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Does MENA Defy Gravity?
How MENA has Performed in its Intraregional, EU and Other Trade: Implications for EU and Intra-MENA Trade Arrangements

JEFFREY B. NUGENT AND TARIK M. YOUSEF

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For further information:
Mediterranean Programme
Robert Schuman Centre for Advanced Studies
European University Institute
Via delle Fontanelle, 19
50016 San Domenico di Fiesole (FI), Italy

Fax: + 39 055 4685 770
E-mail: MedProgSecretary@iue.it
http://www.iue.it/RSCAS/Research/Mediterranean/Index.shtml

Abstract

The purpose of this paper is three-fold: (1) to examine the extent to which trade of MENA countries, both intra-regional trade and extra-regional, has lived up to its potential based on the gravity model and other standard determinants of trade patterns, (2) to examine alternative explanations for such discrepancies, and (3) to offer quantitative simulations of the extent to which the existing patterns could be changed by alternative trade policy or regime scenarios such as strengthened intra-MENA trade and/or strengthened MENA-EU trade.

Keywords

Gravity Models, Bilateral Trade, GAFTA, Trade Diversion and Trade Creation

I. Introduction: The Pros and Cons of Intra-Regional and Extra-Regional Trade Arrangements*

The purpose of this paper is three-fold: (1) to examine the extent to which trade of MENA countries, both intra-regional trade and extra-regional, has lived up to its potential based on a standard gravity model of the determinants of trade patterns, (2) to examine alternative explanations for such discrepancies, (3) to offer quantitative simulations of the extent to which the existing patterns would be changed by alternative trade policy and other scenarios, in particular, strengthened intra-MENA trade and/or strengthened MENU-EU trade.

The first two purposes are primarily of interest because they are needed to be able to fulfill the third objective. Hence, we start with the rationale for it.

In recent years there has been a considerable, though somewhat intermittent, rebirth of interest in inter-Arab or inter-MENA trade for at least three reasons (1) as a possible counterbalance to already initiated trade arrangements with Europe (the Euro-Med Agreements), (2) as a means of preparing for those trade arrangements and (3) as a more politically and socially acceptable means of maintaining some degree of openness and liberalization in the face of accumulated resentment arising from the presently very dim prospects for the peace process and cooperation between Israel, the Palestinians and the other nation states in the region.

The focus for much of this interest is in the proposal for the Greater Arab Free Trade Association. But this isn't the only form that greater intra-regional trade could take. It could be subregional (the Arab Maghreb Union, the Arab Common Market, the Gulf Cooperation Council (GCC)) or alternatively broader inter-MENA as a whole. Also of interest is the effect of the EU itself in MENA trade. The key policy question to be answered is what would be the effects on EU-MENA trade and both other MENA trade and intra-MENA trade should intra-MENA trade be expanded? Similarly, what would be the effects on intra-MENA trade should EU-MENA trade be expanded?

Different Analysts, Different Results, Lack of Comparability

Nevertheless, despite a large number of papers and books on such matters (see below), there still exists considerable variation in views about the relative net benefits for MENA countries of pursuing either an inter-Arab (or inter-MENA) trade agreement or additional MENA-EU trade arrangements and the magnitude of the possible effects of either of these arrangements for MENA trade with all regions and for MENA economic growth. Some doubts about the desirability of emphasis on intra-MENA trade stem from the long history of failure in multilateral trading arrangements in the region (the Arab Common Market, other initiatives of the Arab League and the Council of Economic Unity, various subregional arrangements such as among Maghreb countries, Turkey, Iran and Pakistan, and the many bilateral trade agreements formed among countries of the region). Not only have these special arrangements been far from fully realized, but also even normal trade among countries of the region has been periodically and unexpectedly interrupted by trade boycotts, ad hoc border closings and so on. This implies that businesses set up to take advantage of regional trade have been adversely impacted by such failures. Without a radical change, it would therefore be better for businesses not to think about such trade in making their investment and production decisions.

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Yet, if they have failed in adhering to intra-regional trade agreements, will MENA countries do any better in the case of EU-Mediterranean arrangements? How much trade creation as opposed to trade diversion will free trade arrangements (FTAs) with the EU have?

Doubts about the wisdom of FTAs and customs unions (CUs) promoting intraregional trade also derive from the economic integration theory literature. This literature points to the possibilities for welfare-reducing trade diversion of free trade agreements, especially in conditions not unlike those of the MENA region where differences in factor endowments are relatively small, tariff rates vary considerably from one country to another, technological efficiency is relatively low and differences in wage rates are relatively small. In addition, the past experience with such arrangements, in developing countries at least, suggests that there could well be conflict-generating polarization effects, given the relatively large differences in initial levels of income, market size and policy environments of relevance to trade and competitiveness among countries in the MENA and other regions of developing countries (LDCs). Finally, since factor movements (of both labor and capital) are rather high among countries of the region, and factor movements can substitute for trade, some feel that such flows undermine the basis for trade within the region. Some have even argued that the promotion of factor movements is a better way of achieving regional integration than trade. Even at best, many see regional trading arrangements as coming at the expense of the more advantageous broader multilateral trading arrangements (such as those within the WTO).

Since there are many different positive as well as negative effects that need to be considered in any such assessment and relevant environmental conditions vary considerably from one country to another and over time, different analyses may arrive at rather different conclusions. Typically, they have.

Another reason why various analysts, policy makers and policy advisors have come to very different conclusions about the relative merits of intraregional and extraregional FTAs and CUs has been the use of different models and different data sets.

For example, a common form of modelling of such issues has been through computable general equilibrium (CGE) models.[1] Since these models are highly dependent on many modelling assumptions and parameter estimates of unknown realism, not surprisingly different modellers have derived different conclusions about the effects of trade policy from these models. In many cases, moreover, the results derived from these models are more attributable to modelling features than to trade issues. In fact, the trade scenarios used in simulating such models are typically very naïve and based on ad hoc assumptions about how future trade patterns would be affected by alternative trade policies and strategies. Another issue that arises with CGE models is whether it is better to use national models or world models. Indeed, the results from single country CGE models are often very different than those obtained from multi-country or world models. Given the long lead-time needed to set up and calibrate such models, each such CGE modelling effort requires a large data base that is almost inevitably seriously outdated for use in the period to which it is to be applied. The sizable investment of time and expertise involved has resulted in different institutions in different parts of the world developing different modelling assumptions and data bases. Hence, in comparing different results for the same question obtained by different research teams, seldom is it possible to distinguish the effects of different modelling assumptions from those of different data sets.

Many of the parameter values used in CGE models are merely guesses. Even if they are estimates based on micro data sets or time series analysis, seldom is concern given to issues of specification bias, errors in variables, identification problems, multicollinearity, etc. Moreover, as indicated above, many of the parameters that are estimated (as opposed to only assumed) are often based on single

1 Hertel (1997) provides a rather encyclopedic description of the construction and application of CGE models to international trade and Robinson and Thierfelder (1999) a survey of the empirical literature on the application of CGE models to regional economic integration in particular.

observations, e.g., an average input-output coefficient from a social accounting matrix (SAM table) for a particular (usually badly outdated) year.

The estimates of trade flows obtained from world econometric models (like Project Link or other simpler versions of econometric and simulation models) suffer from similar problems, again limiting the comparability of their results and raising serious methodological questions as to the internal consistency of the models and the validity of any conclusions drawn.[2]

Use of the Gravity Model and Standard International Data

In order to help put the analysis of such effects of different types of trade strategies on a firmer basis, the present study focuses on the determinants of trade patterns within a world setting, based on trade flows between each pair of countries in the world over the period 1970-1992. This is an updated version of a large trade matrix that has now been used in a number of the studies referred to below.

Further, in order to generate the predicted or potential trade flows for comparing to the actual trade flows, we also make use of a model that has been widely used in the applied trade literature. This is the gravity model. Gravity models focus on the effects on trade patterns of the geographic distance between, and respective market sizes, of each pair of trading partners. Important advantages of the gravity model are its relatively high explanatory power and its modest data requirements.

One study using a gravity model applied to some countries of the MENA region is that of Ekholm et al. (1996). This study, which happens to use somewhat similar methods as in the present study, has argued that the potential for trade growth within the region, even within a more peaceful one, is quite small. This study computed four sets of predicted to actual export ratios (across all trade partners in the sample) for twelve MENA countries (Algeria, Egypt, Iran, Israel, Jordan, Mauritania, Morocco, Saudi Arabia, Sudan, Syria, Tunisia and Turkey). One of these was intra-regional on the basis of no integration, another intra-regional with full intra-MENA integration, and a third for trade of each individual MENA country with EU countries as a whole, and fourth trade with EU countries but in this case assuming full integration with the EU. For no MENA countries was full intra-regional integration found to increase the predicted to actual ratio of exports by more than 15 percent. In most countries, moreover, the predicted to actual export ratio is below unity, indicating that intra-MENA trade is already larger than might be expected on the basis of country income, distance and various other transaction cost variables.[3] The results for the trade levels of individual MENA countries with all other countries are quite similar as far as the impact of economic integration is concerned, but are quite different[4] from those obtained from the intra-regional data.

These calculations were made on the basis of parameter estimates obtained from a different set of countries and then applied to data for the explanatory variables taken from MENA and other countries. To estimate the parameters, the authors use a gravity model equation along the lines of that used in the next section but with a smaller set of explanatory variables.[5] They estimate the parameters of the model on the basis of cross section data for the year 1989 (that year being deemed to be a normal trade year for MENA and other countries) from a relatively small set of countries, 13 developed countries[6]

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2 For example, in large models of this sort it is obviously impossible to estimate all variables simultaneously. Usually a bloc procedure is used with little information about the reliability of the assumptions made in the use of such simplifying procedures.

3 Fischer (1993) was also pessimistic about the prospects of increased trade through integration within the MENA region.

4 In particular, the predicted to actual trade levels are typically much larger than unity.

5 Specifically, the explanatory variables included are the GDP's and GDP's per capita of each trading partner, distance, difference in mean years of schooling, the shares of primary products in total exports of both countries, common language, common border and a dummy variable for membership in the European Community.

6 The developed countries in the sample are Austria, Belgium-Luxemburg, Canada, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Sweden, United Kingdom and United States.

and 11 developing countries.[7] The latter sample includes only relatively open countries whose trade values would not have been suppressed or distorted. Being quite restrictive in coverage, the total sample amounts to only 469 observations. While most of the parameter estimates were of the expected sign and magnitude and were statistically significant (at the five percent level), certain key ones were not, namely, the coefficients of common language and European Community. Both of these variables have been found to have had positive and significant effects on bilateral trade flows in other studies but in this one, neither was statistically significant and very small in magnitude. The small size and lack of significance of the latter was obviously of considerable importance since it was the coefficient used to simulate the effect of complete intra-regional integration.

The small size of the sample, the fact that most countries in the sample were rich (either developed or high income developing countries), that EC countries make up a significant portion of the sample, could contribute to the explanation for why the integration variable is so small and insignificant compared to estimates obtained in other studies and why the intra-MENA trade values were so large relative to the values predicted from the gravity model. Moreover, other studies using more traditional Vinerian methods have been much more optimistic about the potential for increased trade in the MENA region.[8]

We specify a gravity model that is more general, includes additional measures than in the Ekholm et al (1996) model. Instead of including only a small set of countries for a single year, neither of which may be very representative, we use the experience of virtually all countries in the world and for a number of different years taken at the decades of the 70s, 80s and 90s. We also attempt to greatly mitigate or even altogether eliminate the problems of endogeneity and uncertain directions of causality that often arise in the use of models when trade variables depend on variables that may be endogenous, such as GDP, relative prices, demand patterns or even policy variables like tariffs and quotas which are also endogenous within a political economy framework.

The gravity model is used as the basis for simulating the levels of trade that would be predicted among each pair of countries, including the MENA countries, under alternative assumptions about trade regimes and other conditions. This allows us to determine the extent to which actual trade flows among partners exceeds or falls below those that would be expected. The general finding is that MENA countries tend to trade less than would be expected on the basis of the gravity model, especially so in the case of intra-regional trade. Different estimating equations are used and alternative regimes assumed in making these predictions. In particular, we examine the effects of two scenarios, the Euro-Med trade agreements and an FTA among Arab or MENA countries, independently as well as jointly.

The remainder of the paper proceeds as follows: Section II outlines the methodology and its application to the questions at hand, including the data sources. Section III presents some results obtained from the gravity model, and summarizes the answers to the first two objectives of the paper. Section IV contains the simulations and derives conclusions concerning the third objective. Section V concludes.

II. The Gravity Model and its Application to Bilateral Trade of the MENA and Other Regions

To help answer the question concerning the extent to which actual intraregional trade patterns of MENA countries differ from those that would be expected on the basis of standard determinants of trade, we need a standard model of bilateral trade flows that would allow us to draw on the experience of the world as a whole for a reasonable number of years at different points in time. For such a model, we use the well-known ‘gravity model’ developed in the 1960s and which has been extremely widely

7 These are: Brazil, Chile, Hong Kong, Israel, Korea (South) , Malaysia, Singapore, Thailand, Tunisia, Turkey and Uruguay.

8 For example, Zarrouk (1992) estimated that the elimination of tariff barriers in the MENA region would induce intra-regional trade to grow somewhere between 4 and 8 percent per annum faster over the first ten years faster than it would without such an action. See also Abed (2000) and El-Naggar (1992).

applied ever since.[9] The use of the gravity model is especially attractive in this context because of its demonstrated applicability to many different kinds of countries and regions, its robustness over time, and to various different specifications. According to this model, the trade flows between any pair of countries should be affected by their mass (the product of their respective GDPs) as well as by the distance between them.[10] The latter is because transport and transaction costs can be assumed to rise with distance. Since factors such as exchange rate variability, common language, common colonial or other historical experience, common currency, free trade agreement, having a common border can affect these transaction or transportation costs, all such variables can be included in the gravity model.

While hypotheses concerning the importance of trade for growth have been popular for many years, they remain very controversial since the construction of tests of the impact of trade on income growth have been subject to obvious problems of simultaneity and causality. The gravity model has received considerable recent attention in this context since it permits a measure of openness to trade that is not dependent on potentially endogenous variables. Actual exports and/or imports would depend heavily on income itself and also on tariff rates and quotas. Even tariffs and quotas are endogenous in a political economy sense. To get around this long-standing problem, Frankel and Romer (1999) used a gravity model containing only exogenous variables as instruments in order to 'predict' trade in relation to GDP. The employed data for the year 1985 from 150 countries to estimate the parameters of the gravity model and then used the estimated parameters to predict the trade flows for that year. The results were then used as the new and improved measure of openness to be inserted into a standard cross-country model for the level of per capita GDP. Other variables included investment rates, population, area and in some cases other variables suggested in standard cross country growth models. The relationship between the new and improved measure of openness and per capita income (or growth) was shown to be positive and significant.

Recent papers by Rose (2000) and Frankel and Rose (2000) have applied just such a model to bilateral aggregate trade flows for a large incomplete panel data set of 186 countries for five year intervals between 1970 and 1990. These authors compiled the relevant data on all the relevant variables and have made that data set available to other researchers. For this reason we make use of this data but extend it in three important directions. First, we extend it in time to 1992, based on the international trade matrix for 1992 put together by the National Bureau of Economic Research (Feenstra, Lipsey and Bowen 1997). Second, we fill in several thousand observations that were missing in the original data set with information from more recent standard international sources, especially for explanatory variables like country size, distance and for MENA countries whose coverage was rather spotty in the original data set. Third, we extend it by disaggregating the trade matrices of each year from the aggregate flows constructed by Rose and his colleagues into energy (specifically oil and gas flows) and non-energy subtotals.

Rose (2000) found the results of the basic gravity model to be strong and to be remarkably robust to alternative specifications such as the inclusion of other variables or alternative measures of some of the included variables. Among the additional variables were regional dummy variables, the product of the two countries' tariff rates, a dummy variable for whether one of the countries is landlocked, the sum or products of the two countries' land areas, and dummy variables for one or both countries having controls on the current account and foreign exchange surrender and for one (or both) being an island economy. Yet, since few of these variables turned out to be either very significant or to affect the other results in any substantial way, these variables are excluded from the present specification.

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9 See for example, Anderson 1975, Bergstrand 1985, Deardorff (1998), McCallum 1995, Rose (2000) and numerous other references contained therein. To our knowledge, however, the only previous studies that have used the gravity model in the context of the Middle East have been Al-Atrash and Yousef (2000), Limam and Abdalla (1999) and Sayan (1998). Their results are of limited usefulness either because they either focused on aggregate trade flows for one period or utilized small samples of countries and few explanatory variables.

10 As noted by Rose (2000), Leamer and Levinsohn (1995, p. 1384) attribute to the gravity model 'some of the clearest and most robust empirical findings in economics'.

Specifically, we first specify the model as follows:

$$Ln\,(X_{ijt}) = \beta_0 + \beta_1 Y_{ijt} + \varepsilon_{ijt}$$

where i and j denotes the two trade partner countries, t denotes year, and the variables are defined as follows: X_{ij} denotes the value of bilateral trade between i and j; Y_{ijt} is a vector of characteristics concerning the same two trading partners at time t and ε_{ijt} is the error term. The variables included in the vector Y are the product of the real GDPs of i and j, the product of their per capita GDPs, the distance between the two trading partners, dummy variables for each of the following: sharing a common border (Cont), common language (Lang), a regional trade arrangement (FTA), a common nation (ComNat), the same colonizer after 1945 (ComCol), colonial relationship (Colony), currency (CU), and the volatility of the exchange rate between their currencies (V) within each five year period.

This is the specification that we have used in a preceding paper (Miniesy, Nugent and Yousef, 2001). The results with this specification are reproduced in Table 1 for each different period, i.e., 1970, 1975, 1980, 1985, 1990 and 1995 as well as for the pooled sample. Note that for each period there were at least 4000 observations and the pooled sample contains over 27,000 observations. Note also that, although the magnitude of the parameter estimates varies somewhat from one sample to another, with perhaps a single exception the signs of the coefficients do not vary across samples. The numbers in parentheses below the corresponding parameter values are White's heteroskedasticity-consistent standard errors. In virtually every case, the estimated coefficient has the sign expected according to the gravity model, i.e., negative for exchange rate volatility and distance and positive for all the others. In most cases, moreover, as indicated by the asterisks next to the coefficients, the coefficients are all significant at the 5 percent level or below. The value of adjusted R^2 varies from 0.57 to 0.73, indicating explanatory power comparable to that obtained by Rose (2000) and Frankel and Rose (2001).

In this paper, however, we make use of some additional gravity-type variables that are available in the Rose (2000) data set. These include: Distance squared (D^2_{ij} or DISTSQ) , Landlocked (LL), sum of the areas (SAREA), sum of the tariffs (TARS) and dummy variables if one of the partners is an oil exporter (ONEOIL), or if both partners are oil exporters (BOTHOIL). Finally, subsequently, to capture possible trade-diverting effects of both FTAs and currency unions, we include dummy variables if only one partner is a member (ONEFTA), and ONECU). Irrespective of the specific variables included on the right hand side, this shall be called equation (1).

Alternatively, the dependent variable could be the bilateral trade flows relative to the product of the GDPs in which case the ln(YiYj) term is removed from the right hand side. This has the effect of removing the most important source of endogeneity in the equation. By comparing the results of both specifications in Frankel and Romer (1999), however, it can be seen that there is a price to be paid for this in terms of a lower R^2. This specification shall be referred to as equation (2).

The trade matrix data set used is reported to cover 98% of all international (broadly defined) trade. The 1970-90 values of the GDP at constant prices, distance, contiguity, common language and other transaction cost measures are taken from Rose (2000) based on Penn World Tables (5.6), World Development Indicators and other sources. The 1992 values for GDP, population and other variables are taken from standard sources such as the World Bank's World Development Report (for 1995), World Development Indicators. Detailed sources for the earlier years are given in Rose (2000). The exchange rate volatility index was computed as the standard deviation of the first difference of the monthly natural log of the bilateral exchange rate (based on line 'ae' from the International Monetary Fund's *International Financial Statistics* in the preceding five years). As in Rose, the EEC/EC, NAFTA, EFTA, Australia/New Zealand, ASEAN, CACM, CARICOM, PATCRA, SPARTECA, Cartagena Agreement (Andean Group) and Israel/US Free Trade Agreements are all treated as examples of FTAs and hence signified by values of 1 in the FTA dummy variable. Significantly, Rose did not include any of the aforementioned trade arrangements among MENA countries as examples of

FTAs. Presumably, this was because their effectiveness was deemed to be too slight to be treated on an equal footing with those other arrangements.

By drawing on the two data sources for the trade matrix and the other identified sources for the explanatory variables, for purposes of this paper we arrive at a somewhat more complete panel of observations on the aggregate trade flows between each pair of countries (for 186 countries) for the years 1970, 1975, 1980, 1985, 1990 and 1992.[11] Virtually all the other data (GDP, population, area, language, geographic distance, contiguity, colonial background, FTAs, currency unions and tariffs) is taken from Rose (2000) or from the large data bank available from the World Bank's website or as a last resort for GDP data from the United Nations MEDS data set. The expansion of the data set from that used in Rose (2000) and Miniesy, Nugent and Yousef (2001) is largely for MENA countries and their trade partners.

As indicated above CU and FTA dummy variables are used to capture the effects of existing currency unions or other arrangements which may have affected trade patterns of some or all countries. Past users of the gravity model have estimated the effects of FTAs and currency unions in some detail, but as far as we know, (with the exception of one study limited to NAFTA) none have attempted to capture any of the trade diversion effects arising from these partial and inherently discriminatory arrangements. Failing to do so clearly implies that existing estimates of the benefits of FTA participation may be overestimates.

As indicated by the form of equation (1), the model is loglinear in the continuous variables so that the estimated coefficients represent elasticities, i.e., percentage changes in the bilateral trade values with respect to given percentage changes in the continuous explanatory variables (such as products of the respective GDPs). The parameters of the dummy variables indicate the percentage change in the dependent variable attributable to a unit increase in the dummy variable (from '0' to '1'). An idiosyncrasy of this data set is that only positive trade flows are reported. In other words, for those cells in the matrix for which no bilateral trade is reported, no information on the explanatory variables is provided. Presumably, this is because the authors suspected that in fact there were some trade flows but that the information was missing. As a result, the parameters can be estimated by ordinary least squares (OLS) just as they were by Frankel and Romer (1999), Frankel and Rose (2001) and Rose (2000).

Estimates of equation (1) for the enlarged pooled sample based on the extended gravity model that includes the additional variables are given in Table 2. In this and subsequent cases, we present the coefficients in the first column and t values based on White heteroskedasticity-consistent standard errors in the second columns. The parameter values and t-values for total trade are given in the first two columns, for oil trade in the second pair of columns and for non-oil trade in the third pair of columns. At the bottom of each column are: the number of observations (N) and the values of adjusted R^2.

Comparing the estimates across columns of the table, it can be seen that the explanatory power of the gravity model is much stronger for total trade and especially non-oil trade than for oil trade. This is hardly surprising since oil trade is often between countries very distant from one another. Note that in the total trade specification virtually all variables in the model have the expected signs and are highly statistically significant. The logs of bilateral trade flows are highly and positively responsive to the product of both the respective GDPs and GDPs per capita while the effect of the distance variable (lnD) is negative and significant. Similarly, all the transaction cost-reducing variables, such as currency union (CU), contiguity, common language, Free Trade Arrangement (FTA), same nation, same colonizer and same colonial relationship, have positive and highly significant effects on the bilateral trade flows whereas the transaction cost-increasing variables (V, LL and SAREA) have highly significant negative effects. While the three added variables all have significant effects on the lnXiXj trade variable, their inclusion with the somewhat enlarged data set (with 35621 observations

11 A recent application of the gravity model to the evaluation of the effects of intraregional trade arrangements on extraregional trade arrangements by Al-Mashat 2000 for NAFTA showed these effects to be much more positive than suggested in the standard trade literature.

instead of 27,291) does not increase the explanatory power of the model relative to that for the smaller sample shown in Table 1. Notice that the effect of distance squared (captured by the coefficient of lnD^2 or quadratic distance term) is negative but much smaller in absolute value than the linear term. Not only is the explanatory power of the model virtually identical to that in Table 1 but most of the other parameter values are rather similar in magnitude to the estimates from the pooled data set in Table 1. Some partial exceptions are the coefficients of CU, lnD and lnYiYj which are somewhat smaller and those of Cont and Lang which are somewhat larger (in absolute terms).

As in Miniesy, Nugent and Yousef (2001) the explanatory power of the model for Energy or Oil Trade is much lower than for either total trade or non-energy trade. The value of adjusted R^2 is only 0.248. The directions of the effects of the D, Lang, FTA and CU terms are now opposite to those expected. This would seem to be because bilateral trade in oil is obviously primarily between those countries with oil and those countries without oil. Since countries that are close together are not likely to be trade partners in this respect, countries that are farther away from each other and not both members of the same CUs or FTAs are more likely to have bilateral trade in oil. For the same reason, the effect of Cont is somewhat weaker in the case of oil trade. On the other hand, the common colonial background variables remain very large and positive and both D^2 and LL have negative influences, the latter a very large and highly significant one.

Not surprisingly, therefore, the results of the extended gravity model are especially strong for non-energy or non-oil trade. The value of R^2 is slightly larger and the coefficients of lnYiYj, Lang, FTA, CU, ComNat, and Colony are all larger, positive and more highly significant whereas the influences of D and LnSAREA are more strongly negative. Note, however, that in this case the coefficient of D^2 is positive and significant at the 5 percent level.

To examine the sensitivity of the results to alternative specifications and sample sizes in subsequent tables (Tables 3-5) we present the results for different specifications and data sets. The results in Table 3 are based on essentially the same extended gravity model as in Table 2 but including also TARS (the sum of the tariff rates between each pair of trading partners i and j). Since the data on tariff rates, especially for the earlier sample years of countries, is quite incomplete, this has the effect of reducing the number of available observations to 15,992 for total trade, 6586 for oil trade, and 15,734 for non-oil trade. Due to a high correlation between the tariff rate variable (TARS) and Cont for this data set, the Cont variable had to be omitted from the model. TARS is also fairly highly correlated with D. For this smaller data set, the values of the adjusted R^2 are slightly higher for each set of estimates in this table than for the comparable models in Table 2. In other respects, however, the results are quite similar. As expected, TARS has a negative effect on bilateral trade flows in all three types of trade, significantly negative for both total trade and non-oil trade. Another difference is that the coefficient of the linear distance term (LnD) in each case is much weaker and even positive for all three types of trade. This is compensated, however, by the fact that the coefficient of the quadratic distance term (LnD^2) is now more strongly negative in each case.

To retain the larger and sample and to avoid potential endogeneity in the use of TARS as an explanatory variable, in Table 4 we exclude TARS and return to the larger sample of 35,621 (for total trade). Given, the much poorer application of the simple gravity model to energy trade and the fact that quite a few MENA countries are in fact energy exporters, the specification used in generating the results of this table includes two additional dummy variables for being an energy exporter. ONEOIL takes the value of 1 if only one of the trade partners is an oil exporter (and the value of 0 in all other cases). BOTHOIL takes a value of unity if both trade partners are oil exporters (and 0 in all other cases). We would expect the coefficient of ONEOIL to be positive in the case of oil trade and ambiguous in other trade types and that of BOTHOIL to be negative in all cases. Since oil export depends on being well-endowed in this form of natural resources, it can safely be assumed to be exogenous to the level of trade flows.

For total and non-energy trade, the inclusion of these variables has the effect of increasing the explanatory power modestly, sharpening some of the other effects. More importantly, both variables (but especially BOTHOIL) have significant negative effects on bilateral trade values for total and non-energy trade. For energy trade, however, the increased explanatory power is more substantial and as expected the ONEOIL dummy has a highly significant positive effect. The effect of BOTHOIL is once again negative and significant. Hence, the relatively large energy endowments among MENA countries may contribute to the explanation for why MENA countries trade less than might otherwise be expected on the basis of the simpler version of the gravity model.

Next, to deal more thoroughly with the possibility of trade diversion, the specification in Table 5 for all trade adds two new dummy variables, one for 'One Trader in an FTA or ONEFTA' and another for 'One Trader in a CU or ONECU'. Note from the results given in both columns of the table (i.e., with and without the oil export dummy variables) that the coefficient of the former is negative and significant at the 5 percent level, indicating that there is indeed a small but significant trade diversion effect. In the case of a currency union, however, no such effect is evident. The other coefficients, however, are left largely unaffected. Some minor exceptions are that the coefficients of both ComNat and CU are increased at least to a moderate extent. Note that the inclusion of the Trade diversion terms slightly raises the adjusted R^2.

Finally, since the variables involving GDP on the right hand side of equation (1) are potentially endogenous, to eliminate this source of simultaneous equation bias and reversed causality (trade also raising GDP), in Table 6 we present some results based on estimating equation (2) In this case, GDP has been moved to the product of the GDPs has been moved to the left hand side of the equation. The variable to be explained is the log of bilateral trade less the log of the product of the GDPs. As can be seen by comparing the results of the two equations, the effect is a large reduction in explanatory power. Since these product of GDP and GDP per capita terms were among the strongest and most significant of the explanatory variables in the estimates of equation (1), this is probably not surprising. Nevertheless, there is remarkably little change in most of the other results. Not a single coefficient has a change in sign or significance and in most cases the magnitudes of the coefficients are only very slightly affected. There is some change however, in the magnitudes of the CU and FTA variables. The effects of both CU (for both countries being members of the same currency union) and 'One Trader in CU' are increased and the latter becomes statistically significant. In the case of FTA, however, the effect (although not terribly large in magnitude) is the opposite. In other words, the positive effect of both partners being in the same FTA is reduced and the negative effect of only one being in the FTA becomes more strongly negative and significant. Thus, in removing this remaining source of endogeneity bias, it becomes clearer that currency unions are in fact trade creating (both intra-regionally and extra-regionally) but that FTAs can be both trade creating and trade-diverting as suggested by traditional customs union theory.

Since tariffs and tariff-equivalent quotas have been excluded from the results of Tables 5 and 6, in Table 7 we examine the extent to which the variation in our tariff rate measures contribute to the aforementioned explanation for the tendency for MENA countries to export less than would be expected on the basis of the simple gravity model without tariffs. Specifically, we regress the residuals from each of the trade equations reported in Table 5 on the sum of the tariff rates of the trading partners and various other barriers to trade. The latter include controls on the capital account transactions, controls on current account transactions and the requirement of an exporter to surrender export proceeds to the Central Bank. The results are presented in the corresponding columns of Table 7. Because there is some correlation among the various regulatory measures across countries, the estimates are presented in three different panels. The first (Panel A) includes (on the right hand side of the estimating equation) only the tariff rates, the second (Panel B) the full set of variables, and the third (Panel C) all the others but excluding the tariff rates. Although the inclusion of all variables together (as in Panel B) has the effect of reducing the magnitude of some of the coefficients, the explanatory power (measured by the Adjusted R^2) is higher for these models than for the others. Note also that each type of barrier has a

negative and significant on the residual, consistent with the notion that such barriers may be the explanations for the under-achievement of trade by MENA countries, especially among each other.

A major shortcoming of the results presented above are that the data used is rather dated, being based on data going back to 1970 but none more recent than 1992. While as mentioned above, this is because the large and internally consistent and PPP adjusted data set that has now been made available to researchers through the efforts of the NBER and Rose (2000), trade matrices can be constructed based on information from the IMF's *Direction of Trade*, at the aggregate level at least, for more recent years and again linked up with national accounts and other data from standard international sources, even if not entirely consistent with that for the earlier period. Al-Atrash and Yousef (2000) have done this for 18 Arab countries and 43 other countries that make up over 90 percent of trade of Arab countries for the years 1995-1997. The dependent variable in this case is the average value of the bilateral trade over the years 1995-97 and explanatory variables are many of the same ones used above inspired by the gravity model. By restricting the country coverage and averaging over three years, they are better able to distinguish between zeros and missing values in the bilateral trade flows. Whereas the data set used above and based on Rose (2000) had no zero observations for bilateral trade, Al-Atrash and Yousef report that almost 15 percent of the entries in their bilateral trade matrix were indeed zero. For this reason, they employ a Tobit procedure instead of OLS used in the other studies.

The maximum likelihood estimates obtained by Al-Atrash and Yousef (2000, Tables 4 and 5) are reproduced here as Tables 8 and 9. Their set of explanatory variables was somewhat smaller and different from that used above and their data set (3718 observations) was much smaller and limited to that of particular relevance to the Arab countries. For example, they distinguish between various different FTAs instead of using a single FTA dummy for all. They also distinguish between reporting country and partner country characteristics, different common languages and subregions within MENA. Hence, their results are by no means closely comparable to those reported in the preceding tables. Nevertheless, from the columns labeled 'Trade' in both tables, one can see much the same patterns in the results and a very similar value of R^2. In particular, notice that the coefficients of distance, common border, GDP are identical in sign and similar in magnitude and significance to the corresponding values reported in preceding tables. As in Table 1 above, the effects of membership in the AMU and GCC (Table 8) have strong negative (as opposed to positive effects) very different from other FTAs. So too do the dummy variables for oil exporter (Arab2) and for both countries being Arab countries (Arab3) in Table 8. Some slight differences are in the effects of GDP per capita for the reporting country (having a negative and significant influence in Table 9) and the coefficient of the 'Openness' measure for the partner country (which is negative and significant in Table 9). In general, however, it would seem that, despite the differences between the data and methods used in Tables 8 and 9 from those used in Tables 1-7, the main findings of the gravity model would seem to be as applicable in the late 1990s as in the earlier years.

III. Simulations of the Differences between Actual and Predicted Bilateral Trade Flows with Different Modelling Assumptions and Policy Scenarios

The purpose of this section is to address the question posed in the title of the paper and the third purpose of the paper.

Hints to the effect that MENA does defy gravity—in the sense of not trading as much as would be expected on the basis of the gravity model—have already appeared in that: (1) the Arab countries in general and the AMU, ACM and GCC all have negative and significant dummy variables in the aforementioned regressions for bilateral trade, (2) substantial gaps between actual and predicted MENA trade were obtained in the earlier analyses of Miniesy, Nugent and Yousef (2001) for 1992 and of Al-Atrash and Yousef (2000). On the other hand, we have also seen that adding some additional variables like dummy variables for oil endowments and to allow for possible trade diversion effects when only one country of any trading pair is a member of a particular FTA or CU might well have the

effect of lowering the predicted values of trade for some MENA countries. If so, this would mean that the aforementioned gaps may have been overestimated, but also confirming the fact that trade diverting effects of FTAs elsewhere have had the effect of lowering MENA trade.

Columns of (1)-(4) of Table 10 provide some comparisons based on the pooled 1970-92 regression results presented above. Column (1) provides the actual intra-regional trade of the Arab portion of the MENA region as a whole for each year. In other words, the first four rows of the table provide the sum of the bilateral trade flows among Arab countries in the data base from Rose (2000) for the years 1980, 1985, 1990 and 1992, respectively. The absolute values are not exactly comparable with each other across years because the number of cells (indicated in the 'No. Obs.' column) in the trade matrix for which there exists data varies from one year to another. As mentioned above, the other data for predicting such trade is available only for those trade cells with data. Hence, the values of actual and predicted are based on the same number of observations and therefore are more comparable one to another for any given year than over time. Columns (2)-(4) provide the predicted values of such trade under alternative specifications of the gravity model. Those in column (2) are based on the parameter estimates of the extended gravity model presented in the first column of Table 2. Those in column (3) are based on the parameter estimates of the extended gravity model with the oil dummy variables added given in the first column of Table 4. Those given in column (4) are based on the parameter estimates presented in the first column of Table 5, i.e., a specification which includes both the oil dummy variables and the trade diversion variables ONEFTA and ONECU.

Subsequent rows in the table present the same figures for MENA trade with other regions, the EU in the second set of four rows, followed by NAFTA , OOECD, LDCs and EE, respectively, in the remaining sets of rows in the table.

Focusing first on the comparisons of columns (1) and (2), the latter based on the regressions based on the first panel of Table 2, one can see that the direction of the difference or gaps varies from year to year as well as region to region. In 1980, the year at which oil prices were at their peak in real terms, actual MENA trade exceeded the predicted value in the EU, NAFTA, OOECD, and LDCs, in most of these cases by a considerable margin. Only for the MENA region itself and Eastern Europe did the actual trade fall short of the predicted values and in neither case by as much as 50 percent. Yet, for the year 1992 and for each region, MENA's trade fell short of that predicted by the basic extended version of the gravity model. The predictions of column (3) take into account the ONEOIL and BOTHOIL dummy variables that provide a crude way of incorporating natural resource endowments in the form of energy reserves. These were based on the predictions of equation (1) based on the regressions presented in Table 4. The inclusion of these variables has the effect of reducing the predicted values of trade in every year and region relative to the base model predictions. Note, however, that the reductions are much smaller for intraregional trade than for extraregional trade.

Column (4) provides the predictions based on the regression equation (1) in which the variables ONEFTA and ONECU are also included, i.e., based on the results presented in the first column of Table 5. Note that this change very substantially reduces the predicted trade of Arab MENA countries with each other and all other regions. In other words, it appears that all their trade flows are very significantly reduced by the trade diversion of FTAs in other parts of the world. Hence, modification of the gravity model to account for both endowments of natural resources and trade diversion from existing FTAs (most importantly ASEAN, NAFTA and the EU) has the effect of substantially reducing the values of trade predicted by the gravity model. Whereas the comparison of columns (1) and (2) for 1992 showed the predicted to exceed the actual trade values of MENA countries with every region, comparing (1) with (4) shows this to be no longer the case for NAFTA, OECD, and LDCs. Overall, however, and for the MENA, EU and EE regions, there remain gaps between the predicted and actual trade of MENA countries, suggesting that in 1992, the MENA countries were indeed underachievers in international trade.

To facilitate further comparisons the figures presented in columns (1) and (2) of Table 11 are copied from columns (1) and (4) of Table 10. Those in column (3) are simulated values of the various MENA trade patterns based on the modelling assumptions of column (2) but assuming that MENA would have a full-fledged FTA. Notice the big jump in intra-MENA trade resulting from this scenario and rather modest changes in the trade flows with other regions. The projections in column (4) are again similar to those in column (2) except that instead of an FTA among MENA countries, there is free trade between each MENA country and the EU. Finally, in column (5) of Table 11 are projections of MENA trade flows for each of the four years assuming both a MENA FTA and one between MENA and the EU.

These simulations dramatize the quite different patterns of trade implied by (or predicted by) rather extreme trade policy scenarios. They also show the effect on these patterns of introducing different controls or other modifications to the basic gravity model. The advantage of the gravity model is that it allows predictions to be made about bilateral trade patterns that depend essentially on exogenous factors like distance, border, access to the sea, area of the country, common language, and colonial background. However, from this point of view it would seem important to capture the influence of natural resource endowments that also are largely exogenous.

IV. Caveats, Conclusions and Policy Implications

Before concluding, some important caveats must be stated. First, it must be firmly stated that the simulations presented are not intended to be realistic. A full-fledged FTA between each MENA country and the EU is something that goes well beyond the most enthusiastic supporters of Euro-Med arrangements. So too, does the idea of an intra MENA FTA of the strength of other FTAs such as the EU, NAFTA and ASEAN, etc. Even more in the direction of 'pie in the sky' is the notion that one could have both a MENA-wide FTA and an FTA between the EU and MENA. These alternative scenarios are introduced only to identify the different directions that trade patterns might take as a result of extreme trade policy changes but otherwise based on gravity model considerations.

Also no claim is made that the modified gravity model utilized in this paper represents the ultimate model of bilateral trade. Undoubtedly, further improvements can be and should be made. It would be useful, for example, to include natural resource endowments other than energy sources, and possibly other kinds of endowments. Yet, going much beyond the modified models used here will require a substantial improvement in the trade data base.

Although some results are presented for the years 1995-97 which appear to be similar to those obtained for the period 1970-1992, this is a far cry from actually producing results form a consistent data base and model for the years 1970-2000 which would be highly desirable. To combine the two data sets not only should the trade and other data for recent years be deflated in ways to make them consistent with the constant price series used in this paper, but also a serious effort should be made to distinguish between missing trade data and zero trade in the earlier data set used in this study. These are ambitious tasks that unfortunately must remain for future research.

Moreover, no claim is made to have uncovered the exact cause or causes of the shortfall in overall trade of MENA countries and especially that within the MENA region. Various reasons have been offered in the literature explain the low level of intra-regional trade in the Middle East. These are discussed in some detail in Miniesy, Nugent and Yousef (2001). One of these is trade policy itself (El-Erian and Fischer 1996; El-Naggar 1992), the average tariff for the region as a whole being higher than that of any other region, except Africa.[12] Non-tariff barriers are also extensive and many countries employ a variety of measures, including restrictive licensing, bans, state trading/monopolies,

12 The average tariff for Arab countries is estimated at about 17 percent. This compares to an average tariff of 20 percent for African countries, of 13 percent for Western Hemisphere countries, of 12 percent for Asia Pacific, of 10 percent for the Baltic, Russia, and other countries of the former Soviet Union (BRO), and of 9 percent for Europe (excluding BRO).

restrictive foreign exchange allocation, and multiple exchange rates, to discourage imports. Another is that adherance to market mechanisms and development strategies vary considerably across countries (Allum 1998). Then there are the delays and costs involved in clearing customs and obtaining rebates in cases where trade taxes can be exempted when the final products are exported. Note, for example, that only 12 percent of the private firms doing business in the MENA region surveyed as part of the Worldwide Private Sector Survey used in the World Bank's 1997 World Development Report rated the 'overall efficiency of the country's customs services as good or very good'.[13] Political differences and military conflicts among countries have also resulted in periodic boycotts, border closings, etc. (Limam and Abdalla 1999) and the enduring conflicts with Israel and Iraq's invasion of Kuwait have divided countries of the region and impeded their facilitation of trade and communications among each other. While among MENA countries as a whole, there is clearly considerable complementarity in resource endowments that should be trade promoting, at the sub-regional level in which such trade has been most intensive, the lack of product and resource complementarity has often been cited as an important factor hindering intra-Arab and inter-MENA trade (Fischer 1993). The relative similarity of resource endowments at the subregional level has made them competitors in the same product markets (e.g., in trade in oil, phosphates, petrochemicals, and agricultural products) rather than collaborators in international trade (Havrylyshyn, 1997).

At the same time, the lack of a diversified export base—particularly in manufactures—limits the opportunities for trade based on product differentiation. Thus, even though in some product lines, such as oil, natural gas, phosphates, urea, cotton, and citrus, different Arab countries are producing similar goods, they are not manufactured goods and not product-differentiated goods. Hence, neither of two non-gravity models of international trade, the Heckscher-Ohlin model that bases trade on different factor endowments or the intra-industry model that bases trade on product differentiation, would seem to predict sizable amounts of intra-regional trade among Arab or MENA countries. Differences in per capita income have also been cited as a factor constraining intra-Arab trade (Fischer 1993; Zarrouk 1992). Clearly, much more detailed analyses at the sectoral level, detailed analyses of customs procedures and political economy analyses would be needed to assess the relative importance of these different sources of intra-MENA trade shortfall

Similarly, no claim is made that the demonstrated under-achievement of MENA countries in international trade relative to what might be expected has any necessary welfare implication. Tracing the welfare implications of this analysis is no easy task and it too must be left for future research Nevertheless, given that we have shown in Table 6 that the shortfalls in actual trade across countries and over time were at least partially attributable to tariff and other barriers to trade, this tends to mitigate the possibility that the differences could be due to measurement error and noise. Also, it should be recalled from our earlier discussion that Frankel and Romer (1999) used the predictions of a somewhat simpler version of the gravity model as a new, improved and more exogenous measure of openness which in turn was used to show that greater openness raises the level of income per capita. This implies that that tariff and other barriers to trade and transactions costs arising from any source may have the effect of reducing per capita income (or equivalently long run economic growth).

The results of different specifications of the gravity model's estimating equation have indicated that the predicted trade patterns tend to be quite sensitive to relatively small differences in specification of the estimating equations (1) and (2). The gaps between predicted and actual trade bilateral trade flows are also sensitive to the price of oil. Nevertheless, despite these sensitivities and caveats, some useful conclusions can be drawn.

1. For 1992 at least and quite probably for 1995-97, the even withal the modifications to the gravity model undertaken, there is evidence that the MENA regions trades less tan it would be predicted to on the basis of the gravity model.

13 See Brunetti, Kisunko and Weder (1997).

2. The biggest shortfall of actual relative to the predicted level of trade is with respect to intraregional trade. Trade with the EU is also well below what it would be predicted to be according to gravity considerations.
3. The size of these gaps and the fact that the coefficients of dummy variables introduced into the estimating equations for Arab or MENA countries are typically negative suggest that MENA does defy gravity to a considerable extent.
4. While the omission of natural resource endowments in existing applications of the gravity model contributes to the gap, it by no means eliminates it.
5. Another factor that contributes to the gap would seem to be the trade diversion effects of FTAs like the EU. When these effects are accounted for, there is evidence that their influence falls disproportionately on the MENA region. This may not be so much as the FTA itself as the Common Agricultural Policy of the EU. Without out these trade diversion effects, gravity considerations would predict much larger trade between MENA and the EU than they do once these effects are included.
6. A full-fledged FTA with the EU could have a very significant influence in part since this would eliminate these harmful trade diversion effects and add trade creation effects. This would have its influence only in a substantially reformed Common Agricultural Policy. At the same time, however, these arrangements would further exacerbate the shortfall in inter-MENA trade.
7. Only by reducing the many subtle sources of transaction costs as well as formal barriers to trade among MENA countries can the intra-MENA shortfall be overcome.
8. There is strong evidence from the bilateral trade regressions that the existing subregional trade arrangement such as the ACM, AMU and GCC have failed to increase trade.

Jeffrey B. Nugent
Professor of Economics
University of Southern California
University Park Campus
Los Angeles, CA 90089-0253
U.S.A.

nugent@usc.edu

Tarik M. Yousef
Shaykh Sabah al-Salem al-Sabah Chair of Arab Studies
Assistant Professor of Economics
Georgetown University
Center for Contemporary Arab Studies
151 Intercultural Center
Washington, DC 20057-1020
U.S.A.

youseft@georgetown.edu

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Appendix

Table 1: Regression Coefficients Obtained for the Basic Gravity Model for Total Trade from Estimating Equation (1) for Different Samples

TOTAL TRADE	1970	1975	1980	1985	1990	1992	Pooled
Currency Union (CU)	0.85**	1.26***	1.08***	1.33***	1.50***	1.89	0.92***
	(0.43)	(0.41)	(0.26)	(0.27)	(0.27)	(1.42)	(0.14)
Exch. Rate	-0.06***	0.00	-0.06***	-0.03***	-0.01***	-0.02***	-0.04***
Volatility (V)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
Output	0.77***	0.81***	0.81***	0.80***	0.83***	0.79***	0.79***
(lnYiYj)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
ln YiYj/	0.65***	0.66***	0.61***	0.66***	0.73***	0.38***	0.53***
POPiPOPj)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)
Distance (DIST)	-1.09***	-1.15***	-1.02***	-1.05***	-1.12***	-1.09***	-1.09***
(LnDij)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.02)
Contiguity	0.48**	0.35*	0.72***	0.51***	0.63***	0.26	0.56***
(Contij)	(0.21)	(0.19)	(0.18)	(0.18)	(0.18)	(0.20)	(0.08)
Language	0.57***	0.40***	0.31***	0.41***	0.55***	0.63***	0.51***
(Lang)	(0.10)	(0.10)	(0.09)	(0.08)	(0.08)	(0.09)	(0.04)
FTA	0.96***	1.01***	1.26***	1.21***	0.67***	1.20***	0.88***
	(0.17)	(0.21)	(0.16)	(0.17)	(0.14)	(0.22)	(0.08)
Same Nation	1.72**	1.38**	1.05**	1.79***	0.89*	1.41	1.60***
ComNat	(0.71)	(0.67)	(0.45)	(0.66)	(0.52)	(1.48)	(0.26)
Same	0.90***	0.71***	0.52***	0.47***	0.57***	0.20	0.43***
Colonizer (ComCol)	(0.15)	(0.14)	(0.12)	(0.12)	(0.12)	(0.13)	(0.06)
Colony	2.42***	2.39***	2.27***	2.01***	1.71***	1.47***	2.04***
	(0.22)	(0.19)	(0.13)	(0.13)	(0.15)	(0.14)	(0.07)
Intercept	-18.17***	-19.41***	-19.67***	-20.79***	-22.58***	-15.65***	-17.40***
	(0.68)	(0.62)	(0.56)	(0.56)	(0.56)	(0.65)	(0.25)
No. of Obs.	4,052	4,474	5,092	5,091	4,239	4,343	27,291
R^2 Adjusted	0.57	0.59	0.62	0.65	0.73	0.64	0.61
RMSE	2.18	2.18	2.03	1.94	1.74	1.87	2.07

Notes: Numbers in parentheses beneath the coefficients are standard errors.

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Dependent variable is the log of the value of trade between pairs of countries in the given years.

Table 2: Full Sample Panel Regressions of Basic Gravity Model with Added Variables Distance Squared (Ln D^2), Landlocked (LL), Sum of the Areas (SAREA)

Variable/Parameter	ALL TRADE		OIL TRADE		NON-OIL TRADE	
	Estimate	t-value	Estimate	t-value	Estimate	t-value
INTERCEPT	-12.285	-18.17	-14.68	-9.75	-10.029	-13.08
(LnYiYj)	0.864	152.16	0.337	23.44	0.892	156.62
LnYiYj/POPiPOPj	0.068	9.39	0.227	12.08	0.033	4.62
Ln Dij (DIST)	-0.638	-3.72	2.01	5.2	-1.325	-6.87
Ln D2	-0.023	-2.09	-0.214	-8.44	0.025	2.04
Contij	0.876	10.83	0.794	5.74	0.803	9.89
Langij	0.650	18.07	-0.07	-0.87	0.662	18.64
FTAij	0.902	10.44	-0.126	-0.82	0.986	10.78
ComNatij	1.254	5.11	0.271	0.51	1.791	5.95
ComColij	0.588	12.99	1.44	11.2	0.531	11.80
Colonyij	1.827	18.26	0.797	4.94	1.891	19.02
CUij	0.760	5.58	-0.023	-0.08	0.932	6.13
Vij	-0.033	-21.68	-0.043	-10.59	-0.03	-20.49
LL	-0.619	-22.48	-1.840	-23.72	-0.483	-17.95
LnSAREAij	-0.144	-15.79	0.370	16.88	-0.181	-19.85
N	35,621		23,787		34,845	
R2 Adjusted	0.604		0.248		0.617	

Table 3: Smaller Sample Panel Regressions of Extended Gravity Model with Tariff Data

Variable/Parameter	ALL TRADE		OIL TRADE		NON-OIL TRADE	
	Estimate	t-value	Estimate	t-value	Estimate	t-value
INTERCEPT	-17.293	-15.04	-9.287	-3.56	-17.69	-14.80
LnYiYj	0.848	106.13	0.454	21.91	0.87	109.31
LnYiYj/POPiPOPj	0.061	5.75	0.140	4.82	0.027	2.58
Ln D_{ij}	0.612	2.13	0.095	0.14	0.612	2.05
Ln D^2_{ij}	-0.108	-5.93	-0.097	-2.29	-0.103	-5.48
$ComNat_{ij}$	0.89	7.95	0.662	3.26	0.93	8.38
$Lang_{ij}$	0.644	14.52	0.200	1.87	0.64	14.60
FTA	0.586	6.05	-0.154	-0.89	0.63	6.57
$ComCol_{ij}$	0.961	16.05	2.449	13.26	0.87	14.79
$Colony_{ij}$	1.805	15.11	0.998	4.84	1.85	15.70
CU_{ij}	1.255	5.69	0.383	0.83	0.87	3.81
V_{ij}	-0.0217	-12.26	-0.039	-7.59	-0.021	-11.93
LL_{ij}	-0.656	-17.75	-2.138	-19.88	-0.54	-14.90
$LnSAREA_{ij}$	-0.025	-1.85	0.329	10.17	-0.042	-3.11
$TARS_{ij}$	-0.03	-19.84	-0.0049	-1.19	-0.032	-21.63
N	15,992		6589		15,734	
R^2 Adjusted	0.690		0.307		0.700	

Table 4: Larger Sample Panel Regressions of Extended Gravity Model with Variables for Oil Exports Included

Variable/Parameter	ALL TRADE		OIL TRADE		NON-OIL TRADE	
	Estimate	t-value	Estimate	t-value	Estimate	t-value
INTERCEPT	-11.689	-17.33	-10.461	-7.32	-9.824	-12.90
LnYiYj	0.859	152.03	0.415	30.18	0.884	156.53
LnYiYj/POPiPOPj	0.077	10.60	0.147	8.17	0.053	7.36
Ln Dij	-0.810	-4.74	0.788	2.14	-1.426	-7.45
Ln D2ij	-0.013	-1.22	-0.130	-5.38	0.029	2.36
ComNatij	0.860	10.68	0.805	6.16	0.770	9.58
Langij	0.682	18.96	0.189	2.42	0.668	18.96
FTA	0.839	9.73	0.056	0.39	0.877	9.67
ComColij	0.585	12.97	1.084	8.90	0.552	12.39
Colonyij	1.853	18.80	0.914	6.08	1.902	19.52
CUij	0.894	6.94	0.734	2.74	1.068	7.51
Vij	-0.034	-22.32	-0.039	-10.00	-0.032	-21.75
LLij	-0.661	-23.89	-1.552	-21.02	-0.573	-21.32
SAREAij	-0.127	-13.75	0.216	10.18	-0.142	-15.42
ONEOIL	-0.061	-2.33	2.280	39.53	-0.423	-16.47
BOTHOIL	-1.344	-17.47	-1.827	-10.21	-1.261	-16.78
N	35,621		13,143		34,645	
R2 Adjusted	0.608		0.329		0.624	

Table 5: Larger Sample Panel Regressions of Extended Gravity Model Allowing for Trade Diversion and Including Oil Export Variables

Pooled 1970-1992	(1) ALL TRADE	(2) ALL TRADE
CU ij	0.680	0.789
	(0.136)	(0.137)
V ij	-0.034	-0.032
	(0.002)	(0.002)
LnYiYj	0.863	0.868
	(0.006)	(0.006)
LnYiYj/POPiPOPj	0.076	0.066
	(0.007)	(0.007)
Ln D ij	-0.799	-0.628
	(0.171)	(0.171)
Ln D2 ij	-0.014	-0.024
	(0.011)	(0.011)
Cont ij	0.860	0.875
	(0.081)	(0.081)
Lang ij	0.685	0.650
	(0.036)	(0.036)
FTA	0.802	0.876
	(0.087)	(0.087)
ComNat ij	1.301	1.277
	(0.244)	(0.245)
ComCol ij	0.585	0.583
	(0.045)	(0.045)
Colony ij	1.774	1.807
	(0.100)	(0.101)
LL ij	-0.654	-0.614
	(0.028)	(0.028)
SAREA ij	-0.130	-0.149
	(0.009)	(0.009)
ONEOIL	-0.058	
	(0.026)	
BOTHOIL	-1.343	
	(0.077)	
ONEFTA	-0.055	-0.045
	(0.023)	(0.023)
ONECU	0.037	0.087
	(0.025)	(0.025)
INTERCEPT	-11.776	-12.353
	(0.674)	(0.676)
N	35621	35621
R2 Adjusted	0.608	0.604
RMSE	2.052	2.061

Table 6: Panel Regressions for Equation (2) Version of Extended Gravity Model Allowing for Trade Diversion and Oil Export Dummy Variables

Pooled 1970-1992	(3) TRADE LESS GDP	(4) TRADE LESS GDP	(5) TRADE LESS GDP	(6) TRADE LESS GDP
CU ij	0.923	1.022	0.888	0.976
	(0.137)	(0.137)	(0.137)	(0.137)
V	-0.034	-0.033	-0.035	-0.034
	(0.002)	(0.002)	(0.002)	(0.002)
Ln D ij	-0.741	-0.566	-0.755	-0.584
	(0.172)	(0.173)	(0.172)	(0.173)
Ln D2 ij	-0.018	-0.028	-0.018	-0.027
	(0.011)	(0.011)	(0.011)	(0.011)
Cont ij	0.789	0.806	0.792	0.807
	(0.081)	(0.082)	(0.081)	(0.082)
Lang ij	0.798	0.758	0.805	0.767
	(0.036)	(0.036)	(0.036)	(0.036)
FTA	0.709	0.772	0.762	0.830
	(0.087)	(0.087)	(0.087)	(0.087)
ComNat ij	1.557	1.520	1.532	1.488
	(0.246)	(0.247)	(0.246)	(0.247)
ComCol ij	0.726	0.734	0.748	0.755
	(0.044)	(0.044)	(0.044)	(0.044)
Colony ij	1.535	1.575	1.542	1.599
	(0.101)	(0.101)	(0.100)	(0.101)
LL ij	-0.651	-0.613	-0.664	-0.625
	(0.028)	(0.028)	(0.028)	(0.028)
SAREA ij	-0.253	-0.265	-0.249	-0.262
	(0.007)	(0.007)	(0.007)	(0.007)
ONEOIL	-0.035		-0.048	
	(0.027)		(0.026)	
BOTHOIL	-1.307		-1.326	
	(0.078)		(0.078)	
ONEFTA	-0.112	-0.107		
	(0.023)	(0.023)		
ONECU	0.134	0.174		
	(0.025)	(0.025)		
INTERCEPT	-13.789	-14.457	-13.792	-14.433
	(0.664)	(0.666)	(0.664)	(0.666)
N	35621	35621	35621	35621
R2 Adjusted	0.300	0.294	0.299	0.292
RMSE	2.069	2.078	2.070	2.080

Table 8. Maximum Likelihood Estimates of the Gravity Model Using the Tobit Procedure (Arab countries as one group)

Dependent Variable	Imports		Exports		Trade	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Arab Dummy Variables						
Arab1[a]	0.35	1.41	-0.82	-3.17 ***	0.19	0.83
Arab2[b]	-1.17	-5.62 ***	-1.12	-4.83 ***	-0.88	-4.62 ***
Arab3[c]	-0.65	-2.34 ***	-0.26	-0.84	-0.42	-1.78 **
Proximity						
Distance	-1.01	-12.0 ***	-1.34	-13.9 ***	-1.01	-13.1 ***
Border	1.29	3.52 ***	0.611	2.5 ***	0.97	2.87 ***
Reporter						
GDP[i]	0.98	18.4 ***	1.08	20.14 ***	0.95	19.5 ***
GDPPC[i]	0.16	2.69 ***	0.32	5.12 ***	0.21	3.77 ***
Partner						
GDP[j]	1.25	25.4 ***	1.29	23.1 ***	1.14	25.3 ***
GDPPC[j]	0.16	3.27 ***	-0.02	-0.4	0.11	2.39 ***
Preferential						
ASEAN	1.56	1.94 **	2.02	2.16 ***	1.84	2.47 ***
EU	-0.83	-2.53 ***	-0.89	-2.4 ***	-0.61	-2.05 **
Language						
English	1.46	5.53***	1.63	5.43 ***	1.49	6.1 ***
French	0.42	0.88	0.34	0.63	0.24	0.54
Openness						
Reporter Country	0.24	1.53*	…	…	0.28	1.91 **
Partner Country	…	…	-0.16	-0.96	-0.18	-1.37 *
No.of countries	61		61		61	
Uncensored observations	3718		3718		3718	
S.E.	2.53		2.53		2.53	
Log-likelihood	-2.35		-2.45		-2.29	
R^2	61.4%		62.3%		62.7%	

Note: ***, ** and * denote significance at the 5 percent, 10 percent, and 15 percent level, respectively.

a. If the reporting country is an Arab country; b If the reporting country is an oil exporting country and c If both countries are Arab countries

Table 9. Maximum Likelihood Estimates of the Gravity Model Using the Tobit Procedure (Arab countries disaggregated into three groups)

Dependent Variable	Imports		Exports		Trade	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Arab Dummy Variables 1/						
AMU	-1.79	-4.66 ***	-1.6	-10.14 ***	-1.48	-4.39 ***
GCC	-0.84	-2.41 ***	-0.26	-0.66 ***	-0.17	-1.55 *
Mashraq	0.79	2.04 **	1.1	2.83 ***	0.54	1.86 **
Proximity						
Distance	-1.18	-8.19 ***	-1.61	-10.13 ***	-1.14	-9.1 ***
Border	1.34	2.16 ***	0.51	1.98 **	0.97	2.87 ***
Reporter						
GDP^i	1.12	14.33 ***	1.52	18.4 ***	1.57	17.86 ***
$GDPPC^i$	0.129	1.23	0.31	2.78 ***	-0.05	-0.61 **
Partner						
GDP^j	1.55	19.5 ***	1.57	17.86 ***	1.14	25.3 ***
$GDPPC^j$	0.2	2.47 ***	-0.05	-0.61	0.11	2.39 ***
Preferential						
ASEAN	1.46	1.99 **	2.37	1.58 **	1.84	2.47 ***
EU	-1.34	-2.42 ***	0.97	-1.61 **	-0.61	-2.05 **
GCC	-4.3	-3.5 ***	-0.25	-0.66	-0.57	-0.84
AMU	-0.27	-3.11 ***	-1.43	-3.62 ***	2.05	2.42 ***
ACM	1.63	2.34 ***				
Language						
English	1.76	3.91 ***	2.43	4.98 ***	1.49	6.1 ***
French	0.76	1.64 *	0.54	1.12	0.24	0.54
Openness						
Reporting Country	0.03	0.12	…	…	-0.04	-0.02
Partner Country	…	…	-0.33	-1.24 *	-0.39	-1.8 **
Number of countries	61		61		61	
Uncensored observations	3718		3718		3718	
S.E.	4.2		4.6		3.79	
Log-likelihood	-2.86		-2.9		-2.7	
R2	63.8%		64.1%		65.1%	

Note: ***, ** and * denote significance at the 5 percent, 10 percent, and 15 percent level, respectively. 1/ The regressions presented in this table do not impose any common dummy variables on the Arab countries as a whole.

Table 10: Comparisons of Actual and Predicted Levels of Bilateral Trade Flows Aggregated into Regions Under Different Modelling Assumptions and Trade Policy Scenarios Total Trade

Region	Year	No. Obs.	Actual	Predicted		
			(1)	(2) Base	(3) Oil Dummies Included	(4) Oil and One FTA and CU Dummies Included
MENA	80	130	26,454	33,981	31,938	9576
	85	109	7007	26,428	26,395	9040
	90	120	6736	20,522	18,741	7623
	92	86	6337	20,697	19,016	9465
EU	80	246	314,313	162,893	119,927	74143
	85	241	96,930	180,005	133,591	82780
	90	234	75,777	221,559	165,057	97445
	92	236	83,420	276,909	205,016	114136
NAFTA	80	16	30,135	9265	5692	2602
	85	20	8540	13271	8150	3541
	90	20	7434	16,344	10,030	4343
	92	16	6544	15,611	9618	4510
OOECD	80	81	24,405	15,721	9844	4132
	85	83	9691	19,517	12,144	5120
	90	82	8805	24,911	15,431	6540
	92	76	7044	25,000	15,526	6765
LDCs	80	457	105,741	18,969	12,303	5901
	85	462	32,107	23,280	15,016	7188
	90	486	37,363	32,821	21,147	10124
	92	435	37,606	37,784	24,320	12406
EE	80	102	15,330	21,706	15,172	5832
	85	89	11,002	19,368	13,461	5004
	90	91	4241	10,826	7837	4534
	92	82	2206	8811	6391	3795

Table 11: Comparisons of Actual and Predicted Levels of Bilateral Trade Flows Aggregated into Regions Under Different Modelling Assumptions and Trade Policy Scenarios Total Trade

Region	Year	No. Obs.	Actual	Predicted			
			(1)	(2) Oil and OneFTA and CU Dummies Included	(3) Same as (2) but with MENA FTA	(4) Same as (2) but with EU-Med FTA but no MENA FTA	(5) Same as (4) but with MENA FTA as well
MENA	80	130	26,454	9576	21,347	9576	21,346
	85	109	7007	9040	20,153	9040	20,154
	90	120	6736	7623	16,694	7623	16,994
	92	86	6337	9465	21,000	9465	21,100
EU	80	246	314,313	74143	77,400	172,550	172,550
	85	241	96,930	82780	86,512	192,865	192,865
	90	234	75,777	97445	102,554	228,626	228,626
	92	236	83,420	114136	120,156	267,867	267,867
NAFTA	80	16	30,135	2602	2602	2602	2602
	85	20	8540	3541	3713	3541	3713
	90	20	7434	4343	4581	4343	4581
	92	16	6544	4510	4755	4510	4755
OOECD	80	81	24,405	4132	4267	4132	4266
	85	83	9691	5120	5271	5120	5270
	90	82	8805	6540	6718	6540	6718
	92	76	7044	6765	6951	6765	6951
LDCs	80	457	105,741	5901	5959	5901	5959
	85	462	32,107	7188	7252	7187	7252
	90	486	37,363	10124	10,230	10,124	10,230
	92	435	37,606	12406	12,529	12,406,	12,529
EE	80	102	15,330	5832	5831	5832	5832
	85	89	11,002	5004	5004	5004	5004
	90	91	4241	4534	4534	4534	4534
	92	82	2206	3795	3796	3796	3796

Table 12: Comparisons of Actual and Predicted Levels of Bilateral Trade Flows for Total Trade in 1992 Under Different Modelling Assumptions, Trade Scenarios and Alternative Specifications than in Tables 10 and 11

	Actual	Predicted Base	Predicted With Oil Dummies and MENA FTA	Predicted With Oil and Trade Diversion with EU-MENA Link	Predicted With Oil and Trade Diversion with EU and MENA FTAs
MENA1	6431	20697	33763	14067	33763
MENA2	4968	10088	5056	5056	5056
MENA3	284	1425	894	856	894
EU	83931	276909	118450	284288	284288
NAFTA	6620	15611	4736	4536	4736
OOECD	7161	25000	7526	7345	7526
LDCs	37826	37784	12750	12634	12750
EE	2220	8811	3693	3693	3693