A Dynamic Analysis of Jordan's Trade Liberalisation

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Key words: dynamic computable general equilibrium models, Jordan, trade liberalisation.

Abstract

This paper aims at providing a qualitative and quantitative assessment of the effects of establishing a free trade area between the European Union (EU) and Jordan, under the framework established by the Euro-Mediterranean Partnership. In order to capture intertemporal effects brought about by trade liberalisation on the Jordanian economy, a dynamic CGE model is specified and is calibrated to the Jordanian economy. The effects of broad, i.e. non-discriminatory, opening up of Jordanian trade are also computed. Fiscal measures are necessary to counteract the fall in government revenue. Their impacts are investigated in additional scenarios of trade liberalisation.

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1 Introduction

The Euro-Mediterranean Association Agreement between Jordan and the European Union (EU) was signed in November 1997. It is part of a larger programme, the Euro-Mediterranean Partnership, that began with the 1995 Barcelona Declaration and involves through a network of bilateral relations the EU and countries in the Middle East and North Africa (MENA) region[1]. The Euro-Jordanian Association Agreement entered into force on May 1st, 2002, after ratification in national parliaments of all EU member states, and replaces the 1977 Cooperation Agreement. The Association Agreement allows imports into the EU of Jordanian products free of custom duties and free of quantitative restrictions, with the exclusion of agricultural products. Custom duties and charges on imports into Jordan of EU products are progressively abolished, and duties on agricultural products are gradually and partially eliminated. The Agreement aims eventually at creating a free-trade area between the EU and Jordan within 12 years by its entry into force.

Trade liberalisation in the form of a preferential trade agreement (PTA) with the EU is expected to provide benefits for Jordan in terms of trade creation, and lower consumer prices, that bring about a rise in welfare, and increased competition in the domestic economy. A key role in such a process is played by investment demand, that is potentially important to the dynamic behaviour of output over the long-run (Francois et al., 1997). On the other hand, trade liberalisation has some unpleasant effects on Jordan's economy. There is clearly a loss in government revenue, due to foregone import tariff duties. Such an impact is likely to be particularly strong for Jordan, where government revenue relies heavily on custom duties[2]. The magnitude of the adverse effects will be influenced by the measures taken by the Jordanian government to counteract the effects of revenue loss. Ideally, trade liberalisation ought to be accompanied by an appropriate and parallel process of economic reforms, such as modernisation of the tax system and broadening of the tax base in order to offset the loss in custom duties. As measures of fiscal reform, the Jordanian government has harmonised the General Sales Tax (GST) rates on domestic and imported goods, has replaced the GST, introduced in 1994, by a Value-Added-Tax(VAT)-like sales tax in 2000, and has undertaken an income tax reform in 2001.

[1] The countries involved in the Euro-Mediterranean Partnership are Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, the Palestinian Authority, Syria, Tunisia and Turkey.

[2] Import duties in Jordan averaged more than one-third of total tax revenue and about 6% of GDP in period 1994-96 (Abed, 1998).

A trade policy issue playing a role in Jordan's trade liberalisation is the debate about global versus regional integration (Winters, 1996). Whereas there is wide empirical evidence that economic growth rates and trade liberalisation are positively related (Sachs and Warner, 1995), there is further evidence supporting the view that non-discriminatory trade openness leads to higher growth than preferential trade liberalisation does (Vamvakidis, 1998). Moreover, preferential trade liberalisation is likely to cause trade diversion, that is a diversion of Jordanian imports from more efficient non-EU countries to more costly EU producers. The policy implications for Jordan therefore suggest that broad and non-discriminatory openness would be more beneficial than regional integration (Hoekman and Djankov, 1997, Ghesquiere, 1998). A multilateral liberalisation process would avoid the costs of trade diversion, although it would clearly further reduce government revenues, and hence require additional compensatory fiscal measures.

Jordan has joined the World Trade Organisation (WTO) in April 2000, after starting the process of regional integration with the EU. It could be noticed that preferential trade agreements (PTAs) depart from the non-discriminatory principle of the WTO and are therefore conflicting with the WTO "most-favoured nation" (MFN) rule. However, WTO members are allowed, under specific conditions, to set up custom unions and free trade areas. In order to foster South-South economic integration, Jordan, Egypt, Morocco and Tunisia have established in May 2001 the Mediterranean Arab Free Trade Area (the so-called "Agadir" process). Jordan has also signed bilateral FTAs with several countries in the MENA regions, and is a member of the Arab Free Trade Area Agreement, with other 13 countries who are members of the Arab League. As a step towards even broader trade liberalisation, Jordan concluded FTAs with the United States in October 2000 (entered into force in December 2001), and with the European Free Trade Association (EFTA) in June 2001 (inton force since September 2002).

Previous studies on Jordan's trade liberalisation by Hosoe (2001) and by Lucke (2001) have investigated the effects of opening up Jordanian trade by using static computable general equilibrium (CGE) models. Hosoe simulated the impacts of two trade policy scenarios for Jordan, the Uruguay Round implementation and the establishment of a free trade area with the EU, by using a model based on Devarajan et al. (1990). Simulation of the Uruguay Round shows that its implementation would lead to trade creation in imports and exports and would increase Jordan's welfare by 0.28%. The EU-Jordan FTA scenario would further increase Jordan's welfare by 0.16%, would increase the two-way trade between the EU and Jordan, but it would determine trade diversion favourable for EU imports. The work by Lucke

focuses on fiscal effects of the EU-Jordanian Association Agreement, and discusses fiscal responses aiming at overcoming the loss in government revenue, such as introducing a VAT, simplifying and harmonising tax rates, and broadening the tax base.

The main objective of this paper is the assessment of dynamic effects on the Jordanian economy of establishing a free-trade area between the EU and Jordan. Using a dynamic computable general equilibrium (CGE) model, the impacts of gradually decreasing and eventually eliminating tariff barriers in Jordan for EU goods are estimated. As pointed out above, the beneficial impacts of the preferential trade agreement with the EU on the Jordanian economy are expected through trade creation and increase in the efficiency. However, there may be the need of taking appropriate fiscal measures to counterbalance the adverse effects brought about by trade liberalisation. Therefore, the impact of discriminatory trade openness is assessed together with accompanying fiscal actions, such as the harmonisation of the GST rate on domestic goods and imports. Finally, the results simulating a PTA with the EU are compared with the effects of non-discriminatory trade liberalisation. The paper is structured as follows: Section 2 describes the model, Section 3 concerns data and calibration, Section 4 examines the results of simulations, and Section 5 draws the conclusions.

2 The model

The model implemented is a simple neo-classical open-economy model. It is based on Devarajan and Go (1998), which is an extension of the static "1-2-3" model by Devarajan et al. (1997). Discounted lifetime utility of the whole population is maximised by choosing optimal consumption and investment paths. Firms produce one good. Perfect competition and full employment are assumed. International trade flows are characterised by imperfect substitution between domestic and foreign goods. The final good Q is allocated across domestic sales D and exports E through a constant elasticity of transformation (CET) function. Total absorption X is differentiated among four uses - private consumption X_{PC}, government consumption X_{GC}, intermediate input X_{AQ}, investment X_{IC} - and is an Armington composite of domestic good D and imported good M. The parameters in the Armington functions are the same for all uses, as well as prices. The domestic country is assumed to be a price-taker in the international markets, that is world prices of imports and exports are exogenously determined, and the domestic rate of return to capital is given by the exogenous and fixed world

interest rate.

2.1 Consumers

On the demand side, consumers choose consumption and new capital so as to maximise expected discounted lifetime utility of the whole population L, subject to the budget constraint, the motion equation of capital, the equality between savings and investment, and the given initial capital stock. The optimisation problem is therefore:

$$\max_{\{X_{t,PC},K_{t+1}\}} U = L_0^{\nu} \sum_{t=0}^{\infty} \left[\frac{(1+n)^{\nu}}{1+\rho}\right]^t \frac{X_{t,PC}^{1-\nu}}{1-\nu} \tag{1}$$
$$\rho > 0,\ \nu > 0,\ \nu \neq 1$$

subject to

$$P_t^X X_{t,PC} = Y_t \tag{2}$$

$$X_{t,IC} = K_{t+1} - (1-\delta)\, K_t,\ 0 < \delta < 1 \tag{3}$$

$$P_t^X X_{t,IC} = PS_t + GNS_t + FNS_t \tag{4}$$

$$K_0 = \bar{K}_0 \tag{5}$$

where $X_{t,PC}$ and K_t are real aggregate private consumption and real aggregate capital in period t, L_0 is the initial number of identical consumers, i.e. labour force, n is the exogenous rate of growth of labour, Y is total net nominal income, ρ is the rate of time preferences at which consumers discount future utility, ν is the inverse of the constant elasticity of substitution between consumption at any two points in time, P^X is the supply composite price index, δ is the constant capital depreciation rate, X_{IC} is real investment, PS is personal saving, GNS government net saving, FNS foreign net saving, and $\bar{K}_0$ is the given initial level of capital stock.

Net nominal income Y_t is defined as

$$Y_t = \left(1 - t_t^Y\right) w_t L_t + \left(1 - t_t^K\right) r_t K_t + P_t^X GT_t - PS_t + FL_t + FK_t + FR_t \tag{6}$$

where L_t is labour supply at period t, w is the nominal wage rate, t^K is the capital rent tax rate, r is the nominal rate of return to capital, that equals the exogenous world interest rate i. The variables GT, real government transfer to consumer, FL, foreign labour income, FK, foreign capital income, and FR, foreign remittances, are growing in the benchmark equilibrium at the exogenous rate n.

Solution of the above maximisation problem yields the intertemporal condition for household consumption:

$$\frac{X_{t+1,PC}}{X_{t,PC}} = \left[\frac{\left(1 - t_{t+1}^K\right) \frac{r_{t+1}}{P_{t+1}^X} + (1 - \delta)}{(1 + \rho)} \right]^{\frac{1}{\nu}} \tag{7}$$

Household consumption $X_{t,PC}$ is in turn a composite of domestic and import goods, modelled through the standard Armington (1969) assumption of constant elasticity of substitution (CES) between domestically-produced goods and imports. Households choose the optimal level of domestic and import goods, by taking the Armington specification as constraint of the cost-minimisation static problem[3]:

$$\min_{M_{PC}, D_{PC}} P^X X_{PC} = P^{MF} M_{PC} + P^D D_{PC} \tag{8}$$

$$\text{s.t.} \quad X_{PC} = \Phi \left[\varepsilon \left(M_{PC}\right)^{\frac{\gamma-1}{\gamma}} + (1 - \varepsilon) \left(D_{PC}\right)^{\frac{\gamma-1}{\gamma}} \right]^{\frac{\gamma}{\gamma-1}}, \; 0 < \varepsilon < 1 \tag{9}$$

where P^{MF} and P^D are the consumer prices - i.e. they are inclusive of all taxes and import duties - of imported and domestic consumption good; γ is the elasticity of substitution between domestic goods and imports, Φ is the shift parameter and ε is the imports share parameter.

Reflecting the structure of the Social Accounting Matrix (SAM), aggregate imports of consumption goods are then disaggregated across three

[3] For simplicity the time index in static equations is from now on dropped.

regions, i.e. Arab countries[4], the EU and the rest of the world, through a Cobb-Douglas specification. The optimisation problem for the households is given by:

$$\min_{\{MC^j_{PC}\}} P^{MF} M_{PC} = \sum_j P^{MFj} M^j_{PC} \tag{10}$$

$$\text{s.t.} \quad M_{PC} = \Phi_M \prod_j \left(M^j_{PC}\right)^{\varepsilon_j}, \ \sum_j \varepsilon^j = 1 \tag{11}$$

where M^j_{PC} is households consumption of foreign good imported from region $j = AR, EU, RW$, P^{MFj} is the price of good imported from region j, Φ_M is the shift parameter, and ε^j is the share parameter of imports from region j. The elasticity of substitution between imports is therefore constant and equal to one, being the Cobb-Douglas specification a particular case of CES function.

2.2 Firms

On the supply side, constant returns to scale and perfect competition are assumed. Total output in the domestic economy Q is determined by a two-stage production process, which exhibits at the top tier a fixed-proportions, or Leontief, specification between intermediate input X_{AQ} and value-added output F:

$$Q = \min\left\{\frac{F}{a_1}, \frac{X_{AQ}}{a_2}\right\} \tag{12}$$

where a_1 and a_2 are the fixed requirements of valued-added output F and intermediate input X_{AQ}, respectively, for production of aggregate output Q.

At the second tier, intermediate input X_{AQ} is an Armington composite of domestic and foreign intermediate consumption goods, D_{AQ} and M_{AQ}. Value-added production is determined by a technology that allows for substitution between the two primary inputs, capital K and labour L:

[4] Arab countries are Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan's Free Trade Zone, Kuwait, Lebanon, Lybia, Mauritania, Morocco, Oman, Palestinian Authority, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, the United Arab Emirates and Yemen.

$$F = A\left[\alpha L^{\frac{\sigma-1}{\sigma}} + (1-\alpha)\,K^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}},\ 0<\alpha<1,\ \sigma>0,\ \sigma\neq 1 \tag{13}$$

where A is the time-invariant technological parameter, α is the labour share parameter, and σ is the constant elasticity of substitution between labour and capital. The representative firm maximises value-added profit, given by

$$\Pi = P^V F - (wL + rK) \tag{14}$$

Total production Q can be sold on the domestic market or abroad. Total exports and domestic sales are modelled according to a constant elasticity of transformation (CET) function, that represents the constraint for the producer maximising total sales:

$$\max_{E,D^S} PP^Q Q = P^E E + PP^D D \tag{15}$$

$$\text{s.t.}\quad Q = \chi\left[\theta E^{\frac{1+\psi}{\psi}} + (1-\theta)\,D^{\frac{1+\psi}{\psi}}\right]^{\frac{\psi}{1+\psi}} \tag{16}$$

where Q is total domestic production, E is total exports, D is supply of aggregate domestic good, PP^Q is producer output price (i.e. net of taxes), P^E is producer exports price (which equals the world price of exports PW^E, given the absence of export subsidy), PP^D is producer domestic sales price (i.e. net of GST), θ is the export share parameter, χ is the shift parameter, and ψ is the elasticity of transformation between domestic good and export good, with $\psi > 0$.

Given the exports disaggregation provided by the SAM, total exports are allocated across three trading partners - Arab countries, the EU and the rest of the world - by means of the optimisation problem, in which a Cobb-Douglas specification is adopted:

$$\max_{\{E^j\}} P^E E = \sum_j P^{Ej} E^j \tag{17}$$

$$\text{s.t.}\quad E = \chi_E \prod_j \left(E^j\right)^{\theta_j},\ \sum_j \theta^j = 1 \text{ for } j = AR, EU, RW \tag{18}$$

where total exports E is given by regional exports E^{AR}, E^{EU} and E^{RW}, $P^{E,j}$ are producer export prices (all of them equal to PW^E), χ_E is the shift parameter, θ^j is the share parameter of exports to region $j = AR, EU, RW$, and PE^j is the producer price of exports to region j.

The zero-profit condition for the representative firm ensures there is no extra-profit:

$$P^Q Q = P^X X_{AQ} + P^V F + gstdPP^D D \tag{19}$$

Intermediate inputs X_{AQ} and investment goods X_{IC} are characterised by a CES Armington specification between domestic goods and total imports and by a Cobb-Douglas function for disaggregated imports. Given that functional parameters and prices are the same for all kinds of uses, optimal intermediate inputs and optimal investment are determined by (8)-(11), with the subscript AQ and IC replacing PC.

2.3 Government

The government consumes an exogenous amount of good, raises taxes and tariffs, provides a transfer to consumers, and borrows money at the world interest rate. Government consumption is given by (8)-(11), with the index GC replacing PC. Government revenue comes from a General Sales Tax (GST), that applies with different rates to domestic and imported goods ($gstd$ and $gstm^j$, for $j = AR, EU, RW$), a tax on capital rent (t^K), an income tax (t^Y), import duties, that apply with three different rates to Arab countries, the EU and the rest of the world (tm^j), and foreign grants FG. The expenditure is given by transfer to household GT, consumption of good X_{GC}, payment abroad GP, and net saving GNS. The government budget constraint is therefore given by:

$$\begin{aligned} t^K rK + t^Y wL + gstdPP^D D + PW^M \sum_j tm^j M^j \\ + PW^M \sum_j \left(1 + \sum_j tm^j \right) gstm^j M^j + FG = P^X GT \\ + P^X X_{GC} + GP + GNS \end{aligned} \tag{20}$$

for $j = AR, EU, RW$.

Government net saving is the difference between gross government saving and interest payment on current government debt, i.e.

$$GNS_t = GSAV_t - i_t GDEBT_t \tag{21}$$

2.4 Market-clearing conditions

The balance of payments is:

$$PW^M M + GP = PW^E E + FL + FK + FR + FG + FNS \tag{22}$$

where foreign net saving FNS is gross foreign saving at the net of interest payment on current foreign debt:

$$FNS_t = FSAV_t - i_t FDEBT_t$$

The market clearing conditions for the equilibrium in the good, labour and investment markets are:

$$X = X_{PC} + X_{GC} + X_{AQ} + X_{IC} \tag{23}$$

$$L_t = (1+n)^t L_0 \tag{24}$$

$$P^X X_{IC} = PS + GNS + FNS \tag{25}$$

2.5 Dynamic equations

Capital evolves over time according to the following motion equation:

$$K_{t+1} = (1-\delta) K_t + X_{t,IC} \tag{26}$$

Government debt dynamics is given by

$$GDEBT_t = (1+i_{t-1}) GDEBT_{t-1} - GSAV_{t-1} \tag{27}$$

and foreign debt changes over time according to

$$FDEBT_t = (1+i_{t-1}) FDEBT_{t-1} - FSAV_{t-1} \tag{28}$$

3 Data and Calibration

The dataset is based on the Social Accounting Matrix (SAM) for Jordan constructed by Lucke (2001). The SAM is based on 1998 data and uses the input-output coefficient matrix updated to 1987. The original SAM has 12 production sectors, which have been aggregated into one. The base-year dataset is assumed to reflect a steady state economy, i.e. an economy in which all relevant variables grow at constant rates. Then parameters are calibrated in order to obtain a solution reproducing the benchmark equilibrium. All variables are then scaled, such that the initial labour force is normalised to one, i.e. $L_0 = 1$. The world prices of export PW^E and import PW^M are exogenously fixed to one. The net-of-taxes domestic sales price PP^D, the value-added price P^V and the wage rate w are initialised to one. The rate of return to capital r is set equal to the exogenous world interest rate $i = 0.1$. Real variables are then derived from the base-year nominal variables provided in the SAM.

Exogenous values, such as elasticities, are taken from estimates in the existing literature, and are shown in Table 1.

Elasticity	Value	Source
Substitution bw domestic good and import (γ)	0.6	Devarajan et al. (1997)
Substitution bw domestic good and export (ψ)	6.867	Devarajan et al. (1999)
Substitution bw labour and capital (σ)	0.9	Devarajan and Go (1998)
Inverse of subst consumption (υ)	0.9	Devarajan and Go (1998); Blanchard and Fischer (1998)

Table 1. Elasticities values.

After setting exogenously the elasticity values, the share and shift parameters of the Armington, CET and Cobb-Douglas specifications and the value-added specification are computed by making use of the relevant first-order conditions. The SAM provides the values regional imports without distinguishing among the use of the imported good, i.e. it provides the values of total import from region j, M^j, but it does not provide the values of import of consumption good i from region j, M_i^j. Such values are derived after calibrating the Armington parameters.

The fixed-proportion coefficients of the Leontief specification are calibrated as follows:

$$a_1 = \frac{F_0}{Q_0}, a_2 = \frac{X_{0,AQ}}{Q_0} \tag{29}$$

The assumption of steady state allows to calibrate the dynamic parameters δ and ρ. From the capital accumulation equation and from the steady-state condition $K_{t+1} = (1+n) K_t$ the depreciation rate of capital is:

$$\delta = \frac{X_{ss,IC}}{K_{ss}} - n \tag{30}$$

The steady-state intertemporal condition for private consumption allows then to calibrate the consumers' discount rate as:

$$\rho = \left(1 - t_0^K\right) \frac{r_0}{P_0^X} - \delta \tag{31}$$

The two steady-state conditions apply also as terminal conditions.

4 Simulations

The model is implemented by means of the mathematical software GAMS (General Algebraic Modeling System). Many dynamic scenarios of opening up Jordanian trade can be considered. The main one is, of course, that provided by the EU-Jordan Agreement. The Agreement establishes the schedule for the gradual reduction of Jordanian tariff rates on EU-imports. There are four groups of goods subject to different tariff-reduction schedules. Reduction of import charges on import into Jordan of agricultural products from the EU listed in Annex II of the Association Agreement are set to follow a schedule in which the tariff rate begins to decrease gradually four years after the date of entry into force of the Agreement and it is finally fixed to 50% of the basic duty after eight years after the date of entry into force. A group of non-agricultural goods - included in List A of Annex III of the Agreement - have their tariff rate reduced by 20% in four steps in the three years following the date of entry into force of the Agreement and abolished afterwards. List B of Annex III includes EU-imported goods on which custom duties are reduced gradually beginning four years after the date of entry into force of the Agreement, and finally set to zero twelve years after the entry into force of the Agreement. For products other than those above, custom charges shall be abolished upon the entry into effect of the Agreement. However, the Agreement allows the parties to re-negotiate the tariff dismantlement for some products four years after the entry into force of the Agreement.

Table 2 shows in details the timetable of custom duty reduction for the three groups of goods that follow a gradual process of trade liberalisation. The numbers in the left column show the number of years after the date of entry into force of the Association Agreement (AA), and the figures in the

remaining columns indicate the percentage of the base-year duty charged in the relevant period.

period	Annex II	List A Annex III	List B Annex III
entry into force of the AA	100	80	100
one year after entry into force	100	60	100
two years after entry into force	100	40	100
three years after entry into force	100	20	100
four years after entry into force	90	0	90
five after entry into force	80	0	80
six years after entry into force	70	0	70
seven years after entry into force	60	0	60
eight years after entry into force	50	0	50
nine years after entry into force	50	0	40
ten years after entry into force	50	0	30
eleven years after entry into force	50	0	20
twelve years after entry into force	50	0	0

Table 2. Association Agreement schedule.

Given that the model implemented has one import good, the exercise simulating the EU-Jordan Agreement can be carried out by setting the import tariff rate over time according to the average of the schedule provided by the Agreement. This implies reducing gradually the basic duty $tm_{\mathbf{0}}^{EU}$, beginning in period 1 - when the AA enters into force - until period 13, and then fixing the import charge for the next periods equal to that assumed in period 13, tm_{13}^{EU}.

To see the immediate impact of a change in one or more of the import duties, consider the first-order conditions for the Armington specifications of consumption good i

$$\frac{M_i}{D_i} = \left[\frac{\varepsilon P^D}{(1-\varepsilon) P^{MF}}\right]^{\gamma} \tag{32}$$

and the lower-tier first-order conditions for regional imports

$$\frac{M_i^j}{M_i^k} = \frac{\varepsilon^j}{\varepsilon^k}\frac{P^{MFk}}{P^{MFj}} \tag{33}$$

where $j,k = AR, EU, RW$.

The regional import prices are defined as

$$P^{MFj} = PW^M \left(1+tm^j\right)\left(1+gstm^j\right)$$

where tm^j is the tariff rate on products imported from region j and $gstm^j$ is the GST rate applied to region-j imports. Hence, ceteris paribus, from (33)

it follows that regional imports M_i^j are decreasing in the consumer regional imports price P^{MFj}. Since P^{MF} is a composite price, made up of the three regional import prices $P^{MF,AR}$, $P^{MF,EU}$ and $P^{MF,RW}$, a fall in one or more import tariff rates will clearly decrease the respective regional import prices and also the composite import price. Therefore, due to a reduction in one import tariff rate, the value of all sectoral imports of the region the custom duty of which has been reduced will rise, and aggregate imports will increase as well. A reduction in the tariff rate on EU imports, tm^{EU}, can induce a trade creation effect, since more-competitive output from the FTA partner (i.e. the EU) might replace high-cost Jordanian production. On the other hand, discriminatory opening up of trade can have a trade diversion effect, which arises when import is diverted from third-country low-cost production to higher-cost production from the partner country.

The fall in domestic prices boosts directly demand, investment goes up and output will increase in the long-run. The loss in government revenue due to the import duty reduction is partially offset by the expansion in the tax base. The government must compensate the fall in revenue by undertaking counteracting fiscal measures, such as an increase in the domestic tax rates.

As pointed out above, a non-discriminatory process of trade liberalisation would ensure that no trade diversion effect takes place, and is likely to be more welfare-increasing. On the other hand, it would also decrease further government revenue, and would force the government to implement even more painful fiscal measures.

The first scenario considered is one in which the FTA with the EU is implemented, together with the harmonisation of the GST rates and the endogenisation of the capital tax rate. The FTA with the EU increases welfare by 2.52%. Imports per head of EU good into Jordan in the new steady state are 24% higher than in the benchmark equilibrium, while imports per head from Arab countries and from the rest of the world in the final steady state go up by 12.5%. Figure 1 shows the dynamics of the detrended levels of imports.

The same schedule of import duties reduction can be applied to the scenario of non-discriminatory trade liberalisation, with the harmonisation of GST rates and the endogenisation of t^K. As expected, the process of broad trade openness is more welfare-enhancing than the process of prefential trade openness. Welfare rises by 2.7%. The steady-state increase in imports per head from the EU is slightly lower than before, being now 22.8%. Per capita imports from the rest of the world rise in the steady state relatively to the reference run by 17%, and detrended imports from the Arab countries in the steady state are 19.3% higher than the benchmark value. Figure 2 depicts

detrended imports under the full liberalisation scenario relatively to the benchmark equilibrium.

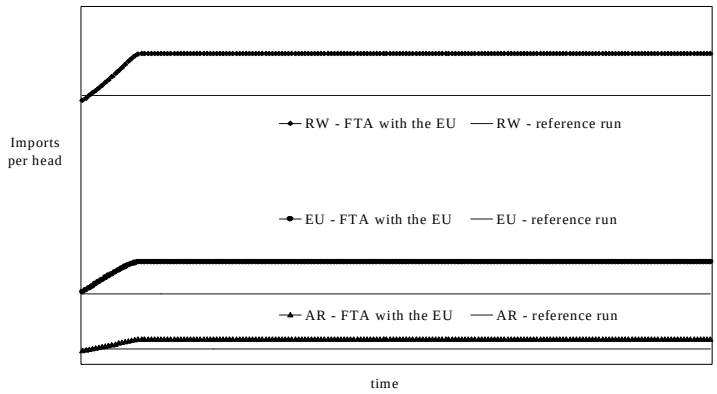

Figure 1. Imports per head under the FTA scenario.

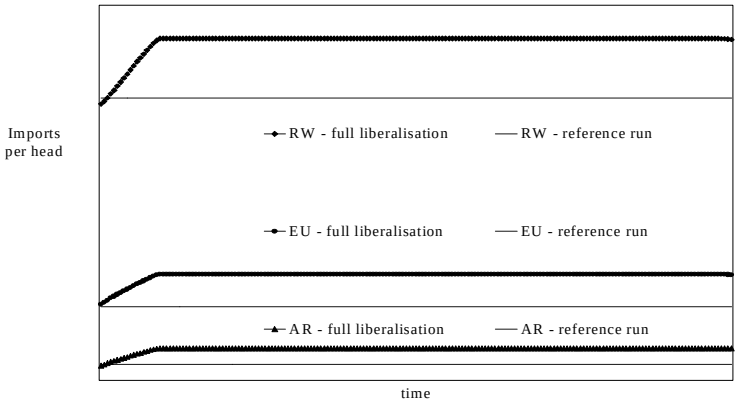

Figure 2. Imports per head under full liberalisation.

As shown in Figure 3, the growth of capital per head under the full liberalisation scenario is higher than under the FTA with EU. Capital per capita reaches under full liberalisation a steady-state level which is 11.4% larger than the benchmark equilibrium. The steady-state increase in the case of preferential trade liberalisation is some 8%..

Figures 4 and 5 show respectively the dynamics of consumption per head and investment per head under the scenarios of prefential trade agreement and full liberalisation. Opening up domestic trade in a non-discriminatory way leads to a larger fall in domestic prices, and therefore to higher long-run levels of investment per head and consumption per head.

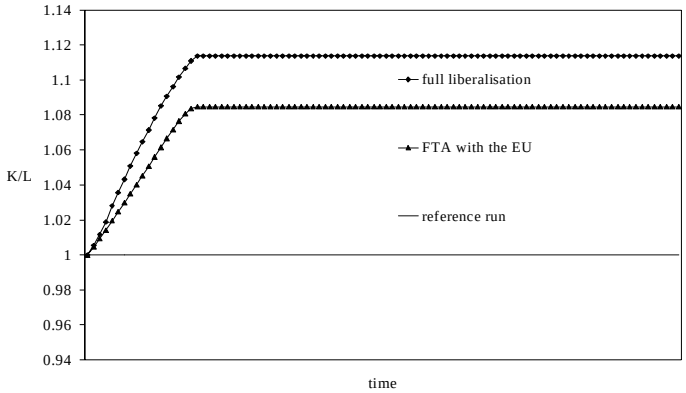

Figure 3. Capital per head.

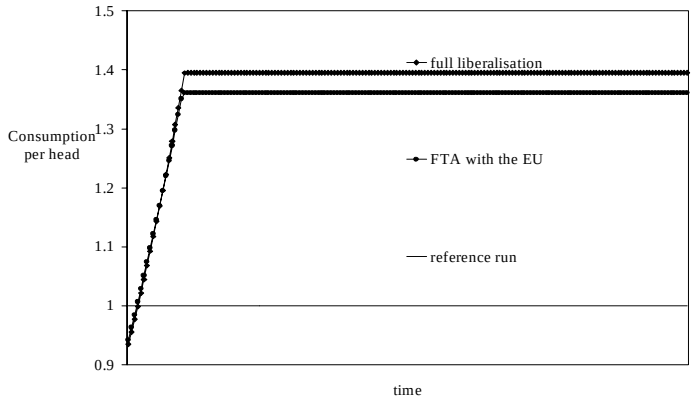

Figure 4. Consumption per head.

Finally Figure 6 shows the effect of trade liberalisation on GDP per head. The detrended level of GDP rises sharply under both scenarios. The final steady-state levels are 6.4% higher than the benchmark value under broad liberalisation, and 5% under the FTA with the EU.

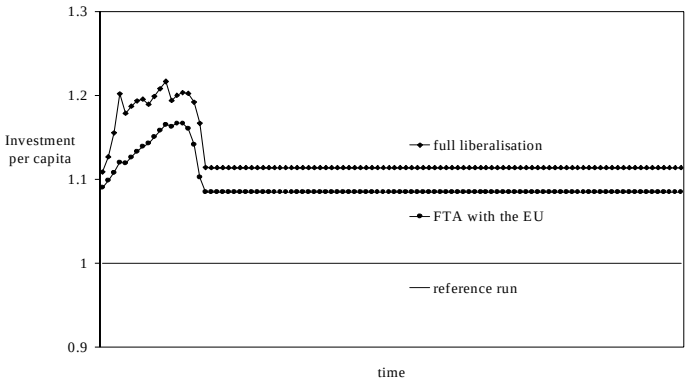

Figure 5. Detrended investment.

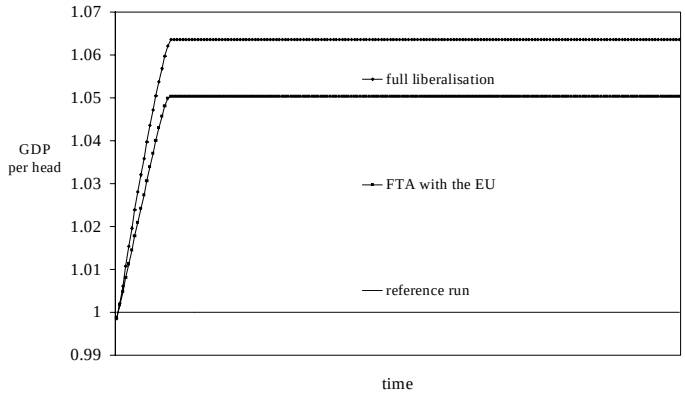

Figure 6. GDP per head at constant prices.

5 Conclusions

This paper has assessed the bilateral trade liberalisation process undertaken by Jordan by means of a simple dynamic CGE model. The implications for the Jordanian economy of the PTA with the EU have been analysed, and the outcomes have been then compared with those yielded by a process of non-discriminatory trade liberalisation. The main conclusion is that non-discriminatory import tariff reduction raises welfare more than a PTA with the EU does, as suggested by economic theory.

In spite of its simplicity, this model captures the long-run effects on Jordan of opening up domestic trade. On the other hand, this simple dynamic model has some drawbacks. It has only one productive sector, and it assumes perfect competition. Scope for future research will be therefore to extend the number of production sectors in the domestic economy, in order to as-

sess intersectoral effects of trade liberalisation, to include non-competitive behaviour of firms.

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