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# TOWARD A PAN-ARAB FREE TRADE AREA: ASSESSING TRADE POTENTIAL EFFECTS OF THE AGADIR AGREEMENT

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On February 25, 2004, a free trade agreement (FTA) was concluded between Jordan, Egypt, Morocco, and Tunisia, as a first step toward the implementation of a larger Pan-Arab FTA. This paper proposes an estimation of the trade potential among these countries. Based on new developments of the gravity equation, we estimate a static and dynamic panel data model, using respectively the Hausman and Taylor, and the Arellano, Bond, and Bover's estimators. Results show that trade flows remain dramatically low between these countries, as a result of high trade costs. In particular, the estimated border effects clearly reflect a significant trade integration deficit in this area. However, there is only a limited export potential between these countries, due to the lack of trade complementarity between them. As a consequence, the Agadir Agreement may only have limited trade effects.

## I. INTRODUCTION

On February 25, 2004, a free trade agreement (FTA) was concluded between Jordan, Egypt, Morocco, and Tunisia. This agreement, known as the Agadir Declaration, can be regarded as the first step toward economic and social integration in the Arab Mediterranean world.[1] It can also be seen as an additional step toward the achievement of the Euro-Mediterranean FTA (Euromed) by 2010. As regards this prospect, the EU has pledged to support the Agadir process, from both the political and a financial points of view. Thus, a specific 4 million euro program was initiated in 2003, with the purpose of encouraging South-South trade integration in the Mediterranean area. The other Middle Eastern and North African (MENA) countries have also been invited to join the Agadir process, in order to create a large Pan-Arab Free Trade Area (PAFTA).[2]

[1] In fact, there have been some unsuccessful attempts in the past. In particular, the Arab Maghreb Union (AMU) agreement, concluded in 1988 between Algeria, Morocco, Tunisia, Libya, and Mauritania, has never been applied.

[2] The PAFTA initiative was launched in 1998 with the ambitious hope of creating a free trade area between the 14 signatory countries by 2005. Although the Agadir Agreement has gained more

By creating a South-South FTA of more than 100 million people in the Agadir signatories' countries, it is expected that trade and investment will be boosted both within the four MENA countries, as well as between the EU and these countries. Specifically, within the MENA countries, the FTA could create scale economies that would compensate for the small size of individual domestic markets, and thus promote trade flows. This may in turn foster economic development in the region.

This paper investigates the potential effects of trade integration in the countries that have concluded the Agadir Agreement. However, Algeria is taken into account as well, because this country may join the Agadir agreement in the near future, as it is involved in the Euromed process. Moreover, because of its central geographic position in the Maghreb, Algeria constitutes a link between Morocco and Tunisia.

Section II investigates the current trade relationships among the five MENA countries (hereafter called the MENA countries). It is pointed out that intra-MENA countries' trade is marginal and essentially involves primary and basic manufactured products. It is emphasized that these countries' relative export position on their own market is highly unfavorable, especially in comparison with the EU or the Gulf countries. Finally, this section highlights the lack of trade complementarity between the MENA countries, a point that emerges from the calculation of a specific indicator.

Based on new developments of the gravity equation, Section III estimates a static and dynamic panel data model, using respectively the Hausman and Taylor, and the Arellano, Bond, and Bover's estimators. This model makes it possible to quantify the main determinants of these countries' trade patterns. It is also used for the calculation of the trade potential between MENA countries. Results show that the trade cost variables are particularly significant in explaining these countries' exports. In particular, the countries concerned face very high border effects amongst themselves. This result underlines the significant trade integration deficit between the countries concerned. However, as suggested by the dynamic model estimates, there is only a limited export potential among the MENA countries, due to their lack of trade complementarity.

## II. MAIN FEATURES OF THE INTRA-MENA COUNTRIES' TRADE

The present section will not investigate MENA countries' general trade patterns, as this is an issue that has already been dealt with by many other studies. These include work by Blavy (2001), Dessus, Devlin, and Safadi (2001), Handoussa and Reiffers (2003, 2004), and Hoeckman and Kheir-El-Din (2000). The section will

importance than PAFTA, the former may nevertheless be viewed as a step toward the completion of the latter.

instead specifically focus on the most striking features of intra-MENA countries' trade.

Table I shows that trade between the MENA countries remains dramatically low; during the period 1998–2001, it accounted for only 1.3 percent of their overall trade. As shown in Figure 1, this proportion has remained remarkably stable over the past three decades. In fact, the trade of the MENA countries is particularly oriented toward the EU, which accounts for 56 percent of total trade. As regards the Maghreb countries, the EU's share of trade is even more important, being as high as 78 percent in the case of Tunisia. The only exception is Jordan, whose trade is oriented more toward the Gulf countries and Asia. The United States is generally

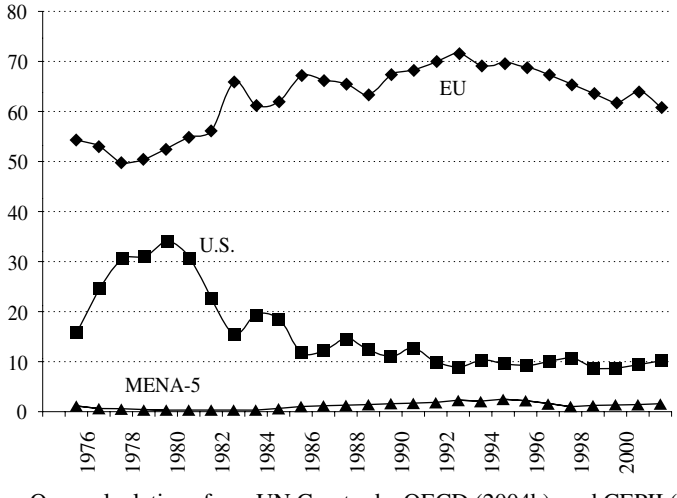
TABLE I

MAIN INDICATORS FOR INTRA-MENA COUNTRIES' TRADE

| | Exports (2001, US$ Mil.) | Imports (2001, US$ Mil.) | Share in Total Trade (%, 1998–2001) | | | |
|---|---|---|---|---|---|---|
| | | | MENA-5 | EU | USA | Gulf |
| Algeria | 19,894.6 | 10,067.8 | 1.2 | 63.1 | 11.8 | 0.4 |
| Morocco | 7,862.3 | 10,969.0 | 1.6 | 66.1 | 4.8 | 7.3 |
| Tunisia | 6,765.0 | 9,113.7 | 1.7 | 77.7 | 2.3 | 4.7 |
| Egypt | 5,939.9 | 17,259.3 | 0.8 | 40.5 | 16.3 | 4.7 |
| Jordan | 2,770.0 | 4,871.3 | 1.9 | 4.3 | 1.7 | 17.8 |
| *MENA-5* | *43,231.8* | *52,281.1* | *1.3* | *56.0* | *9.3* | *4.9* |

Sources: Own calculations from UN Comtrade, OECD (2004b), and CEPII (2003).

Fig. 1. Evolution of MENA Countries' Trade with Their Main Partners (% in Total MENA-5 Exports)




Sources: Own calculations from UN Comtrade, OECD (2004b), and CEPII (2003).

the second trading partner after the EU. However, it remains far behind the latter, the United States representing less than 10 percent of MENA countries' trade.

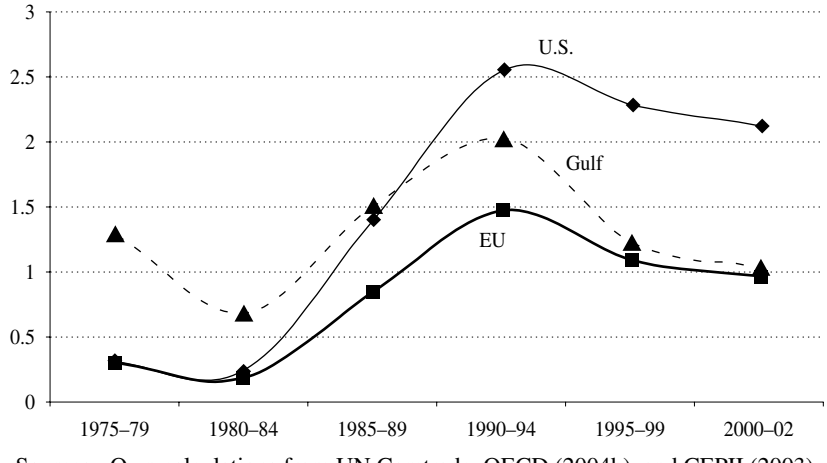
Additional information is provided by the calculation of an index of trade position (*ITP*). This index is calculated as follows:

$$ITP = \frac{(X+M)_{MENA\text{-}MENA} / (X+M)_{MENA\text{-}RoW}}{(X+M)_{other\text{-}MENA} / (X+M)_{other\text{-}RoW}},$$

where *X*, *M*, and *RoW* denote exports, imports, and the rest of the world (non-MENA countries) respectively.

The index corresponds to the relative market share of MENA countries on their own market, as compared to other countries (the United States, the EU, and the Gulf countries). For example, when *ITP* = 1, it means the MENA countries' share in MENA overall trade is identical to the MENA countries' share in other countries' overall trade (United States, EU, or Gulf). Calculations are displayed in Figure 2. Several significant points emerge from this graph. First, a striking feature is the low *ITP* value regarding the EU: This value has always been below or around 1, except during the period 1990–94. Thus, the share of MENA countries in the EU's trade is generally equal to, or above, the share of MENA countries in MENA's trade. This clearly reflects a lack of trade integration within the MENA region, as the EU performs at least as well in this region. Conversely, the *ITP* is far above 1 for the United States. This suggests that MENA countries are more integrated with each other than they are with the United States. Another interesting result is that the *ITP* has increased since 1975. This shows that MENA countries improved to some ex-

Fig. 2. Index of Trade Performance of MENA Countries as Compared to Their Partners on Their Own Market



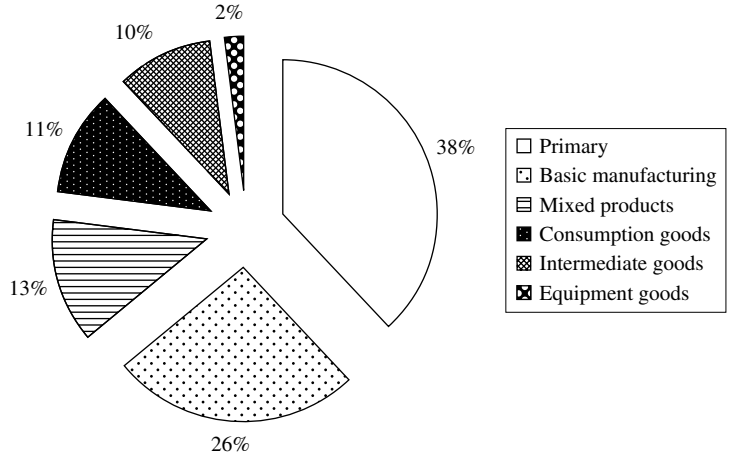

Sources: Own calculations from UN Comtrade, OECD (2004b), and CEPII (2003).

tent their trading position within this region, compared with non-MENA countries. Nevertheless, in the most recent period, the *ITP* has tended to reach a ceiling so far as the EU and Gulf countries are concerned. Consequently, there is still much progress to be made toward more integration in the MENA region.

Regarding the sectoral composition of intra-MENA countries' trade, it is worth stressing that almost two-thirds of total trade consists of primary products or basic manufacturing goods (Figure 3). These are highly concentrated on two products, namely, natural gas (exported by Algeria) and basic chemicals (exported by the other MENA countries, especially Tunisia). Conversely, consumer goods account for only 11 percent of intra-MENA countries' trade. These consumption goods consist mainly of pharmaceutical products (exported by Jordan) and preserved fruit (exported by Morocco, Egypt, and Jordan). Mixed products (13 percent of intra-trade) essentially consist of refined petroleum products (Algeria and Morocco). Lastly, intermediate goods account for 10 percent of intra-MENA trade. They may be divided into various small flows, including tubes, yarn fabrics, vehicle components, plastics, and rubber articles.

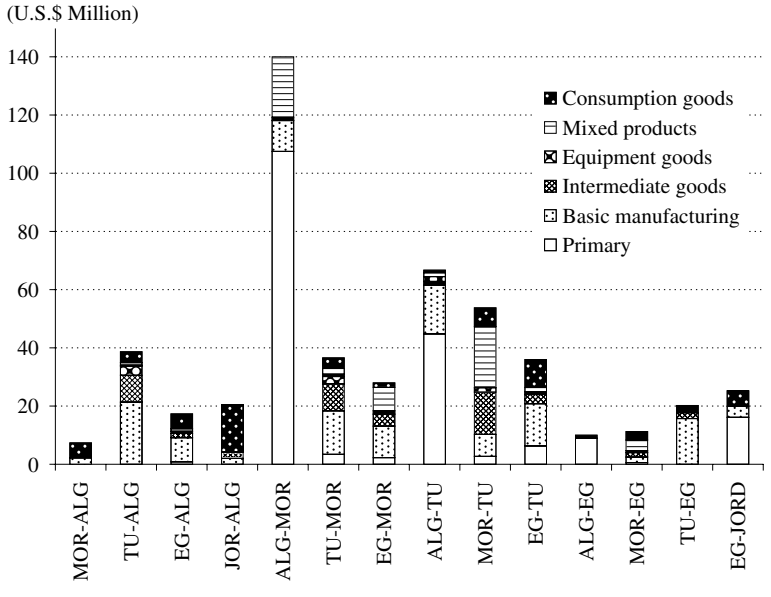
Figure 4 summarizes the most significant bilateral flows (> US$5 million). If we exclude the flows from Algeria to Morocco and Tunisia, which consist mainly of natural gas, we can see that the various bilateral flows correspond to very small amounts (generally below US$40 million). The only exception concerns exports from Morocco to Tunisia, which reach the US$50 million level. Again, bilateral exports of consumption goods are marginal: the highest flows are those of pharmaceutical exports from Jordan to Algeria.

Fig. 3. Sectoral Composition of Intra-MENA Countries' Exports
(Yearly Average: 1998–2002)




Sources: Own calculations from UN Comtrade, OECD (2002), and CEPII (2003).

Fig. 4. Main Bilateral Flows between MENA Countries (Yearly Average: 1998–2002)




Sources: Own calculations from UN Comtrade, OECD (2004a), and CEPII (2003).
Note: Calculated for significant bilateral flows (> US$5 million).

To sum up, it is clearly apparent that trade between MENA countries is small and very concentrated on primary products and basic manufacturing goods. Interestingly, the sectoral composition of intra-MENA countries' trade is very different from the sectoral composition of MENA trade with other countries. Table II shows that the extra-trade share of manufactured products is much more important than the corresponding intra-trade share. An outstanding example is textile and clothing, which represent a very large export share in Tunisia (55.3 percent), Morocco (37.1 percent), Jordan (27.7 percent), and Egypt (19 percent). However, intra-MENA trade in this product category is insignificant. Most other consumer manufactured goods are also mainly traded with Northern countries, whereas the intra-share is insignificant. By contrast, the share of primary products is much more important for intra-regional than for extra-regional trade flows. In particular, natural gas and crude oil, and basic inorganic chemicals together account for 43 percent of intra-MENA trade, twice that of the share of the extra-MENA countries' share. This difference between intra- and extra-MENA trade composition may be explained by the lack of trade complementarity in this region. Indeed, MENA countries all mostly specialize in the same manufactured products (mainly clothing). Similarly, they face a comparative disadvantage with regard to the same products (machinery, aircraft, telecommunication equipment, and so on). This lack of complementarity may

TABLE II

SECTORAL COMPOSITION OF INTRA- AND EXTRA-MENA COUNTRIES' TRADE, 2001

(% of total trade)

| | Intra-trade | Extra-trade |
|---|---|---|
| Clothing | 0.03 | 8.32 |
| Yarns fabrics | 1.18 | 4.33 |
| Cereals | 0.04 | 3.11 |
| Knitwear | 0.01 | 2.60 |
| Electrical apparatus | 0.89 | 3.04 |
| Aeronautics | 0.00 | 1.89 |
| Telecommunications equipment | 0.04 | 1.84 |
| Specialized machines | 0.41 | 2.19 |
| Fats | 0.47 | 1.75 |
| Plastic articles | 1.57 | 2.15 |
| Engines | 1.71 | 2.25 |
| Pharmaceuticals | 1.15 | 1.59 |
| Other edible agricultural products | 2.34 | 2.53 |
| *Refined petroleum products* | *9.77* | *7.75* |
| *Coke* | *2.16* | *0.08* |
| *Animal food* | *2.79* | *0.61* |
| *Paper* | *3.46* | *1.15* |
| *Cement* | *3.24* | *0.20* |
| *Preserved fruits* | *3.57* | *0.51* |
| *Non ferrous metals* | *3.93* | *0.87* |
| *Iron Steel* | *5.60* | *1.95* |
| *Basic inorganic chemicals* | *8.68* | *1.41* |
| *Natural gas and crude oil* | *34.52* | *20.00* |

Sources: UN Comtrade and CEPII (2003).
Note: Calculated for significant trade shares (> 1.5% of intra and/or extra trade shares).

be quantified by the calculation of an index of trade complementarity (ITC):[3]

$$ITC = 1 - \frac{\sum_k \left| \frac{M_j^k}{M_j} - \frac{X_i^k}{X_i} \right|}{2},$$

with $0 < ITC < 1$, and $i$ being the exporting country, $j$ the importing country, and $k$ representing categories of goods. This index equals one when the import needs of country $j$ match perfectly with the export supply of country $i$. Conversely, it takes a zero-value when the sectoral composition of country $i$'s exports has no overlap with the import composition of country $j$.

As shown in Table III, although there are some differences amongst countries, the trade complementarity index is generally low within the MENA region. In a

[3] This type of index is frequently used in the empirical trade literature, as for instance in Otsubo and Umemura (2003).

TABLE III

INDEX OF TRADE COMPLEMENTARITY BETWEEN MENA COUNTRIES AND THEIR MAIN PARTNERS, 1998–2002 (Yearly Average)

| From\To | Algeria | Morocco | Tunisia | Egypt | Jordan | EU | USA | Gulf |
|---|---|---|---|---|---|---|---|---|
| Algeria | — | 0.165 | 0.110 | 0.100 | 0.200 | *0.125* | *0.153* | *0.152* |
| Morocco | 0.239 | — | 0.308 | 0.253 | 0.294 | *0.316* | *0.319* | *0.283* |
| Tunisia | 0.285 | 0.359 | — | 0.317 | 0.370 | *0.363* | *0.367* | *0.376* |
| Egypt | 0.322 | 0.488 | 0.434 | — | 0.517 | *0.404* | *0.387* | *0.462* |
| Jordan | 0.397 | 0.357 | 0.369 | 0.423 | — | *0.420* | *0.344* | *0.285* |
| *EU* | *0.680* | *0.634* | *0.658* | *0.722* | *0.704* | — | — | — |
| *USA* | *0.619* | *0.593* | *0.584* | *0.691* | *0.601* | — | — | — |
| *Gulf* | *0.095* | *0.221* | *0.164* | *0.137* | *0.251* | — | — | — |

Sources: Own calculations from UN Comtrade, OECD (2004b), and CEPII (2003).

first group of countries, we find Algeria, whose exports show only weak complementarity with regard to the other countries' imports. Morocco and Tunisia also present quite low complementarity levels, though to a lesser extent. A higher degree of complementarity is found for Egypt and Jordan, whose trade structure is more diversified. It is also interesting to observe that MENA countries are generally more complementary with their Northern trading partners (the EU and the United States) than with the Gulf countries or with their MENA partners. This is particularly striking in the case of MENA's imports. Of course, this lack of complementarity may be due to high trade barriers across MENA countries. But it may also partly be due to factor endowments. For example, the low complementarity indexes found in the Maghreb countries may be explained to some extent by the great concentration of their comparative advantage (natural gas for Algeria and clothing for the other Maghreb countries). As a consequence, it is likely that this lack of complementarity will persist, at least partly, after the completion of the FTA in this region. This would lessen the potential trade effects of the Agadir Agreement within the area. The impact of trade complementarity on trade flows will be investigated in more detail in the next section.

## III. THE MODEL

The model proposed here is inspired by new theoretical developments as regards the gravity equation. It is now generally recognized that this equation may be derived from several theories, including mainly Ricardian, Heckscher-Ohlin, and monopolistic competition models (Helpman and Krugman 1985, Bergstrand 1989, Markusen and Wigle 1990, Deardorff 1998, Evenett and Keller 2002), and also from the reciprocal-dumping model (Feenstra, Markusen, and Rose 2001). It may also be derived from both complete or incomplete specialization frameworks

(Haveman and Hummels 2004). Other recent progress has been made concerning trade cost specification, with the introduction of border effects and multilateral resistance variables as new trade cost variables (Feenstra 2002, Anderson and van Wincoop 2003, Deardorff 2004). Introducing these variables is justified both theoretically and empirically, since it allows the avoidance of biases due to omitted variables, which are commonly found in standard gravity equations. Since the present study particularly focuses on trade costs regarding MENA countries, we start from the theoretical equation derived by Anderson and van Wincoop (2003):

$$X_{ij} = \frac{Y_i Y_j}{Y_w} \left( \frac{T_{ij}}{P_i P_j} \right)^{1-\sigma}, \qquad (1)$$

where $Y_i$, $Y_j$, and $Y_w$ denote the aggregate income in countries $i$, $j$, and the world income respectively; $T_{ij}$ accounts for transport costs and other trade barriers; $P_i$ and $P_j$ reflect the implicit aggregate equilibrium prices; and $\sigma$ is the CES between all goods in the consumer utility function.[4]

We assume from this equation that trade costs $T_{ij}$ may be divided into several components, namely, transport costs, tariff and non-tariff barriers (NTBs), differences in languages, lack of trade complementarity, and other border effects. Since some of these variables are not directly measurable for the MENA countries at a bilateral level, we use several proxies. The first of these is the traditional geographical distance $D_{ij}$ (as a proxy for transport costs). A second proxy is a dummy variable which accounts for regional economic agreements $R_{ij}$ (as an inverse proxy for tariffs and NTBs). This variable captures the trade preferences granted by the EU to exports from MENA countries. The lack of trade complementarity $C_{ij}$ is calculated from the index of trade complementarity developed in Section II, by taking $C_{ij} = 1 - ITC_{ij}$. Differences in languages ($L_{ij}$) are measured by a dummy variable which equals 0 if countries share the same language, and 1 otherwise. Finally, the other border effects ($B_{ij}$) are calculated by an additional dummy variable which equals 0 for trade within countries, and 1 for trade across countries.[5] Overall, this trade cost equation is original since it simultaneously includes traditional as well as new trade cost variables, such as border effects and complementarity.

In order to carry out the estimations, we make the following additional assumptions. Firstly, since the implicit aggregate prices $P_i$ and $P_j$ are unobserved variables,

[4] See Anderson and van Wincoop (2003) for the complete derivation of the model.

[5] This dummy requires the calculation of internal trade flows ($X_{ii}$) and internal distance ($D_{ii}$). Following Wei (1996), the former is calculated by substracting a country's exports from its production. Turning to internal distance, Head and Mayer (2002) propose the following measurement, assuming that the economic activity is evenly distributed within a country:

$$D_{ii} = \frac{2}{3\Pi^{1/2}} S_i^{1/2}, \text{ where } S_i \text{ denotes the size of country } i.$$

we will consider them as specific random effects in the econometric model.[6] In addition, the world income $Y_w$ will be captured by the constant term, as in Anderson and van Wincoop (2003), or Feenstra (2002). Finally, we assume the existence of non-tradable goods (as in Anderson 1979). This allows the introduction of income elasticities different from unity.

The final estimable gravity equation is thus:

$$\ln X_{ijt} = \alpha_0 + \alpha_1 \ln Y_{it} + \alpha_2 \ln Y_{jt} + \alpha_3 \ln D_{ij} + \alpha_4 \ln B_{ij} + \alpha_5 \ln R_{ijt} + \alpha_6 \ln L_{ij} + \alpha_7 \ln C_{ijt} + \beta_i + \lambda_j + \varepsilon_{ijt}, \quad (2)$$

where $X_{ijt}$ corresponds to the exports from country $i$ to country $j$ in year $t$. This equation is estimated for the five exporting MENA countries described in Section II. We selected 42 main import partners, which account for more than 90 percent of MENA countries' trade[7] from 1975 to 2001 (a period of 27 years). These large country and time samples ensure a large number of observations (5,670), with 210 bilateral trade flows.

The data sources are as follows. Trade flows are derived from the UN Comtrade (the United Nations Statistics Division) and OECD (2004b), GDP totals for individual countries have been taken from CEPII (2003), and great circle distances between capitals have been calculated from latitudes and longitudes of states, using the service provided at http://www.indo.com/distance/.

## IV. ESTIMATION AND RESULTS

Table IV shows the estimation results of equation (2). Since this equation includes key time-invariant variables (border, distance, language), it is not possible to estimate fixed effects models (FEMs). Consequently, we used several random effect estimators: the static Hausman and Taylor model (HTM) and the dynamic Arellano, Bond, and Bover's estimator (ABB). The former has been preferred to a standard REM because the Hausman test indicates a correlation between the independent variable and the random effects. We therefore estimated an HTM, which takes this problem into account. Several specification attempts have been carried out in order to select the appropriate correlated and instrumental variables. Based on Hausman and Taylor identification tests, the final specification keeps the exporter and im-

[6] In fact, some authors tentatively estimated a model with price index variables (Baier and Bergstrand 2001). However, published prices indexes do not necessarily reflect theoretical implicit prices, which represent multilateral resistance, including non-pecuniary trade costs (home market preferences, time and currency risks involved in international trade, and so on).

[7] These partners are the 15 EU countries, the five selected MENA countries, as well as the United States, Canada, Mexico, Japan, South Korea, Turkey, Norway, Switzerland, Australia, New Zealand, Israel, South Africa, Brazil, Argentina, Chile, India, Hong Kong, Singapore, Taiwan, Malaysia, Philippines, Thailand, and China.

TABLE IV

ESTIMATION RESULTS

| | HTM | Dynamic ABB | |
|---|---|---|---|
| | | Parameter Estimates | Long-Run Elasticities |
| Exporter GDP ($Y_i$) | 1.281*** | 0.256*** | 1.299*** |
| Importer GDP ($Y_j$) | 1.462*** | 0.275*** | 1.396*** |
| Distance ($D_{ij}$) | –1.908*** | –0.374*** | –1.898*** |
| Border ($B_{ij}$) | –3.556*** | –0.109 | –0.553 |
| Lack of complementarity ($C_{ij}$) | –4.464*** | –4.786*** | –24.294*** |
| Regional agreements ($R_{ij}$) | 0.382*** | 0.083 | 0.421 |
| Different language ($L_{ij}$) | –0.284 | –0.054 | –0.274 |
| Constant | –12.501*** | –4.344*** | –22.050*** |
| Lagged exports ($X_{ijt-1}$) | — | 0.803*** | — |
| *No. of observations* | *5,670* | *5,670* | |
| *No. of bilateral relations* | *210* | *210* | |
| *Adjusted $R^2$* | *0.811* | *0.666* | |
| AIC | 0.963 | 1.757 | |
| LM test | 21.1557*** | — | |
| Hausman $\chi^2$ test | 98.59*** | — | |
| Condition index | 54.079 | — | |
| White test | 1,030.99*** | — | |
| Estimated autocorrelation (rho) | 0.569 | — | |

***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

porter GDP as the correlated time-varying variables (see Hausman and Taylor [1981] for more details about this method).

A dynamic ABB model has also been estimated in order to take into account habit persistence in export flows, through the lagged dependent variable. This is theoretically justified by the existence of sunk costs following market entry or exit. These costs prevent export flows from returning immediately to an equilibrium after a shock or a policy change.[8] From an econometric standpoint, the lagged dependent variable may introduce a bias, caused by the correlation of this variable with the random error term. Due to the likely existence of a simultaneity bias, the most appropriate estimation method appears to be GMM. We therefore used here the estimator developed by Arellano and Bover (1995), and Arellano and Bond (1998).

Both AIC and LM tests indicate that these two models are superior to the standard REM specification. Additional econometric tests have been carried out. First, heteroskedasticity has been controlled through the reestimation of the models with

[8] See Dixit (1989) and Baldwin and Krugman (1989) for more details.

the White heteroskedasticity-corrected variance-covariance matrix. Autocorrelation has also been checked out through the calculation of the rho-coefficient. In both HTM and ABB, rho values are not very high. This indicates small problems of autocorrelation. Still, estimations with an AR(1) error structure have also been implemented. However, we finally kept the uncorrelated form of the model, given that parameter estimates were very close in the AR(1) or AR(0) specifications. Finally, multicollinearity has been controlled. The condition index does not ensure the absence of collinearity problems. Consequently, further investigations have been made through a step-by-step estimation procedure. The latter indicated that the one by one addition of each variable did not significantly change the value of the estimated coefficients. As a consequence, the multicolinearity bias does not appear to be significant.

Column 2 in Table IV reports the major results of the HTM. With the exception of the common language variable, all coefficients are significant at the 1 percent level. Moreover, they all present the expected sign. The trade cost variables are particularly significant in explaining the trade patterns of the MENA countries. These relate to the traditional gravity variables, such as distance and regional agreements with the EU. However, the highest trade cost coefficients are found for the new gravity variables, namely, the lack of complementarity and border effects. The former is particularly significant:[9] a 1 percent reduction of this variable allows MENA exports to rise by almost 4.5 percent. Since we have observed in Section II that there is little complementarity among the MENA countries, we can thus conclude that this lack of complementarity is a major barrier for intra-MENA countries' trade. In the same way, the border effect coefficient is also high (–3.556). Taking the exponent of this parameter indicates that trade across MENA countries is 35 times lower than trade within each MENA country. As compared with studies which have calculated the border effects for developed countries, it is interesting to observe that border effects are much higher for MENA countries than they are for developed countries. For example, as regards the United States, Anderson and van Wincoop (2003) and Feenstra (2002) find a border effect coefficient equal to –1.65 and 1.55 respectively. In a more extensive empirical study, Péridy (2005) finds an estimate of 2.24 on average for OECD countries. Consequently, the higher border effects among the MENA countries indicate a notable trade integration deficit in the Mediterranean area.

Further information related to border effects is provided in Table V. We first calculated these effects between MENA countries and with their main export partner groups, including the United States and Canada, the EU, South Asian countries, Central and South American countries, and the other OECD countries.[10] Estima-

[9] This result correlates with that found by Otsubo and Umemura (2003).
[10] These are Israel, Turkey, Australia, and New Zealand.

TABLE V

ESTIMATIONS OF MENA COUNTRIES' BORDER EFFECTS WITH THEIR MAIN PARTNERS

| | All MENA (1975–87) | Maghreb | Mashrek | All MENA (1995–2001) |
|---|---|---|---|---|
| MENA | –5.761*** | –3.856*** | –5.880*** | –5.653*** |
| USA-Canada | –5.686*** | –5.710*** | –5.070*** | –5.991*** |
| EU | –5.679*** | –5.429*** | –4.712*** | –4.821*** |
| Other OECD | –4.426*** | –2.117*** | –6.526*** | –4.868*** |
| South Asia | –3.627*** | –2.543*** | –5.391*** | –4.035*** |
| South America | –2.557*** | –1.863 | –3.107*** | –3.853*** |
| All partners | –3.356** | –3.189*** | –5.537*** | –4.594*** |

***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

tions highlight that the highest border effects of the MENA countries are found amongst themselves (–5.761). Border effects are lower with all their other partners, in particular with South Asian or Central and South American countries. This result further underlines the very important lack of trade integration within MENA countries, as it is less costly for them to trade with all non-MENA countries than among themselves.

Separate calculations for the Maghreb and Mashreq countries (the latter group comprises Egypt, Jordan, Lebanon, Syria, and Palestine) indicate that the Maghreb countries experience lower border effects than the Mashreq countries do. In particular, the specific Maghreb border effect with MENA countries is smaller than the Mashreq one. This simply reflects the very small amount of trade between Egypt and Jordan, as compared to the higher amount between Maghreb countries. However, if we exclude natural gas and refined petroleum products from our analysis (which are mainly traded amongst Maghreb countries), this difference in the border effect between the Maghreb and Mashreq countries disappears.

Finally, calculations carried out for the period 1995–2001 reveal that border effects among the MENA countries have increased in recent years. This is because border effects with Asian or American countries have increased, whereas those with the EU or with MENA countries have tended to stabilize or decrease slightly. Again, this increase in the overall border effects reflects the persistence of the trade integration deficit of MENA countries with their main partners. However, the slight decrease with the EU may be related to the first effects of the Euromed agreement.

Parameter estimates of the dynamic ABB model are also provided in Table IV. An important result is that the lagged dependent variable's parameter is highly significant. This supports the assumption of persistence habits in trade flows through entrance and exit barriers due to sunk costs. Furthermore, the traditional gravity parameters are also significant. In order to compare these estimates with those found in the static model, we calculated long-run elasticities. The latter are very close to

the static parameter estimates. The lack of complementarity is also greatly significant, and the influence of this parameter is reinforced in the dynamic model as compared to its static version. Conversely, the parameters corresponding to border effects, regional agreements, and common languages are no longer significant, though they present the expected sign.

Since the dynamic model captures persistence in trade flows in addition to the other determinants, it has been used to calculate trade potentials amongst the MENA countries. These calculations have been carried out from the residuals of the model, by using an out-of-sample technique, in order to avoid misspecification biases, as suggested by Egger (2002). Table VI displays the actual/potential export ratio for each country. The most important point emerging from this table is that the current trade flows among the MENA countries are generally close to their potential levels. At first sight, this is a quite surprising result. Indeed, given the small amount of trade among these countries as compared to trade with their other partners (the EU and the United States), one would have expected a much higher trade potential within the MENA region. However, several factors considerably reduce this potential. The first of these is the lack of trade complementarity between the MENA countries. Indeed, since the corresponding parameter estimate is greatly significant and presents a high long-run elasticity, the observed lack of complementarity between MENA countries (Table III) considerably reduces these countries' export potential. Secondly, the low GDP levels in these countries are an additional factor explaining why trade potential is currently limited in this region. Finally, the lagged export coefficient, which accounts for the past low levels of trade within the region, also reduces trade potential levels in this area. However, the influence of this last factor seems limited, since implementing trade potential's estimations with the static model does not provide a very significant increase in export potential levels. Thus, it appears that the low trade potential among MENA countries is mainly attributable to lack of trade complementarity and the low economic development levels observed in these countries.

There are, however, some differences amongst the MENA countries. For example, Algeria's current exports are above their potential with all the other MENA

TABLE VI

ESTIMATIONS OF ACTUAL/POTENTIAL EXPORT RATIOS

| From\To | Algeria | Morocco | Tunisia | Egypt | Jordan |
|---|---|---|---|---|---|
| Algeria | — | 1.180 | 1.290 | 1.140 | 1.080 |
| Morocco | 0.880 | — | 1.080 | 1.210 | 1.130 |
| Tunisia | 0.960 | 0.920 | — | 1.030 | 0.980 |
| Egypt | 0.880 | 0.630 | 0.790 | — | 0.620 |
| Jordan | 0.960 | 1.010 | 0.930 | 0.820 | — |

countries. This may stem from the fact that the Algerian export potential is particularly low, because of the very low complementarity level highlighted in Table III. But this is also explained by relatively high current export flows to MENA countries, because of the specific Algerian comparative advantage in natural gas. Similarly, Moroccan and Tunisian exports to their partners are generally close to or slightly above their potential levels, given that current export flows are boosted by basic manufactured products.[11] Conversely, Egypt and Jordan's actual/potential export ratios are well below unity. This suggests higher export possibilities, due especially to higher trade complementarity indexes, as shown in Table III.

## V. CONCLUDING REMARKS

Accounting as they do for only 1.3 percent of their overall trade, trade flows between the countries involved in the Agadir arrangement remain dramatically low. Based on the new developments of the gravity equation, this paper points out that the trade costs variables are particularly significant in explaining these countries' trade patterns. In particular, they face very high border effects across themselves. This result underlines the significant trade integration deficit between these countries, as it is less costly for them to trade with non-MENA countries than among themselves. As a consequence, the Agadir Agreement, which reduces trade barriers between the participating countries, is expected to promote trade flows in this area. However, as shown by the dynamic model estimates, there is only a limited export potential among these countries, because of the lack of trade complementarity between them. As a consequence, the Agadir Agreement may only have limited trade effects.

[11] Alternative calculations without primary and basic manufacturing products indicate that the actual/potential export ratios recover levels below unity.

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