Agricultural Trade Liberalization and Poverty in Rural Areas in Tunisia: 
Micro-simulation in a general equilibrium framework

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1 Statement of the Research Problem and Objectives of the Project

The pattern and trends in poverty are central in policymaking and policy reform in developing countries. Several policies that have undergone reforms, such as food price subsidies, general cash transfers, and expansion in public sector employment, have traditionally been justified on the basis of supporting the needy. Reforming public sector institutions and policies to increase economic growth requires careful attention to the impact of such reforms on poverty and income distribution. After adopting the structural adjustment program in the mid-80s and early 90s by most of developing countries with the supervision of the International Monetary Fund and the World Bank, these developing countries are now oriented to trade liberalization.

A wave of trade liberalization over the last decade has positioned many developing countries to increasingly participate in world markets. This new openness has been accompanied by concern that the poor will be adversely affected, and that the distribution of income in developing countries will deteriorate. Accordingly, the issue of trade and developing-country poverty has become the focus of much research in the last several years (Reimer, J.J., 2002).

This study aims at clarifying and estimating the effects on rural households of the reduction of barriers to trade on agricultural products through regional and multilateral trade liberalization. Regionalism and Globalization presents both risks and opportunities for developing countries in general and household, mostly the poor of them, in particular. Likewise, accompanying domestic reforms may have a strong impact on income distribution.

Accounting for the effects of economic policy on the distribution of welfare among individuals and households has long been on the agenda of economists. Doing it satisfactorily has proved difficult, however. Progress in economic analysis and the increasing availability of micro-economic household data eased things a little. At the same time, the growing intensity of the debate on distribution, poverty, and the social effects of globalization have made the issue a practical operational objective for national governments, multilateral agencies and other aid agencies (Bourguignon, et al., 2002).

Using numerical general equilibrium and micro-simulation technique for Tunisia, the study’s main objective is to model the external and domestic reforms in agricultural sector and simulate their effects on rural households. Furthermore, the effects of each reform and external shock on rural household income, welfare, and level of poverty will be accounted.

In addition to it’s involvement in many bilateral free trade agreements (with the European Union, GAFTA area and AGADIR process), Tunisia is member of WTO and is participating in the current multilateral trade liberalization under the “Doha Round”. The current multilateral trade negotiations are expected to more liberalize international trade, and mostly for agricultural products markets beyond the Uruguay Round current targets, and that should induce significant price and income effects for countries in the MENA region where the agriculture sector continue to play a crucial role both in terms of employment (15 percent of total working population) and economic activity (10 to 13% of GDP). At the same time, further liberalization will expose both countries to international price shocks in a more direct way.

Under this research proposal, the following questions will be addressed:

How Tunisian economy and agricultural sector will be affected by bilateral (Euro-Med) and multilateral (Doha Round expected agreement and CAP reform) agricultural trade liberalization? How these exogenous shocks are transmitted, through changes in relative prices and especially in agricultural terms of trade, to household incomes? And how these income changes affect the poor and the non-poor households in the rural areas?

And at the micro level, how the rate of poverty will changes in rural areas through a change in rural households income and expenditure levels?
2. Review of past studies on the evaluation of the effect of trade liberalization in agricultural products in Tunisia.

At the time Free Trade Area (FTA) between Tunisia and the European Union was under negotiations, a great deal of work was already underway to analyze the impact of this FTA, which has been implemented by Tunisia in 1996 and by the European Union in 1998. A number of single-country CGE models had been developed to analyze various reform scenarios under the FTA Agreement. Some of the pioneer models developed to assess the impacts of trade liberalization on the Tunisian economy, was either performed by or done in close collaboration with government agencies, particularly the Institute of Quantitative Studies and the Ministry of Economics in Tunisia. This is the case for the two studies done by Tarr and al. (1995), and Decaluwe and Souissi (1996). Other studies are performed by International Organization as the case of the OECD Development Centre (Chemingui and Dessus, 1999 and 2003) while others are carried out for International Organization. This is the case for the on-going work by Chemingui and al. (2003) for the World Bank and ERF. Finally, some other studies are done by individual researchers (Chemingui and Thabet, 2001, Thabet and al., 2003, and Boughanmi, 1997).

In the first fourth studies cited above, CGE models has been used to evaluate the impact of some scenarios of agricultural trade liberalization between Tunisia and the European Union on the Tunisian economy. In addition, the models are used to estimate the effects of the Uruguay Round agreement on the Tunisian Economy through a changes in the international prices of the main Agri-food commodities. Compared to the first two studies (Decaluwe and Souissi, 1996, Boughanmi, 1997) among the fourth, the CGE model developed by Chemingui and Dessus (1999) presents more advantages in the evaluation of the effects of agricultural trade liberalization on the Tunisian economy. The first advantage is that the model developed in this study is of dynamic type, unlike the two other studies, which, while they seek to measure long-term effects, do not take into account major dynamic phenomena. It’s probable, as has been asserted by Boughzala (1997), that Tunisia would not have signed the partnership agreement if it had expected no more than the concretization of the predictions derived from static modeling. And it is in fact the case that a swifter accumulation of factors and acceleration in the transfer of technology can also be expected from the same agreement. Additionally, the sequential dimension of liberalization is an important issue in the agreement. The tariff consolidation provided for by GATT may for example lead initially to an increase in the nominal effective protection of Tunisian agriculture. The issue of co-ordination and the net effect over time of the two agreements now signed is also important. Only dynamic analysis can simulate the overall effect of the various measures to be implemented, measures which will come into force at different times. The second advantage of the model developed by Chemingui and Dessus (1999) compared to the two same studies related to the fact that the statistics used make it possible to specify the agricultural and industrial sectors in much greater detail in order to differentiate between the instruments available to government in the area of agricultural policy and thus to study the specific impact of modification of each of those instruments individually. In this study, several prospective scenarios for Tunisian agriculture to the horizon 2010 had been analyzed. These scenarios cover mainly: (i) an abolition of tariff barriers on agricultural imports from the UE, (ii) a reduction in government support for agriculture, (iii) an increased access to the EU for Tunisian agricultural exports, (iv) a reciprocal reform of agricultural trade between Tunisia and the European Union and, (v) a multilateral reform of agricultural and industrial trade. Regarding the outcomes, results suggest that liberalization of agriculture without reciprocal concessions from the European Union would not permit Tunisian agriculture to generate sufficient gains, since it would be in that case affected by a major constraint in terms of outlets for products on which it enjoys a relative competitive advantage. The reform seems
to be viable only if accompanied by the lifting of the quotas facing Tunisian agricultural exports on the European markets.

In their second study, Chemingui and Dessus (2003) used the same CGE model developed in 1999 with additional features to analyze food security in Tunisia. In Tunisia, the context of agricultural policy making is now changing as resource constraints are becoming more severe, and the capacity of the sector to create employment is diminishing. The developed model and its database incorporate projections for land and labor supplies, productivity growth, consumption patterns, and changes in trade policy. The main scenarios analyzed in this study covers the effects of further agricultural liberalization, increased public spending on agriculture with resulting yield increases, and increased urbanization, which is reflected by a decline in the rural population as well as in agricultural employment and land resources. Their results indicate that, relative to the base scenario, further agricultural liberalization is the key for improving aggregate welfare. Liberalization does, however, have a negative impact on rural welfare. It also leads to a decline in food self-sufficiency. Increases in spending on agriculture have a positive impact on self-sufficiency; rural households benefit slightly whereas urban households gain significantly (but less than under agricultural liberalization). The urbanization scenario has overall negative effects but raises welfare for the remaining rural population. In sum, their results indicate the presence of trade-offs between the government’s goals of food self-sufficiency and improved welfare for both rural and urban households. The results for a scenario that combines liberalization, increased government spending on agriculture, and accelerated urbanization show a stronger performance in terms of both self-sufficiency and welfare objectives.

The objective of the next study (Chemingui and Thabet, 2001) was to assess the impacts of the removal of trade barriers and the internal support to agriculture on household incomes and income distribution in the rural area in Tunisia. The CGE model developed by Chemingui and Dessus (1999) was used for this purpose with some new developments in its database. In fact, and for the needs of this study, we broke up the rural household into nine sub-groups on the basis of professional vocation of the rural household. The disaggregating level is as follows: households of the farmers practicing olives, households of the farmers practicing the field crops, households of the farmers practicing the other fruits, households of the farmers practicing vegetables, households of the farmers practicing livestock, households of the farmers practicing fishing, households of the permanent workers, remaining households which draw part or all of their incomes from an agricultural activity, and finally the remaining rural households that do not have an agricultural activity.

Several scenarios have been examined. The first two: reductions in agricultural tariffs and government support unilaterally. The third one stipulates a reciprocal reform of agricultural trade between Tunisia and the European Union. Initially, each of the three reforms is assessed separately in an endeavor to evaluate its intrinsic impact on the agriculture and income distribution in Tunisia. A fourth simulation combines the first three. A fifth assumes a rise in world food prices, as a result of a full liberalization in agricultural world trade. The last policy option consists in increasing progressively (with respect to GDP) the share of public expenditures aimed at improving the yields in agriculture, such as public agronomic research and public infrastructures. The main conclusion is that trade reform and subsidies reduction will most likely decrease the average welfare of the most rural household categories mostly the poor. Only an increase in agriculture yield will improve income and then reduce poverty in rural area. The structure of this model can be improved and especially the disaggregating criteria of rural household groups which can be done according to their level of income and not to their main economic activities, if the focus of the model will be on poverty analysis. Urban households (30% of Tunisian poor) have also to be disaggregated. Further more, we believe that it’s very important to model how within each group inequality
is going to be affected by the different reforms which means including directly individual data in the general equilibrium model according to the principles of micro simulations. This is one of the multiples objectives of the on-going study on trade liberalization and poverty in Tunisia and Jordan. This study covers only industrial trade liberalization and its effects on poverty in rural and urban area in two MENA countries: Tunisia and Jordan. We will discuss in further details the methodology used in this study in the section related to the detailed approach to be used in the current research.

The last study that can be briefly presented is related to internal support reform with a special attention to water pricing reform (Thabet and al, 2003). Tunisia will achieve its total mobilization of its renewable water resources at the horizon of the year 2010. Its previous strategy founded on water supply extension has to be abandoned and replaced by another strategy focused on water demand management. Irrigation water prices have been set at very low levels for a long time and thus were disconnected from costs, mainly due to socio-economic considerations. This situation led water users to consider water as "heaven sent" and not as a scarce resource. This resulted in significant wastes of water resource as well as huge subsidies that significantly contributed to the public budget deficit. To cope with this situation, the Tunisian government developed a water saving programme including irrigation water pricing reform. Public authorities aimed first at variable cost recovery related to the functioning and maintenance of the hydraulic infrastructure and second at the recovery of fixed costs in the long run. To do so, a "personalized" two-tier pricing (tariff) method seems to have been selected as a tool of demand regulation. This tariff consisted of two parts: the first one is fixed and based on irrigated surface land whereas the second one is variable, depending on consumed water volume. The fixed component is intended to cover fixed costs and the variable component (that is proportional to water consumption) will cover the marginal costs of water production. In this research work, authors compared the efficiency and equity of three second best pricing methods, namely: i) an average cost method, ii) a classical two-tier pricing method, and iii) a “personalized” two-tier pricing method. They also examined the impacts of reducing irrigation water subsidy on its alternative uses by economic sectors (agriculture, industries, and services) and households as well as resource allocation among sectors. Furthermore, special attention was given to the distributional effects of irrigation water pricing. A static CGE model was developed to provide answers to all these policy issues. Although similar in spirit and conception to most CGE models developed in the economic literature, their model has two specific features. First, it has an appropriate representation of agricultural sectors and second, an explicit modelling of water markets. Six primary inputs including salaried labour, non-salaried labour, capital, irrigated land and rainfed land, and water are consumed by agricultural sectors. In order to capture the effects of various economic policy changes on income distribution, they distinguished rural and urban households. Results show that public choice of a personalized two part tariff for irrigation water has positive effects on the welfare of urban households and negative effects on rural households. Negative impacts are due to the land rent decrease transferred, as a result, for government. This pricing scheme has a marginal effect on the equilibrium variables of irrigated productions. Thus, import and export production levels have changed marginally. Classical two part tariff and average cost method have more pronounced effects on the structure of various irrigated productions with negative consequences on exports of dates, citrus and vegetables. With regard to the welfare, the effects are negative not only for rural households but also for urban. However, the average cost method allows the most important water saving with a better water allocation between users. Classical and personalized two part tariffs present allocative impacts with the same amplitude but less than the average cost method.
3. The agricultural and agro-food sector in Tunisia. Despite the permanent changes observed in the Tunisian economy (industrialization, growth of service sector and the development of tourism), the agricultural sector remains economically and socially important for its contribution to the achievement of national objectives as regards to food security, employment, regional equilibrium and social cohesion. The relative contribution of agriculture and fisheries sector and the associated food processing industries in the economy remains relatively high attaining 15% of the national GDP (Table 1).

<table>
<thead>
<tr>
<th>Year</th>
<th>Tunisian GDP Nominal prices (Millions Tunisian Dinars)</th>
<th>Tunisian GDP 1990 prices (Millions Tunisian Dinars)</th>
<th>Value Added of Agriculture Sector Nominal prices (Millions Tunisian Dinars)</th>
<th>Contribution to GDP %</th>
<th>Value Added of Food Processing Industries Nominal prices (Millions Tunisian Dinars)</th>
<th>Contribution to GDP %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>17051.8</td>
<td>13074.3</td>
<td>1938.2</td>
<td>11.4%</td>
<td>555.7</td>
<td>3.3%</td>
</tr>
<tr>
<td>1996</td>
<td>19066.2</td>
<td>14008.6</td>
<td>2614.6</td>
<td>13.7%</td>
<td>586.2</td>
<td>3.1%</td>
</tr>
<tr>
<td>1997</td>
<td>20898.2</td>
<td>14770.7</td>
<td>2759.7</td>
<td>13.2%</td>
<td>700.5</td>
<td>3.4%</td>
</tr>
<tr>
<td>1998</td>
<td>22560.8</td>
<td>15477.4</td>
<td>2865.6</td>
<td>12.7%</td>
<td>708.3</td>
<td>3.1%</td>
</tr>
<tr>
<td>1999</td>
<td>24671.6</td>
<td>16414.5</td>
<td>3210.9</td>
<td>12.4%</td>
<td>816.5</td>
<td>3.3%</td>
</tr>
<tr>
<td>2000</td>
<td>26685.3</td>
<td>17181.3</td>
<td>3297.5</td>
<td>11.6%</td>
<td>862.7</td>
<td>3.2%</td>
</tr>
<tr>
<td>2001</td>
<td>28757.2</td>
<td>18027.5</td>
<td>3347.0</td>
<td></td>
<td>903.2</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Contribution of agriculture sector and the food processing industries to GDP

In Tunisia, agricultural sector is characterized by a certain specialization in fruit, horticultural and livestock production (Table 2), but still vulnerable to limitations in natural resources and recurrent droughts.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total value of Agricultural Production (Millions Tunisian Dinars at nominal prices)</th>
<th>Cereals (Millions Tunisian Dinars)</th>
<th>Fruit production (Millions Tunisian Dinars)</th>
<th>Horticultural production (Millions Tunisian Dinars)</th>
<th>Livestock production (Millions Tunisian Dinars)</th>
<th>Fisheries production (Millions Tunisian Dinars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>2291.3</td>
<td>161.5</td>
<td>592.6</td>
<td>388.5</td>
<td>898.3</td>
<td>183.5</td>
</tr>
<tr>
<td>1996</td>
<td>2985.7</td>
<td>650.3</td>
<td>647.3</td>
<td>444.4</td>
<td>963.8</td>
<td>202.4</td>
</tr>
<tr>
<td>1997</td>
<td>3167.3</td>
<td>275.3</td>
<td>1116.4</td>
<td>442.3</td>
<td>1091.0</td>
<td>241.0</td>
</tr>
<tr>
<td>1998</td>
<td>3284.5</td>
<td>429.4</td>
<td>809.6</td>
<td>515.0</td>
<td>1181.6</td>
<td>247.5</td>
</tr>
<tr>
<td>1999</td>
<td>3683.6</td>
<td>459.8</td>
<td>950.7</td>
<td>598.7</td>
<td>1316.5</td>
<td>249.2</td>
</tr>
<tr>
<td>2000</td>
<td>3760.5</td>
<td>285.1</td>
<td>1118.6</td>
<td>600.1</td>
<td>1379.2</td>
<td>273.4</td>
</tr>
<tr>
<td>2001</td>
<td>3861.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Production Structure of Tunisian Agriculture Sector

From a social standpoint, the encouraging results obtained helped avert a massive rural exodus; however, the pronounced objective of a significant growth of national agricultural output is still to be achieved, despite some progress in cereal production which remains in the centre of the national strategies of self sufficiency.

Currently, food processing exports represent close to 10% of Tunisia total exports. The structure of the Tunisian food processing exports remained the same during the last few years. Olive oil is by far the main agricultural product exported and represents 30% of the food processing exports. Roughly, 60% of the Tunisian olive oil production is exported and Tunisia assures close to 20% of world-wide sales. Fish and sea food products represent the second group by order of importance representing 20% of total food processing exports. Fruit exports, essentially dates and citrus fruits, come in the third place. Dates exports recorded a sustained growth during the last decade.
Table 3: Structure of Tunisian food processing trade (Millions of Tunisian Dinars at nominal prices)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food Processing Imports</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td>11,7</td>
<td>8,2</td>
<td>15,7</td>
<td>10,2</td>
<td>6,3</td>
<td>10,7</td>
<td>0,2</td>
</tr>
<tr>
<td>Milk, cheese, butter, etc…</td>
<td>50,6</td>
<td>27,9</td>
<td>43,0</td>
<td>24,8</td>
<td>21,2</td>
<td>28,1</td>
<td>29,1</td>
</tr>
<tr>
<td>Cereals</td>
<td>403,1</td>
<td>241,9</td>
<td>348,8</td>
<td>326,9</td>
<td>268,1</td>
<td>382,9</td>
<td>513,4</td>
</tr>
<tr>
<td>Vegetable oils</td>
<td>111,0</td>
<td>112,5</td>
<td>99,6</td>
<td>140,2</td>
<td>126,7</td>
<td>103,9</td>
<td>69,2</td>
</tr>
<tr>
<td>Tea and coffee</td>
<td>35,0</td>
<td>32,5</td>
<td>46,0</td>
<td>45,1</td>
<td>40,4</td>
<td>43,7</td>
<td>49,5</td>
</tr>
<tr>
<td>Sugar</td>
<td>68,6</td>
<td>87,4</td>
<td>92,2</td>
<td>108,2</td>
<td>79,1</td>
<td>74,5</td>
<td>79,9</td>
</tr>
<tr>
<td><strong>Food Processing Exports</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olive oil</td>
<td>216,6</td>
<td>117,1</td>
<td>288,4</td>
<td>212,6</td>
<td>382,7</td>
<td>263,9</td>
<td>200,3</td>
</tr>
<tr>
<td>Fish and sea food</td>
<td>74,1</td>
<td>90,8</td>
<td>107,3</td>
<td>125,7</td>
<td>102,1</td>
<td>119,9</td>
<td>126,5</td>
</tr>
<tr>
<td>Dates</td>
<td>58,3</td>
<td>46,7</td>
<td>52,1</td>
<td>70,1</td>
<td>56,3</td>
<td>52,8</td>
<td>105,6</td>
</tr>
<tr>
<td>Citrus fruit</td>
<td>10,6</td>
<td>9,1</td>
<td>6,4</td>
<td>9,5</td>
<td>8,5</td>
<td>9,9</td>
<td>12,8</td>
</tr>
<tr>
<td>Wine and alcholic beverages</td>
<td>14,8</td>
<td>6,4</td>
<td>6,4</td>
<td>6,0</td>
<td>6,9</td>
<td>6,8</td>
<td>8,4</td>
</tr>
<tr>
<td>Meal preparations</td>
<td>39,8</td>
<td>26,3</td>
<td>65,3</td>
<td>63,9</td>
<td>60,6</td>
<td>35,9</td>
<td>26,0</td>
</tr>
</tbody>
</table>

Source: Tunisian Ministry of Agriculture and Central Bank of Tunisia, Tunisia.

Food processing imports, on the other hand, represent more than 10% of the value of total imports in Tunisia. The structure of food processing imports reveals the chronic dependence on cereal imports. Indeed, in 2001, cereals represented more than 60% of Tunisia food processing imports. The food processing balance presents a continual deficit. Even if the recovery of the commercial balance was one of the principal objectives of the structural adjustment program in Tunisia, the value of exports is far from allowing payment of food imports. A closer look at the Tunisian food processing flows by destination reveals a dependence of the Tunisian food processing exports on the EU market which stand a strong intra Mediterranean competition. This situation is the result of the historical preferences and the relatively good prices received that did not encourage the Tunisian exporters to develop new strategies and diversify markets. Actually, even for Tunisian dates, considered as free access product to the EU market, Tunisian exports began to face an increased competition from other countries; namely, Algeria and Israel. At the import level, one attends a certain diversification of the supplying sources; namely, imports of cereals for which international competition allows Tunisia to benefit from relatively low prices. The EU roughly provides half of Tunisia imports.

4. Poverty overview in Tunisia.

Social achievements and equity are among Tunisia’s greatest assets, which have distinguished it from other countries in the region and ensured internal cohesion. The level of government’s budgetary expenditures for social policies has remained consistently high even during the years of stabilization and adjustment, amounting to 5-6% of GDP for education and 2.2% of GDP for health (World Bank, 1995). With increasing international competition and closer integration with Europe, the enhancement of those achievements are more important now with the presence of a strong middle class (nearly 80% of the country’s population) and a young population (64% of the population under 35 years of age). This can be accomplished mainly via further reduction of poverty and particularly vulnerability and employment growth.

4.1. Employment growth and wage policies. In Tunisia, unemployment rates are exceptionally high. Recent official estimations by the National Institute of Statistics establish a rate of 15% (INS, 2000). If the Tunisian labor market is inefficient as given by official
statistics related to unemployment, the consequences of external and internal liberalization will be a source of real preoccupation to Tunisian government. As Tunisia deepens its partnership and becomes more integrated in the world market, opportunities will increase, and so will competitive pressures. Better jobs for higher-skill workers will be generated, and at the same time less skilled workers will encounter greater difficulties in finding and retaining jobs. Social tensions are likely to increase in the groups most at risk of deterioration in their relative and possibly absolute economic and social status (Rama, 1995). Expected efficiency gains from reforms will not be reaped if workers losing their employment in regressing sectors are unable to find new jobs in competitive sectors of the economy; or if they find a job after a long period of unemployment. This preoccupation can lead Tunisian government to avoid implementing reforms rapidly. A high unemployment rate can also be seen as an index of important distortions in the labor market needing radical political and institutional reforms.

The wage policy (including minimum wage policy) has been designed to improve competitiveness and reduce macro imbalances. To undo the excessive wage growth of the late 1970s and early 1980s, the Government slowed wage increases in the public sector which also influenced the evolution of private sector wages. The Tunisian Government fixes two types of minimum wages: the guaranteed industrial minimum wage (SMIG) and the guaranteed agricultural minimum wage (SMAG). However, to minimize the negative effect of minimum wages on employment, the Government has kept the rate of increase below the rate of growth of labor productivity. The most important rigidities of the Tunisian labor market are related to the legal constraints on hiring and lying off workers and labor policies preventing wage flexibility. Also there is an absence of unemployment insurance benefits. As a result, these constraints have reduced the demand for permanent skilled workers. The increase in recent years in the hiring of temporary workers, most at low wages, has been in part a response to a rigid labor code that prevents firms from hiring and firing as business conditions change.

4.2. Dimensions and main characteristics of poverty. Tunisia has had an impressive record of poverty reduction over the years, cutting the incidence of poverty (using the national line poverty) from 40% in 1960 to 11% by 1985 and further to 7.4% by 1990 (Fig.1). At the same time, the growth rate of population declined and life expectancy increased markedly, regional disparities were reduced, and improvements achieved in education, access to health care and basic infrastructure. The distribution of income too improved when the Gini coefficient fell from 0.434 in 1985 to 0.401 in 1990, and average per capita expenditures for the lowest deciles of the population moved closer to mean expenditures for the country as a whole. Between 1990 and 1995, the incidence of poverty hovered around the 7 percent mark, even though real GDP per capita grew over 3% per year. In absolute term the number of poor increased from 600,000 in 1990 to 690,000 in 1995 (World Bank, 2000'). Given that the distribution of consumption is quite steep near the poverty line, many households can be vulnerable to sliding back into low incomes. The main cause of these developments was a prolonged drought leading to a severe drop in agricultural production over 1993-95, which was most likely accompanied by a deterioration in income inequality.

The elasticity of poverty to growth was found to be negative in Tunisia as in most countries. Therefore positive growth of per capita income over 1990-95 should have resulted in declining poverty, all else being equal (Van Eeghen, 1995). This did not happen, however. The inequality of income distribution is, thus, likely to have increased during that period. Income equality may have deteriorated between 1990 and 1995, as the severe drop in agricultural incomes is likely to have reduced the incomes of poor households around the
poverty line significantly more than the incomes of other households, which rely more on non-agricultural sources of income.

Figure 1

**Fig.1: Poverty reduction: Recent trends**

In Tunisia, poverty remains primarily a rural phenomenon: in 1995, the incidence of rural poverty was 13.9% compared to 3.6% (table 4) in urban areas. With less than 40% of the total population, rural areas accounted for more than 70% of the poor (World Bank, 2000b).

<table>
<thead>
<tr>
<th>Year</th>
<th>Share of population (%)</th>
<th>Poverty Lines (DT/p.c./year)</th>
<th>Poverty incidence (%)</th>
<th>Number of poor (in million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>1990</td>
<td>100</td>
<td>196</td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>1995</td>
<td>100</td>
<td>258</td>
<td>7.6</td>
</tr>
<tr>
<td>Large cities</td>
<td>1990</td>
<td>26.6</td>
<td>248</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>1995</td>
<td>26.6</td>
<td>310</td>
<td>1.9</td>
</tr>
<tr>
<td>Other urban</td>
<td>1990</td>
<td>32.9</td>
<td>208</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>1995</td>
<td>34.6</td>
<td>286</td>
<td>5.0</td>
</tr>
<tr>
<td>Total urban</td>
<td>1990</td>
<td>59.5</td>
<td>218</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>1995</td>
<td>61.2</td>
<td>290</td>
<td>3.6</td>
</tr>
<tr>
<td>Total urban</td>
<td>1990</td>
<td>40.6</td>
<td>185</td>
<td>13.1</td>
</tr>
<tr>
<td></td>
<td>1995</td>
<td>38.8</td>
<td>242</td>
<td>13.9</td>
</tr>
</tbody>
</table>


Between 1990 and 1995, the number of poor fell in the larger cities by 20,000; it increased in smaller cities and peri-urban areas by 50,000, and increased in rural areas by 60,000. At least in part, the deterioration in rural areas was caused by the severe droughts that resulted in a cumulative decline of 23% in agriculture output in real terms between 1993 and 1995. The increase in the poverty incidence in smaller cities and peri-urban areas was mainly caused by an accompanying demographic shift: the share of population in smaller cities and peri-urban areas increased from 33% in 1990 to 35% in 1995, while the share of the population in rural areas decreased from 41 to 39% during the same period.

Geographically, the incidence of poverty is highest in the mountainous North-West, and above the national average in the hilly and desert areas of the Center-West and the South. On average the poor households, both urban and rural, have more household members, and in particular more children, than the non poor households. For example, the average size of poor households is about seven persons in rural areas and six in urban areas compared to the national averages of six and five respectively. There is also a strong association between lack
of human capital and poverty in both rural and urban areas (over 60% of poor household heads have no formal education compared to about 40% for non-poor households). Poor rural households engaged in production activities typically have access to land, but their land holdings are small (averaging 2 hectares), rarely irrigated, and often exhibit low productivity, especially in rain-fed areas. There is also a correlation between poverty and the sector of employment. In rural areas, the rural poor derive their incomes primarily from agricultural activities (own-farm activities and agricultural wage labor), but commonly also earn income outside of agriculture. The need to diversify their sources of income stems in part from the inability of small farms to provide a full time occupation, and in part from the variability of agricultural incomes with fluctuations in rainfall. The incidence of poverty is highest among households whose lead is employed in construction, followed by services and agriculture. In urban areas, more than 60% of the poor earn their living as wage earners, followed by self-employment in nonagricultural activities. By occupation of household head, the highest incidence of urban poverty is in construction. Between 1990 and 1995, poverty incidence increased in agriculture and fishing and in the construction sectors (where the poor were already very concentrated), and fell in tourism and commercial activities.

4.2.3. Income, expenditure and standard of living. The results of the five years census on household budgets and consumption conducted by INS (2000) show that the average annual expenditures per capita amounts to 1329 Dinars, recording an improvement of 6.5% at current prices and 3.6% at constant prices compared to the same census results conducted in 1995. The results show also that the increasing in the level of expenditures per capita have been more important in the rural area (10%) than in the urban counterpart (5.9%), which means a greater reduction of the difference between the two areas. In this context, it is important to point out that the annual expenditures per capita in rural area, represents 58% of the annual expenditures of an urban area citizen in 2000. This share was estimated at 48% in 1995. Furthermore, table 5 shows that between 1980 and 2000, the annual current expenditures per capita have grown rapidly from 248 Dinars to 1329 Dinars implying more than a fivefold increasing in 20 years and corresponding to an annual average growth rate of 8.75%. The annual average growth rate of rural household's expenditures has risen more than the urban households (respectively 9.33% against 8.28%).

<table>
<thead>
<tr>
<th>Table 5: Evolution of the average annual expenditures per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current prices in TD/capita/year</td>
</tr>
<tr>
<td>Urban</td>
</tr>
<tr>
<td>Rural</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Source: INS, 2000

The breakdown of the population according to expenditure classes shows a net improvement of the standard of living accompanied by a decrease of the poorest population proportion and an increase of the middle and well-heeled proportion as illustrated by figure 2.
The distribution of the population according to expenditure classes is partially indicative of income distribution. In fact, for the low revenue population, expenditures and revenues are very close to each other. However, for the high revenues groups, expenditures are only a part of revenues since the remaining are saved.

The socio-professional category of the household principal support constitutes also an indication of his standard of living level. Table 6 gives the annual expenditures per household and per capita according to the socio-professional category of the principal household support in 2000. This table shows that the lowest level of expenditures concerns the households that were unemployed at the moment of the census followed by those whose principal support comes from an agricultural worker, and then the households whose principal support comes from a farmer, an industrial or a service worker.
### Table 6: Household annual expenditures according to the socio-professional category of the household principal support

<table>
<thead>
<tr>
<th>Socio-professional category of the principal household support</th>
<th>Annual expenditures per household (TD)</th>
<th>Annual expenditures per capita (TD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior managers and liberal professions</td>
<td>13227</td>
<td>2846</td>
</tr>
<tr>
<td>Middle managers and liberal professions</td>
<td>10151</td>
<td>2110</td>
</tr>
<tr>
<td>Other employers</td>
<td>8182</td>
<td>1597</td>
</tr>
<tr>
<td>Patrons of small professions (industry, commerce and services)</td>
<td>8064</td>
<td>1537</td>
</tr>
<tr>
<td>Artisan’s and independents (industry, commerce and services)</td>
<td>6175</td>
<td>1176</td>
</tr>
<tr>
<td>Non agricultural workers</td>
<td>5365</td>
<td>1036</td>
</tr>
<tr>
<td>Farmers</td>
<td>5732</td>
<td>1024</td>
</tr>
<tr>
<td>Agricultural workers</td>
<td>3986</td>
<td>731</td>
</tr>
<tr>
<td>Actives without jobs</td>
<td>3329</td>
<td>656</td>
</tr>
<tr>
<td>Retired people</td>
<td>7590</td>
<td>1744</td>
</tr>
<tr>
<td>Other inactive</td>
<td>3992</td>
<td>1387</td>
</tr>
<tr>
<td>Support from the outside of the household residence</td>
<td>4320</td>
<td>1064</td>
</tr>
<tr>
<td>Aggregate</td>
<td>6450</td>
<td>1329</td>
</tr>
</tbody>
</table>


### 5. Agriculture and Trade Policies in Tunisia: a brief review.

The high level of dependency of agriculture on other countries is probably one of the reasons leading the Tunisian government to put in place a large number of administrative regulation mechanisms, the aim being to ensure adequate income levels for farmers and growers, national self-sufficiency for certain products and low prices for staple commodities. These mechanisms are deployed by means of five instruments of economic policy: i) the development of agricultural infrastructures and incentives for private investment; ii) the mobilization and protection of natural resources; iii) training of farmers and growers combined with dissemination of new technology and methods; iv) control of prices for products, agricultural input products and consumer prices; v) and protection of the domestic market against foreign competition. We discuss below in greater detail the last two components of agricultural policy.

#### 5.1. Prices.

Up until the mid 1970s, agricultural price policies were designed with the following objectives to:

- Set prices at a level that would provide just enough incentive for farmers to produce;
- Maintain farm income at socially acceptable levels;
- Increase farm productivity and production with input subsidies;
- Provide food for low income urban populations at affordable prices; and
• Protect consumers and producers from the adverse effects of high international price volatility.

Indeed, some agricultural commodity prices were set by the government. For grains and their by-products, considered as strategic goods, prices were fixed at all levels. The same goes for fluid milk. For some other agricultural commodities, prices are fixed at the production level only; e.g., tomato prices if it is to undergo processing. On the input side, government intervention was through price fixing, often at relatively low levels for fertilizer, feed concentrate, seed irrigation water and credit. Subsidy administration required government control and direct involvement in input distribution. Almost all agricultural inputs were marketed through public enterprises. On the marketing side, the marketing of agricultural output was carried out through two main channels: the market and public enterprises. Indeed, the majority of agricultural products were marketed according to the rules of supply and demand. However, commodities with fixed prices were and still are marketed by state monopolies. Cereal grains are required to be exclusively to the state owned grain board (Office des Céréales) which has the monopoly of locally produced cereal grains and importing cereals from the international market. The same goes for olive oil which has a similar marketing system. The “Office National de l’Huile” had the monopoly on buying and exporting locally produced olive oil and importing vegetable oil. Regarding their effects on production prices, and as there are two market – one for public monopolies and one for private purchaser – the private market price determine the public price. This is why such instrument will not be taken into account in the modeling of agricultural production as prices are almost determined by the private sector. This high government intervention in the agricultural sector, led to serious economic difficulties in the 1980s. Slow growth, inflation, unemployment, inefficient and costly system of government transfers to compensate some segments of the product channel, an important budget deficit and a serious balance of payment problems were persistent and adjustment and even radical structural reforms proved to be inevitable. As a remedy to this situation, the government of Tunisia asked, in the mid-1980s, for an IMF and a World Bank loans and committed itself to stabilization and a structural adjustment programs (SAP) coupled with sector programs. The Agricultural Sector Adjustment Program (ASAP) in Tunisia was designed to remedy to the above problems and in particular to:

• Remove all major sources of price distortions that adversely affect efficiency and productivity. This implies getting input and output prices closer to world prices by increasing commodity prices that are administratively fixed below international levels and reducing subsidies on inputs;

• Marketing functions that used to be under state control are to be liberalized. So far, many options are under study but little has been achieved in the area of what has been termed as strategic commodities. Except for barley, marketing and import of wheat are still under the control of the grain board. Obviously, this system is characterized by inefficiencies and does not target the rural poor;

• Improvement of public sector management, which entails increasing privatization. This implies the modification of the role played by the government by rationalizing its involvement in activities, where the private sector can provide more efficient management.

The above structural adjustment package seems to have targeted real weaknesses in the economy and major revisions in past policy pricing have taken place. Indeed, gradual disengagement from price fixing, removal of input subsidies (fertilizers, animal feed, pesticides and herbicides). Progress towards reducing state intervention in the food marketing
has been very slow. The dominance of the state marketing board for cereal grains (large size operations and storage facilities) remains very strong and makes it very difficult for private operators to compete. Milk and meat imports were liberalized in 1990/91 but subsidized sales by state owned enterprises have made it very difficult for the private sector to gain a market share. At this point, there is a need to reassess progress made in agricultural policy reforms especially related to price support and subsidies going to cereal production. The question whether these subsidies are targeted and reach the poor in the rural area is still raised.

5.2. External Protection. Regarding trade policy applied for agricultural products, a full description is provided in Chemingui and Dessus (2002). We limit ourselves to a brief presentation of the main features of trade policy applied for agricultural products in Tunisia and the recent reforms undertaken by the government since the adoption of the structural adjustment program. Two instruments are available to the Tunisian authorities to protect the domestic market from outside competition: tariff and non-tariff policies. The content of both began to be modified in 1995 with the implementation of the GATT, which stipulates the translation of non-tariffs barriers into tariff barriers.

In terms of Tunisia’s current tariff policy, a minimum rate is applied to all imports with the exception of those covered by tariff rate quotas (TRQs). For those imports, preferential tariffs are applied if the imported volume level is below the imposed quota, while discouraging tariffs are applied for exceeding quantities. All duties are expressed ad-valorem and based on the cost insurance freight (CIF) value. There are no special or combined duties.

6. Modeling Trade Liberalization and Poverty in Tunisia


Accounting for the effects of trade policy on the distribution of welfare among individuals and households has long been on the agenda of economists. Some economists have used aggregate indicators such as the levels of wages and employment, or the value added in different sectors, in order to assess the effects of different trade regimes on the distribution of income (Beyer et al, 1999; Harrison and Hansen, 1999). As this approach fails to capture the mix of effects on specific households and their responses to prices, other economists have tried more elaborated models accounting for the interrelationship between labor markets and prices of staple agricultural goods. For instance, Ravallion (1989) used a partial equilibrium model to examine the rural welfare distributional effects of changes in food prices under induced wage responses for rural Bangladesh. Levy and van Wijnbergen (1992) also followed this partial equilibrium approach when analyzing income effects on different types of groups after changing production and consumption subsidies on agricultural goods.

Other economists have used econometric models to analyze the impact of trade on income distribution and poverty. There is a huge literature on this (Dollar, 1992; Edwards, 1992; Ben-David, 1993; Sachs and Warner, 1995, etc.). The general conclusion and the ensuing policy advice that have emerged from these studies can be summarized as follows: development countries applying more open trade regimes have enjoyed higher growth rates than those implementing restrictive policies. However, more recent critical work finds the relationship between trade liberalization and growth to be much weaker than expected (see Rodriguez and Rodrik, 1999 and Harrison and Hanson, 1999).

A more comprehensive way of modeling the overall impact of policy changes on the economy is CGE modeling, which incorporates many important general equilibrium interactions that are present in the economic system. These models are well suited to explain medium- to long-term trends and structural responses to changes in development policy. An effort to adapt CGE models to the analysis of different adjustment programs and to estimate
the costs of other strategies was made in the late 80’s by the OECD, through the work of Bourguignon, Branson and de Melo (1991). Their “macro-micro” model links the short-run impacts of macroeconomic policies that affect the distribution of income through inflation, interest rate and other asset price changes with the medium-run impacts of structural adjustment policies that affect the distribution of income through relative commodity and factor price changes.

To measure distributive impacts, these extended CGE models map factor income to different types of households. The models were applied to analyze different policy changes in several developing countries. Comprehensive as they are, these modified CGE models require an important amount of work and resources. Research done at the World Bank for Panama and Iran are examples of such approach. The procedure used in these cases is a straightforward combination of household surveys, which provide the structure of households’ consumption at the moment of the simulation, and of simulated or actual price changes. The change in the cost of living by segments of the population is then used to assess the impact on income distribution of the various simulations. By their nature, these studies provide an upper bound measurement of the increase in expenditure that would be required for each group to purchase the same quantities of goods as in the base situation.

Decaluwé and al. (1999a) have evaluated the relevance of different types of macroeconomic general equilibrium modeling for measuring the impact of economic policy shocks on the incidence of poverty and on the distribution of income. Three approaches were identified from the literature and implemented using an archetypal economy: i) the first is based on a traditional form of the CGE model which specifies a large number of households allowing the capture of only inter group income inequalities, ii) the second uses survey data to estimate the distribution function and average variations by group which allows the estimation of poverty evolution, iii) the third approach includes individual data directly in the general equilibrium model according to the principles of micro-simulations. The results show the importance of intra group information and therefore the relevance of micro-simulation exercises. In another study, Decaluwé and al. (1999b) have highlighted the usefulness of Social Accounting Matrices (SAM) and CGE models to address issues related to income distribution and poverty. Their CGE model was calibrated again on an archetypal African SAM and an interesting innovation of its specification has been made (endogenizing the poverty line and the resulting poverty incidence among different socioeconomic household groups, representing income distribution with a flexible Beta distribution function and using the F-G-T additively decomposable class of poverty measures).

Furthermore, and according Anne Case (2000), it is important to understand the present consumption patterns in the country and the anticipated behavioral responses of households to price and income changes following trade liberalization. This means that we need to develop a framework allowing us to study simultaneously the behavior of households in the past through survey analysis, and to be able to simulate what will be this behavior in the future, depending on the evolution of the economic environment. In this regard, Anne Case estimates income and price elasticities for thirteen commodity groups in South Africa, and she proposes to use them as intermediate inputs into the CGE model developed by Devarajan and van der Mensbrugghe (2000) which assesses the impact of trade liberalization on income distribution in South Africa. More recently, Cockburn (2001) has attempted to bridge the gap between CGE models and poverty/distribution analysis by constructing a CGE model that explicitly models all the households from a nationally representative household survey in Nepal. Households are characterized by their sources of income and their consumption patterns, which in turn determine how they are individually affected by macroeconomic shocks. The author underlined the suitability of this type of fully disaggregated model for analyzing distributional impacts of trade liberalization.
Traditional computable general equilibrium models fail to address income distribution and poverty issues for different reasons that we elaborate on later. In addition, household or employment surveys cannot be alone very helpful for simulating the impact of external shocks or domestic policies on income distribution and poverty.

The present study which draws upon the contributions of Meagher (1993), Bourguignon, Fournier and Gurgand (1999), Case (2000), Cogneau and Robilliard (2000), Cockburn (2001) and Cogneau (2000) aims at achieving consistency between the macroeconomic framework and households microeconomic behavior. A CGE framework is essential if we are looking to estimate the impact of changes in the macroeconomic framework, through internal economic reforms and external shocks, on poverty level. Accounting for the heterogeneity of individual and household behavior and their different responses to shocks becomes necessary, if we want to study the effects of such shocks on the distribution of income and poverty at a sufficiently disaggregated level. It is also necessary to model the wage setting mechanism that prevails on each segment of the labor market. In what follows we present the proposed methodology.

Numerical general equilibrium models are the most widely used tools for simulating the impact of public policies or external shocks on various economic variables. The extensive use of this kind of models in developing countries is mainly due to the fact that they can be run on the basis of a one-year database. This is an important argument in developing countries where long-time series are often not available, incomplete, or of bad quality. The other argument in favor of their use is that they include the most important economic variables in an integrated framework.

In the present proposal, we plan to develop a CGE model with micro-simulation to quantify the effects of trade liberalization in agricultural products on poverty level in rural areas in Tunisia.

6.2. Research Methodology. Numerical general equilibrium models are the most widely used tools for simulating the impact of public policies or external shocks on various economic variables. The extensive use of this kind of models in developing countries is mainly due to the fact that they can be run on the basis of a one-year database. This is an important argument in developing countries where long-time series are often not available, incomplete, or of bad quality. The other argument in favor of their use is that they include the most important economic variables in an integrated framework. Although, the representative agent hypothesis is still the basis of CGE models, and even if we disaggregate the population of households into a few representative groups, we still won't be able to obtain relevant results concerning the evolution of total inequality. Indeed, decomposable income indices show that intra-group inequality often contributes more to total inequality measure than inter-group inequality. There are two main ways to achieve the consistency between the macro framework and the micro-economic surveys. The first one, proposed by Cogneau and Robilliard (2000)¹ has been labeled the “fully integrated micro-macro framework”. It is based on a standard CGE model where representative households and workers are replaced by a full sample of households and workers whose behaviors are observed from household and labor force surveys. The advantage of this method is its ability to capture the impact of the macroeconomic changes on the workers and households, and also the feed-back effect of the micro-simulation on the macro part of the model. The second method that can be implemented is the “sequential micro-macro framework”. The macro part of the model is an extended CGE model supposed to describe the functioning of the economy to be analyzed.

The link with the micro-simulation model is through a vector of prices, wages, and aggregate employment. Knowing the change in the link variables that result from a shock in the macro-part of the model, the micro household database is modified in a way that is consistent with the link variables.

The “fully integrated micro-macro framework” will be used in this research following the pioneer work of Cognau and Robilliard (2000) and the recent work done by Cockburn (2002). The modeling work will be done through the following stages:

**Stage 1: Development of the static CGE model for Tunisia:** This step of the project consists of building a CGE model for Tunisia with a special treatment of agricultural sectors. The representation of the labor market with its different categories and wage setting mechanisms will be an important component of the modeling effort. The model to be used in this study will be based on the one developed by Chemingui and Dessus (1999) for the analyses of the impact of agricultural policy reforms. The Social Accounting Matrix will be updated either for the year 1995 or 2000 according the household expenditures surveys to be used in this research.

The CGE model to be used in this research will be based directly on the prototype developed by the OECD Development Center (Beghin, Dessus, Roland-Holst and van der Mensbrugghe, 1996) for analysis of trade policies and applied for Tunisia (Chemingu and Dessus, 1999). The model is a standard neoclassical static model with imperfect substitution between domestic and foreign goods. Prices are endogenous on each market (goods and factors) and equalize supplies (imports; production for the domestic market; factors supply) and demands (final demand from households, the government, investors and the rest of the world; intermediate demand from producers; factors demand), so as to obtain the equilibrium. The equilibrium is general in the sense that it concerns all the markets simultaneously. For instance, a decrease in tariffs will affect the demand for imports of both final and intermediate goods. This will in turn affect the supply of domestic goods and the demand of factors in each activity. This will equally affect the price of goods and the income of households, which will in turn affect their demand, etc.

Supply is modeled using nested constant elasticity of substitution (CES) functions, which describe the substitution and complement relations among the various inputs. Producers are cost-minimizers and constant return to scale is assumed. Output results from two composite goods: intermediate consumption and value added, combined in fixed proportions. The intermediate aggregate is obtained by combining all products in fixed proportions. The value-added is then decomposed in two substitutable parts: labor and capital in a first level. In the second level, labor will be further disaggregated among labor categories and capital will be also disaggregated among capital categories using the information contained in the Social Accounting Matrix for Tunisia. In this respect, a distinction will be made between physical capital and land rents. Land rents will be further disaggregated into different categories of land. For labor market, unemployment will be taken into account for each category.

Income from labor and physical capital accrue to household using fixed shares derived from the SAM, as well as all rents created by specific capital factors. Household total demand is derived from maximizing the utility function, subject to the constraints of available income and consumer price vector. Household utility is a positive function of consumption of the various products and savings, with income elasticity for each product being set to unity. Government and investment demands are disaggregated in sectoral demands once their total value is determined according to fixed coefficient functions.

The model assumes imperfect substitution among goods originating from different geographical areas. Import demand results from a CES aggregation function of domestic and
imported goods. Export supply is symmetrically modeled as a constant elasticity of transformation function. Producers decide to allocate their output to domestic or foreign markets responding to relative prices. At the second stage, importers (exporters) choose the optimal choice of demand (supply) across regions, again as a function of the relative imports (exports) prices and the degree of substitution across regions. Substitution elasticity between domestic and imported products is set at 2.2, and at 5.0 between imported products according to origin. The elasticity of transformation between products intended for the domestic market and products for export is 5.0, and 8.0 between the different destinations for export products.2

Finally, several macro-economic constraints are introduced in this model. First, the small country assumption holds, both economies are unable to change world prices; thus, its imports and exports prices are exogenous. Capital transfers are exogenous as well, and therefore the trade balance is fixed, so as to achieve the balance of payments equilibrium. Second, the model imposes a fixed real government deficit, and fixed real public expenditures. Public receipts thus adjust endogenously in order to achieve the predetermined net government position, by shifting households’ income tax.3 Third, investment is determined by the availability of savings, from households, government and abroad. Since government and foreign savings are exogenous in this model, changes in investment volumes reflect changes in household savings and changes in the price of investment.

Policy impacts are compared to the situation observed in the base year, in terms of macro-economic aggregates, trade volumes, sectoral outputs and poverty levels.

The model will be calibrated using information contained in the Social Accounting Matrix for the year 1995 or 2000. This SAM will be built by updating the SAM developed for Tunisia by Chemingui and Dessus (1999). The updating of the SAM will be done using the cross entropy approach (Chemingui et al, 2003). The earlier SAM considers two representative Tunisian households, one rural and the other urban. In all, 57 economic sectors and 5 types of work are taken into account, these being distinguished notably by their levels of qualification and geographical mobility: 3 are rural, 1 urban, and 1 allocated to the whole of the country. This last is a buffer between rural and urban areas. It covers casual workers, who react swiftly to fluctuations in labor demand. If the source of this demand is urban for example, they will go to that area and transfer a fixed part of their income to rural households. They therefore cushion the stocks which particularly affect one geographical area – changes in agricultural policy for example. Of the 57 economic sectors, 26 are related to agriculture and food industries. The SAM distinguishes three types of capital: physical capital, reserve of natural resources (crude oil, phosphates) and land. The last of these is itself broken down into categories based on the degree of permanence of its cultivation, the level of irrigation, and the crop varieties grown, if these are specific. Finally, the SAM will make a distinction between two trading partners for Tunisia: the European Union and the Rest of the World.

Stage 2: integrating the micro-data in the Social Accounting Matrix for Tunisia.

The second step consists in integrating the micro data in the Tunisian SAM. The essence of micro-simulation is to model the behavior of the individual agents that are included in a micro database, thereby capturing micro-level heterogeneity. This step will be

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2 Trade elasticities come from the empirical literature devoted to CGE models. They are not specific to Tunisia. See for instance Burniaux, Nicoletti and Oliveira-Martins (1992), Konan and Maskus (1997) or more recently Gallaway, McDaniel and Rivera (2000). These elasticities are not distinguished by product, which explain to a large extent their low levels. They are not either statistically significant.

3 This closure policy can be understood as a net transfer from households to government (or the reverse). With one representative household, it is considered the most neutral way to assess trade reform. Other closures could be tested (e.g. adjusting indirect taxes for instance) but would bear the risk to introduce new distortions, thereby making more difficult to conceptually isolate the impact of the trade policy.
done after many manipulations of raw data contained in the household’s expenditures survey in Tunisia.

With the introduction of this new information regarding household’s revenue and expenditure, the SAM becomes unbalanced. To re-establish equilibrium, we will use the cross-entropy approach to balance the SAM (Chemingui et al., 2003). Once the SAM is balanced, we will replace the representative household by the number of households surveyed in the Tunisian Households survey in 1995 or 2000.

7. Capacity Building

The Trade Liberalization and Poverty in Rural Areas in Tunisia: Micro simulation in a General Equilibrium Framework is a research proposal that targets the strengthening of Tunisian capacity in the area of policy analysis and the development of a framework that will allow a better understanding of the effects of liberalization on rural households in Tunisia.

The need to understand all the intricacies and the channels through which the reforms are transmitted to rural households and the reaction of these households to macro changes are only one part of the reasons that motivated this project. Building the Tunisian capacity, through interaction with talented agricultural economics researchers in the Poverty and Economic Policy network from Tunisian institutions, to build and refine a policy model as a supportive tool for understanding the impact of liberalization on the agricultural sector, is another objective of this work. For these reasons, the project team includes in addition to the three principal researchers, other assistants and researcher from the following institutions:
- National Institute for Agricultural Research – Division of Agricultural Economics
- National School of Agriculture – Department of Economics and Rural Development

8. Different tasks

We envisage a period of twelve months for the project during which we will update the macro databases (SAM), calibrate the CGE model for Tunisia, analyze and prepare the micro-data on households, integrate the micro-data in the Tunisian SAM, balancing the SAM, performs simulations and results interpretation.

Our activities will be carried out in these stages:

* **SAM updating and CGE model calibration (3 month)**
  Primary data (SAM) will be updated from the year 1992 to either the year 1995 or 2000. The static CGE model will be calibrated using the new SAM. The analytical specification of the CGE model will be further approved in conformity with the objective of this study, mainly in the labor market behavior, and household income and expenditures.

* **Preparation of the micro-data. (3 months).**
  During this phase, the micro-data will be prepared in order to estimate the different sources of income and expenditures for each household in the Tunisian survey.

* **Integrating the micro-data in the Social Accounting Matrix for Tunisia. (2 months)**
  In this task, the micro-data will be fully integrated in the SAM and a re-balancing of the SAM will be performed before re-calibrating the CGE model.

* **Scenario Development and Simulations. (2 month)**
Relevant scenarios will be developed and then simulated. The aim is to assess the sign and strength of the agricultural trade liberalization of poverty in Tunisia using different indicators for poverty.

* Final Report Writing (2 month)

7. Team Composition.

* First Researcher: Mohamed Abdelbasset CHEMINGUI. Was born in 1969, is a Tunisian national holding a Ph.D. in Economics from the University of Montpellier in France in July 2000. Awarded a first medal prize for his study on poverty analysis under the topic Rural Development and Poverty Reduction (on be-half with Chokri Thabet) during the Second GDN Medals Competition in Rio de Janeiro, Brazil, December 2001. From June 2002 he is working as Research Scientist at the Kuwait Institute for Scientific Research (Techno-Economics Division), he is also affiliated to ERF (Economic Research Forum in Cairo) as Research Associate. He has worked as a consultant, among others, to the European Commission, the World Bank, the Arab Planning Institute in Kuwait, the ERF, the Global Development Network, the International Development Research Center, the Femise network, and the UNDP. He worked as Research Assistant (1997-1998) and Economist (2000) for the OECD Development Center. His research interests are in Partial and General Equilibrium Models, International Trade, Agricultural Economics, Environmental Economics, Labor markets and Income Distribution.

* Second Researcher: Chokri THABET. is a Tunisian national, working since 1992 as an Assistant Professor at Ecole Superieure d’Horticulture et d’Elevage de Chatt Mariem (Tunisia). Before that hi was employed as Engineer at the Ministry of Professional Formation in Tunisia. His major fields of research include applied CGE models in the areas of agricultural economics, natural resources management.

* Third Researcher: Lassaad Lachaal

Dr Lachaal graduated from the University of Missouri at Columbia in 1994 with a Ph.D. in Agricultural Economics (Area of specialization: Production Economics and Economic Growth) and a Minor in International Agricultural Development. He also holds a Master of Arts in Economics in the area of Economic Development and a Master of Sciences in Agricultural Economics in the area of policy analysis.

Dr Lachaal has supervised research through student training programs in the three following main areas of research. Structural adjustment program and growth in Tunisia. The determinants of agricultural competitiveness and the sources of productivity growth. The development of economic tools for agricultural policy analysis using GAMS software, e.g., partial equilibrium models, community models, etc...). The economics of the crop / livestock integration in rainfed agriculture: Efficiency-Equity-Environment (Mashreq / Maghreb ICARDA-IFPRI Project). He has Coordinated the socio-economic component of the same project. Other professional activities include, among others, the following: Council member of the UN Institute for Natural Resources in Africa. Consultant to the International Fund for Agricultural Development (IFAD) since 1995, and the Food and Agricultural Organization (FAO) since 1996.
Active member of a Tunisian multi-institutional Food and Agricultural Policy Research Group (GREPPA), since 1986; member of the national commission in charge of the evaluation of national research programs in the area of economics of natural resources and other international research network groups.

Lecturer of a senior level course of Operations Research (Linear and Quadratic Programming, risk analysis, etc...) and a graduate course on Duality theory at INAT. Academic advisor and/or a member to Masters and Ph.D. level students thesis committee at INAT.

Dr Lachaal has received the following awards: The J. William Fulbright Visiting Research Scholar Award, 1997. The Superior Graduate Achievement Award, 1994. The SAEA Distinguished Professional Contribution Award, 1993. The Tenth Research and Creative Activities Forum 1st Place Award, 1992.

References


38. World Bank, (2000a), “Memorandum of the president of the international bank for reconstruction and development to the executive directors on a country assistance strategy of the World Bank group for the republic of Tunisia”. Report No. 20161-TN.