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A CGE Analysis of the Economic Impact of Trade Liberalisation on the Algerian Economy

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Abstract
The principal focus of the study is to show the nature and extent of the incentives trade policy liberalisation could provide on the way to further boost the economy of Algeria. It also tries to find out what the economic position would be, should the trade regime be more or fully liberalisation by reducing or elimination the existing tariff. In this study, different types of external price shocks are also considered in order to test the response of the economy.
Model results indicate that by reducing tariffs, domestic output increase in almost all the sectors but government revenue and saving decline significantly. Government revenue fall due to the reduction/elimination of tariff could be compensated by reducing net subsides to the corporate sector and also by increasing income tax in a progressive way. Exports also increase showing the justification of the liberalisation and also supporting the argument that tariffs bias exports. But the increase in total import is bigger than the increase in exports which causes a deterioration of the real balance of trade, but the elimination of tariff increase private consumption and total absorption.
Export price shocks in petroleum sectors chow a fall in domestic output and consequently a fall in value added and total employment. Domestic terms of trade of exports deteriorate and exports fall. This also causes a fall in GDP, private consumption and total absorption. The government revenue declines and budget deficits worsen. A 10 percent devaluation in the real exchange rate shows a fall in domestic output in aggregate agriculture and service whereas an increase in output in industry. GDP at factor cost also falls simultaneously with a fall in total absorption and private consumption. Devaluation pushes up exports in the majority of the sectors and brings down import in some sectors only.

Keywords :*External Shocks, trade policies, Algerian Economy, Computable General Equilibrium Model.*

1. Introduction

Since early 1980s, a massive amount of work has been done using this modeling technique with the help of sophisticated computer softwares, such as GAMS, and General Algebraic Modelling Package (GAMPACK) etc. Area of application of this modeling technique has been expending and the application of it in explaining environmental issues is more frequent now. For example, THIELE and Wiebelt (1993) have used CGE model in explaining the causes of over exploitation and depletion of rain forests in Cameroon. Wiebelt (1994) has explained the role of macro-economic, sectoral, and regional policies to protect the rain forests in Brazil with the help of a CGE model.San, Lofgren and Robinson (2000) have also used a CGE model to analyse the impact of tax policy on the forestation in sumatra regional economy, Indonesia. Some of the studies similar to the model developed for this study purpose are presented here

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briefly. Lofgran (2001b) has developed a model for the study of trade policy issues in Malawi. Wobst (2001) has developed a model for Tanzania to analyse the impact of structural adjustment policies on overall economic growth, sectoral performance, welfare, and income distribution, in this study, trade and exchange rate policy simulations were carried out with special emphasis on agriculture.Sapkota and Sharma (1999) have presented a CGE model for Nepal where impact of trade policy liberalization on different household groups in analyzed.Siddiqui and Iqbal (1999) have developed a similar type of CGE model to analyze the impacts of tariff reduction on the income distribution on different household groups.

CGE models are a class of economy wide models that are widely used for policy analysis in developing countries. This paper provides a detailed documentation of an applied Computable General Equilibrium (CGE) model of Algeria. The purpose of this paper is to serve as a source of background information for analysts using the model in the context of the current project and in the future.

The applied Algerian model can be used for analyses in a relatively wide range of areas, including agricultural, trade, and tax and subsidy policies. It is characterized by a detailed treatment of the labor market and households, permitting model simulations to generate information about the disaggregated impact of policies on household welfare.

As part of the project research activities, the model will be used to analyze trade, fiscal policy, and agricultural issues. The model is built around a 2009 Social Accounting Matrix (SAM) for Algeria, developed in the context of the current project.

Like most other CGE models, the Algerian CGE model is solved in a comparative static mode. It provides a simulation laboratory for doing controlled experiments, changing policies and other exogenous conditions, and measuring the impact of these changes. Each solution provides a full set of economic indicators, including household incomes; prices, supplies, and demands for factors and commodities (including foreign trade for the latter); and macroeconomic data.

The model is structured in the tradition of trade-focused CGE models of developing countries described in Dervis, de Melo, and Robinson (1982). It is a further development of the stylized CGE model found in Löfgren (2000). To make it appropriate for applied policy analysis, more advanced features have been added, drawing on recent research at IFPRI (see Harris et al. 2000). Most importantly, the model has an explicit treatment of trade inputs, which are demanded whenever a commodity is distributed domestically as part of international trade (to or from the border) or as part of domestic trade (from domestic supplier to domestic demander). This feature is particularly important in many African settings where an underdeveloped transport network leads to high transportation costs (cf. Ahmed and Rustagi 1993). In addition, the model can handle non-produced imports, i.e., commodities for which the total supply stems from imports. Compared to the stylized CGE model, the current model also has more advanced functional forms for production and consumption to enable it to better capture observed real- world behavior.

The model is built around a 2009 SAM for Malawi. Most of the model parameters are set endogenously in a manner that assures that the base solution to the model exactly reproduces the values in the SAM – the model is "calibrated" to the SAM. (The remaining parameters, a set of elasticities, are set exogenously.) However, as opposed to

the SAM, which is a data framework that records payments, the model contains the behavioral and technical relationships that underlie these payments (Thorbecke 1985).

2. Structure of the Model

This study is fanatical to estimate impacts (i.e. baseline estimation and simulation target) of external price shocks and foreign trade policies on the Algerian economy and quantifies the linkages between recession and economic instability. The Algerian computable general equilibrium model is presented in this section, which is a set of non-linear simultaneous equations followed by Lofgren, et al (2002), where the number of equation is equal to the number of endogenous variables. This section introduces the framework of the CGE model and algorithm for solving the objectives. The equations are classified in six different blocks, system constraints block as follows.

A-Price Block

The price system of the model is rich, primarily because of the assumed quality differences among commodities of different origins and destinations (exports, imports, and domestic outputs used domestically). The price block consists of equations in which endogenous model prices are linked to other prices (endogenous or exogenous) and to non-price model variables.

Import Price

$$PM_c = pwm_c(1 + tm_c) \cdot EXR \qquad (1)$$

Where PM_c is import price in LCU (local-currency units) including transaction costs, tm_c is the import tariff rate, pwm_c is the import price in FCU (foreign-currency units), EXR is the exchange rate (LCU per FCU).

The import price in LCU (local-currency units) is the price paid by domestic users for imported commodities (exclusive of the sales tax). Equation (1) states that it is a transformation of the world price of these imports, considering the exchange rate and import tariffs plus transaction costs (the cost of trade inputs needed to move the commodity from the border to the demander) per unit of the import.

Export Price

$$PE_c = pwe_c(1 + te_c) \cdot EXR \qquad (2)$$

Where $PE_c$the export price (LCU) is, te_c is the export tax rate, pwe_c is the export price (FCU).The export price in LCU is the price received by domestic producers when they sell their output in export markets. This equation is similar in structure to the import price definition. The main difference is that the tax and the cost of trade inputs reduce the price received by the domestic producers of exports (instead of adding to the price paid by domestic demandersof imports).

Absorption

The absorption PQ_cQQ_c by the domestic demanders is the function of quantity supplied to the domestic market can be expressed as:

$$PQ_cQQ_c = [PD_cQD_c + PM_cQM_c](1 + tq_c) \qquad (3)$$

Where: PQ_c=composite commodity price, QQ_c = quantity supplied to domestic market, PD_c= domestic price of domestic output, QD_c= quantity of domestic output sold domestically and tq_c= sales tax rate.
Similarly the domestic output value, activity price and value added can be expressed as:

$$PX_c \cdot QX_c = PD_c QD_c + PE_c QE_c \quad (4)$$

Activity price

$$PA_a = \sum_{c \in C} PX_{ac}\, \theta_{ac} \quad (5)$$

Value added price

$$PVA_a = PA_a - \sum_{c \in C} PQ_c\, ica_{ca} \quad (6)$$

Where: PX_c= producer price, QX_c= quantity of domestic output, PVA_a= value added price, PA_a= activity price, θ_{ac}= yield of commodity c per unit of activity a, and$c \in C$ where C is commodities.

B-Production and trade block

The production and trade block covers four categories: domestic production and input use; the allocation of domestic output to home consumption, the domestic market, and exports; the aggregation of supply to the domestic market (from imports and domestic output sold domestically); and the definition of the demand for trade inputs that is generated by the
distribution process. Production is carried out by activities that are assumed to maximize profits subject to their technology, taking prices (for their outputs, intermediate inputs, and factors) as given. In other words, it acts in a perfectly competitive setting. This block defines production technology and demand for factors as well as CET (constant elasticity of transformation) functions combining exports and domestic sales, export supply functions and import demand and CES (constant elasticity of substitution) aggregation functions. This block contains several functions and equations for the production side of the economy as follows:

Activity production function

$$\mathrm{QA_c} = \mathrm{ad_a} \prod_{\mathrm{f \in F}} \mathrm{QF_{fa}^{\alpha_{fa}}} \quad (7)$$

Factor demand

$$WF_f WFDIST_{fa} = \frac{a_{fa} PVA_a QA_a}{QF_{fa}} \quad (8)$$

Intermediate demand

$$\mathrm{QINT_{ca}} = \mathrm{ica_a\, QA_a} \quad (9)$$

Output function

$$\mathrm{QX_c} = \sum_{\mathrm{a \epsilon A}} \theta_{\mathrm{ac}}\, \mathrm{QA_a} \quad (10)$$

Composite supply (Armington) functions

$$\mathrm{QQ_c} = \mathrm{aq_c} \left(\delta_{\mathrm{c}}^{\mathrm{q}} \mathrm{QM_c^{-p_c^q}} + \left(1 - \delta_{\mathrm{c}}^{\mathrm{q}}\right) \mathrm{QD_c^{-p_c^q}} \right)^{\frac{-1}{\mathrm{p_c^q}}} \quad (11)$$

Import-domestic demand ratio

$$\frac{\mathrm{QM_c}}{\mathrm{QD_c}} = \left(\frac{\mathrm{PD_c}}{\mathrm{PM_c}} \frac{\delta_c^q}{\left(1-\delta_c^q\right)}\right)^{\frac{1}{1+p_c^q}} - 1 < p_c^q < \infty \quad (12)$$

Composite supply for non-imported commodities

$$\mathrm{QQ_c} = \mathrm{QD_c} \quad (13)$$

Output transformation function

$$QX_c = at_c \left(\delta_c^t QE_c^{p_c^t} + (1-\delta_c^t) QD_c^{p_c^t}\right)^{\frac{1}{p_c^t}} \quad (14)$$

Export-domestic demand ratio

$$\frac{QE_c}{QD_c} = \left(\frac{PE_c}{PD_c} \frac{(1-\delta_c^t)}{\delta_c^t}\right)^{\frac{1}{p_c^t-1}} - 1 < p_c^t < \infty \quad (15)$$

Output transformation for non-exported commodities

$$QX_c = QD_c \quad (16)$$

Where: QA_c= activity level, $QF_{fa}^{\alpha_{fa}}$= quantity demanded of factor f by activity a, $WFDIST_{fa}$= wage distortion factor for f in a, $QINT_c$= quantity of c used in activity a, WF_f= average wage (rental rate) of factor f, ad_a= production function efficiency parameter, ica_a= *quantity of c as intermediate input per unit of activity a,* qg_c = *government commodity demand,* δ_c^q= *share parameter for composite supply (Armington)function,* δ_c^t= *share parameter for output transformation (CET) function,* p_c^q= *exponent for composite supply (Armington)function,* at_c= *shift parameter for output transformation (CET) function, ,* p_c^t=*exponent for output transformation (CET) function* and$f \in F$ is the fictional from where F is factors with f being labor or capital.

C-Institution block

This block consists of equations that map the flow of income from value added to institutions and ultimately to households. These equations fill out the inter-institutional entries in the SAM (Social Accounting Matrix of Algeria. This block contains several functions and equations for the institution side of the economy as follows:

Factor income

$$YF_{hf} = shry_{hf} \sum_{a \in A} WF_f WFDIST_{fa} QF_{fa} \quad (17)$$

Non-government domestic institution

$$YH_h = \sum_{f \in F} YF_{hf} + tr_{h,gov} + EXR \cdot tr_{h,row} \quad (18)$$

Household consumption demand

$$QH_{ch} = \frac{\beta_{ch}(1-mps_h)(1-ty_h)YH_h}{PQ_c} \quad (19)$$

Investment demand

$$QINV_c = qinv_c \cdot IADJ \quad (20)$$

Government revenue

$$YG = \sum_{h \in H} ty_h \cdot YH_h + EXR \cdot tr_{gov,row} + \sum_{c \in C} tq_c \left(PD_c QD_c + PM_c QM_c\right) + \sum_{c \in CM} tm_c EXR \cdot pwmc_c \cdot QM_c + \sum_{c \in CE} te_c EXR \cdot pwe_c \cdot QE_c + ygi \quad (21)$$

Government expenditures

$$EG = \sum_{h \in H} tr_{h,gov} + \sum_{c \in CE} PQ_c \cdot qg_c \quad (22)$$

Where : YF_{hf} *= transfer of income to h from f,* WF_f *= average wage (rental rate) of factor f,* $WFDIST_{fa}$ *= wage distortion factor for f in a,* QF_{fa} *= quantity demanded of factor f by activity a,* YH_h *= income of h,* $tr_{h,gov}$ *= government transfer from household,* QH_{ch} *= quantity of consumption of commodity c by h,* $QINV_c$ *= quantity of investment demand,* $IADJ$ *= investment adjustment factor, YG= government revenue,* $shry_{hf}$ *= share of the income from factor f in h,* mps_h *= share of disposable income to savings,* ty_h *= rate of income tax for h,* $qinv_c$ *= base-year investment demand,* $tr_{gov,row}$ *= government transfer to rest of the world and* qg_c *= government commodity demand.*

D-System constraints block

This block defines the constraints that are must be satisfied by the economy as a whole. The model's micro constraints apply to individual factor and commodity markets. The system constrains in an economy as follows:

Factor markets

$$\sum_{\propto \in A} QF_{fa} = QFS_f \quad (23)$$

Composite commodity markets

$$QQ_c = \sum_{\propto \in A} QINT_{ca} + \sum_{h \in H} QH_{ch} + qg_c + QINV_c \quad (24)$$

Current account bala*nce for ROW

$$\sum_{c \in CE} \mathrm{pwe_c} \cdot \mathrm{QE_c} + \sum_{i \in I} \mathrm{tr_{i.row}} + \mathrm{TASV} = \sum_{c \in CM} \mathrm{pwm_c} \cdot \mathrm{QM_c} + \mathrm{irepat} + \mathrm{yfrepat_f} \quad (25)$$

Savings-Investment balance

$$\sum_{**h \in H} \mathrm{mps_h} \cdot (1 - \mathrm{ty_h}) \mathrm{YH_h} + (\mathrm{YG} - \mathrm{EG}) + \mathrm{EXR} \cdot \mathrm{FSAV} = \mathrm{ygi} + \mathrm{EXR} \cdot \mathrm{irepat} + \sum_{c \in C} \mathrm{PQ_c} \cdot \mathrm{QINV_c} + \mathrm{WALRAS} \quad (26)$$

Price normalization

$$\sum_{c \in C} PQ_c \cdot cwts_c = cpi \qquad (27)$$

Where: QFS_f = *supply of factor f,* $QINT_{ca}$ = *quantity of c used in activity a,* $FSAV$ = *foreign savings,* $irepat$ = *investment surplus to ROW,* $yfrepat_f$ = *factor income to ROW, EG= government expenditure,walras= dummy variable,* $tr_{i.row}$ = *transfer to institution to ROW,* cpi = *consumer price index,* $cwts_c$ = commodity weight in CPI.

The basic model of my study consists 14 sectors, four institutional agents, two primary factors production, and the rest of the world (ROW). The 14 sectors where aggregated from the 2009 Algerian Input-Output table that initially comprised of 22 sectors. The benchmark model representing the baseline economy is constructed using the social accounting matrix of Algeria 20009 as shown in Table 1. For the sectors each sector is assumed to produce a single composite commodity for the domestic market and for ROW. There are four domestic final demand sectors. They are household, enterprise, government and an agent that allocate saving over investment demand from all production sectors. These institutions obtain products from both domestic production sectors and ROW (imports).

Table 1: Sectoral Aggregation of Algerian Social Accounting Matrix (SAM) for year 2009(DZD thousand)

	A	C	L	C	H	E	G	S-I	Ytax	Tva	Tariff	ROW	Total
Activities		13759741											13759741
Commodities	4403061				3922963		1862704	4545845				3427170	18161745
Labor	8273639												8273640
Capital													
Household			5286439		7052	29228	1102359					25387	6450466
Enterprises				2986615		5277	542227					14000	3548120
Government	1083040				797552		701887		1984716	542063	169055	598871	5877188
Saving - Investment					1514413	1601408	1430023						4545845

Income tax					205540	1779176							1984716
Sales tax		542063											542063
Tariff		169055											169055
ROW		3690885	585		2943	133029	237986						4065430
Total	13759741	18161745	8273640		6450466	3548120	5877188	4545845	1984716	542063	169055	4065430	
Source: Author													

All producers are assumed to maximize profits and each faces a two-level nested Leontief and Cobb-Douglas production function (Lofgren, et al, 2002). Each commodity is produced by Leontief technology using intermediate input from various production sectors and primary inputs (labour and capital). The primary inputs are determined by Cobb-Douglas production function. To capture features of intra-industry trade for a particular sector, domestic products and products from ROW within the sector are assumed to be imperfect substitutes and their allocations are determined according to Armington CES (constant elasticity of substitution) function. On the supply side, output allocation between the domestic market and ROW are according to constant elasticity of transformation (CEF) function. On the demand side, a single household is assumed. The household is assumed to maximize utility according to Cobb-Douglas utility function subject to income constraint. Consumption demand for a sector's product is also a CES function of the domestically produced and imported product. Government expenditure is specified as exogenously determined. Sectoral capital investments are assumed to be allocated in fixed proportions among various sectors. In terms of macroeconomic closure, investment is saving-driven and capital is assumed mobile across activities and fully employed. Labor is also fully mobile at fixed wage. Both factors are available in fixed supplies. Factor incomes are distributed to household and enterprise on the basis of fixed shares (derived from base-year data). Outputs are demanded by the final demand agents at market-cleaning prices and exchange rate is assumed flexible.

3. Simulation design and model results

3.1 Description of the simulation

This section presents the results obtained from different policy simulations carried out using the CGE model developed for this study purpose. The simulations carried out are mostly based on the realistic situation of the economy and tried to fit with the trend of the economy.

The scenario 1, reduction/elimination of tariff, is carried out as a major thrust of the economic policy reform still has to be carried out, which has been promised by government of Algeria and has been pressed by both the IMF and World Bank. This

simulation was carried out in four steps; scenarios 1a and 1b are 50 percent and 70 percent reduction of import tariffs respectively. The scenario 1c is the full liberalisation, i.e., elimination of tariff in all in the importing sector. In this simulation, tariff adjustment is done in three small steps in order to differentiate the intensity of the effects. Finally in fourth step (scenario 1d), the loss in revenue due to elimination of tariff was adjusted in order to maintain the neutrality of the government revenue. The fall in government revenue due to elimination of tariff is adjusted through increasing corporate tax rate and income tax rate in the model economy.

In scenario 2, 10 percent devaluation of real exchange rate is simulated to test the impact on the domestic economy. Exchange rate is one of the major trade policy instruments often used to correct the current account deficits and also to maintain international reserve. The exchange rate can be manipulated as a tool to promote tradables, and a more diversified production and export structure.

Scenario 3 is accordingly designed to analyse sector specific export price shocks for petroleum, which has special policy implication for the economic sectors performance. Given the importance of the hydrocarbon sector in the Algerian economy. We used the model to shock in the export price of oil, By making two types of simulation, the former is the rise of price by 20 percent, while the second simulation relates to decline prices of oil by 50 percent.

Finally the impact of technological change in the agricultural sector is carried out by changing the efficiency parameter in the value-added function for the agriculture sector in simulation 4. The principal objective of this simulation is to examine the linkages of agricultural productivity growth on non-agricultural sectors. Simulation experiments are listed in table and the corresponding simulation results are presented sequentially.

Table 2: scenario codes and definition of the simulation

Scenario codes	Simulation specifications
Scenario 1	Reduction/elimination of import tariff to increase competitiveness of the economy and to reduce/eliminate anti-export bias
Scen 1a	50% reduction of import tariff, ceteris paribus.
Scen 1b	70% reduction of import tariff, ceteris paribus.
Scen 1c	100% reduction of import tariff, ceteris paribus.
Scen 1d	Elimination of import tariff with adjustment of corporate and income taxes to maintain neutrality of government revenue.
Scenario 2	10 percent devaluation of the real exchange rate, ceteris paribus.
Scenario 3	Petroleum price shock in the international market
Scen 3a	Increasing the world price of hydrocarbons (sector 3) by 20 percent.
Scen 3a+1c	Simultaneously increasing the world market price of hydrocarbons (sector 3) and elimination the tariff in all importing sectors.
Scen 3b	
Scen 3b+1c	Decreasing the world price of hydrocarbons (sector 3) by 50 percent.
Scenario 4	Simultaneously decreasing the world market price of hydrocarbons (sector 3) and elimination the tariff in all importing sectors.
Scen 4+1c	Increasing the production efficiency parameter in the agriculture sector by 10 percent to test the impacts on the other sectors of the economy. Simultaneously increasing the efficiency by 10 percent and elimination the tariff in all importing sectors.

3.2 Model results and discussion

A CGE model is used to analyse Algerian's economic situation if the country moves further to more liberalisation trading system and how the economy could react with different external shocks. The principal database for the model is the input output table of Algeria for 2009, from which 38x38 social accounting matrix is construction using other data.

Model results indicate that by reducing tariffs, domestic output increases in almost all the sectors and an elimination of tariff increases total domestic by 1.21 percent. This is because the elimination of tariff makes imports cheaper in the domestic market and imports increase. In Algeria, in the base year, about 60 percent of total imports are intermediate inputs, so a fall in prices increase the demand for imported inputs, and more of the inputs are used, which pushes the production up. Increase in output in aggregate agriculture is 1.17 percent and in aggregate industry and in aggregate services are 3.34 and 1.03 percents respectively. An increase in output increases the demand for labour and consequently total employment increase by 0.89 percent. Private consumption and absorption increases by 1.23 percent and 1.67 percents respectively. Nominal GDP increases by 0.98 percent.

In the external trade sector, imports rise due a fall in domestic prices on imports. Exports also increase showing the justification of the liberalisation and also supporting the argument that tariffs bias exports. But the increase in total import is bigger than the increase in exports which causes a deterioration of the real balance of trade, but the elimination of tariffs increase private consumption and total absorption. Government revenue and government savings decline under this scenario.

A 10 percent depreciation in the real exchange rate shows a mixed impact on the domestic output. Aggregate agriculture and aggregate service sector show a fall in output by 0.76 and 1.77 percents respectively, whereas the aggregate industrial sector shows an increase by 2.87 percent. But the fall in output is larger than the increase, causes a fall in the aggregate domestic output. GDP at factor cost also falls simultaneously with a fall in total absorption and private consumption by 0.64 and 0.97 percents respectively. Devaluation pushes the exports up in almost all the sectors and brings down import and improves the real balance of trade showing the justification of devaluation. A 10 percent devaluation in the real exchange rate improves real balance of trade by about 20 percent, but the devaluation causes transfer of resources from aggregate agriculture to aggregate non-agriculture. So the devaluation of the real exchange rate favours industry and service, whereas it disfavours agriculture.

In the scenario 3, the external price shocks to liberalize the economy, the increase in the world price of oil by 20 percent, led to increased production in most sectors, where the total increase was estimated at 3.59 percent, as well as an increase in total imports increased by 14.37 percent, while total exports known deficiency causing a deficit in the trade balance was estimated at 8.43 percent, while the impact on most economic variables are positive, where it knew an increase and improvement, such as, government income, private consumption and total investment that increased by 4.72, 5.69 and 12.05 percents respectively. While the drop in oil prices by 50 percent, resulting a decline in production in all sectors, an increase in exports and a decrease in total imports, which reflected negatively on all economic variables.

In the end, we conclude that the economic crisis caused by the decline in the global price of oil, Adversely affect the most sensitive economic sectors,, such as the hydrocarbon sector, construction and public works sector, Despite the relative improvement in some sectors such as the agricultural sector, in addition to the deterioration of the indicators that reflect the welfare such as income, consumption and also The high proportion of unemployment.

Fall in remittance work through fall in household's consumption and results in a fall in demand. Fall in demand brings the prices down and consequently, the production and employment down. Fall in remittances causes a fall in output both aggregate agriculture and aggregate service but the production in aggregate industry increases. Because the fall in output is greater than the increase, the net effect is the fall in aggregate output. Again, aggregate employment also fall as the wage rate and wage proportionality factors are both fixed in the model.

The impact of the change in productivity in agriculture influences the model economy positively at both sectoral and macro level. A shift in the scale parameter by 10 percent in the value added function is considered as a productivity improvement in the agriculture sector. This pushes total output, exports, imports and consumption up. Increase in output and employment in the non-agriculture sector is also significant. The effects are more positive when tariff is removed.

Conclusion

Appropriate policy measures should be taken to reap the maximum benefit of trade policy liberalization as the farming community responds positively with it. Under various types of institutional difficulties, market imperfections, lack of infrastructural facilities, without active policy support and careful participation of the government in the system, maximum benefit of the policy reform could not be reached to the farming community.

Although reduction of government expenditure is suggested in the structural adjustment programme, strong government supports for basic agricultural infrastructure is necessary for sustainable agriculture development.

Again, Algeria is a special case in the Arabic countries for its highly densed population and human capital development is one of the few options left for the country for future economic development.

In addition, public expenditure should be increased in order to increase the administrative efficiency. So, government expenditure should be categorized carefully to avoid non-productive expenditure to fit with the changing revenue condition.

Removal of tariff could further boost domestic production, promote export, raise employment level and GDP and could mitigate the effects of international price shocks through competitiveness of the economy. But the further opening up of the economy should be carefully associated with the access to the international market condition; otherwise, further elimination of tariff may not be fruitful.

Government revenue fall due to the reduction/elimination of tariff could be compensated by reducing net subsides to the corporate sector and also by increasing income tax in progressive way.

Economic performance in Algeria is still highly dependent on hudrocarbure production and productivity growth in agriculture has a highly positive impact on the whole of the economy. This way, the policies which increase investment in agriculture are particularly recommended.

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