities – low elasticity of substitution between male and female domestic work – we observe that the adjustment to labor market is achieved primarily through changes in leisure. For all female workers, except "White" population group, we observe a decrease in market labor supply whereas domestic work and leisure time increase. As male labor market participation increases, men continue to perform less domestic work and, contribute more to household income. This is likely to reduce the bargaining power of women in their households although this is not modeled explicitly in this study. Women welfare will continue to be negatively affected by heavy time burden with trade liberalization.

Table 5: Labor and leisure effects

	Share in time use					Change in				
	African	Colored	Indian	White	All	African	Colored	Indian	White	All
Male labor supply	19.1	24.8	40.0	41.6	27.6	0.86	-0.3	0.43	0.58	0.61
Male domestic labor	14.7	11.2	8.2	10.6	12.8	-0.1	-0.02	-0.25	-0.25	-0.13
Male leisure	66.2	64.0	51.8	47.9	59.7	-0.24	0.11	-0.27	-0.33	-0.23
ALL	100	100	100	100	100	-	-	-	-	-
Female labor supply	13.2	16.1	26.7	28.9	18.2	-1.51	2.87	2.1	1.39	0.13
Female domestic labor	44.2	36.0	33.5	32.3	39.6	0.18	-0.35	-0.49	-0.31	0
Female leisure	42.6	47.8	39.8	38.8	42.1	0.32	-0.56	-0.74	-0.45	-0.04
ALL	100	100	100	100	100	-	-	-	-	-
Average Male Wage	-	-	-	-	-	-1.23	-1.24	-1.19	-1.03	-1.17
Average Female Wage	-	-	-	-	-	-1.78	-0.58	-0.73	-0.91	-0.96

Conclusion

Our policy simulation examines the impacts of fiscal policy through the elimination of all import tariffs from national budget and a compensatory increase in indirect taxes. A number of important conclusions emerge from the analysis. We first observe that trade liberalization penalizes the initially highly protected sectors (in particular, footwear, electric machinery and other non-metallic mineral products) and favours the export-intensive and high input-used sectors (in particular, basic iron and steel, transport equipment manufacturing, radio and communication equipment, transport services, hotel and restaurant, and agriculture). While wage rates and average returns to capital remain quasi-unchanged, the general level of prices in the economy increases with the depreciation of the trade balance, such that real wages and real average returns to capital decrease. "White" households emerge as the biggest losers. This is due primarily to their smaller consumption of the initially protected goods for which prices fall the most.

We observe a strong gender bias against women with a decrease in their labor market participation, while men participate more in the market economy. This strong result is due to the fact that female workers are concentrated in contracting sectors which were initially among the protected sectors, and several service sectors, which benefit little from the fall in input prices. In contrast, male workers are more concentrated in the expanding export-intensive sectors.

Increased labor market participation of men comes at the expense of their domestic work and pure leisure time. As a large proportion of their time spent outside market work is devoted to leisure activities rather than domestic work, men will perform least domestic work with trade liberalization. Women spending roughly three times as much time in domestic work as men will increase their domestic work and take more leisure time adjusting to their decreased labor market participation.

Although the overall net negative impact of elimination of import tariff on national welfare is small, two key issues would need Government attention regarding policy on men and women time use and on compensatory taxation. Firstly, the simulations showed that because of the many competing demands on women, they continue to suffer from heavy time burden. It is therefore important to design complementary policies to reduce the time burden on women through measures that promote the use of technology helping to save time and improve productivity. Secondly, while revenue loss on the part of Government can be offset by an increase in indirect taxes, compensatory taxation that target female intensive sectors should be put in place to ensure equitable income distribution among men and women, thus contributing to poverty reduction.

This study uses a representative household CGE model to provide interesting insights on the average impacts on men and women and household groups. However, it cannot capture the substantial heterogeneity among households within a given group. Indeed, microsimulation approaches (Cockburn, 2001), which involve replacing representative household categories by actual individual households from a nationally-representative household survey, are preferable. In particular, they make it possible to fully capture the diversity of household characteristics in terms of income sources and consumption patterns. In the case of gender analysis, whereas the representative household will have an average gender composition of workers, we know that individual households will have widely different shares of male and female workers. Only the microsimulation approach can capture this. Poverty analysis is

generally performed at the household level as consumption expenditures and non labour income data are generally collected at this level. Men and women are considered poor if they belong to a household that is poor. Intra-household poverty still remains ignored. However, the introduction and gender decomposition of time allocation in the model is an important step in performing other dimension of poverty: “time poverty” (and, in particular, leisure poverty), which provides a starting point for further intra-household poverty analysis. In this way, the micro-simulation approach is a first step toward the ultimate goal of performing individual level welfare and poverty analysis, rather than current household level analysis.

Appendix 1: Deregulation of the South African tariff structure

	All rates 1990	All rates 1996	All rates 1999	Positive rates 1999
Number of lines	12500	8250	7743	2463
Number of bands	200	49	47	45
Minimum rate (%)	0	0	0	1
Maximum rate (%)	1389	61	55	55
Unweighted mean rate (%)	27.5	9.5	7.1	16.5
Standard deviation (%)	n.a.	n.a.	10.0	8.6
Coefficient of variation (%)	159.8	134.0	140.3	52.2

Source: Lewis (2001)

Appendix 2: Male and Female work and leisure time (in percent)

	African		**Coloured**		**Indian**		**White**		**All**	
Category	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Work in establishments	8.8	4.4	12.6	8.6	17.9	9.6	17.6	11.5	10.5	5.8
Primary production	2.3	1.9	0.3	0.1	0.1	0.1	0.4	0.2	1.8	1.5
Work in non-establishment	0.9	0.9	1.1	0.4	0.4	0.1	0.8	0.8	0.9	0.8
Total Market work	**12.0**	**7.2**	**14.1**	**9.0**	**18.3**	**9.7**	**18.8**	**12.4**	**13.2**	**8.1**
Household maintenance	5.3	13.1	3.8	10.4	3.4	11.3	5.1	11.5	5.1	12.6
Care of persons	0.2	2.2	0.4	2.4	0.4	1.7	0.6	2.2	0.3	2.2
Community service	0.4	0.2	0.6	0.2	0.1	0.0	0.3	0.3	0.3	0.2
Total Non Market Work	**6.0**	**15.5**	**4.7**	**13.1**	**4.0**	**12.9**	**5.9**	**14.0**	**5.8**	**15.0**
Learning	8.3	7.1	5.2	5.4	7.2	6.9	4.9	4.5	7.6	6.7
Social & cultural	15.6	12.0	15.1	13.1	11.5	9.4	13.3	11.5	15.1	11.9
Mass media use	7.0	6.5	9.6	9.5	9.4	9.9	10.6	10.4	7.8	7.3
Total other personal activities	**30.8**	**25.5**	**29.9**	**28.0**	**28.1**	**26.2**	**28.8**	**26.4**	**30.5**	**25.9**
Personal care	**51.2**	**51.7**	**51.2**	**49.9**	**49.5**	**51.1**	**46.5**	**47.1**	**50.5**	**51.0**
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: The report of time use for 2000, Statistics South Africa (2001)

Appendix 3: Trade and Output Effects

		Sectoral shares			Import	Export	Volume changes				Price changes		
Sectors	Tariff	VA	Imports	Exports	Penetration	Intensity	Imports	Exports	Output	D	Imports	D	Output
Agriculture	0.64	3.60	1.87	4.43	7.42	17.17	-2.25	2.77	0.29	-0.17	2.26	0.48	0.29
Coal	0.00	1.38	0.33	5.26	5.85	52.01	-2.02	0.00	0.17	0.34	2.92	0.90	0.28
Gold	0.00	2.45	0.00	14.70	0.00	92.85	0.00	0.00	0.00	-0.01	0.00	0.58	0.08
Other mining	0.01	2.62	7.14	16.05	67.33	86.63	-0.55	0.00	0.20	1.13	2.90	1.48	0.35
Food	6.96	3.43	4.38	5.13	8.25	10.50	4.88	2.27	*-0.38*	-0.59	-3.78	0.62	0.25
Textiles	8.75	1.00	2.86	2.04	18.61	16.39	5.49	2.27	-1.07	-1.36	-5.36	0.09	-0.22
Footwear	26.42	0.14	0.75	0.09	30.16	6.03	19.53	0.36	-5.22	-5.37	-18.60	-1.10	-1.49
Petroleum	5.19	4.09	14.35	9.38	23.82	18.87	2.43	2.14	-0.40	-0.86	-2.16	0.53	0.34
Other non-metallic mineral products	14.97	0.72	1.14	0.80	14.51	11.63	11.68	1.37	-1.97	-2.38	-10.48	0.13	-0.09
Basic iron and steel	2.29	4.32	22.20	18.97	37.76	37.71	0.14	3.25	1.31	0.35	0.61	0.44	0.57
Electrical machinery	10.58	0.58	2.78	1.03	29.24	15.07	5.48	2.14	-1.95	-2.53	-6.93	-0.60	-0.71
Radio	3.38	0.27	8.69	0.86	72.10	24.69	0.11	4.18	0.85	0.12	-0.45	-0.46	-0.47
Transport equipment	4.83	1.38	14.68	4.69	40.58	20.07	1.17	3.40	0.05	-0.64	-1.83	-0.34	-0.38
Other manufacturing	6.74	3.20	6.56	7.75	18.71	23.97	3.64	2.72	-0.18	-0.87	-3.58	0.06	0.01
Electricity	0.00	2.82	0.00	0.25	0.00	1.58	-2.50	2.68	0.10	0.06	2.92	0.71	0.24
Water	0.00	0.52	0.01	0.00	0.13	0.00	-2.54	0.00	-0.07	-0.07	2.92	0.79	0.29
Construction	0.00	3.22	0.24	0.03	0.58	0.09	-2.98	3.12	0.03	0.03	2.92	0.33	-0.17
Trade	0.00	12.32	0.07	0.09	0.08	0.12	-2.72	2.59	-0.11	-0.11	3.50	1.24	0.17
Hotels and restaurants	0.00	2.11	1.41	1.67	11.12	13.73	-2.58	2.85	0.49	0.11	2.92	0.61	0.36
Transport services	0.00	5.21	6.76	3.37	15.87	9.15	-2.54	3.18	0.58	0.31	2.95	0.50	0.14
Communications	0.00	3.17	1.10	0.65	4.94	3.15	-2.67	2.83	0.14	0.05	2.92	0.58	0.14
Financial intermediation	0.00	8.72	1.10	1.90	1.91	3.46	-2.63	2.66	0.07	-0.02	2.92	0.67	0.23
Real estate	0.00	6.65	0.12	0.04	0.35	0.11	-3.06	2.95	-0.11	-0.11	2.92	0.38	-0.12
Business activities	0.00	2.86	0.74	0.37	3.50	1.91	-2.57	2.75	0.11	0.06	2.92	0.66	0.19
General government	0.00	17.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.02
Health and social work	0.00	1.84	0.06	0.09	0.42	0.64	-2.95	2.71	-0.16	-0.18	2.92	0.53	0.03
Other activities and services	0.00	4.02	0.66	0.36	2.74	1.63	-2.87	2.76	-0.06	-0.10	2.92	0.54	0.06
ALL*	3.93	100.00	100.00	100.00	14.09	15.34	1.20	1.80	0.02	-0.21	-1.27	0.46	0.13

Legend: VA=value added; D=local sales of domestic output; *: Average variation for volumes - Laspeyres index variation for prices

Appendix 4: Factor Effects

	Changes in		Shares						Change in								
	Value added		Wages in VA		K income	Total wages		Total K	Wage rate		Returns	Labour supply		K	Unemployment	
Sectors	Price	Vol.	Male	Female	in VA	Male	Female	income	Male	Female	K	Male	Female	Supply	Male	Female
Agriculture	0.36	0.29	38.25	11.86	49.89	2.84	2.31	5.43	0.17	0.14	0.56	0.58	0.60	0.00	-0.39	-0.44
Coal	0.15	0.17	38.68	2.73	58.59	1.10	0.20	2.45	0.00	-0.01	0.27	0.40	0.41	0.00	0.00	0.02
Gold	0.00	0.00	66.28	2.40	31.32	3.35	0.32	2.32	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.02
Other mining	0.17	0.20	39.51	3.47	57.02	2.13	0.49	4.51	0.00	-0.01	0.30	0.46	0.46	0.00	0.00	0.02
Food	-0.25	-0.38	39.32	11.71	48.97	2.78	2.17	5.08	0.00	-0.01	-0.50	-0.74	-0.74	0.00	0.00	0.02
Textiles	-0.12	-1.07	40.50	46.22	13.28	0.84	2.51	0.40	0.00	-0.01	-0.83	-1.23	-1.23	0.00	0.00	0.02
Footwear	-1.87	-5.22	50.58	15.25	34.17	0.14	0.11	0.14	0.00	-0.01	-5.31	-7.86	-7.85	0.00	0.00	0.02
Petroleum	-0.28	-0.40	39.62	9.20	51.18	3.35	2.03	6.33	0.00	-0.01	-0.55	-0.82	-0.82	0.00	0.00	0.02
Other non-metallic mineral products	-1.09	-1.97	45.77	9.30	44.93	0.68	0.36	0.98	0.00	-0.01	-2.39	-3.56	-3.56	0.00	0.00	0.02
Basic iron and steel	0.47	1.31	56.38	8.48	35.14	5.03	1.98	4.59	0.00	-0.01	1.34	2.02	2.03	0.00	0.00	0.02
Electrical machinery	-1.19	-1.95	42.45	10.14	47.41	0.51	0.32	0.84	0.00	-0.01	-2.48	-3.69	-3.69	0.00	0.00	0.02
Radio	0.14	0.85	57.69	22.25	20.06	0.32	0.32	0.16	0.00	-0.01	0.71	1.07	1.07	0.00	0.00	0.02
Transport equipment	0.01	0.05	62.76	9.38	27.86	1.79	0.70	1.17	0.00	-0.01	0.04	0.07	0.07	0.00	0.00	0.02
Other manufacturing	-0.10	-0.18	42.03	14.00	43.97	2.77	2.42	4.25	0.00	-0.01	-0.22	-0.33	-0.33	0.00	0.00	0.02
Electricity	0.12	0.10	30.13	4.88	65.00	1.75	0.74	5.54	0.00	-0.01	0.19	0.29	0.30	0.00	0.00	0.02
Water	-0.18	-0.07	17.31	2.75	79.94	0.19	0.08	1.26	0.00	-0.01	-0.23	-0.34	-0.33	0.00	0.00	0.02
Construction	0.00	0.03	66.74	9.93	23.34	4.43	1.73	2.27	0.00	-0.01	0.02	0.04	0.04	0.00	0.00	0.02
Trade	-0.01	-0.11	61.18	31.49	7.33	15.57	20.96	2.73	0.00	-0.01	-0.08	-0.12	-0.12	0.00	0.00	0.02
Hotels and restaurants	0.39	0.49	25.86	19.51	54.63	1.13	2.23	3.49	0.00	-0.01	0.72	1.08	1.08	0.00	0.00	0.02
Transport services	0.16	0.58	58.18	12.03	29.79	6.26	3.39	4.70	0.00	-0.01	0.54	0.82	0.83	0.00	0.00	0.02
Communications	0.03	0.14	52.62	20.92	26.46	3.45	3.58	2.54	0.00	-0.01	0.12	0.19	0.19	0.00	0.00	0.02
Financial intermediation	0.04	0.07	31.03	20.08	48.88	5.59	9.46	12.89	0.00	-0.01	0.09	0.14	0.14	0.00	0.00	0.02
Real estate	-0.28	-0.11	12.52	8.05	79.43	1.72	2.90	15.98	0.00	-0.01	-0.35	-0.51	-0.51	0.00	0.00	0.02
Business activities	0.00	0.11	61.95	30.64	7.41	3.66	4.74	0.64	0.00	-0.01	0.08	0.12	0.12	0.00	0.00	0.02
General government	0.00	0.00	67.75	21.20	11.05	24.29	19.89	5.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Health and social work	-0.11	-0.16	15.01	35.18	49.81	0.57	3.51	2.78	0.00	-0.01	-0.22	-0.31	-0.31	0.00	0.00	0.02
Other activities and services	-0.01	-0.06	45.24	48.61	6.15	3.76	10.56	0.75	0.00	-0.01	-0.05	-0.06	-0.06	0.00	0.00	0.02
ALL*	0.00	0.03	48.43	18.51	33.07	100.00	100.00	100.00	0.00	0.00	0.00	0.07	-0.02	0.00	-0.39	-0.42

Legend: VA=value added; K=capital; *: Average variation for volumes - Laspeyres index variation for prices

Appendix 5: Nominal Income Effects

	Male labor			Female labor						Change in income from:								
	Ag.	Non-Ag.	Gov.	Ag.	Non-Ag.	Gov.	K	Other	All									
Ch. in rate return	-0.94	-1	-0.88	-0.66	-0.94	-0.88	-0.72	-0.88		Male labor			Female labor					Total
	Share in total nominal income									Ag.	Non-ag.	Gov.	Ag.	Non-Ag.	Gov.	K	Other	(YH)
African	3.22	46.94	22.17	1.05	25.24	9.24	9.4	17.41	100	0.005	-0.001	0.000	0.001	-0.002	0.000	0.000	0.000	0.018
Colored	2.33	50.92	5.89	1.09	24.72	2.07	7.25	5.63	100	0.005	-0.001	0.000	0.002	-0.002	0.000	0.000	0.000	0.016
Indian	0.43	61.25	2.01	0.09	23.82	0.6	12	2.48	100	0.001	-0.002	0.000	0.000	-0.002	0.000	0.000	0.000	0.011
White	0.94	49.66	21	0.29	18.12	10	13.76	1.45	100	0.002	-0.001	0.000	0.001	-0.002	0.000	0.000	0.000	0.067

Legend: Ag=Agriculture; K=capital; Gov=General government

Appendix 6: Consumer Price Effects

Sectors	Import Intensity	Indirect tax rate	Change in domestic prices			Consumption shares			
			Imports	Local output	Consumer	African	Colored	Indian	White
Agriculture	7.42	1.72	0.50	2.26	0.48	0.62	1.73	0.41	0.81
Coal	5.85	0.18	0.50	2.92	0.90	1.02	0.07	0.02	0.01
Gold	0.00	0.00	0.50	0.00	0.58	0.58	0.00	0.00	0.00
Other mining	67.33	0.03	0.50	2.90	1.48	2.43	0.00	0.00	0.00
Food	8.25	12.45	0.50	-3.78	0.62	0.22	25.74	28.18	19.36
Textiles	18.61	5.13	0.50	-5.36	0.09	-1.05	4.41	4.23	3.75
Footwear	30.16	3.08	0.50	-18.60	-1.10	-8.26	1.25	1.09	0.86
Petroleum	23.82	13.44	0.50	-2.16	0.53	-0.15	4.85	4.94	7.13
Other non-metallic mineral products	14.51	-0.74	0.50	-10.48	0.13	-1.74	0.09	0.05	0.06
Basic iron and steel	37.76	2.96	0.50	0.61	0.44	0.51	1.07	1.24	1.38
Electrical machinery	29.24	3.49	0.50	-6.93	-0.60	-2.70	0.15	0.13	0.25
Radio	72.10	7.67	0.50	-0.45	-0.46	-0.45	1.34	1.41	1.48
Transport equipment	40.58	4.47	0.50	-1.83	-0.34	-0.98	1.35	2.32	4.87
Other manufacturing	18.71	1.78	0.50	-3.58	0.06	-0.68	5.05	3.44	3.73
Electricity	0.00	2.41	0.50	2.92	0.71	0.71	2.43	2.75	1.67
Water	0.13	1.55	0.50	2.92	0.79	0.79	0.27	0.52	0.49
Construction	0.58	4.29	0.50	2.92	0.33	0.34	0.00	0.00	0.00
Trade	0.08	1.85	0.50	3.50	1.24	1.24	4.17	3.84	9.04
Hotels and restaurants	11.12	4.20	0.50	2.92	0.61	0.86	2.16	1.66	2.49
Transport services	15.87	-1.40	0.50	2.95	0.50	0.89	9.91	6.99	5.77
Communications	4.94	1.01	0.50	2.92	0.58	0.70	1.58	2.75	4.08
Financial intermediation	1.91	1.96	0.50	2.92	0.67	0.71	3.91	4.87	5.98
Real estate	0.35	5.09	0.50	2.92	0.38	0.39	4.78	5.95	7.31
Business activities	3.50	1.13	0.50	2.92	0.66	0.74	0.22	0.34	0.35
General government	0.00	0.51	0.50	0.00	0.52	0.52	0.18	0.18	0.64
Health and social work	0.42	5.96	0.50	2.92	0.53	0.54	3.14	3.21	3.99
Other activities and services	2.74	4.60	0.50	2.92	0.54	0.60	5.46	3.26	5.00
ALL	14.09			-1.27	0.46	0.19	100.00	100.00	100.00
					Change in household consumer price	0.02	0.03	0.04	0.17