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Abstract

The aim of this paper is to evaluate the potential for monetary integration in the South Mediterranean area, in a context of both trade liberalization and strong orientation of trade flows towards the EU. It uses a gravity setting that includes both exchange rates volatility and relative prices, as measures of *de facto* exchange-rate and monetary conditions, to investigate trade integration for a large sample of countries. MENA countries appears reactive to exchange-rate misalignments but not very sensitive to exchange-rate volatility. Intra-MENA trade is not impacted by real exchange rate changes. A stabilization of their currenies against the Euro will not translate in much more trade but could be a good strategy to stabiliza the prices of manufactured exports.

1 Introduction

The neighbors of the European Union (EU) display very contrasted features. On the one hand, the New European Member States (NMS) - where the Central and Eastern European (CEE) countries are predominant - have been through a very deep and rapid integration with the EU, market by deep trade integration, deepening financial integration, and coming monetary integration.

On the other hand, the Southern frontier of the EU15 appears very heterogeneous and fragmented, despite more than 10 years of preferential relationship (the Barcelona agreements). Trade is not as strongly EU-oriented, trade and financial barriers are still high to some extent, and despite the proximity of the Middle-East and North African (MENA) countries to the European Union, there seems to be no sign of significant monetary integration within the Mediterranean basin. Indeed, and for instance, Jordan is de facto pegged to the USD, Morocco and Tunisia operate under managed float, Algeria operates a *de jure* free floating regime, just as Egypt (which had a fixed peg to the dollar until 2003). As a consequence, monetary regimes are very different and bilateral exchange rates quite volatile.

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Moreover, pegging regimes can be quite unstable in MENA countries, as shown by the relative volatility of MENA countries currencies against the USD and against the euro. While Turkey and Egypt, together with Israel, tend to exhibit long-lasting lower volatility against the USD than against the "euro", the same is not true for Morocco, Algeria and Tunisia, who exhibit much more volatile apparent pegging, and a more euro-oriented pegging in the case of Morocco.

Finally, as far as intra-MENA monetary integration is concerned, the most striking feature is the high volatility of nominal exchange rates within the area.[1] Indeed, intra-MENA volatility is much larger on average than the volatility of these countries' currencies against the euro or the USD.

More than half of MENA trade takes place with the EU (especially for Tunisia, Morocco and Algeria while Israel, Egypt and Turkey have more diversified partners), and the EU is probably a a natural trade partner for the countries of the region. The potential endogeneity of optimal currency areas, pointed out by Frankel and Rose (1997), suggests that trade and monetary integration deepen together. In this respect, the lack of monetary integration within the area can be seen as an impediment to further trade integration. Moreover, the lack of monetary stability in the Euro-med area might also hinder further integration between MENA countries.

[1] This feature obviously results from the diverging pegging choices made by the countries of the region

Table 1: Imports and exports of MENA countries by regions: 1980-2002

		Share in imports (%)					Share in exports (%)				
		AC	Asia	MENA	OECD	UE15	AC	Asia	MENA	OECD	UE15
1980	Algeria	1.8	1.0	0.6	13.2	70.8	0.9	0.1	0.0	51.1	42.3
2002	Algeria	1.6	5.7	5.3	14.0	64.4	0.5	1.9	7.3	19.5	62.3
1980	Israel	1.6	1.1	2.5	29.2	38.5	0.8	6.5	0.5	23.7	44.2
2002	Israel	1.2	9.1	2.6	22.1	47.1	1.3	13.5	1.3	44.4	26.0
1980	Morocco	1.7	2.2	0.2	9.1	57.6	4.5	2.8	1.9	4.6	65.3
2002	Morocco	1.5	5.8	3.3	7.3	60.4	1.6	6.2	1.7	10.3	70.4
1980	Tunisia	1.7	0.9	1.3	8.2	70.5	0.7	1.4	3.2	2.8	83.2
2002	Tunisia	1.0	3.4	3.1	3.7	75.8	1.2	1.7	2.8	1.8	78.9
1980	Turkey	5.4	0.8	1.1	7.7	35.6	6.8	1.5	1.6	6.0	42.9
2002	Turkey	4.6	8.1	3.4	9.1	48.9	5.3	3.0	5.3	10.3	51.4
1980	Egypt	2.3	3.4	0.3	30.1	50.4	2.9	2.2	3.7	10.9	63.3
2002	Egypt	2.3	11.7	3.2	23.5	35.1	0.8	9.3	3.4	19.9	40.7

Such worries about the future of regional integration within the Mediterranean area however need to rely on empirical analysis. More precisely, they depend on the fact that trade flows indeed depend on the behavior of monetary variables.

There is little debate about trade flows being determined by the behavior of real exchange rates: appreciation in the real exchange rate leads to a worsening of the competitive position of the economy, and consequently to a rise in imports, and a fall in exports. This fact is now well documented, and is robust to the use of alternative measurement strategies (macro-economic equations for exports and imports, gravity equations, more micro-economic analysis), even if aggregate demand and supply elasticities also depend on the structure of specialization in each country.[2]

The impact of exchange rate volatility on trade is more controversial, both in theory and empirical analysis. In theory, an increase in exchange rate volatility could either increase or decrease trade, depending on the risk aversion of firms or on the shape of the production functions. Looking at empirical analysis suggests that the measured effects of exchange-rate volatility on trade can be either very low and little significant or significantly negative, though minor in magnitude.

This paper is an attempt to evaluate the impact of exchange-rate behavior on trade. The main focus is on the MENA countries, but the analysis draws on a larger sample, in order both to ensure the robustness of the empirical results, and to test for potential asymmetries between the MENA countries and the rest of the world. The analysis rests on the estimation of a gravity equation for both exports and imports, for a set of 47 countries, during the 1980s throughout to 2003. Therefore, the analysis offers both a cross-sectional and time dimension, and is run using panel data tools.

Section 2 presents the empirical model and the data. The estimates

[2] The impact of exchange-rate changes is even more important in small developing countries, as their firms have little market power to implement pricing-to-market strategies - i.e. to shelter their competitiveness from real exchange rate appreciation; and their markets are usually not large enough to prevent importing firms to pass all exchange-rate changes through onto prices. Therefore, any exchange rate change leads to changes in export and import prices. For an empirical evidence with detailed results for developing countries, see Gaulier et al. (2006).

are displayed and analyzed in Section 3, and Section 4 provides some tentative conclusions and possible developments for this analysis.

2 Empirical model and data

2.1 Deriving the desirability of an exchange-rate regime from trade equations

The most popular analysis of the choice of an exchange-rate regime is the theory of optimum currency areas (OCA thereafter). According to this theory, first developed by Mundell (1961), the desirability of sharing the same currency increases with bilateral openness and labor market flexibility; the centralization of fiscal policy (also called fiscal federalism) can be a substitute for these conditions. Following the seminal paper by Mundell, a number of other criteria have been put forward, like the degree of structural similarity, which affects *ex-ante* the probability that countries experience asymmetric shocks (McKinnon, 1963; Kenen, 1969).

The construction of currency unions is a quite infrequent phenomenon. Still, the OCA theory has been used not only to investigate the potential of the EU12 to be an optimum currency area, but also to gauge the potential anchoring strategies of countries, including emerging countries. This area of studies was launched by Bayoumi and Eichengreen (1996, 1997, 1998), working on the optimal anchoring policy for Asian or EU countries, and a number of work has followed, including Bénassy (1997), or Bénassy and Lahrèche-Révil (1999, 2002), about the Central and Eastern European (CEE) or the MENA countries. The issue in these studies is to explain nominal exchange rate volatility by a number of macro-economic determinants (such as the relative size of countries, their bilateral openness and so on), in order to identify the potential anchor currency.

The main drawback of such an approach is that it ignores the potential endogeneity of OCA, i.e. the fact that stabilizing the nominal exchange rate between two countries creates the conditions for more trade, and therefore more desirable exchange-rate anchoring ex-post than it was ex-ante (Frankel and Rose, 1998). Therefore, the responsiveness of trade flows to exchange rate changes is a major and prior issue for any further investigation about the desirability of pegging or floating. This was the intuition of Rose (1999), who renewed the literature on exchange-rate regimes and trade. Looking at the impact of currency unions on trade, Rose indeed showed that currency unions cannot be identified to zero-volatility in exchange rates, but introduced more radical changes and could lead to sizeable trade increases: according to its estimates, the increase in trade could be 300% - a figure that could not be significantly lowered in further research.

Turning to MENA countries, existing research (Benassy-Quéré and al., 2002) founded on the OCA theory shows that these countries would have an advantage if they pegged more to the euro than to the dollar. This was shown to be true both for nominal and real pegging strategies (i.e. focusing on competitiveness), although the MENA countries were found to be highly heterogeneous, and the structure of the optimal pegging basket did not suggest 100% anchoring to the euro. Given the existing literature, one could expect that the heterogeneity in MENA currencies *de facto* and *de jure* pegging strategies, because it leads to intra-MENA exchange-rate volatility, is an impediment to real integration within the region. However, the recent experience of NMS, and the older one of Asia countries, suggests that monetary and financial integration within emerging areas does not necessarily stem from intra-regional integration, but can be led by a common integration to a third region.

Asia is a well known example, where common pegs to the dollar have led to real (through trade) and financial (through common pegs) integration. Asia also brightly showed that common and un-coordinated anchoring could be fragile, because increasing integration makes un-coordinated monetary policies unsustainable (Mundell's holy trinity). The NMS offer an alternative example, where common anchorage to the euro leads regional integration, and is made more sustainable through the commitment to enter the euro zone.

In this paper, the potential for further monetary integration within the MENA area is investigated using the methodology developed by Rose. More precisely, the sensitiveness of trade to exchange-rate regimes - defined in a de facto way by the level and the volatility of the exchange rate - is explored for a large sample, that includes the MENA countries. We first gauge the situation of MENA countries with respect to other emerging countries. We also characterize intra-MENA trade with respect to MENA trade with other countries, and compare it with the situation in other countries - especially NMS. Gains from anchoring are assumed to be larger when the elasticity of trade to exchange rate volatility is higher, and this assumption allows to investigate the potential gains of further intra-regional integration, depending on whether this integration is limited to the region or lead by increased integration with the euro area.

2.2 The empirical model

The impact of monetary integration on trade flows it investigated within a gravity setting. The use of the gravitational equation is now well established in trade issues, both for theoretical reasons (this equation is theoretically consistent with most existing theoretical models of international trade) and empirical reasons (it has a very good and robust explanatory power for trade flows). Moreover, it allows for a bilateral analysis, which is of particular interest as the regional dimension of trade become a striking feature of international trade flows.

The impact of real exchange-rate changes on trade is now being quite well identified: a real appreciation usually has a deleterious impact on exports through a demand effect (lower competitiveness) or a supply effect (higher profitability of the traded goods sector compared to the non-traded goods sector).

The link between exchange-rate volatility and trade flows is less clear. According to McKenzie (1999), the elasticity of trade flows to exchange-rate volatility can be either positive or negative, and the results depend on the precise measure of volatility, on the estimation technique and on the sectors and countries concerned. Moreover, the impact of exchange-rate volatility might differ according to the countries under study: Sauer and Bohara (2001) show that exchange-rate volatility has a negative impact on African and Latin American exports, a non-significant impact on Asian exports and on developed countries exports. The gravitational analysis of trade flows has renewed the literature however. Frankel and Wei (1995, 1996) evidence a significant negative impact of exchange-rate volatility on trade flows across Asian countries on a cross-section basis, a result found to be strongly robust by Rose (2000), who finds exchange-rate volatility to be a significant and systematic impediment to trade for an extensive sample of countries. Finally, Tenreyro (2006) finds opposite results. Following Santos Silva and Tenreyro (2006), she uses a pseudo-maximum likelihood (PML) technique to deal with heteroskedastic biases. To deal with the endogeneity and the measurement error of exchange rate variability she then develops an instrumental-variable (IV) version of the PML estimator. Results indicate that nominal exchange rate variability has no significant impact on trade flows.

The typical gravitational equation links trade (defined either as total trade, imports or exports) to the product of country sizes, impediments to trade, and a set of bilateral variables. In its theoretical expression, it has the following functional form:

$$X_{ij} = Y_i^{\alpha} Y_j^{\beta} D_{ij}^{\gamma} \delta_{ij}^{\eta} Z_{ij} \tag{1}$$

with $\alpha, \beta > 0$, $\gamma < 0$ and $\eta > 0$.

where X_{ij} stands for exports from country i to country j, $Y_{i,j}$ refers to the economic size of country i (resp. j) - GDP is a usual proxy when the sectoral dimension of production is not taken into account. D_{ij} is the distance between countries, δ_{ij} is a dummy for common borders and Z_{ij} is a vector of bilateral variables which frequently includes a dummy for the use of a common language, and can also include exchange-rate variables, as in Rose (2000).

While gravity models are often estimated on a cross-country basis, panel data analysis is being more and more common (See Frankel, 1997, or Egger and Pfaffermayr, 2003), as it allows for the inclusion of relevant, time-varying variables, such as exchange rates.

This paper focuses on the impact of exchange-rate variables on trade flows, and consequently does not seek to improve or refine the underlying gravity framework. This is the reason why the baseline equation used in this paper is a very standard one, including both the bilateral and time dimensions, as follows:

$$\begin{aligned} \ln X_{ij} &= \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln DIST_{ij} + \alpha_4 \ln RER_{ijt} \\ &+ \alpha_5 VOL_{ijt} + GRAVITY_{ijt} \\ &+ \beta_i + \beta_j + \beta_t + \beta_{region_{i,j,ij}} + \varepsilon ijt \end{aligned} \tag{2}$$

The dependent variable is the volume of exports in constant dollars (trade data from the CHELEM-CEPII database, price indexes from the World bank and the IMF).

$GDP_{i,jt}$ is the PPP-converted GDP for either country i or j (in volume, World Bank data). The gravitational variables are summarized in $DIST_{ij}$ and $GRAVITY_{ijt}$. $DIST_{ij}$ is the geodesic distance between i and j. $GRAVITY_{ijt}$ is a vector of variables relating to gravitation, which includes variables such as dummies for common languages or borders, a common colonizer, and so on. These data are taken from the CEPII's website.[3] RER_{ijt} is the real exchange rate, computed using CPI and defined as the relative price of j to i (an increase therefore signals a real depreciation of the currency of country i).

[3] See www.cepii.fr/anglaisgraph/bdd/distances.htm

VOL_{ijt} is a measure of volatility. This measure is one of the less obvious to build, as can be seen from the large number of volatility proxies that are available for the exchange rate. First of all, a large part of the financial literature highlights the fact that, as long as agents are information-seeking, only the unexpected part of exchange-rate volatility can have potential consequences on economic decisions. This is the reason why this literature has developed econometric models of the exchange-rate volatility (see e.g. ARCH models - and their various derivatives - for exchange rate series) aiming at extracting information from volatility series, and therefore allowing build unexpected volatility series.

In the longer run, exchange-rate are often described as following a random walk, and their standard deviation (or their coefficient of variation) is often enough to describe their volatility. While this might be true for nominal exchange rates, it is less relevant for real exchange rates, that are driven by fundamentals. In order to correctly measure their volatility, de-meaning is usually necessary, and a better measure of volatility is therefore the standard deviation of the rate of change of exchange-rate series.

We chose to use this last definition of volatility, applying it alternatively to monthly nominal and real exchange rates.[4]

The definition of exchange rate volatility is therefore the following:

$$VOL = \sqrt{Var(\ln ER_{ij\tau} - \ln ER_{ij,\tau-1})_{\tau=1\rightarrow 12}} \qquad (3)$$

Where $ER_{ij\tau}$ is the exchange rate, either nominal or CPI-deflated, and τ is monthly. Hence, we compute the volatility of the monthly exchange rate for a given year.

The sample includes 47 countries, of which all the countries of the EU15 and the CEE new European members, and 6 MENA countries (Morocco, Tunisia, Egypt, Turkey, Israel, Algeria). The time sample spans from 1980 to 2003. Hence, the total possible number of observations is 49,726. Due to missing data, the available number of observations is reduced to 34,457. Because the data are pooled over the cross-country and time dimension, the equation is estimated using the panel within estimator, which implies the use of individual and time fixed effects. Here, the fixed effects are included for country i, country j and time (β_i, β_j and β_t), the pure bilateral dimension ij being caught by the distance variable. Additional fixed effects are also introduced to control for regional features of the countries (summarized in vector $\beta_{region_{i,j,ij}}$). This vector includes fixed effects for the region to which either the exporter or the importer belong[5] and bilateral regional fixed effects (i.e. a dummy for each pair of region to which the exporter/importer belong).

Hence, β_i is a vector of fixed effects for the exporting countries. β_j is a vector of fixed effects for the importing countries. β_t is a vector of fixed effects for time (yearly frequency). The $\beta_{region_{i,j,ij}}$ vector includes dummies for the exporter's and importer's broad regional belonging (MENA, Asia, NMS ...)

The main focus of this paper is to investigate whether exchange-rate changes have an impact on trade flows in the MENA countries, in order to

[4] Notice that working on shorter-run data would call for the use of ARCH models. However, ARCH effects are usually shown to be less prevalent in the longer run (from the quarter to the year).

[5] 6 regions have been defined: new European member states, Asia, MENA countries, EU, XXXXXXX

have an insight on the potential for monetary integration, either within the region, or at least with the main trading partner, i.e. the EU15/25. The availability of a large sample of countries allows to investigate this issue with more precision, as it also allows to measure the degree of symmetry of the MENA country with respect to the rest of the world. This is the reason why a step-by-step estimation strategy is implemented here. In a first step, the trade equation is estimated on the whole sample of countries, assuming that all the countries of the sample behave symmetrically as far as the estimated elasticities are concerned, and only differ up to a constant term, which includes regional effects. In further steps, the model accounts for region-specific effects, in order to investigate potential asymmetries between the countries of the sample.

3 Bilateral trade and the bilateral exchange rate

In the following, the empirical analysis is systematically run over the whole period (1980-2002), but also over shorter sub-periods. Indeed, the whole period is quite long, and structural breaks might be present within it (due for instance to the liberalization of capital flows during the 1990's, which was not only a feature of industrialized countries). Including fixed effects for time controls for breaks in the constant term, but not in estimated coefficients. However, it should be noted that shortening the time period also reduces the number of degrees of freedom, as well as the variance of variables. This turns out to have the effect of reducing the significance of most exchange rate variables, as can be seen in the following.

3.1 Panel estimates on the whole sample

In the following, we display a number of estimates run on the whole sample, both on (the log of) exports and imports.[6]

The results are very close to what is usually obtained in similar empirical analysis. First of all, gravitational variables are highly significant and bear the expected sign, a result that further confirms the strong explanatory power of gravitational modeling for trade flows. The estimated coefficient for GDP are close to 1, which is the expected order of magnitude, and the distance coefficient is also very close to minus 1.

Other gravity variables are also highly significant, mostly pointing to geographical and historical proximity leading to more exports. The only exception is with contiguity, which unexpectedly bears a negative sign. However, this variable is potentially collinear to the adjacency variable (close countries have a higher probability to share the same language), which could explain the sign of the estimate.

Turning to exchange-rate variables, the real exchange rate has the expected positive sign, meaning that a 10% depreciation leads to a 5% increase in bilateral exports. This is a rather sensible price-elasticity estimate (working on the G7 countries, and relying on time-series econometrics, Hooper et al., 1998, find the long-run price-elasticity of exports to be ranging between .2 and 1.6).

The impact of exchange rate volatility however is less robust, and it tends to vanish when the time period is reduced. The coefficient on the

[6] Estimates for fixed effects are not displayed but are available upon request.

real exchange rate also tends to be less (it drops to approximately .4, from almost .6). This might be an indication that the impact of exchange-rate variables is lessened by the financial integration of economies, as hedging can be made more easy. It can also be the consequence of diminishing variance in the variables, as the 1990s where a period of reducing exchange-rate volatility. Notice that the results in columns (5) and (6) are much less easy to interpret, as the number of available observations to estimate the impact of exchange-rate variables is very limited.

As far as the impact of exchange-rate volatility is concerned, columns (1) to (4) suggest that the impact of real exchange rate volatility on export is more significant and stronger than the impact of nominal exchange-rate volatility, which is not unexpected, since it is easier to hedge against nominal than against real exchange-rate risk.

On the import side, the results are roughly similar: gravity variables bear a strong high explanatory power, and are signed as expected: the GDP elasticity is around 1, and the distance coefficient is very close to minus 1. Once again, contiguity fails to be significant and signed consistently to usual expectations.

A depreciation of country i's currency (increase in the real exchange rate) leads to an increase in country j imports from i. In other words, when j appreciates in real terms, imports increase, with an elasticity around .2. This elasticity is lower than the available estimates for the G7, and would suggest that the Lerner-Marshall and Robinson critical values are not met on average for the countries of the sample (the sum of price elasticities in absolute value is .5+.2=.7, which is lower than 1). Once again, this result keeps consistent with the empirical literature, which often highlights the low level of price elasticities (see for instance the elasticities pessimism, as reviewed in Obstfeld, 2002).

Consistently with the results obtained on exports, exchange-rate variables fail to significantly explain import flows on the most recent period, a result which is stems from the limited number of observations in the time dimension. Consistently also with previous results, the volatility of the real exchange rate tends to impact imports more strongly and significantly than the volatility of the nominal exchange rate. All in all, the volatility of the exchange rate has a detrimental effect on imports , and its size is comparable to the impact on exports (which is expected, since the CHELEM trade data are harmonized, and $X_{ij} = M_{ji}$).

Table 3 about here

Summing-up the whole-sample estimates, it appears that exchange rate volatility tends to be detrimental to trade, since both exports and imports are adversely affected by an increase in volatility. This is especially the case for real exchange rate volatility, and the results are somewhat sensitive to time period under analysis.

Long-run changes in the real exchange rate have a more robust and systematic impact on trade, suggesting that, in the whole sample of countries, changes in the *level* of the real exchange rate have more impact than changes in its *volatility*. However, the sum of price elasticities is lower than 1, suggesting that - at least over one year - the price effects are not integrally balanced by volume effects. Hence the efficiency of the real exchange rates as an adjustment tool is not guaranteed within the sample.

This first set of estimates builds on the hypothesis that trade reaction to exchange rates is homogeneous across the sample. The next subsection investigates the relevance of such a hypothesis, by allowing exchange-rate elasticities to vary according to the regional belonging of the countries of the sample.

3.2 Are the MENA countries behaving differently?

The previous set of estimates provides with a broad picture of the impact of exchange-rate variables on trade, showing that both exchange-rate volatility and changes in the level of the real exchange rate affect trade, although with varying robustness. A question is however to determine whether this is a general feature of all the countries of the sample, or whether some country groupings behave differently.

In order to address this issue, regional dummies are built, corresponding to the following groupings: EMU, EU15, OCDE, New European Member States (NMS hereafter), Asian and MENA countries. These dummies (either for exporters or importers) are then interacted with the exchange-rate variables, in order to catch potential asymmetries in the reaction of trade to exchange-rate regimes changes. In a first step, the behavior of MENA countries is compared to that of all the remaining countries of the sample. The estimated equations are the following, for exports and imports respectively:

$$\begin{aligned}
\ln X_{ijt} &= \beta + \alpha_1 MENA_i \ln RER_{ijt} + \alpha_2 (1 - MENA_i) \ln RER_{ijt} \\
&+ \alpha_3 MENA_i VOL_{ijt} + \alpha_4 (1 - MENA_i) VOL_{ijt} \\
&+ GRAVITY_{ijt} + \beta_i + \beta_j + \beta_t + \beta_{region_{i,j,ij}} + \varepsilon_{ijt} \qquad (4) \\
\ln M_{ijt} &= \beta + \alpha_1 MENA_j \ln RER_{ijt} + \alpha_2 (1 - MENA_j) \ln RER_{ijt} \\
&+ \alpha_3 MENA_j VOL_{ijt} + \alpha_4 (1 - MENA_j) VOL_{ijt} \\
&+ GRAVITY_{ijt} + \beta_i + \beta_j + \beta_t + \beta_{region_{i,j,ij}} + \varepsilon_{ijt} \qquad (5)
\end{aligned}$$

Where $MENA_{i,j}$ is the dummy variable associated to MENA countries (taking the value of 1 if country i or j - depending on whether estimates are run on exports or imports - belongs to the corresponding grouping). Therefore, the coefficient associated to the interaction of the MENA dummy with exchange-rate data reflects the MENA-specific impact of the real exchange rate (resp. the exchange rate volatility) on trade, which can be directly compared to the same coefficient in the other countries of the sample. Results are displayed in Tables 4 and 5.

As far as the MENA countries are compared to the rest of the sample, the results show there is indeed some heterogeneity in terms of behavior between the MENA countries and the rest of the sample. MENA exports are much less elastic to real exchange-rate changes (the elasticity, when significant, is half in MENA countries, and the difference between MENA countries and the rest of the sample is statistically significant - `CHECK`) - see Tables 4.

The impact of exchange-rate volatility is also quite heterogeneous, as exchange-rate volatility negatively affects other countries exports, while it has no impact or a positive impact for MENA countries (1980-2002 and 1992-2002 periods).

Turning to imports, MENA countries were much more sensitive to exchange rate changes than other countries of the sample on the whole period (1980-2002), but this conclusion is quite sensitive to the period of analysis. Indeed, it is no more significant after 1992. Such a result suggests a structural break within the whole sample, and would deserve further analysis.

This result is obviously the outcome of the trade specialization of these countries. The share of raw products (such as oil) is higher in their exports than it is for other countries of the sample. As the prices of these products are set on international markets - where market power has almost no impact - and directly in international currencies, exports are rather inelastic to changes in prices. On the import side, the situation is different, as the price elasticity of MENA imports is slightly higher as the price elasticity of other countries' imports: MENA countries import more manufactured goods, for which the price-elasticity of demand is higher. Whether this reflects a composition (MENA countries import a higher share of price-elastic goods than the other countries of the sample) or a structural effect (the price elasticity of demand of MENA countries is higher, regardless of the composition of imports) is an issue that cannot be further investigated within the framework of this paper.

Table 4 about here

Going further, we investigate here the existence of asymmetries in the behavior of MENA countries relative to other developing countries of the sample. Therefore, 3 regional dummies are interacted with the level and the volatility of the real exchange rate (the three regions being the MENA countries, Asian countries and the European new member states and acceding countries). The real exchange rate level and volatility are also included in the analysis. They give an information about what happens in the remaining countries of the sample (i.e. OECD developed countries). The estimated equations are therefore the following:

$$\begin{aligned}
\ln X_{ijt} &= \beta + \alpha_1 MENA_i \ln RER_{ijt} + \alpha_2 MENA_i VOL_{ijt} \\
&+ \alpha_3 ASIA_i \ln RER_{ijt} + \alpha_4 ASIA_i VOL_{ijt} \\
&+ \alpha_5 AC_i \ln RER_{ijt} + \alpha_6 AC_i VOL_{ijt} \\
&+ \alpha_7 \ln RER_{ijt} + \alpha_8 VOL_{ijt} + GRAVITY_{ijt} \\
&+ \beta_i + \beta_j + \beta_t + \beta_{region_{i,j,ij}} + \varepsilon ijt \qquad (6) \\
\ln M_{ijt} &= \beta + \alpha_1 MENA_j \ln RER_{ijt} + \alpha_2 MENA_j VOL_{ijt} \\
&+ \alpha_3 ASIA_j \ln RER_{ijt} + \alpha_4 ASIA_j VOL_{ijt} \\
&+ \alpha_5 AC_j \ln RER_{ijt} + \alpha_6 AC_j VOL_{ijt} \\
&+ \alpha_7 \ln RER_{ijt} + \alpha_8 VOL_{ijt} + GRAVITY_{ijt} \\
&+ \beta_i + \beta_j + \beta_t + \beta_{region_{i,j,ij}} + \varepsilon ijt \qquad (7)
\end{aligned}$$

Results are displayed in Table 6. Gravity variables estimates other than for GDP and distance remain unchanged in terms of sign and significance. The coefficient on the real exchange rate describes the all-countries sensitivity of trade to exchange rates, net from regional specificities. The interaction of regional dummies with exchange rate variables identifies the additional impact of belonging to a given region on the sensitiveness of trade to exchange rate changes. For instance, the total impact of real exchange rates on MENA exports is given by the sum of α_1 and α_6.

According to Table 6, heterogeneity can be sizeable in the sample. Looking first at the real exchange rate, its "net" (of Asia, NMS and MENA countries specificities) impact on exports is positive and significant, as well as quite large in absolute value (close to .6 over the whole time period). But it is significantly lower in MENA countries (as well as in the NMS), while Asia countries exhibit a higher price-elasticity of trade than the other countries of the sample. Hence, the conclusion obtained previously on MENA countries is confirmed.

As to exchange-rate volatility, it has a negative (though somehow fragile) impact on exports.[7] Most countries of the sample behave similarly, as evidenced by the fact that region-specific dummies for Asia and the NMS are not significantly different from zero. The MENA countries are heterogeneous in this respect, as they tend to exhibit *less* sensitivity of exports to nominal exchange-rate volatility (the coefficient on MENA × volatility is positive and significant, and is large enough to reverse the sample-estimate of the impact of volatility on trade $(-.6 + 1.4 = .8)$

On the import side however (Table 7, the differences are quite marginal: the sensitivity of MENA, Asian and NMS countries to the real exchange rate is quite similar. These results suggest once again that export specialization might play a dominant role in the behavior of the trade balance with respect to the exchange rate (since the behavior of imports is quite homogeneous across regions). On the whole, exchange-rate variables tend to have a higher impact on Asian countries - especially for exports, while the differences is probably not significant for imports - which may be reflecting the Asian specialization manufactured goods with higher price-elasticity.

Table 6 and 7 about here

3.3 Is intra-MENA trade specific?

In order to gauge the potential for monetary integration within the MENA countries, the impact of exchange-rate features on intra-MENA trade also deserves attention. To this aim, another set of dummies is included into the regression, to identify the impact of intra-MENA exchange-rate changes. Because the EU is the closest and largest neighbor of MENA countries, the euro is the most obvious candidate for external anchoring of the currency, as already shown by existing studies (Bénassy-Quéré et al., 2002). A dummy is therefore also included, that identifies MENA/EU trade flows. The definition of dummies is the following:

- $MENA_{ij}$ takes the value of 1 when both trade partners are MENA countries. Therefore, this dummy identifies intra-MENA trade.
- MENA/UEM takes the value of 1 when trade takes place between a MENA country and a EU member. Therefore, this dummy identifies EU trade with the MENA countries.

All dummies are interacted with exchange-rate variables, so that the following equation is estimated both for imports and for exports:

[7] Here, only nominal exchange rate volatility is investigated, to make our results more comparable to the existing literature, where the nominal exchange rate is mostly used to measure volatility.

$$
\begin{aligned}
\ln X_{ijt} &= \beta + \alpha_1 \ln RER_{ijt} + \alpha_2 MENA_{ij} \ln RER_{ijt} \\
&+ \alpha_3 MENA/UEM \ln RER_{ijt} + \alpha_4 VOL_{ijt} \\
&+ \alpha_5 MENA_{ij} VOL_{ijt} + \alpha_6 MENA_i UEM_j VOL_{ijt} \\
&+ \alpha_7 MENA_j UEM_i VOL_{ijt} + GRAVITY_{ijt} \\
&+ \beta_i + \beta_j + \beta_t + \beta_{region_{i,j,ij}} + \varepsilon_{ijt} \qquad (8)
\end{aligned}
$$

This equation identifies the impact of exchange-rate variables on intra-MENA trade and, additionally, of trade between EU and MENA countries. In order to obtain more evidence about the specificity of MENA imports and exports with the EU, we also estimated the equation by substituting MENA/UEM by:

- $MENA_i UEM_j$ takes the value of 1 when i is a MENA country, and j belongs to the EU. This dummy describes MENA imports from the EU.
- $MENA_j UEM_i$ takes the value of 1 when j is a MENA country, and i belongs to the EU. This dummy describes MENA exports to the UE.

Results are displayed in Tables 8 and 9.

Tables 8 and 9 about here

Compared to what is observed over the whole sample (real exchange rate elasticity of exports around .6), intra-MENA seems to be little reactive to changes in the real exchange rate. The total impact of 10% a real exchange rate change (say, a depreciation) is a 2% increase in intra-MENA exports (0.6-0.4 * 10%).

However, this result can be further investigated (Column 2 of Table 8 for exports). MENA exports to the EMU are oddly affected by the real exchange rate ($-.4 + 1 > 0$), probably reflecting the raw-materials orientation of MENA exports. EMU exports towards MENA countries, on the contrary, are similarly affected by a change in the exchange-rate as other EMU exports.

Not controlling for other regional groupings, intra-MENA and EMU-MENA trade is not behaving differently as far as volatility is concerned.

Similar results are obtained from imports.

Hence, while MENA trade on the whole seems to react to exchange rate changes in an asymmetric way compared to other broad groups of countries, there is nothing very much specific in intra-MENA trade sensitivity to the exchange rate - except the fact that MENA exports to the EMU are not sensitive to exchange rates in the expected direction.

4 Summary of results and policy implications

The choice of an exchange rate regime, and eventually the move towards greater monetary cooperation between countries is an important issue for emerging countries, which are getting more and more open and seek both growth and stability. The optimum currency area theory states that countries should feel a greater incentive to peg to the same currency, the more bilaterally opened they are, and the smoother internal adjustment to shocks is. However, recent developments in this area also state that bilateral openness is endogenous to exchange rate developments, and that a given exchange-rate strategy could eventually prove ex-post more desirable than it could have been ex-ante. This conclusion is however conditional to the structural patterns of trade. On the empirical side, the gravity analysis has shown with continuous robustness that trade was determined by very structural and slowly changing (if ever) determinants as the size of the partner countries and distance - as an approximation for trade costs. The potential for monetary integration should therefore primarily be determined by a number of geographical determinants, and in a second step by exchange-rate developments, as these also influence trade flows.

The analysis developed above yields a number of conclusions, and some insight for MENA countries. First of all, it confirms the powerfulness of the gravity equation for explaining trade flows. It also confirms that de facto exchange-rate regimes - defined by the level of and the volatility of the (real) exchange rate - also contribute to the determination of trade flows. All in all, once gravity determinants are controlled for, exchange-rates have only limited impact on trade flows: the elasticity of exports to the real exchange rate is found to be low (compared to standard macro-economy results), around 0.5, as is the elasticity of imports (0,2). Volatility has an negative impact on both kinds of flows, ranking between -0.2 and -0.9 depending on the definition of this variable. Within this framework, MENA countries do not behave as strong outliers: the elasticity for exports is lower than for the whole sample (while the elasticity for imports is slightly larger), and the impact of volatility compares with what is obtained for the whole sample. Moreover, they behave quite similarly to European NMS and accession countries - in this respect, Asian countries display a more asymmetric behaviour, with higher sensitivity to exchange-rate volatility and standard price elasticities of trade. Compared to the NMS, MENA countries display more volatility of intra-area exchange rates, which is by sure an impediment to trade, and therefore an obstacle for further monetary integration. However, some of them also display high volatility against the most obvious candidate currency for anchoring (namely, the euro and the dollar in the second place), and the failure to coordinate monetary policies against the same international anchor further depletes intra-MENA monetary stability.

What would be the best strategy for further increasing monetary integration within the region? An attempt was made in this paper to identify the impact of de facto exchange-rate regime characteristics on intra-MENA trade, compared to MENA trade with other countries. It appears that intra-MENA trade is slightly more - but not significantly - impacted by real exchange rate changes than MENA trade irrespective of the partner.[8] Therefore, increasing intra-MENA monetary integration would probably not yield overwhelming gains in terms of trade, given that intra-MENA trade integration is still very limited. Once proximity to the EU and the size of EU is controlled, the estimates were not able to put forwards any interesting impact of exchange rates on MENA/EU trade. This could be interpreted as the fact that MENA/EU trade does not differ much from overall MENA trade in terms of sensitivity of the de facto exchange-rate regime. But given the weight of the EU as a trade partner

[8] The elasticity of exports to the real exchange rate is 0.3 for whole MENA trade - 0.681-0.414, while it is also 0.3 - 0.61-0.312 - for intra-MENA trade

for most MENA countries, stabilizing the exchange rate and containing real exchange rate shifts appears as a more important target as monetary integration within the EU. Moreover, it could be the case that MENA countries, by stabilizing their exchange rates against the euro, would by the same time stabilize also intra-MENA currencies. Such a phenomenon was actually grounding the process of intra-Asian integration before and after the Asian crisis of 1997. As far as competitiveness vis-à-vis the rest of the world is concerned, the analysis confirms that the countries of the sample tend to export more when their exchange rate depreciates more that the currency of their main competitors in export markets. Given that MENA countries tend to display a similar pattern of partners as NMS (at least as long as manufacturing exports are concerned), and given that NMS are their main competitors (with Asian countries for textile) on EU markets, this means that MENA countries should feel and incentive, not only to contain the volatility of the exchange rate against the euro, but also to contain real appreciation, compared to their main competitors.

While the euro appears as a natural anchor to MENA countries, due to the proximity of both areas, its desirability as a potential anchor would not stem mainly from the impact of exchange rate volatility on trade, but on other factors like the openness of MENA countries towards the EMU, or the share of EMU countries in MENA capital inflows, or the need for a cut in risk premia for MENA countries. MENA exports are less sensitive to variations of exchange rate and to volatility than others developing countries. Intra MENA trade intra-MENA seems to be little reactive to changes in the real exchange rate due to the heterogeneity. Therefore, a stabilization of their currency against the Euro may not translate in much more trade. Thus, it could stabilize the price of their manufactured goods which are more sensitive to chnages in prices in exports markets. If this strategy is chosen, it could be quite difficult to avoid trade inbalances. To stabilize their currencies agianst the Euro will probably be acompanied with a real apreciation and their trade remains quite sensitive to the level of real exchange rate.

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Table 2: Exchange rates and the volume of exports

	Dependent Variable: Log of Exports					
	1980-2002		1992-2002		1998-2002	
Model :	(1)	(2)	(3)	(4)	(5)	(6)
intcpt	-37.316[a]	-38.077[a]	-30.337[a]	-30.771[a]	-43.574[a]	-42.317[a]
	(1.639)	(1.639)	(4.038)	(4.032)	(13.752)	(13.748)
$\ln GDP_{it}$	0.956[a]	0.970[a]	0.735[a]	0.744[a]	0.632[c]	0.609[c]
	(0.043)	(0.043)	(0.111)	(0.111)	(0.355)	(0.354)
$\ln GDP_{jt}$	0.977[a]	0.991[a]	0.938[a]	0.947[a]	1.511[a]	1.488[a]
	(0.043)	(0.043)	(0.111)	(0.111)	(0.355)	(0.355)
Contiguity	-0.080[b]	-0.074[b]	0.034	0.033	0.055	0.054
	(0.034)	(0.034)	(0.042)	(0.042)	(0.059)	(0.059)
Common Language	0.431[a]	0.420[a]	0.450[a]	0.450[a]	0.513[a]	0.513[a]
	(0.023)	(0.023)	(0.031)	(0.031)	(0.044)	(0.044)
Colony	0.410[a]	0.411[a]	0.281[a]	0.281[a]	0.273[a]	0.273[a]
	(0.040)	(0.040)	(0.051)	(0.051)	(0.072)	(0.072)
Common Colony	0.674[a]	0.655[a]	0.902[a]	0.902[a]	0.904[a]	0.903[a]
	(0.049)	(0.049)	(0.065)	(0.065)	(0.091)	(0.091)
Colony after 1945	0.428[a]	0.425[a]	0.499[a]	0.498[a]	0.427[a]	0.424[a]
	(0.062)	(0.062)	(0.082)	(0.082)	(0.116)	(0.116)
Same Country	0.574[a]	0.569[a]	0.485[a]	0.486[a]	0.306[a]	0.305[a]
	(0.054)	(0.054)	(0.061)	(0.061)	(0.084)	(0.084)
$\ln DIST_{ij}$	-0.955[a]	-0.951[a]	-1.001[a]	-1.000[a]	-0.990[a]	-0.989[a]
	(0.015)	(0.015)	(0.019)	(0.019)	(0.027)	(0.027)
$\ln RER_{ijt}$	0.541[a]	0.539[a]	0.568[a]	0.568[a]	0.374[a]	0.374[a]
	(0.022)	(0.022)	(0.040)	(0.040)	(0.111)	(0.111)
NER vol. ($\sigma_{d\ln NER_{ijt}}$)	-0.567[a]		-0.261		-0.171	
	(0.137)		(0.226)		(0.652)	
RER vol. ($\sigma_{d\ln RER_{ijt}}$)		-0.933[a]		-0.769[b]		-0.762
		(0.152)		(0.343)		(0.680)
N	34457	34273	20636	20636	9821	9821
R^2	0.771	0.771	0.794	0.794	0.804	0.804
RMSE	.977	.973	.945	.945	.91	.91

Note: Standard errors in parentheses: [a], [b] and [c] stand for statistical significance at the 1%, 5% and 10% levels respectively.

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Tables

Table 3: Exchange rates and the volume of imports

	Dependent Variable: Log of Imports					
	1980-2002		1992-2002		1998-2002	
Model :	(1)	(2)	(3)	(4)	(5)	(6)
intcpt	-36.303^a	-37.024^a	-29.253^a	-29.656^a	-39.618^a	-38.327^a
	(1.639)	(1.640)	(4.032)	(4.026)	(13.741)	(13.738)
$\ln GDP_{it}$	1.011^a	1.023^a	0.962^a	0.971^a	0.631^c	0.608^c
	(0.043)	(0.043)	(0.111)	(0.111)	(0.355)	(0.355)
$\ln GDP_{jt}$	0.894^a	0.909^a	0.695^a	0.702^a	1.439^a	1.416^a
	(0.043)	(0.043)	(0.111)	(0.111)	(0.354)	(0.354)
Contiguity	-0.087^b	-0.084^b	0.037	0.036	0.052	0.052
	(0.034)	(0.034)	(0.042)	(0.042)	(0.059)	(0.059)
Common Language	0.431^a	0.419^a	0.446^a	0.445^a	0.509^a	0.509^a
	(0.023)	(0.023)	(0.031)	(0.031)	(0.044)	(0.044)
Colony	0.414^a	0.422^a	0.279^a	0.280^a	0.274^a	0.274^a
	(0.040)	(0.040)	(0.051)	(0.051)	(0.072)	(0.072)
Common Colony	0.678^a	0.658^a	0.910^a	0.910^a	0.904^a	0.903^a
	(0.049)	(0.049)	(0.065)	(0.065)	(0.091)	(0.091)
Colony after 1945	0.426^a	0.418^a	0.503^a	0.501^a	0.429^a	0.427^a
	(0.062)	(0.062)	(0.082)	(0.082)	(0.116)	(0.116)
Same Country	0.574^a	0.568^a	0.483^a	0.484^a	0.307^a	0.306^a
	(0.054)	(0.054)	(0.061)	(0.061)	(0.084)	(0.084)
$\ln DIST_{ij}$	-0.961^a	-0.957^a	-1.002^a	-1.001^a	-0.990^a	-0.989^a
	(0.015)	(0.015)	(0.019)	(0.019)	(0.027)	(0.027)
$\ln RER_{ijt}$	0.195^a	0.192^a	0.185^a	0.186^a	-0.112	-0.112
	(0.022)	(0.022)	(0.040)	(0.040)	(0.111)	(0.111)
NER vol. ($\sigma_{d \ln NER_{ijt}}$)	-0.554^a		-0.228		0.087	
	(0.138)		(0.226)		(0.652)	
RER vol. ($\sigma_{d \ln RER_{ijt}}$)		-0.898^a		-0.781^b		-0.504
		(0.152)		(0.342)		(0.680)
N	34458	34274	20638	20638	9821	9821
R^2	0.8	0.8	0.823	0.823	0.835	0.835
RMSE	.978	.974	.943	.943	.91	.91

Note: Standard errors in parentheses: ^{a}, ^{b} and ^{c} stand for statistical significance at the 1%, 5% and 10% levels respectively.

Table 4: Do MENA countries behave differently from all the countries of the sample? Exports

Model :	Dep. Variable: Log of Exports (1) 1980-2002	(2) 1992-2002	(3) 1998-2002
intcpt	-36.117[a]	-30.395[a]	-41.875[a]
	(1.646)	(4.038)	(13.774)
$\ln GDP_{it}$	0.902[a]	0.736[a]	0.555
	(0.044)	(0.111)	(0.356)
$\ln GDP_{jt}$	0.983[a]	0.939[a]	1.522[a]
	(0.043)	(0.111)	(0.355)
Contiguity	-0.075[b]	0.035	0.055
	(0.034)	(0.042)	(0.059)
Common Language	0.438[a]	0.452[a]	0.512[a]
	(0.023)	(0.031)	(0.044)
Colony	0.397[a]	0.275[a]	0.274[a]
	(0.040)	(0.051)	(0.072)
Common Colony	0.690[a]	0.912[a]	0.898[a]
	(0.049)	(0.065)	(0.091)
Colony after 1945	0.435[a]	0.504[a]	0.426[a]
	(0.062)	(0.082)	(0.116)
Same Country	0.573[a]	0.483[a]	0.308[a]
	(0.054)	(0.061)	(0.084)
$\ln DIST_{ij}$	-0.952[a]	-1.000[a]	-0.989[a]
	(0.015)	(0.019)	(0.027)
$MENA_i \times \ln RER_{ijt}$	0.220[a]	0.346[a]	0.156
	(0.046)	(0.108)	(0.287)
$(1 - MENA_i) \times \ln RER_{ijt}$	0.626[a]	0.598[a]	0.397[a]
	(0.024)	(0.041)	(0.118)
$MENA_i \times VOL_{ijt}$	0.557	1.318[b]	-2.450[c]
	(0.349)	(0.603)	(1.285)
$(1 - MENA_i) \times VOL_{ijt}$	-0.760[a]	-0.497[b]	0.431
	(0.146)	(0.239)	(0.714)
N	34457	20636	9821
R^2	0.771	0.794	0.804
RMSE	.976	.944	.91

Note: Standard errors in parentheses: [a], [b] and [c] stand for statistical significance at the 1%, 5% and 10% levels respectively.

Table 5: Do MENA countries behave differently from all the countries of the sample? Imports

Model :	Dep. Variable: Log of Imports		
	(1)	(2)	(3)
	1980-2002	1992-2002	1998-2002
intcpt	-36.496^a	-30.546^a	-39.598^a
	(1.545)	(4.030)	(13.122)
$\ln GDP_{it}$	1.014^a	0.962^a	0.635^c
	(0.043)	(0.111)	(0.355)
$\ln GDP_{jt}$	0.876^a	0.708^a	1.387^a
	(0.044)	(0.111)	(0.356)
Contiguity	-0.087^b	0.035	0.053
	(0.034)	(0.042)	(0.059)
Common Language	0.434^a	0.445^a	0.509^a
	(0.023)	(0.031)	(0.044)
Colony	0.410^a	0.280^a	0.272^a
	(0.040)	(0.051)	(0.072)
Common Colony	0.684^a	0.907^a	0.910^a
	(0.049)	(0.065)	(0.091)
Colony after 1945	0.429^a	0.504^a	0.432^a
	(0.062)	(0.082)	(0.116)
Same Country	0.576^a	0.482^a	0.309^a
	(0.054)	(0.061)	(0.084)
$\ln DIST_{ij}$	-0.960^a	-1.003^a	-0.990^a
	(0.015)	(0.019)	(0.027)
$MENA_j \times \ln RER_{ijt}$	0.296^a	-0.082	0.468^c
	(0.045)	(0.105)	(0.285)
$(1 - MENA_j) \times \ln RER_{ijt}$	0.166^a	0.215^a	-0.199^c
	(0.024)	(0.041)	(0.118)
$MENA_j \times VOL_{ijt}$	0.015	1.363^b	-0.881
	(0.349)	(0.599)	(1.283)
$(1 - MENA_j) \times VOL_{ijt}$	-0.648^a	-0.443^c	0.362
	(0.146)	(0.239)	(0.713)
N	34458	20638	9821
R^2	0.766	0.79	0.805
RMSE	.978	.943	.909

Note: Standard errors in parentheses: ^{a}, ^{b} and ^{c} stand for statistical significance at the 1%, 5% and 10% levels respectively.

Table 6: Heterogeneity of estimates across developing countries of the sample. Exports

Model :	Dep. Variable: Log of Exports		
	(1)	(2)	(3)
	1980-2002	1992-2002	1998-2002
intcpt	-35.798[a]	-34.315[a]	-40.720[a]
	(1.660)	(4.056)	(13.787)
$\ln GDP_{it}$	0.890[a]	0.888[a]	0.516
	(0.044)	(0.112)	(0.357)
$\ln GDP_{jt}$	0.983[a]	0.938[a]	1.518[a]
	(0.043)	(0.111)	(0.355)
Contiguity	-0.078[b]	0.032	0.055
	(0.034)	(0.042)	(0.059)
Common Language	0.438[a]	0.452[a]	0.511[a]
	(0.023)	(0.031)	(0.044)
Colony	0.397[a]	0.273[a]	0.273[a]
	(0.040)	(0.051)	(0.072)
Common Colony	0.698[a]	0.912[a]	0.895[a]
	(0.049)	(0.065)	(0.091)
Colony after 1945	0.440[a]	0.517[a]	0.429[a]
	(0.062)	(0.082)	(0.116)
Same Country	0.580[a]	0.517[a]	0.311[a]
	(0.054)	(0.061)	(0.084)
$\ln DIST_{ij}$	-0.953[a]	-0.997[a]	-0.989[a]
	(0.015)	(0.019)	(0.027)
$\ln RER_{ijt}$	0.599[a]	0.701[a]	0.487[a]
	(0.032)	(0.060)	(0.176)
Vol. NER ($\sigma_{d \ln NER_{ijt}}$)	-0.581[b]	-0.523	0.319
	(0.231)	(0.416)	(1.123)
$MENA_i \times \ln RER_{ijt}$	-0.378[a]	-0.340[a]	-0.299
	(0.055)	(0.120)	(0.332)
$NMS_i \times \ln RER_{ijt}$	-0.152[b]	-0.584[a]	-0.807[a]
	(0.066)	(0.093)	(0.297)
$ASIA_i \times \ln RER_{ijt}$	0.152[a]	0.350[a]	0.194
	(0.048)	(0.095)	(0.276)
$MENA_i \times VOL_{ijt}$	1.142[a]	1.838[b]	-2.831[c]
	(0.408)	(0.718)	(1.623)
$NMS_i \times VOL_{ijt}$	-0.175	0.270	-2.412
	(0.306)	(0.516)	(1.640)
$ASIA_i \times VOL_{ijt}$	-0.272	-0.740	0.128
	(0.394)	(0.623)	(1.395)
N	34457	20636	9821
R^2	0.771	0.795	0.804
RMSE	.976	.943	.91

Note: Standard errors in parentheses: [a], [b] and [c] stand for statistical significance at the 1%, 5% and 10% levels respectively.

Table 7: Heterogeneity of estimates across developing countries of the sample

Model :	Dep. Variable: Log of Imports		
	(1)	(2)	(3)
	1980-2002	1992-2002	1998-2002
intcpt	-37.771[a]	-30.980[a]	-40.539[a]
	(1.559)	(4.048)	(13.120)
$\ln GDP_{it}$	1.026[a]	0.962[a]	0.640[c]
	(0.043)	(0.111)	(0.354)
$\ln GDP_{jt}$	0.915[a]	0.728[a]	1.419[a]
	(0.044)	(0.112)	(0.357)
Contiguity	-0.081[b]	0.037	0.055
	(0.034)	(0.042)	(0.059)
Common Language	0.433[a]	0.444[a]	0.503[a]
	(0.023)	(0.031)	(0.044)
Colony	0.411[a]	0.282[a]	0.272[a]
	(0.040)	(0.051)	(0.072)
Common Colony	0.674[a]	0.903[a]	0.931[a]
	(0.049)	(0.065)	(0.091)
Colony after 1945	0.420[a]	0.487[a]	0.425[a]
	(0.062)	(0.082)	(0.116)
Same Country	0.571[a]	0.486[a]	0.331[a]
	(0.054)	(0.061)	(0.084)
$\ln DIST_{ij}$	-0.957[a]	-1.002[a]	-0.984[a]
	(0.015)	(0.019)	(0.027)
$\ln RER_{ijt}$	0.068[b]	-0.072	-0.382[b]
	(0.032)	(0.061)	(0.176)
$MENA_j \times \ln RER_{ijt}$	0.227[a]	-0.019	0.854[a]
	(0.054)	(0.117)	(0.329)
$NMS_j \times \ln RER_{ijt}$	0.145[b]	0.469[a]	0.073
	(0.067)	(0.093)	(0.298)
$ASIA_j \times \ln RER_ijt$	0.274[a]	0.637[a]	0.690[b]
	(0.049)	(0.095)	(0.276)
NER vol. ($\sigma_{d \ln NER_{ijt}}$)	-1.327[a]	-1.074[b]	-2.610[b]
	(0.231)	(0.417)	(1.121)
$MENA_j \times VOL_{ijt}$	1.315[a]	2.448[a]	1.732
	(0.407)	(0.715)	(1.618)
$NMS_j \times VOL_{ijt}$	1.108[a]	0.807	7.958[a]
	(0.307)	(0.516)	(1.635)
$ASIA_j \times VOL_{ijt}$	1.354[a]	2.192[a]	4.411[a]
	(0.389)	(0.623)	(1.393)
N	34458	20638	9821
R^2	0.766	0.791	0.805
RMSE	.977	.942	.908

Note: Standard errors in parentheses: [a], [b] and [c] stand for statistical significance at the 1%, 5% and 10% levels respectively.

Table 8: Is Intra-Mena trade specific? Exports

	Dep. Variable: Log of Exports	
Model :	(1)	(2)
intcpt	-37.316*	-35.959*
	(1.637)	(1.640)
$\ln GDP_{it}$	0.918*	0.890*
	(0.043)	(0.043)
$\ln GDP_{jt}$	1.013*	0.986*
	(0.043)	(0.043)
Contiguity	-0.079˜	-0.060
	(0.034)	(0.034)
Common Language	0.432*	0.428*
	(0.023)	(0.023)
Colony	0.407*	0.406*
	(0.040)	(0.040)
Common Colony	0.678*	0.682*
	(0.049)	(0.049)
Colony after 1945	0.429*	0.412*
	(0.062)	(0.062)
Same Country	0.572*	0.581*
	(0.054)	(0.054)
$lnDIST_{ij}$	-0.956*	-0.942*
	(0.015)	(0.015)
$\ln RER_{ijt}$	0.623*	0.625*
	(0.023)	(0.023)
$MENA_{ij} \times \ln RER_{ijt}$	-0.368*	-0.375*
	(0.102)	(0.101)
$MENA/UEM \times \ln RER_{ijt}$	-0.538*	
	(0.054)	
NER vol ($\sigma_{d \ln NER_{ijt}}$)	-0.558*	-0.558*
	(0.141)	(0.140)
$MENA_{ij} \times VOL_{ijt}$	0.575	0.450
	(1.095)	(1.094)
$MENA/UEM \times VOL_{ijt}$	-0.248	
	(0.662)	
$MENA_i/UEM_j \times \ln RER_{ijt}$		-1.093*
		(0.076)
$MENA_j/UEM_i \times \ln RER_{ijt}$		-0.018
		(0.075)
$MENA_i/UEM_j \times VOL_{ijt}$		1.542
		(0.961)
$MENA_j/UEM_i \times VOL_{ijt}$		-0.615
		(0.895)
N	34457	34457
R^2	0.771	0.772
RMSE		

Note: Standard errors in parentheses: * , stand for statistical significance at the 1%, 5% and 10% levels respectively.

Table 9: Is Intra-Mena trade specific?

	Dep. Variable: Log of Imports	
Model :	(1)	(2)
intcpt	-36.798*	-35.338*
	(1.535)	(1.537)
$\ln GDP_{it}$	0.985*	0.953*
	(0.043)	(0.043)
$\ln GDP_{jt}$	0.920*	0.888*
	(0.043)	(0.043)
Contiguity	-0.087	-0.065
	(0.034)	(0.034)
Common Language	0.431*	0.427*
	(0.023)	(0.023)
Colony	0.413*	0.411*
	(0.040)	(0.040)
Common Colony	0.682*	0.687*
	(0.049)	(0.049)
Colony after 1945	0.424*	0.404*
	(0.062)	(0.062)
Same Country	0.581*	0.592*
	(0.054)	(0.054)
$\ln DIST_{ij}$	-0.960*	-0.944*
	(0.015)	(0.015)
$\ln RER_{ijt}$	0.255*	0.256*
	(0.023)	(0.023)
$MENA_{ij} \times \ln RER_{ijt}$	0.125	0.130
	(0.102)	(0.102)
$MENA/UEM \times \ln RER_{ijt}$	-0.480*	
	(0.054)	
NER vol. $(\sigma d \ln NER_{ijt})$	-0.524*	-0.525*
	(0.141)	(0.141)
$MENA_{ij} \times VOl_{ijt}$	0.280	0.134
	(1.096)	(1.094)
$MENA/UEM \times VOL_{ijt}$	-0.968	
	(0.663)	
$MENA_i/UEM_j \times \ln RER_ijt$		-1.110*
		(0.076)
$MENA_j/UEM_i \times \ln RER_{ijt}$		0.131
		(0.076)
$MENA_i/UEM_j \times VOL_{ijt}$		0.477
		(0.896)
$MENA_j/UEM_i \times VOL_{ijt}$		-1.059
		(0.961)
N	34458	34458
R^2	0.766	0.767
RMSE		

Note: Standard errors in parentheses: [a], [b] and [c] stand for statistical significance at the 1%, 5% and 10% levels respectively.

Table 10: Data description

variable name	variable label	Source
t	Year	
Xivol	Exports from i to j, constant USD millions, base year in 2000	CHELEM + WB/IMF export-price indexes
Xival	Exports from i to j, value, Nci mns.	CHELEM
Mjvol	Imports of j from i, constant, USD mns, base year in 2000	CHELEM + WB/IMF import-price indexes
Mjval	Imports of j from i, current value, mns.	CHELEM
GDP_i	GDP, PPP (constant 1995 international $) WDI	WB
GDP_j	GDP, PPP (constant 1995 international $), WDI	WB
nertij	Bilateral monthly nominal exchange rate, source IMF, International Financial Statistics, line rf.	IMF, line rf
rer_ppp_ij	PPI deflated bilateral real exchange rate	IMF, line rf and 63 + national sources
rert_cpi_ij	CPI deflated bilateral real exchange rate	IMF, line rf and 64 + national sources
sd_rer	Standard-deviation of monthly real exchange rate in year t	Authors calculations
sd_ner	Standard-deviation of monthly nominal exchange rate in year t	Authors calculations
mean_rer	Mean of monthly real exchange rate in year t	Authors calculations
mean_ner	Mean of monthly nominal exchange rate in year t	Authors calculations
vol_rer	Real exchange rate monthly volatility	Authors calculations
vol_ner	Nominal exchange rate monthly volatility	Authors calculations
sd_growth_rer	Standard deviation of monthly real exchange rate changes in year t	Authors calculations
sd_growth_ner	Standard deviation of monthly nominal exchange rate changes in year t	Authors calculations
dist	simple distance (most populated cities, km)	CEPII online database
distcap	simple distance between capitals (capitals, km)	CEPII online database
distw	weighted distance (pop-wt, km)	CEPII online database
distwces	weighted distance (pop-wt, km) CES distances with theta=-1	CEPII online database
Dummy variables		
ichlnum	Exporter dummy	
jchlnum	Importer dummy	
reg_exp	Exporter's region	
reg_imp	Importer's region	
contig	1 for contiguity	CEPII online database
comlang_off	1 for common official of primary language	CEPII online database
comlang_ethno	1 if a language is spoken by at least 9% of the population in both countries	CEPII online database
colony	1 for pairs ever in colonial relationship	CEPII online database
comcol	1 for common colonizer post 1945	CEPII online database
curcol	1 for pairs currently in colonial relationship	CEPII online database
col45	1 for pairs in colonial relationship post 1945	CEPII online database
smctry	1 if countries were or are the same country	CEPII online database