# Trade Liberalisation with Trade Induced Technical Change in Morocco and Egypt: Findings and Wider Research Implications

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# Abstract

Since the Barcelona Declaration of 1995, the EU and the countries of the Southern Mediterranean, referred to here as the Mediterranean and North African or MENA countries, have been engaged in a more active process of integration and trade liberalisation. Whereas prior to 1995 the relationship was primarily asymmetric, the Barcelona process envisaged trade relations becoming both more symmetric as well as deeper than heretofore. The context of these developments in the MENA countries is an explosion in the number of regional trade agreements in recent years. An analysis of such agreements and historical analysis of patterns of trade and formation of trade blocs in the post-war period suggests that RTAs can be categorised into three types: (1) bloc creation, (2) bloc expansion, (3) market access. (see Evans et al 2006). In assessing any regional trade agreement it is important to consider the impact of policies and trends affecting both "shallow" and "deep" integration. "Shallow" integration involves the lowering or elimination of barriers to the movement of goods and services across national borders within the region. Within this context "negative" integration entails the lowering trade barriers created by national policies. "Deep" integration: Involves establishing or expanding the institutional environment in order to facilitate trade and location of production without regard to national borders. In this context "positive" integration suggests policies designed to encourage trade and facilitate segmentation of production processes and value chains. An important component of such deep integration is Smithian trade induced technical change based on local scale economies and externalities.

This paper considers closer economic relations between Morocco and the EU, and Egypt and the EU. These agreements are primarily market access agreements but with some elements of deep integration. The primary methodology used is a regional Computable General Equilibrium (CGE) model referred to as the MENA CGE model, a methodology well suited to the analysis of shallow integration. In addition, two elements of deep integration included. First, preliminary econometric estimates of trade induced technical change are included in the MENA CGE model, based on (Gasiorek et al 2005 and 2006. The preliminary econometric results suggest a positive relationship between trade shares in output and total factor productivity change at the firm level. Second, some experiments designed to capture possible orders of magnitude of welfare gains from incorporating a degree of regulatory harmonisation product standards or process standards that may generate production externalities such as Smithian gains.

The trade induced productivity linkages were included in the MENA CGE model, based on (McDonald et al., 2005). This facilitated estimates of the impact of changes in tariffs and trade-induced technical change on from FTA's with the EU. In the case of Morocco, a direct estimate of poverty impacts was also made. The second element of deep integration from regulatory harmonisation considered was from notional increases in export supply elasticities for Egypt and Morocco, and for import demand elasticities for the EU.

Thus, the MENA CGE model experiments were designed to assess:

- the economy-wide impact of shallow integration in Morocco, Egypt and the EU on economic welfare assuming only the reduction of tariff barriers in a FTA with the European Union. Note that the FTAs considered are asymmetrical because EU tariffs on manufactured imports from Morocco and

Egypt have already been eliminated whilst Morocco and Egyptian protection against EU exports of manufactures that is eliminated in the FTAs is high.

- the economy-wide impact of trade policy reform together with deep integration in the form of trade-induced productivity changes using response elasticities based on the preliminary econometric findings reported in (Gasiorek et al 2005 and 2006).
- the economy wide impact of a broader trade policy reform with additional deep integration defined as a degree of harmonisation of standards inducing increased export supply elasticities in Egypt and Morocco and import demand elasticities in the EU.
- With respect to these policy experiments, we report on the impact of the simulations on aggregate performance (trade, GDP, absorption), on factor markets, and for Morocco, on poverty. Most experiments reported have a fixed wage for unemployed labour allowing for changes in unemployment of unskilled labour, , roughly reflecting high recorded base year levels of unemployment in both MENA economies.
- In our preliminary experiments, there was evidence of some trade diversion in Morocco, and strong trade diversion in Egypt, at base levels of MFN tariffs. Egypt has begun a process of reform of MFN tariffs and some additional experiments were conducted to estimate the impact of such MFN tariff reforms on economic welfare and trade diversion.

# 1. Introduction

## Aims and objectives of research

The research aims to:

- explore the relationship between productivity and trade liberalisation by looking at data over time using firm level data for Morocco over the 1990-2002 time period, and on sectoral level data for Egypt over the 1983-1994 time period.

- examine trade and productivity linkages for more detailed firm level data set for Morocco for the years 1997-1998.

- use the econometrically estimated linkages between changes in shares of output traded and productivity in a CGE model including Morocco and Egypt in a model of the MENA region in the world economy. This facilitated estimates of the impact of changes in tariffs and trade-induced technical change on from FTA's with the EU. In the case of Morocco, a direct estimate of poverty impacts was also possible.

## Background to the research

Since the Barcelona Declaration of 1995, the EU and the countries of the Southern Mediterranean, referred to here as the Mediterranean and North African or MENA countries, have been engaged in a more active process of integration and trade liberalisation. Whereas prior to 1995 the relationship was primarily asymmetric, the Barcelona process envisaged trade relations becoming both more symmetric as well as deeper than heretofore. The context of these developments in the MENA countries is an explosion in the number of regional trade agreements in recent years. An analysis of such agreements and historical analysis of patterns of trade and formation of trade blocs in the post-war period suggests that RTAs can be categorised into three types: (1) *bloc creation*, (2) *bloc expansion*, (3) *market access.* (see Evans et al 2006). In assessing any regional trade agreement it is important to consider the impact of policies and trends affecting both "shallow" and "deep" integration. "Shallow" integration involves the lowering or elimination of barriers to the movement of goods and services across national borders within the region. Within this context "negative"

integration entails the lowering trade barriers created by national policies. “Deep” integration: Involves establishing or expanding the institutional environment in order to facilitate trade and location of production without regard to national borders. In this context “positive” integration suggests policies designed to encourage trade and facilitate segmentation of production processes and value chains. An important component of such deep integration is Smithian trade induced technical change based on local scale economies and externalities.

This paper considers closer economic relations between Morocco and the EU, and Egypt and the EU. These agreements are primarily market access agreements but with some elements of deep integration. The primary methodology used is a regional Computable General Equilibrium (CGE) model referred to as the MENA CGE model, a methodology well suited to the analysis of shallow integration.

The first element of deep integration considered uses the preliminary econometric estimates of linkages between changes in shares of output traded and productivity reported in (Gasiorek et al 2005 and 2006) in the MENA CGE model based on (McDonald *et al*., 2005) and using the GTAPV6 dataset with a regional breakdown that includes Morocco and Egypt.. This facilitated estimates of the impact of changes in tariffs and trade-induced technical change on from FTA’s with the EU. In the case of Morocco, a direct estimate of poverty impacts was also made. The second element of deep integration from regulatory harmonisation considered was from notional increases in export supply elasticities for Egypt and Morocco, and for import demand elasticities for the EU.

The econometric findings on productivity and trade policy reform emphasise the richness of the estimation at the micro firm-level data. The preliminary results suggest a positive relationship between exports and trade – where the size of the coefficient depended both on the sector being considered, as well as the time period.

The MENA CGE model was used to assess:

- the economy-wide impact of shallow integration in Morocco, Egypt and the EU on economic welfare assuming only the reduction of tariff barriers in a FTA with the European Union. Note that the FTAs considered are asymmetrical because EU tariffs on manufactured imports from Morocco and

Egypt have already been eliminated whilst Morocco and Egyptian protection against EU exports of manufactures is high.

- the economy-wide impact of trade policy reform together with deep integration in the form of trade-induced productivity changes using response elasticities based on the econometric findings reported in (Gasiorek et al 2005 and 2006).
- the economy wide impact of a broader trade policy reform with additional deep integration defined as a degree of harmonisation of standards inducing increased export supply elasticities in Egypt and Morocco and import demand elasticities in the EU.
- With respect to these policy experiments, we report on the impact of the simulations on aggregate performance (trade, GDP, absorption), on factor markets, and for Morocco, on poverty. Most experiments reported have a fixed wage for unemployed labour allowing for changes in unemployment of unskilled labour, roughly reflecting high recorded base year levels of unemployment in both MENA economies.
- In our preliminary experiments, there was evidence of some trade diversion in Morocco, and strong trade diversion in Egypt, at base levels of MFN tariffs. Egypt has begun a process of reform of MFN tariffs and some additional experiments were conducted to estimate the impact of such MFN tariff reforms on economic welfare and trade diversion.

## CGE Modelling of RTAs and the MENA countries

A survey of over 100 computable general equilibrium (CGE) model studies of RTAs established in the last 15 or so years by Robinson and Thierfelder (2003) found overwhelming evidence that trade creation dominates trade diversion. Broadly speaking, the studies were of multi country RTA's facilitating shallow integration arising from the removal of barriers to trade in commodities. Changes in trade barriers affecting services were usually outside of the RTA's studied or outside the analyses with CGE models considered. In Egypt, several authors have used CGE models for the analysis of Egypt's regional trading relationships using static and dynamic, single and multi-country models of MENA countries, but not including specific modelling of

Egypt's major trading partners such as the USA and the EU. This rich Egyptian literature has been surveyed recently by El-Said (2005). The findings of the static CGE models on Egypt's regional trading relations in the 1990s do not always support the general finding of Robinson and Thierfelder, that for shallow integration, trade creation dominates trade diversion. For example, Hoekman and Konan (1998) find that shallow integration under the EU-Egypt Agreement produces net trade diversion with negative welfare effects indicating some trade diversion. Hoekman and Konan also extended the analysis of shallow integration to include deep integration where trade barriers in services are removed and efficiency benefits of liberalisation of domestic and foreign capital in services are considered, producing extremely large welfare gains (see also Konan and Kim (2004)). Thus, the CGE studies for RTA's involving Egypt do not fit into the pattern found by Robinson and Thierfelder for many-country RTAs.

# 2: The Globe CGE model and data

The study uses an application of the (comparative static) Globe computable general equilibrium (CGE) model (see McDonald *et al*., 2005) to the MENA region. The Globe model is a multi region development of the single country/region CGE model first described by Dervis, *et al*., (1982), and subsequently developments models reported by Robinson *et al*., (1990) and Kilkenny (1991). The properties of this type of model are well known. The multi region formulation is a direct descendant of a model first developed to evaluate NAFTA (see Robinson, *et al*., 1993). The model is also a member of the class of Social Accounting Matrix (SAM) based CGE models (see Pyatt, 1998) and is therefore calibrated using a SAM representation of the GTAP v6 dataset for 2001 (see McDonald and Thierfelder, 2005).

## Model

The Globe model adapted to the MENA region is, in effect, a series of single country/region CGE models that are linked by commodity trade. Trade is modelled following the Armington 'insight'; namely domestically produced and consumed commodities are imperfect substitutes for both imports and exports. Import demand is modelled via series of nested constant elasticity of substitution (CES) functions; imported commodities from different source regions are treated as imperfect substitutes and hence aggregated into 'composite' import commodities that are then

imperfect substitutes for their counterpart domestic commodities The ‘composite’ imported commodities and their counterpart domestic commodities are then combined to produce composite consumption commodities. These are the commodities demanded by domestic agents as intermediate inputs and for final demand.

Export supply is modelled via series of nested constant elasticity of transformation (CET) functions; the ‘composite’ export commodities are treated imperfect substitutes for domestically consumed commodities, and exported commodities from a source region to different destination regions are treated as imperfect ‘substitutes’ for each other. Total domestic commodity production is an aggregation of the ‘composite’ exported commodities and their counterpart domestic commodities. As such this model differs from the GTAP model through the use of CET functions for export supply; consequently domestic producers adjust export supplies in response to changes the relative prices of exports and domestic commodities, thereby moderating the terms of trade effects in this class of model.

The production structure is a two stage nest. Intermediate inputs are used in fixed proportions per unit of output– Leontief technology, while primary inputs are combined as imperfect substitutes, according to a CES function, to produce value added. The combination of aggregate value added and aggregate intermediate inputs to produce output can be by either Leontief or CES technology.

Final demand by the household is modelled under the assumption that households are utility maximisers who respond to changes in relative prices and their incomes. The utility function in the model are Cobb-Douglas; this has the advantage that with a standard, neoclassical, set of closure rules the changes in household consumption expenditure can be interpreted as equivalent variations in welfare, and hence provide useful summary measures of the welfare effects of the policy simulations. Final demand by the government and for investment is modelled under the assumption that the relative quantities of each commodity demand by these two institutions are fixed – this reflects the absence of a clear theory that defines an appropriate behavioural response by these agents to changes in relative prices. The Globe model is formulated to allow a wide range of alternative closure rules; the alternatives used in this study are defined below when the policy experiments are specified.

In order to estimate the impact of trade reform experiments on poverty we follow the general approach presented by Lofgren *et al*., (2003), which assumes that there are household survey data available which include income sources that correspond to the income sources in the CGE model.[1] Changes in factor income in the CGE model can then be translated into proportional changes in household incomes and then, once all household incomes are adjusted, distributional and poverty statistics are computed and compared with the pre-adjustment values to see the impact of the experiment. This was only possible for Morocco, despite only having access to summary information from a household survey. Using (summary) information on the within-group income distribution, we fit a lognormal distribution to each within-group distribution, and use these estimates to generate synthetic samples, which were then used to analyzing poverty and the distribution of income.

## Data

The global SAM adapted to the MENA region has model has nine regions and thirteen commodities.[2] While Morocco is a separate region in the SAM, Egypt is part of the region "Other North Africa", which consists of Egypt, Libya and Algeria. But Egypt contributes 60% GDP to this region and hence the "Egypt" experiments reported are the results for "Other North Africa".

Summary structural statistics of Morocco and Egypt are reported in Tables 2.1 - 2.4. With two exceptions, the structural characteristics of Morocco and "Egypt" are strikingly similar. Both countries have around 15% of value added in agriculture and nearly 60% in utilities, construction and services. The exceptions are minerals, which in "Egypt" account for a much large share of economic activity than Morocco, and manufactures. In Morocco, manufactures account for nearly 20% of value added and about 14% in "Egypt". The much larger minerals sector and smaller manufacturing

[1] Lofgren, H., S. Robinson, and M. El-Said. 2003. "Poverty and Inequality Analysis in a General Equilibrium Framework: The Representative Household Approach." In *The Impact of Economic Policies on Poverty and Income Distribution: Evaluation Techniques and Tools*, edited by F. Bourguignon and L. Pereira da Silva. World Bank and Oxford University Press, pp. 325-337. The "poverty module" for generating distributional information from model-generated changes in income for representative households is described in detail.

[2] The regions in the model are: United States, EU 15 (since the database is for 2001 the EU is defined by the pre expansion members), Rest of Europe, Morocco, Tunisia, Turkey, Rest of the Middle East, Rest of North Africa, and the Rest of the World. The commodities in the model are: Cereals, Other Crops, Livestock, Minerals, Food Products, Textiles, Other Manufacturing, Heavy Manufacturing, Electricity, Gas and Water, Construction, Transport and Communication, Services.

sector in “Egypt compared with Morocco arises in part to the inclusion of Libya in the aggregate Other North Africa. The second major difference is in the height of protection, which is in the medium to high range for Morocco and “Egypt” except in Textiles. Textiles in Morocco have the highest rate of nominal protection at 38%, and for Egypt the average tariff is at over 180%. In Morocco, the EU is a high cost source of imports for Other Manufactures and for Heaving Manufactures as reflected by the lower tariff barriers in Morocco in these sectors compared with other import sources. In “Egypt”, the EU is the low cost supplier of Textiles especially compared with the Rest of the World (ie East Asian suppliers). Another but less striking difference between Morocco and “Egypt” are the trade shares with the EU. The export shares are with the EU are about the same, but Morocco has a much higher share of imports arising from the EU (60%) compared with “Egypt” (nearly 45%) (see Tables 2.3a and b). In comparison with the real Egypt, the composite “Egypt” has several biases. Compared with the real Egypt, our “Egypt” data overstates trade shares with the EU and overstates the height of tariffs. These biases between the real Egypt and our composite “Egypt” need to be borne in mind when interpreting the results. These biases and the structural differences between “Egypt” and Morocco have an important bearing on the empirical results reported below.

**Table 2.1 Value Added Shares 2001 %**

| Activity | Morocco | Egypt |
|---|---|---|
| **Cereals** | 5.47 | 3.70 |
| **Other crops** | 6.57 | 7.34 |
| **Livestock** | 7.75 | 6.00 |
| **Minerals** | 2.91 | 13.41 |
| **Food products** | 2.88 | 2.74 |
| **Textiles** | 5.80 | 3.13 |
| **Other manufacturing** | 4.73 | 3.09 |
| **Heavy manufacturing** | 6.64 | 4.46 |
| **Electricity** | 2.45 | 0.79 |
| **Gas and water** | 0.20 | 0.77 |
| **Construction** | 5.57 | 4.96 |
| **Transport and communication** | 21.08 | 23.12 |
| **Financial and other services** | 27.96 | 26.48 |
| **Total** | 100.00 | 100.00 |

Source: GTAP V6 dataset for 2001

**Table 2.2: Factor Shares 2001 %**

| Activity/Factors | land | | UnSkld | | SkLab | | Capital | | NatRes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Morocco | Egypt | Morocco | Egypt | Morocco | Egypt | Morocco | Egypt | Morocco | Egypt |
| **Cereals** | 29.25 | 22.97 | 7.24 | 5.94 | 0.21 | 0.21 | 4.38 | 2.64 | 6.73 | 0.45 |
| **Other crops** | 32.90 | 44.32 | 8.57 | 11.72 | 0.25 | 0.42 | 5.41 | 5.32 | 37.13 | 5.61 |
| **Livestock** | 37.85 | 32.71 | 9.86 | 8.90 | 0.29 | 0.32 | 6.23 | 4.47 | 0.00 | 0.00 |
| **Minerals** | 0.00 | 0.00 | 2.20 | 2.93 | 0.95 | 1.35 | 3.69 | 17.39 | 56.14 | 93.94 |
| **Food products** | 0.00 | 0.00 | 3.90 | 3.35 | 2.34 | 1.68 | 2.17 | 2.98 | 0.00 | 0.00 |
| **Textiles** | 0.00 | 0.00 | 7.55 | 4.15 | 3.28 | 1.64 | 5.25 | 3.25 | 0.00 | 0.00 |
| **Other manufacturing** | 0.00 | 0.00 | 5.51 | 3.59 | 2.89 | 1.66 | 4.88 | 3.59 | 0.00 | 0.00 |
| **Heavy manufacturing** | 0.00 | 0.00 | 5.95 | 4.63 | 3.40 | 2.45 | 9.02 | 5.59 | 0.00 | 0.00 |
| **Electricity** | 0.00 | 0.00 | 1.27 | 0.47 | 1.87 | 0.59 | 4.08 | 1.23 | 0.00 | 0.00 |
| **Gas and water** | 0.00 | 0.00 | 0.00 | 0.23 | 0.00 | 0.29 | 0.51 | 1.44 | 0.00 | 0.00 |
| **Construction** | 0.00 | 0.00 | 8.83 | 9.05 | 4.66 | 4.22 | 2.81 | 2.71 | 0.00 | 0.00 |
| **Transport and communication** | 0.00 | 0.00 | 22.82 | 24.71 | 15.50 | 14.56 | 22.68 | 27.85 | 0.00 | 0.00 |
| **Financial and other services** | 0.00 | 0.00 | 16.30 | 20.33 | 64.36 | 70.60 | 28.88 | 21.55 | 0.00 | 0.00 |
| **Total** | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

Source: GTAP V6 dataset for 2001

**Table 2.3a: Export Shares 2001 %**

| From/to | USA | EU_15 | Rest Eur | Mar | Tun | Rest N_Afr | Tur | Rest M_E | ROW | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **USA** | 0.00 | 29.52 | 2.83 | 0.09 | 0.06 | 0.77 | 0.49 | 3.40 | 62.85 | 100 |
| **EU_15** | 11.45 | 54.65 | 9.10 | 0.28 | 0.29 | 0.66 | 0.76 | 2.88 | 19.93 | 100 |
| **Rest Eur** | 9.49 | 59.19 | 10.16 | 0.10 | 0.08 | 0.47 | 0.93 | 2.57 | 17.01 | 100 |
| **Mar** | 9.99 | 59.66 | 3.18 | 0.00 | 0.40 | 0.98 | 0.48 | 2.63 | 22.68 | 100 |
| **Tun** | 6.59 | 70.55 | 2.47 | 0.46 | 0.00 | 3.75 | 0.89 | 3.01 | 12.28 | 100 |
| **Rest N_Afr** | 15.14 | 58.05 | 2.89 | 0.51 | 0.84 | 0.30 | 2.76 | 3.41 | 16.10 | 100 |
| **Tur** | 12.15 | 52.05 | 6.77 | 0.24 | 0.37 | 2.28 | 0.00 | 7.44 | 18.70 | 100 |
| **Rest M_E** | 17.48 | 21.15 | 1.48 | 0.41 | 0.07 | 0.54 | 1.33 | 8.45 | 49.08 | 100 |
| **ROW** | 31.12 | 19.06 | 2.55 | 0.08 | 0.05 | 0.37 | 0.37 | 2.52 | 43.89 | 100 |

Valuation FOB from GTAP V6 dataset 2001

**Table 2.3b: Import Shares 2001 %**

| From/to | USA | EU_15 | Rest Eur | Mar | Tun | Rest N_Afr | Tur | Rest M_E | ROW | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **USA** | 0.00 | 23.22 | 2.82 | 0.09 | 0.05 | 0.45 | 0.43 | 2.86 | 70.08 | 100 |
| **EU_15** | 10.53 | 55.27 | 8.77 | 0.27 | 0.26 | 0.87 | 0.91 | 1.73 | 21.40 | 100 |
| **Rest Eur** | 6.79 | 61.81 | 10.12 | 0.10 | 0.06 | 0.29 | 0.80 | 0.81 | 19.23 | 100 |
| **Mar** | 6.80 | 60.80 | 3.31 | 0.00 | 0.38 | 1.67 | 0.92 | 7.33 | 18.79 | 100 |
| **Tun** | 5.40 | 72.43 | 2.98 | 0.44 | 0.00 | 3.14 | 1.60 | 1.39 | 12.62 | 100 |
| **Rest N_Afr** | 17.81 | 43.66 | 4.51 | 0.28 | 0.91 | 0.29 | 2.60 | 2.85 | 27.09 | 100 |
| **Tur** | 10.55 | 46.69 | 8.36 | 0.13 | 0.20 | 2.49 | 0.00 | 6.56 | 25.02 | 100 |
| **Rest M_E** | 14.72 | 35.40 | 4.63 | 0.14 | 0.14 | 0.62 | 1.58 | 8.38 | 34.39 | 100 |
| **ROW** | 22.62 | 20.34 | 2.54 | 0.10 | 0.05 | 0.24 | 0.33 | 4.04 | 49.73 | 100 |

Valuation FOB from GTAP V6 dataset 2001

**Table 2.4a: Tariff protection in Morocco 2001**

| | USA | EU_15 | Rest Eur | Mar | Tun | Rest N_Afr | Tur | Rest M_E | ROW | Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Cereals | 22.80 | 29.29 | 27.40 | 0.00 | 0.00 | 4.53 | 26.71 | 0.00 | 26.25 | 26.99 |
| Other crops | 10.67 | 23.58 | 20.59 | 0.00 | 24.94 | 10.48 | 29.36 | 21.58 | 23.50 | 22.77 |
| Livestock | 18.87 | 28.91 | 15.09 | 0.00 | 0.68 | 1.54 | 25.08 | 30.30 | 24.68 | 27.56 |
| Minerals | 11.92 | 7.04 | 0.92 | 0.00 | 0.76 | 8.09 | 17.57 | 7.00 | 15.45 | 8.36 |
| Food products | 28.43 | 47.58 | 35.56 | 0.00 | 25.76 | 14.57 | 52.03 | 24.94 | 28.72 | 35.73 |
| Textiles | 34.48 | 39.33 | 34.90 | 0.00 | 20.42 | 21.12 | 35.05 | 10.35 | 37.25 | 38.66 |
| Other manufacturing | 15.92 | 12.44 | 16.23 | 0.00 | 17.45 | 14.58 | 25.91 | 12.16 | 16.77 | 13.32 |
| Heavy manufacturing | 25.72 | 20.29 | 20.16 | 0.00 | 14.20 | 1.78 | 32.30 | 16.57 | 26.66 | 20.29 |
| Electricity | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

% tariff equivalents. Source: GTAP V6 database.

**Table 2.4b: Tariff protection in Egypt 2001**

| Egypt | USA | EU_15 | Rest Eur | Mar | Tun | Rest N_Afr | Tur | Rest M_E | ROW | Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Cereals | 2.73 | 2.58 | 5.19 | 0.00 | 0.00 | 0.00 | 1.21 | 0.00 | 2.40 | 2.55 |
| Other crops | 7.39 | 14.71 | 36.57 | 0.92 | 13.34 | 7.76 | 16.34 | 14.98 | 13.45 | 14.18 |
| Livestock | 10.53 | 12.93 | 3.89 | 1.30 | 12.50 | 2.79 | 2.80 | 7.42 | 5.17 | 6.28 |
| Minerals | 3.47 | 9.54 | 3.40 | 20.35 | 7.38 | 11.53 | 14.07 | 2.47 | 3.85 | 4.88 |
| Food products | 15.26 | 12.98 | 34.05 | 2.91 | 8.49 | 8.56 | 22.58 | 15.83 | 13.25 | 14.70 |
| Textiles | 92.49 | 71.03 | 53.57 | 3.06 | 21.40 | 12.32 | 135.17 | 38.08 | 262.84 | 182.27 |
| Other manufacturing | 10.15 | 13.94 | 14.14 | 1.33 | 11.10 | 11.33 | 19.50 | 9.70 | 16.37 | 13.92 |
| Heavy manufacturing | 7.89 | 16.88 | 16.12 | 2.78 | 10.10 | 8.63 | 21.12 | 8.96 | 17.48 | 14.98 |
| Electricity | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.05 |

% tariff equivalents. Source: GTAP V6 database.

In addition to the transactions data from the SAM it is necessary to specify a series of substitution elasticities. We specify high substitution elasticities for imports from (and exports to) different countries/regions, which allows the model to capture trade-diversion effects from regional trade agreements—the focus of our work. Substitution elasticities between traded composites and domestic goods are in-line with estimates from other global models.[3]

# 3. Model experiments

The formulation of the experiments involves specifying both the appropriate set of closure rules and the appropriate set of shocks. These are dealt with in turn.

## Closure Rules

The model contains certain conditions that must be satisfied – government account balance, external balance, factor market balance and savings-investment equality. These closure rules represent important assumptions on the way institutions operate in the economy and can substantively influence model results.

- Land, Skilled Labour, Capital, and Natural Resources are assumed to be perfectly mobile across sectors and fully employed; hence these factor markets are treated as competitive, producing market-clearing wage and rental rates. This is also the case for Unskilled labour in the first experiment, but thereafter the wage rates for unskilled labour are fixed at institutionally determined rates,

[3] See, for example, references on the web site of the Global Trade and Analysis Project (GTAP) at Purdue University.

and the market is cleared from a pool of unemployed or underemployed unskilled labour. In 2000-2002 total unemployment in Morocco was estimated at 12% of the total labour force while for Egypt total unemployment was 9%.[4] With about 70% of wage payments going to unskilled workers in both economies, this implies that unemployment amongst unskilled labour is around 16% in Morocco and 12% in Egypt. Hence the assumption of underemployed Unskilled labour appears reasonable.

- Exchange rates are assumed to flexible for all regions with the external balance cleared with fixed real balances on the current account.
- The savings-investment account is cleared by fixing the (value) share of investment in domestic final demand and allowing the savings rates for the households to adjust to clear the account. There is an interaction with the government and external accounts since both these accounts contribute to savings within a region.
- Trade liberalisation will cause reductions in tariff revenues. In this study these are replaced by equiproportionate increases in factor use taxes for all factors except unskilled labour, which faces no factor use tax. Tariff reform will change commodity prices, with complex indirect impacts on income distribution, but the replacement tax on factors will have a direct, pro-poor impact, since unskilled workers are relatively poor.

Shocks

In specifying the model shocks, the preliminary econometric estimates of trade induced technical change had to be translated into elasticity estimates for the model. For Morocco the data made it possible to examine the relationship for different firm sizes and where we found significant differences. The negative relationship appears to hold for small firms (less than 10 employees), but there was a positive relationship for large firms (greater than 100 employees) – such that a 10% increase in openness led to an increase in productivity of roughly 4.0%. In the case of Egypt, the estimates of the trade induced productivity links were not as significant. For Egypt on the export side, strong trade - productivity elasticities of up to 4 were found. Using a good deal

[4] World Bank, *World Development Indicators***,** Table 2.4

of judgement, the best estimate of the trade-productivity elasticities for both exports and imports in both countries were set at .4 for Experiment 5.

The experiments have three key differentiating features.

- Experiment 1 is the standard neo-classical closure of factor markets.
- Experiment 2, and then all the other experiments have a fixed wage for unskilled labour so that the level of employment of unskilled labour can vary. Given the significant levels of unemployment in the MENA countries in the base year of over 10%, this specification aims to capture an important structural characteristic of both countries.
- Trade induced technical change is included in Experiments 3-7 starting from lower bound and an upper bound estimate in Experiment 6 with a best estimate elasticity of .4 in Experiment 5.

Stylised deep integration is included in Experiment 7.

The results from seven (7) experiments are reported for each FTA; the experiments are summarised in Table 1. While each FTA is considered separately there is a strong hub-and-spoke structure of MENA trade with the EU, so it makes little difference to the results if the FTAs are considered for each country separately or combined. Also, agricultural tariffs are relatively low, so the results are not much affected by choosing a full FTA rather than a FTA in manufactures only.

# 4. Results

## Impact of trade policy change — Morocco

The results for Morocco  are summarised in Table 4.1 below. All results are shown as % changes over base levels.

**Table 4.1: Experiment Results for Morocco**

| | Base | M1 | M2 | M3 | M4 | M5 | M6 | M7 |
|---|---|---|---|---|---|---|---|---|
| | | % | % | % | % | % | % | % |
| **Exports** | 1.15 | 11.90 | 14.01 | 14.36 | 16.41 | 18.93 | 23.81 | 24.13 |
| **Imports** | 1.44 | 11.42 | 13.33 | 13.64 | 15.48 | 17.80 | 22.27 | 22.74 |
| **GDP expenditure** | 3.17 | -0.54 | 1.05 | 1.34 | 2.61 | 3.45 | 4.79 | 4.18 |
| **Absorption** | 3.46 | 0.29 | 1.85 | 2.12 | 3.37 | 4.26 | 5.72 | 5.26 |
| **E+M for Morocco** | | | | | | | | |
| **Global** | - | 12.15 | 14.46 | 14.79 | 16.77 | 19.21 | 23.93 | 24.28 |
| **FTA** | - | 34.34 | 36.98 | 37.32 | 39.75 | 43.50 | 50.95 | 51.18 |
| **ROW** | - | -19.84 | -19.66 | -19.33 | -18.05 | -17.58 | -17.02 | -16.49 |
| **Real Exchange Rate** | 1.00 | 3.91 | 3.73 | 3.66 | 3.12 | -0.21 | 1.99 | 1.60 |
| **Disposable factor income** | | | | | | | | |
| **Land** | 0.06 | 4.68 | 5.78 | 6.10 | 7.65 | 8.51 | 9.95 | 9.62 |
| **UnSkld** | 1.31 | 2.55 | 3.77 | 3.98 | 5.04 | 5.94 | 7.47 | 6.95 |
| **SkLab** | 0.45 | -1.48 | 0.37 | 0.73 | 2.28 | 3.24 | 4.70 | 4.23 |
| **Capital** | 0.86 | -0.55 | 1.39 | 1.69 | 3.06 | 4.01 | 5.57 | 5.07 |
| **NatRes** | 0.02 | -8.00 | -6.57 | -6.26 | -5.81 | -8.11 | -12.71 | -8.90 |
| **% Change Headcount poverty** | 19.04 | -5.99 | -10.29 | -11.13 | -13.29 | -14.71 | -17.44 | -16.44 |
| **Elasticity poverty wrt income** | 0.00 | -0.77 | -0.65 | -0.63 | -0.46 | -0.40 | -0.34 | -0.35 |
| **TFP** | | | | | | | | |
| **Food** | 2.43 | 0.00 | 0.00 | 2.51 | 14.88 | 20.60 | 29.75 | 29.39 |
| **Textiles** | 2.37 | 0.00 | 0.00 | 0.25 | 2.24 | 6.02 | 13.61 | 7.89 |
| **Other Manuf** | 2.23 | 0.00 | 0.00 | 1.54 | 6.00 | 7.38 | 7.60 | 10.45 |
| **Heavy Manuf** | 2.10 | 0.0 | 0.0 | 0.5 | 2.9 | 3.0 | 2.1 | 3.0 |

Notes:
Column 1 is the base value. Experiment columns are percent change from base, except headcount poverty, which
is the percentage point change from the base values.
Financial variables are in $US billions for 2001.
The "elasticity of poverty wrt income" is the change in headcount poverty divided by the change in total household disposable income.

The upper panel of Table 4.1 details the results for exports, imports, GDP, absorption, household expenditure and real exchange rate. By choice of import and export substitution elasticities affecting the regional composition of trade, the international terms of trade hardly change in each experiment (the small country assumption holds) and are not reported. The middle panel shows impacts on factor incomes, headcount poverty, and the elasticity of the change in the headcount poverty rate with respect to percent change in total household income. Finally the bottom panel of the table shows the trade-induced changes in TFP generated by the experiments. In summary the key findings are:

***Experiment M1:*** The Morocco-EU FTA has a strong effect on total exports and imports and leads to a depreciation of the real exchange rate of nearly 4%. Real GDP measured in base-year prices falls slightly, largely as a result of the small adverse international terms of trade effect (not shown). A measure of the over-all welfare benefits of the Morocco-EU FTA when there is no change in foreign savings is given by the change in absorption, which equals GDP plus imports minus exports. There is a small increase in absorption (0.3%).

Since over half of Morocco's imports of manufactures are included in the FTA, one would expect significant trade diversion to occur. Within-FTA trade expands by 34%, while trade with the rest of the world (ROW) declines by 20%. There is, however, a net increase in total trade for Morocco of 12%, so the FTA is net trade expanding. It is important to note that net trade expansion does not measure net trade creation. The cost of trade diversion is included within real imports less real exports and is not netted out.

The changes in the structure of production leads to an increase in the demand for unskilled labour, with a resulting increase in the unskilled wage of 2.55%, and an increase in returns to agricultural land. While there is a slight decline in the skilled wage, the net impact is pro-poor. The poverty head count falls by 6%.

***Experiment M2***: Experiment M2 repeats Experiment M1, except unskilled wages are fixed and unskilled employment can increase or decrease, depending on labour demand.

As in Experiment M1, there is a substantial increase in overall trade, but now unskilled employment increases (by 3.8%) and GDP increases (by 1.1%). The result is a larger increase in aggregate absorption than in Experiment M1 (1.9 % compared to 0.3%).

The changes production structure and increase in GDP lead to increases in all factor returns except for Natural Resources, with land and unskilled labour gaining the most. The result is a significantly larger reduction in head count poverty by just over 10%.

***Experiment M3***: Here we now allow for trade-induced productivity changes linked to changes in manufacturing exports, but not linked to changes in imports. With these trade-linked technical changes, the competitiveness of Moroccan industry increases by more than in the preceding experiment. The pattern of changes is overall similar to

that in earlier experiments, but the GDP response is larger. Compared with Experiment M2, there is a small increase in employment of unskilled labour. There is a larger increase in exports and imports, a slightly smaller change in the exchange rate (in order to maintain external balance). The rise in aggregate absorption is also larger, due largely to the increase in GDP.

This experiment reduces headcount poverty, but only slightly compared to Experiment M2. The productivity gains are shared across all factors, and the increase in employment of unskilled labour is small. With the fixed unskilled wage, the small increase in employment does not suffice to generate much more poverty reduction.

***Experiments M4 to M7***: These experiments explore the impact of varying assumptions about the links between increased trade and productivity. Experiment M6 is the most dramatic, yielding very large productivity increases, especially in food and textiles. The results are generally larger increase in trade, GDP, employment, and absorption. The employment effects lead to dramatic decreases in head count poverty, with Experiment M6 yielding a decrease of 17.4% — the most optimistic result in all the experiments.

Experiment M7 repeats Experiment 5, but adds assumed results from elements of deep integration. The EU-Morocco FTA is assumed to lead to easier trade penetration in both directions, with increases in the trade substitution elasticities in Morocco between domestic and traded goods (both imports and exports).

Compared to Experiment M5, the results are dramatic. Trade increases a lot (exports increase 24% compared to 19% in Experiment M5). Employment, GDP, and absorption all increase by about a percentage point more than in Experiment M5, and head count poverty falls by about 1.5 percentage points more.

The results from the deep integration experiment are only slightly less beneficial than those from the optimistic trade-productivity link Experiment M6. These results emphasize the potential importance of achieving deep integration, which are also likely to be associated with increased trade-productivity links. There may well be a virtuous synergy between trade liberalisation, deep integration, and trade-productivity links. While these experiments do not explore such causal links, they do indicate that, if present, their impact would be large.

## Impact of trade policy change — Egypt

In order to facilitate comparison across the results, we ran exactly the same sequence of experiments for Egypt, and the results are given in Table 4.2. The results are significantly different. The differences in the results stem largely from the differences in the underlying trade patterns of the Moroccan and Egyptian economies and the initial height of tariff protection. In particular, the EU is a much more important trading partner for Morocco than for Egypt and Egypt has a greater potential for trade diversion at the initial base MFN tariff levels.

From the top panel of Table 4.2, import liberalisation leads to much smaller net changes in trade flows across all the experiments, with exports and imports increasing between 4% and 8%, about a third of the values for Morocco. Given the very high initial protection rates in Egypt, the EU-Egypt FTA causes much more trade diversion than in the case of Morocco. The net impact on welfare is negative, with declines in GDP and absorption for the first four experiments. In the cases where the unskilled wage is fixed, the result is a decline in employment, compared to increases in Morocco. Only in Experiments E5, E6, and E7 do the increases in trade-induced productivity serve to offset the impact of trade diversion, leading to increases in GDP. Employment only increases in Experiments E6 and E7, the most optimistic scenarios in the series.

**Table 4.2. Experiment Results for Egypt**

| | Base | E1 | E2 | E3 | E4 | E5 | E6 | E7 |
|---|---|---|---|---|---|---|---|---|
| | | % | % | % | % | % | % | % |
| **Exports** | 3.82 | 5.42 | 4.99 | 5.08 | 5.63 | 6.15 | 8.08 | 7.07 |
| **Imports** | 4.68 | 1.45 | 1.09 | 1.16 | 1.57 | 1.99 | 3.52 | 2.86 |
| **GDP expenditure** | 17.47 | -0.20 | -0.94 | -0.74 | -0.01 | 0.89 | 3.45 | 1.32 |
| **Absorption** | 18.34 | -0.95 | -1.66 | -1.47 | -0.78 | 0.07 | 2.50 | 0.52 |
| **E+M for Egypt** | | | | | | | | |
| **Global** | 3.85 | 5.17 | 4.76 | 4.84 | 5.39 | 5.88 | 7.73 | 6.75 |
| **FTA** | 7.55 | 28.35 | 27.98 | 28.02 | 28.35 | 28.67 | 29.97 | 29.63 |
| **ROW** | 3.70 | -18.99 | -19.33 | -19.20 | -18.54 | -17.77 | -15.44 | -17.09 |
| **Real Exchange Rate** | 0.00 | 6.57 | 6.15 | 6.20 | 6.13 | 6.33 | 6.35 | 6.32 |
| **Disposable factor income** | | | | | | | | |
| **Land** | 0.00 | -0.77 | -1.20 | -0.90 | -0.04 | 1.33 | 4.99 | 2.02 |
| **UnSkld** | 0.00 | -1.62 | -2.11 | -1.90 | -1.06 | -0.10 | 2.65 | 0.42 |
| **SkLab** | 0.00 | -2.87 | -3.60 | -3.35 | -2.41 | -1.30 | 1.82 | -0.73 |
| **Capital** | 0.00 | -1.93 | -2.83 | -2.62 | -1.73 | -0.74 | 2.08 | -0.21 |
| **NatRes** | 0.00 | 16.41 | 15.00 | 15.10 | 14.24 | 14.48 | 13.26 | 14.11 |
| **TFP** | | | | | | | | |
| **Food** | 0.00 | 0.00 | 0.00 | 1.93 | 1.19 | 10.22 | 33.52 | 12.06 |
| **Textiles** | 0.00 | 0.00 | 0.00 | 0.94 | 11.89 | 17.85 | 44.14 | 23.44 |
| **Other Manuf** | 0.00 | 0.00 | 0.00 | 1.10 | 3.13 | 6.61 | 16.41 | 8.39 |
| **Heavy Manuf** | 0.00 | 0.00 | 0.00 | 0.19 | 0.77 | 1.63 | 2.76 | 1.64 |

Note: Financial variables are in $US billions for 2001.

Compared with the real Egypt, our "Egypt" calculations overstate the impact of the EU-Egypt Agreement on account of the overstated trade shares with the EU and overstate the potential welfare cost of trade diversion because of the overstatement of the height of tariffs. However, in broad terms, the EU-"Egypt" results provide a basis for a preliminary assessment of the relative size of impacts on welfare of the experiments E1 to E7 at the initial base MFN tariff levels. In a similar calculation for Egypt, Hoekman and Konan (1998, Table 3 column (1) also find a small negative welfare impact (- 0.14% of GDP) arising from the trade diversion from the Egypt-EU agreement.

Thus, the results for both Morocco and Egypt on trade diversion are worst-case; because we have only taken into account long-run tariff changes for EU-Morocco and EU-Egypt which aim to reduce import tariffs to zero, by 2016 in the case of Egypt. However, under the auspices of the WTO, Egypt introduced changes in he MFN tariffs of roughly 33% in 2004[5]. To develop this line of argument, we ran two

[5] The application of tariff changes the EU-Egypt agreement on manufactured imports into Egypt began in June 2004. MFN tariff changes under the auspices of the WTO began in September 2004, with a

modified versions of the E5 experiment for Egypt, cutting the base MFN tariff by 33% and 66% respectively. These and a first decomposition of absorption are shown in

heavy emphasis on cuts in tariffs on intermediate inputs and much lower reduction of tariffs on textiles and cars.

**Table 4.3: Absorption Decomposition and mfn Tariff cuts included**

**Morocco**

| Experiment | M2 | M5 | M5A | M5B |
|---|---|---|---|---|
| | % | % | % | % |
| ABSORPTION | 1.85 | 4.23 | 4.79 | 5.34 |
| Q_DOMESTIC | -0.69 | 1.09 | 1.39 | 1.62 |
| T_of_T | 0.08 | 0.04 | 0.00 | -0.03 |
| EXPORTS | 2.45 | 3.10 | 3.39 | 3.74 |

| Egypt | | | | |
|---|---|---|---|---|
| Experiment | E2 | E5 | E5A | E5B |
| | % | % | % | % |
| ABSORPTION | -1.66 | 0.07 | 1.86 | 5.03 |
| Q_DOMESTIC | -1.95 | -0.11 | 1.01 | 2.80 |
| T_of_T | 0.07 | 0.04 | 0.02 | -0.01 |
| EXPORTS | 0.22 | 0.14 | 0.83 | 2.24 |

**Experiments:**

M2 E2, M5 E5 as before

M5A, M5B, E5A, E5B have 33% and 66% cut in mnf tariffs.

The 33% cut roughly corresponds to the average cut in MFN tariffs agreed under the auspices of the WTO in 2004. In this case, the absorption measure of welfare increased from 0.07% to 1.86%. A further cut of the MFN tariff to 66% of the base level increased the absorption measure of welfare to 5.03%. These results underscore the importance for both Egypt and Morocco of accompanying an EU FTA with broader trade liberalisation. For Egypt such broader trade liberalisation, a process already taking place under the auspices of the WTO, appears so far to be driven by considerations relating to the speed of reduction of tariffs on sensitive industries, considerations already present in the differential rates of reduction of tariffs under the Egypt-EU Agreement, rather than economic efficiency ie removing trade diversion.

The net effect of the EU-FTA agreement and the WTO tariff cuts on trade diversion including transitional effects requires further study which will be greatly facilitated by the inclusion of Egypt proper in the GTAP dataset which will be available in the GTAP 7.0 dataset. If the emphasis of further market assess integration between Morocco and Egypt is to shift the balance from shallow to deep integration, how far should the MFN tariff cuts go? Should they stop at some benchmark such as 33% of our base 2001 tariffs, or should they be cut to zero? Should the MFN tariffs be cut to

zero over the time horizon of the cuts in the FTA tariffs with the EU of 10 years, would this facilitate or hinder deep integration?

# 5. Overview of results and policy implications

The findings of the CGE model of the Morocco-EU FTA are of interest for several reasons:

- Looking only at tariffs, shallow integration of Morocco into an EU-Morocco FTA leads to small gains for Morocco, but significant reductions in poverty.
- Applying econometrically estimated elasticities to trade-linked technical change makes the FTA much more beneficial. Sensitivity analysis concerning the nature and size of the trade-productivity links indicates that there are great potential gains from an EU-Morocco FTA.
- Further increased benefits to a Morocco-EU FTA could be achieved by deep integration involving removal of non-tariff barriers and by improving the quality and standards of domestic goods for potential export sales.
- The impact of a EU-Egypt FTA is far less favourable than for Morocco, given Egypt's very high initial levels of import protection and consequent strong trade diversion. Even with MFN tariffs cut by 33% as in the WTO agreements, the welfare improvement for Egypt from the Egypt-EU FTA is only slightly more than 1.Only with trade induced productivity change and elements of deep integration or with further cuts in the MFN tariff are the welfare gains significant.

In conclusion, if initial general protection levels are high, an RTA that only achieves lowering of border barriers to trade (shallow integration) leads to trade diversion and a loss of aggregate welfare. Where the RTA partner is initially a major trading partner, and general protection levels are moderate, trade diversion are weaker and the RTA is beneficial. With trade-productivity links and benefits from deep integration, gains from trade creation are magnified, including distributional improvements and reduction in poverty in the case of Morocco. For Egypt, only with high estimates of TFP change, deep integration measures or MFN tariff cuts are the negative welfare effects of trade diversion offset. There is a need for further research into these links to refine the econometric estimates of TFP change, and at the micro and economy wide

level to decompose the sources of welfare change into trade creation/diversion effects, terms of trade effects and productivity effects. The strong policy conclusions are:

- shallow integration with the EU in Morocco and Egypt risks either lower welfare gains or significant welfare loss through trade diversion
- deep integration measures such as encouraging trade induced TFP change and improved quality and standards for exports have strong positive welfare benefits
- where poverty effects could be measured, the combined effects of the Morocco FTA with the EU had strong poverty reducing benefits, in contrast with Egypt where overall welfare improvement and improved factor income distribution only came with powerful deep integration measures and further cuts in the MFN tariffs.

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