



OECD DEVELOPMENT CENTRE

Working Paper No. 135

(Formerly Technical Paper No. 135)

TRADE INTEGRATION WITH EUROPE,  
EXPORT DIVERSIFICATION  
AND ECONOMIC GROWTH IN EGYPT

by

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Research programme on:  
Regional Co-operation and Integration

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## **ACKNOWLEDGEMENTS**

The authors are indebted to K. Fukasaku, J. de Melo, D. van der Mensbrugghe, and the participants of the CEPR / Venice International University Workshop on *Globalisation, Regional Integration and Development* for their helpful comments, and to A. Kuwahara and D. Konan for providing us with specific data. Usual disclaimers apply.

## RÉSUMÉ

Une diversification accrue des exportations apparaît aujourd'hui nécessaire à l'Égypte si elle désire rompre son isolement et profiter pleinement des potentialités de croissance que procure la globalisation des échanges. Dans quelle mesure l'accord bilatéral de libre-échange prévu avec l'Union européenne peut-il favoriser la transition d'une économie de rente vers une économie dont la croissance est tirée par les exportations ?

Ce document examine différents scénarios prospectifs de l'économie égyptienne à l'horizon 2010, à l'aide d'un modèle d'équilibre général calculable dynamique. Il en ressort que l'accord commercial préférentiel avec l'Europe devrait faciliter cette transition, si le renforcement des échanges permet de générer des gains importants de productivité en Égypte, grâce notamment aux transferts de technologies et à l'accroissement des pressions concurrentielles. A ces conditions, cet accord s'avérerait d'un impact comparable à celui que l'on pourrait attendre d'une libéralisation unilatérale de l'Égypte vis-à-vis de tous ses partenaires commerciaux.

## SUMMARY

Egypt needs to diversify exports further in order to emerge from its isolation and to draw the maximum advantage from the growth potential offered by trade globalisation. To what extent does the bilateral free trade agreement with the European Union encourage the transition from a rentier economy to one of export-led growth?

This paper uses a dynamic, calculable, general equilibrium model to assess different scenarios for the Egyptian economy to the year 2010. The authors reach the conclusion that the preferential trade agreement with Europe should facilitate the transition if the increase in trade results in higher Egyptian productivity through technology transfer and pressure from competition. Under these conditions, the agreement would seem to have a similar impact to that which could be expected from unilateral Egyptian trade liberalisation affecting all the country's trading partners.

## PREFACE

During the 1990s many developing countries have embraced a regional approach to trade and investment liberalisation alongside their unilateral and multilateral efforts. This policy trend reflects the belief that regional policy initiatives can facilitate developing countries' domestic reforms. Whether these regional initiatives will indeed bring about such an outcome remains to be seen, however; the crucial factor is the scope and depth of such commitments. In this respect, the experience of several Southern Mediterranean countries, in the context of the European Union's New Mediterranean Policy, will provide useful lessons for policy makers in both OECD and non-OECD countries.

Following the Europe-Mediterranean Conference held in Barcelona in 1995, four Europe-Mediterranean Agreements have already been signed — with Tunisia, Israel, Jordan and Morocco. Negotiations are underway with several other countries in the region. The establishment of new agreements helps the partnership countries to enhance policy credibility and business confidence, though they still need to clear many hurdles to meet the goals set by these agreements. This is why the Development Centre has undertaken in-depth research on this region — under the theme of “Regional Co-operation and Integration” — as part of its 1996-98 work programme.

This paper is the fourth in a series with respect to the Southern Mediterranean region. The authors present the main results of a simulation analysis of various trade-policy scenarios for Egypt. They discuss the implications of the results for a maximisation of the benefits of globalisation for the Egyptian economy. This series is expected to make an important contribution to policy making on European Union and Southern Mediterranean region relations.

Jean Bonvin  
President  
OECD Development Centre  
June 1998

## I. INTRODUCTION

Egypt is now at a turning point. Oil and gas exports, Suez Canal and tourism receipts as well as remittances sent by expatriate workers, which financed half of imports in 1995, have a limited outlook (World Bank, 1997). The multilateral liberalisation after the Uruguay Round and the new regional initiatives in other parts of the world are tending to erode the preferential access to Europe granted to Egyptian products (Hoekman and Subramanian, 1996). Diversification of exports is hence a major issue for Egypt in order to avoid a major external crisis and it is high on the agenda of the government, which has largely publicised its target of shipping \$10 billion (against \$3.4 billion in 1995) of non-traditional exports by 2000. It is equally an issue of major importance for long-term growth. Indeed, the reliance on exogenous resources has been a significant factor for the weak trade dynamism (Petri, 1997), and has isolated Egypt from globalisation and its associated potential for growth. Manufactured goods, which are at the core of the export diversification strategy, are dynamic, not only in terms of growing foreign demand but also because they may result in productivity externalities (Sachs and Warner, 1995, Gutiérrez de Piñeres and Ferrantino, 1997). They are also likely to create more jobs than the extraction industries, an opportunity that is crucially needed, given the rapidly growing active population.

In that context, what are the chances that the Egyptian-European Partnership Agreement (EEPA) will be a catalyst for the right kind of structural change? This bilateral agreement, under discussion in early 1998, is part of a global Euro-Med Initiative, initiated in 1995, that involves political, cultural, and economic aspects including a free trade agreement (FTA) according to which both partners are intending to suppress all trade barriers on industrial goods at the end of a twelve-year transition period. In fact, the bulk of the effort at trade liberalisation comes mostly from the Mediterranean country, as Europe already grants a preferential duty-free access to industrial products from the Mediterranean zone. Can this agreement promote the export diversification process, by increasing the competitiveness of Egyptian products? Or will it produce negative effects if the economy is not able to reallocate its resources towards the most productive sectors during the transition phase because of insufficient factor mobility and trade diversion?

This paper offers a quantitative analysis of the Partnership Agreement in the long-run, and evaluates its outcome in terms of sectoral reallocation. In a second-best world, such an assessment is better made with numerical tools designed to represent a disaggregated view of the economy. Computable General Equilibrium models (CGE) are often used for that purpose<sup>1</sup>. Their main advantage lies in the possibility of combining detailed and consistent real world

databases with a theoretically sound framework. Two main aspects of the CGE model presented in this paper differentiate it with respect to a previous analysis of the same subject (Konan and Maskus, 1997). First, this model includes (sequential) dynamic features. The simulations run to the year 2010, allowing the introduction of exogenous factors, such as demographic growth that may affect consumption patterns, resource endowment constraints, and changes in foreign rents. Moreover, it endogenises both capital accumulation and total factor productivity growth. Second, the model is calibrated for the year 1995 in order to account for the structural changes following the severe macro-economic adjustment that occurred in the early 1990s (Subramanian, 1997).

We first simulate the future of the Egyptian economy towards 2010 under these resource constraints and the need to pursue a strong stabilisation policy. In the absence of a partnership agreement with EU, there will be a progressive shift from oil exports to manufactured goods. A second set of scenarios models the Egyptian-European Partnership Agreement. Egypt removes the import tariffs on European manufactured goods progressively; in return, Europe grants an improved market access to Egyptian industrial goods and transfers public aid. At this point, we mainly capture the static allocation gains occurring with a FTA. Significant changes in sectoral allocation of resources are occurring which affect the volume, origin and destination of trade, with only minor welfare changes. Next, we add a Marshallian export-led externality that captures possible dynamic effects arising from such a structural transformation (de Melo and Robinson, 1992). This externality may be stimulated by the tighter economic co-operation advocated in the Partnership. This scenario shows that if large welfare gains are to be expected from an agreement of that kind, they will not originate from mere factor reallocation, but rather through technology transfers and increasing competitive incentives. Finally, the outcome of the Euro-Egyptian Partnership Agreement is compared to that of a unilateral liberalisation by Egypt against all trading partners.

## II. CURRENT EGYPTIAN TRADE STRUCTURE AND THE PARTNERSHIP AGREEMENT

Egypt is a fairly open country, with exports and imports amounting to 22 per cent and 26 per cent of GDP respectively in 1995. The main exporting sectors are services that include the revenue from the Suez Canal and tourism, and the petroleum industry (accounting respectively for 53 and 15 per cent of total exports). Textile is lagging behind representing 11 per cent of total exports.

This current export pattern is of concern for long-run growth. First, it relies on resources that are broadly considered as exogenous or risky<sup>2</sup>. Traffic on the Suez Canal cannot grow forever, and the supply of oil is determined by the amount of reserves in the long run. In fact, the predictions are quite pessimistic. In the absence of new petroleum discoveries, the oil rent should decrease dramatically in the coming years while the revenue from the Suez Canal will decline (World Bank, 1997). Second, there are few linkages with the rest of the economy with only 6 per cent of labour employed in these oil-related sectors. Lastly, the overall export level is too low, compared to imports. Foreign transfers cover the structural trade deficit. These are remittances sent by Egyptians working abroad (\$3.3 billion in 1995, or two-thirds of merchandise exports receipts) and capital inflows. The latter are divided between public aid, mainly from the United States (\$2.8 billion in 1995) and foreign direct investment. These foreign sources of funds reinforce the strong dependence to oil. Workers' remittances are indexed to oil revenue in the Gulf zone (which is the main destination of Egyptian expatriates) and foreign direct investments in Egypt are made in the oil sector.

Table 1. **Sectoral Structure of Value Added and Demand in 1995 (%)**

	Value Added	Labour Rem.	Inter- mediate Demand	Private Cons.	Public Cons.	Invest- ment	Imports	Exports
Primary Products	25.5	17.7	10.2	26.2	4.5	8.8	13.1	3.9
Food Processing	6.3	3.6	13.5	19.1	4.1	0.0	9.0	0.9
Textile	3.3	5.1	11.9	8.7	3.3	0.0	2.6	10.5
Petroleum Products	9.4	4.4	15.4	8.2	4.0	0.0	8.2	15.4
Heavy Industries	11.3	13.0	20.7	7.5	5.4	55.0	28.6	5.4
Other Manufactures	2.8	2.0	4.1	4.7	3.8	1.6	9.4	0.8
Tradable Services	22.5	12.8	13.2	12.8	10.2	11.9	7.6	53.0
Other Services	18.9	41.3	11.0	12.8	64.7	22.6	21.5	10.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Value in 1995 (LE billion)	193.1	55.5	156.9	150.2	21.9	42.3	54.0	44.6

*Notes:* Imports and exports are expressed at world prices. Labour figures are sectoral compensations of employees.



The distorted pattern of exports is a mirror image of the structure of production and demand (Table 1). Starting in the 1970s, Egypt had the typical evolution of a country benefiting from windfall gains. This distorted structure of the Egyptian economy is an ordinary feature of economies facing Dutch disease. Other characteristics are more common to other developing countries. As in many other low and middle-income economies, the equipment goods sector is a net importer. Agriculture and food processing industries are also dependent on imports. This dependency might critically increase in the future, as a result of population growth and water shortage.

### ***Geographical Patterns of Trade and Protection<sup>3</sup>***

The EU is a major trade partner of Egypt, accounting for 46 per cent of its exports and 39 per cent of its imports (Tables 2 and 3). NAFTA countries as a whole represent less than 20 per cent of both exports and imports. The neighbouring Mediterranean countries (MED) import only 14 per cent of Egyptian goods while exporting a negligible amount to Egypt. Exports to Europe are more diversified than exports to NAFTA: textiles are as important as oil and there are some exports of equipment goods and agricultural products. Textile exports are concentrated towards EU and NAFTA, denoting the effects of the preferential access to these markets under the multi-fibre arrangement (Kheir-El-Din and El-Sayed, 1997).

**Table 2. Export Structure by Destination in 1995**

	<i>EU</i>	<i>NAFTA</i>	<i>MED</i>	<i>ROW</i>	<i>Total</i>
Primary Products	1.8	0.1	0.8	1.1	3.9
Food Processing	0.3	0.0	0.2	0.4	0.9
Textiles	5.5	2.4	0.8	1.8	10.5
Petroleum Products	6.3	2.8	2.1	4.2	15.4
Heavy Industries	2.8	0.2	1.1	1.3	5.4
Other Manufactures	0.2	0.0	0.2	0.4	0.8
Tradable Services	24.3	8.2	7.3	13.3	53.0
Other Services	4.6	1.5	1.4	2.5	10.0
<b>Total</b>	<b>45.8</b>	<b>15.4</b>	<b>13.8</b>	<b>25.0</b>	<b>100.0</b>

*Note:* Percentage share of exports in total exports (Source: UNCTAD, 1997).

**Table 3. Import Structure by Origin in 1995**

	<i>EU</i>	<i>NAFTA</i>	<i>MED</i>	<i>ROW</i>	<i>Total</i>
Primary Products	2.5	7.5	0.3	2.9	13.1
Food Processing	3.0	1.2	0.1	4.7	9.0
Textiles	0.8	0.4	0.2	1.3	2.6
Petroleum Products	4.7	0.6	0.2	2.6	8.2
Heavy Industries	12.4	3.0	0.7	12.5	28.6
Other Manufactures	4.2	1.2	0.2	3.8	9.4
Tradable Services	3.0	1.5	0.2	3.0	7.6
Other Services	8.4	4.2	0.6	8.4	21.5
<b>Total</b>	<b>38.9</b>	<b>19.6</b>	<b>2.5</b>	<b>39.1</b>	<b>100.0</b>

*Note:* Percentage share of imports (excluding tariffs) in total imports (Source: UNCTAD, 1997).

The geographical pattern is more diversified on the import side. Nearly 40 per cent of imports from NAFTA countries are agricultural products (partly tied to the US aid) while processed food comes mainly from the Rest of the World (ROW). The EU and the ROW are competing in Egypt for most products, in particular for equipment goods, which represent one-third of total imports. The progressive removal of tariff barriers on manufactured European imports could therefore affect principally the price of imported inputs (intermediate and capital goods). The domestic prices of imports for final consumption are expected to suffer a greater impact from a removal of tariff barriers faced by NAFTA and ROW products.

**Table 4. Nominal Import-Weighted Tariff Rates in 1995**

	<i>EU</i>	<i>NAFTA</i>	<i>MED</i>	<i>ROW</i>	<i>Total</i>
Primary Products	6.8	1.9	19.6	8.0	4.6
Food Processing	11.3	6.7	15.2	9.9	10.0
Textiles	27.8	12.8	21.9	38.7	30.6
Petroleum Products	12.6	13.0	12.4	11.7	12.4
Heavy Industries	23.5	31.5	24.8	33.3	28.6
Other Manufactures	14.4	13.5	40.9	17.3	15.9
Tradable Services	0.0	0.0	0.0	0.0	0.0
Other Services	0.0	0.0	0.0	0.0	0.0
<b>Average Tariff</b>	<b>12.4</b>	<b>7.4</b>	<b>16.2</b>	<b>16.1</b>	<b>13.0</b>
<b>Share in Total Tariff Revenue</b>	<b>37.2</b>	<b>11.2</b>	<b>3.1</b>	<b>48.6</b>	<b>100.0</b>

Import weighted tariff rates differ substantially across products and regions of origin (Table 4). The average tariff rate is 13.0 per cent<sup>4</sup>. Besides beverages whose protection reflects the prohibition of alcohol, the most protected goods are furniture, shoes (Other Manufactures), transportation equipment (Heavy Industries), and processed cotton (Textile). Intermediate and capital goods do not remain unaffected by protection. For example, construction materials are subject to a 23 per cent rate import tariff and transportation equipment (including cars) face an even higher 51 per cent rate. Looking at import-weighted tariff rates, the duties on products from the EU are around the average rate, while those from NAFTA are half the average rate (7 per cent) and those from the MED region are far above the average rate (16 per cent).

### ***The Partnership Agreement with Europe***

The Euro-Mediterranean agreements basically involve three features (Hoekman and Djankov, 1997). The first is a progressive abolition of tariffs on manufactured goods traded between the two partners that will be achieved at the end of a twelve-year transition period. Europe already grants duty-free access to Egyptian industrial goods, therefore the trade liberalisation concerns mainly Egyptian tariffs on European products. Trade in agriculture remains regulated by the 1977 agreement, which specifies the quantitative and time-period restrictions applying to Egyptian exports to Europe in detail<sup>5</sup>. Discussions on liberalisation measures were postponed until 2000. As for services, the discussion begins five years after the completion of the Partnership Agreement.

The elimination of duties on European industrial goods should have a positive impact on the imports of equipment goods, which is the principal item imported from the EU (Table 3). The reduction in the price of imported inputs will enhance the competitiveness of the manufacturing industries. It will also reduce the cost of investment and accelerate the accumulation of physical capital. Moreover, an increase in the transfer of foreign technology — embodied in imported inputs — may generate productivity gains.

Trade diversion should be small with NAFTA, because, as we have seen before, imports from Europe and North America are not substitutable in the sense that they do not concern the same type of goods. Imports from NAFTA are more oriented towards agricultural products that are currently out of the scope of the Partnership Agreement. However, the possibility of a trade diversion is not negligible with other trade partners. The ROW appears to be the main competitor for EU in Egypt for manufactured goods and services. In terms of import-weighted tariffs, heavy industry goods from ROW were paying a higher tariff rate than their European counterparts, implying that the two regions were specialised in different varieties of products. Therefore, the trade diversion effect at least on imported inputs might be limited. Another potential loser is the

MED region which might give up its (already small) amount of manufactured shipments to Egypt. A Euro-Egyptian agreement could therefore impede further development of regional trade among Mediterranean countries.

On the export side, a possible change associated with the Partnership Agreement could be to secure the preferential market access granted to Egyptian products. The latter will be shielded from the potential competition of other countries that will either benefit from the global tariff reduction after the Uruguay Round or from other regional agreements signed with the EU (such as the Central European countries). A major cause of uncertainty in the past has relied on the threat of anti-dumping claims by European producers<sup>6</sup>. The agreement only advocates co-operation in the investigation required by a trade dispute, without any commitment to reduce the number of anti-dumping claims. Therefore, improvements in market access in that area will be limited.

The second feature of the Partnership Agreement concerns financial transfers. The Mediterranean countries as a whole will receive ECU 4.7 billion from the EU in 1995-1999, matched by a similar amount financed by the European Investment Bank. It seems unreasonable to conclude that the new collective financial transfer associated with the European Partnership will fully substitute for the traditional bilateral development assistance funding<sup>7</sup>. The amount of foreign aid received by Egypt is therefore expected to increase and ease the transition process, even though the funds coming from Europe as a whole are not as vital for Egypt as they are for other Mediterranean countries, such as Tunisia.

The third feature is what is commonly called "deeper integration". It includes all improvements that could enhance trade and investment linkages with the European Union and with other Mediterranean countries. This covers a wide variety of elements, including the simplification of administrative procedures, the harmonisation of standards, and reforms in the right of establishment. These dimensions are mentioned in the Partnership Agreement but without any commitment. An important aspect related to that point is the definition of the rules of origin. They are defined product-by-product at a rather high level (60 per cent of the value-added on average) and exclude the mere operations of stockholding and assembly<sup>8</sup>.

Negative effects may also arise, especially during the twelve-year transition period. The risk of trade diversion has already been mentioned. In addition, the import-competing industries can be affected by the introduction of better quality and cheaper European products<sup>9</sup>. On the other hand, exports might not respond because of insufficient factor mobility. This would result in a deterioration of the trade balance, leading to a possible exchange rate crisis. Moreover, the government will face a major fiscal issue because it will lose a significant share of its tariff revenue (36 per cent at the end of the transition period, that is approximately 8 per cent of its total tax revenue). Increasing other taxes to balance the budget may produce contractionary effects on the activity.

Measuring the overall effect of the Partnership Agreement requires the use of an analytical tool able to assess the direction and order of magnitude of the changes. For this purpose, we have built a Computable General Equilibrium (CGE). The next section describes the principal properties of the model.

### III. THE MODEL

The model used in this paper originates from a prototype model (Beghin, Dessus, Roland-Holst and van der Mensbrugghe, 1996) built for trade analysis at the OECD Development Centre. It is calibrated on the data contained in a Social Accounting Matrix (SAM) based on a 1991/92 input-output table and updated to 1995. The SAM includes 30 sectors and products, one household supplying a homogeneous labour, 3 different stocks of capital and four trade partners, namely the European Union (EU), North America (NAFTA), the South-Mediterranean rim (MED) and the rest of the world (ROW). A detailed list of the model dimensions is annexed, as well as a description of the updating adjustment for the SAM. The model is made of sequential equilibria (recursive dynamics) and runs for the 1995-2010 period. The following subsections briefly describe its main characteristics.

#### ***Production***

Production is modelled using nested CES functions which describe the substitution and complement relations among the various inputs. Producers are cost-minimisers and constant return to scale is assumed. Output results from two composite goods: intermediates and value added. The intermediate aggregate is obtained by combining all products in fixed proportions<sup>10</sup>. The value-added components are decomposed into two parts: labour and capital. Labour is mobile and fully employed. The capital bundle incorporates three types of capital: the Suez Canal, non-renewable resources in oil and gas, and the physical capital stock accumulated through past investment. The first two capital stocks are sector-specific. The third one decomposes itself between two generations of capital, old and new. The latter results from contemporary investment (putty/semi-putty production function). Substitution possibilities of all inputs and labour (that are function of the relative prices) will be greater with the last vintage of capital, i.e. the contemporary investment, than with the older one, i.e. the installed capital. Figure 1 depicts the nested decision process in production factor demand<sup>11</sup>.

#### ***Income and Absorption***

Labour and physical capital income is allocated to households, corporations, and sent abroad according to a fixed coefficient distribution matrix derived from the original SAM. Oil and Suez rents are fully collected by the government. Private consumption demand is obtained through maximisation of a utility function derived from the Extended Linear Expenditure System (ELES)<sup>12</sup>. The household's utility is a function of consumption of different goods

and savings, and is constrained by disposable income. Income elasticities are different for each product, varying from 0.80 for agricultural and mineral products to 1.20 for services. The calibration of the model determines a per capita subsistence minimum for each product, whose aggregate consumption grows with population, while the remaining demand is derived through an optimisation process. Government and investment demands are disaggregated into sectoral demands according to fixed coefficient functions once their total value is determined (the total amount of government expenditures being exogenous).

### ***International Trade***

The model assumes imperfect substitution among goods originating from different geographical areas<sup>13</sup>. Import demand results from a CES aggregation function of domestic and imported goods. Export supply is symmetrically modelled as a Constant Elasticity of Transformation (CET) function. Producers decide to allocate their output to domestic or foreign markets responding to relative prices. At the second stage, importers (exporters) choose the optimal choice of demand (supply) across regions, again as a function of the relative imports (exports) prices and the degree of substitution across regions. Substitution elasticities between domestic and foreign goods are taken from Konan and Maskus (1997), except for oil: 2.2 (5.0) between domestic products and imports (exports) and 5.0 (8.0) between imports (exports) across regions. Crude and refined oil is assumed to be perfectly substitutable among regions. The small country assumption holds, Egypt being unable to change world prices; thus, its imports and exports prices are exogenous. Capital transfers are exogenous as well, and determine the trade balance.

### ***Model Closure and Dynamics***

The equilibrium condition on the balance of payments is combined with other closure conditions so that the model can be solved for each period. First consider the government budget. Its surplus / deficit is exogenous and the household income tax schedule shifts in order to achieve the predetermined net government position<sup>14</sup>. Second, investment is savings-driven, the latter originating from households, enterprises, government and abroad. The sequential dynamic path of the model results from this closure rule. A change in savings influences capital accumulation in the following period. Finally, exogenously determined growth rates are assumed for other factors that affect the growth path of the economy, such as population and labour supply and (in the reference scenario) the total factor productivity. Agents are assumed to be myopic and to base their decisions on static expectations about prices and quantities.

## IV. SIMULATIONS

We consider four basic sets of scenarios in reference to a fifteen-year (1995-2010) base trend. The latter determines the reference growth trajectory in the absence of any major trade policy reform and is considered as a benchmark scenario. The definition of a plausible evolution for the Egyptian economy is based on several simplifying hypotheses, to match the macro-economic forecast proposed by the World Bank (World Bank, 1997). The definition of a reference growth path only serves the purpose of establishing a counterfactual scenario against which the impacts of the Partnership Agreement are evaluated. Given the macro-economic environment, we believe that this model gives a fairly representative picture of the changes in the direction and intensity of flows at the sectoral level, and is therefore well suited to analysing factor reallocation in the context of a changing external environment.

### ***General Hypotheses for Exogenous Variables***

In order to define the reference path we make the following assumptions, directly inspired by the World Bank's *base case* scenario. This scenario assumes that macro-economic policies will remain sound and consistent, following the line of the stabilisation experience of the 1990s, yet that no significant structural trade reform will be undertaken. We add to this policy scenario several hypotheses concerning factor supplies and exogenous resources (Table 5). The foreign financing of investment will decrease and is compensated by a progressive increase of domestic savings. The reduction of the fiscal deficit is met through a stabilisation of the share of expenditures in the GDP. While the population should increase by 1.7 per cent, the working age population should increase faster (an average 2.7 per cent annual growth rate).

We assume that there is no room for expanding the productive capacity of the Suez Canal unless significant investments are made<sup>15</sup>. Following the World Bank, we also assume that additional oil discoveries will be modest, so that the reserves will decline by one per cent each year<sup>16</sup>. Finally, we retain in the reference scenario a constant total factor productivity growth rate of 0.5 per cent, to match the World Bank's forecast of 4.5 per cent annual GDP growth over the next fifteen years in the absence of major structural reforms.

The external environment — the world prices in the model — remains unchanged over the period and is not affected significantly by the conclusion of the Uruguay Round (Shiells *et al.*, 1996). Probably more important is the elimination of the restrictive regime embodied in the Multi-Fibre Arrangement (MFA) by 2005, but the outcome is unclear. Egypt seems actually moderately



constrained by its quotas. Its export prospects will critically depend on its ability to compete with suppliers from East Asia (Kheir-El-Din and El-Sayed, 1997). We therefore prefer to adopt a neutral hypothesis of unchanged market access for Egyptian textiles during the simulation period. On the import side, the WTO commitments regarding tariffs bindings should not affect significantly Egyptian applied tariffs, which were well below bounds in 1995 (UNCTAD, 1997).

Table 5. **Main Exogenous Hypotheses for the Reference Scenario (%)**

	1995 -1998	1998 -2001	2001 -2004	2004 -2007	2007 -2010
Government consumption / GDP	9.9	9.3	8.9	8.8	8.7
Government savings / GDP	4.3	5.2	5.7	6.0	6.0
Foreign savings / GDP	4.0	3.1	2.7	2.4	2.2
Population growth rate	1.9	1.8	1.7	1.6	1.5
Labour supply growth rate	2.7	2.7	2.6	2.6	2.6
Oil & gas reserve growth rate	-1.0	-1.0	-1.0	-1.0	-1.0
Suez Canal fixed factor growth rate	0.0	0.0	0.0	0.0	0.0
Total Factor Productivity growth rate	0.5	0.5	0.5	0.5	0.5

*Notes:*

1. Government savings are calculated before public investment, and must not be confounded with overall fiscal surplus/deficit. The latter is not identified since public and private investments are not differentiated in the model. Foreign savings equal imports minus exports, and come mostly from workers remittances.
2. The Suez Canal fixed factor equals the rent that perceives the government, which owns the canal.

### ***The Different Policy scenarios***

The reference scenario (*REF*) consists of simulating the future of the Egyptian economy in the absence of any agreement with Europe. Tariffs and world prices remain unchanged over the period.

Three experiments represent the features of the Euro-Egyptian Partnership. A first simulation (*EU1*) concerns a linear reduction in import tariffs facing European manufactured products. This reduction does not apply to agricultural products, services and beverages, the latter being excluded for socio-cultural reasons. Tariffs are reduced by 20 per cent in 1998 with respect to their 1995 level, 40 per cent in 2001, 60 per cent in 2004, 80 per cent in 2007 and completely abolished by 2010.

A second simulation titled *EU2* starts with the same tariff reduction formula as in *EU1* and adds the European contribution to the Partnership. A first feature is to increase the capital transfers from EU to Egypt by LE 1 billion annually between 1998 and 2001. In 1995, the amount of net Official Development Assistance (ODA) from EU members (both bilateral and multilateral) reached \$0.84 billion (LE 2.8 billion). The total amount budgeted by the EU (including the European Investment Bank) for its new Mediterranean policy is approximately equal to \$2.2 billion per annum for the whole region until 2001. Allocation by country has not been officially announced. Keeping the distribution among countries constant would not significantly affect Egypt, which currently collects 40 per cent of the total ODA provided by the EU to the region. Given the uncertainty, we have raised the actual amount by one-third, or LE 1 billion annually between 1998 and 2001. A second feature is to simulate a better and more secure access for Egyptian manufactured products to the European market. Since we do not model the impact of price uncertainty on export supply, a plausible way to describe the drop in the risk premium faced by Egyptian exporters is to increase the exogenous price of Egyptian exports on European markets. A once and for all 2 per cent increase in the prices of manufacturing goods in Europe from 1998 onwards is therefore assumed. This could also be the result of the harmonisation of standards, as assumed by Rutherford *et al.* (1995) in a comparable study for the Tunisian agreement.

This *EU2* experiment is the more plausible scenario for the Partnership Agreement, since it involves a positive commitment by both sides.

The third simulation, *EU3*, aims at reassessing the outcome of the above policy scenario in the presence of an export-led externality so as to take into account the dynamic gains of the agreement. This change in the specification of the model deserves special attention as described below, since it is not generally implemented in trade CGE models.

The final simulation, *UNI*, for unilateral liberalisation, is to apply the linear tariff reduction formula as described above to all trade partners, with a view to measuring the trade diversion phenomenon. This policy simulation is run in the presence of the export-led externality.

### ***Adding an export-led externality to account for dynamic productivity gains***

The 1990s have witnessed a very active debate about the mechanism through which export promotion policies are translated into higher growth (Rodrik, 1995, World Bank, 1993). Even if differences of opinion in the causality of the phenomenon remain, there is now a broad consensus on the idea that the observed success of trade promotion policies cannot be explained if dynamic productivity gains are not taken into consideration<sup>17</sup>. These gains may be a

result of increasing incentives to reduce costs in a more competitive environment, and / or due to a rise in imported technology embodied in non-substitutable intermediate and capital goods, which is itself favoured by the relaxation of the foreign exchange constraint. On the basis of a CGE analysis, De Melo and Robinson (1992) show that structural changes that characterised outward orientation policies (such as the rapid increase in the use of intermediate inputs, the increase in the demand for tradable goods and the rapid industrialisation led by light manufacturing industries) cannot be captured with the standard neo-classical model, where technical progress is assumed to be totally exogenous. Their analysis, based on comparative numerical exercises, indicates that introducing export — or import — externalities better capture the pattern of industrialisation in countries following a strategy of promoting outward orientation.

Following this line of investigation, we add to the model specification a Marshallian export-led externality, described by:

$$Y_t = f(A_t(K, L), X) \quad \text{and} \quad A_t = (1 + g)A_{t-1} \left[ \frac{\sum_{mif} E_t}{\sum_{mif} \bar{E}_t} \right]^\zeta \quad (1)$$

where  $Y$  is value added,  $K$  and  $L$  are capital and labour,  $X$  are exogenous resources (oil and gas reserves and the Suez Canal),  $A$  is the total factor productivity level and  $g$  the exogenous growth rate of technological progress.

$E$  denotes exports of manufactures in any simulation and  $\bar{E}$  exports of manufactures in the reference scenario. Equation (1) thus states that the level of total factor productivity is an increasing function, for  $\eta > 0$ , of the *sum* of exports of manufactures compared to the reference level. This is a true externality since we keep first-order conditions unchanged: producers do not see the benefits of exporting beyond the competitively determined level, and hence do not internalise the presence of the externality. We assume that the externality only impact the physical capital and the labour productivities. The exogenous resources do not benefit from the increase in productivity generated by the externality. The elasticity of productivity with respect to the sum of manufactured exports equal to 0.1, which may be considered a conservative value<sup>18</sup>.

### **General results**

Under the circumstances given in the *REF* scenario, Egypt remains unable to reap the full benefits of globalisation (Table 6). The volume of exports expands at a 4.9 per cent annual growth rate to finance a 4.2 per cent growth rate in imports. Thus, the volume of imports and exports over GDP stagnates. Industries depending on exogenous resources are seriously affected by the stagnation of the latter. At the end of the scenario time-framework, Egypt

becomes a net oil importer, while the Suez Canal export receipts decrease by 1.4 per cent on average each year. This decline favours export diversification dramatically. The share of manufactured goods in total exports goes from 18 per cent in 1995 to 33 per cent in 2010. In order to compensate for the loss of export receipts from traditional exports, Egypt has to allocate a growing part of the output of other industries to foreign markets and therefore to gain in competitiveness. This is achieved through capital accumulation (that reduces the cost of capital) and a very moderate growth in wages, which may be considered *de facto* as a real devaluation.

Comparing the export structure in 1995 and 2010 (Table 7) in the REF scenario reveals that the textile industry is the main beneficiary of the constrained export diversification, followed by heavy and primary industries. There are no expected movements in the relative prices of exports and imports across regions; hence the changes in origin and destination of trade are only affected by changes in its product composition. All in all, however, the constrained diversification of the export industry appears insufficient in creating a strong export-led growth dynamics<sup>19</sup>.

Now consider the removal of tariffs on industrial European products (*EU1*). The decrease of import prices on the Egyptian market (-6 per cent over the whole period) is matched by a drop in the price of the domestically produced goods. This shows that Egyptian manufactured products are gaining in competitiveness due to the reduction of the cost of their inputs, but without significant changes in the composition of exports. The loss in tariff revenue is financed by the household income tax; the private consumption growth thus slows down. As investment is not increasing fast enough, the absorption stagnates and there is a slight loss in welfare, measured by the discounted equivalent variation<sup>20</sup>.

With better market access and a rise in the financial transfers from the EU (*EU2*), the welfare outcome becomes slightly higher than what it would have been without the Partnership Agreement. Export diversification is further promoted (the share of manufactured exports goes up to 36 per cent), but the overall gains compared to the reference scenario remain quite small.

At that stage, only static reallocation gains were taken into consideration. Clearly, the introduction of an externality significantly magnifies the growth and welfare picture of the Partnership Agreement (*EU3*)<sup>21</sup>. The real GDP at factor cost now grows at an annual rate averaging 5.3 per cent, (which represents a gain of 0.8 percentage point of GDP per annum compared to the reference). Total exports increase by 6.4 per cent annually. The externality encourages factor reallocation. Labour demand increases in the textile industry and the primary sector at the expense of the 'Other Services' sector. It also enhances capital accumulation, sustained by larger disposable savings (due to the rise in households' income). A significant welfare gain may also be observed.

Table 6. **Macroeconomic Results in the Different Policy Scenarios**

	<i>REF</i>	<i>EU1</i>	<i>EU2</i>	<i>EU3</i>	<i>UNI</i>
Real GDP growth (%)	4.52	4.56	4.60	5.33	5.33
Private consumption growth (%)	4.16	4.14	4.20	5.01	5.00
Investment growth (%)	4.99	5.11	5.16	5.78	5.99
Export growth (%)	4.91	5.52	5.60	6.43	6.93
Import growth (%)	4.19	4.75	4.85	5.61	6.05
Discounted EV (% of GDP)		-0.18	0.49	5.24	4.60
Export competitiveness growth (%)	0.54	0.68	0.68	0.71	0.80
Import competitiveness growth (%)	0.54	0.30	0.28	0.31	-0.04
Tariff revenue growth (%)	4.10	-1.42	-1.33	-0.67	-15.74

*Notes:*

1. Figures reported are annual growth rates.
2. Import (export) competitiveness is measured by the ratio of the price of foreign goods on the price of domestic goods in the domestic (world) market.

Finally, we consider the unilateral liberalisation scenario *UNI* in the presence of the same export-led externality. The outcome of *UNI* is strictly the same as *EU3* in terms of the GDP at factor cost and inferior in terms of welfare. The initial terms of trade shock endured by Egypt doubles compared to the partial liberalisation towards Europe (and is equivalent to a 12 per cent appreciation). Trade liberalisation, notably with the ROW, further reduces the prices of intermediate inputs and investment, on the whole, since Europe was the main source of intermediate inputs, the additional gain of the unilateral liberalisation is small compared to the cost of increased competitiveness on *final* goods. Moreover, the fiscal cost is much higher. Therefore, despite the drop in the cost of living, households are worse off and decrease their consumption. Export diversification is encouraged by the additional decrease of input prices and by productivity growth in capital and labour-intensive industries.

At this point, it is worth stressing the fact that the ‘deeper integration’ scenario *EU3* performs better than the unilateral liberalisation not because of the externality (since both scenarios include it) but because of the assumption of a better market access. The export-led externality introduces a non-linearity in the model, in the sense that the Egyptian economy as a whole becomes able to reap the full benefit of any improvement in manufactured exports. Without improved access to European markets, the outcome of the Partnership Agreement, even with externalities, would have ranked below that of the Unilateral liberalisation (the annual growth in GDP would have been lower, at 4.8 per cent). On the other hand, the financial transfer from the EU alone has a limited impact on long-run growth, even though we assume that EU funds are merely foreign direct investments in Egypt.

Tables 7 and 8 report the respective structure of exports and imports across sectors in 2010 under the different policy scenarios. The structure of exports is at least as much affected by the import tariff removal than the structure of imports. Our results therefore indicate that the Partnership Agreement is a very sensitive issue with regards to the export diversification process.

**Table 7. Sectoral Export Structure in 2010 in the Different Policy Scenarios**

	<i>REF</i>	<i>EU1</i>	<i>EU2</i>	<i>EU3</i>	<i>UNI</i>
Primary Products	8.7	8.3	8.2	8.4	8.1
Food Processing	1.5	1.5	1.5	1.5	1.5
Textiles	18.4	19.3	20.7	21.6	20.6
Petroleum Products	9.7	8.3	8.3	7.7	7.7
Heavy Industries	11.5	11.7	12.6	12.9	11.9
Other Manufactures	1.2	1.3	1.3	1.3	1.4
Tradable Services	41.9	42.7	40.9	40.0	42.4
Other Services	6.9	6.8	6.5	6.4	6.4
Total	100.0	100.0	100.0	100.0	100.0
Share of manufactured exports	32.7	33.9	36.1	37.4	35.4

*Note:* Manufactured exports are the sum of food processing, textile, machinery equipment and other manufactured exports.

**Table 8. Sectoral Import Structure in 2010 in the Different Policy Scenarios**

	<i>REF</i>	<i>EU1</i>	<i>EU2</i>	<i>EU3</i>	<i>UNI</i>
Primary Products	10.7	9.5	9.6	9.5	8.7
Food Processing	7.7	7.6	7.5	7.5	7.7
Textiles	2.2	2.6	2.6	2.6	3.2
Petroleum Products	14.6	15.3	15.4	15.9	15.8
Heavy Industries	27.1	30.0	29.9	29.4	31.6
Other Manufactures	9.4	9.3	9.3	9.2	9.0
Tradable Services	8.2	7.4	7.4	7.6	7.1
Other Services	20.1	18.3	18.3	18.3	16.9
Total	100.0	100.0	100.0	100.0	100.0

## Geographical Results

Tables 9 and 10 report the change in trade flows in 2010 between Egypt and the four regions considered in the model under the Partnership Agreement (*EU3*) and the unilateral liberalisation (*UNI*) compared to the base experiment. On the export side, changes in the destination of exports come principally from the increased European market access. On the import side, the tariff removal is the main factor affecting the origin of imports. The externality only plays an indirect role with respect to this geographical issue by changing the product composition of trade flows.

With the Partnership Agreement, the EU should absorb more than half of the increase in the level of exports, the rest of the increase being equally divided among the other partners. Most of the rise in exports is due to the tradable services industry and textiles (specifically to Europe and North America).

Table 9. **Exports Across Regions in 2010 Under Different Policy Scenarios**  
(Changes in 2010 with respect to the reference scenario)

	<i>EU3</i>				<i>UNI</i>			
	EU	NAFTA	MED	ROW	EU	NAFTA	MED	ROW
Primary Products	0.7	0.1	0.3	0.4	0.9	0.1	0.4	0.5
Food Processing	0.2	0.0	0.0	0.1	0.1	0.0	0.1	0.2
Textile	4.9	1.2	0.5	1.1	4.2	2.0	0.6	1.5
Petroleum Products	-0.4	0.2	0.2	-0.1	-0.4	0.3	0.3	0.3
Heavy Industries	2.7	0.1	0.5	0.6	2.1	0.2	0.8	0.9
Other Manufactures	0.1	0.0	0.1	0.2	0.1	0.0	0.1	0.3
Tradable Services	3.2	1.1	1.0	1.8	6.1	2.0	1.8	3.3
Other Services	0.5	0.2	0.1	0.3	0.7	0.2	0.2	0.4
<b>Total</b>	<b>12.0</b>	<b>2.8</b>	<b>2.7</b>	<b>4.4</b>	<b>13.7</b>	<b>4.9</b>	<b>4.3</b>	<b>7.3</b>

Note: Changes in exports are expressed in 1995 LE billion.

The imports' story is very different. The EU is the only beneficiary of the increase in Egyptian imports. Imports from the EU of food and equipment goods more than double. NAFTA ends up with the same total amount of sales to Egypt because the market share reduction in these sectors is offset by an increase in agricultural products and services. Finally, the MED region and the ROW are net losers.

**Table 10. Imports Across Regions in 2010 Under Different Policy Scenarios**  
(Changes in 2010 with respect to the reference scenario)

	<i>EU3</i>				<i>UNI</i>			
	EU	NAFTA	MED	ROW	EU	NAFTA	MED	ROW
Primary Products	0.2	0.5	0.0	0.2	0.1	0.4	0.0	0.1
Food Processing	1.7	0.0	0.0	-0.1	0.9	0.2	0.1	1.2
Textile	1.1	0.0	0.0	-0.2	0.3	0.1	0.0	1.4
Petroleum Products	5.7	-0.1	-0.2	-0.5	3.9	0.5	-0.1	1.6
Heavy Industries	13.2	-0.8	-0.2	-3.4	3.4	2.4	0.1	8.2
Other Manufactures	2.8	-0.3	0.0	-0.6	0.8	0.0	0.3	1.3
Tradable Services	0.5	0.2	0.0	0.5	0.4	0.2	0.0	0.4
Other Services	0.9	0.4	0.1	0.9	0.7	0.4	0.0	0.7
<b>Total</b>	<b>26.0</b>	<b>0.0</b>	<b>-0.4</b>	<b>-3.2</b>	<b>10.7</b>	<b>4.1</b>	<b>0.6</b>	<b>14.9</b>

*Note:* Changes in imports are expressed in 1995 LE billion.

If Egypt were to remove its barriers on industrial products against all trade partners, the picture would have been quite different for imports. The overall level of imports would have been higher and the ROW would have emerged as the main beneficiary, followed by the EU and NAFTA. On the export side, the EU would still absorb the largest share of the increase in absolute level but in terms of shares, Egyptian exports would be redirected towards NAFTA countries and the ROW.



## V. CONCLUSION

There is evidence in support of the view that a Partnership Agreement with the European Union could promote the diversification of the Egyptian economy towards tradable industries. This diversification appears necessary to overcome the decline of traditional industries or sources of foreign financing, more or less related to oil, as well as in order for Egypt to reap the growth benefits of globalisation. The welfare cost of the trade opening will be overcome only if the Partnership is able to provide better market access to Europe for Egyptian goods. This can be done either by reducing the uncertainty in the export receipts (due to the threat of anti-dumping claims) or by achieving a "deeper integration" that would bring both partners closer to each other in terms of standards, trade procedures or product quality. If this "deeper integration" takes place and if Egypt is able to capture the benefits of export promotion through an increase in the overall productivity, the outcome in terms of welfare and growth might even be higher than in the case of a unilateral trade liberalisation of Egypt against all partners.

This optimistic stance should not hide the difficult transition that will be faced by Egypt in the years to come. The real structural adjustment effort does not occur because of a particular trade agreement but because it is required by the future evolution of oil revenue and foreign rents. If Egypt is to avoid a major external crisis, it will have to diversify exports anyway. In that sense, the most optimistic scenario is not the "deeper integration" one but the base run, which embodies the largest share of the structural change. This reference scenario might simply not be implemented without the European Partnership Agreement, which could ease the transition with carefully designed accompaniment measures. Under this condition, the Partnership Agreement could play its expected role of anchor and lock in domestic reforms.

## NOTES

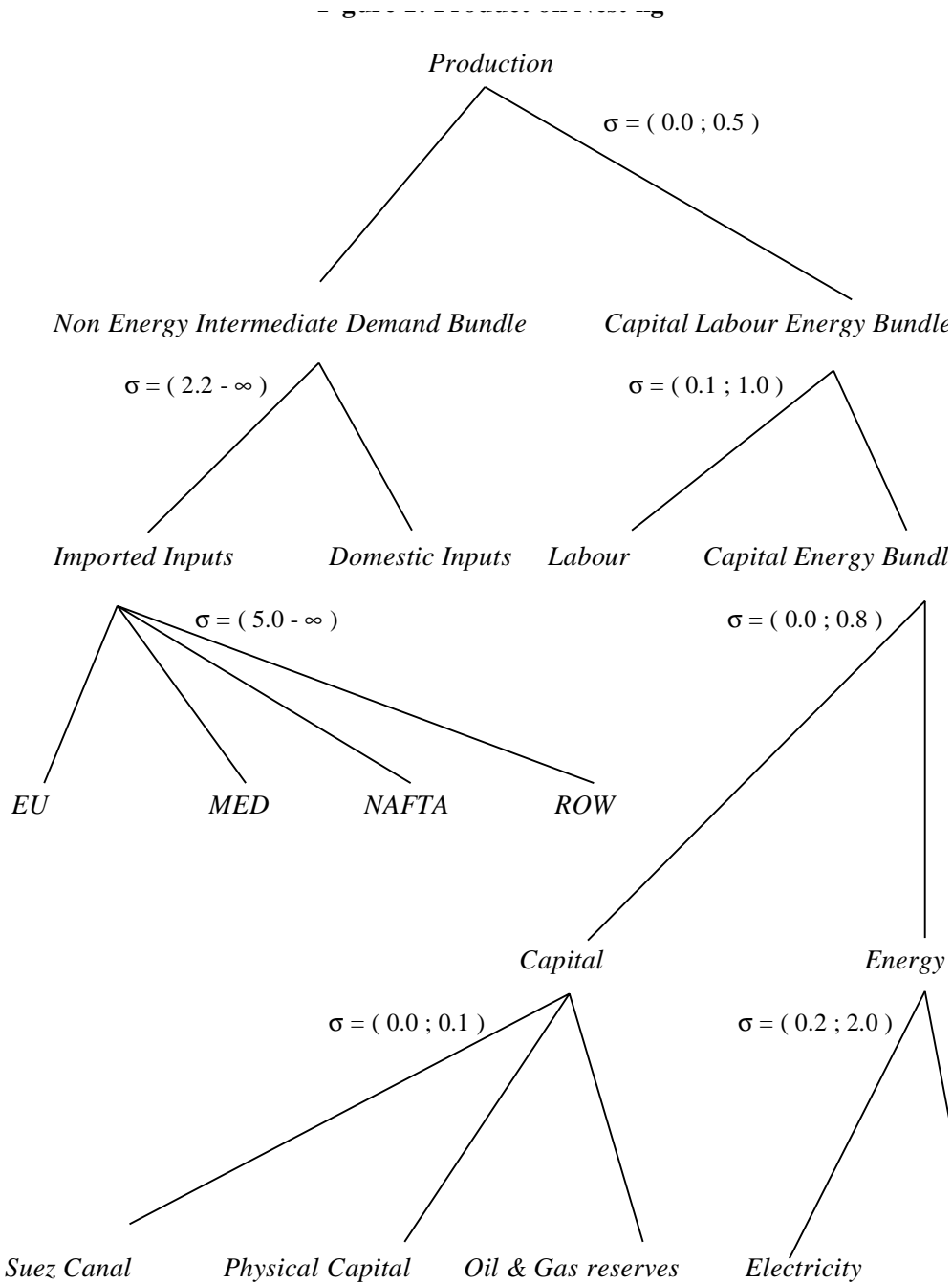
1. See for instance the volume edited by J. Francois and C. Shiells (1994) that gathers several CGE assessments of the North American preferential trade agreement.
2. The volatility of the purchasing power of exports in Egypt may be considered as high in comparison to more diversified economies of the Middle East and North Africa region (Riordan *et al.*, 1998). For these authors, the volatility, which is measured by the standard error of a time trend regression of the purchasing power of exports, approaches 30 per cent.
3. See annex 1 for the definition of the trade partners.
4. At this stage of our study, we focus on import duties, without taking into account non-tariff barriers (NTB) and possible official and non-official protection in the services sector (in particular, through red tape). The reason is that we do not have reliable information on these matters. Therefore we prefer not to implement *ad hoc* assumptions.
5. Agriculture seems to be the most controversial point in the current discussions. Egypt is a net agricultural importer but wants to gain an improved access to Europe for some products (citrus and rice).
6. The 1995-96 claim of dumping in the textile industry is supposed to have resulted in a six-month embargo on Egyptian shipments to Europe (Ministry of Trade, Egypt).
7. The total aid (bilateral and multilateral) provided by EU members to Egypt in 1995 was approximately equal to 1 per cent of GDP, which is of the same relative order of magnitude as the community structural funds accorded to the Southern European Regions.
8. The cumulation of the rules of origin will be recognised between all the countries involved in the Euro-Mediterranean Initiative as well as Algeria.
9. The tariff reduction will not be linear as it will be assumed in the experiments, but will depend on the position of each good in the production process: tariffs on raw and capital goods will be eliminated first, followed by intermediates; finished goods will be affected the latest. They might get a paradoxical higher effective protection during the transition period (Hoekman and Djankov, 1997)
10. Energy is excluded from the bundle of intermediates in the model, and its demand is the result of a more complex process, as illustrated in Figure 1. This is not a sensitive modelling issue for the case we are interested in, so that we prefer to ignore it in the core of the text.
11. Elasticities are derived from the available relevant literature (see Burniaux, Nicoletti and Oliveira-Martins, 1992). For instance, the substitution elasticity between labour and *old* or *new* capital are set respectively to 0.1 and 1.0. Elasticities between intermediates and value added is set to 0 (if the latter incorporates *old* capital) and 0.50 (in the case of *new* capital). See Figure 1 for further details.
12. A useful reference for the ELES approach is found in Lluch (1973).
13. Armington (1969).

14. See Devarajan *et al.* (1997) for a detailed discussion of the impact of Euro-Mediterranean preferential trade agreements on fiscal accounts.
15. Even though, in 1996, the Suez Canal Authority (SCA) announced its project to deepen the canal (International Energy Agency, 1997), this will be the result of new investments in physical capital, and not the result of an increase in the supply of the fixed factor.
16. We average the World Bank's "low" and "high" case scenarios for projected oil & gas rent to obtain this assumption.
17. There is now a large body of empirical literature available on the relationship between productivity growth and increased openness. See Havrylyshin (1990) and Harrison (1996) for a general presentation of such empirical work.
18. De Melo and Robinson (1992) assume that the elasticity ranges between 0.1 and 0.3.
19. This result is robust to changes in the hypotheses concerning substitution elasticities. See Annex 3 for a sensitivity analysis with respect to trade elasticities.
20. The discounted equivalent variation is the actualised sum of equivalent variations divided by the actualised sum of GDP in the reference scenario. The equivalent variation for each year is measured by the difference of expenditure functions, and is defined as the additional income required to obtain post-policy utility levels at pre-policy prices. We retain a 4 per cent actualisation rate. See Burniaux *et al.* (1995) for a general discussion.
21. Our results are in line with those provided by the empirical growth literature: Berthélemy *et al.* (1997) estimate a long-term elasticity of TFP with respect to the openness ratio close to unity. This is roughly what we obtain in the *EU3* scenario compared to the reference scenario. The openness ratio increases by 9.7 per cent while the TFP level increases by 8.8 per cent

## BIBLIOGRAPHY

- ARMINGTON, P. (1969), "A Theory of Demand for Products Distinguished by Place of Production", *IMF Staff Papers*, Vol. 16.
- BEGHIN, J., S. DESSUS, D. ROLAND-HOLST and D. VAN DER MENSBRUGGHE (1996), "General Equilibrium Modelling of Trade and the Environment", *OECD Development Centre Technical Papers*, No. 116.
- BERTHÉLEMY, J.-C., S. DESSUS and A. VAROUDAKIS (1997), "Capital humain et croissance : le rôle du régime commercial", *Revue Économique*, Vol. 48, No. 3.
- BURNIAUX, J. -M., G. NICOLETTI and J. OLIVEIRA-MARTINS (1992), "GREEN: a Global Model for Quantifying the Costs of Policies to Curb CO2 Emissions", *OECD Economic Studies*, Vol. 19, winter.
- CAPMAS (1997), *Social Accounting Matrix, 1991/1992*, Cairo.
- DE MELO, J., and S. ROBINSON (1992), "Productivity and Externalities: Models of Export-led Growth", *The Journal of International Trade & Economic Development*, Vol. 1, No. 1, June.
- DEVARAJAN, S., D. GO, S. SUTHIWART-NARUEPUT and J. VOSS (1997), "Les Effets fiscaux de l'Accord Europe-Méditerranée pour les pays du Bassin Méditerranéen", paper presented at the XLVI annual congress of the French Economic Association.
- FRANCOIS, J., and C. SHIELLS (1994), *Modeling Trade Policy*, Cambridge University Press, Cambridge.
- GUTIÉRREZ DE PIÑERES, S.A. and M. FERRANTINO (1997), "Export Diversification and Structural Dynamics in the Growth Process: The Case of Chile", *Journal of Development Economics*, Vol. 52.
- HARRISON, A. (1996), "Openness and Growth: A Time-Series, Cross-country Analysis for Developing Countries", *Journal of Development Economics*, Vol. 48, No. 2.
- HAVRYLYSHIN, O. (1990), "Trade Policy and Productivity Gains in Developing Countries: A Survey of the Literature", *The World Bank Research Observer*, Vol. 5, No. 1.
- HOECKMAN, B., and S. DJANKOV (1997), "Towards a Free Trade Agreement with the European Union: Issues and Policy Options for Egypt", in A. GALAL and B. HOECKMAN (eds.), *Regional Partners in Global Markets: Limits and Possibilities of the Euro-Med agreements*, Centre for Economic Policy Research and the Egyptian Center for Economic Studies, London and Cairo.
- HOECKMAN, B. and A. SUBRAMANIAN (1996), "Egypt and the Uruguay Round", *Policy Research working paper*, 1597, The World Bank.
- INTERNATIONAL ENERGY AGENCY (1997), *North Africa Oil and Gas*, OECD, Paris.
- KHEIR-EL-DIN, H. and H. EL-SAYED (1997) "Potential Impact of a Free Trade Agreement with the EU on Egypt's textile industry", in A. GALAL and B. HOECKMAN (eds.), *Regional Partners in Global Markets: Limits and Possibilities of the Euro-Med agreements*, Centre for Economic Policy Research and the Egyptian Center for Economic Studies, London and Cairo.

- KONAN, D., and K. MASKUS (1997), "A Computable General Equilibrium Analysis of Egyptian Trade Liberalisation Scenarios", in A. GALAL and B. HOECKMAN (eds.), *Regional Partners in Global Markets: Limits and Possibilities of the Euro-Med agreements*, Centre for Economic Policy Research and the Egyptian Center for Economic Studies, London and Cairo.
- LLUCH, C. (1973), "The Extended Linear Expenditure System", *European Economic Review*, Vol. 4.
- PETRI, P. (1997), "Trade Strategies For the Southern Mediterranean", *OECD Development Centre Technical Paper No. 127*, Paris.
- RIORDAN, E.M., U. DADUSH, J. JALALI, S. STREIFEL, M. BRAHMBATT and K. TAGAKAKI (1998), "The World Economy and its Implications for the Middle East and North Africa, 1995-2010", in *Prospects for Middle Eastern and North African Economies*, N. Shafik (ed.), Macmillan Press for the Economic Research Forum, London.
- RODRIG, D. (1995), "Getting Interventions Right: How South Korea and Taiwan Grew Rich", *Economic Policy*, Vol. 20, April.
- RODRIG, D. (1997), "TFPG Controversies, Institutions and Economic Performance in East Asia", *NBER working paper No. 5914*, Cambridge.
- RUTHERFORD, T., E. RUSTRÖM and D. TARR (1995), "L'Accord de Libre-échange entre la Tunisie et l'Union Européenne", *mimeo*, Banque mondiale.
- SACHS, J., and A. WARNER (1995), "Natural Resource Abundance and Economic Growth", *Development Discussion Papers No. 517*, Harvard Institute for International Development.
- SHIELLS, C., A. SUBRAMANIAN and P. UIMONEN (1996), "Effects of the Uruguay Round on Egypt and Morocco", *IMF Working Paper No. 7*, January, Washington, D.C.
- SUBRAMANIAN, A. (1997), "The Egyptian Stabilization Experience: An Analytical Retrospective", *IMF Working Paper No. 105*, September, Washington, D.C.
- UNCTAD (1997), *Trade Analysis and Information System*, Geneva.
- WORLD BANK (1993), *The East Asian Miracle: Economic Growth and Public Policy*, Oxford University Press for the World Bank.
- WORLD BANK (1997), "Egypt: Issues in Sustaining Economic Growth", *Arab Republic of Egypt Country Economic Memorandum*, March, Washington, D.C.



*Notes:*

1. Each nest represents a different CES bundle. Substitution elasticities separated by a comma indicate respective CES substitution elasticity for *old* capital and for *new* capital. The elasticity may take the value zero. Because putty/semi-putty specification, the nesting is replicated for each type of capital, i.e. *old* and *new*. The values of substitution elasticity will generally differ depending on the capital vintage, with typically lower elasticities for *old* capital.
2. Intermediate demand, both energy and non-energy, is further decomposed by region of origin according to the Armington specification. However, the Armington function is specified at the border and is not industry specific. Substitution elasticities separated by a dash indicate the range of elasticity values.

## ANNEX 1: THE DIMENSIONS OF THE MODEL

The model includes 30 sectors of production, and the corresponding 30 commodities:

1	Food Crops	16	Paper and Printing
2	Non Food Crops	17	Chemical
3	Livestock	18	Refined Petroleum
4	Crude Petroleum and Natural Gas	19	Rubber
5	Other Extractive Industries	20	Construction Materials
6	Food Processing	21	Machinery Equipment
7	Beverages	22	Transportation Equipment
8	Tobacco	23	Other Manufactures
9	Cotton Ginning and Pressing	24	Electricity and Gas
10	Cotton Spinning and Weaving	25	Construction
11	Other Textiles	26	Trade
12	Leather	27	Tourism
13	Shoes	28	Transports
14	Wood Products	29	Financial Services
15	Furniture	30	Public Services

In the tables of the paper the sectors are aggregated for presentation purposes using the following scheme: *Primary Products*: sectors 1-3, 5; *Food Processing*: sectors 6-8; *Textile*: sectors 9-11; *Petroleum Products*: sectors 4,17-18; *Heavy industries*: sectors 19-22; *Other Manufactures*: sectors 12-16, 23; *Tradable Services*: 26-28; *Other Services*: sectors 24-25, 29-30.

The model includes four trading partners:

- 1) EU      European Union  
*Austria, Belgium, Denmark, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, Turkey, United Kingdom,.*
- 2) NAFTA      North American Free Trade Area  
*Canada, Mexico, United States of America*
- 3) MED      Southern Mediterranean Countries  
*Algeria, Cyprus, Israel, Jordan, Lebanon, Malta, Morocco, Syria, Tunisia, Turkey, West Bank and Gaza,*
- 4) ROW      Rest of the World

## ANNEX 2: THE UPDATING OF THE SOCIAL ACCOUNTING MATRIX

The SAM (CAPMAS, 1997) is actualised from 1992 to 1995 to match the national accounts in 1995. In order to do so, we assume that the relative product composition of the component of the final demand remains unchanged, except for imports and exports, for which is available the detailed composition by products in 1995, and the applied tariffs. We equally assume that production technologies are unchanged between 1992 and 1995. This means that the production of one unit of the product  $i$  requires the same amount of intermediate inputs and value added in 1992 and in 1995. The principle of the actualisation consists in identifying the sectoral outputs using the available information on the structure and the amount of the different components of the demand and the equilibrium properties.

One may write the equilibrium on the domestic goods markets as:

$$\begin{pmatrix} A_{11} & \cdot & A_{1N} \\ \cdot & \cdot & \cdot \\ A_{N1} & \cdot & A_{NN} \end{pmatrix} \begin{pmatrix} XP_1 \\ \cdot \\ XP_N \end{pmatrix} + \begin{pmatrix} FD_1 \\ \cdot \\ FD_N \end{pmatrix} - \begin{pmatrix} t_1 & & \\ & \cdot & \\ & & t_N \end{pmatrix} \begin{pmatrix} XP_1 \\ \cdot \\ XP_N \end{pmatrix} = \begin{pmatrix} XP_1 \\ \cdot \\ XP_N \end{pmatrix}$$

where  $XP_i$  is the total output of the  $i$ th sector ( $i=1, \dots, N$ ),  $FD_i$  is the final demand (private and public consumption, plus gross domestic investment, plus exports minus imports) for the  $i$ th product;  $A_{ij} = C_{ij} / XP_j$  are the technical coefficients ( $C_{ij}$  is the intermediate consumption of the product  $i$  by the sector  $j$ ) and  $t_j = indtax_j / XP_j$  are the sectoral net indirect tax rates. We thus obtain the sectoral outputs writing the previous equation as follows:

$$A_{(N,N)}XP_{(N,1)} + FD_{(N,1)} - T_{(N,N)}XP_{(N,1)} = XP_{(N,1)}, \text{ or } XP_{(N,1)} = (I - A + T)_{(N,N)}^{-1} FD_{(N,1)}$$



The estimated macro-economic social accounting matrix for 1995 is reported below.

**The Macro-economic Social Accounting Matrix in 1995**  
(LE billion 1995)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	Total
(1) Activity	156.9				150.2		21.9	42.3		44.6	415.9
(2) Labour	55.5										55.5
(3) Capital	121.2										121.2
(4) Exogenous resources	16.4										16.4
(5) Households		55.5	118.5				11.2			11.1	196.4
(6) Net indirect taxes	4.9										4.9
(7) Government				16.4	12.2	4.9			7.0		40.4
(8) Capital account					34.0		7.3			1.0	42.3
(9) Tariffs	7.0										7.0
(10) World	54.0		2.7								56.7
<b>Total</b>	<b>415.9</b>	<b>55.5</b>	<b>121.2</b>	<b>16.4</b>	<b>196.4</b>	<b>4.9</b>	<b>40.4</b>	<b>42.3</b>	<b>7.0</b>	<b>56.7</b>	

## ANNEX 3: SENSITIVITY ANALYSIS

The Table A below reports the macro-economic results of different policy scenarios using different sets of substitution elasticities for exports and imports with respect to domestic production. In the first sensitivity analysis, we divide Armington and CET elasticities (at first and second level) by 3. For instance, the elasticity of substitution between domestic and imported products equals 0.7 (instead of 2.2). In the second sensitivity analysis, we multiply Armington and CET elasticities (at first and second level) by 3.

Table A. **Sensitivity Analysis of Macro-economic Results  
in Different Policy Scenarios**

	<i>Sub. Elasticities divided by 3</i>			<i>Sub. Elasticities multiplied by 3</i>		
	<i>REF</i>	<i>EU1</i>	<i>EU3</i>	<i>REF</i>	<i>EU1</i>	<i>EU3</i>
Real GDP growth (%)	4.44	4.47	4.71	4.55	4.61	7.48
Private consumption growth (%)	4.07	4.05	4.32	4.21	4.20	7.35
Investment growth (%)	4.73	4.83	5.03	5.10	5.34	7.88
Export growth (%)	4.76	4.94	5.20	5.00	7.29	10.71
Import growth (%)	4.05	4.21	4.48	4.27	6.38	9.65
Discounted EV (% of GDP)		-0.15	1.71		-0.04	18.09
Export competitiveness growth (%)	1.35	1.51	1.54	0.17	0.32	0.34
Import competitiveness growth (%)	1.35	1.20	1.21	0.17	-0.32	-0.32
Tariff revenue growth (%)	4.06	0.34	0.60	4.10	-8.08	-5.26

*Note:* See Table 6.