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1. Introduction[1]

Morocco is about to start implementing an Association Agreement with the European Union (AAEU) at the same time as the country adjusts its trade policies to conform to WTO rules. A major policy question facing Morocco's policy makers is whether and to what extent they should pursue additional unilateral trade liberalization. Given that Morocco's agriculture currently enjoys substantial protection, additional trade liberalization is expected to have a detrimental impact on rural households, including many poor.

In this study, a dynamically recursive computable general equilibrium (CGE) model of Morocco is used as a laboratory for analyzing alternative policy scenarios for the period 1998-2012. The model distinguishes between rural and urban activities and households. Its economywide perspective permits us to capture interdependencies between the rural and urban economies. It has a relatively detailed treatment of agricultural and other rural production, the labor market, and households. The basic scenario assumes gradual implementation of the EU agreement. The other simulations investigate the impact of additional unilateral trade liberalization with and without complementary domestic policies. Section 2 provides a brief background on the Moroccan economy and economic policy. Section 3 presents the CGE model and its database; Section 4 is devoted to simulations while Section 5 summarizes the results and discusses policy implications.

2. Background

Since the early 1980s, Morocco has gradually reformed its economy in the direction of trade liberalization and increased reliance on market forces and the private sector. Since the mid-1980s, macroeconomic management, has been more successful than in most other countries in the Middle East and North Africa (Page and Underwood, 1997). Nevertheless, compared to the 1970s, economic growth decelerated in the 1980s and even more so during the period 1990-96. In spite of far-reaching trade reforms, Morocco still has significant trade barriers with a high degree of dispersion of protection rates across sectors, with particularly high protection for agriculture (Table 1).

Table 1. Tariff and non-tariff rates and values for Morocco, 1994.

	Non-tariff barrier (%)	Aggregate tariff rate (%)	EU tariff rate (%)	Non-EU tariff rate (%)	Aggregate tariff revenue (mn Dh)	EU tariff revenue (mn Dh)	Non-EU tariff revenue (mn Dh)
Hard wheat	60.1	16.2		16.9	40.5		40.5
Soft wheat	177.9	16.2	16.6	15.9	180.5	85.7	94.8
Barley		25.2	21.8	37.6	21.9	14.8	7.1
Maize		19.6	17.5	20.9	122.6	40.6	82.0
Sunflower		29.6	37.4	29.5	192.3	3.1	189.2
Other industrial crop		29.4	18.4	35.4	380.9	84.4	296.5
Vegetable		10.8	15.3		25.2	25.2	
Olives		51.1	46.7	60.8	20.8	13.1	7.8
Other fruit		63.9	78.6	61.3	15.3	2.8	12.6
Milk	44.1	98.2	97.3	99.3	9.3	5.1	4.1
Beef	162.0	89.7	88.9	96.7	139.2	125.2	14
Sheep-goat meat	154.8	90.9	90.6	91.1	26.6	10.3	16.2
Sheep-goat wool	158.8	92.3	94.4	91.0	5.1	2.0	3.1
Other animal	186.6	88.2	87.9	89.6	890.7	751.1	139.7
Forestry		3.0	19.4		7.6	7.6	
Fishing		48.3	68.5		7.9	7.9	
Mining		8.4	18.1	6.6	142.3	48.6	93.7
Petroleum		20.6	46.8	16.3	1647.8	522.8	1125.0
Manufacturing	2.0	31.6	37.0	22.1	16527.2	12344.9	4182.3
Total		29.6	37.2	19.8	20403.7	14095.1	6308.6

Source: Model SAM.

For Morocco's policymakers, rural development remains a key challenge. Agriculture, the main source of rural income, provides somewhat less than 20% of total GDP but around 45% of total employment. Rural areas are also strongly disfavored according to indicators such as poverty rates, access to electricity and safe water, literacy, and school enrollment, with the female population standing out as particularly disadvantaged (Table 2). The skill gap is a major source of inequality between rural and urban areas; on average, skilled workers earn 6-7 times the wage of unskilled workers (Karshenas, 1994). These relatively unfavorable rural conditions have led to rapid rural-urban migration.

Table 2. Social and economic indicators: nation-wide and by locale (rural and urban)

	Rural	Urban	Total
Population (1994)			
mn	12.7	13.4	26.1
%	48.6	51.4	100.0
Annual population growth (1982-1994)			
Natural	2.6	1.7	2.2
Post-Migration	0.7	3.6	2.0
Poverty rate (1991)	18.0	7.0	13.1
Electricity access (1994)	9.7	80.7	46.2
Safe water access (1994)	4.0	74.2	40.1
Illiteracy rate (1994)			
Male	61.0	25.0	41.0
Female	89.0	49.0	67.0
Total	75.0	37.0	55.0
Primary school enrollment rates (1991)			
Male	56.5	86.7	69.9
Female	29.9	84.7	52.8
Total	43.2	85.7	61.3
Labor force (1995)			
'000	5,024.4	4,982.1	10,006.4
%	50.2	49.8	100.0
Participation rate (1995)	39.5	36.0	37.7
Unemployment (1995)			
'000	384.2	1,111.7	1,495.9
% (of labor force)	7.6	22.3	14.9
Employment (1995)			
'000	4,640.2	3,870.4	8,510.5
%	54.5	45.5	100.0
Skilled labor (1995; % of total)	5.6	41.1	21.7

Note: Units are in percent (unless otherwise indicated)

Given the high degree of agricultural protection, the challenge of rural development is intertwined with trade policy. The EU is Morocco's major trading partner, receiving 64% of total exports and providing 44% of all imports (Royaume du Maroc, 1997). In 1996, Morocco signed an Association Agreement with the EU, including the establishment of a Free Trade Area. For industrial imports from the EU, Morocco will

gradually (over a maximum of 12 years) eliminate tariffs and any quantitative restrictions, taxes, and other measures that have the same effect as tariffs. In return, Morocco will receive aid for education and infrastructure projects (Oneworld, 1995). With few exceptions, Morocco's non-agricultural exports will continue to enjoy unrestrained, duty-free access to the EU. Morocco's agricultural exports to the EU remain strictly regulated with limited scope for expansion. Hence, Morocco's agriculture is little affected by the AAEU. Similarly, Morocco's implementation of the GATT/WTO agreement of the Uruguay Round will have little impact on agriculture since the tariff bounds to which it has commited itself are well above actual applied rates.

Currently, one major policy question is whether Morocco should pursue further unilateral import liberalization (covering agricultural imports and/or industrial imports from regions beyond the EU). Broad import liberalization may have a positive impact on aggregate economic performance but may hurt rural welfare. Given this, it may be appropriate to pursue agricultural trade liberalization in combination with complementary policies that compensate vulnerable rural households.

3. Model Structure and Data

Model disaggregation. The disaggregation of activities, factors and institutions is shown in Table 3. All activities use capital and labor. Agricultural activities demand additional factors: livestock makes use of pasture-fallow land; crop activities rely on rainfed land; irrigated crop activities also use water. Outside agriculture, the labor force of each activity includes both skilled and unskilled labor whereas for all agricultural activities, except fishing and forestry, the labor force is made up of a separate category of (unskilled) agricultural labor. In crop and livestock agriculture, most activities produce multiple commodities and most commodities are produced by two activities, one in rainfed and one in irrigated areas. Fodder byproducts are produced by most crop activities. Livestock activities produce meat and milk (disaggregated by animal type) and, for the cow activities, manure. Multiple-output activities produce their commodities in fixed physical proportions.

Table 3. Disaggregation of activities, factors, and institutions.

Sets	Elements
Activities (45)	
Irrigated crops	Soft wheat, Hard wheat, Barley, Maize, Other cereal, Legumes, Fodder, Sugarbeet, Sugarcane, Sunflower, Other industrial crop, Vegetable, Olive, Citrus, Other fruit
Irrigated Livestock	Cow, Sheep-goat
Rainfed crops	Soft wheat, Hard wheat, Barley, Maize, Other cereal, Legumes, Fodder, Sugarbeet, Sunflower, Other industrial crop, Vegetable, Olive, Other fruit
Rainfed Livestock	Cow, Sheep-goat
Other agriculture	Other animal, Forestry, Fishing
Rural non-agriculture	Manufacturing, Construction, Other service
Urban	Mining, Petroleum, Electricity, Manufacturing, Construction, Other service, Public administration
Factors (7)	
Agricultural resources	Irrigated land, Water, Rainfed land, Pasture
Other	Skilled labor, Unskilled labor, Capital
Institutions (7)	
Households	Rural Poor, Rural Non-poor, Urban Poor, Urban Non-poor
Other	Government, EU, Non-EU (Rest of the world)

Outside crop and livestock agriculture, each activity produces only one commodity. Given that service commodities tend to be location-specific, rural and urban service activities are viewed as producing distinct commodities. For industrial and agricultural commodities, markets are integrated across regions (irrigated and rainfed agricultural zones, or rural and urban regions) and with international trade.

Production activities. Producers are assumed to maximize profits given their technology and the prices of inputs and outputs. The technology of the production activities is specified as a Leontief function of aggregate value-added and an aggregate intermediate input. Value-added is produced by a CES function of primary factors. Intermediate coefficients are flexible inside agriculture but fixed for other sectors. For

irrigated crop agriculture, an aggregate land-water factor is among the arguments in the CES function. This aggregate factor is produced by a set of alternative factor-aggregation activities based on Leontief technology that specifies substitution possibilities between the land and water along a linearized CES isoquant. This Leontief representation is preferred to a continuous CES function to allow for the possibility of water or land being in excess supply, with a corresponding price of zero for the non-scarce factor. The income of each factor is allocated to domestic institutions (households and government) in fixed shares, after adjustments for factor payments to and from the rest of the world (both of which are fixed in foreign currency).

Institutions. Both rural and urban *households* receive the bulk of their incomes from factors. Compared to the non-poor, the poor depend more heavily on labor incomes in general and unskilled labor incomes in particular. In addition, households receive transfers from the government (defined as fixed GDP shares) and the rest of the world (fixed in foreign currency). Household income is used to pay direct taxes, save and consume. Direct taxes and savings are fixed shares of household income. Consumption demand is determined by the linear expenditure system (LES).

Besides factor incomes, *government* revenue consists of taxes - direct taxes from households, indirect taxes from domestic activities, domestic sales taxes, and import tariffs (with different rates applying to EU and non-EU goods' imports). All taxes are *ad valorem*. Apart from transfers to households, the government uses its income for consumption (fixed quantities), transfers to the rest of the world (fixed in foreign currency), and consumer subsidies (a fixed share of the consumption value for manufactured goods, representing food items). The *rest of the world* interacts with Morocco through commodity trade and the above-mentioned transfers (which add to or deduct from the incomes of factors and domestic institutions).

Commodity markets. Commodities are supplied by domestic production activities and by imports. On the other side of the market, we find domestic demand and exports. Imperfect substitutability is assumed for commodities from different geographical sources (different domestic activities, imports from EU vs. non-EU, or aggregated imports vs. domestic output). Symmetrically, commodities delivered to different destinations (exports to EU vs. non-EU, or domestic market vs. aggregated export market) are imperfectly transformable. Import demand results from a CES aggregation function of domestic and imported goods, and export supply is symmetrically modeled as a CET (Constant Elasticity of Transformation) function. The shares of commodities from different sources or to different destinations are sensitive to relative prices. These assumptions of imperfect substitutability and transformability grant the domestic price system a realistic degree of independence from international price changes.

For imports, it is assumed that Morocco is a small-country facing infinitely elastic supplies at exogenous world prices. For exports, it is similarly assumed that Morocco is a small country facing infinitely elastic demands at exogenous world prices. The only exception is for agricultural exports to the EU. A dual-regime formulation is used according to which an increase in Morocco's supply price will give rise to reduced exports along a constant-elasticity demand curve. However, a decrease in the Moroccan price will not give rise to a corresponding increase in demand. The EU will purchase the base-year quantity at the (lower) price, in the process capturing the rent produced by the constraint. As a result, the EU pays exactly the price needed to induce Morocco to export the fixed quantities.

Factor markets. Given the medium-to long-run perspective of the current analysis, the dynamic model version assumes that each factor is mobile across the activities that use it. A market-clearing price generates demand-supply balance in the context of fixed resource utilization. The only exception applies to land and water in irrigated agriculture for which two regimes are possible: full employment with a market-clearing price or unemployment with the utilization level as the clearing variable. Given that the sectoral production function always demands the land-water aggregate, at most one of the two factors is unemployed at any given point in time.

Macro closure. Government savings - the difference between the government's *current* revenues and spending - is a fixed share of GDP. Adjustments in the rate of value-added tax (uniform across all activities)

assure that the government savings target is met. Foreign savings are fixed. A flexible real exchange rate clears the current account of the rest of the world. Aggregate investment varies endogenously to achieve savings-investment equilibrium.

The Dynamic Module. The within-period, static model is solved for 1994 (the base year for the database) and 1998 (to update the model to the base year for the model-based analysis), and every two years thereafter until 2012. Between the static-model solutions, selected parameters are updated in the between-period (dynamic) module, either using endogenous values (from solutions in previous periods) or exogenous trends. The aggregate capital stock is updated endogenously on the basis of previous investment and depreciation, interpolating for inter-period years. Population, labor supplies, foreign savings, institutional payments to and from the rest of the world, and total factor productivity by activity are updated exogenously.

Database and solution approach. The model data is based on a disaggregated Social Accounting Matrix (SAM) for 1994, to which the model parameters are calibrated.[2] A cross-entropy method was used to generate a balanced model SAM that uses all the information contained in the original data set (Thissen and Löfgren, 1998; Robinson, Cattaneo and El-Said, 1998). A variety of studies of Morocco were consulted for estimates of elasticities for the Armington, CET, CES (production), LES (household consumption), and export-demand functions.[3] The model is solved as a mixed-complementarity problem (MCP) using the PATH solver. The GAMS software is used to generate the database and to implement the model.[4]

4. Simulations

The model simulations and their results are presented in Tables 4 and 5. The simulation AAEU defines the status quo in the sense that policy changes are limited to what Morocco unambiguously made a commitment to implement in association with the EU. The simulated annual growth in aggregate real GDP at factor cost is at 3.7%, a rate that changes very little across the simulations that are reported in this paper.[5] Growth is biased in favor of urban production and non-agricultural sectors, in part because these do not depend on natural resources (land, water, and pasture-fallow areas), the physical quantities of which are fixed at the 1994 level.

Table 4. Alternative trade policy simulations: Scenario definitions

Item	AAEU	TRADE-LIB	TRANSFER	SKILL-UPGRADE
Industrial tariffs				
EU	AAEU*	AAEU*	AAEU*	AAEU*
Non-EU	No change	Unified at 10%**	Unified at 10%**	Unified at 10%**
Agricultural tariffs				
EU	No change	Unified at 10%**	Unified at 10%**	Unified at 10%**
Non-EU	No change	Unified at 10%**	Unified at 10%**	Unified at 10%**
Non-tariff barriers	No change	Eliminated**	Eliminated**	Eliminated**
Rainfed factor compensation	No	No	Yes	No
Skill upgrade	No	No	No	Yes

AAEU = implementation of the Association Agreement with the European Union with status-quo policies.
TRADE-LIB = tariff unification and reduction plus non-tariff barriers cut
TRANSFER = TRADE-LIB + transfers to owners of rainfed agricultural resources (land and pasture), in each period fully compensating for loss compared to AAEU
SKILL-UPGRADE = TRADE-LIB + in each period, the stock of rural skilled labor is augmented by 5% with the additional labor coming from the unskilled labor of rural households
Notes:
* AAEU = Gradual elimination of tariffs on industrial imports from EU 1999-2010.
**Tariff unification and elimination of non-tariff barriers is done gradually 1999-2005. In 1994, the average tariff for industrial and agricultural imports was 29%.

Table 5. Simulation results

	1998 value	AAEU	TRADE-LIB	TRANSFER	SKILL UPGRADE
		% annual growth 1998-2012			
Real GDP at factor cost (bn. 1994 Dh.)					
Agriculture	48.46	2.16	1.83	1.80	1.86
Rural non agriculture	27.21	3.43	3.48	3.48	3.73
Urban	191.06	4.07	4.11	4.16	4.42
Real factor income (bn 1994 Dh.)					
Total	265.42	3.24	4.18	3.86	4.34
Irrigated resources	6.38	6.71	5.93	5.53	6.67
Rainfed resources	20.04	5.57	3.48	3.09	4.08
Unskilled labor	37.96	3.91	4.01	3.71	4.49
Skilled labor	94.91	2.63	4.14	3.93	4.03
Capital	106.12	2.74	4.27	3.89	4.45
Labor shares (%)*					
Agriculture	43.47	43.48	38.36	38.03	37.34
Rural non agriculture	11.00	10.11	11.30	11.30	11.18
Urban	45.53	46.41	50.34	50.67	51.49
Real household per capita income/welfare ('000 1994 Dh)**					
All	9.77	1.88	2.41	2.34	2.57
Urban Poor	3.08	2.66	2.96	2.72	3.46
Urban Non-poor	13.45	1.65	2.25	2.07	2.08
Rural Poor	3.00	2.86	2.60	3.03	3.83
Rural Non-poor	7.52	2.19	2.67	2.78	3.33
Real trade quantities (bn 1994 Dh.)					
Exports	80.05	4.52	5.29	5.25	5.60
Agriculture exports	5.45	-0.13	0.13	0.12	-0.16
To EU	4.15	-0.55	-0.75	-0.76	-0.93
To non-EU	1.30	1.07	2.42	2.41	1.89
Industrial exports	43.89	5.97	7.04	6.99	7.43
To EU	28.97	5.72	6.81	6.76	7.14
To non-EU	14.91	6.45	7.48	7.43	7.96
Imports	98.12	4.17	4.81	4.78	5.04
Agriculture imports	7.86	6.20	11.38	11.32	11.93
From EU	3.32	5.61	13.32	13.23	13.79
From non-EU	4.54	6.60	9.63	9.59	10.27
Industrial imports	69.75	4.75	4.66	4.65	4.89
From EU	39.86	7.38	6.75	6.73	6.99
From non-EU	29.89	-1.11	0.61	0.60	0.82
Real exchange rate (index 1998 = 100)	100	105.02	116.37	116.41	116.55
		(% of GDP)***			
Tariffs	7.34	2.46	1.63	1.61	1.67
Value added tax	-0.42	4.09	4.03	8.04	4.07
Transfers and compensations				3.75	

Note: See table 4 for description of the simulations.
* In all columns, share of labor force by aggregate sector (not annual growth).
** Per-capita income in 1998 column; %-age change in welfare for other columns (see Footnote 6).
***Except for the 1998 column, GDP shares in 2012.

On average, real factor incomes grow at a similar pace to GDP, with the most rapid growth for agricultural resources. Household welfare grows at 2-3% per year, both on the aggregate level and for the different household groups.[6] Welfare growth is biased in favor of the poor and rural areas, a reflection of the pattern of growth in factor incomes.[7]

Imports and exports grow faster than GDP and incomes; the economy is gradually becoming more open. The agricultural trade deficit grows as domestic production, hampered by the limited resource supply, is unable to keep up with growing domestic demand. For industry, export growth is more rapid than import growth; imports from EU grow rapidly while imports from non-EU countries decline, i.e., the AAEU leads to trade diversion toward the partner countries in the free-trading area. Compared to 1998, the real exchange rate appreciates. To maintain savings at a predetermined share of GDP in the face of reduced tariff rates and other trends, the government collects value-added taxes at a level equivalent to 4.1% of GDP.

The second simulation, TRADE-LIB, introduces a substantial degree of trade liberalization. In addition to elimination of tariffs on industrial imports from the EU (as in AAEU), all other commodity tariffs are unified at 10% and all non-tariff barriers are removed. The new changes are introduced gradually during the period 1999-2005. This involves a drastic change for agriculture, initially the most protected sector.

Compared to the AAEU scenario, import and export growth is more rapid. Import growth is especially rapid for agriculture. A stronger real exchange rate depreciation is required to maintain balance in the current account. The decline in tariff revenues is mitigated by stronger import growth, leaving the revenue from the value-added replacement tax virtually unchanged.

Growth declines for agricultural production but accelerates for rural non-agriculture and the urban sector.

This shift is accompanied by labor migration from agriculture to other activities. Factor incomes decline for agricultural resources (especially in rainfed areas) while capital and labor incomes increase. Unskilled labor incomes grow less rapidly than skilled labor incomes since agriculture uses unskilled labor. Aggregate growth in factor incomes and household welfare improves significantly, a reflection of efficiency gains from reduced price distortions. Among the disaggregated households, the rural poor lose while all other groups are better off under liberalization. The losses for the rural poor stem from their relatively heavy reliance on unskilled labor incomes and agricultural resources, especially in rainfed areas. According to the compensating variation measure, by the year 2012, aggregate gains under TRADE-LIB exceed those of AAEU by more than 5% of the GDP of the AAEU simulation in the same year. Hence, there is scope for having the winners compensate the losers in a way that assures that both groups are better off than in the AAEU run.

In the last two simulations, we combine the policy changes under TRADE-LIB with complementary measures that aim at compensating rural losers and compare the results to TRADE-LIB. The TRANSFER simulation is inspired by Mexico's PROCAMPO program under which farmers are compensated in a non-distorting manner for reduced protection of agricultural markets (World Bank, 1997b). In Morocco, baseline payment levels could be established on the basis of data from the 1997 agricultural census. 70% of the simulated cost of the TRANSFER program is payments to farmers while 30% is spent on administration.[8] The simulated skill enhancement program is motivated by the fact that, as noted in Section 2, the skill gap between urban and rural areas is a major source of rural-urban inequality. It assumed that the program can be financed without an increase in total educational expenditures (for example via a reduction in urban-focused higher education that produces graduates lacking the skills demanded in the labor market). Neither of the programs is narrowly targeted to poor households: they benefit all owners of rainfed resources and all rural households with unskilled labor.

Compared to TRADE-LIB, the TRANSFER simulation generates gains for rural households, especially the poor, while the urban households lose. This reflects the fact that urban households own little rainfed resources while they, like the rural households, suffer from declining factor incomes because of the value-added tax, which increases in rough proportion to the value of the transfer - in 2012 it is close to 3.8% of GDP.

The transfer increases gradually during the implementation of the reduction in border protection. After reaching a peak in 2004, it starts a steady but slow decline. In other respects, the transfer has a limited impact. It primarily functions as a device for income redistribution. As opposed to the TRADE-LIB scenario, the rural poor are now better off compared to the base scenario. However, relative to GDP, the total cost of the transfer program is substantial, suggesting the need to target such programs more narrowly, perhaps to rainfed regions with little rainfall.

In the simulation SKILL-UPGRADE, we raise the skill level of the rural labor force. In every year starting from 1999, the skilled rural labor force is augmented by 5%, boosting its annual growth rate for the period 1998-2012 from 3.8% to 7.7%. The rural unskilled labor force is reduced so as to leave unchanged the total labor force, cutting its growth rate from 2.4% to 2.0%. Compared to the TRADE-LIB simulation, GDP growth accelerates significantly for rural non-agricultural and urban activities, but not in agriculture since this sector only uses unskilled labor. Incomes go up for all factors except skilled labor, an indication of that demand for this labor type is inelastic. Welfare is boosted strongly for all households except the urban non-poor, who initially depend more heavily than others on skilled labor incomes. They see their wages decline without any change in their endowment of skilled labor.

5. Conclusion

The base simulation with our CGE model of Morocco assumes that Morocco implements its Association Agreement with the EU. For the period 1998-2012, real GDP at factor cost grows at an annual rate slightly

below 4%. Rural poor and urban poor households enjoy the most rapid welfare increases, a reflection of a pro-poor pattern of factor income growth. According to the simulation TRADELIB, additional trade liberalization leads to considerably more rapid expansion in aggregate factor incomes and household welfare. However, income growth declines for agricultural resources, especially in rainfed areas. The owners of these resources tend to be a relatively poor part of the rural population. On the household level, the trade liberalization scenarios disfavor the rural poor, who represent 70% of all poor in Morocco.

Two domestic policy scenarios aim at addressing the relatively negative impact of trade liberalization on the owners of rainfed resources and the rural poor. In one of the scenarios, we introduce a non-distorting transfer program that compensates the owners of rainfed resources for the losses they incur from trade liberalization. On the household level, the result is a pro-rural development pattern, with poor and non-poor rural households registering the strongest welfare improvements. Also the urban households are significantly better off than under the base scenario. However, the transfer is quite large (close to 3.8% of GDP in 2012), suggesting the need for more narrow targeting.

In the second domestic policy scenario, we upgrade the skills of the rural labor force, approximately doubling the rate of growth for rural skilled labor (from a low base). This leads to a significant growth expansion for GDP (driven by non-agricultural expansion), aggregate factor incomes, and aggregate household welfare. The outcome is pro-rural and pro-poor: the two rural households record the fastest growth, followed by the urban poor, while the urban non-poor face a minor growth deceleration. The overall conclusion from this paper is that, if combined with complementary domestic policies, trade liberalization can lead to a win-win outcome: the welfare of all household groups grows more rapidly than if status-quo policies are followed.

Endnotes

[1] The authors are Research Fellow, Research Analyst and Division Director, Trade and Macroeconomics Division, International Food Policy Research Institute (IFPRI). This paper is a synopsis of Löfgren, El-Said and Robinson (1999). The constructive comments on an earlier version of this paper by Drs. Mohamed Lahouel and Bachir Hamdouch are highly appreciated.

[2]The SAM was constructed on the basis of data from a various sources, including Moroccan agencies and international organizations (World Bank, FAO and other UN agencies, the OECD, and the IMF). See Löfgren, El-Said and Robinson (1999) for details.

[3]See Löfgren, El-Said and Robinson (1999) for the consulted studies. In summary, the values used are: 1. Elasticity of substitution for CES value-added functions: 0.8 for all activities except Public Administration (0.19); 2. Elasticity of substitution for CES intermediate-input aggregation functions for agricultural activities: 0.5 for all activities except vegetables (2.0); 3. CES (Armington) function elasticities for aggregation of imports from different regions and of imports and domestic output: between 2 and 7 for all commodities, with the higher values for grains; 4. CET function elasticities for transformation of domestic output to aggregate exports and domestic sales and of aggregate exports to exports disaggregated by region: between 2 and 5 for all commodities; 5. Elasticities for constant-elasticity export demand functions for agricultural exports to the EU and for service exports: -1.5. Household expenditure elasticities were computed on the basis of Royaume du Maroc (1993).

[4]For GAMS, see Brooke, Kendrick, and Meeraus (1988). Rutherford (1995) provides more information on PATH.

[5]The simulated aggregate growth rate is in line with the expectations of the World Bank, both for Morocco and the region at large (al-Hayat, December 16, 1998; World Bank, 1997a). Growth in aggregate real GDP at factor cost (an index of real production) varies little across the different simulations since supplies are exogenous for all factors except capital (for which supply growth is endogenous but quite similar across the different simulations given similar levels of real investment) while utilization rates are permitted to vary only for irrigated resources.

[6]The welfare index is based on the compensating variation (CV; defined as the amount of money which, if taken away from the household after a price and/or income change, would leave it just as well of as before the change; i.e., what the household would be willing to pay for enjoying the change). More specifically, the index was defined as the ratio between the simulated value of household consumption and the consumption value that would have left household welfare at the 1994 level (simulated consumption value minus compensating variation). In Table 5, the household values in all columns except "1998" show the percentage annual growth rate in the welfare index between 1998 and 2012. The 1998 column shows per-capita consumption in

1998 (at 1994 prices).

[7] The household are classified on the basis of their 1994 characteristics (including location, income level, and patterns of asset holdings). Migrating labor does not change its household affiliation.

[8]This charge is highly approximate - it is not clear what the cost of such a program would be in Morocco, *inter alia* since it depends on the capacity of the existing administration to manage an additional program. The assumed administrative cost share may be an overestimate -- Latin American experience suggests that 30% is at the upper end for administrative costs of targeted social programs (Grosh, 1994).

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