



FEMISE RESEARCH
PROGRAMME

2006-2007

***Assessing the Macro Economic
Effects of the Barcelona Initiative's
Liberalization Process***

Research n°FEM31-10

Directed By

Bernd Lucke, Hamburg University, Germany

***Roby Nathanson, Israeli Institute for Economic & Social
Research, Israel***

November 2007



Ce rapport a été réalisé avec le soutien financier de la Commission des Communautés Européennes. Les opinions exprimées dans ce texte n'engagent que les auteurs et ne reflètent pas l'opinion officielle de la Commission.

This report has been drafted with financial assistance from the Commission of the European Communities. The views expressed herein are those of the authors and therefore in no way reflect the official opinions of the Commission.

**Assessing the Macro Economic
Effects of the Barcelona Initiative's
Liberalization Process**

Prof. Bernd Lucke

Dr. Roby Nathanson

Submitted to FEMISE

November 2007

Table of Contents

Page

I. PLEASE INSERT NAME OF CHAPTER - Prof. Bernd Lucke

1. Introduction
2. The Model
3. Data
4. Econometric Analysis
5. References

II. TABLE – Summary of the Literature and Empirical Overview of CGE Models

III. Literature and Empirical Overview of CGE Models – Dr. Roby Nathanson, Hagar Tzameret-Kertcher, Ori Greenfeld, Ziv Rubin and Oleg Glybshenko

1. The Welfare Implications of Trade Liberalisation between the Southern Mediterranean and the EU- *Augier, P. and Gasiorek, M.*
2. Fiscal Challenges of the Euro-Mediterranean Agreements - *Bayar, A.H.*
3. Trade Liberalization and the Dynamic of Poverty in Tunisia: Short-term Pain for Long-term Gain - *Bibi, S. and Chatti, R.*
4. Assessing Non – Tariff Barriers in Syria - *Chemingui, M. A. and Dessus, S.*
5. Internal and External Reforms in Agricultural Policy in Tunisia and Poverty in Rural Area - *Chemingui, M. A., and Thabet, C.*
6. Les leçons du mariage entre les modèles d'équilibre general calculable et la nouvelle théorie du commerce international: Application à la Tunisie - *Cockburn, J., Bernard, D. and Benoît, D.*
7. Economic Implications of Europe-Maghreb Trade Agreements - *Deardorff, A.*
8. Trade Integration with Europe and Labour Reallocation in the Southern Mediterranean Countries: The Case of Egypt - *Dessus S. and Suwa-Eisenmann, A.*
9. Preferential Trade Liberalization, Fiscal Policy Responses and Welfare: A Dynamic CGE Model for Jordan - *Feraboli, O.*

10. Policy Implications of the Euro-Med Partnership: The Case of Jordan - *Feraboli, O.*
11. The Barcelona Initiative and the Importance of NTBs: A Dynamic CGE Analysis for Syria - *Gaitan, B. and Lucke, B.*
12. Trade Reform in the Partially Liberalised Economy of Turkey - *Harrison, G.W., Rutherford, T.F. and Tarr, D.G.*
13. Economic Implications for Turkey of a Customs Union with the EU - *Harrison, G.W., Rutherford, T.F. and Tarr, D.G.*
14. Deep Integration, Nondiscrimination and Euro-Mediterranean Free Trade - *Hoekman, B., and Konan, D.E.*
15. Alternative Socioeconomic Development Scenarios for Egypt: Results from an Economy-Wide Simulation Model - *Khorshid, M.*
16. Beyond Border Barriers: The Liberalization of Services Trade in Tunisia and Egypt - *Konan, D.E. and Kim, K.E.*
17. A Computable General Equilibrium Analysis of Egyptian Trade Liberalization Scenarios - *Konan, D.E. and Maskus, K.E.*
18. Joint Trade Liberalization and Tax Reform in a Small Open Economy: The Case of Egypt - *Konan, D.E. and Maskus, K.E.*
19. The Fiscal Impact of Trade Liberalization: The Case of Jordan and Syria - *Lucke, B. and Lucke, D.*
20. Trade Liberalization with Trade-Induced Technical Change in Morocco and Egypt - *McDonald, S., Evans, D., Gasiorek, M. and Robinson, S.*
21. On Turkey's Trade Policy: Is a Customs Union with Europe Enough? - *Mercenier, J. and Yeldan, E.*
22. Growth, the Maghreb and the European Union - *Page, J. and Underwood, J.*
23. An Examination of Morocco's Trade Options with the EU - *Philippidis, G. and Sanjuán, A.I.*
24. Morocco's Free Trade Agreement with the EU: A Quantitative Assessment - *Rutherford, T.F., Rutstrom, E.E. and Tarr, D.*
25. Two Decades of CGE Modeling: Lessons from Models for Egypt - *Thissen, M.*

IV. References

V. Annex I: Macro Economic Overviews of Countries Included in the Sample – *Dr. Roby Nathanson and Dan Turner*

1. Algeria's Economy
2. Egypt's Economy
3. Jordan's Economy
4. Lebanon's Economy: Summary Data, 1999-2005
5. Morocco's Economy
6. Syria's Economy: Summary*
7. Tunisia's Economy

VI. Annex II: Special Country Reports – *Dr. Roby Nathanson and Dan Turner*

1. Isarel's Economy
2. The Turkish Economy

I. PLEASE INSERT NAME OF CHAPTER

1. Introduction

Trade liberalization under the Barcelona Initiative was inspired by standard results in trade theory which state that trade is mutually beneficial to trading partners. Precisely how beneficial decreases in tariff rates might be for the Southern Mediterranean Partner Countries (SMPC) was the subject of a wave of applied economic research that took place mainly in the late 1990s and early 2000s. The workhorse of this research was a neoclassical Computable General Equilibrium (CGE) model, which usually assumed a representative agent (RA) setup. The models (for one or a group of SMPCs) used data compiled in a Social Accounting Matrix (SAM) framework to calibrate model parameters such that the base-year SAM represented the equilibrium solution of the CGE model. Trade liberalization was then implemented as a single, unexpected shock to certain model parameters, e. g. tariff rates. This shock implied a new equilibrium solution for the model which could be compared with the base-year equilibrium and thus allowed inference on the likely effects of trade liberalization.

Reality, however, was far more complex. First, measures of trade liberalization (which did not only involve the removal of formal barriers but also of non-tariff barriers, NTBs) did not come unexpected for consumers and investors in SMPCs. They were announced long before they were implemented. The 1995 Barcelona Initiative was probably the first serious announcement of changes in SMPCs' foreign trade regimes. But, second, the early announcements were mere declarations of intent. Their credibility depended on the willingness of SMPCs to sign Partnership Agreements with firm pledges to liberalize the protection of domestic markets and on their ability to honor these pledges. Generally speaking, the credibility of pre-announced trade liberalization increased over time, as negotiations proceeded, agreements were signed and later ratified, or governments signalled their deliberation by agreeing on Free Trade Agreements (FTAs) with third countries.

Third, the actual, implemented measures of trade liberalization under the Barcelona Initiative were not a single, once-and-for-all shock, but extended over a long period of up to twelve years. Each step (except the last) in the schedule of announced tariff decreases had (and has) a double effect: It not only lowered the costs of imports but also increased the credibility of the

steps still ahead. Due to the long transition period, the full benefits of the Barcelona Initiative may not materialize earlier than in a couple of years and substantial changes in the economic environment of SMPCs, partially unrelated to, partially fuelled by trade liberalization may still occur and intertwine with the benefits of greater openness. Such changes were not accounted for in most CGE studies. In particular, CGE models were predominantly static, i. e. they assumed a constant capital stock and did not allow for the possibility that trade liberalization stimulates supply side effects of private investment¹.

While the CGE exercises aimed at ex-ante evaluations of the Barcelona Initiative, this study uses econometric methods to evaluate ex-post. The approach is ex-post in the sense that data up to and including 2005 are analysed to trace possible effects of the Barcelona Initiative. However, the study is in no sense final, as the twelve-year transition period is not yet completed for any of the SMPCs.

As in the CGE studies, we will use a standard neoclassical representative agent model as the theoretical foundation. Such a model can provide some guidelines for the specification of the regression equation and the choice of regressors. To keep things simple, however, the theoretical model will abstract from adjustment costs, delayed responses or any other feature that would be able to generate protracted lag structure in the regression equation. It goes without saying (and the discussion above should have made this fairly clear), that the effects of trade barrier removal stretch out over time. Due to data scarcity and multicollinearity problems, it will generally not be possible to specify distributed lags of tariff rates or related regressors in the regression equation. Rather, selected leads and lags of explanatory variables will be chosen to represent the announcement and implementation effects found in the theoretical model. The precise choice of these leads and lags is essentially an empirical issue and will be treated accordingly in the econometric investigation.

Hier könnte jetzt noch ein Passus zur Evaluation der CGE-Modelle eingefügt werden.

¹ Exceptions are dynamic CGE-studies by Feraboli (2006), Lucke and Zotti (2006), Feraboli and Trimborn (2006), Gaitan and Lucke (2007), all of which account for the stepwise reduction in tariff rates. Gaitan and Lucke (2007) also allow for the effects of announced future changes in trade barriers (including NTBs).

2. The Model

Intertemporal open economy models suitable to depict foreign trade in goods, services and capital require substantial modeling effort. They need to distinguish between different kinds of goods (domestically produced or imported), different kinds of assets (domestic capital stock or foreign asset holdings), different types of taxes (taxes on the domestic economic activity and taxes on foreign trade). They need to spell out impediments to an instantaneous adjustment to the steady state equilibrium by either limiting the scope for international borrowing and lending through adjustment costs or by introducing additional production factors (state variables like human capital) whose growth cannot be accelerated through loans on international markets. Finally, they need to have multidimensional state spaces (state variables are, e. g., private capital, public debt, net private and net public foreign assets, and, possibly, human capital).

Such a model is hard to find – even the best CGE-models typically fall short of specifying a full-fledged small open economy dynamically integrated in world goods and capital markets. Rather, simplifying exogeneity assumptions e. g. on international borrowing and lending are widely used. For our present purpose of deriving the basic structure of the regression equation it is sufficient to illustrate the issue in a model which does not explicitly separate domestic economy and the rest of the world. Rather, we will assume a unified economy in which some commodities (those that are actually imports) are subject to taxes. Such import taxes raise the price of the aggregate consumption bundle and we simplify again by assuming that the consumer price of aggregate (per capita) consumption c is given by $(1 + \tau)$, where τ is an appropriately weighted function of the import tariffs.

Since the econometric investigation works with aggregate data only, substitution between different kinds of consumption goods (domestically produced or imported) can be ignored in the present context. What is important is the fact that import tariffs raise the price of aggregate consumption. We will assume that investment goods are not subject to tariffs, which is again an (innocuous) simplifying assumption. In fact, we could easily allow for tariffs on investment goods as long as changes in the tariff structure change relative prices between the components of aggregate demand.

This said, consider a representative agent who maximizes an intertemporal utility function subject to an aggregate budget constraint and initial conditions:

$$\max_c \int_0^{\infty} \frac{c^{1-\sigma} - 1}{1-\sigma} e^{(n-\rho)t} dt$$

$$\text{subject to} \quad \dot{k} = w + rk - (1 + \tau)c - nk \quad (1)$$

$$\text{and} \quad k(0) = k_0.$$

Here, k is the aggregate capital stock in per capita terms, σ is the inverse of the intertemporal elasticity of substitution, n is the population growth rate, ρ is the RA's subjective discount rate, w is the marginal product of labor, and r is the (net) marginal product of capital.

As is well known, the current value Hamiltonian is given by

$$H(c, k, \lambda) := \frac{c^{1-\sigma} - 1}{1-\sigma} + \lambda(w + rk - (1 + \tau)c - nk) \quad (2)$$

and the necessary conditions are

$$c^{-\sigma} = (1 + \tau)\lambda \quad (3)$$

$$\dot{\lambda} = (\rho - r)\lambda \quad (4)$$

in addition to (1) and the transversality condition $\lim_{t \rightarrow \infty} \lambda k = 0$. Solving this system is standard and results in planned consumption described by $c = c^0(t)$.

Imagine now that at time $t_1 > 0$ the RA learns about a tariff rate decrease² to take effect at time $t_2 > t_1 > 0$. Let's say the tariff rate is announced to be set to a lower level of $\tilde{\tau} < \tau$. Given the change in the tariff system, the current intertemporal consumption path $c^0(t)$ will in general not be optimal any more. Rather, the RA reoptimizes in t_1 by solving the following

² For ease of exposition, we focus on a once-and-for-all change in the tariff rate.

problem³:

$$\max_c \int_{t_1}^{\infty} \frac{c^{1-\sigma} - 1}{1-\sigma} e^{(n-\rho)(t-t_1)} dt$$

$$\text{subject to} \quad \dot{k} = w + rk - (1 + \tau)c - nk, \quad t \in [t_1, t_2), \quad (5)$$

$$\dot{k} = w + rk - (1 + \tilde{\tau})c - nk, \quad t \in [t_2, \infty) \quad (6)$$

$$\text{and} \quad k(0) = k_0.$$

The Hamiltonian for this problem is still given by (2) and the transversality condition is unchanged. Other necessary conditions, however, now apply piecewise, see Bryson and Ho (1975, p. 101) and Trimborn (2006, pp. 38-40). In particular, (1), (3), and (4) have to hold separately on $t \in (t_1, t_2)$ and on $t \in (t_2, \infty)$. In addition, so-called interior boundary conditions (also known as the first Weierstrass-Erdmann corner conditions) imply

$$\lim_{\varepsilon \rightarrow 0} \lambda(t_2 - \varepsilon) = \lim_{\varepsilon \rightarrow 0} \lambda(t_2 + \varepsilon) \quad (7)$$

and

$$\lim_{\varepsilon \rightarrow 0} H(t_2 - \varepsilon) = \lim_{\varepsilon \rightarrow 0} H(t_2 + \varepsilon) - \mu \quad (8)$$

where μ is a non-zero, finite Lagrange-Multiplier associated with the policy change time t_2 and $H(t) := H(c(t), k(t), \lambda(t))$ is the value of the Hamiltonian at time t .

Condition (7) states that the shadow price λ must be continuous (although not necessarily differentiable) at t_2 . By contrast, condition (8) states that there must be a discontinuity (a jump) in the value of the Hamiltonian $H(t_2) \equiv H(c(t_2), k(t_2), \lambda(t_2))$. Since the capital stock k is a state variable (which cannot jump by definition) and the co-state λ is continuous by virtue of (7), we see that the jump in the Hamiltonian expressed in (8) must be due to a jump in c at time t_2 . Formally,

$$\lim_{\varepsilon \rightarrow 0} c^1(t_2 - \varepsilon) \neq \lim_{\varepsilon \rightarrow 0} c^1(t_2 + \varepsilon) \quad (9)$$

where $c^1(t)$ denotes the solution to the RA's problem in period $t=1$. Obviously, initial consumption at t_1 is in general different from planned consumption at t_1 prior to the announced policy change:

³ Reoptimizing behavior in such models gave rise to the famous Lucas-critique.

$$\lim_{\varepsilon \rightarrow 0} c^0(t_1 - \varepsilon) \neq c^1(t_1) \quad (10)$$

We thus find two jumps in consumption in response to changes in (trade) policy: There is the “announcement effect” at t_1 expressed by (10) and the “implementation effect” at t_2 expressed by (9).

This finding has important consequences for the specification of a regression equation suitable to test for the effects of the Barcelona Initiative: Observed changes in consumption at time t may be either explained by perceived future tariff changes (the announcement effect) or by simultaneous or lagged actual tariff changes (the implementation effect)⁴. Therefore, potential explanatory variables to be included in the regression are both a future and the current or lagged tariff rate.

Taking logs of (3), differentiating with respect to time and substituting into (4) yields

$$\frac{\dot{c}}{c} = \frac{(r - \rho)}{\sigma}, \quad (11)$$

the well-known Ramsey-rule. Treating the real interest rate as roughly constant, the discrete time analogue of (11) would be $\ln c_t - \ln c_{t-1} = \text{const.}$ and a regression specification which allows for (but does not impose) the unit root would be

$$\ln c_t = \beta_0 + \beta_1 \ln c_{t-1} + u_t \quad (12)$$

Note that the standard Ramsey rule is independent of the tariff rate, even though τ was made explicit in (3). This is because the Ramsey rule refers to consumption as a differentiable (and thus continuous) function of time. However, by the analysis above we know that the consumption path has two discontinuities caused by announcing and implementing a change in the tariff rate. Hence a properly specified regression equation has to include one measure of anticipated and one measure of actual (or lagged) tariff rates. We therefore have to modify (12) accordingly:

$$\ln c_t = \beta_0 + \beta_1 \ln c_{t-1} + \beta_2 \tau_{t-l} + \beta_3 \tau_{t+f} + u_t, \quad l \geq 0, f > 0 \quad (13)$$

As is well-known from modern macroeconomics, other macroeconomic aggregates inherit the

⁴ In the theoretical model the implementation effect implies an instantaneous response of consumption to the change in the tariff rate. Realistically, we will also allow for lagged responses in the empirical analysis.

unit root of the Ramsey rule and cointegrate with consumption. We will therefore fit regressions of type (13) to all macroeconomic aggregates of interest. We will also allow for other changes in the economic environment by testing if conditioning variables which were implicitly assumed constant in the Ramsey model have a decisive influence on the endogenous variable. For a given endogenous variable z and additional conditioning variables $x_k, k=4, \dots, K$, the final regression equation thus is

$$\ln z_t = \beta_0 + \beta_1 \ln z_{t-1} + \beta_2 \tau_{t-l} + \beta_3 \tau_{t+f} + \sum_{k=4}^K \beta_k x_k + u_t, \quad l \geq 0, f > 0. \quad (14)$$

3. Data

At present, it seems impossible to evaluate the effects of the Barcelona Initiative using time series data of a single country only. Since 1995, the year of the Initiative, not more than eleven or at most twelve annual observations are available (1995-2006) and it may well be that in the first years of this rather limited sample potential effects of the Barcelona Initiative are not strong enough to be identified in a statistically significant way.

We therefore resort to panel data analysis. In order for this to be fruitful, it seems advisable to focus the analysis on a set of countries which is structurally similar. We thus exclude countries like Israel, Turkey and Malta and restrict our attention to a group of seven Arabic countries, Algeria, Egypt, Jordan, Lebanon, Morocco, Syria, and Tunisia. Data availability (and probably data quality) varies greatly across countries, with Lebanese data being the least complete. We generally use all available data for the analysis, i. e. we typically work with unbalanced panels. In order to single out the effects of the Barcelona Initiative, it seems advisable to include some observations from the pre-Barcelona period as well and we thus choose to let the sample start in 1992 and let it run just up to the most recent observation (usually 2006).

For each country, we consider the following (annual) variables: GDP (lny), consumption (lnc), investment ($lninv$), government expenditure (lng), and imports ($lnimp$), all real, per capita and in logs. These data are taken from the IMF International Financial Statistics. From the same source, we used the (log of the) real effective exchange rate (lne) and the inflation rate computed from the consumer price index ($infcp$). For foreign direct investment ($lnfdi$),

we use World Bank data on nominal FDI measured in US dollars and the US GDP-deflator to convert into real values. We again express this magnitude in per capita terms and in logs. We use the HWWA raw materials index for crude oil deflated by the US GDP deflator to proxy real oil prices (*lnpoil*). This regressor is padded with zeros for those countries which are net oil importers (Egypt, Jordan, Lebanon) so that it drops out as explanatory variable for these countries.

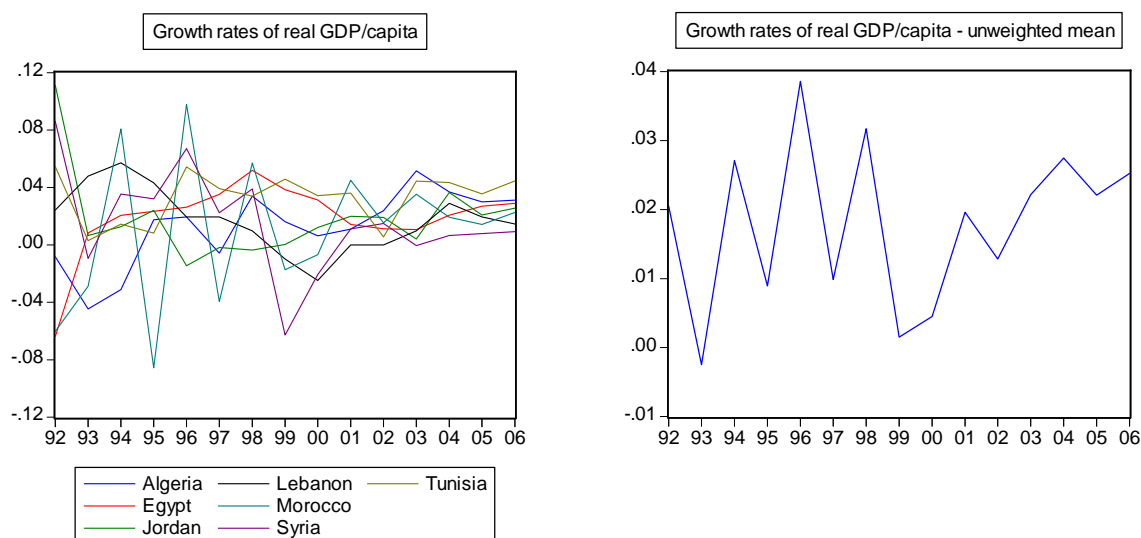
The World Bank publishes estimates of tariff rates (computed as unweighted means across a suitable commodity classification)⁵. Unfortunately, the time series provided by the World Bank have some missing observations for each of the countries in our study. We chose to use linear interpolation if there were not more than three missing observations between reported values and the reported values before and after the missings were relatively close. For one country, Syria, we preferred not to interpolate the missing tariff rates for 1991 to 1995 since here we had five missings and a rather large jump in the reported rates (11% in 1990, 21% in 1995). We rather dropped Syria in the early 1990s from the analysis, so that our panel is unbalanced⁶. We denote the resulting variable by *tuw*.

As an alternative measure of tariff rates we computed the weighted average of tariff rates and denote this by *tw*. For this purpose we used information on tariff revenues provided by the IMF and (in some cases) national statistical offices and divided by nominal imports. (The tariff series, as all our data, are available upon request). Since no information on customs revenues is available for Lebanon, regressions with *tw* as regressor are always confined to six cross sections.

Before proceeding to the econometric analysis, it may be helpful to get a visual impression of some important features of the data. The most stunning may be that output *growth rates* show clear evidence of σ -convergence (Barro and Sala-i-Martin (1992)), i. e. a pronounced decrease in the cross-country standard deviations over time. Since σ -convergence implies β -convergence this finding implies a value of β_1 smaller than unity when (14) is estimated with $\Delta \ln y$, i. e. the growth rate of output, as the dependent variable.

⁵ See World Bank (2006).

⁶ Another reason for unbalancedness is the incompleteness of observations for 2006.

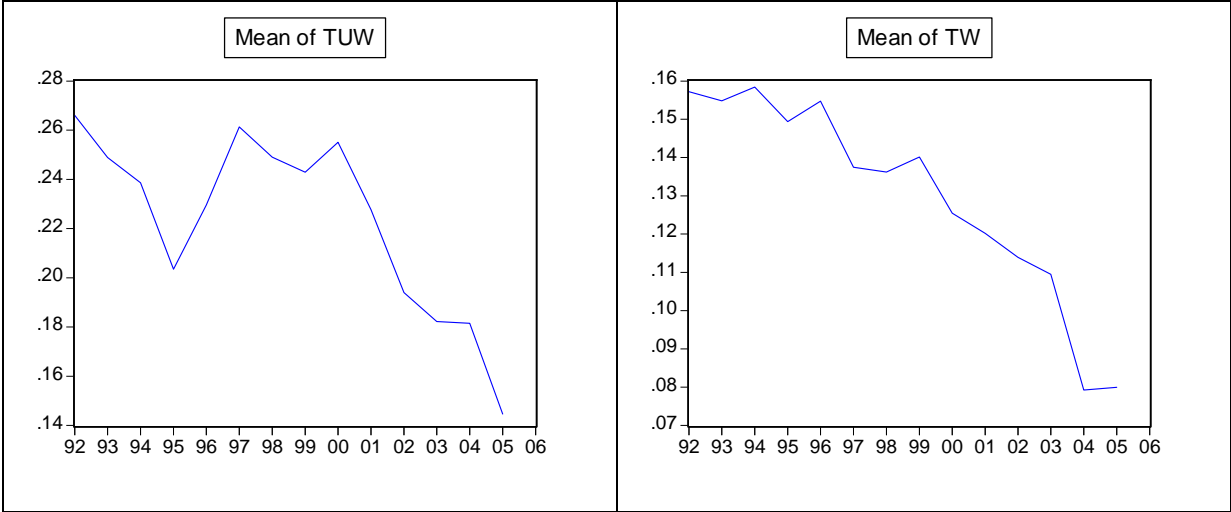


Moreover, the (unweighted) mean of the growth rates of GDP fluctuate strongly and without discernible trend in the 1990, but display a clear upward trend since 1999. Similar upward trends in the cross-section mean of the growth rates are found for consumption and investment.

The other variables of central interest are the measures of tariff rates tuw and tw . Looking at the (unweighted) cross-country mean of tuw , we have clear evidence of a reduction of formal tariff barriers since the end of the 1990s. The downward trend is even more pronounced in tw , the weighted average tariff rate. For tw , it seems that measures of trade liberalization have already cautiously started in the early 1990s and have continuously accelerated afterwards. Note that the unweighted tariff rate is much higher than the weighted tariff rate for the obvious reason that less trade typically takes place in commodities with high customs duties.

Neither measure includes NTBs. Nor does a measure of the tariff rate capture accompanying economic and institutional reforms which were clearly on the agenda of the Barcelona Initiative. Therefore, changes induced by the Barcelona Initiative may be incompletely represented by formal tariff barriers only. On the other hand, it is very likely that a country which embraces the Barcelona Initiative seeks to implement its objectives through a multifaceted reform process. As such, the observable reduction in formal tariff barriers may well be correlated with less easily observed or quantified reduction of NTBs, market-oriented

economic reforms or efficiency-enhancing institutional change. As such, the reductions in tariff rates should be interpreted as a proxy for a broader measure of trade liberalization than a mere decrease of customs duties. The regressors *tuw* and *tw* function as catchalls for variables which are unobservable or difficult to measure but may be equally important for the success of the Barcelona Initiative.



4. Econometric Analysis

Equation (14) is a dynamic equation – the lagged dependent variable is among the set of regressors. As is well known, standard fixed or random effects estimators are inconsistent in this context. The widely used Arellano-Bond (1991) estimator, however, is consistent, irrespective of whether individual effects are fixed or random. This estimator uses a dynamic set of instruments applied to the first difference of the regression equation. An alternative estimator which is also consistent is the Arellano-Bover (1995) estimator which uses orthogonal deviations rather than first differences. Both transformations eliminate the individual effects which cause the asymptotic bias.

In this investigation, we experimented with both the Arellano-Bond and the Arellano-Bover estimator. The asymptotic properties of both estimators are well-known, but their behavior in finite samples is less clear. Unfortunately, the data set described above has very limited scope (time series dimension at most sixteen, cross section dimension at most seven). Thus the properties of both estimators may be far off from what one would expect asymptotically. It

turned out that the Arellano-Bond estimator delivered very stable and economically sensible results. These results were robust with respect to the particular choice of instruments and qualitatively similar to simple estimators like fixed or random effects OLS, GLS or two stage least squares. The Arellano-Bover estimator, by contrast, yielded highly non-robust and partially absurd results. We therefore report only the results of the Arellano-Bond estimator.

Before applying this estimator, however, it may be useful to employ some of the simpler methods for preliminary data analysis. The reason for this is twofold: First, a look at alternative (though inferior) methods can serve as a robustness check for the Arellano-Bond (AB) estimator. (While this is not a formal test, it would certainly be troubling if AB- and, say, OLS-estimators came up with very different results.) Second, the appropriate time lag (or lead) by which tariff rates may affect macro variables is more easily determined by comparing the results of a broad range of estimators, many of which exploit more information than the AB-estimator. (Recall that the latter requires instruments lagged by at least two periods so that at least two years of exploitable information are lost.)

We will first consider GDP per capita, i. e. $\ln y$. Panel unit root tests (not reported here) give conflicting results about the validity of the unit root null. We therefore use the framework proposed by Bhargava (1986) which nests a trend-stationary and a unit root with drift model. Bhargava's formulation is conveniently nested in (14) by including a linear time trend t among the conditioning variables x_k , $k \geq 4$.

Due to the rather limited amount of observations we use a specific-to-general rather than a general-to-specific approach. We will thus start with estimating the restricted equation

$$\ln y_{it} = \beta_{i0} + \beta_1 \ln y_{it-1} + \beta_2 tuw_{it+l} + \beta_k t + u_{it}, \quad i = 1, \dots, 7 \quad (15)$$

for various leads and lags of tuw and with a broad set of different methods. This will enable us to study the partial correlation between current output and tariff rates. We will later sequentially test additional regressors to see if further conditioning variables in the regression are appropriate. Note that (15) is equivalent to regressing the growth rate of GDP per capita on its lagged level, i. e. (15) is a typical growth regression.

Let us first assume a fixed effects model. Estimating (15) for various values of l by ordinary least squares and allowing for fixed cross section effects (i. e. using the so-called covariance- or within-estimator) yields the following results:

Table 1:
OLS-Regression results for (15) with fixed effects

l	leads					lags			
	4	3	2	1	0	-1	-2	-3	-4
$\ln y_{it-1}$	0.588 <i>0.000</i>	0.637 <i>0.000</i>	0.660 <i>0.000</i>	0.717 <i>0.000</i>	0.763 <i>0.000</i>	0.782 <i>0.000</i>	0.747 <i>0.000</i>	0.692 <i>0.000</i>	0.689 <i>0.000</i>
tuw_{it+l}	0.059 <i>0.540</i>	0.170 <i>0.064</i>	0.042 <i>0.618</i>	-0.031 <i>0.745</i>	-0.108 <i>0.292</i>	-0.105 <i>0.261</i>	-0.199 <i>0.018</i>	-0.132 <i>0.079</i>	-0.131 <i>0.035</i>
t	0.008 <i>0.000</i>	0.008 <i>0.000</i>	0.006 <i>0.000</i>	0.005 <i>0.000</i>	0.005 <i>0.000</i>	0.005 <i>0.000</i>	0.005 <i>0.000</i>	0.007 <i>0.000</i>	0.007 <i>0.000</i>
\bar{R}^2	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
$\hat{\sigma}$	0.032	0.031	0.031	0.031	0.029	0.027	0.026	0.027	0.027
DW	1.976	1.964	1.805	1.863	1.968	2.241	2.185	2.077	2.111

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

Throughout the analysis, we apply a significance level of 5%. We find that the contemporaneous tariff rate tuw is not significant, nor is any of its leads. However, lags 2 and 4 of tuw are significant, with a slightly more favorable evidence for lag 2. The coefficient is negative, suggesting that GDP responds positively to a lower tariff rate with a delay of two years or more. Since tuw is not logged, its coefficient is a semi-elasticity, i. e. the coefficient of lag 2 can be interpreted as indicating that a decrease of the tariff rate by one percentage point increases GDP by 0.2 percent. Note that this is the short-run effect controlling for a given value of GDP in the previous period. (The meaning of short-run is somewhat ambiguous, however, since it seems to take two to four years for the effect to become visible).

As we have seen, tuw is a variable with a negative time trend. Note that tuw_{it-2} is significant although we allowed for two alternative trending regressors, the linear time trend and lagged $\ln y$. Hence we can conclude that it are indeed the specific deviations from the trend in the tariff rate which have explanatory power.

By contrast, it seems that future tariff rates do not contribute to explaining today's output. This is not in line with what we expect from the theoretical model. We will in the following see that this finding is typical for the unweighted tariff average tuw , but different for the weighted average tw . For the time being, however, we focus on tuw .

We also note that the standard error of the regression is minimal when tuw_{it-2} is used as regressor. The adjusted R^2 is close to one in all of the specifications, which is probably due to the fact that much of the between-group variation can be explained by allowing for individual country-effects. The Durbin Watson statistic (DW) is in the neighborhood of 2, as one would expect in regressions with a lagged endogenous variable.

Using GLS-estimation with fixed effects we find again that the lagged tariff rate tuw_{it-2} is significant. The coefficient is almost the same as under OLS-estimation. No other lagged tuw is significant (but note that the p-values for lags 3 and 4 are below 10%!). There is hence again evidence for a lagged positive response of GDP to trade liberalization. In addition, we find that lead 3 is significant, albeit with a positive coefficient. This result, however, is not robust: If we estimate the regression with both tuw_{it-2} and tuw_{it+3} as regressors, then tuw_{it+3} becomes insignificant (p-value 0.431), while tuw_{it-2} remains highly significant (p-value 0.004). The result for tuw_{it+3} in Table 2 is thus likely to be not more than a statistical artefact.

Table 2:

GLS-Regression results for (15) with fixed effects

l	leads					lags			
	4	3	2	1	0	-1	-2	-3	-4
$\ln y_{it-1}$	0.689 <i>0.000</i>	0.712 <i>0.000</i>	0.729 <i>0.000</i>	0.783 <i>0.000</i>	0.809 <i>0.000</i>	0.820 <i>0.000</i>	0.791 <i>0.000</i>	0.757 <i>0.000</i>	0.725 <i>0.000</i>
tuw_{it+l}	0.081 <i>0.437</i>	0.207 <i>0.014</i>	0.012 <i>0.897</i>	-0.092 <i>0.406</i>	-0.172 <i>0.100</i>	-0.155 <i>0.123</i>	-0.197 <i>0.026</i>	-0.128 <i>0.062</i>	-0.096 <i>0.086</i>
t	0.007 <i>0.000</i>	0.007 <i>0.000</i>	0.005 <i>0.000</i>	0.005 <i>0.000</i>	0.004 <i>0.000</i>	0.004 <i>0.000</i>	0.004 <i>0.000</i>	0.006 <i>0.000</i>	0.007 <i>0.000</i>
\bar{R}^2	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
$\hat{\sigma}$	0.032	0.030	0.031	0.030	0.029	0.027	0.026	0.026	0.026
DW	1.706	1.606	1.455	1.558	1.572	1.758	1.632	1.686	1.680

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

Up to now we have assumed that the individual effects are fixed. If, by contrast, we assume random effects, we can use the GLS random effects estimator to derive the results displayed in Table 3⁷:

Table 3:

GLS-Regression results for (15) with random effects

l	leads					lags			
	4	3	2	1	0	-1	-2	-3	-4
$\ln y_{it-1}$	0.680 <i>0.000</i>	0.720 <i>0.000</i>	0.748 <i>0.000</i>	0.805 <i>0.000</i>	0.846 <i>0.000</i>	0.854 <i>0.000</i>	0.811 <i>0.000</i>	0.756 <i>0.000</i>	0.762 <i>0.000</i>
tuw_{it+l}	0.068 <i>0.415</i>	0.169 <i>0.039</i>	0.028 <i>0.726</i>	-0.042 <i>0.635</i>	-0.112 <i>0.238</i>	-0.102 <i>0.241</i>	-0.198 <i>0.017</i>	-0.123 <i>0.094</i>	-0.116 <i>0.068</i>
t	0.006 <i>0.000</i>	0.006 <i>0.000</i>	0.005 <i>0.000</i>	0.004 <i>0.000</i>	0.003 <i>0.003</i>	0.004 <i>0.000</i>	0.004 <i>0.000</i>	0.006 <i>0.000</i>	0.006 <i>0.000</i>
\bar{R}^2	0.786	0.823	0.830	0.864	0.900	0.926	0.927	0.923	0.925
$\hat{\sigma}$	0.032	0.030	0.031	0.030	0.029	0.027	0.026	0.027	0.027
DW	2.040	2.016	1.866	1.951	2.056	2.303	2.222	2.103	2.150

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

⁷ We use the Wansbeek-Kapteyn (1989) random effects estimator, which is specifically designed for unbalanced panels.

Apparently, a random effects specification leads to results very close to those of the fixed-effects model estimated by GLS. Again, lead 3 and lag 2 of tuw are significant, but the coefficient of lead 3 is counterintuitively positive and becomes insignificant in a regression with both lead 3 and lag 2 of tuw , while the coefficient of tuw_{it-2} stays significant. Also, as before, the standard error of regression becomes minimal when tuw_{it-2} is included. Note that due to modelling the individual effects as random we now have meaningful values of \bar{R}^2 . The maximum value is attained for tuw_{it-2} .

Summing up the preliminary analysis, we have collected some evidence that a decreasing tariff rate affects GDP with a lag of two years (or more). We did not find convincing evidence of expected future tariff rates affecting today's GDP. However, all inference is based on estimators which are asymptotically biased. We will now turn to Arellano-Bond estimators, which are consistent under fairly general conditions. In particular, consistency holds even though there are lagged endogenous variables among the regressors and irrespective of fixed or random individual effects.

AB-estimators use dynamic instruments, i. e. the set of instruments varies with time. For this reason, the dimension of the space spanned by the instruments can quickly become very large. Clearly, this dimension must not exceed the number of observations available. Unless otherwise specified, we will instrument the lagged dependent variable lny_{it-1} with the set $\{lny_{it-2}, lny_{it-3}, lny_{it-4}\}$ and tuw_{it-2} with the set $\{tuw_{it-2}, tuw_{it-3}\}$. While the possibility of reverse causation (i. e. high levels of GDP encourage lower tariff rates) cannot be discarded, the time lag makes it quite unlikely that such an effect determines the relation between $ln y_{it}$ and tuw_{it-2} . We thus instrument the regressor tuw_{it-2} by itself. Given that we include the regressor in the set of instruments, it seems less urgent to include lag 4 than in the case of the regressor $ln y_{it-1}$, which must not be included in the set of instruments, because it clearly correlates with the error term. (Recall that under AB-estimation the dependent variable is $\Delta lny_{it} = lny_{it} - lny_{it-1}$). It is not possible to include lag 4 for both regressors in the set of instruments because in this case the number of instruments would exceed the number of observations. Exogenous variables like the time trend will, of course, always be instrumented by themselves (and only by themselves).

The first specification to be estimated by the AB-method is

$$\ln y_{it} = \beta_{i0} + \beta_1 \ln y_{it-1} + \beta_2 \text{tuw}_{it-2} + \beta_K t + u_{it}, \quad i = 1, \dots, 7, \quad (16)$$

i. e. (15) with $l=2$. The set of instruments comprises the dynamic instruments $\{\ln y_{it-2}, \ln y_{it-3}, \ln y_{it-4}, \text{tuw}_{it-2}, \text{tuw}_{it-3}\}$ and the standard instrument t . This implies that the regression has instrument rank 71, which is already fairly large. We find, see Table 4, column 1, results very much in line with what we observed in the preliminary analysis: All regressors are highly significant, β_1 is much smaller than 1 (indicating β -convergence), and, in particular, the semi-elasticity of the lagged tariff rate is about -0.2. Since equation (16) can be rewritten as

$$\Delta \ln y_{it} = \beta_{i0} + (\beta_1 - 1) \ln y_{it-1} + \beta_2 \text{tuw}_{it-2} + \beta_K t + u_{it}, \quad i = 1, \dots, 7, \quad (17)$$

we can interpret this result as saying that a decrease in the tariff rate by one percentage point has a one-time (short run) positive impact on the growth rate of real per capita GDP of 0.2 percent. Note that this is not a permanent rise in the growth rate! Rather, in the next period, the level of GDP will have increased due to the formerly higher growth rate. Therefore, $\ln y_{it-1}$, whose coefficient is negative in (17), will (partially) offset the effect of a permanently lower tariff rate on the growth rate of GDP. Hence, as is familiar from standard growth theory, a change in a policy parameter has a permanent level effect, but only a temporary effect on the growth rate.

We test the robustness of our result with respect to the choice of instruments by varying the set of dynamic instruments. The basic equation (first column of Table 4) is instrumented as described above, alternative set of dynamic instruments and the corresponding estimation results are given in the adjacent columns. (The linear trend is always instrumenting itself). As can be seen from Table 4, the results are qualitatively unchanged with different sets of dynamic instruments.

Table 4:

Arellano-Bond GMM results for (16)

	dynamic instruments <i>lny_{it-2}, lny_{it-3}, lny_{it-4},</i> <i>tuw_{it-2}, tuw_{it-3}</i>	<i>lny_{it-2}, lny_{it-3},</i> <i>tuw_{it-2}, tuw_{it-3}, tuw_{it-4}</i>	<i>lny_{it-2}, lny_{it-3},</i> <i>tuw_{it-2}, tuw_{it-3}</i>	<i>lny_{it-2},</i> <i>tuw_{it-2}</i>
<i>lny_{it-1}</i>	0.702 <i>0.000</i>	0.618 <i>0.000</i>	0.567 <i>0.000</i>	0.791 <i>0.000</i>
<i>tuw_{it-2}</i>	-0.191 <i>0.000</i>	-0.201 <i>0.000</i>	-0.198 <i>0.000</i>	-0.258 <i>0.000</i>
<i>t</i>	0.006 <i>0.033</i>	0.007 <i>0.018</i>	0.007 <i>0.010</i>	0.004 <i>0.025</i>
$\hat{\sigma}$	0.042	0.040	0.039	0.044
Instrument rank	71.000	71.000	57.000	29.000
Bold: Significant regression coefficients. <i>Italics:</i> P-values (using heteroskedasticity-consistent standard errors).				

Note that there are no generally accepted measures of fits for equations estimated by the generalized method of moments (GMM). In particular, it does not make sense to compute an \bar{R}^2 for an equation which is estimated without a constant term (due to first differencing). In terms of the standard error of regression $\hat{\sigma}$, columns 2 and 3 seem to dominate the basic equation in column 1. This conclusion would be premature, however, since the basic equation has to fulfill a different (and probably more demanding) set of orthogonality conditions: Unlike its modifications in columns 2, 3, and 4 the basic equation must produce residuals which are orthogonal also to lny_{it-4} . If the regressions in columns 2 and 3 are able to produce a lower standard error without this requirement, it is fairly obvious that they do so by violating it. This violation is precisely the reason why we prefer the basic equation and generally instrument also with lny_{it-4} . The important point, however, about Table 4 is given by the relative constancy of the regression coefficients: Regardless of the particular choice of instruments we find a semi-elasticity of -0.2 for the unweighted average of the tariff rates. (Note that the one deviating result in column 4 has the largest standard error with the fewest orthogonality conditions, hence this regression is not to be taken seriously. Also note that the coefficient of the tariff rate seems to be even more stable across variations in the set of instruments than the coefficient of the lagged endogenous variable).

Following the specific-to-general approach, we amend equation (16) by further conditioning variables. We begin with the oil price $lnpoil$ as an additional explanatory variable for GDP in Algeria, Morocco, Syria and Tunisia. Table 5 contains a number of specifications which test the explanatory power of oil prices. In the first three columns, oil prices supplement equation (16) contemporaneously or with a lag of one or two years. (The coefficient of $lnpoil$ is restricted to be the same for all countries in these columns.) Surprisingly, it turns out that contemporaneous oil prices are insignificant, and so are oil prices lagged one year. Only oil prices with a lag of two year have a significantly positive impact on GDP of oil exporters.

That oil prices affect GDP only with a lag of two years is not too plausible. Also, while lag 1 is insignificant, its p-value is much lower (and the coefficient is hence closer to significance) than the p-value for contemporaneous oil prices. To investigate this further, we allow for country-specific coefficients of oil prices. Thus, in the next three columns each of the four countries has its own price elasticity estimated. (The variables d_{ALG} , d_{MOR} , d_{SYR} , and d_{TUN} are simple country dummies for Algeria, Morocco, Syria, and Tunisia, respectively.) With this specification, oil prices continue to be completely insignificant contemporaneously. We also find that oil prices with a lag of two years are now insignificant for all of the countries, which casts some doubts on the restricted version of this equation. For oil prices lagged one year, we have a significant coefficient for Morocco, with insignificant results for the other three countries.

Table 5:

Arellano-Bond GMM results for (16) amended for oil prices

l	Lag l of oil price variable						
	0	-1	-2	0	-1	-2	-1
$\ln y_{it-1}$	0.645 <i>0.000</i>	0.630 <i>0.000</i>	0.617 <i>0.001</i>	0.500 <i>0.008</i>	0.544 <i>0.008</i>	0.618 <i>0.000</i>	0.634 <i>0.000</i>
tuw_{it-2}	-0.160 <i>0.040</i>	-0.122 <i>0.139</i>	-0.134 <i>0.076</i>	-0.152 <i>0.034</i>	-0.185 <i>0.000</i>	-0.150 <i>0.011</i>	-0.165 <i>0.008</i>
$\ln poil_{t+l}$	-0.005 <i>0.725</i>	0.031 <i>0.150</i>	0.020 <i>0.013</i>				
$d_{ALG} * \ln poil_{t+l}$				0.014 <i>0.602</i>	0.011 <i>0.596</i>	0.041 <i>0.137</i>	
$d_{MOR} * \ln poil_{t+l}$				-0.013 <i>0.123</i>	0.089 <i>0.000</i>	0.018 <i>0.095</i>	0.100 <i>0.000</i>
$d_{SYR} * \ln poil_{t+l}$				-0.091 <i>0.003</i>	-0.029 <i>0.500</i>	0.000 <i>0.999</i>	
$d_{TUN} * \ln poil_{t+l}$				0.057 <i>0.175</i>	0.010 <i>0.697</i>	0.017 <i>0.482</i>	
t	0.006 <i>0.038</i>	0.005 <i>0.085</i>	0.006 <i>0.067</i>	0.008 <i>0.012</i>	0.006 <i>0.044</i>	0.006 <i>0.058</i>	0.005 <i>0.068</i>
$\hat{\sigma}$	0.041	0.040	0.040	0.038	0.039	0.041	0.040
Instrument Rank	45.000	45.000	45.000	48.000	48.000	48.000	45.000

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

The last column then displays the preferred specification, which is obtained by deleting insignificant regressors. An increase in world oil prices by 1% raises the GDP of Morocco by 0.1%. The semi-elasticity of GDP with respect to lagged tariff rates tuw_{it-2} is slightly smaller than before (-0.17), but remains highly significant. Note that across all specifications tested the point estimate of the coefficient of tuw_{it-2} is remarkably stable. Also, this estimate is mostly significant even in the presence of other insignificant regressors.

Since (lagged) oil prices are significant for Morocco, we keep this regressor in all following specifications. We proceed to test whether the real effective exchange rate $\ln e$, the (consumer price) inflation rate $\ln fcpi$ or foreign direct investment $\ln fdi$ are suitable conditioning variables

which might either explain the growth experience of GDP or capture cross-sectional heterogeneity. For all these variables, we test for both a contemporaneous and a lagged influence.

Table 6:
Arellano-Bond GMM results, further amendments of (16):
Exchange rate, inflation rate and FDI

l	Lag l of $lne_{it+l}, infcpi_{it+l}, lnfdi_{it+l}$					
	0	-1	0	-1	0	-1
lny_{it-1}	0.568 <i>0.033</i>	0.564 <i>0.024</i>	0.634 <i>0.000</i>	0.660 <i>0.000</i>	0.640 <i>0.006</i>	0.634 <i>0.004</i>
tuw_{it-2}	0.179 <i>0.086</i>	0.042 <i>0.747</i>	-0.174 <i>0.004</i>	-0.187 <i>0.008</i>	-0.161 <i>0.001</i>	-0.099 <i>0.131</i>
lne_{it+l}	-0.042 <i>0.657</i>	0.051 <i>0.471</i>				
$infcpi_{it+l}$			-0.049 <i>0.404</i>	-0.141 <i>0.349</i>		
$lnfdi_{it+l}$					-0.003 <i>0.420</i>	-0.005 <i>0.324</i>
$d_{MOR} * lnpoil_{t-1}$	0.084 <i>0.000</i>	0.083 <i>0.000</i>	0.101 <i>0.000</i>	0.090 <i>0.001</i>	0.089 <i>0.000</i>	0.070 <i>0.000</i>
t	0.009 <i>0.035</i>	0.010 <i>0.001</i>	0.005 <i>0.070</i>	0.004 <i>0.197</i>	0.007 <i>0.025</i>	0.007 <i>0.036</i>
$\hat{\sigma}$	0.048	0.047	0.040	0.039	0.040	0.039
Instrument Rank	32.000	34.000	47.000	49.000	48.000	50.000

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

Table 6 contains the results. In all regressions we instrument $lne_{it+l}, infcpi_{it+l},$ and $lnfdi_{it+l},$ $l = 0, -1, -2,$ with $lne_{it-2}, infcpi_{it-2},$ and $lnfdi_{it-2},$ respectively, in order to account for the possibility of reverse causation. Neither the contemporaneous nor the lagged variables have significant explanatory power. By, contrast, Moroccan oil prices are significant throughout with a fairly stable coefficient estimate. The tariff rate tuw becomes insignificant in the regressions which include the real effective exchange rate lne as an (highly insignificant

regressor), but continues to be significant in the regressions which include either *infcpu* or *lnfdi*. In fact, the estimated coefficient for tuw_{it-2} is not much different in these regressions from the estimates obtained previously. Given the clearly insignificant results for the new conditioning variables, the preferred specification continues to be the last column of Table 5.

Next, we investigate whether (real) domestic consumption, investment or government expenditure have explanatory power for observed changes in real GDP per capita. All of these variables may be affected by decreased tariff barriers, because imported goods become cheaper or – in the case of the government - because revenues fall. Hence they may function as transmission channels through which the stimulating effects of tariff rate reductions on GDP operate. Alternatively, there may be an independent reason why consumption, investment or government absorption fluctuate and it may these fluctuations (unrelated to trade liberalization) which cause movements in GDP.

If changes in these aggregates are due to trade liberalization (we will subsequently test for this), a significant impact of consumption or government expenditure on GDP can be interpreted as affecting GDP via the demand side of the economy, while a significant impact of private investment is more likely to express a supply side effect. (The demand side effect of increased investment in SMPC countries is probably small since many investment goods are imported).

Note that regressing lny_{it} on $lninv_{it}$ is essentially the same as regressing lny_{it} on the (log of the) investment or savings rate – standard regressors in cross country growth regressions. Similarly, consumption, government expenditure and imports could be rephrased as shares. Naturally, when these regressors are contemporaneous, they need to be instrumented. We will test the regressors both contemporaneously and with a lag of one period. Since Arellano-Bond-estimators operate on first differences, the lagged regressors must also be instrumented, so that we will always use the $t-2$ and the $t-3$ observations of the regressors as dynamic instruments. The lagged endogenous variable is still instrumented with lags 2, 3, and 4 as dynamic instruments.

Table 7:

Arellano-Bond GMM results, further amendments of (16):

Private consumption, private investment and government absorption

l	Lag l of lnc_{it+l} , $lninv_{it+l}$, lng_{it+l}					
	0	-1	0	-1	0	-1
lny_{it-1}	0.487 <i>0.001</i>	0.664 <i>0.000</i>	0.576 <i>0.000</i>	0.648 <i>0.000</i>	0.635 <i>0.000</i>	0.668 <i>0.000</i>
tuw_{it-2}	0.018 <i>0.814</i>	-0.162 <i>0.000</i>	-0.181 <i>0.000</i>	-0.204 <i>0.000</i>	-0.225 <i>0.000</i>	-0.189 <i>0.000</i>
lnc_{it+l}	0.225 <i>0.029</i>	0.022 <i>0.650</i>				
$lninv_{it+l}$			0.038 <i>0.276</i>	-0.029 <i>0.464</i>		
lng_{it+l}					-0.048 <i>0.233</i>	-0.005 <i>0.891</i>
$d_{MOR} * lnpoil_{t-1}$	0.046 <i>0.008</i>	0.036 <i>0.003</i>	0.059 <i>0.000</i>	0.047 <i>0.000</i>	0.083 <i>0.000</i>	0.046 <i>0.000</i>
t	0.006 <i>0.000</i>	0.006 <i>0.000</i>	0.007 <i>0.000</i>	0.007 <i>0.000</i>	0.008 <i>0.000</i>	0.006 <i>0.003</i>
$\hat{\sigma}$	0.036	0.042	0.040	0.041	0.040	0.040
Instrument Rank	72.000	77.000	72.000	77.000	73.000	78.000

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

It turns out that with the exception of lnc_{it} the macroeconomic aggregates are insignificant, regardless of whether they enter the regression equation with or without lag. The lagged tariff rate, however, remains significant in the presence of the insignificant regressors and the estimated coefficient centers around -0.2 quite nicely. For lnc_{it} , however, the picture is different: Contemporaneous consumption is significant and tuw_{it-2} loses its significance in the presence of this regressor. This may be interpreted as saying that the main impetus of trade liberalization on GDP operates via a stimulation of private consumption, whereas supply-side effects are not (or not yet) strongly driving aggregate output of arabic SMPC countries. Note that changes in the level of government absorption, be they trade policy induced or the result of some unrelated policy considerations, do not seem to have a measurable impact on GDP.

For further investigation of the transmission channels, we estimate equation (14) for components of GDP. We start with a version of (14) which includes two lags of the endogenous variable, the aggregate tariff rate tuw_{it-2} , the oil price regressor for Morocco and a linear trend. We then delete regressors which are clearly insignificant to derive a more parsimonious specification. Table 8 contains the results for private consumption and private investment:

Table 8:
Arellano-Bond GMM results for components of GDP:
Private consumption and private investment

	Endogenous variable				
	inc_{it}	inc_{it}	$lninv_{it}$	$lninv_{it}$	$lninv_{it}$
Lag 1 of endogenous variable	0.415 <i>0.000</i>	0.456 <i>0.000</i>	0.278 <i>0.243</i>	0.270 <i>0.080</i>	0.274 <i>0.062</i>
Lag 2 of endogenous variable	0.095 <i>0.460</i>		-0.022 <i>0.799</i>		
tuw_{it-2}	-0.561 <i>0.000</i>	-0.598 <i>0.000</i>	-0.867 <i>0.000</i>	-0.843 <i>0.000</i>	-0.844 <i>0.000</i>
$d_{MOR} * lnpoil_{t-1}$	0.150 <i>0.001</i>	0.155 <i>0.000</i>	0.018 <i>0.530</i>	0.018 <i>0.538</i>	
t	0.009 <i>0.001</i>	0.009 <i>0.001</i>	0.006 <i>0.202</i>	0.007 <i>0.096</i>	0.007 <i>0.093</i>
$\hat{\sigma}$	0.056	0.056	0.100	0.100	0.100
Instrument Rank	45.000	45.000	45.000	45.000	44.000

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

The first two columns describe the response of consumption. The linear trend, the oil price for Morocco and the lagged tariff rate tuw_{it-2} are highly significant in both specifications, but inc_{it-2} is not, and so this regressor is eliminated in column 2. A lower average tariff rate seems to stimulate private consumption quite strongly: The estimated semi-elasticity in the more parsimonious specification is -0.6 with a standard error of 0.095. Thus, as we have already conjectured, trade liberalization seems to operate through a stimulation of private consumption. If consumption were the only channel through which trade liberalization affects

GDP, we would expect tuw_{it-2} to become insignificant in regressions which explain lny_{it} by regressing on lnc_{it} and other variables. We would also expect that regressions without the regressor lnc_{it} do find a significant semi-elasticity of lny_{it} with respect to tuw_{it-2} . This semi-elasticity should be smaller in absolute value than the semi-elasticity found by regressing lnc_{it} on its own past and the lagged tariff rate, since the consumption share is usually smaller than one. (For the SMPC countries in this study the consumption share for year 2000, say, varies between 0.4 and 0.8). Comparing the two estimates and controlling appropriately for the different coefficients of the lagged endogenous variable yields the impression that the semi-elasticity in the consumption equation is surprisingly large. However, due to the nonlinear transformation and the panel structure of the data with considerable heterogeneity across time and cross section, it seems difficult to formally test whether the two point estimates are compatible and we will not do so here.

For private investment, we find that neither lag 2 of the endogenous variable nor oil prices for Morocco are significant. Even lag 1 of the endogenous variable and the linear trend are insignificant, but we do not eliminate them from the regression since their p-values are both below 10%. The lagged tariff rate tuw_{it-2} , however, is highly significant in all three specifications (column 3-5 in Table 8) and the estimated semi-elasticity seems to be very stable at a value of about -0.85 (standard error 0.13 in the most parsimonious specification). Hence, it seems that private investment is also stimulated by trade liberalization.

This finding is surprising, since including lnc_{it} as explanatory variable for lny_{it} was sufficient to make tuw_{it-2} insignificant (column 1 of Table 7). Thus there seems to be somewhat conflicting evidence as far as the supply side effect of trade liberalization is concerned. The reason for this may be that the share of private investment in GDP is rather small for most SMPC economies in this study (below 20% in most cases), so that an effect of decreased tariff rates on GDP may be dominated by noise once we control for the consumption channel. Under this interpretation, we have much stronger evidence of beneficial effects of trade liberalization if we study private investment directly – and given that building up a capital stock is a rather slow process, further gains may be ahead.

We also check for other channels by which trade liberalization affects the economies. Table 9 is analogous to Table 8 and studies the role of government expenditure, FDI, and imports. (We do not investigate exports since foreign market access for the Mediterranean Partners has not changed much under the Barcelona Initiative.)

Table 9:

Arellano-Bond GMM results for components of GDP and balance of payments:

Government absorption, imports and FDI

	Endogenous variable					
	lng_t	lng_t	$lnimp_t$	$lnimp_t$	$lnfdi_t$	$lnfdi_t$
Lag 1 of endogenous variable	0.276 <i>0.005</i>	0.330 <i>0.011</i>	0.483 <i>0.000</i>	0.540 <i>0.000</i>	-0.151 <i>0.420</i>	-0.019 <i>0.935</i>
Lag 2 of endogenous variable	0.115 <i>0.269</i>		-0.034 <i>0.703</i>		-0.036 <i>0.835</i>	
tuw_{it-2}	0.237 <i>0.303</i>	0.268 <i>0.212</i>	-0.812 <i>0.000</i>	-0.814 <i>0.001</i>	0.073 <i>0.965</i>	-0.167 <i>0.947</i>
$d_{MOR} * lnpoil_{t-1}$	0.207 <i>0.011</i>	0.206 <i>0.017</i>	0.255 <i>0.111</i>	0.231 <i>0.086</i>	0.047 <i>0.954</i>	0.188 <i>0.778</i>
t	0.015 <i>0.000</i>	0.016 <i>0.000</i>	0.020 <i>0.003</i>	0.018 <i>0.012</i>	0.038 <i>0.143</i>	0.049 <i>0.079</i>
$\hat{\sigma}$	0.090	0.091	0.120	0.122	0.802	0.919
Instrument Rank	45.000	45.000	45.000	45.000	37.000	38.000

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

Table 9 clearly indicates that trade liberalization has neither a positive nor a negative effect on government absorption, cf. columns 1 and 2. Thus it seems that governments neutralize lower tariff revenue on the revenue side, i. e. through other taxes or increased debt. Turning to imports, it is as clear that lower values of tuw_{it-2} strongly encourage imports – the estimated semi-elasticity is about -0.8 in both specifications. The standard error of this estimate is much larger than in the investment equation: 0.24 in the parsimonious specification. Thus, on average, a decrease in the tariff rate by one percentage point seems to raise aggregate imports by about 0.8%, but this effect is subject to considerable variation across time and cross section. FDI, finally, is not satisfactorily explained by any of the regressors and there is thus

no evidence that it has responded to trade liberalization.

So far, we have explored the explanatory potential of the unweighted aggregate tariff rate tuw . We have, however, a second measure of protection, the weighted aggregate tariff rate tw . We could, in principle, repeat all of what we have analysed so far by using tw instead of tuw and thus check for the robustness of our results. This might be somewhat boring for the reader and, fortunately, such an avenue of research is quickly redirected to a different route, as it turns out that tw seems to capture the forward looking aspect of trade liberalization as opposed to tuw whose maximum explanatory power comes along with a lag of two years.

We thus start with an analysis analogous to Table 1, but replace tuw by tw . The estimation method is again least squares for a model with fixed effects, i. e. we estimate for various leads and lags

$$\ln y_{it} = \beta_{i0} + \beta_1 \ln y_{it-1} + \beta_3 tw_{it+l} + \beta_k t + u_{it}, \quad i = 1, \dots, 6 \quad (18)$$

which is analogous to (15). While these estimates are not consistent, this approach provides an easy way to check the explanatory power of tw in a preliminary assessment. Note that the sample is slightly smaller in any regression which involves tw , since we do not have observations on tw for the year 2006 and no observations at all for tw in Lebanon, i. e. there are only six cross section elements.

Table 10:

OLS-Regression results for (18) with fixed effects

l	leads					lags			
	4	3	2	1	0	-1	-2	-3	-4
$\ln y_{it-1}$	0.553 <i>0.000</i>	0.586 <i>0.000</i>	0.604 <i>0.000</i>	0.609 <i>0.000</i>	0.678 <i>0.000</i>	0.750 <i>0.000</i>	0.765 <i>0.000</i>	0.846 <i>0.000</i>	0.825 <i>0.000</i>
tw_{it+l}	-0.032 <i>0.881</i>	-0.123 <i>0.377</i>	-0.267 <i>0.012</i>	-0.305 <i>0.013</i>	-0.158 <i>0.058</i>	-0.173 <i>0.149</i>	-0.151 <i>0.110</i>	-0.107 <i>0.192</i>	-0.189 <i>0.009</i>
t	0.008 <i>0.014</i>	0.007 <i>0.002</i>	0.006 <i>0.001</i>	0.006 <i>0.001</i>	0.006 <i>0.002</i>	0.004 <i>0.011</i>	0.004 <i>0.015</i>	0.003 <i>0.024</i>	0.003 <i>0.120</i>
\bar{R}^2	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
$\hat{\sigma}$	0.034	0.033	0.032	0.031	0.031	0.029	0.030	0.026	0.026
DW	1.900	1.949	1.924	1.856	1.909	1.989	1.999	2.699	2.580

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

As can be seen from Table 10, tw enters (18) with significant coefficients for leads 1 and 2 and for lag 4. This contrasts remarkably with the results of Table 1, where significant statistics for tuw in (15) were obtained only for lags (lag 2 and lag 4). It seems to indicate that tw is better suited to capture the effects of preannounced changes in the tariff rate, while tuw captures the (lagged) actual changes in protection.

In fact, this is what one would expect under the plausible assumption that people who trade already in certain commodities with a certain SMPC country watch preannounced policy changes more attentively than people who do not do business with this particular country. (Recall that the weighted tariff rate tw puts more weight on tariff rates for commodities which are traded in large volumes, while the unweighted tariff rate tuw weighs all commodity tariffs equally regardless of the actual volume of trade.) People who are already engaged in trade will find that tw more accurately reflects the tariff rates they are interested in and they may expand their activities as soon as they realize that measures of protection they are currently facing will be lifted in the future. By contrast, people not trading with the country at the current tariff system may have chosen not to trade precisely because they found certain tariff rates prohibitively high. Thus they may find the unweighted measure tuw to better reflect the tariff rates they are interested in and they may realize the potential of lower protection later than the people already engaged in trade, either because they do not follow the trade policy of

this country as closely and thus recognize changes in protection rather late or because it takes more time to build up profitable trade with a country in which one does not yet have a foothold.

We therefore check if the two tariff rates tw and tuw can be taken to represent the effects of the preannounced and the actual tariff change, respectively. (Recall that these two effects were implied by the theoretical analysis in Section 2.) Hence we include tuw_{it-2} as additional regressor in (18) to represent actual changes in tariff rates and test again the explanatory power of tw at various leads and lags, i. e. we estimate

$$\ln y_{it} = \beta_{i0} + \beta_1 \ln y_{it-1} + \beta_2 tuw_{it-2} + \beta_3 tw_{it+l} + \beta_K t + u_{it}, \quad i = 1, \dots, 6 \quad (19)$$

The interesting question is whether a lead of tw survives as a significant regressor in combination with a lag of tuw , which would be evidence for economic responses to preannounced tariff rate changes completely in line with the theoretical model.

Table 11:

OLS-Regression results for (19) with fixed effects

l	leads of tw_{it+l}				0	lags of tw_{it+l}			
	4	3	2	1		-1	-2	-3	-4
$\ln y_{it-1}$	0.575 <i>0.000</i>	0.578 <i>0.000</i>	0.579 <i>0.000</i>	0.560 <i>0.000</i>	0.638 <i>0.000</i>	0.699 <i>0.000</i>	0.692 <i>0.000</i>	0.786 <i>0.000</i>	0.773 <i>0.000</i>
tuw_{it-2}	-0.332 <i>0.000</i>	-0.299 <i>0.000</i>	-0.273 <i>0.000</i>	-0.284 <i>0.000</i>	-0.245 <i>0.003</i>	-0.203 <i>0.059</i>	-0.213 <i>0.036</i>	-0.114 <i>0.141</i>	-0.127 <i>0.101</i>
tw_{it+l}	0.221 <i>0.125</i>	-0.022 <i>0.884</i>	-0.253 <i>0.071</i>	-0.320 <i>0.019</i>	-0.127 <i>0.195</i>	-0.229 <i>0.053</i>	-0.225 <i>0.034</i>	-0.123 <i>0.219</i>	-0.206 <i>0.018</i>
t	0.010 <i>0.000</i>	0.008 <i>0.000</i>	0.006 <i>0.000</i>	0.007 <i>0.000</i>	0.006 <i>0.000</i>	0.005 <i>0.005</i>	0.005 <i>0.003</i>	0.005 <i>0.027</i>	0.004 <i>0.093</i>
\bar{R}^2	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
$\hat{\sigma}$	0.030	0.028	0.028	0.027	0.028	0.027	0.027	0.025	0.025
DW	2.616	2.545	2.400	2.312	2.265	2.249	2.287	2.950	2.821
Bold: Significant regression coefficients. <i>Italics:</i> P-values (using heteroskedasticity-consistent standard errors).									

The results are given in Table 11. Apparently, tuw_{it-2} and tw_{it+1} are jointly significant if $l=1$ or $l=-2$. In the latter case, however, the p-values are less convincing (above 3% for both) and this is not surprising since both variables enter with the same lag and thus likely capture the same phenomenon (namely actual tariff changes). For the lead $l=1$, on the other hand, we find tuw_{it-2} to be highly significant and tw_{it+1} with a p-value below 2%. Hence this specification might well capture both the announcement and the implementation effect of trade liberalization. Quite plausibly, the lead of one year for tw would suggest that the announcement of lower tariff rates becomes credible enough to induce measurable changes in real GDP only one year ahead of time.

We obtain virtually the same results if we estimate equation (19) with GLS. The only qualitative difference seems to be that tuw_{it-2} and tw_{it-4} are also jointly significant, thus it may be that there is a protracted, longlasting effect of actual tariff changes. But as before, we also find a joint significance of tuw_{it-2} and tw_{it+1} so that we can distinguish the announcement and the implementation effect, cf. Table 12.

Table 12:

GLS-Regression results for (19) with fixed effects

l	leads of tw_{it+l}					lags of tw_{it+l}			
	4	3	2	1	0	-1	-2	-3	-4
$\ln y_{it-1}$	0.659 <i>0.000</i>	0.636 <i>0.000</i>	0.645 <i>0.000</i>	0.586 <i>0.000</i>	0.662 <i>0.000</i>	0.783 <i>0.000</i>	0.769 <i>0.000</i>	0.846 <i>0.000</i>	0.853 <i>0.000</i>
tuw_{it-2}	-0.345 <i>0.000</i>	-0.302 <i>0.000</i>	-0.276 <i>0.000</i>	-0.283 <i>0.000</i>	-0.239 <i>0.006</i>	-0.190 <i>0.065</i>	-0.206 <i>0.043</i>	-0.129 <i>0.068</i>	-0.160 <i>0.013</i>
tw_{it+1}	0.225 <i>0.076</i>	-0.008 <i>0.957</i>	-0.203 <i>0.123</i>	-0.229 <i>0.010</i>	-0.029 <i>0.692</i>	-0.107 <i>0.195</i>	-0.140 <i>0.022</i>	-0.124 <i>0.122</i>	-0.222 <i>0.000</i>
t	0.008 <i>0.000</i>	0.007 <i>0.000</i>	0.006 <i>0.000</i>	0.007 <i>0.000</i>	0.007 <i>0.000</i>	0.004 <i>0.003</i>	0.005 <i>0.007</i>	0.003 <i>0.038</i>	0.002 <i>0.102</i>
\bar{R}^2	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
$\hat{\sigma}$	0.029	0.028	0.028	0.026	0.027	0.026	0.026	0.024	0.024
DW	2.075	1.991	1.960	1.780	1.662	1.825	1.814	1.927	1.978

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

For the purpose of further robustification of this kind of preliminary analysis we estimate (19) under a random effects specification. Results are given in Table 13. With random effects, tw is nowhere significant, but it is closest to significance (p-value 5.2%) with a lead of 1 and tuw_{it-2} is highly significant in this specification.

Table 13:

GLS-Regression results for (19) with random effects

l	leads of tw_{it+l}					lags of tw_{it+l}			
	4	3	2	1	0	-1	-2	-3	-4
lny_{it-1}	0.660 <i>0.000</i>	0.645 <i>0.000</i>	0.639 <i>0.000</i>	0.616 <i>0.000</i>	0.707 <i>0.000</i>	0.772 <i>0.000</i>	0.767 <i>0.000</i>	0.873 <i>0.000</i>	0.861 <i>0.000</i>
tuw_{it-2}	-0.339 <i>0.000</i>	-0.300 <i>0.000</i>	-0.271 <i>0.000</i>	-0.279 <i>0.000</i>	-0.239 <i>0.008</i>	-0.188 <i>0.055</i>	-0.196 <i>0.041</i>	-0.094 <i>0.221</i>	-0.116 <i>0.133</i>
tw_{it+l}	0.227 <i>0.182</i>	0.001 <i>0.995</i>	-0.224 <i>0.088</i>	-0.290 <i>0.052</i>	-0.089 <i>0.355</i>	-0.176 <i>0.141</i>	-0.172 <i>0.076</i>	-0.075 <i>0.480</i>	-0.169 <i>0.061</i>
t	0.009 <i>0.000</i>	0.007 <i>0.000</i>	0.006 <i>0.000</i>	0.006 <i>0.000</i>	0.005 <i>0.000</i>	0.004 <i>0.025</i>	0.004 <i>0.013</i>	0.003 <i>0.105</i>	0.002 <i>0.246</i>
\bar{R}^2	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
$\hat{\sigma}$	0.030	0.028	0.028	0.027	0.028	0.027	0.027	0.025	0.024
DW	2.636	2.531	2.382	2.297	2.286	2.310	2.341	3.056	2.922

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

Given this kind of preliminary evidence, it seems reasonable to explore the joint effects of preannounced (tw_{it+1}) and actual (tuw_{it-2}) tariff rate changes further in estimation strategies which yield consistent estimates in dynamic settings under both fixed and random effects specifications, i. e. with Arellano-Bond estimators. In doing so, we will treat tw_{it+1} as a predetermined variable, since its value in period $t+1$ was typically fixed under the stepwise tariff dismantling schedules of the Association Agreements (AA) several years before the tariff rate was actually set to its $t+1$ level. Precisely how many years ahead tw_{it+1} should be considered predetermined is impossible to say – and the lead will probably not be constant over time. We assume, however, that tw_{it+1} is set in advance of periods t and $t-1$, so that it does not correlate with shocks affecting macroeconomic aggregates in these periods. This assumption seems fairly innocuous, since it is not plausible to view tariff rates as correlating with short-run shocks.

It may nevertheless be sensible to check the sensitivity of estimation results under under this assumption. We therefore estimate

$$\ln y_{it} = \beta_{i0} + \beta_1 \ln y_{it-1} + \beta_2 tw_{it-2} + \beta_3 tw_{it+1} + \beta_K t + u_{it}, \quad i = 1, \dots, 6, \quad (20)$$

with various sets of instruments for tw_{it+1} . In the first column of Table 14 we estimate (20), using tw_{it+1} as its own instrument, i. e. assuming that tw_{it+1} was more or less predetermined three years in advance. In the adjacent columns we instead use lagged observations of tw as instruments

Table 14:
Arellano-Bond GMM results for (20)

	instruments for tw_{it+1}			
	tw_{it+1}	tw_{it}	tw_{it-1}	tw_{it-2}
$\ln y_{it-1}$	0.503 <i>0.002</i>	0.438 <i>0.008</i>	0.300 <i>0.121</i>	0.197 <i>0.406</i>
tw_{it-2}	-0.185 <i>0.015</i>	-0.178 <i>0.017</i>	-0.255 <i>0.000</i>	-0.207 <i>0.001</i>
tw_{it+1}	-0.440 <i>0.048</i>	-0.459 <i>0.061</i>	-0.631 <i>0.002</i>	-0.274 <i>0.159</i>
t	0.007 <i>0.018</i>	0.008 <i>0.001</i>	0.007 <i>0.000</i>	0.012 <i>0.001</i>
$\hat{\sigma}$	0.041	0.040	0.037	0.032
Instrument rank	42.000	42.000	42.000	39.000

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

The leading tariff rate tw_{it+1} is marginally significant if instrumented by itself. It has almost the same point estimate and a p-value only slightly larger if instrumented by tw_{it} . It is highly significant even if tw_{it-1} is used as instrument, although the point estimate is somewhat larger in absolute value. The regressor becomes insignificant only if the instrument is lagged as much as three periods. It thus seems that the quality of the estimation decreases with more distant instruments – estimates get more volatile and standard errors increase. This is, of course, what must be expected, since more distant instruments will, in general, have lower correlation with the variable they are supposed to substitute for. Thus, even if tw_{it+1} were inappropriate as an instrument for itself, alternative instruments may not be better: While

there may be less correlation with the contemporaneous error term, there may also be less correlation with the regressor. In general, as Nelson and Startz (1990a, 1990b) have shown, weak instruments can lead to severely biased estimates and large standard errors, so that in many cases the simultaneity bias may be smaller than the bias induced by weak instruments.

Turning to the other regressors, we see that tuw_{it-2} is significant independent of which particular instrument is used for tw_{it+1} and the point estimate is fairly stable. The same is true for the linear trend. But the coefficient for lny_{it-1} becomes insignificant in columns 3 and 4. It is very implausible that lny should not be persistent. Thus it seems inappropriate to use distant instruments for tw . Given that the estimates in the first column of Table 1 are significant and numerically close to both the coefficient estimates in the second column and those that we obtained before we introduced tw as additional regressor, we decide to instrument tw by itself.

As before, we check whether oil prices have explanatory power for GDP. The finding (cf. Table 15) is qualitatively the same as in the regression equation which did not yet include the regressor tw , cf. Table 5. Contemporaneous oil prices and oil prices lagged one year are not significant, but oil prices lagged two years are. As the significance is only marginal for lag 2 (p-value is 4.3%) and the long time lag is not too convincing, we allow for country-specific effects of oil prices in line with the analysis above. It turns out that oil prices are not significant at any lag for Algeria and Tunisia. Contemporaneous oil prices are significant with the wrong sign for Syria and Morocco, so the equation in column 4 of Table 15 probably suffers from misspecification. However, the oil price lagged one year seems to have a significant effect on Morocco's GDP and this is supported by a separate regression which eliminates all regressor except this one. So we will amend the set of regressors for Morocco (and only for Morocco) by $lnpoil$ in all subsequent regressions.

It is important to note that the final specification in Table 15 (i. e. column 7 in which the only oil-price-related regressor is $d_{MOR} * lnpoil_{t+i}$) results in an insignificant coefficient estimate of tw_{it+1} . However, since a future tariff rate as regressor is implied by the theoretical model and the p-value of tw_{it+1} is not far from significance (7.7%), we will nevertheless keep tw_{it+1} as a regressor and see how it fares in the specifications we study below.

Table 15:

Arellano-Bond GMM results for (20) amended for oil prices

l	Lag l of oil price variable						
	0	-1	-2	0	-1	-2	-1
$\ln y_{it-1}$	0.500 <i>0.002</i>	0.508 <i>0.002</i>	0.481 <i>0.006</i>	0.308 <i>0.049</i>	0.406 <i>0.027</i>	0.488 <i>0.008</i>	0.528 <i>0.001</i>
tuw_{it-2}	-0.188 <i>0.012</i>	-0.165 <i>0.044</i>	-0.175 <i>0.022</i>	-0.176 <i>0.014</i>	-0.238 <i>0.000</i>	-0.188 <i>0.003</i>	-0.212 <i>0.001</i>
tw_{it+1}	-0.488 <i>0.025</i>	-0.422 <i>0.040</i>	-0.422 <i>0.057</i>	-0.454 <i>0.028</i>	-0.388 <i>0.086</i>	-0.410 <i>0.064</i>	-0.375 <i>0.077</i>
$\ln poil_{t+1}$	-0.024 <i>0.168</i>	0.023 <i>0.304</i>	0.013 <i>0.043</i>				
$d_{ALG} * \ln poil_{t+1}$				-0.017 <i>0.386</i>	-0.005 <i>0.583</i>	0.020 <i>0.211</i>	
$d_{MOR} * \ln poil_{t+1}$				-0.025 <i>0.008</i>	0.087 <i>0.000</i>	0.015 <i>0.070</i>	0.093 <i>0.000</i>
$d_{SYR} * \ln poil_{t+1}$				-0.130 <i>0.001</i>	-0.037 <i>0.400</i>	0.009 <i>0.670</i>	
$d_{TUN} * \ln poil_{t+1}$				0.046 <i>0.141</i>	0.000 <i>0.998</i>	0.007 <i>0.718</i>	
t	0.007 <i>0.015</i>	0.006 <i>0.029</i>	0.007 <i>0.019</i>	0.011 <i>0.000</i>	0.009 <i>0.000</i>	0.007 <i>0.022</i>	0.006 <i>0.016</i>
$\hat{\sigma}$	0.041	0.041	0.041	0.037	0.040	0.042	0.041
Instrument Rank	43.000	43.000	43.000	46.000	46.000	46.000	43.000

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

Next, we check the explanatory power of conditioning variables like the real effective exchange rate, the consumer price inflation rate, and FDI. We amend the current specification one by one with these variables, see Table 16.

Table 16:

Arellano-Bond GMM results, further amendments of (20):

Exchange rate, inflation rate and FDI

l	Lag l of lne_{it+l} , $infcp_{it+l}$, $lnfdi_{it+l}$					
	0	-1	0	-1	0	-1
lny_{it-1}	0.242 <i>0.062</i>	0.265 <i>0.106</i>	0.514 <i>0.001</i>	0.521 <i>0.001</i>	0.374 <i>0.053</i>	0.442 <i>0.028</i>
tuw_{it-2}	-0.357 <i>0.068</i>	-0.350 <i>0.160</i>	-0.222 <i>0.000</i>	-0.223 <i>0.000</i>	-0.345 <i>0.000</i>	-0.329 <i>0.000</i>
tw_{it+1}	-0.542 <i>0.000</i>	-0.559 <i>0.000</i>	-0.405 <i>0.081</i>	-0.408 <i>0.058</i>	-0.408 <i>0.015</i>	-0.437 <i>0.019</i>
lne_{it+l}	0.045 <i>0.476</i>	0.040 <i>0.271</i>				
$infcp_{it+l}$			-0.109 <i>0.209</i>	-0.197 <i>0.225</i>		
$lnfdi_{it+l}$					0.006 <i>0.441</i>	-0.002 <i>0.643</i>
$d_{MOR} * lnpoil_{t-1}$	0.121 <i>0.000</i>	0.118 <i>0.000</i>	0.096 <i>0.000</i>	0.098 <i>0.000</i>	0.105 <i>0.000</i>	0.108 <i>0.000</i>
t	0.012 <i>0.000</i>	0.011 <i>0.000</i>	0.006 <i>0.011</i>	0.004 <i>0.153</i>	0.007 <i>0.000</i>	0.007 <i>0.001</i>
$\hat{\sigma}$	0.042	0.043	0.041	0.042	0.039	0.040
Instrument Rank	31.000	31.000	44.000	44.000	39.000	38.000

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

None of the conditioning variables is significant, neither contemporaneously nor with a lag. But the future tariff rate tw_{it+1} is now significant in four out of six specifications, and it is not far from significance in the other two. The lagged tariff rate tuw_{it-2} is also significant in four out of six specifications, and the tariff rates are actually jointly significant in the specifications which include either contemporaneous or lagged FDI. This might indicate that there is some explanatory power in both types of regressors, but that there is some sort of misspecification which gives rise to conflicting results about their significance.

In order to explore this issue further, we note that the simple inclusion of tw_{it+1} does not adequately reflect what this regressor is intended to capture. Recall that the inclusion of tw_{it+1} along with the assumption of its predeterminedness was motivated by the SMPC's pledge to decrease external protection over twelve years in a stepwise fashion which was fully specified in the Association Agreements. This pledge may have been credible only after the AA was signed⁸. It is quite plausible that there was no trust in SMPC's tariff dismantling prior to this date. We therefore define a modified regressor as

$$tw_{it}^* := \begin{cases} tw_{it} & t \geq t_i^* \\ 0 & \text{else} \end{cases} \quad (21)$$

where t_i^* is the year in which country i signed the Association Agreement. (This year is 2002 for Algeria, 2001 for Egypt, 1997 for Jordan, 1996 for Morocco and 1995 for Tunisia. Syria's AA has not yet been signed, but it has been initialled in 2004 and we take this as a similarly binding commitment).

Modifying the weighted tariff rate as in (21) essentially introduces heterogeneity in the response to tw over time. Analogously, we might allow heterogenous responses to future tariff rates across *countries*, as some countries pledges may be more credible than other's. Column 1 of Table 17 introduces the time dependency, but restricts all country responses to be the same. As we can see, this drives the weighted tariff rate close to being significant, but the p-value is still slightly above 5%. In column 2 we therefore allow for country-specific responses to tw_{it+1}^* and find that these are clearly significant in three countries, with two responses clearly insignificant (Algeria and Egypt) and one case somewhat borderline (Tunisia). Eliminating Algeria's and Egypt's responses makes Tunisia become marginally significant, with the other countries (Jordan, Morocco, and – surprisingly – Syria) displaying strong responses to future tariff rate changes. Note that the two specifications with heterogenous responses across countries have smaller residual variance than the specification with imposed homogenous response. This finding supports our modeling approach.

⁸ In fact, it may have been credible later, i. e. when the AA was ratified or when it entered into force.

Table 17:

Arellano-Bond GMM results for (20) with heterogeneous responses to tw_{it+1}

	Dependent variable: lny_{it}		
lny_{it-1}	0.558 <i>0.001</i>	0.418 <i>0.040</i>	0.444 <i>0.015</i>
tuw_{it-2}	-0.276 <i>0.000</i>	-0.275 <i>0.000</i>	-0.276 <i>0.000</i>
tw_{it+1}^*	-0.163 <i>0.058</i>		
$d_{ALG} * tw_{it+1}^*$		-0.163 <i>0.375</i>	
$d_{EGY} * tw_{it+1}^*$		0.069 <i>0.609</i>	
$d_{JOR} * tw_{it+1}^*$		-0.318 <i>0.000</i>	-0.267 <i>0.000</i>
$d_{MOR} * tw_{it+1}^*$		-0.400 <i>0.000</i>	-0.371 <i>0.000</i>
$d_{SYR} * tw_{it+1}^*$		-0.709 <i>0.037</i>	-0.643 <i>0.032</i>
$d_{TUN} * tw_{it+1}^*$		-0.197 <i>0.057</i>	-0.175 <i>0.046</i>
$d_{MOR} * lnpoil_{t+1}$	0.097 <i>0.001</i>	0.077 <i>0.000</i>	0.074 <i>0.000</i>
t	0.010 <i>0.004</i>	0.012 <i>0.001</i>	0.011 <i>0.001</i>
$\hat{\sigma}$	0.041	0.039	0.039
Instrument Rank	43.000	48.000	46.000

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

We now turn to the question by which channel tariff rate changes or other measures of trade liberalization affect GDP. We therefore again include other macroeconomic aggregates among the set of regressors to see if this affects the significance of the tariff rate regressors. The basic specification which we now modify corresponds to column 3 in Table 17.

Our approach is analogous to the one laid out in Table 7. We start with adding private consumption and government absorption to the set of regressors, both contemporaneously and with a lag of one year. We use dynamic instruments lagged 2, 3, and 4 periods for lny_{it-1} and dynamic instruments lagged 2 periods for the regressors lnc and lng . (We also ran the regressions with dynamic instruments lagged two and three periods for lny , lnc , and lng but did not find substantial changes in results).

As can be seen from Table 18, only the contemporaneous regressor lnc_{it} is significant. (lng_{it} is close to significance and has the “wrong” sign, i. e. the point estimate is negative which would require a non-Keynesian interpretation, cf. Giavazzi and Pagano (1990)). Also, the standard error for the regression which includes lnc_{it} is much smaller than for the other three specifications. Thus it seems that column 1 of Table 18 is the most interesting. Since the regressor tuw_{it-2} loses its significance in the presence of lnc_{it} (note that the same result was obtained in Table 7), one may again conjecture that the lagged influence of decreased tariff rates mostly affects private consumption, so that, once we control for contemporaneous consumption, no measurable effect of lagged tariff rate changes on GDP can be observed. However, the conjecture we advanced in commenting on Table 7 (the main impetus of trade liberalization might operate via a stimulation of private consumption), is not necessarily true, since significant effects of preannounced tariff rate changes are present even if we control for private consumption.

This is not to say that consumption is not responding to expected tariff rate changes. Quite to the contrary, we observe that the semi-elasticities of tw_{it+1}^* are uniformly smaller in absolute value in the first column of Table 18 than in the basic specification of Table 17, column 3. We interpret this as saying that the difference is due to the forward-looking behavior of consumers. For Jordan, it may even be true that forward-looking behavior is most apparent in private consumption, since the semi-elasticity of future tariffs rates becomes zero when contemporaneous consumption is included in the set of regressors. Note that for the specifications involving government absorption the point estimates of semi-elasticities (for tuw_{it-2} and tw_{it+1}^*) are more or less of similar magnitude as in Table 17, column 3. This might indicate that tariff rates do not have a measurable impact on government absorption. We will investigate this further in [Table 20](#) below.

Table 18:

Arellano-Bond GMM results, further amendments of (20):

Private consumption and government absorption

l	Lag l of lnc_{it+l} and lng_{it+l}			
	0	-1	0	-1
lny_{it-1}	0.310 <i>0.063</i>	0.507 <i>0.000</i>	0.492 <i>0.003</i>	0.504 <i>0.007</i>
lnc_{it+l}	0.256 <i>0.027</i>	-0.080 <i>0.304</i>		
lng_{it+l}			-0.095 <i>0.051</i>	-0.003 <i>0.890</i>
tuw_{it-2}	-0.069 <i>0.426</i>	-0.297 <i>0.000</i>	-0.300 <i>0.000</i>	-0.326 <i>0.000</i>
$d_{JOR} * tw_{it+1}^*$	0.125 <i>0.405</i>	0.006 <i>0.983</i>	-0.156 <i>0.212</i>	-0.144 <i>0.119</i>
$d_{MOR} * tw_{it+1}^*$	-0.152 <i>0.000</i>	-0.306 <i>0.000</i>	-0.379 <i>0.000</i>	-0.325 <i>0.002</i>
$d_{SYR} * tw_{it+1}^*$	-0.359 <i>0.006</i>	-0.611 <i>0.001</i>	-0.401 <i>0.444</i>	-0.883 <i>0.048</i>
$d_{TUN} * tw_{it+1}^*$	-0.105 <i>0.010</i>	-0.150 <i>0.025</i>	-0.321 <i>0.048</i>	-0.212 <i>0.074</i>
$d_{MOR} * lnpoil_{t-1}$	0.046 <i>0.031</i>	0.069 <i>0.000</i>	0.056 <i>0.002</i>	0.056 <i>0.004</i>
t	0.009 <i>0.000</i>	0.011 <i>0.000</i>	0.013 <i>0.000</i>	0.011 <i>0.000</i>
$\hat{\sigma}$	0.034	0.039	0.039	0.042
Instrument Rank	59.000	59.000	59.000	59.000

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

Table 19:

Arellano-Bond GMM results, further amendments of (20):

Private investment

l	Lag l of $lninv_{it+l}$				
	0	-1	-2	-3	0 and -2
lny_{it-1}	0.438 <i>0.001</i>	0.350 <i>0.011</i>	0.325 <i>0.035</i>	0.396 <i>0.015</i>	0.303 <i>0.012</i>
$lninv_{it}$	0.109 <i>0.002</i>				0.088 <i>0.008</i>
$lninv_{it+1}$		0.089 <i>0.000</i>	0.083 <i>0.001</i>	0.021 <i>0.301</i>	0.067 <i>0.000</i>
tuw_{it-2}	-0.214 <i>0.002</i>	-0.304 <i>0.000</i>	-0.344 <i>0.000</i>	-0.296 <i>0.000</i>	-0.288 <i>0.000</i>
$d_{JOR} * tw_{it+1}^*$	-0.064 <i>0.694</i>	-0.051 <i>0.723</i>	-0.156 <i>0.269</i>	-0.029 <i>0.884</i>	
$d_{MOR} * tw_{it+1}^*$	-0.245 <i>0.000</i>	-0.257 <i>0.000</i>	-0.276 <i>0.000</i>	-0.238 <i>0.000</i>	-0.281 <i>0.000</i>
$d_{SYR} * tw_{it+1}^*$	-0.957 <i>0.000</i>	-0.727 <i>0.000</i>	-0.675 <i>0.000</i>	-0.495 <i>0.000</i>	-0.979 <i>0.001</i>
$d_{TUN} * tw_{it+1}^*$	-0.117 <i>0.016</i>	-0.167 <i>0.008</i>	-0.223 <i>0.009</i>	-0.180 <i>0.002</i>	-0.171 <i>0.043</i>
$d_{MOR} * lnpoil_{t-1}$	0.057 <i>0.000</i>	0.068 <i>0.000</i>	0.069 <i>0.000</i>	0.078 <i>0.000</i>	0.051 <i>0.000</i>
t	0.010 <i>0.000</i>	0.012 <i>0.000</i>	0.012 <i>0.000</i>	0.012 <i>0.000</i>	0.012 <i>0.000</i>
$\hat{\sigma}$	0.038	0.039	0.037	0.039	0.035
Instrument Rank	59.000	59.000	59.000	59.000	58.000

Bold: Significant regression coefficients. *Italics:* P-values (using heteroskedasticity-consistent standard errors).

For private investment, cf. Table 19, we find a protracted influence of investment on GDP. Not only contemporaneous investment, but also investment lagged one or two years are significant. Only when investment is lagged three years it becomes insignificant. This finding is well in line with the durable character of capital goods.

We also ran a regression with contemporaneous and lagged values of investment. It turns out that in such an approach only contemporaneous investment and investment lagged two periods are significant, cf. column 5 of Table 19. Investment lagged one or three periods is insignificant. This equation also happens to have the smallest standard error and thus becomes our preferred specification.

Note that the estimated semi-elasticity with respect to tuw_{it-2} in column 1 is only about two-thirds of the same semi-elasticity estimated in regressions with only lagged values of investment. It is also smaller than the point estimate in the basic equation (Table 17, column 3). This suggests that contemporaneous investment is indeed affected by tariff rate changes with a lag of two years, since the estimated semi-elasticity decreases when we control for contemporaneous investment. Thus, investment seems to be another (and probably supply-side) channel through which trade liberalization affects the economy. Investment may also have a forward-looking component, as all semi-elasticities with respect to tw_{it+1}^* (with the exception of Syria) have smaller point estimates if contemporaneous investment is among the explanatory variables⁹.

In Tabel 20, we estimate regressions with consumption or investment as dependent variable. We test two lags of the endogenous variable as regressors, but lag two is never close to significance. By contrast, tuw_{it-2} is highly significant in all specification, it has the expected sign and fairly stable coefficient estimates. The effects of pre-announced tariff rates are much weaker. Oil prices for Morocco are significant for consumption but not for investment (which might indicate that it is not oil-related investment which is fostered by trade liberalization).

Starting from the general specifications in columns 1 and 4 of Table 20 and sequentially eliminating insignificant regressors leads to the specifications in columns 2 and 5, respectively, where some of the pre-announced tariff rates have p-values around 10% or lower. Moreover, their point estimates are rather similar. If we restrict the semi-elasticities with respect to these variables to be the same (cf. columns 3 and 6), we find that also pre-announced tariff rate changes have significant effects on consumption and investment for

⁹ The comparison between the point estimates of the semi-elasticities in different specification is legitimate since the coefficient for the lagged endogenous variable is virtually the same in both regressions.

specific countries (they matter for consumption in Jordan and Morocco, for investment in Morocco and Tunisia). Thus columns 3 and 6 are our preferred specifications.

Table 20:

Arellano-Bond GMM results for components of GDP:

Private consumption and private investment

	Endogenous variable					
	lnc_{it}	lnc_{it}	lnc_{it}	$lninv_{it}$	$lninv_{it}$	$lninv_{it}$
Lag 1 of endogenous variable	0.215 <i>0.109</i>	0.305 <i>0.024</i>	0.310 <i>0.015</i>	0.222 <i>0.320</i>	0.376 <i>0.021</i>	0.374 <i>0.019</i>
Lag 2 of endogenous variable	0.108 <i>0.428</i>			-0.017 <i>0.869</i>		
tuw_{it-2}	-0.493 <i>0.000</i>	-0.573 <i>0.000</i>	-0.578 <i>0.000</i>	-0.818 <i>0.010</i>	-0.894 <i>0.000</i>	-0.898 <i>0.000</i>
$d_{JOR} * tw_{it+1}^*$	-0.347 <i>0.286</i>	-0.373 <i>0.090</i>	-0.325 ¹ <i>0.005</i>	0.001 <i>0.998</i>		
$d_{MOR} * tw_{it+1}^*$	-0.234 <i>0.052</i>	-0.300 <i>0.002</i>	-0.325 ¹ <i>0.005</i>	-0.344 <i>0.249</i>	-0.366 <i>0.113</i>	-0.360 ¹ <i>0.003</i>
$d_{SYR} * tw_{it+1}^*$	0.176 <i>0.645</i>			1.957 <i>0.388</i>		
$d_{TUN} * tw_{it+1}^*$	-0.424 <i>0.232</i>			-0.423 <i>0.017</i>	-0.384 <i>0.076</i>	-0.360 ¹ <i>0.003</i>
$d_{MOR} * lnpoil_{t-1}$	0.131 <i>0.000</i>	0.136 <i>0.000</i>	0.133 <i>0.000</i>	-0.019 <i>0.517</i>		
t	0.012 <i>0.002</i>	0.012 <i>0.001</i>	0.012 <i>0.001</i>	0.005 <i>0.322</i>		
$\hat{\sigma}$	0.051	0.051	0.051	0.107	0.107	0.106
Instrument Rank	46.000	44.000	44.000	46.000	42.000	41.000
Bold: Significant regression coefficients. <i>Italics:</i> P-values (using heteroskedasticity-consistent standard errors). ¹ Coefficients restricted to be equal.						

For government absorption, imports and FDI we also find, see Table 21, that lag 2 of the endogenous variable has never any explanatory power. In fact, for FDI we do not find any significant variable, even if we reduce the list of regressors. (The only exception is the linear trend which becomes significant when all other regressors are eliminated.) Government

absorption does not react to lagged tariff rate changes, confirming the analogous results in Table 9. There are significant reactions to changes in future tariff rates tw_{it+1}^* for two countries (Morocco and Syria, cf. column 2 of Table 21), but the coefficients have opposite signs and it may thus be that these are just statistical artefacts.

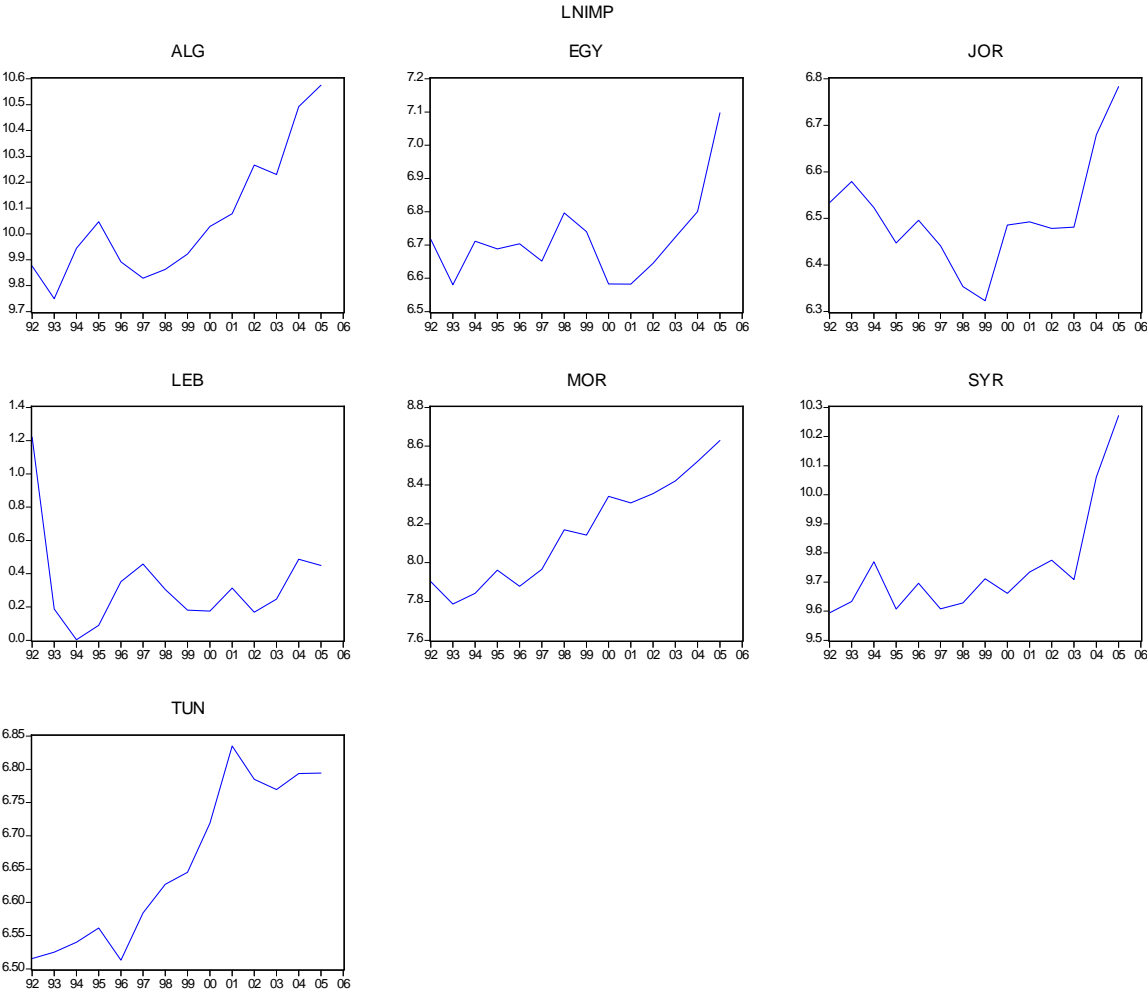
Table 21:

Arellano-Bond GMM results for components of GDP and balance of payments:

Government absorption, imports and FDI

	Endogenous variable				
	lng_t	lng_t	$lnimp_t$	$lnimp_t$	$lnfdi_t$
Lag 1 of endogenous variable	0.362 <i>0.019</i>	0.634 <i>0.000</i>	0.333 <i>0.004</i>	0.457 <i>0.007</i>	-0.182 <i>0.270</i>
Lag 2 of endogenous variable	0.079 <i>0.523</i>		0.046 <i>0.478</i>		-0.093 <i>0.669</i>
tuw_{it-2}	0.261 <i>0.432</i>		-0.305 <i>0.151</i>		2.165 <i>0.322</i>
$d_{JOR} * tw_{it+1}^*$	0.397 <i>0.286</i>		-1.193 <i>0.001</i>	-1.013 ¹ <i>0.005</i>	-3.239 <i>0.348</i>
$d_{MOR} * tw_{it+1}^*$	-0.908 <i>0.108</i>	-0.427 <i>0.000</i>	0.035 <i>0.763</i>		-0.273 <i>0.758</i>
$d_{SYR} * tw_{it+1}^*$	3.921 <i>0.002</i>	4.659 <i>0.000</i>	-3.781 <i>0.078</i>	-1.013 ¹ <i>0.005</i>	-15.322 <i>0.256</i>
$d_{TUN} * tw_{it+1}^*$	-0.081 <i>0.698</i>		-0.172 <i>0.407</i>		0.700 <i>0.686</i>
$d_{MOR} * lnpoil_{t-1}$	0.103 <i>0.004</i>	0.148 <i>0.002</i>	0.115 <i>0.000</i>	0.110 <i>0.000</i>	0.539 <i>0.111</i>
t	0.016 <i>0.000</i>	0.010 <i>0.007</i>	0.022 <i>0.005</i>	0.017 <i>0.003</i>	0.035 <i>0.214</i>
$\hat{\sigma}$	0.085	0.093	0.111	0.113	0.885
Instrument Rank	46.000	43.000	46.000	43.000	40.000
Bold: Significant regression coefficients. <i>Italics:</i> P-values (using heteroskedasticity-consistent standard errors). ¹ Coefficients restricted to be equal.					

For imports, we find no significant effect of tuw_{it-2} any longer. Rather, imports seem to react only to pre-announced changes, and only in Jordan and Syria. With respect to Syria, this is even more surprising since the government of this country does neither have a tradition of clear nor of reliable announcements. Moreover, in the unrestricted estimate (column 3 of Table 21), the Syrian semi-elasticity with respect to tw_{it+1}^* seems much too large in absolute value. And, finally, for all countries except Syria and Jordan the above result would suggest that imports do not react to trade liberalization. This is hard to believe given the tremendous surge of imports observed in most countries in the years after the launch of the Barcelona-Initiative.



These properties of the estimated import equation cast some doubt on the validity of its results. In fact, it has to be borne in mind that the specification of the regression equation was mechanically made analogous to the specification of the consumption, the investment and the

government absorption equation. But, from a theoretical point of view, there may be important differences between these aggregates and imports. Consumption, investment and government absorption are usually thought of being derived from dynamic optimization problems, which quite naturally give rise to forward-looking behavior. Imports, by contrast, are typically derived from static optimization: Agents import goods if their price relates favorably to the price of similar goods produced domestically¹⁰. Thus imports essentially depend on today's relative prices – and not on future prices.

For these reasons, we decide to reject specifications of the import equation which involve future tariff rates as regressors. We rather prefer the specification displayed in Table 9, column 4, which finds a highly significant influence of actual (lagged) tariff rates on real imports.

Summing up, we have derived regression equations for GDP, consumption, investment, government absorption and imports. These equations are specified in the standard form of growth regressions with particular emphasis on tariff rates as a catchall for trade liberalization and accompanying economic reforms. The regression coefficients for the tariff rates are semi-elasticities computed ex post. It is interesting to compare these to semi-elasticities which were computed ex ante by using CGE models.

It is important to note that the ex-post estimates of the semi-elasticities are short-run elasticities, since the regression equations contain lagged endogenous variables. This matches well with the overwhelmingly static (i. e. short-run) CGE-studies which have tried to assess the effects of the Barcelona Initiative ex ante. In case the CGE study is calibrated on a base year data set prior to credibly announcing a schedule of tariff rate decreases, the ex-ante semi-elasticities must be compared to the sum of the announcement effect and the implementation effect. Otherwise (i. e. if the base year data set contains already the announcement effect), the ex-ante semi-elasticity must be compared only to the ex-post semi-elasticity with respect to tuw_{it-2} . (In lack of a clear criterion for a credible announcement we decided to take the year after signing (or, in the case of Syria, initialling) the Association Agreement as the first of this type of base year.)

¹⁰ In the literature, this is formalized in the so-called Armington (1969) approach.

Many CGE studies analyse the effect of trade liberalization on output under the counterfactual assumption that investment and government absorption stay constant. If this is the case, then we need to use ex-post semi-elasticities which were estimated in a regression controlling for the level of investment and government absorption. As we have seen above, government absorption is not a significant regressor and tariff rate changes do not seem to have had a measurable impact on it. Thus we do not need to bother about controlling for government absorption. As far as investment is concerned, we have presented evidence that investment has indeed been stimulated by trade liberalization and that contemporaneous investment is significantly associated with changes in output. We will therefore use ex-post semi-elasticities from Table 19, column 5, when we compare with CGE-studies which hold investment and government absorption constant.

For ready reference, we display the relevant specifications from which we draw the ex-post semi-elasticities:

GDP: Table 19, column 5, if investment is assumed constant in the CGE model

Table 17, column 3, if investment is assumed endogenous in the CGE model

Consumption: Table 20, column 3, investment endogenous or constant.

Investment: Table 20, column 6, if investment is assumed endogenous in the CGE model

Imports: Table 9, column 4, investment endogenous or constant.

The specifications of the consumption equation do not control for the level of investment. As such, the estimates are derived for a model with endogenous investment. However, we modified the equations by adding investment (contemporaneous, lagged one and two years) as a regressor. For all lags and for all sets of instruments we tested, investment was never significant (or even close to significance) in the consumption equation. Therefore, the semi-elasticities in Table 20, column 3, apply equally to endogenous or exogenous investment.

The specifications for the investment equation do also not control for the level of investment. This, however, is intentionally so, because the imported component of investment is typically

endogenous in CGE models even if investment is exogenous. Note that CGE models only fix the amount of total investment, but they typically leave it to the representative consumer to decide, how much of total investment is imported. So the substitution effect between foreign and domestic goods is always endogenous. True, with endogenous investment there is an additional quantity effect. But we do not have the econometric means to control just for the quantity effect of increased total investment. As the substitution effect is probably at least as important as the quantity effect, we use the same semi-elasticities for both the exogenous and the endogenous investment assumption.

In the most common case of a static CGE model with exogenous investment and a base year prior to or equal to the year of signature of the AA, we thus have the following estimated (ex-post) semi-elasticities:

Table 22
 Estimated ex-post semi-elasticities: Exogenous investment

	GDP	Consumption	Imports
Algeria	-0.288	-0.578	-0.814
Egypt	-0.288	-0.578	-0.814
Jordan	-0.288	-0.903	-0.814
Morocco	-0.569	-0.903	-0.814
Syria	-1.267	-0.578	-0.814
Tunesia	-0.459	-0.578	-0.814

If, however, investment is endogenous, the following semi-elasticities apply:

Table 23

Estimated ex-post semi-elasticities: Endogenous investment

	GDP	Consumption	Investment	Imports
Algeria	-0.276	-0.578	-0.898	-0.814
Egypt	-0.276	-0.578	-0.898	-0.814
Jordan	-0.543	-0.903	-0.898	-0.814
Morocco	-0.647	-0.903	-1.258	-0.814
Syria	-0.919	-0.578	-0.898	-0.814
Tunesia	-0.451	-0.578	-1.258	-0.814

5. References

- Arellano, M., and Bond, S., (1991): Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, *Review of Economic Studies* 58, pp. 277-297.
- Arellano, M., and Bover, O., (1995): Another Look at the Instrumental Variable Estimation of Error-Components Models, *Journal of Econometrics* 68, pp. 29-51.
- Armington, P. S. (1969) - *A theory of demand for products distinguished by place of production*". IMF Staff Papers 16, 159-176.
- Barro, R. J., and Sala-i-Martin, X. (1992): *Convergence*, *Journal of Political Economy* 100, pp. 223-251.
- Bhargava, A., (1986): *On the Theory of Testing for Unit Roots in Observed Time Series*, *The Review of Economic Studies* 52, pp. 369-384.
- Bryson, A. E., and Y.-C. Ho (1975): *Applied Optimal Control: Optimization, Estimation, and Control*, Hemisphere Publishing Corporation, Washington, DC.
- Giavazzi, F., and Pagano, M., (1990): Can Severe Fiscal Contractions be Expansionary? Tales of Two Small European Countries, *NBER Macroeconomics Annual*, pp. 75-111.
- Nelson, C. R., and Startz, R., (1990a): *Some Further Results on the Exact Small Sample Properties of the Instrumental Variables Estimator*, *Econometrica* 58, pp. 967-976.
- Nelson, C. R., and Startz, R., (1990b): *The Distribution of the Instrumental Variables Estimator and Its t-ratio when the Instrument is a Poor One*, *Journal of Business* 63, pp. 125-140.
- Swamy, P. A. V. B., and Arora, S. S., (1972): *The exact finite sample properties of the estimators of coefficients in the error components regression models*, *Econometrica* 40, pp. 261-275.
- Wansbeek, T., and Kapteyn, A., (1989): *Estimation of the Error Components Models with Incomplete Panels*, *Journal of Econometrics* 41, pp. 341-361.
- World Bank (2006): *Trends in Average Applied Tariff Rates*, available at: siteresources.worldbank.org/INTRES/Resources/tar2005.xls.

III. TABLE – Summary of the Literature and Empirical Overview of CGE Models

Assumptions and Data									
Paper	Country	Temporality	Competition	Exrate	Leon	Employment	Prod function	Trbal	IO-matrix
Augier,Gasiorek 2003	Malta	static	imperfect	fixed	yes	full			Unido data 1995
	Egypt	static	imperfect	fixed	yes	full			Unido data 1995
	Israel	static	imperfect	fixed	yes	full			Unido data 1995
	Jordan	static	imperfect	fixed	yes	full			Unido data 1995
	Morocco	static	imperfect	fixed	yes	full			Unido data 1995
	Tunisia	static	imperfect	fixed	yes	full			Unido data 1995
	Turkey	static	imperfect	fixed	yes	full			Unido data 1995
Bayar et al, 2001	Turkey	static	imperfect	fixed	no	full			Turkish SAM
	Tunisia	static	perfect	flexible	yes	full	CES function	zero	Tunisian SAM
	Morocco	static	6 sectors perfect 7 imperfect		yes	no	CES function		Mixed sources Moroccan 1996
	Egypt	static	perfect		yes	full	CES function		Various sources
Bibi, Chatti, 2005	Tunisia	dynamic		flexible	yes	full in rural to full in urban	CES function		Tunisian 1998
Chemingui,Dessus 2004	Syria	static	perfect	fixed	yes	full	CES function	zero	Syria 1999
Chemingui, Thabet, 2001	Tunisia	dynamic	imperfect	flexible	yes	full	CES function		Mixed sources Tunisia 1992
Cockburn, Bernard, Benoit, 1998	Tunisia	static	perfect		yes	full	CES function	zero	Tunisia 1990
Dessus, Eisenmann, 1998	Egypt	dynamic	perfect		yes	flexible	CES function	zero	Egypt 1995
Feraboli, 2003	Jordan	dynamic	perfect		yes	full	CES function		Jordan 1998
Feraboli, 2005	Jordan	dynamic	perfect	fixed	yes	full	CES function	zero	Jordan 1998
Gaitan, Lucke, 2007	Syria	dynamic	perfect, no in financial sector	fixed	yes	full		zero	Syria 2001-2004
Harrison, Rutherford,Tarr 1993	Turkey	static	perfect	fixed	yes	full	CES function	zero	Turkey 1985
Harrison, Rutherford,Tarr 1996	Turkey	static	perfect	fixed	yes	full	CES function	zero	Turkey 1990

Hoekman, Konan, 1998	Egypt	static	perfect		yes	full	CES function		Egypt 1989/90
Khorshid, 2003	Egypt	Within-period static inter-period dynamic	perfect	fixed	yes	not full	CES & other	zero	Egypt 2002-2007
Konan, Kim, 2004	Egypt	static	perfect		yes		CES function	zero	Egypt
	Tunisia	static	perfect		yes		CES function	zero	Tunisia
Konan, Maskus, 1997	Egypt	static	perfect	fixed	yes	full	CES function	zero	Egypt 1989/90
Konan, Maskus, 2000	Egypt	static	perfect	flexible	yes	full	CES function		Egypt 1989/91
Lucke B., Lucke D., 2001	Jordan	static	perfect	fixed	yes	full	CES function	not zero	Jordan 1998
	Syria	static	perfect	fixed	yes	full	CES function	not zero	Syria 1999
Mcdonald, Evans, Gasiorek, Robinson 2006	Morocco	static	perfect	flexible	yes	full for skilled not for unskilled	CES function	zero	GTAP data v6 2001 update
	Egypt	static	perfect	flexible	yes		CES function	zero	
Mercenier, Yeldan 1997	Turkey	dynamic	imperfect	fixed	yes	full	CES function	zero	
Philippidis, Sanjuan, 2006	Morocco	static	perfect in services & agriculture not in manufacturing	fixed	no	full		not zero	v 6 GTAP
Rutherford, Tarr 1993	Morocco	static	perfect	fixed	yes	full	CES function	zero	Morocco 1980

- **Ex.rate** – Exchange rate.
- **Leon** – Leontief technology for intermediates.
- **Prod function** – Production function.
- **Trbal** – Trade balance.

Results in % change							
Paper	Country	Av tariff reduction	GDP growth	Cons.	Imp.	Exp.	Investment
Augier,Gasiorek 2003	Malta	7.200	1.160		0.050	-0.480	
	Egypt	29.780	1.390		0.120	-0.360	
	Israel	6.910	0.180		0.010	0.050	
	Jordan	20.810	-0.160		0.010	-0.160	
	Morocco	23.050	5.360		0.140	-0.820	
	Tunisia	29.950	8.900		0.170	-0.940	
	Turkey	8.790	0.020		0.000	-0.020	
Bayar et al, 2001	Turkey	8.880	0.040				
	Tunisia	27.470	6.500				
	Morocco			0.700	1.300	1.100	
	Egypt	23.550	4.330		2.740	6.250	4.350
Bibi, Chatti, 2005	Tunisia	Results are only in Graphs					
Chemingui,Dessus 2004	Syria	8.300	0.400	0.100	5.000	4.100	2.300
Chemingui, Thabet, 2001	Tunisia		1.200		15.000	14.000	2.460
Cockburn, Bernard, Benoit, 1998	Tunisia	10.900	0.700				0.500
Dessus, Eisenmann, 1998	Egypt	23.310	0.670	-0.200	3.800	4.000	2.060
Feraboli, 2003	Jordan	11.380	0.040	0.017			
Feraboli, 2005	Jordan	11.380	3.000				
Gaitan, Lucke, 2007	Syria	11.540	1.600	1.200			2.000
Harrison, Rutherford,Tarr 1993	Turkey	8.100	1.300				
Harrison, Rutherford,Tarr 1996	Turkey	8.000	1.100				
Hoekman, Konan, 1998	Egypt	25.000	5.600				
Khorshid, 2003	Egypt	No Tariff reduction Scenarios					
Konan, Kim, 2004	Egypt		0.820				
	Tunisia		6.910				
Konan, Maskus, 1997	Egypt	15.100	2.130		23.400	31.300	
Konan, Maskus, 2000	Egypt	44.800	0.300				
Lucke B., Lucke D., 2001	Jordan	14.000	6.010	13.090	11.500	2.980	-1.050
	Syria	9.530	2.220	2.210	9.890	4.290	1.120
Mcdonald, Evans,Gasiorek, Robinson 2006	Morocco	26.050	1.050		13.330	14.010	
	Egypt	18.730	-0.940		1.090	4.990	
Mercenier,Yeldan 1997	Turkey	8.000	-0.800	-0.340			0.900
Philippidis, Sanjuan, 2006	Morocco		12.230				
Rutherford,Tarr 1993	Morocco	19.000	1.290				

Results in semi-elasticity							
Paper	Country	Av tariff reduction	GDP growth	Cons.	Imp.	Exp.	Investment
Augier,Gasiorek 2003	Malta	7.200	0.161		0.007	-0.067	
	Egypt	29.780	0.047		0.004	-0.012	
	Israel	6.910	0.026		0.001	0.007	
	Jordan	20.810	-0.008			-0.008	
	Morocco	23.050	0.233		0.006	-0.036	
	Tunisia	29.950	0.297		0.006	-0.031	
	Turkey	8.790	0.002			-0.002	
Bayar et al, 2001	Turkey	8.880	0.005				
	Tunisia	27.470	0.237				
	Morocco						
	Egypt	23.550	0.184		0.116	0.265	0.185
Bibi, Chatti, 2005	Tunisia	Results are only in Graphs					
Chemingui,Dessus 2004	Syria	8.300	0.048	0.012	0.602	0.494	0.277
Chemingui, Thabet, 2001	Tunisia						
Cockburn, Bernard, Benoit, 1998	Tunisia	10.900	0.064				0.046
Dessus, Eisenmann, 1998	Egypt	23.310	0.029	-0.009	0.163	0.172	0.088
Feraboli, 2003	Jordan	11.380	0.004	0.001			
Feraboli, 2005	Jordan	11.380	0.264				
Gaitan, Lucke, 2007	Syria	11.540	0.139	0.104			0.173
Harrison, Rutherford,Tarr 1993	Turkey	8.100	0.160				
Harrison, Rutherford,Tarr 1996	Turkey	8.000	0.138				
Hoekman, Konan, 1998	Egypt	25.000	0.224				
Khorshid, 2003	Egypt	No Tariff reduction Scenarios					
Konan, Kim, 2004	Egypt						
	Tunisia						
Konan, Maskus, 1997	Egypt	15.100	0.141		1.550	2.073	
Konan, Maskus, 2000	Egypt	44.800	0.007				
Lucke B., Lucke D., 2001	Jordan	14.000	0.429	0.935	0.821	0.213	-0.075
	Syria	9.530	0.233	0.232	1.038	0.450	0.118
Mcdonald, Evans,Gasiorek, Robinson 2006	Morocco	26.050	0.040		0.512	0.538	
	Egypt	18.730	-0.050		0.058	0.266	
Mercenier,Yeldan 1997	Turkey	8.000	-0.100	-0.043			0.113
Philippidis, Sanjuan, 2006	Morocco						
Rutherford,Tarr 1993	Morocco	19.000	0.068				

- **Av tariff reduction** – Average tariff reduction.
- **Cons.** – Private consumption.
- **Imp.** – Imports.
- **Exp.** – Exports.

II. Literature and Empirical Overview of CGE Models

By

Dr. Roby Nathanson

Hagar Tzameret-Kertcher

Ori Greenfeld

Ziv Rubin

Oleg Glybshenko

1. The Welfare Implications of Trade Liberalisation between the Southern Mediterranean and the EU

Patricia Augier and Michael Gasiorek, 2003

Abstract

This paper explores the impact on the Southern Mediterranean Countries (SMC) of the current process of trade liberalisation with the European Union. The methodology applied is computable general equilibrium modelling under imperfect competition; the model includes 10 countries and 11 sectors. The experiments considered are full liberalization of tariffs as well as changes in market access and trade-induced productivity changes. The results show that liberalisation may have a substantial though non-monotonic impact on SMC economies in terms of changes in production and subsequently on welfare. The welfare impact is potentially very high for high tariff economies in particular.

The Model

The theoretical model is based on imperfect competition and increasing returns to scale. The base year on which the data are based is 1995, the latest year for which a complete set of data was available. The model has 10 countries, 7 of which are Southern Mediterranean Countries (SMCs) or country groupings, plus the Mediterranean EU countries (EuMed), the rest of the EU (EU), and the rest of the world (ROW). Each country is endowed with three primary

factors of production: capital as well as manual and nonmanual labour. Capital is assumed to be perfectly mobile internationally and available at a constant price. Other factors are internationally immobile so that in the long run, their prices adjust to equate demand to endowments. Each of the manufacturing industries is assumed to be imperfectly competitive, with a number of firms producing differentiated products and production being subject to increasing returns to scale.

Demand for differentiated products is modelled as a two-stage process, where demand for a product aggregate depends on a price index for that aggregate whereas demand for an individual variety depends on the price of the variety relative to that of the product aggregate. The authors assume that firms act as quantity competitors in segmented markets. Each firm chooses sales in each country market, taking as constant the sales of all its rivals in that market. Optimisation requires equating marginal revenue to marginal cost in each market, where the slope of each firm's perceived demand curve depends on the extent of product differentiation and on the firm's share in that market. A key feature of the model is that price-cost margins depend on firms' market shares, and increased import penetration causes firms to behave more competitively, that is, they lower their price-cost margins.

Free entry and exit of firms is allowed and factor prices are flexible in all of the experiments. The authors also assume no net change in government revenue; hence, any reductions in tariff revenue are compensated for by lump-sum taxes. Finally, in all but the last of the experiments reported here there is no change in the nominal exchange rate. The trade balance is thus maintained by changes in trade in the perfectly competitive sector.

Trade data was obtained from the COMTRADE data bank; production data was obtained from the UNIDO industrial database. Data on returns to scale derive from the survey conducted by Pratten (1988).

Scenarios

Sc1 - Full EU-SMC tariff reduction; results are given in Table 1.

Sc2 – Tariff reductions, productivity changes and improved market access. Here the authors again allow for full reductions in tariffs but also (trade-induced) changes in productivity as well as improved SMC access to EU markets. It is assumed that in addition to tariffs, there are other barriers to trade with the EU at the calibrated equilibrium. These were modelled as equivalent to a

10% tariff but treated as a real barrier to trade. For this experiment we assume that SMC economies experience a 50% reduction in these real barriers.

Sc3 - MFN tariff reductions: The simulations undertaken here are similar to the preceding but this time we also allow for trade liberalisation between the SMCs and the ROW. We do not assume full reduction in SMC import tariffs (with respect to the EU) but do allow tariffs to decline to EU levels. In effect, we assume that SMC economies are employing the equivalent of the EU's common external tariff. We also assume that there is a 50% reduction in tariffs by the ROW on imports from the SMCs. The results are given in Table 3.

Table 1

	Malta	Egypt	Israel	Jordan	Morocco	Tunisia	Turkey
Total welfare change (%)	1.16	1.39	0.18	-0.16	5.36	8.90	0.02
Average tariff reduction (%)	7.20	29.78	6.91	20.81	23.05	29.95	8.79
Semi-elasticity	0.161	0.047	0.026	-0.008	0.233	0.297	0.002

Table 2

	Malta	Egypt	Israel	Jordan	Morocco	Tunisia	Turkey
Total welfare change (%)	3.15	11.38	0.72	9.61	13.90	18.42	1.20
Average tariff reduction (%)	12.20	34.78	11.91	25.81	28.05	34.95	13.79
Semi-elasticity	0.258	0.327	0.060	0.372	0.496	0.527	0.087

Table 3

	Malta	Egypt	Israel	Jordan	Morocco	Tunisia	Turkey
Total welfare change (%)	4.77	13.43	1.14	9.54	15.56	18.85	1.63
Average tariff reduction (%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Semi-elasticity	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Q&A

Dynamic or static model? Static

Assumes perfect competition? No, imperfect

Assumes flexible exchange rate? No, fixed

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates)

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? CES production function

Assumes full employment? Yes

Assumes trade balance is zero? ???

Assumes diagonal input output matrix? ??

Uses IO-matrix of country under study or imported IO matrix? Unido data 1995

2. Fiscal Challenges of the Euro-Mediterranean Agreements.

Ali H. Bayar and Ghazi Ben-Ahmed, Maria G. Bosco, Paul de Boer, Ouafa Chabi, Mohamed Chater, Rim Chatti, Salma Elloumi, Joe Francois, Selçuk Onay, Masudi Opese, Sevgi Recberoglu and Dean Spinanger, 2001

EU-Turkey Customs Union

Abstract

Using a multinational general equilibrium model with imperfect competition, this paper assesses the impact of the Customs Union between the European Union and Turkey. The paper examines both internal and external economic issues such as imports and exports, production, welfare, output, capital use and labour use. The paper argues that the Customs Union will bring about fundamental institutional changes in the Turkish economy given that it involves harmonization of Turkey's commercial and competition policies with those of the EU together with extending the majority of the EU's trade and competition rules to cover the Turkish economy. It concludes that Turkey requires political and macroeconomic stabilization in order to draw on all the potential benefits of the Customs Union.

The Model

The model used in this study is a multinational general equilibrium model with imperfect competition. The origin of the standard model used in this study lies in the Global Trade Analysis Project (GTAP) (Hertel et al., 1997). The standard GTAP model is a multiregional, computable general equilibrium model with perfect competition and constant returns to scale. Bilateral trade is dealt with by the Armington assumption. The standard GTAP model assumes perfect competition in all industries. However, this specification is irrelevant for many sectors, especially in trade liberalisation analyses. It is therefore important to take imperfect competition and endogenous product differentiation into account.

The model retains the Cobb-Douglas function for the regional household's utility function and the government's utility function as well as the Constant Difference Elasticity of substitution (CDE) utility structure of the private household. The sub-utility function for composite commodities is the most appropriate level in the utility tree for incorporating differentiated products.

In the standard model with perfect competition and constant returns to scale, homogeneous commodities are produced by perfectly competitive industries in each region. Due to the Armington assumption, an ad hoc product differentiation scheme is made possible, based on the geographical origin of the homogeneous commodity.

Scenarios

- **EXP1SR:** *Customs union (tariff harmonization), short-term effects*

In this experiment we investigate the short-run effects of tariff harmonization and trade liberalization between the EU and Turkey in non-agricultural sectors. EFTA countries have also been taken into account. This experiment focuses on the short-term effects. This means that in this experiment we do not take into account any capital accumulation effects.

- **EXP2LR:** *Customs union (tariff harmonization), long-term effects*

The experiment is similar to EXP1SR except that in this case, we allow for capital accumulation effects in the long term.

- **EXP3LR:** *Customs union + risk reduction, long-term effects*

In addition to the long-term capital accumulation and trade liberalization effects of the Customs Union, this experiment takes into account the effects of foreign capital inflows into Turkey resulting from the reduction in the risk premium.

- **EXP4LR:** *Customs union + technological shock, long-term effects*

In this experiment we assume that following the Customs Union, the Turkish economy will, in the long term, benefit from a technical change that will improve labour and capital productivity in all sectors.

- **EXP5LR:** *Customs union + risk reduction + technological shock, long-term effects*

This simulation is the ideal long-term scenario that combines a reduction in the risk premium with technical change in the Turkish economy.

Results

Effect	EXP1SR	EXP2LR	EXP3LR	EXP4LR	EXP5LR
Welfare (in \$US millions for 1995)	30.79	201.07	4350.60	3441.41	7715.81
Real GDP(in % changes)	0.04	0.12	3.11	2.37	5.45

Q&A

Dynamic or static model? Static

Assumes perfect competition? No

Assumes flexible exchange rates? No

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates): Values not mentioned.

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

No

Assumes limited substitutability for capital and labour? Not mentioned

Assumes full employment? Yes

Assumes trade balance is zero? Not mentioned

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? Turkish SAM

Tunisia

Abstract

In this paper a computable general equilibrium model of a small open economy has been used to quantify the direct and indirect impact of the FTA on the Tunisian government's fiscal revenue, welfare and sectoral adjustments. As tariff receipts on EU imports represent 20% of 1995 fiscal revenue and the ratio of EU imports to total imports is 70%, government revenue losses are found to reach 20% when tariffs on EU imports are removed. The welfare gains resulting from the agreement represent 6% of 1996 GDP. Sensitivity analysis shows that the extent of revenue loss depends on the elasticity of substitution between EU and non-EU imports as well as the elasticity of substitution between labour and capital. As the fiscal revenue implications of the agreement could be substantial, the welfare consequences of different fiscal policy responses to the FTA are investigated. The investigation shows that the welfare changes resulting from endogenous indirect taxes are positive though smaller than those obtained without any fiscal compensation.

The Model

The model used in this study is the Rutherford et al. (1997) standard single country static CGE model of regional FTA. Households decide how to allocate their budgets between final

consumption and savings according to a Cobb-Douglas utility function. Hence, the shares of final consumption and saving in income are assumed fixed. Producers demand composite consumption goods for intermediate use according to a Leontief input-output technology, that is, the coefficients of intermediate production goods are fixed. The primary factors of production composite is a CES function of capital and labour. The latter factors are therefore imperfect substitutes but also assumed to be mobile between sectors and supplied inelastically.

The government maximizes a Cobb-Douglas utility function over savings and final composite consumption goods, subject to its given income. Hence, both government savings and final consumption demand are fixed proportions of its income.

Investment demands for the different composite consumption goods are also assumed to be in fixed shares of total investment demand, which is equal to total saving.

Following the Armington (1969) assumption, each composite good is a CES aggregation function of a domestically produced good and a composite imported good. Therefore, domestic and composite imported goods are imperfect substitutes, with product differentiation at the sectoral level.

Imports of each trading partner are, in addition, assumed to be infinitely elastic, so that the world prices of imported goods are exogenous. All demand and supply functions are homogenous of degree zero in prices.

In equilibrium, all prices adjust such that excess demand equals zero for all goods and factors; household income is equal to total expenditures and total imports net of total exports are equal to the exogenous value of net foreign capital inflow.

Scenarios

- LIB_MAN_EU – Tariffs on manufactured EU imports are eliminated.
- LIB_ALL_EU – Tariffs on all imported goods from EU are eliminated.

Results

	LIB_MAN_EU	LIB_ALL_EU
Welfare changes	6.026	6.533
Government revenue (GR) change	-20.169	-21.876
GR variation/1995 GDP	-5.803	-6.294
Tariffs receipts on imports from other regions than EU	-6.062	-6.502
Income tax receipts change	14.579	14.687
Real exchange rate change	1.779	2.113
Nominal exchange rate	-0.54	-0.56
Capital price change	3.237	3.44

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes

Assumes flexible exchange rates? Yes

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates): Values not mentioned.

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?
Yes

Assumes limited substitutability for capital and labour? Yes

Assumes full employment? Yes

Assumes trade balance is zero? Yes

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? Tunisian SAM

Morocco

Abstract

Morocco has signed an agreement with the EU aimed at establishing a Free Trade Area in about 2010. Customs and levies on a wide range of imported goods, scheduled to expire as a result of the agreement, are described. Elimination of government protection of several sectors may result in growing competition in the domestic economy, creation of a special

trade-exchange climate in the Euro-Mediterranean zone and profound modification of protection of productive sectors.

This paper considers the impact of trade tariff abolition on the Moroccan economy, empirically evaluated with a CGE model. One important aspect concerns fiscal policy as elimination of tariffs entails a certain loss in public tax revenue. Therefore, the trade liberalization requires urgent and necessary fiscal reform in order to account for the loss.

The Model

A CGE model comprises a set of equations that describe the relationship between economic agents. In an attempt to closely model the Moroccan economy, we assumed that 7 of the 13 modelled sectors are imperfectly competitive, while the rest are perfectly competitive. Morocco is modelled as a small economy, trading with the EU and the rest of the world.

In this economy, both factors of production – labour and capital – comply with Cobb-Douglas technology. In the simulation, labour is flexible and capital is fixed in every production sector. Intermediate inputs are Leontief type. Labour is divided into three categories according to degree of qualification. Imperfect substitution is assumed between domestic and imported goods. The model's structure is calibrated with the data from 1996. The greater part of the variables was borrowed from official Moroccan statistics although the numbers were of heterogeneous nature and insufficient to construct a SAM for 1996. Hence, various sources were incorporated into the matrix.

The scenario

The only scenario simulated is elimination of trade tariffs on goods and services of EU origin.

Results

Overall effects of trade tariffs elimination on EU goods and services					
Macroeconomic aggregates		Budgetary Data		Labour Market	
Production	-1.60%	Duties	-54.7%	Labour Demand	-2.3%
Disposable income	-3.40%	Direct tax	-4.2%	Non-qualified labour	-1.1%
Private Consumption	0.70%	Indirect tax	-5.6%	Qualified labour	-3.2%
Gross fixed capital formation	-10.1%	Overall tax collection	-12%		
Imports	1.30%				
EU Imports	7.25%				
ROW Imports	-6.20%				
Exports	1.10%				

Q&A

Dynamic or static model? Static

Assumes perfect competition? 7 sectors imperfectly competitive and 6 competitive

Assumes flexible exchange rates? Not mentioned

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates): Values not mentioned.

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? Not mentioned

Assumes full employment? No

Assumes trade balance is zero? Not mentioned

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? Mixed sources Moroccan

SAM

Egypt

Abstract

The Egyptian economy has seen its links with the world economy weaken in important ways, even as the global economy (manifested in trade and investment flows) has marched toward deeper integration. Economic theory and international experience suggest that it is best to move away from international trade taxation irrespective of whether an agreement with Europe exists or not. In fact, the poorer the country, the more striking the effect on its rate of growth and its rate of export growth such an agreement produces. Exactly what kind of effect will materialize on growth and investment, however, is hard to estimate although evidence suggests that the largest benefits accrue to countries with reasonable macroeconomic stability and flexible domestic markets. The benefits will be realized only to the extent that the countries in the region reform their economies.

The establishment of a Free Trade Agreement (FTA) with the EU offers an important opportunity to rationalize Egyptian trade policy. This is because the EU accounts for over 40% of Egyptian trade. This paper uses a global general equilibrium model to evaluate the likely effects of such an FTA on Egypt. This involves comparing the Egyptian economy at a projected 2005 baseline (based on IMF macro projections) to an alternative set of projected 2005 scenarios involving alternative FTA scenarios. The paper also explores the important

issue of revenue replacement as a significant share of Egyptian tax revenue comes from trade taxes.

The economy-wide implications of trade policy (and trade liberalization) depend critically on patterns of protection, trade and production. Therefore, before we discuss estimation of likely effects of a prospective FTA, we examine the economy-wide patterns of economic activity and economic policy.

The Model

Only an overview of the global standard CGE model is given, with a modified version of the GTAP model after Hertel (1996). The model is implemented in GEMPACK, a software package designed to solve large applied general equilibrium models. Firm output is purchased by consumers, government, the investment sector and other firms. Overall, the model consists of 26 sectors and 6 regions.

The standard CGE model assumes perfect competition with constant returns to scale. Bilateral trade is handled via the Armington assumption. However, this specification is irrelevant for many sectors, especially in trade liberalisation analysis. It is therefore important to take into account imperfect competition and endogenous product differentiation.

The model retains the Cobb-Douglas functional form for the regional household's and the government's utility functions as well as the Constant Difference Elasticity of substitution (CDE) utility structure of the private household. The sub-utility function for composite commodities is the most appropriate level in the utility tree to incorporate differentiated products.

Within each region, firms produce output employing land, labour and capital and combine these with intermediate inputs. Land is only employed in the agricultural sector while capital and labour (both skilled and unskilled) are mobile between all production sectors. Capital is fully mobile within regions. Capital movements between regions are not modelled but, rather, are held fixed in all simulations.

Data on production and trade are based on national social accounting data linked through trade flows (see Reinert & Roland-Holst 1997). With the exception of Egypt, these social accounting data are drawn directly from the Global Trade Analysis Project (GTAP) (GTAP 1999). Egyptian data are based on value added and input-output data from the Egyptian agency CAPMAS, together with more-detailed Moroccan input-output coefficients as well as trade and macro data from the World Bank and the GTAP consortium. The resulting global data set is benchmarked to 1997; it includes detailed national input-output, trade and final

demand structures. The basic social accounting and trade data are supplemented with trade policy data, including additional data on tariffs and non-tariff barriers.

Scenarios

- *Sc1*: Involves projection of the global economy based on scheduled Uruguay Round liberalization and World Bank macroeconomic forecasts through 2005.
- *Sc2*: Involves full free trade between the EU and Egypt, across all sectors.
- *Sc3*: Involves full duty-free access for Egyptian exports to the EU.
- *Sc4*: Involves partial free trade between the EU and Egypt, excluding agricultural and food products.
- *Sc5*: Involves partial duty-free access for Egyptian exports to the EU, excluding agricultural and food products.

Results

Projected changes in Egyptian Macro Indicators (annual percent change through 2005)					
Variables	Sc1	Sc2	Sc3	Sc4	Sc5
Investment levels	3.55%	4.35%	3.57%	4.36%	3.62%
GDP	3.99%	4.33%	4.02%	4.32%	4.02%
Imports	1.32%	2.74%	1.51%	2.75%	1.57%
Exports	3.65%	6.25%	3.90%	6.22%	3.97%
Terms of trade	-3.14%	-4.02%	0.42%	-3.78%	0.41%
Revenue loss (share of GDP)	NA	3.91%	-0.25%	3.86%	-0.22%

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes

Assumes flexible exchange rates? ???

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates): Values not mentioned.

Assumes strict complementarity for intermediates (Leontief tech for intermediates)? Yes

Assumes limited substitutability for capital and labour? Not mentioned

Assumes full employment? Yes

Assumes trade balance is zero? Not mentioned

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? Various sources

3. Trade Liberalization and the Dynamic of Poverty in Tunisia: Short-term Pain for Long-Term Gain

Sami Bibi and Rim Chatti, 2005

Abstract

The aim of this paper is to evaluate the long-term impact of non-agricultural trade liberalization on poverty in Tunisia. Using a layered dynamic CGE-micro-simulation approach, the evolution of prices and income by household category are simulated under continued protection and freer trade assumptions. The model results are then fed into a 1995 household survey database in order to compare the impacts on individual households and, consequently, on poverty. Simulation results show that trade openness slows poverty reduction in the short term. However, to the extent that it leads to new investments in infrastructure and human capital, it enhances poverty reduction in the long term. These results apply to urban and rural areas although the impact on rural poverty is smaller in the short and long term given the industrial nature of the liberalisation and the ensuing industrial export expansion. Furthermore, as more is spent on food items, rural households benefit less than do urban households from the reductions in industrial consumer prices engendered by cheaper imports.

The Model

The model used is largely influenced by the (MINI)-IMMPA framework developed by Agénor (2003) and Agénor et al. (2003). The Tunisian economy for the reference year is disaggregated into 14 production sectors, one rural (agriculture) and 13 urban (industry and services). Excluding urban government public services, the composite output of each of the remaining 12 urban sectors flows from at least one of three types of firms: private, informal, and public. These are assumed to produce imperfect substitutes responding to local demand. Since the focus in this study is poverty and income distribution, the household segment is disaggregated for the reference year into six household groups – two rural and four urban – identified by source of income.

Production functions in the model are nested and exhibit constant returns to scale over private inputs. Gross output of all categories of firms is produced by combining intermediate goods

and primary factors composites in fixed proportions. The primary factors composite is either a Cobb-Douglas or CES aggregate of the various factors used in production.

The model accounts for various sources of labour market segmentation. Unskilled workers are employed in rural agriculture and the urban economy. Skilled workers, however, are employed only in the formal urban economy. There is no unemployment in the rural sector; nominal wages are flexible and adjust directly to the rural unskilled labour market. The supply of labour in the rural area is predetermined at any point in time but grows over time.

Producers demand composite goods, imported and local, for intermediate use, according to a Leontief input-output technology; that is, the coefficients of intermediate goods in production are fixed.

It is assumed that government expenditures and savings as well as transfers to households are in fixed proportion to public sector revenue.

Public stock in education positively affects skills formation. The public stock in infrastructure has a positive effect on private investment on the one hand, and combines with the public stock in health to increase total factor productivity in agriculture, public and private firms on the other.

Government revenue derives from the transferred returns to capital of public firms, the collection of direct taxes set on households' income and firms' return on capital, tariffs, and indirect taxes on private consumption.

The investment demand for the different composite goods, by origin, are also assumed to be in fixed shares of total investment demand, which is equal to total saving. Household preferences are represented by Cobb-Douglas utility functions defined over saving and composite goods. Saving and demand are thus constant fractions of disposable household income.

This DCGE model is designed to capture the relevant structural features of the Tunisian economy. Hence the price and income changes it generates embody the effective direct and indirect effects of policy reform. In this way, any change in poverty obtained from the micro-simulation model described will be as close as possible to that which could be expected.

The relevant information for calibration of the DCGE model is provided by the 1998 social accounting matrix, the construction of which is facilitated by use of national accounts data obtained from the Institut National de la Statistique (2001). For the micro-simulation, a sample of 2500 households from the 1995 household survey was used.

Scenarios

Four alternative scenarios were considered:

- *ref* - Illustrates the path of Tunisian economic growth between 1998 and 2015 in the absence of any technological progress or trade reform. The economy's dynamics involve rural and urban labour force growth in addition to private and public capital accumulation. This simulation provides a benchmark against which to judge the contribution of trade reform and public spending structuring to poverty alleviation in the remaining alternative scenarios.
- *opn* – An annual 10% decrease of all tariffs on non agricultural imports in the first decade is simulated. The tariff decrease is compensated for by an annual 9% increase in all consumption taxes until 2008, when they become fixed at the level reached. In this scenario, trade reform is not sustained by change in total factor productivity. This scenario is meant to isolate the contribution of openness to poverty alleviation.
- *tpf* – This scenario is the same as *opn* but with the addition of technological progress.
- *edu* – In this scenario, subsidies on agricultural goods and food processing are progressively and uniformly eliminated over the transition period, 1998-2015. Each year, the amount of subsidies saved is allocated to investments in education, health and infrastructure, according to the share of each in total public investment. The scenario's goal is to check whether investment in infrastructure and human capital is a better tool to combat poverty than is food subsidies.

Results

There are no written results or tables in this paper, just graphs illustrating the affects of each scenario:

Figure 1: Poverty trend over 1998 – 2015

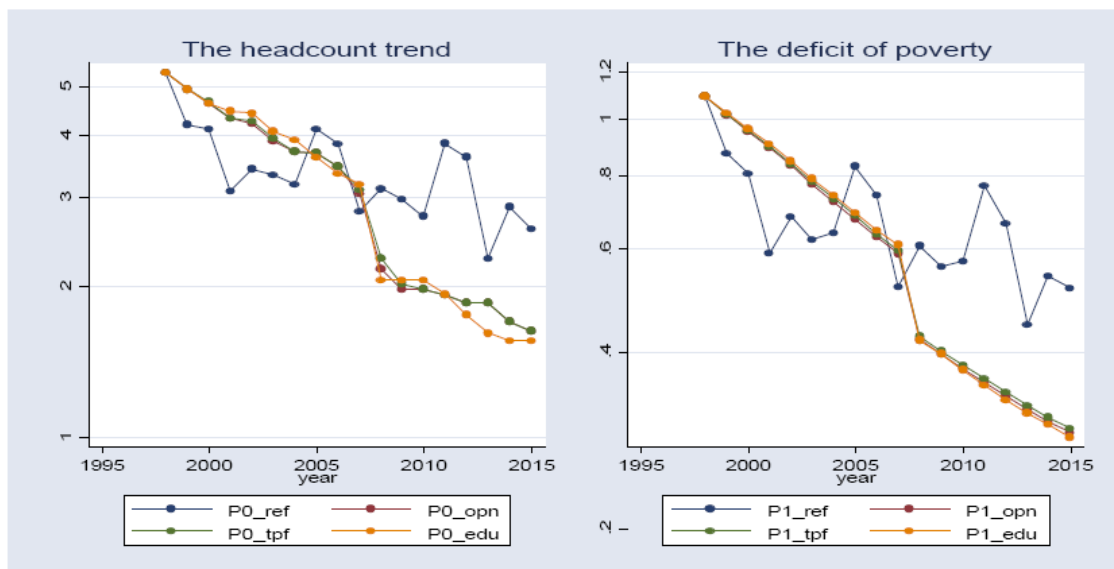
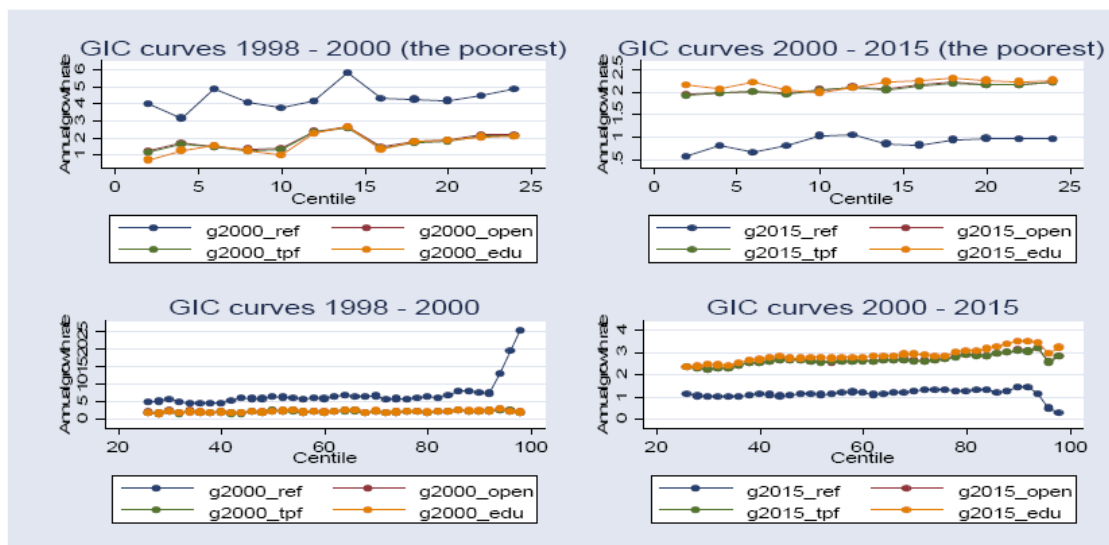


Figure 2: GIC Curves under different scenarios



Q&A

Dynamic or static model? Dynamic

Assumes perfect competition? ???

Assumes flexible exchange rates? Yes

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates): Not mentioned.

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? ???

Assumes full employment? Yes in Rural region. No in Urban

Assumes trade balance is zero? Not mentioned.

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? 1998 Tunisian SAM

4. Assessing Non – Tariff Barriers in Syria

Mohamed Abdelbasset Chemingui, Sebastien Dessus, 2004

Abstract

International trade in Syria is highly regulated through a combination of tariffs and nontariff barriers. At 8% on average, effective tariffs are relatively low. However, nontariff barriers to trade actually make Syria's trade restrictiveness very high. The objective of this paper is to estimate the costs of NTBs on the Syrian economy using a computable general equilibrium model (CGE).

Model

The CGE is a standard neo-classical static model with imperfect substitution between domestic and foreign goods. Prices are endogenous on each market (goods and factors) and supply is equalized (imports, Syrian production for the domestic market, factors supply), as is demand (final demand from households, the government, investors and the rest of the world, intermediate demand from producers, factors demand), in order to obtain the equilibrium. The equilibrium is general in the sense that it applies to all markets simultaneously.

The model uses the information contained in the Social Accounting Matrix constructed by the authors for 1999, extending previous work from Lucke (2002). It considers one representative Syrian household, 23 economic sectors and 18 products. Each product can be produced by more than one sector and each sector can produce more than one product. The model also identifies 5 different trading partners.

Supply is modelled using nested constant elasticity of substitution (CES) functions that describe the substitution and complement relations among the various inputs. Producers are cost-minimisers; constant return to scale is assumed. Output results from two composite goods: intermediate consumption and value added, combined in fixed proportions. The intermediate aggregate is obtained by combining all products in fixed proportions. The value-added is then de-composed in two substitutable parts – labour and capital – both of which are fully employed and perfectly mobile across sectors.

Income from labour and capital accrue to the representative household, as does all the rents created by QRs. In the absence of more specific information, this last assumption ensures the

greatest neutrality of results. Total household demand is derived from maximizing the utility function, subject to the constraints of available income and the consumer price vector. Household utility is a positive function of consumption of the various products and savings, with income elasticity for each product set to unity. Government and investment demands are disaggregated into sectoral demands once their total value is determined according to fixed coefficient functions.

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

Finally, several macro-economic constraints are introduced. First, the small-country assumption holds, the Syrian economy being unable to affect world prices; thus, prices of its import and export are exogenous. Capital transfers are exogenous as well; hence, the trade balance is fixed so as to achieve a balance in payments equilibrium. Second, the model imposes a fixed real government deficit and fixed real public expenditures. Public receipts thus adjust endogenously in order to achieve the predetermined government net position, that is, by shifting households' income tax. Third, investment is determined by the availability of savings from households, government and abroad. Since government and foreign savings are exogenous in this model, changes in investment volumes reflect changes in household savings and changes in the cost of investment.

Results

	Dismantling NTB (%)	Dismantling Tariffs (%)
GDP	1.7	0.4
Private consumption	1.2	0.1
Investment	5.4	2.3
Exports	12.3	4.1
Imports	15.0	5.0
Average tariff reduction	19.3	8.3
Semi-elasticity*	0.0881	0.0482

* Semi-elasticity of GDP vs average tariff reduction.

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes

Assumes flexible exchange rate? No

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates)

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?
Yes

Assumes limited substitutability for capital and labour? No (CET function)

Assumes full employment? Yes

Assumes zero trade balance? Yes

Assumes diagonal input-output matrix?

Uses IO-matrix of country under study or imported IO matrix? SAM for Syria, updated to 1999

5. Internal and External Reforms in Agricultural Policy in Tunisia and Poverty in Rural Area.

Mohamed Abdelbasset Chemingui and Chokri Thabet, 2001

Abstract

Using a calibrated general equilibrium model of the Tunisian economy with 10 types of households (9 rural and one urban) identified by occupation and source of income, this paper assesses the impacts of internal and external reforms in agriculture policy on household incomes and income distribution in rural areas. The general conclusion reached is that trade reform and subsidy reduction will most likely decrease the average welfare of the most rural households, particularly poor households. Only an increase in agricultural yields will improve income and reduce poverty in these areas.

The Model

Tunisia has two trading partners, namely, the European Union (EU) and the Rest of the World (ROW). The model uses Tunisia's Social Accounting Matrix (SAM) for 1992. It considers ten representative Tunisian households, 9 rural and one urban. In all, 57 economic sectors (of which 26 relate to agriculture or food) and 5 types of work are taken into account, with the latter distinguished by skills and geographical mobility; 3 types of work are rural, one urban and one allocated to the whole country.

Supply is modelled using nested Constant Elasticity of Substitution (CES) functions, which describe substitution and complementary relations among the inputs. Producers are cost-minimisers; constant return to scale is assumed. Output is produced from two inputs, an intermediate aggregate and a value added plus an energy aggregate.

The model assumes five categories of demand for labour.

A distinction is incorporated in the model between "old" and "new" capital, with greater flexibility attributed to "new" capital.

Income from labour and capital is distributed among households using a standardized fixed-coefficient matrix.

A wide array of policy instruments is modelled after a conventional type, including production and consumption subsidies, direct and indirect taxes as well as tariffs.

Being a small country, Tunisia is a price-taker relative to the ROW and the EU. The country has a fixed government deficit before investment. Endogenous public receipts adjust the predetermined net government position. Investment is determined by the savings of the country's economic agents.

Scenarios

Baseline Scenario

Based on plausible assumptions for the Tunisian economy until 2010, without new reforms, the baseline scenario is the benchmark against which all other scenarios are evaluated.

Tunisia reduces all tariff rates by 24% (1995-2004), agricultural subsidies by 13% (1995-2004) and eventually abolishes its tariffs while the EU slightly reduces its preferential tariff quotas as applied to Tunisia.

Alternative Scenarios

- A1 – A unilateral staged reduction in preferential and maximum customs tariffs on agricultural and food imports from the EU over the period 2001 to 2010. Compared with the baseline scenario, these tariffs are reduced by 25% in 2001 by 50% in 2004, by 75% in 2007 and abolished in 2010.
- A2 – The gradual reduction of agricultural subsidies between 2001 and 2010. Compared with the baseline scenario, production and consumption subsidies are reduced by 25% in 2001 by 50% in 2004, by 75% in 2007 and by 100% in 2010.
- A3 – Reciprocal reform of agricultural trade between Tunisia and the European Union intensifies the impact of the individual reforms taken separately, with free access for Tunisian products into the EU market.
- A4 - This scenario adds to the three reform simulations discussed above with a cut in the tariffs applied to industrial and agricultural products from the Rest of the World.
- A5 - Full liberalization in agricultural world trade. To do so, the Goldin, Knudsen and van der Mensbrugge (1993) price estimates are used for the main traded crops and food products.
- A6 – This scenario simulates progressive increases (with respect to GDP) in the share of public expenditures on items such as public agronomic research and public infrastructure, aimed at improving agricultural yields. Chemingui and Dessus (2001), who analyzed the evolution of Tunisian agricultural production over the period 1970-1994, observed that these expenditures played a significant role in increasing yields.

Results

	Baseline Scenario		Alternative Scenarios in 2010					
	1992	2010	A1	A2	A3	A4	A5	A6
Real GDP	12.31	33.67	33.56	33.94	33.68	33.83	33.68	34.01
Total production	27.17	75.57	74.82	78.29	75.08	76.71	74.80	74.05
Private consumption	9.82	26.43	26.60	26.68	26.53	26.96	26.45	26.40
Investment	3.65	8.96	8.79	9.22	8.98	9.05	8.85	8.87
Exports	4.23	17.27	17.59	18.18	17.08	18.19	17.09	17.10
Imports	6.10	18.17	18.49	19.08	18.13	19.27	17.81	17.81
Aggregate Household Welfare change			0.3%	0.5%	0.3%	1.20%	-1.90%	1.80%

* These macroeconomic aggregates are expressed in billions of 1992 TND. Welfare changes are expressed in percentage change as compared with the reference simulation.

Q&A

Dynamic or static model? Dynamic

Assumes perfect competition? Monopolistic competition???

Assumes flexible exchange rates? Yes

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates):

Domestic relative to imports: 2.2

EU Imports relative to that of the ROW: 0.5

Domestic relative to exports: 5

EU Exports relative to that of the ROW: 8

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? NOT MENTIONED

Assumes full employment? Yes

Assumes trade balance is zero? The balance of payments equilibrium is determined by the equality of foreign savings (which are exogenous) to the value for the current account.

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? ???

6. Les leçons du mariage entre les modèles d'équilibre general calculable et la nouvelle théorie du commerce international: Application à la Tunisie

John Cockburn, Bernard Decaluwe, and Benoît Dostie, 1998

Abstract

New trade theory shows that consideration of imperfect competition and economies of scale can drastically modify predictions regarding the impact of trade policy. However, despite the apparent importance of these phenomena and the extent of current trade liberalization in developing countries, very few empirical trade analyses take them into account. The main exception to this rule is a study containing a modelling inconsistency leading to considerable overestimation of the pro-competitive effects of trade liberalization. The authors provide a detailed presentation of the theoretical foundations and procedure to follow for consistent modelling of imperfect competition in a traditional computable general equilibrium trade model. An analysis of Tunisian trade policy options illustrates the procedure. The outcomes indicate that very limited pro-competition effects are to be expected from trade liberalization.

The Model

The model includes three sectors – industry, agriculture and administrative. The Tunisian database contains information on 18 sectors. The paper conducts a comparative analysis of the impact of three different assumptions on market behaviour: perfect competition with constant returns to scale, imperfect Cournot competition with constant returns to scale and imperfect competition with increasing returns to scale.

Perfect competition:

The representative consumer's utility function is Cobb-Douglas. Goods are homogenous when produced by local firms in the same branch but heterogeneous by origin (local or imported) and destination (local or exported), with aggregate functions of CES and CET, respectively. Labour and capital are flexible in each economic branch although the overall amount of each is fixed.

Oligopoly:

Imperfect competition in the model is incorporated in producers' decisions; the rest of the model remains unchanged. Profit maximization decisions vary between local and world markets as they depend on the following parameters: local prices, marginal costs of local goods, number of firms and elasticity of demand for local goods, world prices, marginal costs of exports, number of firms and elasticity of demand for exports, respectively. In order to model the relative weakness of Tunisian firms on the world market, world demand for exports is assumed to be highly elastic ($=20$).

Price elasticity of demand to exports is exogenously set, whereas price elasticity for the local market is determined endogenously, depending on the elasticity of substitution between imported and local goods (σ_i) (CES, Armington). Contrary to other studies, the present paper assumes a constant number of firms and does not simulate long-term effects.

Government deficit and current accounts are held constant. Investment is also constant to eliminate inter-temporal effects.

Scenarios

The simulations compare complete abolition of trade tariffs in Tunisia with three versions of firm behaviour.

- SIM1: Perfect competition with CRS in every sector;
- SIM2: Oligopoly in selected sectors with CRS in every sector, assuming 10%, 30% and 50% producer surplus from overall capital gains per sector;
- SIM3: Oligopoly with IRS of 1.04, 1.05 and 1.06 in selected sectors.

Results

Effects	Welfare Changes						
	SIM1	SIM2			SIM3 (10%)		
		10%	30%	50%	1.04	1.05	1.06
GDP	0.70	0.76	1.06	2.23	0.81	0.83	0.87
Salaries	3.83	4.03	4.55	5.54	4.14	4.20	4.29
Returns to Investment	0.50	0.59	0.89	1.84	0.54	0.53	0.52
Production Price Index	-1.33	-1.32	-1.29	-1.17	-1.29	-1.27	-1.24

Q&A

Dynamic or static model? Static

Assumes perfect competition? Perfect competition with constant returns to scale, imperfect competition modelled after Cournot with constant returns to scale and imperfect competition with increasing returns to scale

Assumes flexible exchange rates? ???

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates):???

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? CES production function

Assumes full employment? Yes

Assumes trade balance is zero? Yes

Assumes diagonal input output matrix? SAM model

Uses IO-matrix of country under study or imported IO matrix? Tunisia's Social Accounting Matrix (SAM) for 1990, issued by The National Institute of Statistics.

7. Economic Implications of Europe-Maghreb Trade Agreements

Alan V. Deardorff, 1999

Abstract

This paper reviews the various economic effects on Algeria of accepting the European Union's invitation to enter into an economic partnership, as has already been done by two other Maghreb countries, Morocco and Tunisia. These Euro-Mediterranean partnerships consist primarily of the formation of free trade areas (FTAs), including the EU and the country involved; hence, the analysis is devoted primarily to the economic effects of an FTA. However, the occasion of forming an FTA also provides an opportunity to undertake several additional steps toward integration, also examined. These are (1) deeper integration, (2) extension of the FTA to include other neighbouring countries and (3) tariffs reductions on imports from the rest of the world. The paper concludes that an EU-Algeria FTA would probably be good for Algeria although the benefits would be substantially enhanced and the costs reduced by also pursuing one or more additional steps.

Although the present paper uses the CGE-model framework, its usage is limited to comparing empirical estimates taken from several other studies conducted for Morocco, Tunisia and Egypt. The author assumes similar effects on welfare and other macroeconomic variables while considering the economic differences inherent to Algeria.

8. Trade Integration with Europe and Labour Reallocation in the Southern Mediterranean Countries: The Case of Egypt.

Sebastien Dessus and Akiko Suwa-Eisenmann, 1998

Abstract

The paper looks at the implications of the Euro-Mediterranean partnership agreement on labour and wages in Egypt using dynamic CGE model while taking into account labour market segmentation. The results suggest that trade liberalisation entails the risk of promoting use of capital-intensive technology, thus reducing the employment component of growth. Employment policies that increase mobility between labour market segments, in addition to wage flexibility, could enhance the job creation effect. Employment and trade policies are also complementary in political terms in that employment policy can alleviate the losses suffered by insiders following entry of new workers into the labour market.

The Model

A dynamic model constructed of sequential equilibria is applied. The model is run for the 1995-2010 period. It was constructed on the basis of Egypt's IO matrix (1991), updated to 1995. the model does not assume full employment but does assume perfect competition. World prices in remain unchanged over the period.

Production is modelled using nested CES functions that describe substitution and complementarity among the various inputs. Producers are cost-minimisers; constant return to scale is assumed. Output results from two composite goods: intermediates and value added. Leontief technology is assumed for intermediates.

The small country assumption holds, Egypt being unable to affect world prices; hence, its import and export prices are exogenous. Capital transfers are exogenous as well and determine the trade balance.

Model closure: The model is solved for each period, under the following macro-closures: the balance of payments is at equilibrium; the fiscal balance is constant and adjusted by a change

in household income tax. Investment is savings-driven, the latter originating from households, enterprises, government and abroad. A change in savings determines capital accumulation for the next period. The dynamic path of the model results from this closure on investment. Agents are assumed to be myopic and to base their decisions on static expectations about prices and quantities.

Scenarios

Sc1(Reference scenario) – In this scenario, no significant structural trade or labour reforms are undertaken. Fiscal stabilization is continued through stabilization of the share of government expenditures in GDP and the freezing of the number of government jobs, in addition to freezing the purchasing power of civil servants and public enterprise employees. When foreign financing decreases, compensation is effected by a progressive increase in domestic savings (for the full list of assumptions, see paper, pages 12-13).

Sc2 - Progressive removal of tariff barriers for European manufactured products.

Sc3 - Progressive removal of tariff barriers for European manufactured products accompanied by two dynamic effects: increase in direct foreign investments and improved technological acquisitions, which together lead to increased factor productivity.

Sc4 - In addition to Sc3 assumptions, Sc4 introduces flexible wage-setting in state-owned enterprises. The authors therefore substitute a new function for the fixed real wage rule: the growth rate of real wages is a negative function of the growth in unemployment for the respective labour segment. This function may be assimilated to a Philips curve.

Sc5 - This scenario is also based on Sc3. In addition, it assumes increased mobility between the public sector and the formal private sector. In particular, the authors assume that from 1998 onward, unemployed skilled workers can work in the formal private sector. They also assume that half of the skilled workers employed in the informal sector will move progressively into the formal sector.

Sc6 - This scenario combines the effects on the labour market of Sc5 and Sc4; it is also based on Sc3.

Results

	1995	REF	SC2	SC3	SC4	SC5	SC6
Real GDP	193.1	462.9	466	496.3	501.3	502.6	506.9
GDP change (% to ref scenario)		0	0.67	7.22	8.30	8.58	9.51
Average tariff reduction (%)		0	23.31	23.31	23.31	23.31	23.31
Semi-elasticity		-	0.029	0.309	0.356	0.368	0.408

Q&A

Dynamic or static model? Dynamic

Assumes perfect competition? Yes

Assumes flexible exchange rate? ???

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates)

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? CES production function

Assumes full employment? No

Assumes trade balance is zero? Yes

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? Egypt 1995

9. Preferential Trade Liberalization, Fiscal Policy Responses and Welfare: A Dynamic CGE Model for Jordan

Omar Feraboli, 2003

Abstract

This paper aims at assessing the effects on the Jordanian economy of the Association Agreement (AA) between Jordan and the European Union (EU). Particular emphasis is placed on effects on consumer welfare. The EU-Jordan AA was signed in 1997 and entered into force in May 2002. It progressively eliminates tariffs on most industrial goods imported by Jordan from the EU. Customs duties on agricultural goods and processed agricultural products are gradually but only partially eliminated. Trade liberalization is expected to bring about a positive impact on consumer welfare through lower prices of investment and consumption goods. On the other hand, it reduces government revenue due to foregone tariff revenue. Counteracting fiscal measures are therefore required in order to offset the loss in government revenue. In order to capture intertemporal effects brought about by trade liberalization on the Jordanian economy, a multisectoral dynamic CGE model is specified and calibrated. Simulation results show that the implementation of the AA raises consumer welfare in Jordan and has positive effects on all macroeconomic variables in the long run but reduces consumption in the short run.

The Model

The model implemented in this paper is a neo-classical open-economy single-country intertemporal model built on previous work done by Feraboli et al. (2003) that was based on the dynamic framework developed by Devarajan and Go (1998). In the domestic economy there are ten production sectors, nine of which produce goods and one service. Value added output is, in turn, a constant elasticity of substitution (CES) composite entailing primary inputs, capital and labour.

Output is differentiated among four uses: private consumption, government consumption, intermediate input and investment. Parameters in the Armington functions are the same for all uses as well as prices. The domestic economy is assumed to be a price-taker in the international markets, that is, prices of imports and exports are exogenously determined.

Household consumption of each good and service is in turn a composite of domestic and import goods, modelled with the Armington (1969) assumption of constant elasticity of substitution (CES) between domestically produced consumption goods and imported consumption goods.

Aggregate imports of consumption goods are then disaggregated across imports from the EU and from the rest of the world through a Cobb-Douglas specification. The government consumes an exogenous amount of goods, raises taxes and tariffs, provides transfers to consumers and operates a balanced budget.

The dataset is based on the Social Accounting Matrix (SAM) for Jordan, constructed by D. Lucke (2001). The SAM is based on 1998 data, including the 1987 input-output coefficient matrix updated to 1998. The Jordanian economy is modelled as consisting of 10 sectors.

Scenarios

All scenarios are characterized by two-policy simulations. Trade policy is determined exogenously, established by the Association Agreement with the EU and is common to all scenarios while the responses of domestic fiscal policy are a mix of endogenous and exogenous options.

- *Scenario 1:* Government transfers to households is an endogenous policy variable.
- *Scenario 2:* Reform of domestic income taxation is the government's endogenous policy choice. (In the simulation, the "optimal" income tax rate moves to a value around 0.08 in the initial periods and increases steadily; after 12 years it decreases very slightly and approaches a the new steady-state rate of 0.089)
- *Scenario 3:* The endogenous policy choice is government transfers while an additional exogenous policy response, namely, a 10% increase in VAT rates, is put into effect.

Results

Scenario	Policy variables	Welfare	Capital	Consumption	CPI	Gov. Transfers
1	Government transfer	0.06%	0.05%	0.021%	-0.018%	-0.26%
2	Income tax rate	0.03%	0.02%			
3	Government transfer; VAT 10%	0.03%	0.032%	0.012%	-0.008%	-0.13%

Note: The paper does not specify numerical values for target variables but displays dynamic development of various macro indicators. Qualitative results for all macroeconomic variables are the same under the other scenarios if not specified otherwise.

Scenario 1

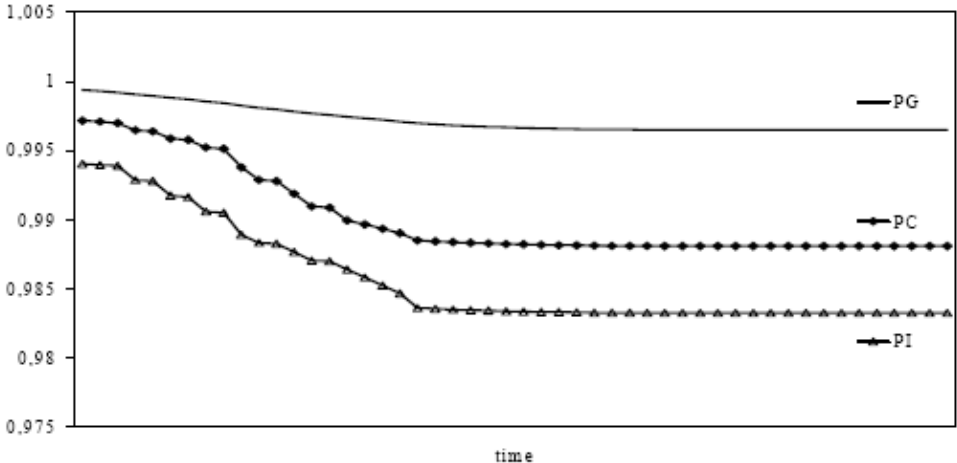


Figure 1. Prices under scenario 1.

where

PC = composite prices of private consumption;

PG = composite prices of government consumption;

PI = composite prices of investment.

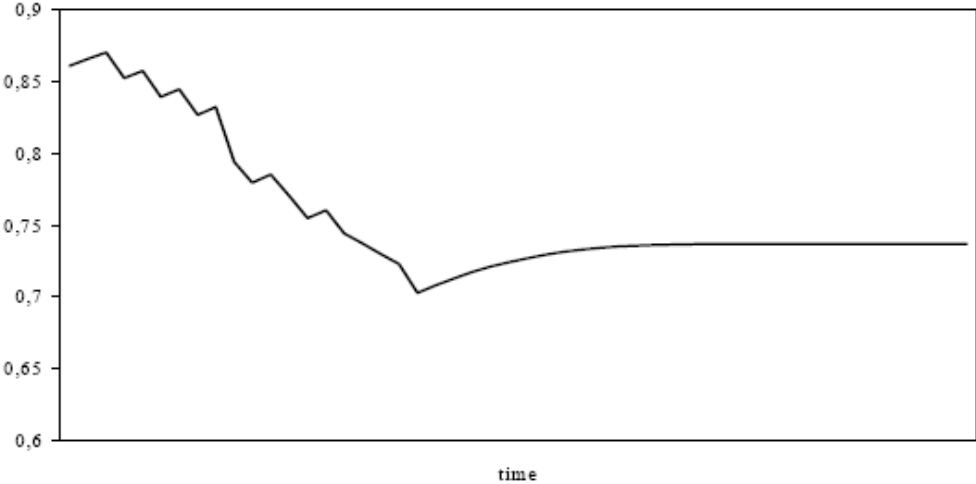


Figure 2. Government transfer to households under scenario 1.

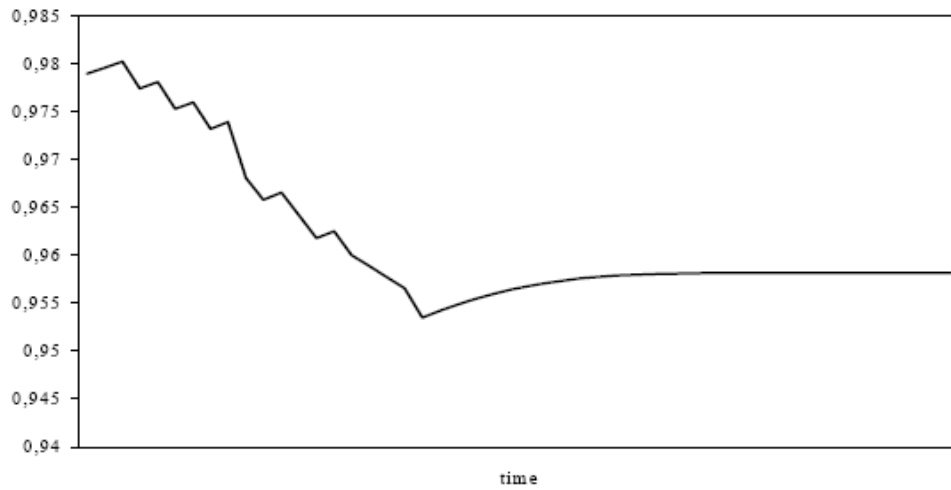


Figure 3. Government revenue under scenario 1.

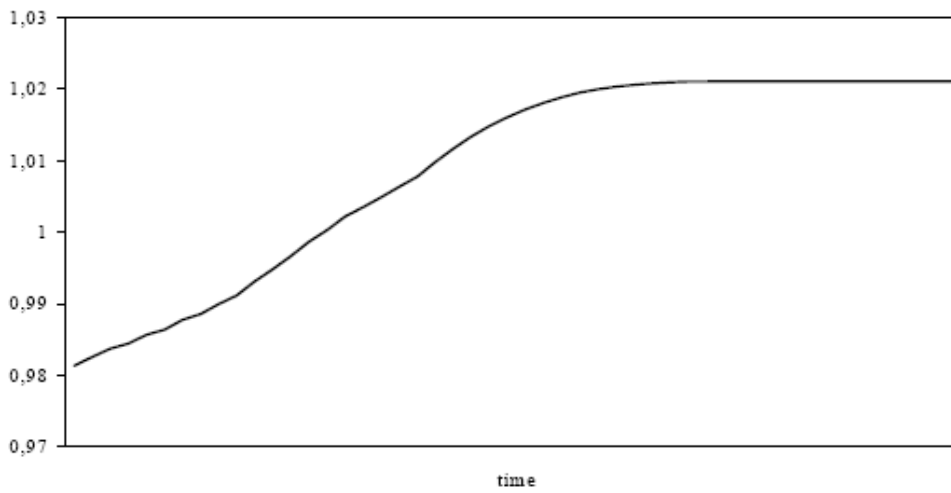


Figure 4. Private consumption under scenario 1.

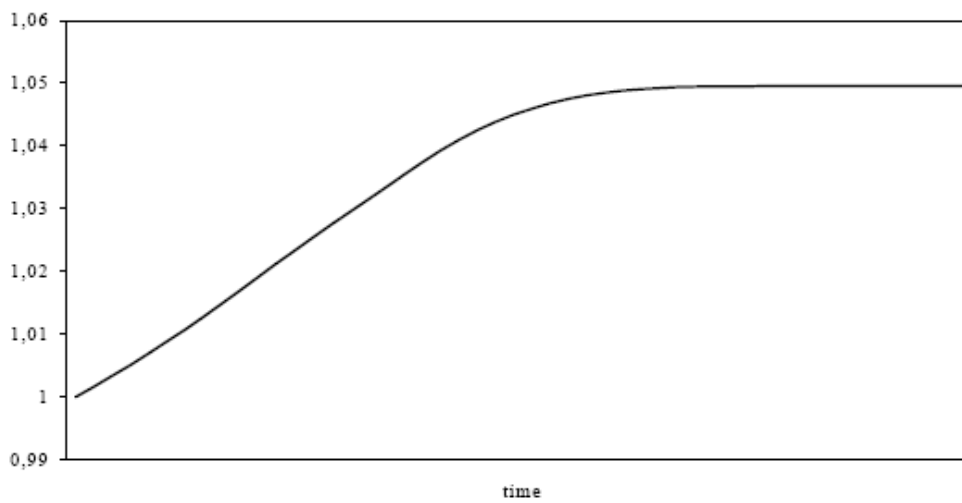


Figure 5. Capital stock in scenario 1.

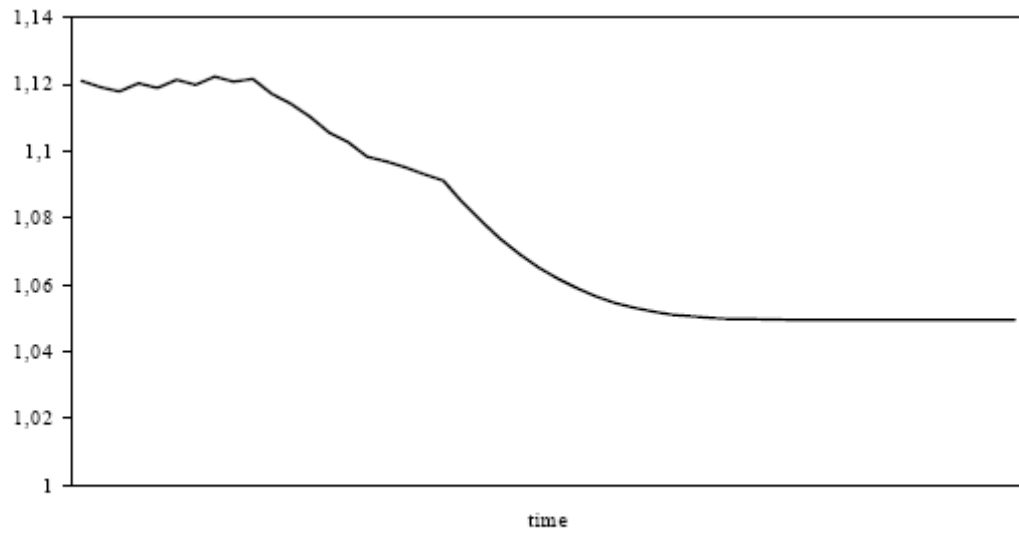


Figure 6. Investment in scenario 1.

Scenario 2

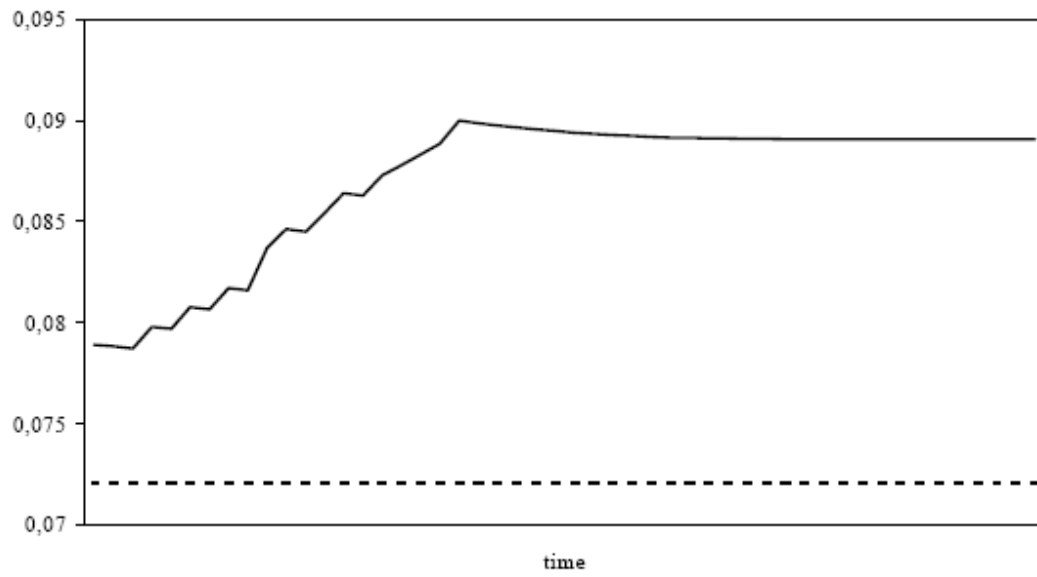


Figure 7. "Optimal" income tax rate.

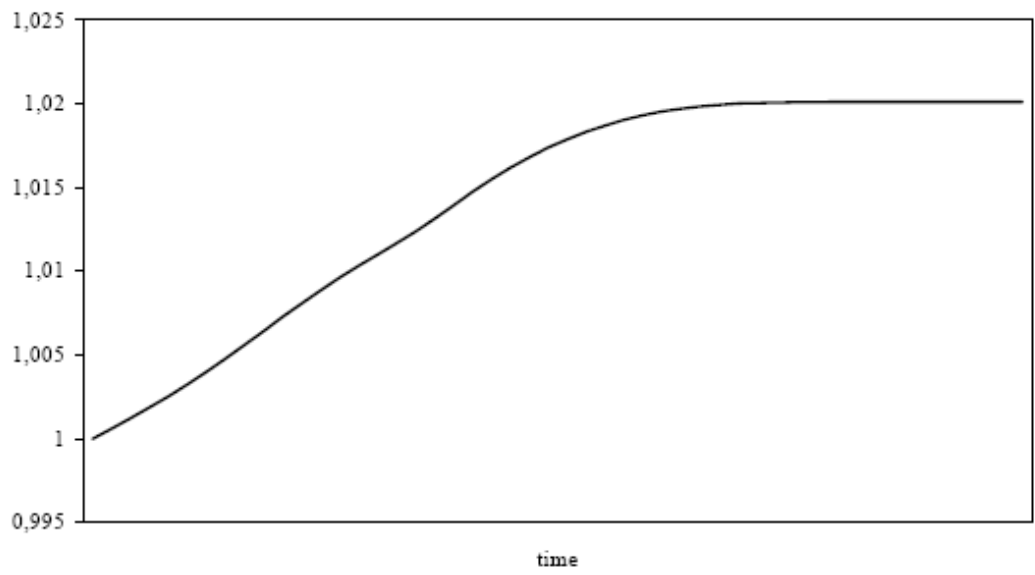


Figure 8. Capital stock under scenario 2.

Scenario 3

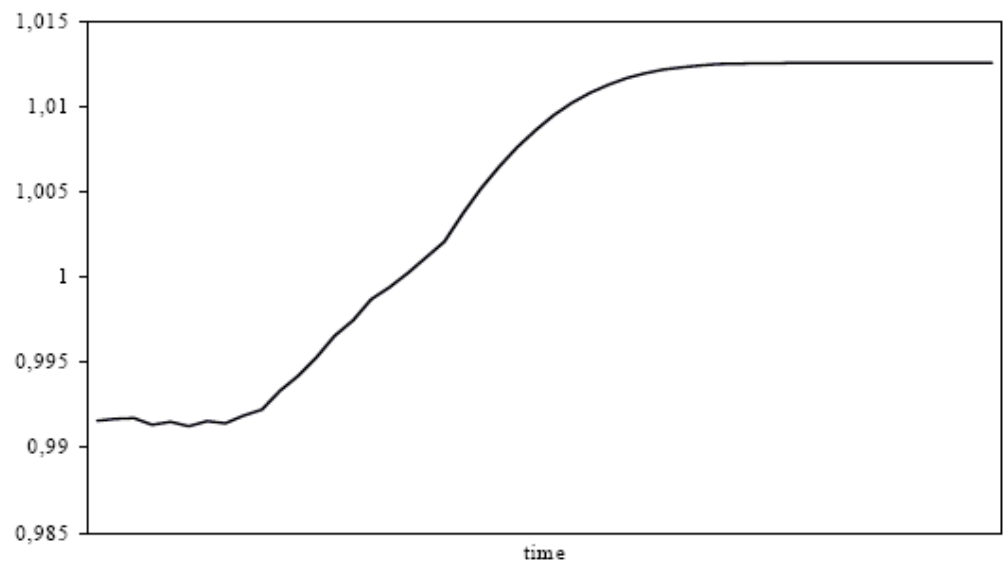


Figure 9. Private consumption under scenario 3.

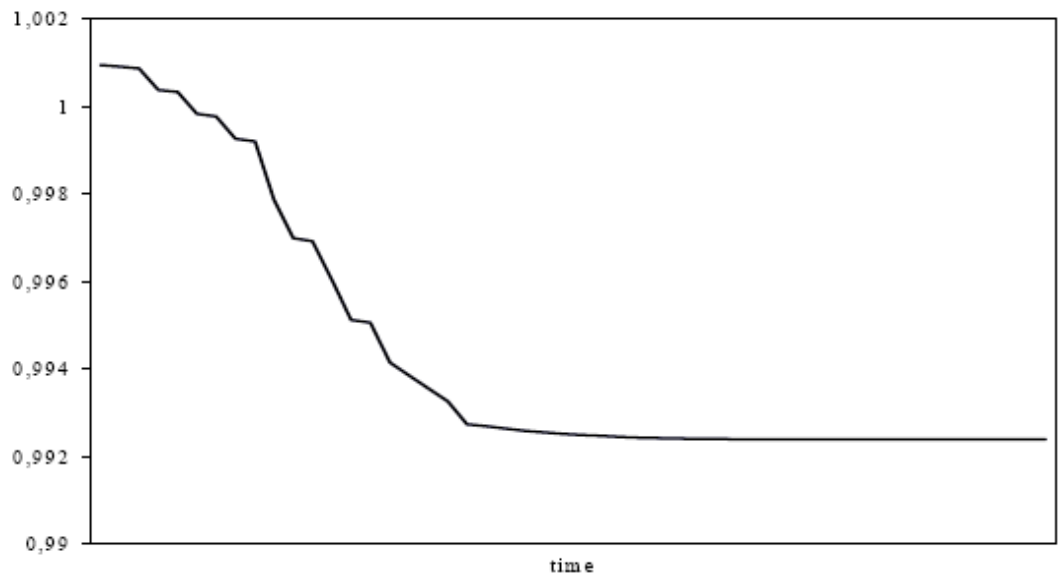


Figure 10. Consumer price index under scenario 3.

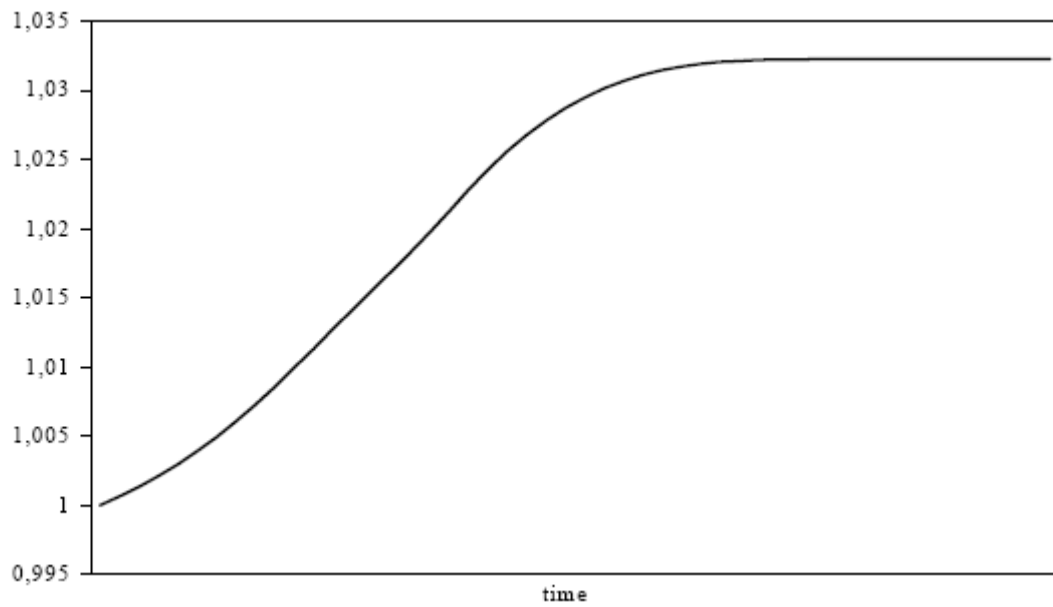


Figure 11. Capital formation under scenario 3.

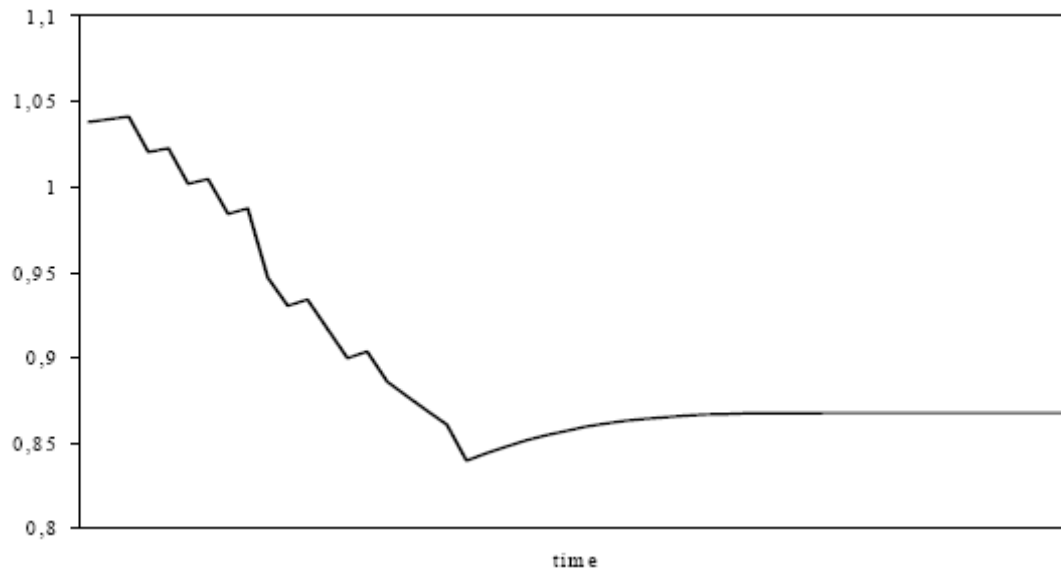


Figure 12. Transfers to households under scenario 3.

Q&A

Dynamic or static model? Dynamic

Assumes perfect competition? Yes, with constant returns to scale

Assumes flexible exchange rates? Not mentioned

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates):

Substitution between domestic goods and imports: 0.6

Transformation between domestic goods and exports: 1.5

Transformation between regional exports: 3

Substitution between labour and capital: 0.9

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? Yes, 0.9

Assumes full employment? Yes

Assumes trade balance is zero? Not mentioned

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? Jordanian SAM

10. Policy Implications of the Euro-Med Partnership: The Case of Jordan

Omar Feraboli, 2005

Abstract

This paper has two main purposes: (a) assessing the effects on the Jordanian economy of implementation of the Association Agreement (AA) with the EU, and (b) drawing implications for domestic fiscal policy accompanying the trade liberalisation process. The AA between Jordan and the EU entered into force in 2002. It progressively eliminates tariffs on industrial goods imported by Jordan from the EU. Custom duties on agricultural products are gradually and only partially eliminated. The Agreement aims at eventually creating a free trade area between the EU and Jordan within 12 years of its entry into force. Given the negative impact of trade liberalisation on Jordanian government revenues, counteractive fiscal measures are required in order to offset the loss. In order to capture intertemporal and intersectoral effects brought about by trade liberalisation, a multisectoral and dynamic CGE model is specified and calibrated.

The Model

The model implemented is a neo-classical open-economy single-country intertemporal model. Discounted lifetime utility of the representative consumer is maximized by choosing optimal consumption and investment paths. There are two production sectors in the domestic economy, one producing goods, the other services. Perfect competition and full employment are assumed in both sectors. International trade flows are characterized by imperfect substitution between domestic and foreign goods. 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 1998. The original SAM has nine sectors producing goods and one sector producing services. The model has been simplified by aggregating all goods sectors. The domestic economy therefore consists of two sectors, producing one good and one service, respectively.

The model is implemented by means of the mathematical software GAMS (General Algebraic Modelling System). The basic scenario, common to all simulations, is gradual reduction of tariff rates on EU-import goods as stipulated by the EU-Jordan Agreement.

Scenarios

The impact on welfare may be ambiguous in principle. On the one hand, lower domestic prices increase consumption and hence household welfare. On the other hand, the reduction in government revenue due to reduced import duty rates forces the government to implement painful fiscal measures, i.e., increases in domestic tax rates and reduction in transfers to households. This negatively affects disposable household income that, ceteris paribus, must reduce consumption. The authors examine four different possibilities for compensating the government for the said revenue loss:

Sc1 – Raising income tax rates

Sc2 – Raising capital tax rates

Sc3 – Lowering transfers to households

Sc4 – Lowering government consumption

Results

	Average tariff reduction (%)	Welfare Change (%)	Semi-elasticity
Scenario 1	11.38	1.254	0.110
Scenario 2	11.38	0.926	0.081
Scenario 3	11.38	1.292	0.114
Scenario 4	11.38	2.329	0.205

Q&A

Dynamic or static model? Dynamic

Assumes perfect competition? Yes

Assumes flexible exchange rates? No

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates)

Assumes strict complementarity for intermediates (Leontief technology for intermediates)? Yes

Assumes limited substitutability for capital and labour? No (CET function, elasticity of substitution = 0.9)

Assumes full employment? Yes

Assumes trade balance is zero? Yes

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? Jordan SAM updated to 1998

11. The Barcelona Initiative and the Importance of NTBs: A Dynamic CGE Analysis for Syria

Beatriz Gaitan and Bernd Lucke, 2006

Abstract

The Barcelona Initiative is the central element of the EU's Mediterranean policy. We study the implementation of this policy with respect to Syria, using a dynamic general equilibrium model with credit constraints and capital market imperfections. Dismantling formal tariffs has only limited effects on the Syrian economy, while reducing non-tariff barriers produces by far larger results. EU association promises broadly positive effects for factor incomes and sectoral outputs, with some temporarily negative effects in agricultural sectors. Nevertheless, we find evidence of severe trade-distorting effects making preferential trade policy clearly welfare-inferior to multilateral trade liberalization within the WTO framework.

The Model

The model's general setup, a dynamic CGE model of a small open economy, is laid out in the paper by Devarajan and Go (1998). The important modification is the introduction of international borrowing and lending. Since perfect capital mobility would – unrealistically – imply infinitely quick adjustment to the steady state, the authors model debt constraints by collateral requirements.

The model allows a non-competitive financial sector. It is widely known that government enterprises in Syria receive more favourable credit conditions than do private enterprises. Therefore, the authors model an interest premium of 3% for all private sectors in the economy.

The social accounting matrix employed in the paper distinguishes a use-matrix (input-output matrix) and a make-matrix. The use-matrix describes how much is spent by the various activities on different commodities as intermediate inputs. The make-matrix indicates the number of commodities produced by each activity. A non-diagonal make-matrix would make the sectoral interrelations highly complex.

Output is produced with capital, labour, land and intermediate inputs according to a constant-returns-to-scale technology. The firms minimize a cost function, depending on the labour

wage rate, rental rate of land and sector-specific interest rates, which express the fact that in state-controlled Syrian banking, government industries receive more favourable credit conditions than do private enterprises.

Households maximize lifetime utility by choosing between consumption and leisure. They behave competitively, taking as given the domestic interest rate, the price of capital goods and the labour wage rate. Households own capital, land (assets) and nominal net external debt (liability).

Investments are financed through private savings and changes in net foreign debt, which is subject to collateral requirements. As for the government, public revenues include general income taxes and single factor taxes on labour, capital and land income. In addition, the government collects indirect taxes from activity output and from import tariffs.

The data on Syria include 23 activities, among them agriculture, mining, various manufacturing and services activities.

The world real interest rate, which can also not be inferred from the SAM, is exogenously fixed at 4%. For the purpose of this study, the European Union is defined as the EU 15. This is due to data limitations: no annual data is currently available for the EU 25. Excluding the EU and the members of the former Soviet Union, we also consider a bloc of Arab countries, Iran, Turkey and the rest of the world.

The focus of the study is the effects of simulations after 25 years, while convergence is achieved after 250 years due to a high elasticity of capital in the mining sector.

Scenarios

- *AA-simulation* – The Association Agreement with the European Union stipulates that Syria immediately abolish NTBs and gradually reduce ad-valorem tariff rates to zero. The AA-simulation must be viewed as an ideal scenario that will probably not be matched in reality. It is nevertheless useful as a benchmark.
- *Tariff scenario* – Gradual tariff dismantling (constant non-tariff barriers)
- *NTB scenario* – Immediate dismantling of NTBs (constant formal tariffs)
- *WTO-scenario* – Under WTO rules, NTBs are to be transformed into formal tariff barriers. After tariffication, tariffs of agricultural goods would be dismantled, based on the Agricultural Goods Agreement for Developing Countries established in the Uruguay Round. This consists of a total 24% decrease in agricultural tariffs during a ten-year period. For the remaining commodities (all non-agricultural goods), tariff reductions are presumed to be instantaneously reduced by 50%.

- *MFN-scenario* – simulates an MFN-policy with reference to the status quo tariff structure, i.e., does not take into account future tariff reductions under preferential trading agreements.

Results

Table1. Some numerical results from AA-scenario

Macro indicators	Immediate	25 years	250 years
Investment	8%		31%
Consumption	-0.50%		40%
Real wage		12%	
Real interest rate	-0.50%		
Agriculture	-1.40%	3%	
Chemicals	9%	20%	
Textiles	7%	14%	

* rounded values

Table 2. Effects of other scenarios in per capita terms

	Tariff scenario	- NTB-scenario	Combined effect
Welfare	0.16%	0.48%	0.33%
25 year effects			
GDP	1.60%	9.90%	13.70%
Consumption	1.20%	7.60%	9.20%
Investment	2.00%	11.80%	15.10%
steady-state effects			
GDP	4.70%	29.10%	39.30%
Consumption	5.30%	33.20%	42.80%
Investment	4.10%	24.80%	32.30%

Table 3. Effects of other scenarios in per capita terms

	WTO- scenario	MFN-scenario
Welfare	1.35%	0.20%
25 year effects		
GDP	5.70%	1.40%
Consumption	7.40%	0.60%
Investment	3.20%	2.20%
steady-state effects		
GDP	21.10%	2.90%
Consumption	28.60%	2.70%
Investment	13.20%	3.20%

Table 4. Growth rates of imports (25-year period)

	NTB- scenario	WTO- scenario
Arabic countries	-4.01%	3.77%
EU 15	26.70%	4.31%
Formerly socialist countries	8.57%	4.17%
Turkey	-14.80%	3.86%
Iran	-21.70%	4.61%
Rest of the world	-14.00%	4.11%
Total imports	3.05%	4.14%
Total exports	10.60%	4.23%

Q&A

Dynamic or static model? Dynamic

Assumes perfect competition? Yes, with a non-competitive financial sector

Assumes flexible exchange rates? No

Numerical values of calibrated Armington parameters:

Import elasticity	Tstat	Number of obs	Method
0.12	1.35	17	ols w/ trend
0.09	1.21*	17	ols w/ GDP
0.11	1.37	17	SUR w/ GDP, all available years
0.13	1.54	17	SUR w/ trend, all available years
Export elasticity	Tstat	Number of obs	Method
0.09	1.43	17	ols w/o trend
0.09	1.35	17	ols w/ (X-M)/GDP w/o trend
less than 20 obs			
* - insignificant at 90%			

Assumes strict complementarity for intermediates (Leontief technology for intermediates)? Yes

Assumes limited substitutability for capital and labour? Yes

Assumes full employment? Yes

Assumes trade balance is zero? Yes

Assumes diagonal input-output matrix? No

Uses IO matrix of country under study or imported IO matrix? Syrian Central Bureau of Statistics Data incorporated in a use-matrix and a make-matrix for 2001-2004

Source: Shantayanan Devarajan and Delfin S. Go. (1998). The simplest dynamic general-equilibrium model of an open economy. *Journal of Policy Modelling*, 20, 677-714.

12. Trade Reform in the Partially Liberalised Economy of Turkey.

Glenn W.Harrison, Thomas F.Rutherford and David G.Tarr, 1993

Abstract

The authors simulate trade liberalisation in Turkey using the CGE model; they find that full trade liberalisation will lead to 1.5% welfare gain for Turkey whereas harmonization to the common external tariff of the EC exclusively will have little beneficial effect. The authors conclude that it harmonisation policy should be accompanied with export subsidy reduction to achieve significant benefits.

The Model

The authors use a small open economy (SOE) model. The model is a generic, static equilibrium model of a single economy. The dataset and elasticities are taken from Harrison, Rutherford and Tarr (1992). Goods are produced using labour, capital and intermediates (Leontief technology for intermediates). Production is characterized with constant returns to scale, with producers behaving competitively. Final demand by private households is modelled with nested CES utility functions; all income elasticities equal unity. Government expenditures and investment are exogenous. Government expenditures are financed with net tax revenues. The three components of government income other than import tariffs and export subsidies are: VAT on factor inputs to production, ad valorem production subsidies or excise taxes on production output, and lump-sum taxes on domestic consumers. World market import and export prices are fixed so that there are no endogenous changes in the terms of trade. There is only one private household in the model.

The authors employ the 1985 Turkish IO table distinguishing 64 production sectors. These are aggregated into 40 sectors for simplicity.

Scenarios

Sc1 - Across-the-board liberalisation (removal of all tariffs and subsidies)

Sc2 – Tariff structure harmonisation with the EC Common External Tariff (CET)

Results

	Sc1	Sc2
Welfare gain (%)	1.5	0.007
Average tariff reduction (%)	8	-
Semi-elasticity	0.1875	-

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes

Assumes flexible exchange rates? No

Numerical values of calibrated Armington parameters

Elasticity of transformation: 2.9 (S.E. 1.3);

Between domestic and imported goods: 2;

Between EC and non-EC imports: 5;

Intermediates: 0, but also values of 0.25, 0.5, 0.75 and 1 (for each sector) considered in the sensitivity analysis.

Elasticity reflecting substitutability of consumption in the 'top-level' of consumers utility function: 1.

Assumes strict complementarity for intermediates (Leontief technology for intermediates)? Yes

Assumes limited substitutability for capital and labour? The primary factor substitution elasticities are based on the regression estimates of Harrison, Jones, Kimbell and Wigle (1991). They range between 0.293 for refined petroleum products (REF) up to 3.125 for restaurants and hotels (RES), but the majority is close to unity.

Assumes full employment? Yes

Assumes trade balance is zero? Yes

Assumes diagonal input-output matrix?

Uses IO matrix of country under study or imported IO matrix? 1985 Turkish SAM

13. Economic Implications for Turkey of a Customs Union with the EU

Glenn W. Harrison, Thomas F. Rutherford and David G.Tarr 1996

Abstract

Using applied intertemporal GE analysis, the authors show that to be welfare improving, the trade reform would have to be pursued further and nontariff barriers on European trade removed. Model simulations show that Turkey will gain 1% - 1.5% in GDP annually from a customs union with the EU, depending on what complementary policy it adopts.

Model:

The model is a static GE model of a single economy with 54 production sectors, 8 types of labour, 5 types of capital and 40 types of households. It assumes two-step production using primary factors (labour and capital) and intermediate inputs (Leontief technology assumed). Production exhibits constant returns to scale and firms behave competitively. Final demand by households arises from nested CES utility functions.

The model allows tariff rates to differ, depending on whether the imports are from the EU or the Rest of the World (ROW). Exports can be sold at different prices according to destination: ROW or EU. The same is possible with the imports.

Government expenditures and investment demand are exogenous; indirect taxes are modelled as VAT. World market import and export prices are fixed so that there are no endogenous changes in terms of trade.

Scenarios:

All scenarios simulate Turkey's implementation of a customs union with the EU but differ in these assumptions:

“ACCESS” – Improved access to EU markets (textile, apparel, steel and agriculture).

“STD” – Improved access to EU markets due to harmonization of product quality standards in Turkey.

“TAR” – Turkey lowers its non-agricultural tariffs against EU products and implements Common External Tariffs (CET), including preferential access agreements.

“RECIP” – Turkey gains access to the markets of several countries (i.e., central European countries, Tunisia, Israel) and grants them preferential access to its own markets (reciprocities).

“XSB” – Turkey eliminates export subsidies program for EU exports.

“TRD” – In the respective scenario, authors simulate the impact of reduction in costs of trading between the EU and Turkey.

“FULL” – Assumes all of the above elements.

“AGLIB” – Assumes reductions in agricultural tariffs in addition to the “FULL” scenario.

“XSB0” - Simulates elimination of export subsidies on a non-discriminatory basis in addition to the “FULL” scenario.

“SECOND” – Eliminates all tariffs, subsidies and taxes, except VAT, present in the base model and allows VAT in each sector to adjust proportionally to compensate for any changes in the fiscal deficit.

“FIRST” – In this scenario, authors also eliminate all distortions but use a uniform VAT as the replacement tax.

Results

	Growth in GDP (%)	Average Tariff Reduction (%)	Semi-Elasticity
ACCESS	0.3	8	0.038
STD	0.1	8	0.013
TAR	0.1	8	0.013
RECIP	0.5	8	0.063
XSB	-0.025	8	-0.003
FULL	1.1	8	0.138
TRD	0.1	8	0.013
AGLIB	1.1	8	0.138
XSB0	1.2	8	0.150
SECOND	1.4	8	0.175
FIRST	1.5	8	0.188

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes

Assumes flexible exchange rate? Fixed

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates)

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? CES production function

Assumes full employment? Yes

Assumes trade balance is zero? Yes

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? Turkey 1990

14. Deep Integration, Nondiscrimination and Euro-Mediterranean Free Trade

Bernard Hoekman and Denise Eby Konan, 1998

Abstract

Using a standard competitive general equilibrium model of the Egyptian economy, Hoekman and Konan find that the static welfare impact of a "deep" free trade agreement is far greater than the impact to be expected from a classic "shallow" agreement. Under some scenarios, welfare may increase by more than 10% of GDP, compared with close to zero under a shallow agreement. Given Egypt's highly diversified trading patterns, a shallow preferential trade agreement (PTA) with the European Union could be merely diversionary, leading to a small decline in welfare. Egypt already has duty-free access to the European Union for manufactured products so that the loss in tariff revenues incurred would outweigh any new trade created. Large gains in welfare from the PTA are conditional on eliminating regulatory barriers and red tape in which case welfare gains may be substantial: 4% to 20% growth in real GNP.

The Model

The model is a competitive, constant returns-to-scale computable general equilibrium model. Egypt is modeled as a price-taker on world markets. Constant returns to scale and perfect competition imply that prices equal marginal costs of output. Final outputs are produced according to a Leontief function using intermediate inputs and real value added. A constant elasticity of substitution (CES) production function describes the substitutability between labor and capital inputs in producing real value-added.

Intermediate inputs and final goods are differentiated by country of origin according to the Armington assumption so that export and import prices differ across regions. In each sector, demand for domestically produced and imported goods is represented by a CES function; intermediate imports are also differentiated by region of supply in a CES structure. Similarly, Egyptian industries supply regionally differentiated goods to both domestic and foreign markets (exports).

Capital is assumed to be partially mobile in the sense that there are a number of resource-constrained sectors; in all other sectors capital is freely mobile. A representative consumer

maximizes a nested CES utility function with a corresponding multi-staged budget constraint. Income elasticities across sectors are set at unity as given by a Cobb-Douglas (CD) utility nest. The consumer determines domestic and aggregate import expenditures in each sector according to a CES function.

Intermediate inputs are disaggregated into domestic sources and imports to incorporate importing costs and tariffs in purchases for the production sector. Two closure rules are imposed: the savings-investment balance is based on the assumption that the capital stock is exogenously fixed at the benchmark level, and the current-account imbalance is held constant at its benchmark level throughout the simulations.

The government budget deficit is a deduction in available income for the representative agent, constituting a transfer to government consumption. The deficit is held fixed during the simulations.

The data for the model consist of a Social Accounting Matrix (SAM) using the 1989/1990 input-output table for Egypt, updated to incorporate trade and tax policies and trade shares as of 1994.

Scenarios

Shallow Integration - Shallow partnership agreement with the European Union in which Egypt preferentially removes all tariffs on EU goods but does not liberalize non-tariff or service barriers.

Deep Integration, Service Costs Fixed, MFN Only - Allows for deep integration and assumes a limited agreement is reached that will result in liberalization of Egyptian import and export regulatory barriers on a MFN basis. There is no liberalization of service barriers.

Deep Integration, Service Costs Fixed, MFN+MRA – Same as above but with removal of standards-related costs on a discriminatory basis through formal mutual recognition-type agreements (MRA) with the EU.

Deep Integration, Service Costs Also Removed, MFN Only – Same as above, MFN Only, although the agreement is not strictly limited to agriculture and manufacturing trade, extending also to the service sector.

Deep Integration, Service Costs Also Removed, MFN+MRA – Same as the above but with removal of standards-related costs on a discriminatory basis through a MRA agreement with the EU.

Results

1. Impacts of Egyptian-EU Trade Agreement:

	Shallow Integration	Deep Integration, Service Costs Fixed, MFN Only	Deep Integration, Service Costs Fixed, MFN+MRA	Deep Integration, Service Costs Also Removed, MFN only	Deep Integration, Service Costs Also Removed, MFN+MRA
<i>Macroeconomic Variables (% change)</i>					
Welfare (EV)	-0.138	4.151	5.626	13.457	20.637
Exchange Rate	1.222	3.425	3.422	4.137	-11.852
Trade Creation (US\$ bn)	0.095	0.126	0.166	0.136	0.490
Trade Diversion US\$bn	0.123	0.100	0.132	0.083	0.045
<i>Export Value Share</i>					
EU	0.306	0.305	0.320	0.156	0.451
US	0.050	0.049	0.047	0.029	0.023
MENA	0.350	0.353	0.358	0.650	0.332
<i>Import Value Share</i>					
EU	0.542	0.544	0.589	0.537	0.575
US	0.149	0.150	0.137	0.154	0.145
MENA	0.032	0.032	0.028	0.032	0.029
<i>Export Value (Change in US\$ billion)</i>					
EU	0.056	0.083	0.225	0.095	0.372
US	0.011	0.015	0.014	0.048	-0.117
MENA	0.081	0.129	0.238	4.176	-0.201
<i>Import Value (Change in US\$ billion)</i>					
EU	0.933	1.350	1.906	1.536	3.378
US	-0.186	-0.057	-0.118	0.044	0.374
MENA	-0.047	-0.023	-0.044	-0.009	0.043

2. Impacts of Egyptian-EU Trade Agreement with an Arab League FTA

	Shallow Integration	Deep Integration, Service Costs Fixed, MFN Only	Deep Integration, Service Costs Fixed, MFN+MRA	Deep Integration, Service Costs Also Removed, MFN Only	Deep Integration, Service Costs Also Removed, MFN+MRA
Macroeconomic Variables (% change)					
Welfare (EV)	0.781	5.305	7.151	16.705	21.128
Exchange Rate	0.714	2.460	0.541	-3.891	-11.874
Trade Creation (US\$ bn)	0.261	0.455	0.660	0.234	0.477
Trade Diversion (US\$ bn)	0.100	0.057	0.067	0.035	0.046
Export Value Share					
EU	0.254	0.231	0.217	0.185	0.415
US	0.039	0.035	0.029	0.028	0.021
MENA	0.461	0.510	0.557	0.565	0.376
Import Value Share					
EU	0.534	0.539	0.589	0.527	0.565
US	0.146	0.144	0.130	0.151	0.143
MENA	0.048	0.049	0.043	0.052	0.044
Export Value (change in US\$ billion)					
EU	-0.081	-0.133	-0.184	-0.566	0.239
US	-0.020	-0.033	-0.060	-0.096	-0.122
MENA	0.705	1.045	1.310	0.646	-0.045
Import Value (change in US\$ billion)					
EU	1.025	1.611	2.485	2.192	3.340
US	-0.168	-0.021	-0.041	0.243	0.375
MENA	0.087	0.146	0.122	0.240	0.226

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes, with constant returns to scale

Assumes flexible exchange rates? Not mentioned

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates): No values mentioned

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? Yes

Assumes full employment? Yes

Assumes trade balance is zero? Not mentioned

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? 1989/1990 IO table for Egypt

15. Alternative Socioeconomic Development Scenarios for Egypt: Results from an Economy-Wide Simulation Model

Motaz Khorshid, 2003

Abstract

In light of the development priorities of the fifth five-year socioeconomic plan (2002-2007) and the current structural problems facing Egypt, three development scenarios are formulated and tested using a central computable general equilibrium model supported by issue-specific sub-models and inter-period dynamic adjustment relations. The first scenario assumes the continuation of the economic policies and development trends applied during the 1990s (Laisser-Faire Scenario). To overcome the current slowdown in economic activity, the second scenario is designed to enhance economic growth prospects through an increase in investment spending, selection of appropriate demand-management policies, promotion of exports and improvement of total factor efficiency. The last scenario is designed to restore Egypt's external balance via promotion of exports and reduction in demand for imports.

Medium-term projections from the model indicated that the Laisser-Faire Scenario results in a deterioration of economic growth, further structural imbalances, a decline in measures of citizen welfare and higher unemployment. The economic growth scenario is superior to other alternatives with respect to growth targets, welfare measures, labour market behaviour and public sector performance. External balance is, however, superior to other scenarios with respect to trade balance, current account deficit, saving performance and the country's capacity to invest.

The Model

The CGE methodology adopted in this paper differs from standard CGE models in two respects. First, the Egyptian model begins with the construction of a consistent accounting framework and then with the specification of the model's mathematical structure. Second, the Egyptian within-period CGE model is enhanced by more elaborate inter-period dynamic relations and supplemented by a set of issue-specific sub-models. Similar to other static CGE systems, Egypt's model consists of three basic relations: (a) economic identities and balancing

relations, (b) technology choices and decision rules of economic agents and, finally, (c) market clearing mechanisms or closure rules.

The model is subdivided into three inter-period dynamic models and four issue-specific sub-models.

The inter-period relations consist of the following modules: (a) a population and labour force sub-model that determines population growth and the supply of labour; (b) a capital stock adjustment mechanism, as a function of investment spending, depreciation rates, privatization and base year capital stock; and (c) a dynamic adjustment routines for managing Egypt's foreign assets and liabilities as well as determining workers' remittances from abroad. The issue-specific models include: (a) labour market supply, (b) financial flow, (c) government income and expenditure, and (d) a sub-model of alternative financing tools to remedy the public sector resource gap.

The central component of the model's database is an SAM for the base year of the fifth five-year plan (2002-2007), which is supplemented with: (a) accounting figures, such labour supply and demand and capital stock as well as (b) time series data needed to capture dynamics in the model.

Other modelling assumptions include exogenous government spending, fixed nominal wages, input substitutability and Armington elasticity among imports and domestic goods.

Scenarios

- *Laisser-faire* – Assumes continuation and relative stability of the economic policies and development trends applied during the 1990s. This is the baseline scenario.
- *Economic growth* – Simulates predicted economic growth through considerable increases in investment expenditures, appropriate selection of demand management policies in addition to promotion of exports and enhancement of total factor efficiency. Other than economic growth, this second alternative aims at achieving improved living standards (through higher per capita income) and improved employment performance.
- *External balance* – Directed mainly to restoring the external balance and eliminating the current balance of payments deficit as the primary development priority. This objective can be obtained through promotion of exports, reduction in demand for imports and increasing net financial transfers from abroad.

Results

Indicator (Real Term- LE million)	Base Year 2001/02	Target Year 2006/2007					
		“Laisser-Faire” Scenario		Economic Growth Scenario		External Balance Scenario	
		Value of Indicator	Percent to total income (%)	Value of Indicator	Percent to total income (%)	Value of Indicator	Percent to total income (%)
GDP at factor cost	363.14	405.67	2.2	489.23	6.1	447.79	4.3
Final Consumption	347.14	393.59	2.5	474.43	6.4	422.16	4.0
Exports	62.60	68.53	1.8	97.47	9.3	89.14	7.3
Imports	87.80	106.60	4.0	154.33	11.9	124.5	7.2
Commodity Trade Balance	-25.2	-34.69	6.6	-20.68	-3.9	-9.471	-17.8
Current account Surplus	-7.039	-15.62	17.3	-4.174	-9.9	8.48	-203.8
Real per capita GDP	5873	5970	0.3	7168	4.0	6570	2.3

Q&A

Dynamic or static model? *Within-period* static with *inter-period* dynamic part

Assumes perfect competition? Yes

Assumes flexible exchange rates? No

Numerical values of calibrated Armington parameters: see Taylor (1990)

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? see Taylor (1990)

Assumes full employment? No

Assumes trade balance is zero? Yes

Assumes diagonal input-output matrix?

Uses IO matrix of country under study or imported IO matrix? 2002-2007 supplemented Egyptian SAM and non-SAM framework

Source: Taylor, L. (Ed.). (1990). *Socially relevant policy analysis: Structuralist CGE models for the developing world*. Cambridge: MIT Press.

16. Beyond Border Barriers: The Liberalization of Services Trade in Tunisia and Egypt

Denise Eby Konan and Karl E. Kim, 2004

Abstract

Tunisia and Egypt have both recently undertaken significant steps toward trade reform. They have committed to a partnership agreement with the European Union. Both countries have also joined the WTO and are participating in Doha Round discussions on the liberalization of non-tariff barriers on both goods and services trade. These developments provide an interesting context within which to investigate not only the changes in welfare associated with reforms affecting trade in goods, but also the impacts of services liberalization. Using open-economy computable general equilibrium models for both Tunisia and Egypt, this paper explores the reasons why structural differences in these two economies imply different opportunities and challenges in these two areas. Application of the model indicates that gains from eliminating barriers at the border for goods trade are significantly greater for Tunisia than for Egypt. Both countries, however, gain substantially from liberalization of foreign direct investment in services. Furthermore, economic growth is more evenly distributed across sectors when elimination of barriers in trade in goods is combined with than with liberalization. In addition to reporting on the impact of alternative policies on income, output, employment and trade, sector-level effects are also considered.

The Model

The paper employs a standard CGE model of a small open economy. Countries are assumed to be small price-taking economies. Production is characterized by constant returns to scale and perfect competition, implying that prices equal marginal costs of output. In all sectors, production functions are approximated with Leontief technologies using composite intermediate inputs and real value added. A constant elasticity of substitution (CES) production function describes the substitutability between labour and capital inputs in producing real value added.

Intermediate inputs and final goods are differentiated by country of origin according to the Armington assumption, so that export and import prices differ across regions.

In each sector, demand for domestically produced and imported goods is represented by a CES function; intermediate imports are also differentiated across regional source of supply in a CES structure.

Capital and labour are assumed to be freely mobile across sectors, implying that our simulations pertain to the long-run outcomes of liberalization.

A representative consumer maximizes a nested CES utility function with a corresponding multi-staged budget constraint. Income elasticities across sectors are set at unity as given by a Cobb-Douglas utility nest.

Scenarios

Goods Liberalization – EU: Involves preferential goods trade liberalization under the Euro Med Agreement. Tariffs on imports of goods from the EU are eliminated and terms of trade on exports to the EU improve.

Goods Liberalization – MFN: Involves the removal of all goods tariffs on either a non-discriminatory or most-favoured nation (MFN) basis.

Services Liberalization – Border: Involves removal of cross-border barriers in services trade.

Services Liberalization – Investment: Involves elimination of internal barriers to foreign investment in service sectors.

Services Liberalization – Joint: Considers combined effects of border and investment liberalization.

Combined – G&S: Involves joint liberalization of goods and services barriers.

Results

Trade Liberalization in Tunisia						
	<i>Goods Liberalization</i>		<i>Services Liberalization</i>			<i>Combined</i>
% Change	<i>EU</i>	<i>MFN</i>	<i>Border</i>	<i>Investment</i>	<i>Joint</i>	<i>G&S</i>
Macro Indicators						
Household welfare (EV)	3.80	4.27	1.05	3.60	4.85	8.32
Output, real	6.12	6.91	0.86	4.80	5.84	13.17
Returns to capital, real	1.29	1.80	1.24	6.89	8.06	12.94
Returns to labour, real	10.77	11.73	0.60	3.46	4.48	14.29

Trade Liberalization in Egypt						
	<i>Goods Liberalization</i>		<i>Services Liberalization</i>			<i>Combined</i>
% Change	<i>EU</i>	<i>MFN</i>	<i>Border</i>	<i>Investment</i>	<i>Joint</i>	<i>G&S</i>
Macro Indicators						
Household welfare (EV)	-0.16	0.46	0.78	6.90	7.66	8.35
Output, real	0.35	0.82	1.07	11.85	12.91	14.79
Returns to capital, real	0.18	0.76	0.76	10.73	11.45	12.77
Returns to labour, real	1.66	2.81	0.66	9.48	10.11	14.41

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes

Assumes flexible exchange rates? Not mentioned

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates): Numerical values not mentioned.

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? Yes

Assumes full employment? Not mentioned

Assumes trade balance is zero? Yes

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? Country

17. A Computable General Equilibrium Analysis of Egyptian Trade Liberalization Scenarios

Denise Eby Konan and Keith E. Maskus, 1997

Abstract

This paper reports results from simulation of a computable general-equilibrium (CGE) model of the Egyptian economy. The model's primary purpose was to provide a basis for studying the intersectoral allocative effects of trade policy reforms, along with the associated changes in economic welfare. The model is referred to as the Egyptian CGE-TL model (for "CGE-trade Liberalization"). The paper's main findings are that significant welfare gains appear to be available from reducing or eliminating NTB administrative costs on trade (such as licensing fees, inspection delays, monopoly port charges, and difficulties due to inadequate transport facilities). Such trade and tariff reform could combine to raise Egyptian welfare by as much as 2.2% of GDP. The extent of such gains depends on the tax instrument used to replace lost tariff revenues.

Another finding is that sectoral impacts of trade liberalization tend to favour output and employment expansion in service relative to manufacturing sectors. However, reductions of NTB trade costs expand trade, output, and employment in the merchandise industries.

The Model

The paper's CGE approach models Egypt as a small open economy (SOE) in which production and household decisions derive from a neoclassical optimization representation. The model assumes that differentiated goods are produced in Egypt and in all regions of the world. Egyptian export prices and import prices thus differ across regions. We treat the government as operating under a fixed government deficit wherein any change in tariff collection is compensated by a domestic tax change that makes trade policy revenue neutral. For each trade scenario analyzed, we estimate the required increase in one of three taxes (sales, corporate and lump-sum) to make up tariff revenue losses.

The model does not explore impacts of liberalization on the nominal exchange rate, balance of payments, or monetary policy and conditions. However, the real exchange rates do adjust to maintain the benchmark-year current-account position.

Production exhibits constant returns to scale and firms operate in a perfectly competitive environment so that prices equal the marginal costs of output. Final outputs are produced according to a Leontief function with the use of intermediate inputs and real value added. A constant elasticity of substitution (CES) production function describes the substitutability between labour and capital inputs into the real value-added nest. Intermediate inputs, as well as final goods, are differentiated by country of origin according to the Armington assumption. The consumer maximizes a nested CES utility function, with a corresponding multi-staged budget constraint. We assume that income elasticities across sectors are unity as given by a Cobb-Douglas (CD) utility nest. The consumer determines domestic and aggregate import expenditures in each sector according to a CES function.

The data for the model consist of a Social Accounting Matrix (SAM); the 1989/1990 Input-Output table for Egypt is used. In the model there are 38 sectors producing outputs, each using production and non-production labour, capital, and intermediate inputs. The sectors include 3 in agriculture, 2 in mining and quarrying, 21 in manufacturing, and 12 in services.

Scenarios

- **TRDREF** - Involves removing the various NTB costs. In the model, this is equivalent to a 5% cut in tariffs on merchandise imports, a 10% cut in export taxes and a 15% cut in restrictions on international services transactions.
- **TARREF** - A unilateral tariff reform by Egypt, setting a uniform tariff rate of 10% on all merchandise imports though retention of existing tariffs on beverage imports.
- **EUPA** - A situation in which Egypt eliminates all tariffs on EU products. The EU responds by liberalizing access to domestic markets, which provides an 8% price increase for Egyptian agricultural, clothing, and textile exports to the EU and a one-percent increase in all other Egyptian export prices in the EU.
- **FTAREF** - Involves a major expansion of the EU partnership agreement. It includes reciprocal liberalization by Egypt on the one hand and the EU, the United States, and MENA on the other. Here we raise all Egyptian export prices to the United States and MENA by 1%, along with those to the EU. At the same time, we simulate a tariff reform in which Egypt imposes a common 10% tariff on all merchandise imports from the ROW.
- **LIBALL** - Involves unilateral tariff elimination by Egypt against all trading partners. Here, however, no increase in export prices is simulated. This case is therefore meant to capture Egypt's unilateral movement toward free trade, with no reciprocal trade concessions from abroad.

Results

1. Impacts of trade liberalization without prior trade reform:

	TARREF	EUPA	FTAREF	LIBALL
	Consumption Tax Replacement			
WELFARE	0.287	0.206	0.696	1.084
ERATE	-0.970	-0.570	-0.805	-0.628
PLWAGE	-0.521	-0.299	-0.282	-0.045
NLWAGE	-0.088	0.286	0.635	1.145
KPRICE	-0.029	0.004	0.234	0.494
XQUAN	1.854	15.949	14.051	14.195
MQUAN	1.383	6.030	7.740	10.588
	Capital Tax Replacement			
WELFARE	0.226	-0.058	0.353	0.637
ERATE	0.037	2.45	3.008	4.276
PLWAGE	0.31	2.041	2.671	3.736
NLWAGE	0.697	2.55	3.491	4.799
KPRICE	-0.394	-2.556	-2.992	-3.617
XQUAN	0.846	12.851	10.423	9.609
MQUAN	0.636	4.006	5.162	7.224
	Lump-Sum Replacement			
WELFARE	0.371	0.408	0.949	1.407
ERATE	-0.398	1.086	1.277	2.035
PLWAGE	0.127	1.55	2.045	2.928
NLWAGE	0.522	2.053	2.866	4.007
KPRICE	0.526	1.584	2.228	3.046
XQUAN	1.868	16.23	14.422	14.679
MQUAN	1.393	6.228	8.002	10.94

2. Impacts of trade liberalization with prior trade reform:

	TRDREF	TARREF	EUPA	FTAREF	LIBALL
	Consumption Tax Replacement				
WELFARE	1.932	2.155	1.767	2.196	2.445
ERATE	-6.339	-7.248	-6.971	-7.169	-7.006
PLWAGE	5.177	4.669	4.845	4.937	5.201
NLWAGE	6.056	5.934	6.496	6.899	7.506
KPRICE	5.917	5.835	5.883	6.124	6.434
XQUAN	29.801	31.663	48.262	46.742	46.739
MQUAN	22.229	23.618	29.501	31.411	34.863
	Capital Tax Replacement				
WELFARE	1.785	2.011	1.485	1.874	2.07
ERATE	-6.865	-6.857	-4.536	-3.993	-2.757
PLWAGE	4.541	4.942	6.917	7.696	8.929
NLWAGE	5.519	6.228	8.545	9.604	11.152
KPRICE	6.066	5.132	3.447	3.045	2.485
XQUAN	29.957	30.613	44.622	42.512	41.366
MQUAN	22.523	23.016	27.307	28.58	31.1
	Lump-Sum Replacement				
WELFARE	1.907	2.221	1.949	2.428	2.746
ERATE	-6.701	-7.07	-5.653	-5.437	-4.678
PLWAGE	4.743	4.917	6.506	7.117	8.122
NLWAGE	5.659	6.173	8.108	9.016	10.351
KPRICE	5.504	6.016	7.299	7.999	8.965
XQUAN	29.801	31.632	48.576	47.165	47.301
MQUAN	22.211	23.576	29.709	31.69	35.254

Variables:

1. **WELFARE** = percentage change in welfare (equivalent variation as a percentage of 1994 benchmark GDP).

2. **ERATE** = percentage change in the real exchange rate.

3. **PLWAGE** = percentage change in the real wage of production workers.

4. **NLWAGE** = percentage change in the real wage of non-production workers.

5. **KPRICE** = percentage change in the real rental rate on mobile capital.

6. **XQUAN** = percentage change in the aggregate quantity of exports.

7. **MQUAN** = percentage change in the aggregate quantity of imports.

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes with constant returns to scale

Assumes flexible exchange rates? No

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates):

substitution elasticity between domestic and imported consumption: 2.0

substitution elasticity between regional imports: 5.0

transformation elasticity between domestic and exported output: 5.0

transformation elasticity between regional exports: 8.0

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? Yes

Assumes full employment? Yes

Assumes trade balance is zero? Yes

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? 1989/1990 IO table for Egypt

18. Joint Trade Liberalization and Tax Reform in a Small Open Economy: The Case of Egypt

Denise Eby Konan and Keith E. Maskus, 2000

Abstract

The authors developed a CGE model of the Egyptian economy to analyze the impact of various trade liberalization scenarios while allowing distortionary domestic taxes to vary endogenously in order to satisfy a fixed real government revenue target. Computed welfare gains were decomposed into effects from tax reform, trade reform, and their interaction. Scenarios included removal or unification of the consumption tax and capital tax, individually and both, as well as tariff unification, a free-trade agreement with the European Union and unilateral tariff elimination. Welfare effects were found to depend critically on the type of revenue replacement tax imposed. While both were important, neither trade-policy reform nor tax reform dominated.

The Model

The model used in the paper is based on the Konan and Maskus (1996) model. Egypt is modelled as a small open economy (SOE) that trades differentiated goods and services with multiple regions. On the supply side, production exhibits constant returns to scale and firms operate in a perfectly competitive environment. Each sector has a constant CES aggregator of production labour and non-production labour. In turn, value added is produced with a CES function of aggregated labour and capital. Imported intermediate inputs of each commodity are aggregated into a CES composite import, allowing substitution across regional sources of supply of imports, according to the Armington (1969) assumption. Intermediate use of each good is a CES composite of domestic and imported sources of supply. Final output is produced as a Leontief function found between value added and intermediates. Output is divided between domestic and foreign sales by a CET specification, while the allocation of exports across destination regions depends on an Armington CET.

On the demand side, a single household represents domestic consumers. The consumer seeks to maximize utility as characterized by a nested CES function with a multi-staged budget process. In the first stage, the consumer decides how much to spend on goods from each sector in a Cobb–Douglas utility nest. In the second CES stage, the consumer determines domestic and import expenditures in each sector. Finally, given a budget for imports, the

consumer selects purchases from each region in an Armington CES nest. The representative consumer receives income from primary factors, net government transfers and current-account deficits.

Agents optimize in a single time period. The equilibrium solutions are inherently static as decision-making is not based on a model of intertemporal optimization. Capital stock is assumed to be exogenously fixed at the benchmark level. The interest rate is endogenous and determined by factor demand.

The current-account imbalance is fixed at its benchmark level throughout the simulations. Foreign currencies are scaled so that the appropriate GDP deflator is 1.0. Because Egypt's current account is in deficit, it represents an addition to the agent's income through exogenous capital inflows. Exports and imports of merchandise and services by region are endogenous. The real exchange rate is the shadow price of foreign exchange required to maintain a constant imbalance in the current account.

The government budget constraint incorporates tariffs and taxes on capital use and commodity consumption. The government budget deficit is held fixed during our simulations, which assumes that the government chooses to consume an unchanged bundle of goods and services throughout all scenarios. There are three tax instruments: a government sales tax (GST), which varies across goods in the economy; a tax on capital (K tax), defined as operating surplus plus depreciation; and a lump-sum replacement tax (LS tax), which is implicit in the calculation of the fixed deficit.

The model is completed by incorporating equations for product-market clearance, factor-market clearance, zero-profit conditions, a series of price relationships incorporating tariffs and taxes and a condition ensuring a balance in the aggregate value of sectoral output supplies.

Scenarios

- **Tariff unification** - Tariff rates are unified at 10% across all imports.
- **FTA with EU** - A free-trade agreement (FTA) with the European Union. Egypt eliminates all tariffs on EU imports while maintaining existing tariffs against other countries' goods at current levels. The EU responds by providing Egyptian exporters additional access to domestic markets, sufficient to procure an 8% increase in the prices of Egyptian agricultural goods, textiles and apparel in the EU, together with a 1% rise in prices of all other Egyptian goods there.

- *Unilateral liberalization* - Full unilateral tariff elimination regarding all of Egypt's trading partners, without stimulating any export price rises.

Results

Economic effects of trade policy reform (% changes in E£ billions, excluding LS tax):

	A	B	C
	<i>Tariff unification</i>		
Welfare	0.49	0.66	0.35
E rate	0.94	-1.55	-0.43
PL wage	1.74	-0.19	0.22
K price	2.02	4.23	0.72
	<i>FTA with EU</i>		
Welfare	0.31	0.32	0.29
E Rate	0.84	0.60	0.71
PL Wage	2.83	2.62	2.67
K Price	2.30	2.52	2.18
	<i>Unilateral liberalization</i>		
Welfare	0.78	0.68	0.89
E rate	1.11	2.91	2.09
PL wage	2.14	3.55	3.23
K price	2.85	1.30	3.80

A: Maintain distorted taxes, replace revenues with GST.

B: Maintain distorted taxes, replace revenues with K tax.

C: Maintain distorted taxes, replace revenues with LS tax.

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes with constant returns to scale

Assumes flexible exchange rates? Yes

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates):

substitution elasticity between domestic and imported consumption: 2.0

substitution elasticity between regional imports: 5.0

transformation elasticity between regional exports: 8.0

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? Yes

Assumes full employment? Yes

Assumes trade balance is zero? Not mentioned

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? 1989/1990 IO table for Egypt

19. The Fiscal Impact of Trade Liberalization: The Case of Jordan and Syria

Bernd Lucke and Dorothea Lucke, 2001

Fiscal Impact of Trade Liberalization: The Case of Jordan

Dorothea Lucke, Bernd Lucke and Anbara Abu-Ayyash, 2001

Abstract

The Association Agreement between the European Union (EU) and Jordan was signed on November 24, 1997. It includes provisions on political and security issues, specifies an economic and financial partnership as well as a partnership in social and human affairs. Our research project only treats the trade provisions between the EU and Jordan.

Regarding industrial products, the Agreement specifies that exports to the EU originating in Jordan shall be allowed to enter free of customs duties. Imports to Jordan originating in the EU shall – with a few exceptions – be allowed free of customs duties after a 12-year transition period. As Jordanian industrial exports could already enter the EU free of customs restrictions by virtue of the General Cooperation Agreement signed between the EC and Jordan in 1977 and 1979, these new provisions hardly change the status of Jordanian exports. On the other hand, the implications for imports to Jordan may be significant.

As to agricultural products, the Agreement introduces regulations on Jordanian exports to the EU regarding duties, quotas and timetables. However, no concessions were made by Jordan regarding the import of agricultural commodities originating in the EU.

Part I of this research project aims at quantifying the effects of the Association Agreement between the EU and Jordan on Jordan's economy, especially on the government budget. In the first three sections, it describes the Jordanian economy, starting with its structure in Section 1. Section 2 provides detailed information on Jordan's external trade. In Section 3, Jordan's indirect tax system is described. These features of the Jordanian economy are then introduced into a computable general equilibrium (CGE) model, described in nonmathematical form in Section 4 and in analytical form in Section 5. In Section 6, the database used in simulations formatted as a social accounting matrix for the year 1998 is presented. Section 7 transmits and explains the simulation results. In Part II, fiscal budget

modifications that could help overcome the loss of tariff revenues in the course of trade liberalization are discussed.

The Model

The CGE model originated in the idea that the Walrasian general equilibrium structure should be used to depict an actual economy. The Jordanian economy is therefore aggregated into 13 sectors and sub-sectors, including agriculture, mining and quarrying, manufacturing, water and electricity, construction, trade and services, and government services, among others. Major trading partners distinguished in this paper are the MENA region, the EU (15), and the Rest of the World (ROW).

The theoretical model for Jordan is very much in the spirit of the Dervis et al. (1982) models. Real net value added at factor cost is produced under constant elasticity of substitution (CES) production functions with labour and capital inputs. Outputs are distinguished between traded and non-traded. For each traded commodity aggregate, a composite commodity – the so-called Armington good which is produced using intermediate inputs into domestic supply and imports in a CES production function. For model trade diversion, assume that for a given import value, Jordan minimizes the costs of imports over trading partners under a CES technology. The treatment of exports is similar.

Households are modelled as paying income taxes. The capital market is modelled as an institution with revenues (supply) and expenditures (demand). Nominal government consumption and investment are assumed to be constant fractions of government revenues. Calibration of the relevant parameters is achieved mainly by means of the 1998 Social Accounting Matrix. This matrix uses 1998 national accounts, foreign trade and government budget data, provided by various Jordanian authorities (Department of Statistics, Ministry of Finance, Customs Department) and the 1987 input-output table, the most recent available.

Scenarios

- Scenario SC 0: The benchmark equilibrium
- Scenario SC 1: 50% decrease in import duties on agricultural products imported from the EU.
- Scenario SC 2: 100% decrease in import duties on agricultural products imported from the EU.
- Scenario SC 3: 100% decrease in import duties on non-agricultural products imported from the EU.
- Scenario SC 4: Scenario 1 + Scenario 3.

- Scenario SC 5: Scenario 2 + Scenario 3.
- Scenario SC 6: Scenario 5 + zero duties on all imports from other MENA countries.
- Scenario SC 7: Scenario 6 + zero duties on all imports from the ROW.

Results

Table 1

Effects of Trade Liberalization on Main Aggregates, Variables in Volume								
Percentage Deviations from Benchmark brackets								
	SC 0	SC 1	SC 2	SC 3	SC 4	SC 5	SC 6	SC 7
Net Domestic Product at factor costs	3811.9	3811.9	3811.9	3811.9	3811.9	3811.9	3811.9	3811.9
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Real GDP at market prices	5180.0	5180.9	5180.4	5171.2	5171.6	5170.9	5168.1	5170.6
		(0.02)	(0.01)	(-0.17)	(-0.16)	(-0.17)	(-0.23)	(-0.18)
Private Consumption	3689.5	3702.4	3718.4	3843.6	3856.6	3872.9	3953.4	4172.6
		(0.35)	(0.78)	(4.18)	(4.53)	(4.97)	(7.15)	(13.09)
Public Consumption	1365.0	1362.7	1359.2	1299.5	1297.0	1293.2	1265.3	1187.9
		(-0.17)	(-0.43)	(-4.80)	(-4.98)	(-5.26)	(-7.31)	(-12.9)
Private Investment	895.0	895.2	895.5	912.1	912.3	912.6	918.8	938.9
		(0.03)	(0.06)	(1.91)	(1.94)	(1.97)	(2.67)	(4.91)
Public Investment	287.9	287.4	286.6	279.6	279.1	278.2	273.3	263.0
		(-0.18)	(-0.46)	(-2.87)	(-3.07)	(-3.37)	(-5.08)	(-8.65)
Imports	3608.7	3618.0	3630.5	3750.3	3759.7	3772.5	3843.8	4023.6
		(0.26)	(0.60)	(3.92)	(4.18)	(4.54)	(6.51)	(11.50)
Exports	2515.7	2515.3	2515.0	2549.5	2548.9	2548.7	2563.0	2590.7
		(-0.02)	(-0.03)	(1.34)	(1.32)	(1.31)	(1.88)	(2.98)
Trade Balance	-1093.0	-1102.8	-1115.5	-1200.8	-1210.8	-1223.8	-1280.8	-1432.9
		(0.90)	(2.06)	(9.86)	(10.78)	(11.97)	(17.19)	(31.10)

Table 2

Effects of Trade Liberalization on Main Aggregates, Variables in Value								
Percentage Deviations from Benchmark brackets								
	SC 0	SC 1	SC 2	SC 3	SC 4	SC 5	SC 6	SC 7
Net Domestic Product at factor costs	3811.9	3816.5	3821.9	3886.6	3891.4	3896.9	3934.4	4041.1
		(0.12)	(0.26)	(1.96)	(2.08)	(2.23)	(3.21)	(6.01)
Real GDP at market prices	5180.0	5181.1	5180.7	5132.5	5133.2	5132.6	5121.9	5087.7
		(0.02)	(0.01)	(-0.92)	(-0.90)	(-0.92)	(-1.12)	(-1.78)
Private Consumption	3689.5	3702.4	3718.4	3843.6	3856.6	3872.9	3953.4	4172.6
		(0.35)	(0.78)	(4.18)	(4.53)	(4.97)	(7.15)	(13.09)
Public Consumption	1365.0	1362.8	1359.1	1292.1	1289.6	1285.8	1256.4	1176.0
		(-0.16)	(-0.43)	(-5.34)	(-5.52)	(-5.80)	(-7.95)	(-13.8)
Private Investment	895.0	895.4	895.8	888.9	889.2	889.7	891.1	885.5
		(0.04)	(0.09)	(-0.68)	(-0.64)	(-0.59)	(-0.43)	(-1.05)
Public Investment	287.9	287.4	286.7	272.5	272.0	271.2	265.0	248.0
		(-0.16)	(-0.43)	(-5.34)	(-5.52)	(-5.80)	(-7.95)	(-13.8)
Imports	3608.7	3618.0	3630.5	3750.3	3759.7	3772.5	3843.8	4023.6
		(0.26)	(0.60)	(3.92)	(4.18)	(4.54)	(6.51)	(11.50)
Exports	2515.7	2515.3	2515.0	2549.5	2548.9	2548.7	2563.0	2590.7
		(-0.02)	(-0.03)	(1.34)	(1.32)	(1.31)	(1.88)	(2.98)
Trade Balance	-1093.0	-1102.8	-1115.5	-1200.8	-1210.8	-1223.8	-1280.8	-1432.9
		(0.90)	(2.06)	(9.86)	(10.78)	(11.97)	(17.19)	(31.10)

Table 3

Effects of Trade Liberalization on Government Budget and Capital Accumulation, Variables in Value								
Percentage Deviations from Benchmark brackets								
	SC 0	SC 1	SC 2	SC 3	SC 4	SC 5	SC 6	SC 7
Tariff Revenue	294.3	289.8	283.3	184.3	179.7	172.9	127.3	0.0
		(-1.52)	(-3.73)	(-37.38)	(-38.95)	(-41.24)	(-56.75)	(-100.0)
Sales tax domest.	285.8	286.0	286.3	284.6	284.8	285.1	284.2	284.2
		(0.08)	(0.19)	(-0.42)	(-0.34)	(-0.24)	(-0.56)	(-0.57)
Sales tax imports	192.2	192.4	192.7	193.8	194.0	194.3	195.6	198.1
		(0.12)	(0.28)	(0.81)	(0.93)	(1.09)	(1.74)	(3.09)
Ind.taxes total	772.3	768.3	762.4	662.7	658.5	652.3	607.0	482.3
		(-0.52)	(-1.28)	(-14.20)	(-14.74)	(-15.53)	(-21.40)	(-37.55)
Direct taxes	135.2	135.4	135.8	139.9	140.1	140.5	142.7	148.9
		(0.20)	(0.45)	(3.49)	(3.70)	(3.95)	(5.58)	(10.18)
All taxes	907.5	903.7	898.2	802.5	798.6	792.8	749.7	631.2
		(-0.41)	(-1.02)	(-11.56)	(-11.99)	(-12.63)	(-17.38)	(-30.44)
Govern. Revenue	1699.5	1696.7	1692.1	1608.8	1605.7	1600.9	1564.3	1464.2
		(-0.17)	(-0.44)	(-5.35)	(-5.53)	(-5.81)	(-7.96)	(-13.86)
Govern. Deficit	310.6	310.7	310.8	313.1	313.2	313.3	314.3	317.1
		(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Househ. savings	526.9	527.6	528.5	536.9	537.7	538.5	543.9	558.9
		(0.15)	(0.31)	(1.91)	(2.05)	(2.21)	(3.24)	(6.07)
Current account	-52.2	-62.6	-76.2	-171.9	-182.6	-196.4	-259.0	-426.7
		(20.10)	(46.11)	(229.53)	(250.06)	(276.59)	(396.63)	(717.98)

Table 4

Trade Diversion of Jordanian Imports									
Percentage Changes of Imports in Scenario SC 1									
	Agricult.	Mining	Food	Textiles	Wood	Chem.	Rubber	Metals	Other
MENA	-2.74	0.17	-0.05	0.23	0.09	0.05	0.08	0.01	0.09
EU15	19.60	0.17	-0.05	0.23	0.09	0.05	0.08	0.01	0.09
ROW	-2.74	0.17	-0.05	0.23	0.09	0.05	0.08	0.01	0.09
Percentage Changes of Imports in Scenario SC 2									
MENA	-5.95	0.37	-0.09	0.52	0.20	0.11	0.16	0.02	0.18
EU15	44.42	0.37	-0.09	0.52	0.20	0.11	0.16	0.02	0.18
ROW	-5.95	0.37	-0.09	0.52	0.20	0.11	0.16	0.02	0.18
Percentage Changes of Imports in Scenario SC 3									
MENA	1.89	-1.64	-7.38	-7.35	-8.07	-7.70	-9.00	-9.16	-12.9
EU15	1.89	56.66	46.56	39.44	22.66	13.63	29.75	33.48	20.93
ROW	1.89	-1.64	-7.38	-7.35	-8.07	-7.70	-9.00	-9.16	-12.9
Percentage Changes of Imports in Scenario SC 4									
MENA	-0.91	-1.47	-7.42	-7.14	-7.98	-7.66	-8.94	-9.15	-12.8
EU15	21.86	56.93	46.49	39.76	22.77	13.69	29.85	33.49	21.03
ROW	-0.91	-1.47	-7.42	-7.14	-7.98	-7.66	-8.94	-9.15	-12.8
Percentage Changes of Imports in Scenario SC 5									
MENA	-4.18	-1.27	-7.47	-6.88	-7.89	-7.60	-8.86	-9.15	-12.7
EU15	47.15	57.24	46.42	40.16	22.90	13.76	29.95	33.50	21.15
ROW	-4.18	-1.27	-7.47	-6.88	-7.89	-7.60	-8.86	-9.15	-12.7
Percentage Changes of Imports in Scenario SC 6									
MENA	30.55	2.78	58.14	40.67	33.83	12.00	5.13	19.21	33.26
EU15	41.81	40.13	40.27	32.68	20.17	11.20	25.63	27.83	20.80
ROW	-7.65	-12.02	-11.3	-11.85	-9.93	-9.68	-11.90	-13.01	-12.9

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes

Assumes flexible exchange rates? No

Numerical values of calibrated Armington parameters (robust under sensitivity analysis of values 1 to 5) –

Elasticity of transformation between domestic and exported goods: 1.5;

Elasticity of transformation between exports to the different regions: 3;

Elasticity of substitution: 3.

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour?

Assumes full employment? Yes

Assumes trade balance is zero? No

Assumes diagonal input-output matrix?

Uses IO matrix of country under study or imported IO matrix? 1998 Jordanian SAM

Dervis, Kemal et al. 1982. *General equilibrium models for development policy*, Cambridge: Cambridge University Press.

Fiscal Impact of Trade Liberalization: The Case of Syria

Bernd Lucke, Mamdouh Alkhatib Alkswani, Dorothea Lucke, Ferdinand Pavel and Anbara Abu-Ayyash, 2001

Abstract

The paper presents a comprehensive study of the Syrian economy in the context of the ever enlarging trade ties with the EU. It describes Syrian trade flows by product groups, origin and destination. In employing the CGE model of the Syrian economy, the work analyzes the impact of 11 trade liberalization scenarios, using macroeconomic indicators such as welfare, investment and consumption, imports and exports, among others. As expected, trade liberalization is likely to stimulate the economy. Following losses in public sector revenues from eliminated taxes and tariffs, fiscal reforms are strongly suggested.

The model

The Syrian economy is decomposed into 11 activities. Real net value added at factor cost is produced under constant elasticity of substitution (CES) productions functions, where agriculture uses three inputs (land, labour, capital), while all other activities use only labour and capital.

Assuming competitive factor markets, profit maximization implies the equality between nominal factor prices and marginal products. The specification allows for heterogeneous rates of return to capital across sectors, which appears to be appropriate given the observed heterogeneity of gross rates of return.

To model trade diversion, we assume that for a given import volume of a commodity group, Syria minimizes the costs of imports over trading partners under a CES technology. Trade partners include the Arab countries, the European Union (EU15), members of the former Soviet Union, the US, Argentina, Brazil and Chile (ABC), Turkey, Japan and the rest of the world (ROW).

Exports, as another component of aggregate demand, are modelled completely analogous to imports, that is, for a given level of real gross output per sector, producers maximize value subject to a constant elasticity of transformation (CET) between sales on the domestic market and exports. Nominal household income consists of disposable factor incomes plus exogenous transfers from the government and abroad. The capital market is modelled as an institution with revenues (supply) and expenditures (demand). The specification of government finances is standard.

The multiple exchange rate system obtains revenues from the surrender requirement for 25% of private non-agricultural exports in addition to a customs tariff equivalent, caused by forcing importers of goods on the "export proceeds payments list" to purchase foreign exchange at a rate higher than the Beirut free market rate.

Calibration of the relevant parameters is achieved mainly by using the 1999 Social Accounting Matrix. This matrix uses national accounts, foreign trade and government budget data provided by various Syrian authorities (Central Bureau of Statistics, 1999, 2000) and the IMF (1999a, 1999b). In addition, data on labour input and capital stocks, partially constructed from available net investment series, are used to calibrate rates of return to capital. It is important to note that only technical (Leontief) coefficients have been borrowed from the Jordanian table.

Scenarios

- Scenario L1: 50% decrease in duties on agricultural products imported from the EU.
- Scenario L2: Zero duties on agricultural products imported from the EU.
- Scenario L3: Zero duties on non-agricultural products imported from the EU.
- Scenario L4: Scenario L1 + Scenario L3.
- Scenario L5: Zero duties on products imported from the EU.
- Scenario L6: Zero duties on products imported from the EU, Arab countries and Turkey.
- Scenario L7: Zero duties on all imports.
- Scenario L8: Zero duties on all imports³ and abolition of MERS.
- Scenario L9: Zero duties on non-agricultural EU-products and abolition of MERS.
- Scenario L10: Zero duties on all products imported from the EU and abolition of MERS.
- Scenario L11: Zero duties on imports from the EU, Arab countries and Turkey as well as abolition of MERS.

Results

Table 1

Effects of Trade Liberalization on Main Aggregates, Variables in Volume								
	L0	L1	L2	L3	L4	L5	L6	L7
GDP at factor cost	781	781	781	781	781	781	781	781
		0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.02%
GDP at market prices	821	821	821	821	821	821	821	821
		-0.01%	-0.04%	-0.05%	-0.07%	-0.09%	-0.07%	-0.01%
Private Consumption	576	576	577	580	580	581	582	589
		0.05%	0.10%	0.69%	0.74%	0.79%	1.01%	2.21%
Public Consumption	93	93	94	93	93	93	93	93
		0.10%	0.21%	-0.50%	-0.40%	-0.29%	-0.22%	-0.15%
Investment	154	154	154	155	155	155	155	156
		0.07%	0.14%	0.21%	0.28%	0.36%	0.48%	1.08%
Imports	292	293	295	298	298	300	302	314
		0.34%	0.74%	1.74%	2.08%	2.48%	3.41%	7.41%
Exports	291	291	291	292	292	293	294	298
		0.14%	0.29%	0.39%	0.52%	0.68%	1.03%	2.56%
Trade Balance	-1.777	-2.370	-3.094	-5.741	-6.338	-7.068	-8.771	-16.03
		33.4%	74.1%	223%	257%	298%	394%	802%

Table 2

Effects of Trade Liberalization on Main Aggregates, Variables in Value								
	L0	L1	L2	L3	L4	L5	L6	L7
GDP at factor cost	781	781	782	786	786	787	789	798
		0.06%	0.14%	0.65%	0.71%	0.79%	1.01%	2.22%
GDP at market prices	821	821	822	821	821	821	821	822
		0.02%	0.03%	-0.03%	-0.02%	0.00%	0.00%	0.10%
Private Consumption	576	576	577	580	580	581	582	589
		0.05%	0.10%	0.69%	0.74%	0.79%	1.01%	2.21%
Public Consumption	93	94	94	93	93	94	94	94
		0.20%	0.43%	-0.12%	0.09%	0.32%	0.52%	1.11%
Investment	154	155	155	154	154	155	155	156
		0.18%	0.39%	-0.07%	0.11%	0.32%	0.54%	1.12%
Imports	292	294	295	299	300	302	305	321
		0.45%	0.98%	2.30%	2.76%	3.30%	4.47%	9.89%
Exports	291	291	292	293	294	295	297	305
		0.25%	0.53%	0.94%	1.19%	1.48%	2.06%	4.92%
Trade Balance	-1.777	-2.373	-3.101	-5.773	-6.381	-7.124	-8.861	-16.398
		33.5%	41.0%	150%	34.2%	41.8%	97.8%	424%

Table 3

Effects of Trade Liberalization on Government Budget and Capital Accumulation, Variables in Value								
	L0	L1	L2	L3	L4	L5	L6	L7
Tariff revenue	16.090	15.789	15.397	10.525	10.213	9.808	8.183	0
		-1.87%	-4.31%	-34.6%	-36.5%	-39.0%	-49.1%	-100%
Domest. ind. tax	30.622	30.641	30.663	30.874	30.893	30.914	30.863	30.716
		0.06%	0.13%	0.82%	0.89%	0.95%	0.79%	0.31%
Total ind. Taxes	46.712	46.430	46.060	41.399	41.106	40.722	39.045	30.716
		-0.60%	-1.40%	-11.4%	-12.0%	-12.8%	-16.4%	-34.2%
Direct taxes	54.205	54.255	54.312	54.557	54.607	54.665	54.796	55.490
		0.09%	0.20%	0.65%	0.74%	0.85%	1.09%	2.37%
All taxes	100.917	100.686	100.372	95.956	95.713	95.387	93.842	86.206
		-0.23%	-0.54%	-4.92%	-5.16%	-5.48%	-7.01%	-14.6%
Govern. deficit	100.501	101.131	101.898	105.081	105.721	106.498	108.368	116.986
		0.63%	1.39%	4.56%	5.19%	5.97%	7.83%	16.4%
Househ. Savings	40.049	40.083	40.121	40.389	40.423	40.462	40.583	41.215
		0.08%	0.18%	0.85%	0.93%	1.03%	1.33%	2.91%
Current account	-4.371	-4.967	-5.695	8.612	-9.220	-9.962	-11.738	-19.632
		13.6%	30.3%	97.0%	111%	128%	169%	349%

Table 4

Effects of Trade Liberalization on Main Aggregates, Variables in Volume					
	L0	L8	L9	L10	L11
GDP at factor cost	781	780	781	781	781
		-0.04%	-0.03%	-0.04%	-0.03%
GDP at market prices	821	823	822	822	822
		0.17%	0.11%	0.06%	0.09%
Private Consumption	576	588	580	581	582
		2,17%	0,64%	0,80%	1,02%
Public Consumption	93	90	90	90	90
		-3,44%	-3,67%	-3,39%	-3,34%
Investment	154	153	152	152	152
		-0,62%	-1,43%	-1,25%	-1,14%
Imports	292	309	293	296	299
		5,67%	0,12%	1,23%	2,14%
Exports	291	300	294	295	296
		3,28%	1,11%	1,63%	1,98%
Trade Balance	-1.777	-8.816	1.104	-641	-2.287
		396%	-162%	-63.9%	28.7%

Table 5

Effects of Trade Liberalization on Main Aggregates, Variables in Value					
	L0	L8	L9	L10	L11
GDP at factor cost	781	799	787	788	790
		1.56%	-0.01%	0.18%	0.41%
GDP at market prices	821	824	823	823	823
		5.60%	5.44%	5.46%	5.46%
Private Consumption	576	588	580	581	582
		2,17%	0,64%	0,80%	1,02%
Public Consumption	93	92	91	91	91
		-1,89%	-2,98%	-2,56%	-2,39%
Investment	154	154	152	152	153
		-0,42%	-1,54%	-1,15%	-0,94%
Imports	292	323	301	305	308
		10,42%	2,82%	4,32%	5,50%
Exports	291	314	302	304	306
		7,93%	3,83%	4,73%	5,33%
Trade Balance	-1.777	-9.213	1.133	-661	-2.362
		418%	-164%	-63.8%	32.9%

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes

Assumes flexible exchange rates? No

Numerical values of calibrated Armington parameters –

Elasticity of transformation between domestic and exported goods: 0.09

Elasticity of transformation between exports to the different regions: 0.1

Elasticity of substitution and transformation between trading blocks: 3.0

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour?

Assumes full employment? Yes

Assumes trade balance is zero? No

Assumes diagonal input-output matrix?

Uses IO matrix of country under study or imported IO matrix? 1999 Syrian SAM

20. Trade Liberalization with Trade-Induced Technical Change in Morocco and Egypt

Evans, Gasiorek, McDonald and Robinson, 2006

Abstract

Recent years have seen a large increase in the number of bilateral preferential trade agreements, especially between developed and less-developed economies, despite the fact that the predicted welfare gains are limited. Supporters of such agreements often argue that the real benefits of such agreements to lesser-developed economies will arise through trade-induced productivity gains. This study examines this argument in the context of the proposed agreement between Morocco and the EU and between Egypt and the EU, using a global CGE model and econometric estimates of the impact of trade liberalisation on total factor productivity in Morocco and Egypt. The results indicate that trade-induced productivity gains can substantially enhance the benefits accruing to Morocco and Egypt and thus appreciably contribute to reducing poverty. However, the analyses also indicate that trade diversion effects may have a major impact on the results; this conclusion is contrary to much previous evidence.

The Model

The model is a member of the class of Social Accounting Matrix (SAM) based CGE models, calibrated using an SAM representation of the GTAP v6 dataset for 2001. The model 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 a 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 imperfect substitutes for their counterpart domestic commodities. The 'composite' imported commodities and their domestic commodity counterparts 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 a series of nested constant elasticity of transformation (CET) functions; the ‘composite’ export commodities are treated as imperfect substitutes for domestically consumed commodities; 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 domestic commodity counterparts.

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 in order 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 household demand is modelled under the assumption that households are utility maximisers who respond to changes in relative prices in addition to their incomes. The utility function in the model is Cobb-Douglas. Final demand by the government and for investment is modelled under the assumption that the relative quantities of each commodity demanded by these two institutions are fixed. This reflects the absence of a clear theory defining these agents' appropriate behavioural response to changes in relative prices. The model is formulated to allow a wide range of alternative closure rules; the alternatives used in this study are defined when the policy experiments are specified.

Results

The modellers examined seven possible scenarios. In all scenarios, the basic shock was the same – full elimination of bilateral tariffs between the EU and Morocco\Egypt.

Scenario 1: This experiment has a standard neo-classical closure of factor markets without trade-induced technical change.

Scenario 2: This experiment assumes existence of unemployment through a fixed wage for unskilled labour so that the level of employment of unskilled labour can vary with no induced technical change. Given the significant levels of unemployment in the MENA countries in the base year – over 10% – this specification aims to capture an important structural characteristic of both countries. This assumption is retained for the remaining experiments.

Scenarios 3-6: These experiments introduce trade-induced technical change with a range of trade-productivity elasticities. The best estimate elasticity of 0.4 is used in experiment 5,

while experiments 3 and 6 are, respectively, lower- and upper-bound elasticities. Experiment 4 is an intermediate elasticity.

Scenario 7: This introduced a stylised representation of deep integration through increases in the import and export elasticities between the EU and Morocco and Egypt.

Results for Morocco

	Sc1	Sc2	Sc3	Sc4	Sc5	Sc6	Sc7
GDP change (%)	-0.54	1.05	1.34	2.61	3.45	4.79	4.18
Real ex rate (%)	3.91	3.73	3.66	3.12	-0.21	1.99	1.6
Av. tariff reduction	26.05	26.05	26.05	26.05	26.05	26.05	26.05
Semi-elasticity	-0.021	0.0403	0.0514	0.1002	0.1324	0.1839	0.1605
Exports	11.90	14.01	14.36	16.41	18.93	23.81	24.13
Imports	11.42	13.33	13.64	15.48	17.8	22.27	22.74

Results for Egypt

	Sc1	Sc2	Sc3	Sc4	Sc5	Sc6	Sc7
GDP change (%)	-0.2	-0.94	-0.74	-0.01	0.89	3.45	1.32
Real ex rate (%)	6.57	6.15	6.2	6.13	6.33	6.35	6.32
Av. tariff reduction	18.73	18.73	18.73	18.73	18.73	18.73	18.73
Semi-elasticity	-0.011	-0.05	-0.0395	-0.0005	0.0475	0.1842	0.0705
Exports	5.42	4.99	5.08	5.63	6.15	8.08	7.07
Imports	1.45	1.09	1.16	1.57	1.99	3.52	2.86

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes

Assumes flexible exchange rate? Flexible

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates)

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?
Yes

Assumes limited substitutability for capital and labour? See CET function

Assumes full employment? Yes for skilled, underemployment for unskilled

Assumes trade balance is zero? Yes

Assumes diagonal input output matrix? SAM model

Uses IO-matrix of country under study or imported IO matrix? SAM model GTAP database v6 2001.

21. On Turkey's Trade Policy: Is a Customs Union with Europe Enough?

Jean Mercenier and Eriq Yeldan, 1997

Abstract

Turkey has decided to harmonize its tariffication structure with that of the European Union. There are signs, however, that political opposition to the government's pro-competitive stance may be strong enough to block any further move toward fuller trade liberalisation. Using applied intertemporal GE analysis, the authors show that to be welfare improving, trade reform would have to be pursued further and nontariff barriers on European trade removed. Failure to do so could be more detrimental to domestic welfare than no reform at all.

The Model

Turkey is defined as part of a world economy consisting of itself and six other regions (Great Britain, Germany, France, Italy, the rest of the EU and the rest of the world.) Each country has nine production sectors, four of which are perfectly competitive. In these sectors, countries are linked by an Armington system so that commodities are differentiated in demand by their geographical origin. The other five industries are modelled as noncompetitive. They operate with fixed primary factor costs and therefore face increasing returns to scale in production. They have no monopsony power. Each individual oligopolist produces a different good. The competitive game between oligopolistic firms is assumed to be static Cournot-Nash. In making optimal decisions subject to their intertemporal budget constraints, households can borrow or lend on international markets. All final demands recognize differences among products from individual oligopolistic firms a la Dixit and Stiglitz. The model is calibrated on base year data assuming a steady state world economy. To compute the transitional dynamics, we make use of recent results by Mercenier and Michel (1994).

Scenarios

Sc1 - Lowering all tariff rates on European imports to zero and harmonizing most rates on imports from the rest of the world (ROW) with existing European rates.

Sc2 - Turkey is assumed to have joined the European Single Market. This implies that in addition to tariff harmonisation, Turkish as well as European firms switch from their initial price-discriminating strategy to single-pricing behaviour within the Extended EU.

Results

	Sc1	Sc2
Total welfare change (%)	-0.832	0.897
Average tariff reduction (%)	8.000	8.000
Semi-elasticity	-0.104	0.112

Q&A

Dynamic or static model? Dynamic

Assumes perfect competition? For 4 of 9 sectors of production, for 5 of 9 non-competitive

Assumes flexible exchange rates? No

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates)

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

Yes

Assumes limited substitutability for capital and labour? No (CET function elasticity of substitution 0.9)

Assumes full employment? Yes

Assumes trade balance is zero? Yes

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? ???

22. Growth, the Maghreb and the European Union

John Page and John Underwood, 1997

Abstract

This paper examines the impact of the EU Partnership agreements with Morocco and Tunisia on growth – gains from trade liberalization, increased foreign investment and improvements in productivity – by observing trends in both countries between 1960 and 1994 and examining recent estimates of the welfare effects of trade liberalization under the agreements. Also investigated is the possible impact on investment behavior and options for accelerating productivity improvement. It concludes that increased investment and technology transfer hold the greatest potential benefits of the Euro-Med Partnership but that further policy actions by Morocco and Tunisia, complementary to those contained in the agreements, will be needed.

* This is not a modeled paper; it is a review of other papers.

23. An Examination of Morocco's Trade Options with the EU

G. Philippidis and A. I. Sanjuán, 2006

Abstract

The paper's first objective is to employ a modified computable general equilibrium (CGE) model to assess the potential for long-term trade and growth through agro-food tariff abolition in Morocco. Moreover, the authors investigate whether an economic incentive exists for such an EU countermovement for the purpose of restoring competitive parity with the US. As a further aim, they examine the trade-inhibiting implications of non-tariff barrier (NTB) trade costs (e.g., red tape, licensing laws, etc.) that have hitherto largely escaped reform. The authors thus estimate NTB trade cost tariff equivalents (TEs) by employing a theoretically consistent gravity specification. TEs are introduced into the CGE model to measure the trade and growth impacts from NTB removal in agro-food and across all Moroccan-EU trade. While agro-food liberalisation yields disappointing results for Morocco, the potential for development-led policies through elimination of NTBs is highly appealing.

The Model

The model employed is the global trade analysis project (GTAP) CGE model (Hertel, 1997) and accompanying version 6 database (Dimaranan and McDougall, 2006) benchmarked to 2001.

In the standard GTAP model framework, utility maximisation is employed to determine three types of 'regional household' 24 final demand: private expenditures, public expenditures and savings.

In the light of the high levels of industry concentration as noted in Elbehri and Hertel (2003), imperfect competition is incorporated into the 15 manufacturing sectors. Accordingly, external estimates of Hirshmann–Herfindahl indices by sector and region are employed to calibrate sectoral firm figures and thereby calculate price mark-ups above marginal costs. Given the long-term time horizon of the experiments, free entry and exit of firms in imperfectly competitive sectors is assumed. As in the standard model treatment, services and primary agricultural sectors are assumed perfectly competitive.

The authors also assume that within this setup, full employment and perfect mobility in all labour (i.e., wages are fully flexible) and capital markets.

To ensure a general equilibrium (i.e., simultaneous market clearance), a large system of market clearing equations is introduced to guarantee that all factors, input and commodity markets are clear. Moreover, accounting identities ensure that regional households and producers remain within their budget and cost constraints. To apportion investment demands across regions, a fictitious agent, known as the ‘global bank’, collects global investment funds (all regions’ savings) and disburses them on the basis of fixed regional investment shares.

The results are compared along a time horizon ending in 2015 while employing a baseline scenario consisting of productivity, growth, skilled and unskilled labour endowments and population (Jensen and Frandsen, 2004; World Bank, 2005) projections for each country/region in the aggregation.

Scenarios

Scenario 1 - Primary agricultural bilateral tariffs and the remaining portion of the EU (Moroccan) tariff that protects EU (Moroccan) agricultural inputs in food processing sectors are removed.

Scenario 2 - Builds on Scenario 1 with the addition of removal of all NTB trade costs on agro-food trade between the two partners.

Scenario 3 - Complete abolition of all tariffs and NTB trade costs.

Results

	<i>Scenario 1</i>	<i>Scenario 2</i>	<i>Scenario 3</i>
Welfare	0.14%	3.3%	12.23%
General price index	0.28	5.23	8.8

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes in services and primary agricultural sectors, No in manufacturing sectors.

Assumes flexible exchange rates? No

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates): Not an Armington structure

Assumes strict complementarity for intermediates (Leontief technology for intermediates)?

No

Assumes limited substitutability for capital and labour? No

Assumes full employment? Yes

Assumes trade balance is zero? No

Assumes diagonal input output matrix? ???

Uses IO-matrix of country under study or imported IO matrix? Version 6 of the GTAP database for 22 tradable sectors

24. Morocco's Free Trade Agreement with the EU: A Quantitative Assessment

Thomas F. Rutherford, E. Elisabet Rutstrom and David Tarr, 1993

Abstract

Using an applied general equilibrium model, the authors find that the EU-Morocco free trade area

(FTA) will increase Morocco's welfare by about 1.5% of its GDP, showing that tradediversification is not dominant. Gains increase to about 2.5% of GDP if Morocco adds trade liberalisation with the rest of the world while adjustment costs rise only slightly, partly reflecting the absence of trade diversion with growing global liberalisation.

The Model

The model is a 39-sector CGE comparative statics model of the Moroccan economy. It assumes no terms-of-trade effects, a single household, no capital accumulation, constant returns to scale and competitive pricing. The Model assumes increases in VAT to compensate for losses in tariff revenues.

The model simulates 6 different scenarios of trade liberalisation for three different levels of elasticity of supply in resource sectors.

Scenarios

Given questions of improved market access of Moroccan fruits and vegetables and of trade diversion and trade creation (which arise in any preferential trade area), we evaluate the following six policy scenarios: (a) improved access for Moroccan fruits and vegetables in the EU (*ACCESS*); (b) unilateral tariff reductions in Morocco against the EU alone (*EULIB*), against imports from the rest of the world alone (*LIBROW*) as well as against all trading partners (*LIBALL*) without improved access to EU agricultural markets; (c) cooperative tariff reductions with the EU, where this implies extended market access for Moroccan fruit and vegetables on the EU side (*FTA*); and (d) full free trade agreements with the EU augmented by unilateral liberalisation of tariffs against remaining world imports (*FTAALL*). The aggregate results on welfare are summarized in the table.

Results

	Welfare Change (%)			Average tariff reduction (%)	Semi-elasticity		
	H	M	L		H	M	L
FTA ^(a)	2.28	1.52	1.2	19	0.120	0.080	0.063
EULIB ^(b)	2.05	1.29	0.97	19	0.108	0.068	0.051
ACCESS ^(c)	0.31	0.27	0.25	-	-	-	-
LIBROW ^(d)	1.86	1.1	0.78	19	0.098	0.058	0.041
LIBALL ^(e)	3.12	2.37	2.06	19	0.164	0.125	0.108
FTAALL ^(f)	3.36	2.6	2.29	19	0.177	0.137	0.121

*All simulations use value-added tax as replacement tax. Results are for high (H), medium (M), and low (L) elasticity of supply in resource sectors.

(a) Full free trade agreement with the EU. Increased export prices for citrus fruits and vegetables for EU

destinations by 8% and elimination of import protection from EU sources.

(b) Unilateral elimination of import protection against EU imports.

(c) Increased export prices for citrus fruits and vegetables to EU destinations by 8%.

(d) Elimination of import protection against non-EU imports.

(e) Elimination of import protection against all imports, EU and non-EU alike.

(f) Full free trade agreement with the EU, augmented by elimination of import protection from non-EU sources as well.

Q&A

Dynamic or static model? Static

Assumes perfect competition? Yes

Assumes flexible exchange rate?

Numerical values of calibrated Armington parameters (for export-import, consumption, investment, government, intermediates). (Armington elasticity is 2 for all sectors except 2 sectors, where imports and domestic production are perfect substitutes.)

Assumes complementarity for intermediates (Leontief technology for intermediates)? Yes

Assumes limited substitutability for capital and labour?

Assumes full employment?

Assumes trade balance is zero? Yes

Assumes diagonal input output matrix? ?????

Uses IO-matrix of country under study or imported IO matrix? IO-matrix for Morocco, 1980 (partially updated).

25. Two Decades of CGE Modeling: Lessons from Models for Egypt

Mark Thissen, 1999

Abstract

Egypt's exceptional experience of two decades of CGE modeling is used to derive lessons for comparable analyses for other countries, raise important issues for CGE modeling in general and provide future modelers with a guide for build on the older modeling experience. The CGE studies of the Egyptian economy indicate that model closure and parameters largely determine the results. However, there is no agreement on the closure rule one should use to describe the Egyptian economy while the parameters are generally not very reliable if compared to parameters generally used in econometric models. The small contribution of these models to actual policy making in Egypt may be explained by the unreliability of the parameters, the absence of financial markets and the short-term focus of most models. It is therefore concluded that improvement of the reliability of the parameters, the adaptation of the model to changes in economic structure and introduction of financial markets are important issues for future research.

IV. References:

1. Augier, P. and Gasiorok, M. (2003). The welfare implications of trade liberalization between the Southern Mediterranean and the EU. *Applied Economics*, 35, 1171-1190.
2. Bayar, A. H. (2001) *Fiscal challenges of the Euro-Mediterranean agreements*, Report of the First Research Programme FEMISE. Brussels: Université Libre de Bruxelles.
3. Bibi, S. and Chatti, R. (2005). *Trade liberalization and poverty in Tunisia: Short-term pain for long-term gain*, MPIA Working Paper No. 2006-07.
4. Chemingui, M. A., and Thabet, C. (2001). Internal and external reforms in agricultural policy in Tunisia and poverty in rural areas. Paper submitted to the Global Development Network Research Medal Competition.
5. Chemingui, M.A. and Dessus, S. (2004). *Assessing non tariff barriers to trade in Syria*, mimeo.
6. Cockburn, J., Bernard, D. and Benoît, D. (1998). *Les leçons du mariage entre les modèles d'équilibre general calculable et la nouvelle théorie du commerce international: Application à la Tunisie*. CRDE.
7. Deardorff, A. (1999). *Economic implications of Europe-Maghreb trade agreements*, Discussion Paper N° 442. University of Michigan.
8. Dessus S. and Suwa-Eisenmann A. (1998). *Trade integration with Europe and labour reallocation in the Southern Mediterranean countries: The case of Egypt*, Working Paper. Paris: OECD Development Centre.
9. Feraboli, O. (2003). Preferential trade liberalization, fiscal policy responses and welfare: A dynamic CGE model for Jordan.
10. Feraboli O. (2005). Policy implications of the Euro-Med partnership: The case of Jordan.
11. Gaitan, B. and Lucke, B. (2007). The Barcelona initiative and the importance of NTBs: A dynamic CGE analysis for Syria. *Journal of International Economics and Economic Policy*, 4(1).
12. Harrison, G.W., Rutherford, T.F. and Tarr, D.G. (1996). *Economic implications for Turkey of a customs union with the European Union*, Policy Research Working Paper No. 1599. Washington, DC: World Bank.
13. Harrison, G.W., Rutherford, T.F., and Tarr, D, (1993). Trade reform in the partially liberalized economy of Turkey. *World Bank Economic Review*, 7(2), 191-217.

14. Hoekman, B. and Konan, D.E. (1998). Deep integration, non-discrimination, and Euro-Mediterranean free trade. Paper presented at the conference Regionalism in Europe: Geometries and strategies after 2000, Bonn.
15. Khorshid, M. (2003). Alternative socioeconomic development scenarios for Egypt: Results from an Economy – Wide Simulation Model.
16. Konan, D.E. and Kim, K.E. (2004). Beyond border barriers: The liberalization of services trade in Tunisia and Egypt. *The World Economy*, 27(9), 1429–47.
17. Konan, D.E. and Maskus, K.E. (1997). *A computable general equilibrium analysis of Egyptian trade liberalization scenarios*, [Working Paper](#) No. 199701. Manoa: University of Hawaii, Department of Economics.
18. Konan, D.E. and Maskus, K.E. (2000). Joint trade liberalization and tax reform in a small open economy: The case of Egypt. *Journal of Development Economics*, 61, 365-392.
19. Lucke, B. and Lucke, D. (2001). *Fiscal impact of trade liberalization: The case of Jordan and Syria*. Forum Euro-Mediterranéen Des Instituts Economiques (FEMISE) and Economic Research Forum (ERF).
20. McDonald, S., Evans, D., Gasiorek, M. and Robinson, S. (2006). Trade liberalisation with trade induced technical change in Morocco and Egypt. Paper presented at the Middle East Economic Association Conference, Boston, MA.
21. Mercenier J. and Yeldan E. (1997). On Turkey's trade policy: Is a customs union with Europe enough? *European Economic Review*, 41, 871-880.
22. Page, J. and Underwood, J. (1997). *Growth, the Maghreb and the European Union*. ECES.
23. Philippidis, G. and Sanjuán, A.I. (2006). An examination of Morocco's trade options with the EU. *Journal of African Economies*, 16(2), 259-300(42).
24. Rutherford, T.F., Rutstrom, E.E. and Tarr, D. (1993). *Morocco's free trade agreement with the EU: A quantitative assessment*. Policy Research Working Paper No. 1173. Washington, DC: World Bank.
25. Thissen, M. (1999). *Two decades of CGE modelling lessons from models for Egypt*, Research Report No. 99C02. University of Groningen, Research Institute SOM (Systems, Organisations and Management).

V. Annex I: Macro Economic Overviews of Countries Included in the Sample

By

Dr. Roby Nathanson

Dan Turner

1. Algeria's Economy

	1998	1999	2000	2001	2002	2003	2004	2005
Annual change in GDP, current prices (%)	5.1	3.2	2.2	2.6	4.7	6.9	5.2	5.3
GDP, current prices (\$ Bn)	48.2	48.8	54.7	55.1	57.0	68.0	85.0	102.4
GDP per capita (\$)	1,633	1,630	1,800	1,787	1,819	2,135	2,626	3,111
Inflation (%)	5.0	2.6	0.3	4.2	1.4	2.6	3.6	1.6
Current account balance (\$ Bn)	-0.9	0	9.1	7.0	4.3	8.8	11.1	21.1
Current account balance (% of GDP)	-1.9	0	16.7	12.8	7.6	13.0	13.1	20.7

Overview

In the mid and late 1990s, Algeria's economy experienced turmoil. Persistent internal violence between Islamic and government forces severely damaged Algeria's economy. Algeria became burdened by heavy foreign debt and eventually received debt relief of over \$4.7 Bn by the Russian government (2006).

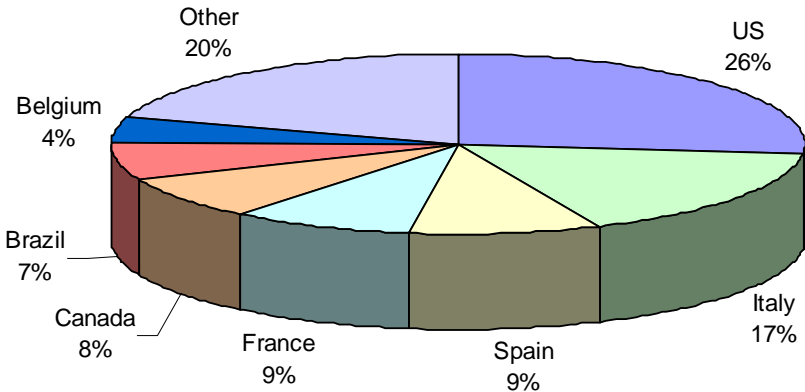
Algeria's main economic engine is its hydrocarbon energy sector, which accounts for 30% of GDP, 60% of revenues and 95% of export earnings. The rise in oil and gas prices, together with macro-economical reforms supported by the IMF, have allowed Algeria's economy to flourish during the last few years. Algeria is now running substantial trade surpluses and building up record foreign reserves. It was able to decrease its external debt to less than 10% of GDP following repayment of its Paris Club and London Club debt in 2006. Real GDP has

risen due to higher oil output and increased government spending; however, little has been done to change Algeria's dependence on the energy sector.

The government's continued efforts to diversify the economy by attracting foreign and domestic investment outside the energy sector has had little success in reducing high unemployment and improving living standards. Structural market reform, such as banking sector development and infrastructure construction, has moved ahead slowly, being hampered by corruption and bureaucratic resistance. Algeria has yet to free itself of its colonial mentality, an attitude that is slowing IMF-supported reform and delaying economic recovery.

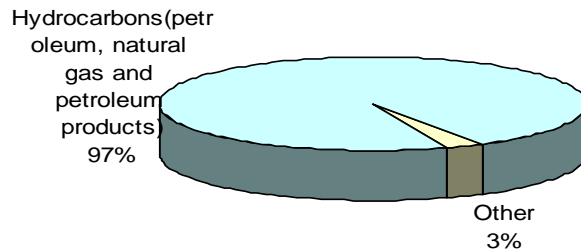
Foreign Trade

Major Export Partners 2006 (55\$ Bn=100%)



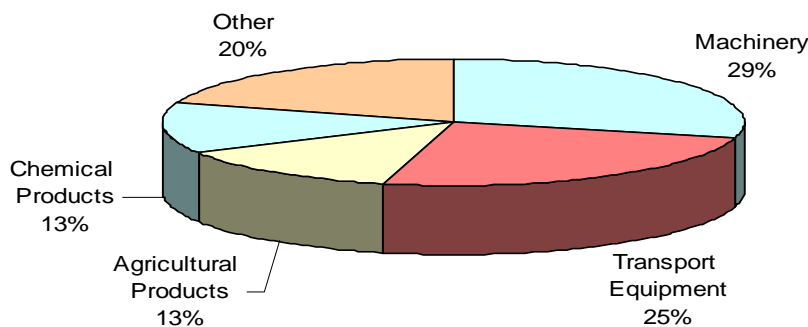
Source: CIA World Fact Book, 2007.

Algeria's Main Exports (%), 2006



Source: CIA World Fact Book, 2007.

Algeria's Major Imports from the EU (%), 2006



Source: European Commission of External Trade, 2006;
http://ec.europa.eu/trade/issues/bilateral/countries/algeria/index_en.htm.

As shown by the above figures, Algeria's is heavily reliant on oil and natural gas as its main source of GDP.

Algeria-EU Trade

The EU is Algeria's main trading partner, as it has been for decades, purchasing petroleum and natural gas and selling Algeria most of the machinery and transportation equipment in addition to agricultural products needed to meet internal demand. The extensive trade between Algeria and the EU and Algeria's efforts to reform its economic infrastructure exhibit the Barcelona Initiative's contribution to trade. Although trade will remain focused on natural

resources and petroleum, the rate of trade is likely to fluctuate with oil prices. Lifting trade restrictions will certainly benefit Algerian exports, as Algeria will enjoy a better position in the petroleum markets due to the advantages provided by the Barcelona Initiative.

Summary

In the past decade, Algeria's economy has done little to detach itself from reliance on petroleum and natural gas production. This means that Algeria is still exposed to fluctuations in oil prices and reservoirs. In addition, the Algerian government has had little success in building manufacturing capacity; hence, with the economy remaining specialized, high unemployment rates continue. Living conditions in rural areas remain poor, with insufficient social services.

Regarding trade, Algeria has seen an improvement in its trade balance along with increasing national revenues as a result of rising oil prices. The latter allowed Algeria's economy to stabilize. The Barcelona Initiative has certainly improved Algeria's position as an energy supplier to the EU, although it has not brought any changes in the composition of Algeria's exports. In the future, Algeria will remain a major energy supplier to the EU and the EU will remain Algeria's main trading partner. Nonetheless, as the energy market shifts to clean energy and oil reserves diminish worldwide, Algeria needs to rethink its economic future and make genuine efforts toward creating valid industries able to respond to future trends.

2. Egypt's Economy

	1998	1999	2000	2001	2002	2003	2004	2005
Annual change in GDP, current prices (%)	7.5	6.1	5.4	3.5	3.2	3.2	4.1	4.5
GDP, current prices (\$ Bn)	84.8	89.9	99.1	95.4	87.5	81.3	78.8	89.7
GDP per capita (\$)	1,382	1,435	1,549	1,460	1,313	1,197	1,136	1,269
Inflation (%)	5.0	3.7	2.8	2.4	2.4	3.2	8.1	8.8
Current account balance (\$ Bn)	-2.4	-1.7	-1.1	0	0.6	1.9	3.4	2.9
Current account balance as % of GDP)	-2.9	-1.9	-1.2	0	0.7	2.4	4.3	3.2

Source: IMF data, 2007.

Overview

A series of IMF arrangements, coupled with massive US support transferred in the wake of the 1991 Gulf War, helped Egypt improve its macroeconomic performance during the 1990s. Through sound fiscal and monetary policies, the government managed to tame double-digit inflation, slash budget deficits and build up foreign reserves. The Egyptian economy relies heavily on tourism revenues, which plummeted twice in the period examined due to the terrorist attacks in Luxor (1997) and Sharm al Sheikh (2005). Although the pace of structural reforms – such as privatization and new business legislation – has been slower than the IMF envisioned, Egypt's steps toward a more market-oriented economy have prompted increased foreign investment.

However, reduced currency inflows from tourism, worker remittances, oil revenues and Suez Canal tolls resulted in pressure on the Egyptian pound and sporadic dollar shortages in the late 1990s, but external payments remained unthreatened. Since the turn of the millennium, monetary pressures have eased, with oil prices continuing to climb since 2002, increased natural gas explorations and production and a moderate rebound in tourism.

Since the Nazif government came to power, it has implemented numerous economic reforms and promoted construction of its legal, tax and investment infrastructure, actions that culminated in 5% annual growth in GDP (2005-2006) and a stock market boom. However, foreign direct investment remains low. Most reforms are still in progress. Other reforms

include liberalization of trade and investments, deregulation of agriculture and privatization of public enterprises.

Yet, despite these achievements, the government has failed to raise living standards for average Egyptians. Poverty levels are still high, and although unemployment formally stands at only 8%, international estimates are much higher. The government subsidizes many basic commodities, a policy that has contributed to growing annual budget deficits of more than 10% of GDP, which represents a significant strain on the economy.

Foreign Trade

Egypt is dependant on imports, especially of commodities and food, in order to provide for the population's basic needs. Other major imports include machinery and heavy equipment, automobiles, chemicals, wood products and fuel. Exports represent 28% of GDP, focusing on crude oil and petroleum, natural gas, cotton, textiles, metal products and chemicals.

Trade with the EU

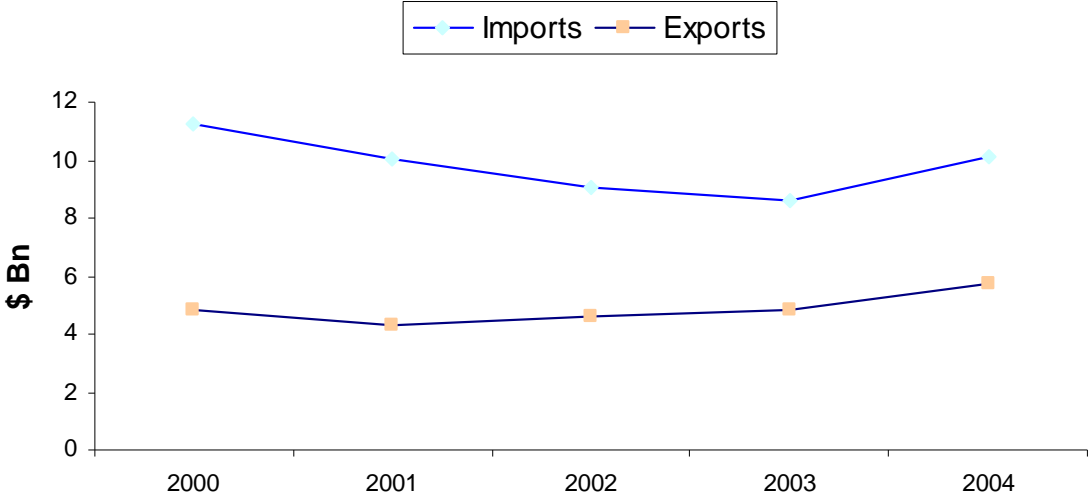
The EU continues to be Egypt's largest trading partner, accounting for 42% of its exports and 37% of imports, with the trade balance in the EU's favor. Trade is still on the rise, with a 5% increase observed in recent years. Major exports include energy, agriculture and textiles whereas major imports include machinery, automobiles and chemicals.

Egypt's constantly evolving/expanding trade relations with the EU became tighter with the signing of the Association agreement in 2004. Difficulties nonetheless continue due to Egypt's overregulated trade regime and cumbersome customs administration even though recent reforms have somewhat remedied the situation. July 2006 saw the beginning of contacts regarding liberalization of trade in services and construction of a dispute settlement mechanism.

As can be seen in the following figures, imports from the EU have declined in value over recent years, while the value of exports has risen. This can be explained by the recent reforms that opened Egypt's borders to other countries outside the EU, along with increasing US support, which resulted in larger sales of American products.

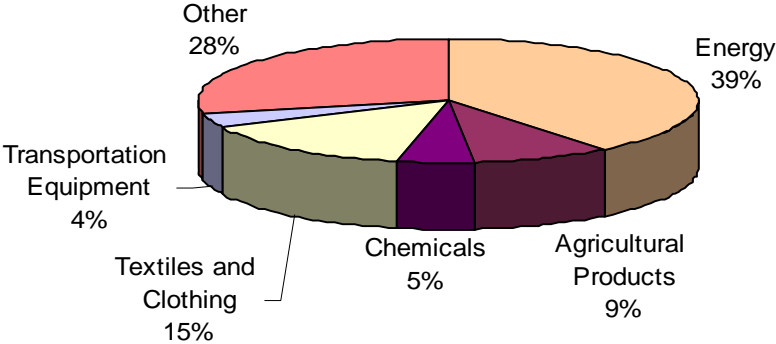
Other major European sources of imports are Germany (6.4% of total imports), Italy (5.4% of total imports) and France (4.6% of total imports). Major EU export destinations include Italy (12.2% of total exports), Spain (8.6% of total exports) and the UK (5.6% of total exports).

Egypt's Foreign Trade with the EU, 2000-2004 (\$ Bn)

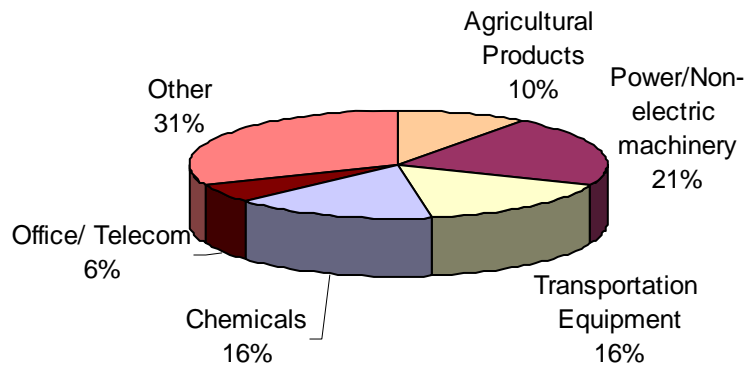


Source: EU statistics, http://ec.europa.eu/external_relations/egypt/intro/tradoc_113375.pdf.

Egyptian Exports to the EU by product Area (%)



Egyptian Imports from the EU by Product Area (%)



Source: EU Statistics: http://ec.europa.eu/external_relations/egypt/intro/tradoc_113375.pdf.

Summary

Egypt's economy has experienced major reforms in recent years as a result of Egypt's strong moves towards becoming a market economy, open to trade and foreign investment. The EU has remained its largest and most influential trade partner throughout. The Barcelona Initiative has certainly affected Egypt's relationship with the EU positively, including making Egypt a major provider of Energy and Textile products throughout Europe. Recent clean energy trends will strengthen Egypt's grasp in European markets. Further negotiations over trade regulation between the two entities will expand the energy trade and no doubt make it more lucrative for both.

However, the Egyptian government needs to address the burning issues on Egypt's socio-economic agenda by allocating more funds and using the growth achieved to reduce poverty and improve living conditions for the average Egyptian. Only then will Egypt enjoy the fruits of its recent reforms in trade policy.

3. Jordan's Economy

	1998	1999	2000	2001	2002	2003	2004	2005
GDP, annual change in current prices (%)	3.0	3.4	4.3	5.3	5.8	4.2	8.4	7.2
GDP, current prices (\$ Bn)	7.9	8.1	8.5	9.0	9.6	10.2	11.4	12.7
GDP per capita (\$)	1663.8	1663.1	1755.3	1816.9	1890.0	1960.7	2130.5	2316.7
Inflation (%)	3.1	0.6	0.7	1.8	1.8	1.6	3.4	3.5
Current account balance (\$ Bn)	0.0	0.4	0.0	0.0	0.5	1.2	0.0	-2.3
Current account balance (% of GDP)	0	5.0	0.0	0.0	5.6	11.6	0.0	-17.8

Source: IMF Data 2007

Overview

Jordan is a small country, suffering from shortages in natural resources such as water, oil and natural gas. After shrinking by nearly 30% in the 1980's, Jordan's economy began to recover in the 1990's with the help of international institutions and the US. The early 1990's brought a positive change in Jordan's economy; with the political situation improving, Jordan's economy showed impressive double-digit growth rates. The peace accord with Israel gave Jordan's economy another boost, as the US government agreed to erase Jordanian debt, an event that fuelled the economy and encouraged foreign trade. Foreign trade has increased in quantity but due to government efforts, the trade balance remained stable during most of the 1990s.

Jordan failed, however, to produce a stable infrastructure for industrial or agricultural development, forcing its economy to rely mainly on services such as tourism, which fluctuate in demand, and on political conditions. This is the major reason for the Jordanian economy's deterioration in the late 1990s, as political conditions in the area became gloomy. Security-related restrictions and general fears kept tourists away from the West Bank, like the rest of the world, and Jordan's hopes for a vibrant tourist industry took a major blow. Since 1998, Jordan has begun implementing several economic reforms with the aid of the IMF, the EU and other partners. Furthermore, the Jordanian economy has become one of the region's more open economies in recent years, achieving a 64% score in the Heritage Foundation's Index of Economic Freedom, a score higher than the global score and the Middle East average. The Government has also made substantial progress in privatization and in attracting foreign

investments, although Jordan still needs to reduce dependence on foreign grants and reduce budget deficits, while empowering local industries and export sectors.

Poverty is also a major issue threatening Jordan's stability, with more than 50% of the population under the age of 16 (Jordan's Dept. of Statistics website, 2006), which makes it difficult for Jordan to generate sufficient jobs and sustain living standards. It is estimated that 30% (2001) of Jordan's population is found below the poverty line (CIA World Factbook, 2006). Despite numerous efforts, the government has failed to make significant changes in this area.

Foreign Trade

The Jordanian government has liberalized the trade regime sufficiently to become a member of the WTO (2000), while signing a free trade accord with the US and an association agreement with the EU, both in 2001. Jordan relies heavily on trade with Iraq, especially for oil imports and textile exports, which caused foreign trade to decline during the 2003 Iraq war. This made Jordan more dependent on Gulf oil, which forced the Jordanian government to raise petroleum prices and sales taxes. Since then, Jordan has contributed greatly to Iraq's recovery, which has positively affected Jordan's economy in turn.

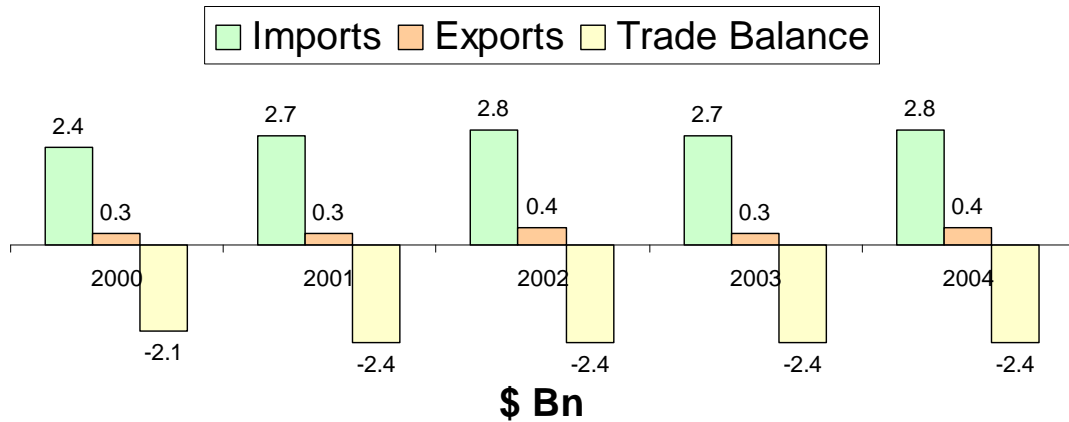
Jordan's main export partners are the US (25%), Iraq (17%) and India (8%), with other major import partners being Saudi Arabia (23%), Germany (8%) and China (8%).

Source of Data: CIA World Factbook, 2006

Trade with the EU

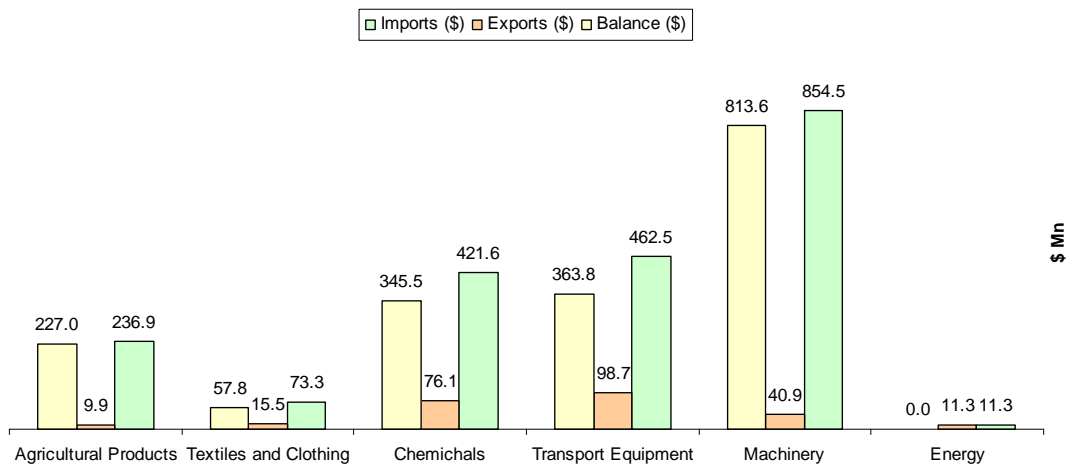
Jordan's trade with the EU is limited and somewhat erratic. Jordan imports mainly commodities and equipment from the EU, while Jordanian exports to the EU consist mainly of machinery and chemicals.

Jordanian Trade with the EU (Bn \$), 2000-2004



Source: Eurostat, Statistical Regime 4 and EU Data, 2005.

Jordan's Trade with the EU by Product Group (\$ M), 2004



Source: Source: Eurostat, Statistical Regime 4 and EU Data, 2005.

As visible in the above figures, EU trade with Jordan is insignificant from the EU's perspective. However, for Jordan, imports from the EU represent an important factor although exports to the EU are a fairly insignificant factor in its economy. The Barcelona Initiative undoubtedly helped Jordan stabilise its import level with the EU. Yet, because imports from the EU maintained their volume, this implies that the Barcelona Initiative has done little to improve trade between Jordan and the EU.

Summary

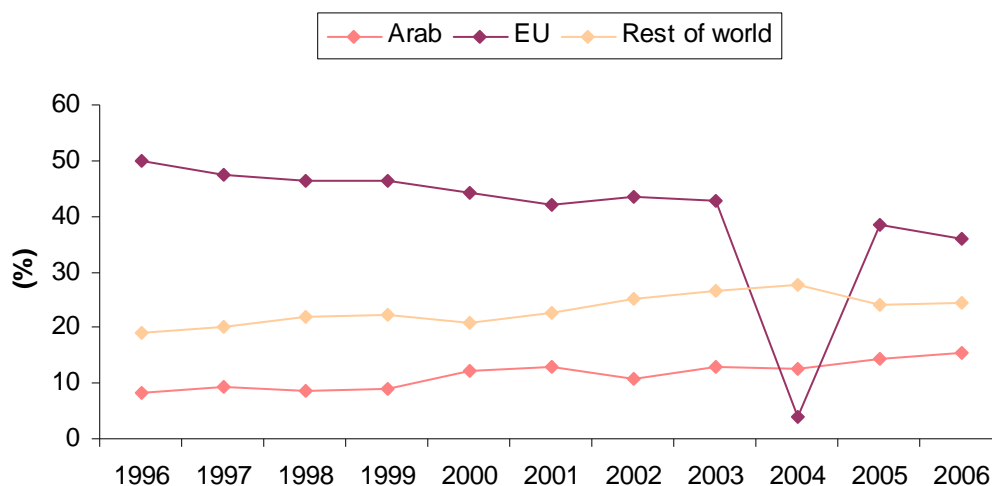
Jordan's Economy is a small, highly erratic and dependant economy. Jordan relies on foreign trade to provide it with necessities such as natural resources, but has not yet been able to offer any real added value to its export goods. Jordan makes up for this by exporting services such as tourism, which is highly susceptible to political turmoil. Jordan also needs to address issues such as domestic poverty and public debt; unless it continues its reform policy, these issues will be difficult to solve. Trade with the EU is small in numbers and unbalanced, focusing on EU exports to Jordan. Although the Barcelona Initiative may have improved Jordan's foreign trade with the EU, there is little evidence of movement in real terms. Unless the EU becomes more intensely involved in the Jordanian economy, its major influence will continue to be exerted through grants to the Jordanian government.

4. Lebanon's Economy: Summary Data, 1999-2005

	1999	2000	2001	2002	2003	2004	2005
Real growth in GDP (%)	-0.8	1.7	4.5	3.3	4.1	7.0	1.0
GDP per capita, current prices (\$)	5028	4909	4958	5323	5559	5922	5862
Inflation (%)	0.2	-0.4	-0.4	1.8	1.3	1.7	-0.7
Current account balance (\$ BN)	-3.2	-2.9	-3.3	-2.6	-2.6	-3.3	-2.5
Current account balance (% of GDP)	-19.1	-17.3	-19.4	-14.3	-13.3	-15.8	-11.7

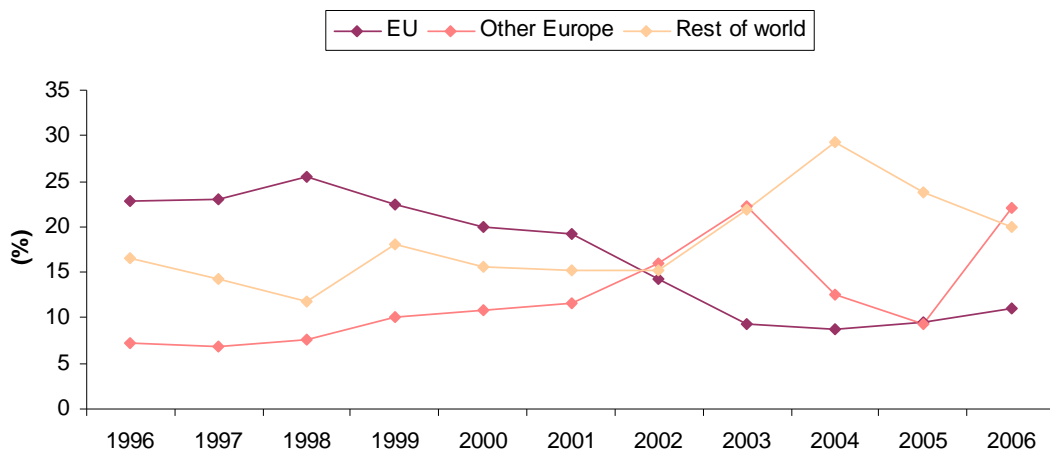
Source: IMF Data, 2007.

Imports from Selected Country Groups as % of All Imports, 1996-2006



Source: Lebanese Central Administration for Statistics, 2006.

Exports from Selected Country Groups as % of All Exports



Source: Lebanese Central Administration for Statistics, 2006.

Overview

During the past decade, Lebanon has undergone significant regime changes that have likewise initiated economic changes. Lebanon enjoys a competitive, free market regime and a strong foreign trade tradition. The Lebanese economy is service-oriented, with its main growth sectors being Banking and Tourism. However, despite this openness and its essentially modern economy, Lebanon is troubled by a fickle political situation, which constantly threatens its economic stability. Lebanon is also highly reliant on the Lebanese Diaspora for funds sent home, investment capital, much of its foreign trade and other improvements in its economic situation.

The past decade saw the Lebanese economy attempting to recover from years of internal conflict. Since Israel's 1996 "Grapes of Wrath" operation, the Lebanese government and foreign investors have invested extensive sums into rebuilding and maintaining Lebanon's infrastructure. This has caused the Lebanese government to accumulate large debt, amounting to \$28 Bn by 2001 or nearly 150% of GDP.

Economic performance was therefore sluggish in 2000-2001, with growth returning only in late 2001. By 2003-2004, the Lebanese economy had fully recovered, which induced a fast pace of growth. However, recent political events/conflicts have reignited chaos; the Summer 2006 war represented yet another setback in Lebanon's recovery.

Reforms

In 2000, the Lebanese government substantially reduced customs duties, initiated export promotion schemes for agricultural products, decreased social security payments as well as restrictions on foreign investments in real estate and adopted an open skies policy. However, the relative appreciation of the Lebanese currency undermined competitiveness, with exports falling from 23% of GDP in 1989 to 4% in 2000.

By early 2001, the debt amassed forced the government to raise gasoline taxes and value added taxes in addition to reducing expenditures. Privatization of most state-owned companies was also promoted, particularly in the telecom and the electricity sector. The government is also making extensive efforts to downsize the public administration while improving its efficiency.

Foreign Trade

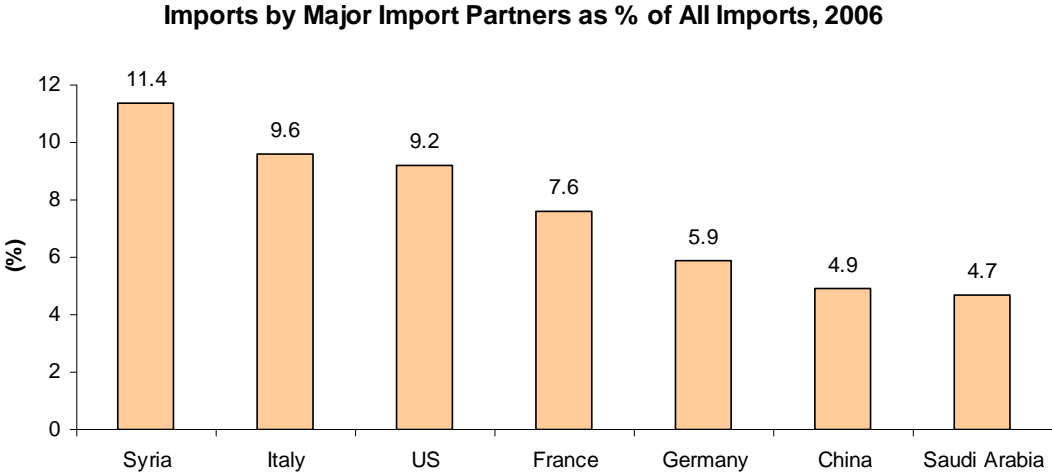
Lebanon has always been highly dependent on foreign trade, being the Arab world's gateway to Europe and the western world in addition to a major vacation centre. Trade patterns have responded to geopolitical and economic changes over the past decade. The beginning of the new millennium witnessed Lebanon's foreign trade shift its center of gravity from Europe to the Arab world. At the same time, trade with the U.S and China came to replace some of the trade previously conducted European countries, particularly in the area of imports. Although foreign dollars continue to flood the Lebanese economy, exports have not shown steady increases. It appears that while foreigners are prepared to invest heavily in Lebanon's resort and financial sectors, they are reluctant to buy Lebanese products.

Effects of the Barcelona Initiative

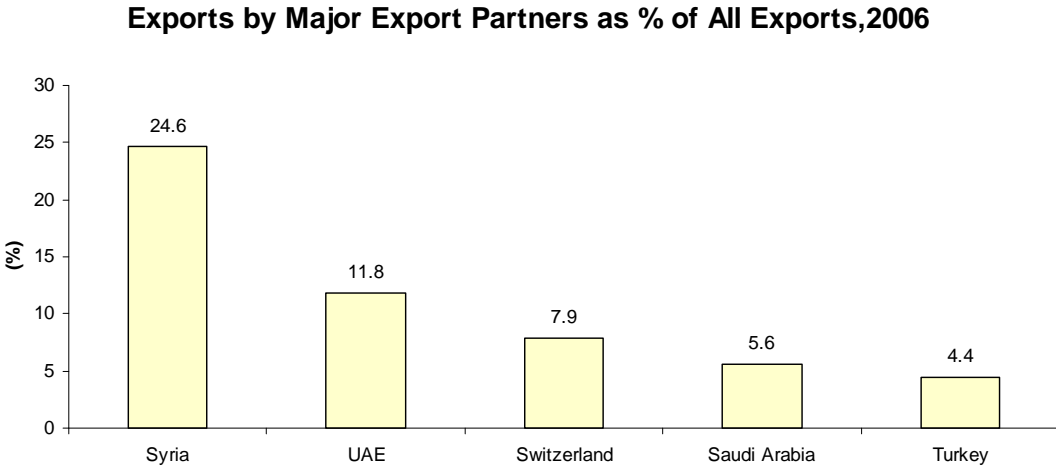
The Barcelona Initiative put in place the infrastructure needed to inaugurate trade agreements between the EU and Lebanon. Although Lebanon-EU trade should have risen in consequence, it declined instead..The EU's position as a trading partner has diminished and given way to other nations. Once Lebanon's second most important trading partner, the EU is now only fourth among its export partners although it remains Lebanon's largest import partner. The EU's position within the Lebanese market has thus steadily declined, aggravated by a major slump in 2004.

All in all, the effect of the Barcelona Initiative appears to be minor if at all. Trade with the EU has declined despite the lifting of trade restrictions and the introduction of trade reforms in

Lebanon. It may be that the Lebanese reforms could themselves be the reason for the EU's worsening position, with Lebanon now more open to other trade opportunities and free of exclusive reliance on EU imports.



Source: CIA World Fact Book, 2007



Source: CIA World Fact book, 2007

Summary:

Despite the Lebanese economy's openness, it is in desperate need of further market reform. Recent years have seen major political turbulence rocking Lebanon; any government wanting to reduce the effects of these blows on the Lebanese economy will be required to create a sustainable economic infrastructure, contain spending and continue privatization efforts while removing further trade barriers.

The Barcelona Initiative has not had its anticipated impact on trade relations between Lebanon and the EU. Trade reform has allowed Lebanon to reduce its dependence on EU imports. Although we can safely say that Lebanon will still need goods coming from the EU for many years, trends do indicate that EU exports will become much less dominant in Lebanon's trade portfolio.

5. Morocco's Economy

	1998	1999	2000	2001	2002	2003	2004	2005
Annual Change in GDP, current prices (%)	7.7	-0.1	1.0	6.3	3.2	5.5	4.2	1.7
GDP, current prices (\$ Bn)	35.8	35.2	33.3	33.9	36.0	43.8	50.0	51.6
GDP per capita (\$)	1,293	1,255	1,171	1,175	1,236	1,484	1,676	1,712
Inflation (%)	2.7	0.7	1.9	0.6	2.8	1.2	1.5	1.0
Current account balance (\$ Bn)	-0.1	-0.1	-0.4	1.6	1.4	1.5	0.9	0.8
Current account balance (% of GDP)	-0.4	-0.5	-1.4	4.8	4.1	3.6	1.9	1.7

Source: IMF data 2007

Overview

Morocco enjoys a fairly stable economy, with the government enacting policies to encourage economic stability since the early 1990s. After a slump in growth rates in the 1980s, the 1990s saw stability, with growth rates averaging at least 8.5%, only to be followed by declines in growth every few years. Despite its strong economic growth, Morocco is still troubled by unemployment, which has reached as high as 20% in urban areas. Poverty rates have climbed in response to the volatile GDP, with Morocco maintaining its dependence on foreign energy and finding itself unable to spur the growth of small- and medium-size enterprises. Currency issues also trouble Morocco. Despite structural adjustment programs supported by the IMF, the World Bank, and the Paris Club, the dirham is fully convertible only for current account transactions. In addition, Morocco's financial sector remains rudimentary.

The Moroccan government has, however, attempted to correct some of its economy's flaws. In 2004, authorities instituted measures to boost foreign direct investment and trade by signing a free trade agreement with the US, which came into force in January 2006, and selling government shares in the state telecommunications company and the largest state-owned bank. External debt is well managed and foreign exchange reserves are plentiful.

Drought is also a major concern for the Moroccan economy, with regional droughts in the late 1990s and the early 2000's causing drops in growth and employment.

Morocco's industrial strong point is its phosphate mining operations in the Western Sahara. Morocco controls almost two-thirds of the world's phosphate reserves, with the industry

providing about half of the country's income. Morocco is also one of the world's largest growers of cannabis, a product cultivated in much of northern rural Morocco. This crop accounts for approximately 0.57% of GDP annually.

Foreign Trade

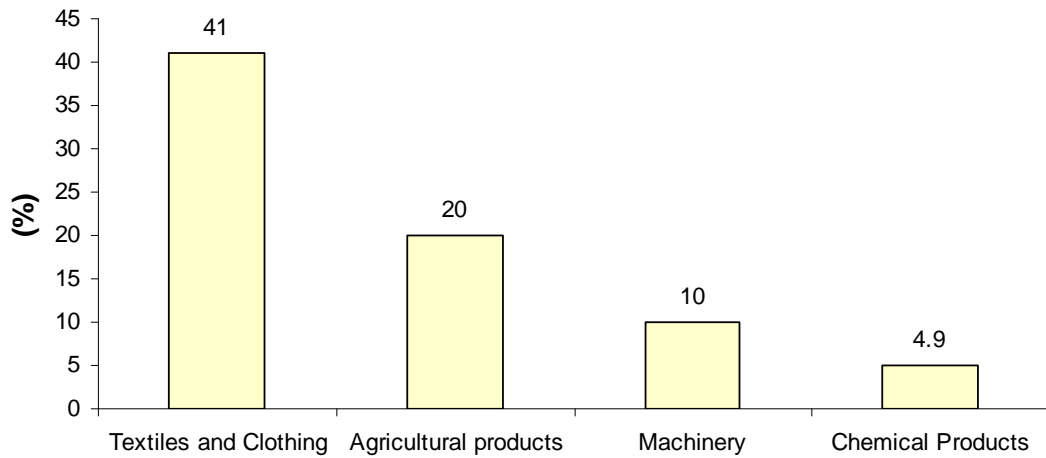
Morocco's leading trading partner is the EU , especially after the Barcelona Initiative came into effect in 2000. In 2004, 65% of Morocco's imports (\$13.3 billion) came from the EU, while 70% of Morocco's exports (\$8.3 billion) were sent to the EU. Morocco's trade deficit with the EU is estimated at \$5 billion.

Morocco's economy is still relatively dependant on trade in textiles and agricultural products, which together accounted for 62% of EU imports/exports in 2004.

Services accounted for 53.5% of Morocco's GDP in 2004, with average annual growth in the sector reaching 3.4%. Total trade in services between the EU and Morocco has increased significantly since the mid 1990s. The EU has had a negative balance vis-à-vis Morocco since 1991. In 2003, EU service imports from Morocco totaled \$3 billion, mainly in the form of tourism (53%), transport (28%), financial and communication services (19%). Alternatively, EU service exports were valued at \$1.8 billion, mainly in business and transport services.

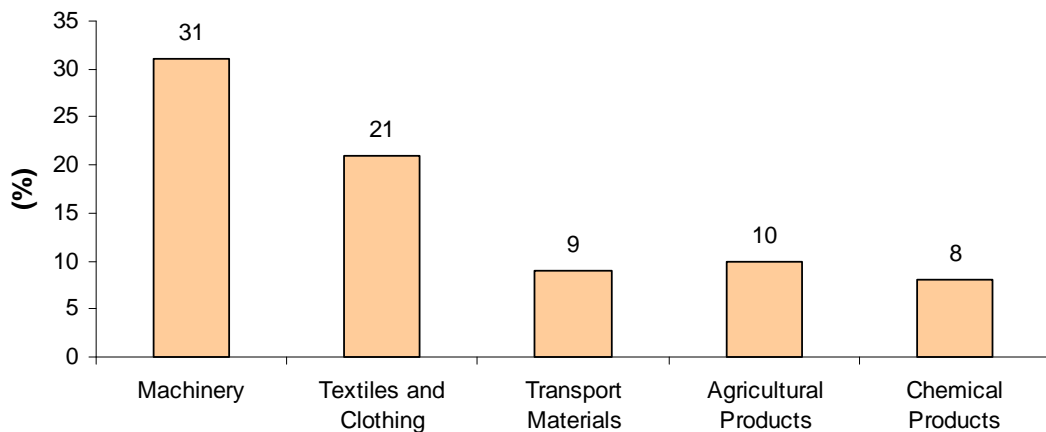
The Barcelona Initiative is thus one of Morocco's major assets. While the initial agreement is currently implemented primarily for goods and commodities, further opening of trade would enable Morocco's services industry, the largest contributor to its GDP, to increase its exports.

Exports to the EU as a % of Total Exports, 2004



Source: EU data, http://ec.europa.eu/trade/issues/bilateral/countries/morocco/index_en.htm.

Imports from the EU as a % of Total Imports, 2004



Source: EU data: http://ec.europa.eu/trade/issues/bilateral/countries/morocco/index_en.htm.

Other trade agreements concluded by Morocco include a free trade agreement with the US and the Agadir Accord, which enabled free trade with Arab and Muslim countries.

Summary

Morocco is a developing economy that has shown the capacity to achieve impressive growth rates. Its government is committed to foreign trade and has acted on this commitment by signing free trade and other agreements with many countries. However, the Moroccan government needs to take better advantage of recent reforms and trade openness as well as learn how to balance these with policies, meant to reduce unemployment and diminish poverty. The Barcelona Initiative has been an influential factor in Morocco's development. It will become even more influential should Morocco manage to promote and export its tourism and services industries while helping small- and medium-size businesses to survive in global and European markets.

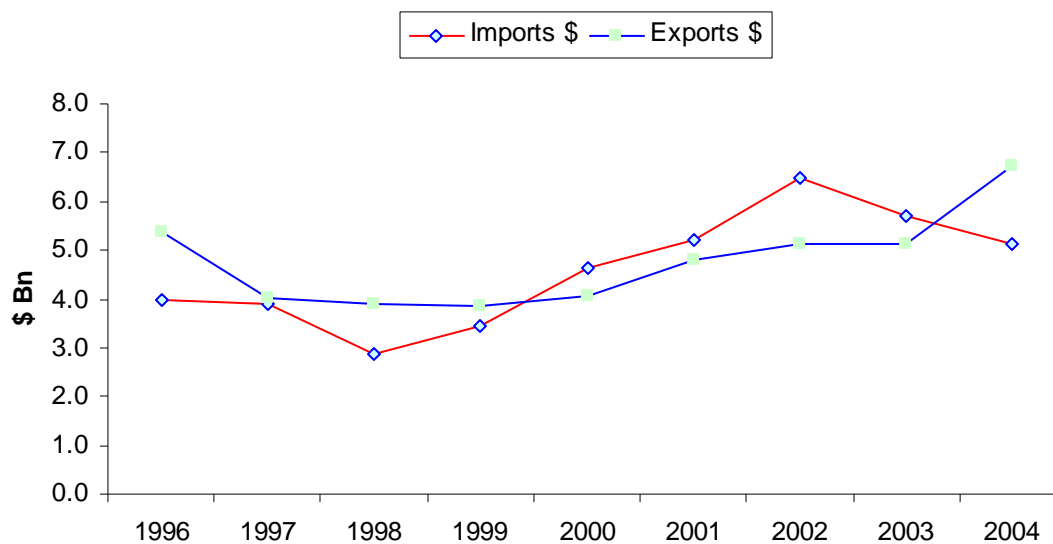
6. Syria's Economy: Summary*

	1999	2000	2001	2002	2003	2004	2005	2006
Annual change in GDP in constant prices (%)	-3.1	2.3	3.7	3.7	1.0	2.4	2.9	3.0
GDP per capita, current prices (\$)	1059	1216	1253	1323	1285	1360	1467	1645
Inflation (%)	-3.7	-3.9	3.4	-0.5	5.8	4.4	7.2	10.0
Current account balance (\$ Bn)	0.2	1.0	1.1	1.6	1.0	0.7	0.2	-0.4
Current account balance (as a % of GDP)	1.6	5.2	5.7	7.2	4.7	3.0	0.8	-1.2

Source: IMF data and estimates, 2007.

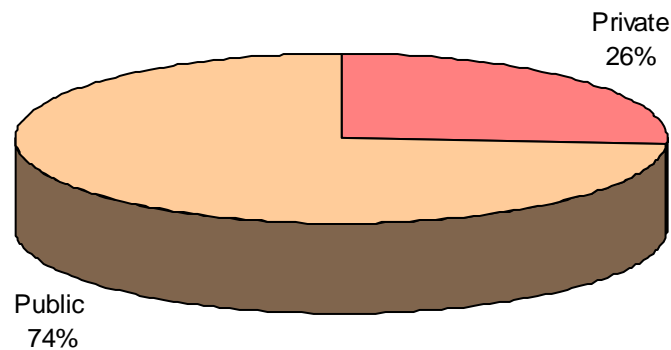
Note: *Data about Syria's economy are difficult to obtain from original government sources. They also tend to be contradictory and inconsistent, making the data difficult to confirm.

Foreign Trade, 1996-2004 (\$ Bn)



Source: Syrian Central Bureau of Statistics, 2005.

Exports by Sector as % of All Exports, 2004



Source: Syrian Central Bureau of Statistics, 2005

Overview:

Despite minor changes in recent years, the Syrian government continues to intervene in Syria's economy just as it has since the 1950s. The government controls Syria's banks, most industries, foreign trade and monetary issues. Therefore, any attempt to reduce trade barriers is as successful as Syria's government allows it to be.

After shrinking by nearly 33% in the 1980's, Syria's economy began recuperating in the 1990s. But the late 1990s saw Syria struggling against a drought that threatened to irreversibly damage its economy. Rising oil prices provided the cash inflow needed to balance a budget suffering from the drought's effect. Income from oil therefore enabled Syria to retain economic stability despite poorly performing public sector firms, low investment levels, low industrial and agricultural productivity and high unemployment.

With a new generation, Syria's leadership began reforming some economic sectors. Reform has thus far been incremental and gradual. The government has begun to address structural deficiencies – such as the lack of a modern financial sector – through changes in the legal and regulatory environment. In 2001, the government legalized private banking; by 2004, four private banks had begun operating. In that same year, a committee was formed to oversee the

establishment of a stock market. The Syrian government is also considering other tax and property rights reforms.

Despite these recent reforms, Syria is still ranked 147 on the Heritage Foundation's *Annual Index of Economic Freedom* and 130 (out of 175 countries) on the World Bank's *Ease of Doing Business* index.

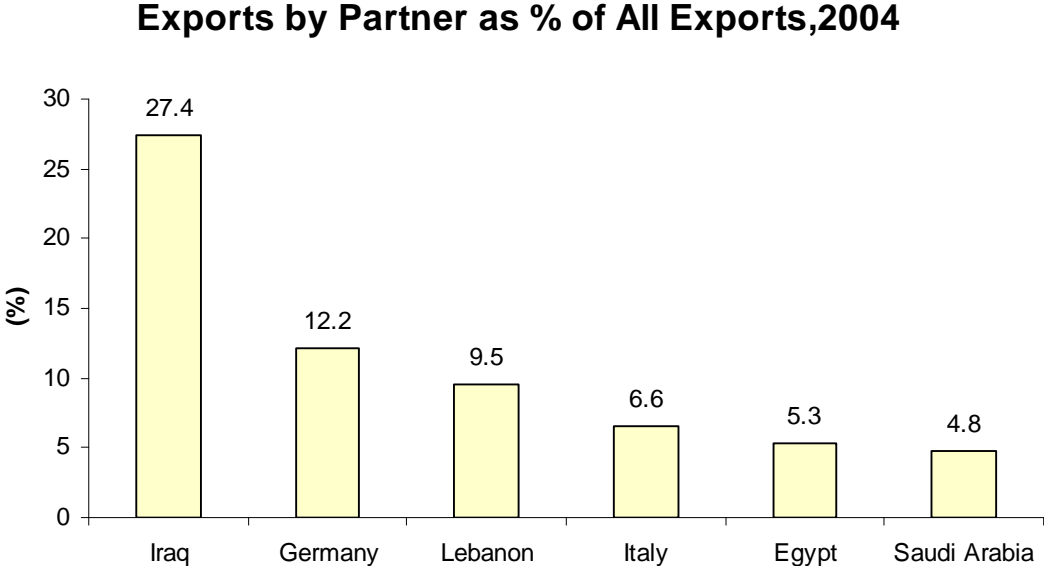
Foreign Trade

Syria's major export sectors are Petroleum and Agricultural goods. It also imports heavy machinery and automobiles, food and livestock, metals and metal products as well as chemicals.

Syria's trading partners are primarily neighboring Arab countries and other Arab/Moslem countries. However, petroleum and its byproducts are heavily exported to the EU (87% of all exports) whereas machinery and chemicals (32% and 16% of all imports from the EU, respectively) are imported in significant quantities from this source.

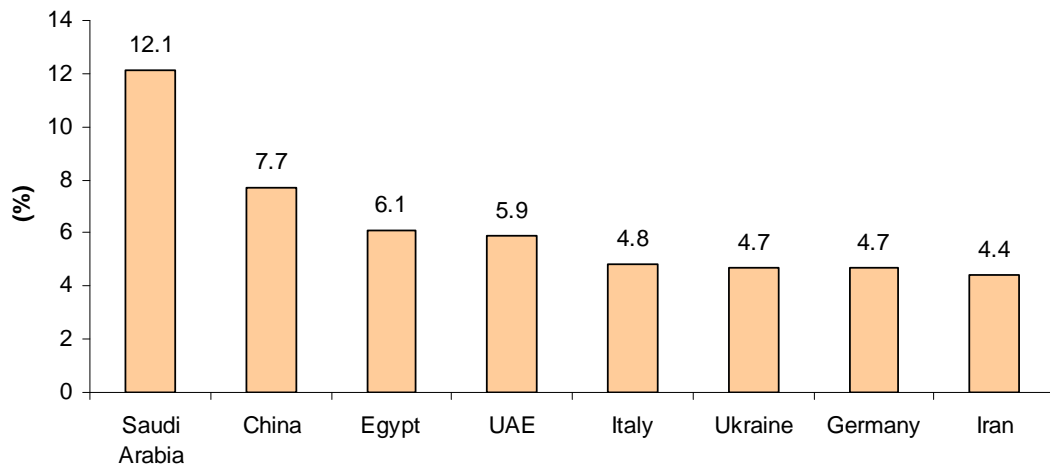
Trade data taken from EU's External Relations segment:

http://ec.europa.eu/external_relations/syria/intro/index.htm



Source: CIA World Fact Book, 2007

Imports by Partner as % of All Imports, 2004



Source: CIA World Fact Book, 2007

Syria's Relationship with the EU

The EU is Syria's main trading partner, accounting for over 40% of total trade in 2003. It is also Syria's main donor, contributing over € 900 Mn in MEDA program support and loans since 1995. Syria was the last MEDA country to sign an agreement (2004) with the EU. Bearing this in mind and considering the inconsistency in Syrian economic data, it is difficult to determine the effects of the Barcelona Initiative on trade. Syria has undoubtedly opened its borders a bit but as long as the government remains its dominant exporter and importer, trade will remain sluggish, ineffective and problematic.

Summary

Among MEDA countries, Syria remains furthest from exhibiting a free trade economy, which means it is still the furthest away from trading freely with the EU.

The Barcelona Initiative, which resulted in the signing of a trade agreement in 2004, might have improved trade relations between Syria and the EU were it not for the Syrian government's high profile in every aspect of the Syrian economy. Recent reforms have been small scale and inconclusive while rising oil prices continue to rescue the Syrian economy from collapse. As its oil reserves are diminishing, Syria will eventually find itself in a difficult economic position in the absence of intensive economic reform.

7. Tunisia's Economy

	1998	1999	2000	2001	2002	2003	2004	2005
Annual change in GDP, constant prices (%)	4.8	6.1	4.7	4.9	1.7	5.6	6.0	4.0
GDP, current prices (\$ Bn)	19.8	20.7	19.4	19.9	21.0	25.0	28.1	28.9
GDP per capita, current prices (\$)	2125	2195	2034	2066	2152	2530	2811	2856
Inflation (%)	3.1	2.7	2.3	2.0	2.7	2.7	3.6	2.0
Current Account Balance (\$ Bn)	-0.6	-0.4	-0.8	-0.8	-0.7	-0.7	-0.5	-0.3
Current Account Balance as % of GDP	-3.4	-2.2	-4.2	-4.2	-3.5	-2.9	-2.0	-1.0

Source: IMF data, 2007.

Overview

Tunisia has undergone major economic reforms over the last 15 years, making it one of the most open, competitive and modern economies among African and MEDA countries. After surviving an economic crisis in the mid 1980's, the Tunisian government set out to institute reform. To do so it introduced a structural adjustment program that liberalized prices, reduced tariffs and reoriented Tunisia in the direction of a market economy.

The Tunisian government borrowed funds from the World Bank and other western creditors and was accepted into the World Trade Organization. In 1996, Tunisia joined the Barcelona Initiative, with the EU assisting the Tunisian government to enhance commercial productivity and prepare its businesses for competition in global markets. Government control of economic affairs, while still heavy, is decreasing: In 2002/03, Tunisia was ranked 34 according to the *Global Competitive Index* as rated by the World Economic Forum. By 2007, Tunisia was ranked first among African nations in the Forum's *Global Competitiveness Report*.

Despite its efforts, Tunisia's economy is still troubled by labour issues. Officially, 15% of the Tunisian work force is unemployed but the real numbers are reportedly higher. Yet, Tunisia's openness to trade may have resulted in internal economic problems. With over 50% of the population under the age of 25 and a reported shortage of skilled workers, Tunisia's socio-economic issues are intensifying.

The beginning of the new millennium saw real growth slowing. It reached a 15-year low of 1.7% in 2002 due to drought and a lackluster tourist season. However, increased rain in 2003 returned the economy to annual growth of 5.6%.

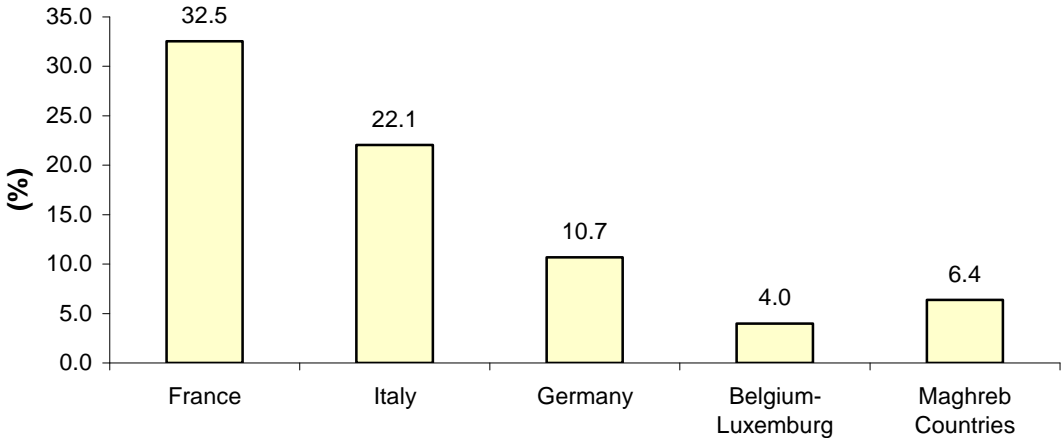
The Tunisian stock market currently lists over 50 firms; despite substantial tax incentives aimed at encouraging firms to join the exchange, expansion is slow. Tunisian investment, like its foreign currency regime, are still subject to limitations although efforts are being made to minimize obstacles to trade.

Foreign Trade

Tunisia's major export destinations are the EU and the Maghreb countries. Exports include clothing, semi-finished goods and textiles, agricultural products, mechanical equipment and chemicals.

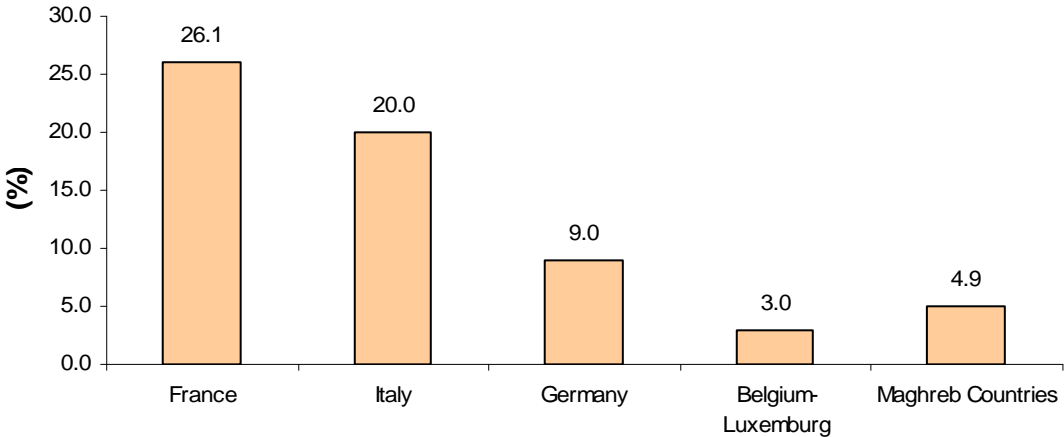
Tunisia imports mainly textiles, machinery and equipment, chemicals and foodstuffs.

Major Export Partners by % of Total Exports, 2005



Source: National Statistics Council, Tunisia, 2005

Major Import Partners by % of Total Imports, 2005



Source: National Statistics Council, Tunisia, 2005

Tunisia's Trade with the EU:

Tunisia's major trading partners over several decades have been countries that are now EU members. Tunisia is the most advanced Euro-Mediterranean partner as far as the introduction of a free trade zone with the EU is concerned (a 12-year transition period has been stipulated). Tunisia began dismantling tariffs in 1996, before the EU-Tunisia Association Agreement came into force in 1998. Tariff dismantling has sped up the country's integration into the European market. Today 84% of Tunisian exports go to the EU, with the EU providing around 72% of Tunisia's total imports. Mutual concessions have been made regarding agricultural products, especially olive oil and wine, with new concessions agreed to in January 2001 and incorporated in the Association Agreement. The EU has also increased the preferential quota for Tunisian olive oil and granted a gradual reduction in customs duties on certain products, including wheat and vegetable oils.

Financial Cooperation

As a member of the Euro-Mediterranean partnership, Tunisia benefits from access to financial co-operation in the framework of the MEDA Program. Tunisia is in fact one of the chief beneficiaries of this financial co-operation because, thanks to its good absorption capacity, it has received about 13% of the MEDA budget while housing only 4% of the population in the Mediterranean region.

Summary:

The Barcelona Initiative has had a profound influence on Tunisia's economy. Tunisia is the most advanced Mediterranean country with respect to the establishment of a free trade zone with the EU, progress that is partially rooted in Tunisia's almost complete dependence on the EU for the conduct of its foreign trade. Tunisia has also received a fair share of support from the EU and other international organizations on its way to becoming a market economy. However, unlike other Mediterranean countries such as Israel and Turkey, Tunisia still suffers from heavy government control over the economy and a listless private business sector. Intensified privatization, further liberalization of investment regulations to attract foreign investment, improvements in administrative efficiency and reduction of the trade deficit are among the challenges it must face.

V. Annex II: Special Country Reports

By

Dr. Roby Nathanson

Dan Terner

1. Israel's Economy

Introduction:

The Barcelona initiative, which began in 1995, aimed to construct a zone of shared prosperity through an economic and financial partnership and the gradual establishment of a free-trade area (Economic and Financial Chapter).

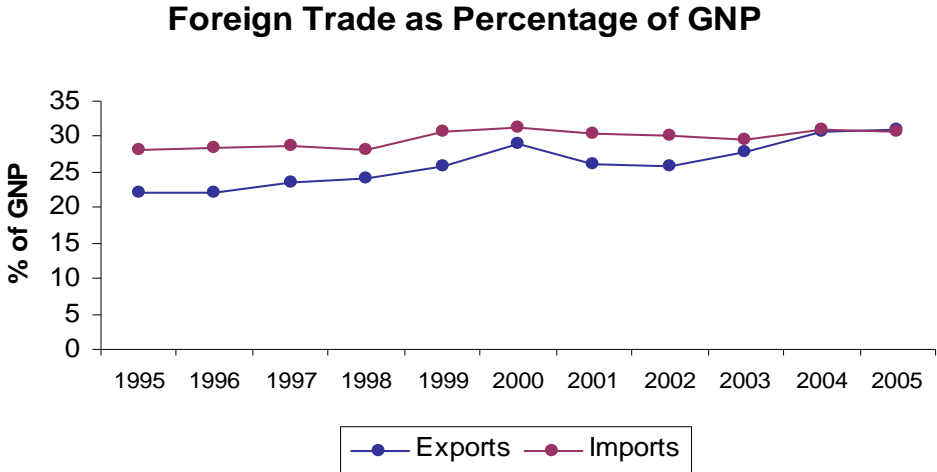
In this paper, we display an overview of Israel's economy and attempt to assess the impact of the Barcelona initiative on it.

	1999	2000	2001	2002	2003	2004	2005	2006
GDP(current prices in Bn \$)	98.8	108.2	109.8	113.5	115.2	122.5	129.8	140.3
GDP per Capita (current prices, 000's)	15.9	16.9	16.8	17.1	17.0	17.8	18.5	19.7
GDP Real Growth Rate (%)	2.9	8.7	-0.6	-0.9	1.5	4.8	5.2	5.1
Exports of Goods & Services (Bn \$)	17.2	21.7	20.3	19.0	20.2	24.7	25.8	30.6
Imports of Goods & Services (Bn \$)	25.3	29	27.7	25.9	26.5	31.8	35.4	38.7
Unemployment Rate (%)	8.9	8.8	9.3	10.3	10.7	10.4	9.0	8.4
Inflation Rate (year end)	6.4	1.3	2.1	6.2	-1.9	1.2	2.4	-0.1
Current Account Balance (% of GDP)	-1.3	-0.7	-0.9	-0.6	1.5	2.5	2.9	5.2

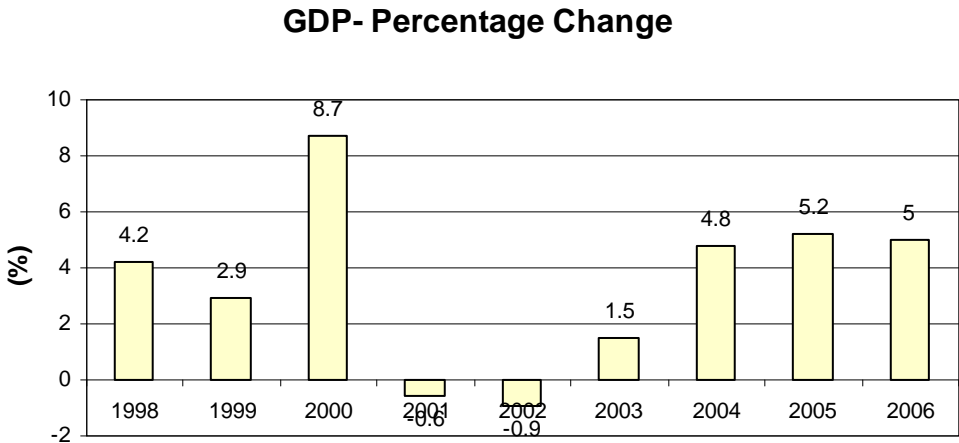
Source: CBS and Bank of Israel Data.

1.1 Foreign Trade:

Having very little natural resources of its' own, Israel is highly reliant on foreign trade to supply its' demands. Israel has also become an export powerhouse in the high technology, chemicals and diamond sectors. Trade with the EU, which had always been one of Israel's biggest trade partners, has transformed since the 1980's. Many of Israel's previously large export branches to Europe, such as clothing and leather goods, have been replaced by High Tech and communications equipment. Israeli farmers still sell hundreds of millions of dollars worth of produce in the EU, but agricultural exports' rate within Israeli export to the EU has dropped. This is because of the tremendous development of High Technology sector and Israel's reliance on their exports.

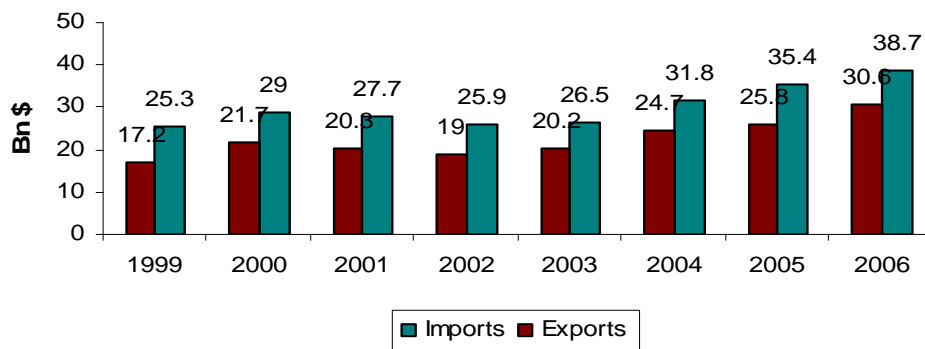


Source: Central Bureau of Statistics, Statistical Abstract of Israel 2006



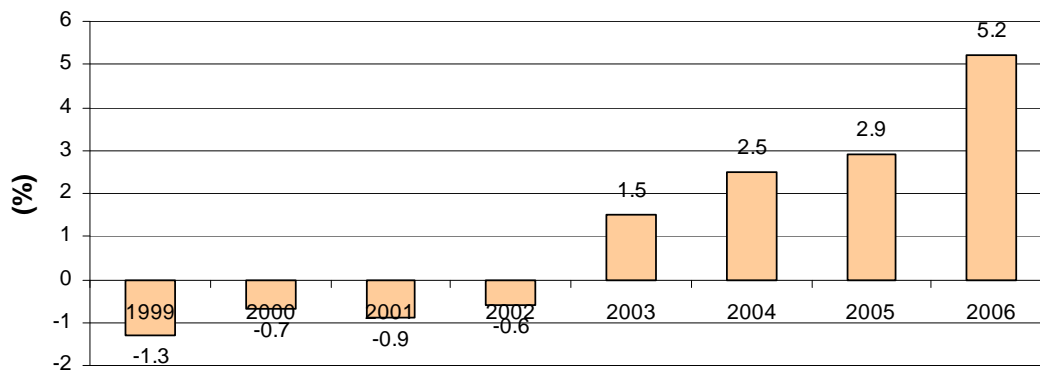
Source: Bank of Israel, Data Series

Israel's National Trade of Goods (exc. Diamonds) Bn\$



Source: The Israeli Export & International Cooperation Institute (www.export.gov.il)

Current Account Balance: Surplus/Deficit as percentage of GDP



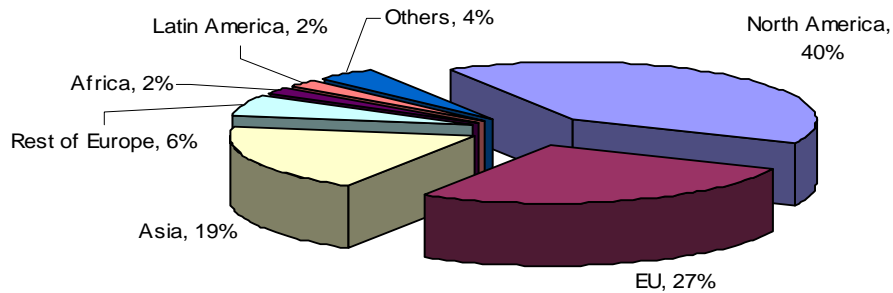
Source: Bank of Israel, Data Series

1.2 Exports:

Israel is showing a constant increase in exports with the High Tech and Communications industries leading the way, but with this rise comes a decrease in traditional industry exports in recent years. Nevertheless, traditional industry exports to the EU have shown a milder decrease over the past 20 years, and some sectors have even increased exports to the EU.

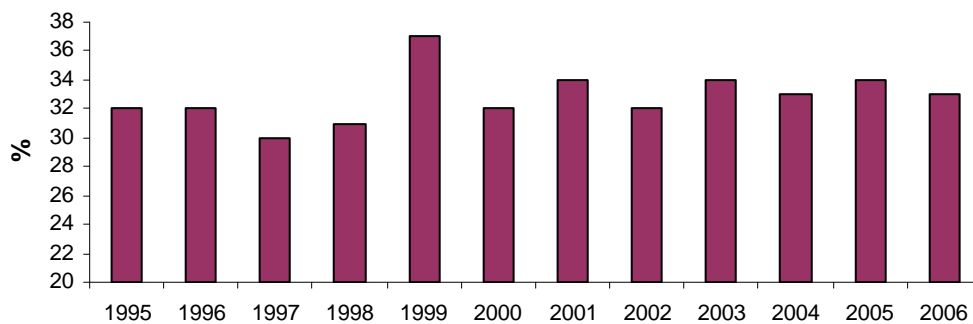
Exports to the EU: Exports to the EU consist 33% of Israeli exports, and have been a dominant factor in Israeli foreign trade in past decades. The EU is Israel's second largest trade partner (following the U.S), and amid a changing political environment trade with the EU has remained stable. Israel's major exports in the EU are Chemicals (comprising 28% of exports to the EU), Communication equipment (19%), and Plastics and rubber (9%).

Exports of Goods by Regions 2006 (inc. Diamonds), %



Source: The Israeli Export & International Cooperation Institute (www.export.gov.il)

Percentage of Exports to the EU out of Total Exports (exc. Diamonds), %



Source: Central Bureau of Statistics, Statistical Abstracts of Israel 1997-2006

Israel's proximity to the EU has provided it with the opportunity to export agricultural and industrial goods at reasonable prices, and the EU's transition to a single currency has helped Israel's exports remain inexpensive for European clients. The Barcelona initiative has also contributed to the stability of Israeli exports, with the decrease in taxation keeping prices down.

With this, it is important to denote that trade with the EU had decreased during the second Intifada because of political reasons and the damage to Israel's image.

1.3 Leading Export Destinations:

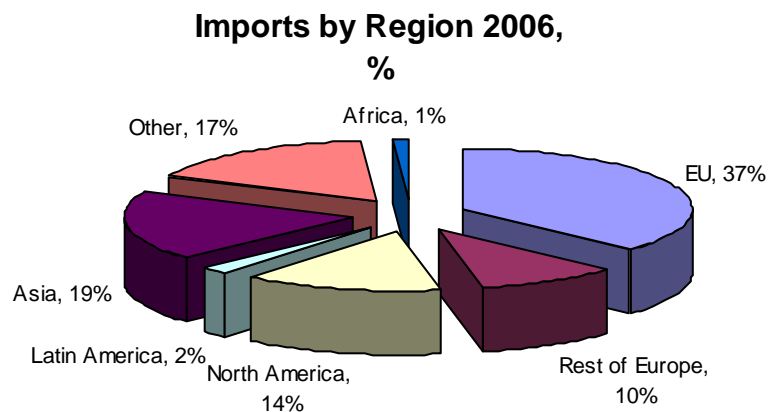
Germany: Exports to Germany comprise 17% of exports of goods to the EU.

Exports to Germany totaled 1.7 Bn \$ in 2006 (which constitutes a 31% rise from 2005). Main industries are Communication equipment and Plastic and rubber.

The U.K: Exports to the U.K comprise 14% of exports of goods to the EU, totaling 1.4 Bn \$ in 2006 (a 3% decrease from 2005). Main exports are Plastics and rubber and Pharmaceuticals.

The Netherlands: Exports to the Netherlands comprise 13% of exports of goods to the EU, totaling 1.3 Bn \$ in 2006 (a 4% increase from 2005). Main industries are Chemicals and Medical equipment.

Imports:

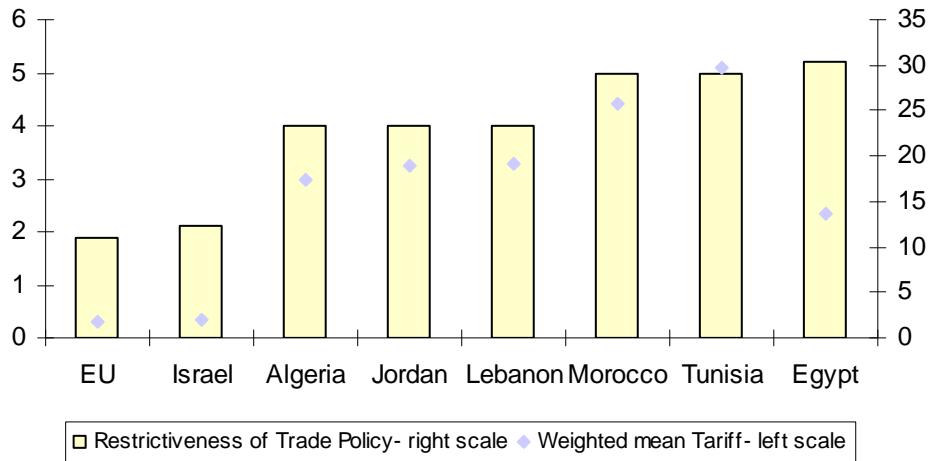


Source: Central Bureau of Statistics

1.4 Trade Agreements:

Free Trade Agreements: U.S.A (1985), EFTA (1992), Turkey (1997), Jordan (Bilateral Trade Agreement 1995), Mexico (1999), Canada (1997), EU- Association Agreement 2000, Romania (2000), Bulgaria (2002).

Avoidance of Double Taxation Agreements: Belarus, Belgium, Brazil, Bulgaria, Canada, China, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, India, Jamaica, Japan, Luxemburg, Mexico, Norway, Philippines, Poland, Romania, Russia, Singapore, Slovakia, South Africa, South Korea, Spain, Sweden, Thailand, The Netherlands, Turkey, U.S.A.

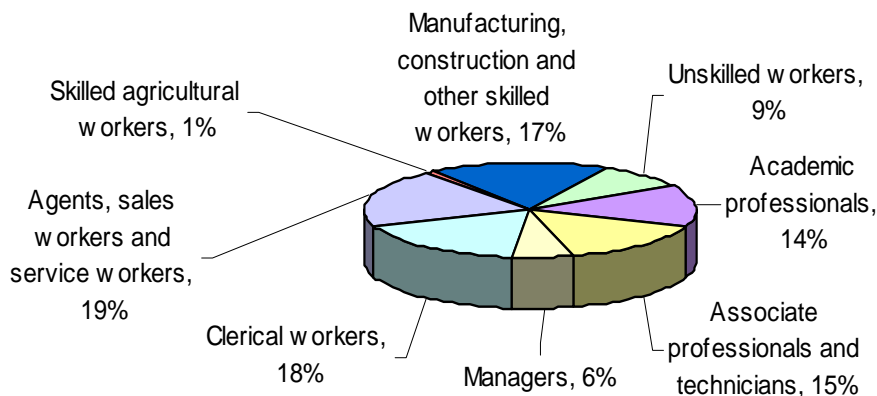


Source: Heritage Foundation (Gwartney et al., 2003) World Bank Development indicators (2002).

2. Labour Market:

The Israeli labour market is a complex and diverse. As Israel is ground to a boosting High Tech industry but also a sluggish Low-Tech industry, Israel's labour market is also divided. This causes major gaps in social benefits and employment opportunities. Since the latest recession of 2002-2003, labour participation rates have been on the rise. Nevertheless, labour participation rates in Israel are significantly lower than in most developed nations. Unemployment rates have also been falling from a high of 10.7% in 2003 to 7.6% in May 2007. This decrease is a result of both Israel's thriving economy and government policies to reduce dependence on welfare, which have been implemented since 2003.

The Israeli Labour Market by Worker Type



Source: CBS , Statistical Abstract of Israel, 2006

3. Israel's Economy- 1990-2006:

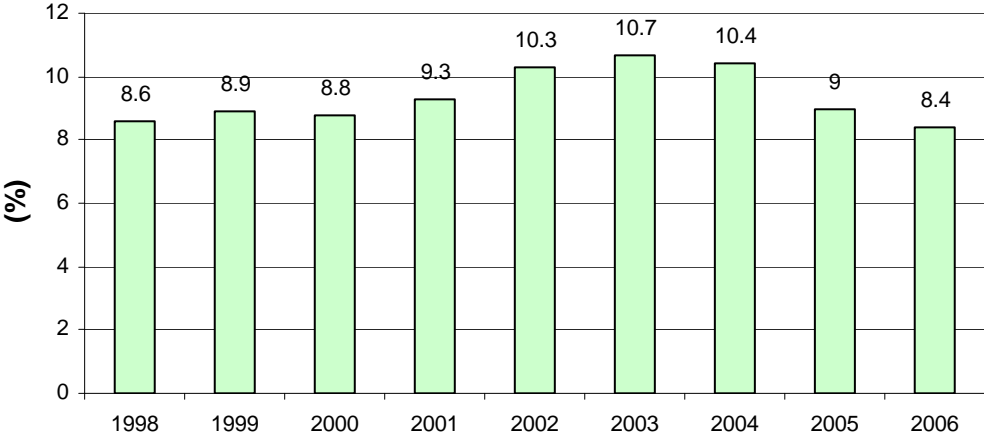
The beginning of the 90's was optimistic for Israel, with the collapse of the Soviet Union and the beginning of the Peace process. The collapse of the Soviet Union brought masses of Russian immigrants, many of whom were academics in technological and medical sectors, which spurred the Israeli private sector's growth.

This massive wave of over 1,000,000 immigrants (20% of the population) spurred outstanding growth in the construction, commodities and transportation sectors, which translated into increased growth rates during the mid 90's. This economic flourish was further boosted by the peace accords signed in '93, '94 and '95. The signing of the peace accords with Jordan and the PLO opened new markets for Israel in Asia and Africa and enabled Israel to extend its' trade with the EU. In the height of this process the Barcelona initiative began and improved trade with the EU- Israel's biggest trade partner at the time. With the change of government in 1996, the political atmosphere in the Middle East changed, with the economy soon following. Israel's growth rate dropped from an average 7% in 1994-1995 to 4.4% in 1996. The following years saw the peace process dying out and the emergence of the Israeli High Tech industry. Israel has long been considered a technological powerhouse, but the 1998-2000 High Tech rush made a significant impact on every aspect of the economy, whether it be the immense growth rates of '99-00', or the increase in exports which improved Israel's trade balance. The High-Tech bubble had also increased Israel's trade with the U.S and Asian countries before bursting in late 2000. The bursting of the High-Tech bubble was also accompanied the beginning of the second Intifada. The Israeli economy suffered a major blow in 2000 having to absorb both an international crisis and domestic bloodshed. Israel's problems were amplified by its' public sector spending, which remained the same as that of the High Tech bubble, due to political reasons. Subsequently, Israel went into a three year recession, suffering from ever high unemployment rates, growing trade and public deficits , and a depreciation in purchase power. This recession period was accompanied by rising security and welfare expenses, while tax collection was dropping, which raised public debt to new heights. The Israeli government's reaction was fierce. In 2003, the government began making significant budget cuts, which further increased unemployment. However, with the reemergence of international markets and the gradual improvement in its' security situation, Israel's economy had also began its' recovery, showing a decrease in unemployment rates as early as the beginning of 2004, and a significant improvement in foreign trade. The recovery of the worldwide High Tech industry had also made a significant contribution to Israel's recovery. The High Tech prosperity meant that venture capital from all across the globe

flooded the Israeli financial markets, causing the regrouping of other sectors of the economy as well. This while the Israeli government kept a strict fiscal regime, monitoring public spending in order to keep the inflow of foreign funds to Israel's economy. This policy, however, had its' downsides as well: Social gaps grew wider and the government was reluctant to spend any money on welfare and subsidies. This made the weaker sectors in society even weaker, raising poverty levels and creating conflict within the Israeli society. The past two years have seen government efforts to diminish poverty using different welfare programs, while attempting to maintain fiscal spending.

The Second Lebanon War: The Second Lebanon War had put the Israeli economy in an ambivalent position. On the one hand, Israel's northern territories had been under constant attack, a state which halted any economic activity, but on the other hand other places in Israel, mainly the central area, have maintain the same economic activity levels, and in some places economic activity had even increased because of the stream of northern residences flowing to Tel Aviv and its' surroundings. The war had greatly affected Israel's north, leaving damaged factories, businesses and houses, but Israel's economy quickly bounced back, with growth rates aligning with previous growth rates, and with little visible damage except for increased security spending.

Unemployment Rate 1998-2006



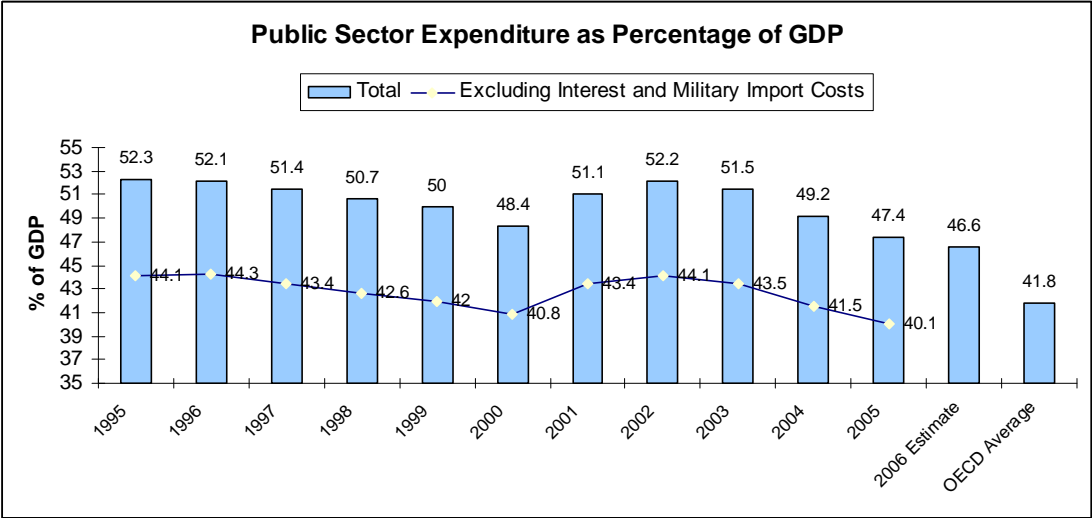
Source: Israel Bank's Data Series

4. The Public Sector:

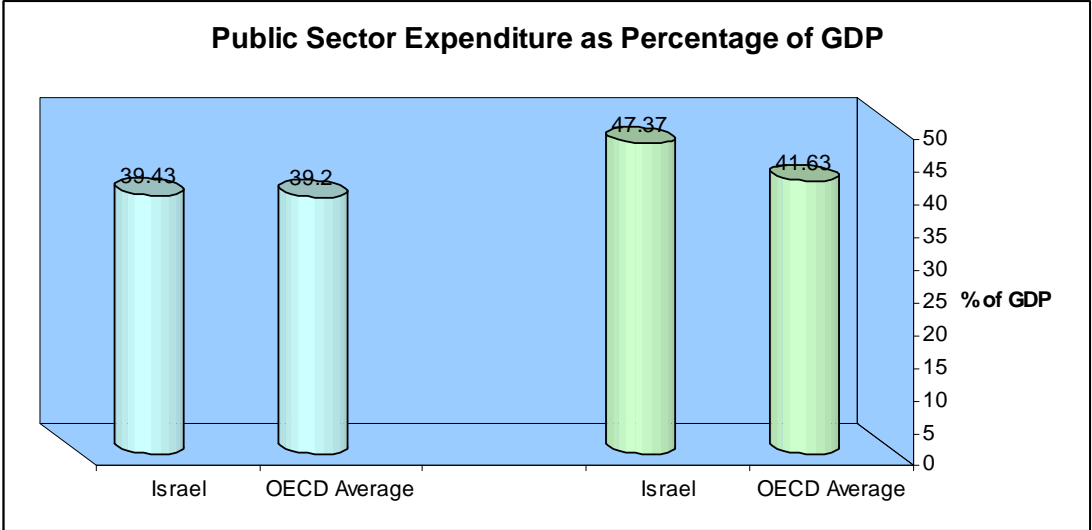
Israel's government expenditure is outstanding in international standards. The main reason for this is Israel's vast military and security spending. Israel's security budget currently constitutes 16.9% of it's annual budget(2007), which is 7.4% of Israel's GDP (10% including additional

expenses). However, the Public Sector's share in the GDP has been decreasing in recent years, ever since the 2003 economic turn around.

Public debt is also a major issue in Israel's economic agenda. In the 1980's, Israel's public debt had reached monstrous proportion of 180% of the GDP. Ever since, the Israeli government has been trying to reduce public debt in order to cut interest payments, which strain Israel's annual budget, and reduce Israel's dependence on U.S support. Nevertheless, efforts to reduce public debt have bared fruit only in times of economic tide, while in recession years Israel's debt had grown.

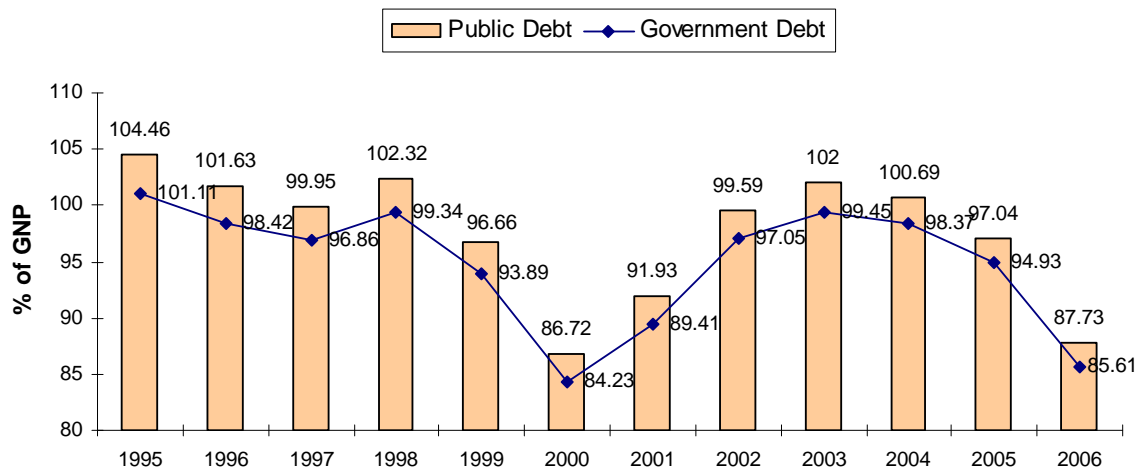


Source: "Trends in Israel's Economy", Israeli Ministry of Treasury presentation, January 2007.



Source: "Trends in Israel's Economy", Israeli Ministry of Treasury presentation, January 2007.

Public Debt as Percentage of GNP



Source: "Trends in Israel's Economy", Israeli Ministry of Treasury presentation, January 2007.

5. Privatization:

In recent years, the Israeli government has put privatization on its financial agenda. Many publicly owned companies, infrastructure facilities and public services have been transferred into private hands, with the government using privatization revenues to lower public debt. Some of the biggest privatization initiatives include Israel's largest communication provider, Israel's cross country road, several banks, refineries and public employment services.

6. Conclusions:

- In the past 15 years, Israel has been transformed into a modern economy, highly reliant on foreign trade.
- Despite recent years' improvement, the public sector in Israel still accounts for almost half of the annual GDP, which is more than the OECD average.
- Due to several prior crises, Israel has become less vulnerable economically to political and military turmoil. This is due to the private sector taking a bigger part of economic activity and becoming the dominant factor in economic growth, due to privatization initiatives and fiscal cuts.
- High Tech exports make up a large portion of Israeli exports, but Israeli exports to the EU are mostly agricultural and industrial, which makes Israeli export to the EU less vulnerable to High Tech slumps.
- The Barcelona initiative has made a solid contribution to Israel- EU trade, despite being an additive to an already developed trade operation.

Summary:

In the past 15 years, Israel has transformed into an open economy, highly reliant on foreign trade and especially the international High Tech market. This because of public sector and fiscal reforms and major investments in R&D. Among negative consequences of this transformation are the forming of social and economic gaps and a decrease in employment. The Barcelona initiative has been a welcome addition to the already blooming trade between Israel and the EU and has certainly been helpful in keeping Israeli product attractive in EU markets and vice versa.

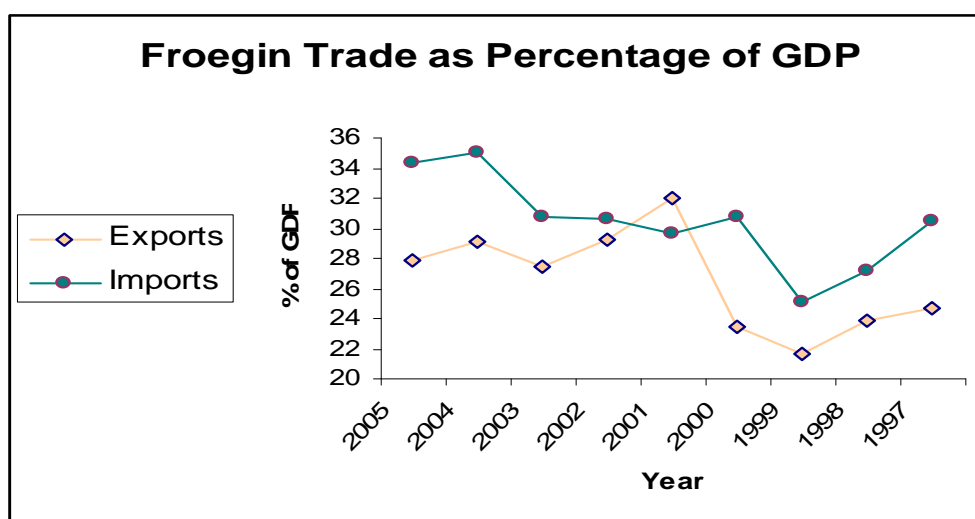
2. The Turkish Economy

1. Introduction

The Barcelona Initiative, begun in 1995, was aimed at constructing a zone of shared prosperity through economic and financial partnership as well as gradual establishment of a [free-trade area](#) (Economic and Financial Chapter). In this paper we provide an overview of Turkey's economy while attempting to assess the Initiative's impact on its development.

Indicators	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. GDP, in 1987 prices ,USD bln	114.8	119.3	112.0	119.1	107.7	116.3	123.1	135.3	145.6
2. GNP per capita, current prices, USD	3,079	3,255	2,879	2,986	2,160	2,584			
3. GDP growth rate, %	7.5	3.1	-4.7	7.4	-7.5	7.9	5.8	8.9	7.4
4. Industrial production growth rate, %	10.9	0.9	-5.2	6.1	-8.7	9.4	8.7	9.8	
5. Consumer price index, 2000=100	21.2	39.1	64.5	100	154.3	223.8	272.1	295.5	319.7
6. Annual unemployment rate, %	6.7	6.8	7.7	6.6	8.4	10.3	10.5	10.3	10.2
7. Current account balance, USD mn	-2,638	1,984	-1,360	-9,819	3,396	-1,481	-8,036	-15,601	-22,603
8. Foreign exchange reserves, USD mn	18,610	19,718	23,177	25,097	18,892	27,006			
9. Exports as % of GDP	24.7	23.8	21.7	23.4	32.0	29.2	27.5	29.1	27.8
10. Imports as % of GDP	30.5	27.2	25.1	30.7	29.7	30.6	30.8	35.0	34.4

Sources: Undersecretariat of Treasury year, State Institute of Statistics year, Ministry of Labour and Social Security year, Central Bank of Turkey year, International Monetary Fund year.

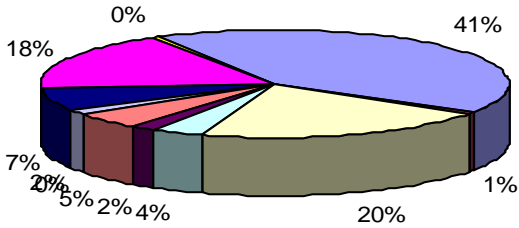


Source: Turkish State Institute of Statistics, year.
Correct: Foreign Trade as a Percentage of GDP

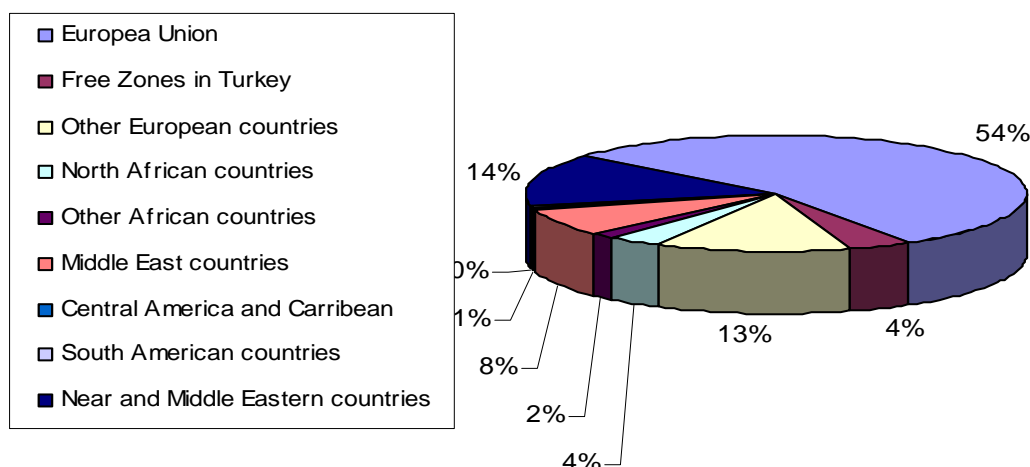
1.1 The foreign trade regime and major regulations

The most significant feature of Turkey's foreign trade policy in the past decade is the Customs Union established between the EU and Turkey on 1 January 1996. This event initiated a process of harmonization between Turkey's legal infrastructure, foreign trade strategy and EU norms. Importantly, the Customs Union covers only industrial and processed agricultural products, with traditional agricultural products remaining outside its scope. With respect to processed agricultural products, the parties agreed to establish a system by which Turkey would differentiate between the agricultural and industrial components of the duties applied in a way similar to EU practice. For goods imported from third countries, Turkey has begun to apply the protective customs rates specified in the EU's Common Customs Tariff, excluding products classified as sensitive. Turkey has also adopted several EU Common Commercial Policy arrangements, including common rules on import and export, inward and outward processing, standardization of foreign trade and administration of quantitative restrictions.

Imports by Region (%), 2005



Exports by Region (%), 2005



Source: Turkish Undersecretariat of Treasury, 2005

1.2 Major bilateral and multilateral trade agreements

In addition to the Customs Union with the EU, Turkey has concluded Free Trade Agreements (FTAs) with EFTA, Israel, Hungary, Romania, the Czech Republic, Slovakia, Latvia, Lithuania, Estonia, Slovenia, Bulgaria, Poland, Macedonia, Croatia, Tunisia, Morocco and Syria. FTA negotiations are still in process with Egypt, Lebanon, Albania, the Faeroe Islands and the South African Customs Union.

1.3 Free Zones

Free Zones are special sites located within a country but deemed to be outside its customs territory. These are areas where the effective regulations regarding foreign trade and other financial and economic activities are either not at all or only partly applied, or where new regulations are tested. Free Zones offer a more convenient business climate, considered necessary to increase trade (import and export) volume for selected goods as compared to the other parts of the country.

1.4. Tax policies and reform

Major tax revisions were introduced as part of Turkey's IMF-backed reform program. In April 2005, the Turkish parliament approved legislation meant to strengthen the power of the tax authorities mandated to reduce the widespread tax evasion. The government realizes that

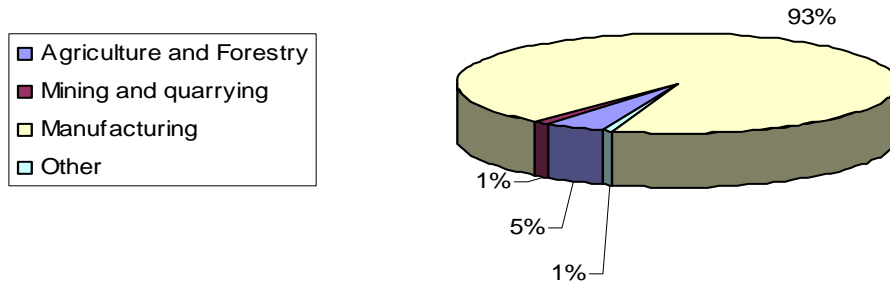
improvement will be difficult to achieve in the short term. In November 2005 the government announced larger than expected tax cuts for 2006 while promising the IMF that it will cut spending if the revisions threaten to prevent reaching fiscal targets. For instance, the corporate tax rate was lowered from 30% to 20% to help attract foreign direct investment (FDI). The maximum personal income tax rate was cut from 40% to 37%. Furthermore, in mid-2006, the 15% capital gains tax on revenues from trading in stocks and bonds on the Istanbul stock exchange imposed on non-residents, introduced at the beginning of that year, was rescinded. These steps indicate that the government prefers increases in indirect taxes as a mechanism for boosting revenue. All in all, Turkey is reforming its tax system. However, due to poor enforcement, the government is still finding it difficult to reach its fiscal goals.

1.5 Developing Sectors

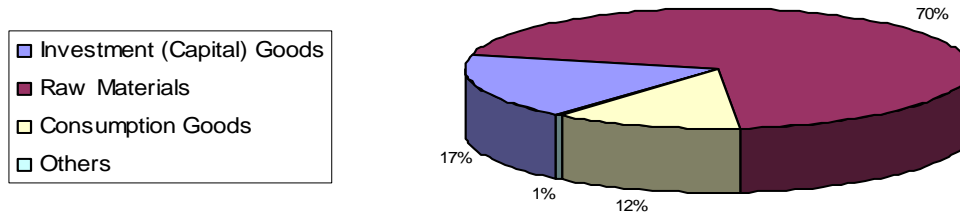
The Automotive Sector: Turkish vehicle manufacturing has been successfully transformed from a highly protected local industry into a competitive and increasingly export-oriented industry employing over 630,000 people. Automobile manufacturing is Turkey's third-largest industry (preceded by Food and Textiles) in terms of contribution to GDP, and its second-largest export sector (after Textiles). Turkey has 18 firms producing passenger cars, light commercial vehicles, tractors, etc., most of which are operated with foreign partners.

Tourism: Turkey is one of the Mediterranean's most popular tourist destinations; its performance in terms of arrivals and revenues is substantially above the world average. In recent years, Turkish tourism policy has stressed quality (in facilities and services) rather than quantity, thereby attracting large numbers of European tourists, mainly from Germany, the UK and the Netherlands.

Exports by Sector (%), 2005



Imports by Product Groups (%), 2005



Source: Turkish Undersecretariat of Treasury, 2005

2. Economic developments/milestones

2.1 The 2001 financial crisis

The 1990s was a period of instability for the Turkish economy. After the complete capital account liberalization in 1989, economic growth was sluggish and beset by two minor and two major recessions. The economy experienced “boom-bust” performance, with a relatively low average growth and high volatility. Growth oscillated between 9.3% and -5.5% of GDP; inflation hovered above 60% for the entire decade, with the government accumulating large budget deficits (Akyüz and Boratav 2003). Liberalization of capital accounts, far from easing government borrowing, forced it to offer higher spreads compared to safer dollar assets, now freely available. Real interest rates on debt soared. Private banks began to concentrate their

activities on transactions in government securities in response to the arbitrage opportunities offered by the high rates on local securities compared to foreign borrowing and domestic deposits (Akyüz and Boratav 2003). The rising interest rates put further pressure on the government to increase borrowing in order to meet interest payments, which reached 75% of tax revenues by the decade's end. Finally, the combination of high interest and inflation rates and open capital accounts generated high volatility in the financial markets.

It was in this context that Turkey began constructing a reform program in cooperation with the IMF (1998). The program's main objective was stabilization of the economy by reducing inflation, which had exceeded 80% at some point in the 1990s (IMF 1998). Turkish policymakers and their IMF colleagues deemed large budget deficits to be at the heart of the inflationary process; so, an important part of the program revolved around different strategies of debt reduction, notably an ambitious privatization scheme. The government also pledged to keep capital flows free from any restrictions and not to intensify trade restrictions (IMF 1999a, b). At the same time, it announced it would try to curtail spending by reducing labor costs and overhauling social programs. In contrast with the efforts exerted to achieve a balanced budget, the banking laws were amended to force the recovery by the Savings Deposits Insurance Fund (SDIF) of any insolvent banks for restructuring or liquidation, while the provision of liquidity by the SDIF to any bank not under its full control was prohibited (IMF 1999b).

On the eve of the 2001 financial crisis, following some financial disruptions in November 2000, the SDIF was given full authority to borrow as needed from the Treasury, with full protection granted to the creditors and depositors of domestic deposit-taking banks (IMF 2000c) in an effort to restore confidence in the program. These two measures would eventually prove very costly, swamping all gains made on the fiscal front, including the large proceeds from privatization.

The stabilization program introduced in December 1999 had centered on a crawling peg model, designed to move in tandem with anticipated inflation. Yet, the program rapidly experienced strains as price increases outpaced expectations. While acknowledging this trend, government officials and IMF staff alike declared that they were satisfied with the program's progress as late as the end of June 2000, an understandable assessment since virtually all other program targets had been met (IMF 2000a, b). Nonetheless, the currency kept appreciating in real terms and, beginning in fall 2000, signs of trouble culminated in a flight from the local currency in November. The last week of November alone witnessed a \$5.3 billion outflow as a result of short-term speculation, culminating in a severe liquidity shortage in domestic

financial markets and surging interest rates, which reached 2,000% overnight. The outward flow of capital was halted and devaluation fears were allayed only after the IMF transferred \$7.5 billion in additional support.

A few months later, in February 2001, a new wave of capital outflows led to the economic program's collapse. Jittery investors pulled \$5 billion out of Turkey on February 19 alone. The Central Bank's foreign exchange reserves, standing at less than \$20 billion, were at risk of depletion. As policymakers attempted to maintain the controlled exchange rate regime amidst financial turmoil, interest rates again soared, to several thousand percent. This impeded the government's ability to raise money. Devaluation of the Turkish lira seemed inevitable. Abandonment of the pegged exchange rate system caused an immediate and sharp devaluation of about 30% against the US dollar. When the dust settled (February 2001), inflation was back where it had been before the stabilization program although it was higher temporarily, government debt as a percentage of GDP had nearly doubled and interest rates were still problematic.

2.2 Economic Recovery

After suffering several financial crises during 1999-2001, Turkey has learned from its previous mistakes, with a solid reform program being implemented over the last five years. Authorities have focused on the need to implement fundamental reforms to modernize the country and improve governance.

Following the crises, the government outlined a new economic recovery program, supported by international financial institutions. In 2002, a new reform-oriented government was elected; in 2003, the economy began to rebound. This was due to the authorities' steadfast efforts to place the economy on a sustainable path by continuing the macroeconomic program supported by the International Monetary Fund (IMF).

In 2005, GNI grew by 7.6%, driven by private consumption, investment, and export growth. Economic growth continued in the first quarter of 2006, albeit at a slower pace. Despite this growth, unemployment, at 10%-11%, has persisted.

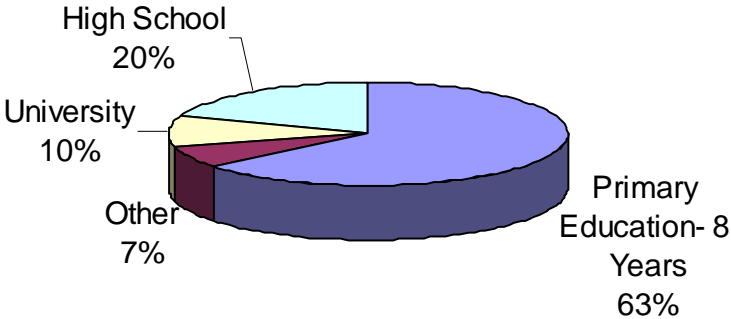
Inflation, which had fallen to single digits in 2004 for the first time in more than 30 years, and which further decelerated to 7.7% in 2005, showed that a strong Turkish lira could help keep the disinflation process on track. However, recent turmoil in the global financial markets put downward pressure on the lira in 2006 and year-end inflation is expected to increase to 8.9%.

3. The Labour Market

While the economy has grown rapidly since the 2001 crisis, new job generation has been lagging, creating social problems and potentially undermining public support for reform. Unfortunately, unemployment remains high (10%-11%) and persistent. Turkey relies on manufacturing and Low- to Medium-Tech industries; unskilled and semi-skilled labour is abundant. High levels of under- and unemployment mean that this situation is unlikely to change in the foreseeable future. However, the risk of shortages of skilled workers, especially in High-Tech industries, is high. Firms continue to be forced to rely on internal training to procure qualified staff.

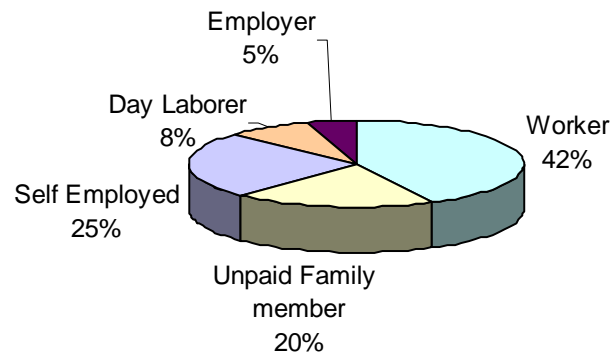
Existing laws mandate a lengthy collective bargaining process and the government has the right to curtail and ban strikes, a fact that limits trade union power. The EU is pressing for changes in this area. A 2002 law making it more difficult for firms to dismiss workers was diluted in 2003. Recent constitutional reforms require the government to negotiate with unions over pay benchmarks for civil servants. If no accord is reached, an arbitration board is convened to make proposals although the government is not bound by them. While wages are low compared with Western European countries, a large increase in the minimum wage in 2004 may have damaged the competitiveness of some low value-added manufacturing sectors.

Labour Force by Qualification Level, 2004



Source: Turkish State Institute of Statistics, 2005

Employees by Status, 2005



Source: State Planning Organization, 2005

4. Financial stability

In the wake of the 2001 financial crisis, foreign banks curbed lending to firms seeking medium-term hard currency loans while non-performing loans (NPL) in the financial sector rose sharply. Since the crisis, the IMF-backed economic reform program has reduced financial instability and encouraged major improvements in bank regulation. Due to the improved conditions, international lending to the private sector resumed in earnest in 2003, and continued into late 2006 despite the bout of severe foreign exchange volatility in May-June 2006.

5. Privatization

Since 1985, privatization has been high on Turkey's national agenda, with hundreds of government companies, infrastructure facilities, real estate properties and licenses transferred to private hands. Leading privatization initiatives have included:

-Privatization of 243 public companies.

-Infrastructure: 4 power generators, 22 incomplete plants, 29 energy generation and distribution units, 6 motorways, 89 public facilities and 6 ports have moved to private hands.

-Licensing: Private sector firms are now licensed to operate several bridges and automobile traffic control stations as well as 2 national lotteries.

-Real Estate: 198 real estate properties have been shifted to private hands.

Public companies are privatized by means of one or more of the following methods:

*Sale: Partial or full transfer of direct ownership or shares through domestic or international tenders, including sales on the stock exchange, sale to investment funds and sale to employees.

*Lease: Right of use of all or some company assets are granted for a designated period of time.

*Granting of operating rights.

*Establishment of property rights other than ownership.

*Introduction of profit-sharing and other legal mechanisms, depending on the nature of the business.

6. Conclusions

- After suffering two major crises in the past 15 years, Turkey has undertaken major monetary, legislative and fiscal reforms.
- Turkey has always viewed the EU as its foremost trading partner. The Barcelona Initiative simplified the conduct of trade between Turkey and the EU, to the extent that many European companies (especially automobile manufacturers) have relocated some of their operations to Turkey.
- The Turkish economy is highly reliant on foreign trade and foreign investment. This is partly due to the Barcelona Initiative but primarily the result of the economic reforms introduced by the government with IMF support.
- Since the 2001 fiscal crisis, the Turkish economy has become much more stable due to legislative and monetary reforms. Nevertheless, the Turkish Lira is still considered unstable and Turkey still has a long way to go before attaining Western-level stability.

Summary

In the past 15 years Turkey has been transformed from a struggling economy based on agriculture to a vibrant and open economy relying on manufacturing and foreign trade. The Barcelona Initiative, although not the major cause of this change, has played a positive part in this transformation.