CO-MOVEMENTS OF BUSINESS CYCLES IN THE MAGHREB: DOES THE TRADE MATTER?*

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FIRST DRAFT

Abstract

Over the past two decades, the Maghreb Countries have initiated a liberalization process characterized by increasing trade flows and they have strengthened economic and financial linkages between their economies.
In this paper, we demonstrate how co-movements of outputs would respond to this integration process. The nature of this relation seems to be important for these countries because the decision to join an economic and monetary union would depend on how the union affects trade and co-movements.
To this end, we estimate a panel model describing the relationship between trade intensity and business cycles correlation during the period 1980-2005. We use three estimation techniques: pooled OLS, fixed vs. random effects as well as 2SLS estimations. Thereafter, we add to this relationship intra-industry trade as a variable describing the similarity of trade structure.
Our results suggest that trade intensity may help to harmonize business cycles in these countries while intra-industry trade causes a reverse effect. Many lessons are thereby learned.

Keywords: business cycles, Trade Intensity, Intra-industry trade, Maghreb.
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INTRODUCTION

The Maghreb Countries (MCs) share many similarities other than geographical proximity. In particular, the five North African countries (Algeria, Libya, Mauritania, Morocco and Tunisia) face similar economic and political challenges arising from threatening poverty, high unemployment and limited integration.

In recent years, the countries of this region have made important strides in the direction of future prosperity. Stability in macroeconomic conditions and some progress in economic reforms have been achieved. In the same frame, trade integration – either at European level or, more recently, at Maghrebian and Arab levels – have been established.

Indeed, the creation of the Arab Maghreb Union (AMU) in 1989 has aimed at coordinating economic policy among the five member states, gradually ensuring free trade among them and strengthening economic and financial linkages across all sectors in the region (Darrat and Pennathur 2002). Moreover, a number of regional initiatives have taken place in order to push trade facilitation and boost intra-regional economic integration. In this vein, the Greater Arab Free Trade Area (GAFTA), established in 1997 has the objectives of progressively removing tariff and non tariff barriers in intra Arab trade (notably in manufactures) and improving efficiency gains. In the same context, many conferences have been held, notably the conference on trade facilitation in Algeria, Morocco and Tunisia that was held in Algiers in November 2005, the Conference on the Role of the Private Sector in Economic Development and Regional Integration in the Maghreb that was held in Tunis in November 2007 as well as the conference on regional cooperation in the Maghreb that was held in Genoa in May 2009.

This progress towards further integration may contribute in the long run to a creation of a common market and a common currency between the countries of this region. [1]

We address here the following question: how would co-movements of outputs respond to this process characterized by increased interest toward developing trade flows between these countries? Our motivation is strengthened by the fact that many empirical works have considered this question for many groups of developed and developing countries but the results have been mixed. Moreover, in our knowledge, very few works have dealt with this issue for the MCs.

The response to the above-mentioned question is important for the MCs because the decision to join an economic and monetary union would depend on how acceleration of trade would reduce co-movements variability. The answer will then offer a vision for them as to whether the integration process will help in the harmonization of the cycles of their economies and if so, whether a decision to remain in the same economic and monetary area in the medium and long run will be reliable.

The rest of the paper is structured as follows: Section one reviews the effect of trade on the synchronization/desynchronization of business cycles in many developed and developing countries. Section two states the empirical methodology. Section three presents the main estimation results. Finally, section four concludes and offers some policy recommendations.

Section 1-The endogeneity hypothesis of Optimum Currency Area (OCA)

OCA theory considers that countries or regions exposed to symmetric shocks or holding mechanisms for the absorption of asymmetric shocks may adopt a common currency. Mundell

[1] It is useful to mention that since 2002, the creation of a single currency and a common central bank for the Maghreb has always been the main concern of the union of Maghreb banks. Moreover, during the Arab banks-summit in Paris last June 2008, the project of monetary integration in the Maghreb was discussed again. In the same frame, the general secretary of AMU is trying to put in place a Maghreb economic community project via a detailed research done in collaboration with the African Development Bank (BAD).

(1961), Mac-Kinnon (1963) and Kenen (1969) were the first to define the criteria that allow a country to belong to the same currency area. Among the key criteria considered is the degree of trade integration among the potential members, as well as the symmetry of their business cycles. Labour mobility, fiscal transfers, financial integration and similarity of inflation rates were also considered. [2]

On the contrary, the endogeneity hypothesis of OCA considers the process of monetary integration as endogenous and does not impose prerequisites. Trade integration and cycle synchronization, however, are not in fact exogenous. The underlying idea is that genuine economic integration between countries strengthens the degree of cyclical correlation and thus the interest to adopt a single currency. The monetary integration process will then create ex-post the conditions of its success.[3]

In the same frame, other works dealing with the endogeneity hypothesis considers that the establishment of a monetary union creates in itself a dynamic process by boosting trade. [4]

Frankel and Rose (1998) were the first to raise the question of endogeneity of OCA criteria by considering the following regression:

$$Corr(i,j)t = \alpha + \beta Trade(i,j)t + \varepsilon(i,j)t \quad \textbf{(1)}$$

Where $Corr(i,j)$ is the degree of correlation of economic activity between countries i and j over period t; $Trade(i,j)$ is the measure of bilateral trade intensity over period t and $\varepsilon(i,j)$ are factors other than trade which influence the correlation degree.

Frankel and Rose's (1998) sample is made up of twenty-one industrialized countries over the period 1959-1993. For these two authors, the size of coefficient β represents the extent to which trade is a source of synchronization or desynchronization of business cycles. Indeed, a negative value of β (β <0) reveals an inter-branch trade and shows that sectoral shocks have asymmetric effects on the economic activity of the country while a positive value (β>0) indicates that trade is intra-branch and has inverse effects. Their results suggest that bilateral trade is mainly intra-industry and that business cycles are positively correlated to trade intensity (β>0).

However, many other works have extended the basic relation of Frankel and Rose (1998) by taking into account many considerations. The main reason is that this basic relation between bilateral trade intensity and similarity of business cycles omits many structural variables that would explain this similarity.

Fidrmuc (2004) tries to re-examine the specification of Frankel and Rose for many OECD countries. He considers that the latter lacks many structural indicators that can explain similarity of business cycles. His new specification is as follows:

$$Corr(i,j)t = \alpha + \beta Trade(i,j)t + \gamma IIT(i,j) + \varepsilon(i,j)t \quad \textbf{(2)}$$

Where $Corr(i,j)$ and $Trade(i,j)$ represents the same parameters as in Frankel and Rose (1998) while $IIT(i,j)$ is the intra-industry trade between the two countries i and j over period t. [5]

The estimation of this equation allows him to conclude that it is the intra-industry trade that helps explains the harmonization of business cycles rather than the inter-industry one.

[2] For a review, see Beine (1998).

[3] This argument is sometimes less reliable when a negative shock is canalized to the other partners via trade intensification. So, the question remains theoretically ambiguous and needs an empirical investigation.

[4] For a survey, see Rose (2004) and De Grauwe & Mongelli (2005)

[5] IIT is constructed following the *Grubel-Llyod index* (see next section for details).

Moreover, by estimating this relation for many Central and Eastern European Countries (CEECs), he finds that the endogeneity hypothesis is verified.
Imbs (2004) tries to estimate for 24 developed and emerging countries a system of simultaneous equations to disentangle the complex interactions between trade, finance, sectoral specialization and business cycle synchronization. His results indicate that the overall effect of trade on business cycle synchronization is strong, but a sizeable portion is found to actually work through intra-industry trade. Estimates of the link between interindustry trade and cycle correlations are smaller in magnitude, and not inconsistent with existing models. Patterns of specialization have a sizeable direct effect on business cycle correlation as two economies with a similar economic structure are significantly more correlated. This is shown to happen mostly because economies grow through evolving stages of diversification.
However, as underlined above, other works have examined the endogeneity hypothesis from another angle. These works have tried to determine the effect of monetary union on trade by resorting to the gravity model.
Rose (2000) tries to test the relationship between monetary union and international trade for 210 developed and developing countries over the period 1960-1996. His specification is as follows:

$$Trade(i,j) = \alpha + \beta MU(i,j) + \delta Z(i,j) + \varepsilon(i,j) \quad \textbf{(3)}$$

Where $Trade(i,j)$ represents the value of bilateral trade between i and j, $MU(i,j)$ is a dummy variable which takes 1 if the two countries belong to the same monetary union and 0 otherwise, $Z(i,j)$ is a vector of control variables (drawn from the gravity model) and $\varepsilon(i,j)$ is a residual term. He finds that bilateral trade between members of a monetary union is three times more important than it is for countries which preserve their own currencies and that this importance is the consequence of a large trade intensity.
Baldwin (2005) presents an analysis which measures the effects of lunching the euro on trade. They find that the creation of the European Monetary Union increases trade from 70% to 112%, while this effect varies from 21% to 108% by considering a sectoral analysis.
For Africa, few works have tested the endogeneity hypothesis. For examples, Nitsch (2002) uses the gravity model to test the effect of the creation of the CFA franc zone (as well as the East Caribbean monetary union) on trade and finds that a monetary union increases trade by almost 55% (while the effect is negligible in the East Caribbean area). Also, Masson and Patillo (2004) apply the same methodology of Glick and Rose (2002) for African Countries and conclude that the effect on trade is the same as found in Rose (2000): a monetary union triples trade. Finally, the same result was also found by Carrère (2004) by resorting to the gravity model in order to examine the effect on bilateral trade of two African monetary unions (ECOWAS and ECCAS).
In this paper, we limit our approach to the first aspect of endogeneity given that the MCs does not share a common currency. In other words, we try to test the effect of increasing trade flows on co-movements of outputs in these countries.

Section 2- Empirical methodology

2.1-Basic objectives:

Our aim here is to test the Frankel and Rose (1998) endogeneity hypothesis for the MCs (equation 1) over the period 1980-2005. As underlined above, this hypothesis indicates the effect of trade intensity on the correlation of business cycles. The extent of this effect depends

on the parameter β. If it is positive, trade intensity increases cycle's synchronization whereas if it is negative, it causes desynchronization.
However, given that this hypothesis has already been extended in many other empirical works, we have enlarged our initial specification by adding the shares of intra-industry trade (IIT) as a variable describing the similarity of trade structure in MCs (equation 2). Basically, similarities in the production and trade structure may affect the nature of the impact of trade integration on cycle correlation, since similar economies are more prone to show a pattern of intra-industry specialization.

2.2-Definition of variables and data:

Our empirical analysis relies, therefore, on measures of three key variables: the correlation of business cycles, bilateral trade intensity and intra-industry trade (see table 1).
The correlation of business cycles in the MCs is computed after detrending the annual real GDP series using both Hodrick-Prescott (HP) and Band Pass (BP) filters. [6] This correlation is calculated by computing the correlation coefficient between the cycles of pair countries.
However, we privileged here a moving correlation[7] by step of five years for detrended bilateral real GDP instead of a static one. [8] Data for real GDP were extracted from "Chelem Database".
As for trade intensity, it is constructed by reporting bilateral trade to the total trade: [9]

$$Trade(i,j) = \frac{(Xij + Mij)}{(Xi + Xj + Mi + Mj)}$$

Where Xij denotes total nominal exports from country i to country j, Mij denotes total nominal imports from country i to country j, Xi denotes total global exports from country i and Mi denotes global imports of country i. We also use a moving average by step of five years for this variable. The data were extracted from the «*Direction of Trade Statistics of IMF*».
Finally, intra-industry trade variable is measured using the nine commodity products[10] defined in "Chelem Database" and is constructed according to *Grubel-Lloyd index* (*GL*): [11]

$$GL = \sum_k \frac{(Xij + Mij) - |Xij - Mij|}{(Xij + Mij)} = 1 - \left[\frac{\sum_k |Xij - Mij|}{\sum_k (Xij + Mij)}\right]$$

Where Xij and Mij denote exports and imports of commodity product k.
It follows that an index of 0 represents a complete specialization in different products for each country; whereas an index of 1 means that all trade is intra-branch (Xij equals Mij).

[6] We apply here the full length asymmetric filter of Christiano-Fitzgerald (2003).
[7] The usefulness of this correlation is twofold: capturing some dynamics in the co-movement and allowing gains of many observations.
[8] Note that other proxies can be used in order to compute the correlation of real activity such as industrial production, total employment and the unemployment rate. Shortness of data for MCs prevent us to use these indicators.
[9] Another measure of trade intensity can also be stated where bilateral trade is normalized by nominal GDP in two countries instead of total trade.
[10] These products are: Building materials, steel industry, textile, mechanics, chemicals, ores, energy, agriculture and food products.
[11] Mauritania is excluded here because of data shortage.

As was the case for cyclical component of real GDP as well as trade intensity, we use here a moving average by step of five years for this variable (IIT) in order to be compatible with our regression framework. The data were extracted from "Chelem Database".

2.3-Estimation techniques:

In our work, we use three estimation techniques to resolve equations 1 and 2. The first one is pooled OLS estimate. This estimation is especially useful when the groups to be pooled are relatively similar or homogenous. This is the case for MCs since -as noted above- these countries share many similarities and face common challenges.

However, there are strong reasons to suppose heterogeneity between pair of countries which can justify the useful of fixed effects estimation technique. For example, the divergence between Algeria and Libya in one part and Morocco, Tunisia and to a lesser extent Mauritania in other parts in terms of economic structure can justify the use of this latter.[12]So, including country pair fixed effects allows us to control for all the time-invariant, country pair-specific variables which may have an impact on output correlation.

Finally, we resort to 2OLS technique to estimate our equations. Generally, recourse to this technique is explained by the fact that the OLS may be out of place, since the commercial intensity may be the result of a monetary union.

To handle this problem of endogeneity bias, Frankel and Rose (1998) have used the instrumental variable technique by drawing from the gravity model of trade.

According to the literature, bilateral trade intensity between countries i and j is instrumented by many variables: distance, remoteness, output, population, border, geographical region, language, colony, main trading partner and regional free trade agreement...

In general, we find that countries that share a common border, that are closer in distance and have trading partners that are farther away from the rest of the world, are members of the same region, speak the same language, have the same colonial origin and the same common main trading partner, higher population and engage in regional free trade agreement, trade more intensively (Calderón et al 2007).

In our work, we use the following three instruments to overtake the endogeneity bias and so to get consistent estimation: log of GDP difference in absolute value, log of the distance between capitals and a dummy variable that takes 1 when countries have frontiers and 0 otherwise (see table 1). Each of these variables is expected to be correlated with trade intensity, but can reasonably be expected to be unaffected by other conditions which affect the correlation of business cycles.

Section 3- Estimation results

Before stating our results, we should present some descriptive statistics for the key variables. Table 2 summarizes these statistics. From this latter, we note too much variability for the dependent variables than the explanatory ones. In fact, for example, bilateral GDP correlation has variability with the range between -0.93 to 0.99 using HP filter and -0.96 to 0.96 using the BP one while bilateral intra-industry trade has variability between 0.001 and 0.5. As for bilateral trade intensity, the variability is small.

[12] Note that the results coming from the first two estimation techniques should be considered with cautious since there is an endogeneity bias which will control it by using 2OLS.

3.1-Trade intensity and correlation of business cycles:

Table A summarizes the effect of trade intensity on the correlation of business cycles (equation 1).

Table A: Trade intensity and correlation of business cycles in MCs

	Pooled regression		Panel regression				2OLS regression	
Filter	**HP**	**BP**	**HP**	**BP**	**HP**	**BP**	**HP**	**BP**
			Fixed effects		Random effects			
Intercept	**-0.089 (-2.18)****	**-0.07 (-1.66)***	**-0.106 (-2.16)****	**-0.100 (- 2.11)*****	**-0.09 (-1.5)***	**-0.09 (-1.04)**	**-0.172 (-2.05)*****	**-0.183 (-2.01)*****
Trade Intensity	**15.384 (1.77)***	**19.551 (2.17)*****	**21.621 (1.59)***	**30.703 (2.32)*****	**18.257 (1.65)***	**27.214 (2.29)*****	**46.209 (1.76)***	**61.118 (2.13)*****
Number of Obs	**220**	**220**	**220**	**220**	**220**	**220**	**220**	**220**
R-squared	**0.014**	**0.021**	**0.012**	**0.025**	**0.043**	**0.02**	**0.014**	**0.029**
Fisher/Wald[a]	**3.12***	**4.71****	**2.75***	**5.36****	**2.72***	**5.24****	**3.11****	**4.54****
Hausman test[b]					**0.669**	**0.552**		

*T-statistics are in parentheses, ***, ** and * are respectively the 1%, 5% and 10% significance level.*
[a] Wald statistics are reported only for random effects model.
[b]Hausman test statistics correspond to P-values.

It shows that our coefficient of interest β is positive, thus suggesting that higher bilateral trade intensity generates more synchronized business cycles. Such results are robust to changes in the de-trending technique used to compute the cyclical fluctuations of output.
Indeed, an increase of one standard deviation in bilateral trade intensity raises the output correlation from 0.05 to 0.08 using the HP filter and from 0.07 to 0.2 using the BP filter. [13] Probably, the progress of these countries toward trade liberalization and the signing of many bilateral agreements may explain the role of increasing trade on the synchronization of business cycles. Moreover, high trade intensity with European partners seems to be a catalyst for the convergence process of these countries (see table 3).
However, the magnitude of the effect in the MCs is small in comparison with the result found in existing literature. In fact, Frankel and Rose (1998) found that an increase in bilateral trade intensity by one standard deviation leads to an increase in business cycle correlation from 0.22 to 0.35. This result can be explained by two facts: the patterns of specialization and the absence of other explaining variables.
For Calderón et al (2007), given the observed patterns of specialization in the world economy, we expect a positive correlation between trade integration and business cycle correlations among industrial countries, and a more ambiguous relationship (i.e., positive and smaller than among industrial countries, and in some cases negative) among industrial-developing country pairs and among developing countries. The main explanation is related to the fact that intra-industry trade prevails in industrial countries while inter-industry trade is dominant in developing ones. In MCs, Algeria and Libya are net oil-exporters whereas Tunisia, Mauritania and Morocco are net oil-importers. Moreover, the formers, like many other resource-abundant countries, have a very small share of non oil-exports while the latters exhibit greater trade openness but have been import biased. Non-oil exports have been increasingly falling short of imports, implying increasing trade balance deficits (World Bank 2006).

[13] The final correlation reported in this paper is equal to the product of one standard deviation of trade intensity (or intra-industry trade in table B) and its coefficient estimate.

On the other hand, as we have already pointed out, inter-industry trade is not itself sufficient to explain the dynamic correlation of business cycles between two or a group of countries (notably MCs) and it imposes the recognition of other structural variables. [14] A decomposition of trade into inter-industry and intra-industry would be valuable. [15]

3.2-Trade intensity, intra-industry trade and correlation of business cycles:

Table B states the effect of trade intensity on the correlation of business cycles after controlling the intra-industry trade variable (equation 2).

Table B: Trade intensity, intra-industry trade and correlation of business cycles in MCs

	Pooled regression		Panel regression				2OLS regression	
Filter	**HP**	**BP**	**HP**	**BP**	**HP**	**BP**	**HP**	**BP**
			Fixed effects		Random effects			
Intercept	**0.166 (2.11)****	**0.245 (3.03)*****	**-0.017 (-0.14)**	**0.083 (0.70)**	**0.147 (1.69)****	**0.127 (0.89)**	**0.228 (2.19)*****	**0.412 (3.65)*****
Trade Intensity	**7.623 (0.84)**	**6.859 (1.74)***	**20.641 (1.63)****	**29.632 (2.48)*****	**9.417 (0.98)**	**24.513 (2.18)*****	**-6.658 (-0.45)**	**31.244 (1.84)****
Intra-Industry Trade	**-0.876 (-3.3)*****	**-0.933 (-3.42)*****	**-0.265 (-0.54)**	**-0.625 (-1.35)**	**-0.823 (-2.82)*****	**-0.731 (-1.81)****	**-0.884 (-3.23)*****	**-0.957 (-3.58)*****
Number of Obs	**132**	**132**	**132**	**132**	**132**	**132**	**132**	**132**
R-squared	**0.083**	**0.087**	**0.024**	**0.063**	**0.66**	**0.09**	**0.065**	**0.009**
Fisher/Wald	**5.85*****	**6.19*****	**2.54***	**4.21****	**9.08*****	**8.43****	**5.22*****	**7.20*****
Hausman test					**0.168**	**0.419**		

*T-statistics are in parentheses, ***, ** and * are respectively the 1%, 5% and 10% significance level.*
[a] Wald statistics are reported only for random effects model.
[b]Hausman test statistics correspond to P-values

It shows that trade intensity is much less significant compared to the results found in table A[16] while intra-industry trade is significant but with opposite sign. This indicates that trade intensity has a much lesser effect on the correlation of business cycles, even if the regression is instrumented by other variables, while there is a negative interaction between intra-industry trade and correlation of business cycles in MCs.
Indeed, an increase of one standard deviation in bilateral trade intensity generates an increase in the output correlation from 0.02 to 0.1 using the BP filter. [17] By contrast, an increase of one standard deviation in bilateral intra-industry trade causes a decrease of the output correlation from 0.12 to 0.13 using HP filter and from 0.1 to 0.14 using the BP filter.
Two main explanations can enlighten these results: the nature of intra-industry trade itself and the trade patterns in MCs.
Basically, intra-industry trade consists of horizontal (different varieties of product that have the same quality) and vertical intra-industry trade (different varieties of product that have different qualities), with each type potentially having opposite effects on business cycle co-

[14] Existing literature has identified many variables such as currency union, industrial structure, financial integration, factor endowments, and similarity of domestic policies…
[15] This is strengthened by the fact that the level of significance of β is low and pushes us to interpret the resut with a great deal of caution.
[16] This result is similar to Imbs (1999) where the inclusion of additional variables lowers the effect of trade integration on the correlation of business cycles.
[17] The use of HP filter provides non-significant results.

movement. Horizontal intra-industry trade covers goods that are at the same stage of processing within an industry. These horizontal goods look like varieties, and are more substitutable to each other. The high substitutability among varieties implies that a demand or supply shock could result in less correlated business cycles between countries. In fact, a positive supply shock in a home country will induce greater demands for its goods and less demand for foreign goods (because of high substitutability among horizontal goods). This will lead to increased production in the home country and less production in foreign country, resulting in less correlated business cycles. On the other hand, vertical intra-industry trade covers goods that are at different stages of processing within an industry. These vertical goods are complements to each other in the production stages within an industry. High complementarities among vertical goods imply that a demand or supply shock could result in more correlated business cycles across countries through similar demand- and supply-side spillovers.

It follows that intra-industry trade in MCs consists especially of trading a varieties of products. In fact, most of the traded (intra-industry) goods are substitutes and not complements. The development of this horizontal intra-industry trade (as opposed to vertical intra-industry trade) can be explained by the fact that main merchandise exports in MCs are labor-intensive. Moreover, a weakness in spending in Research and Development and the lack of workforce qualifications seems to explain this fact.

As a result, the development of horizontal intra-industry trade can generate a specialization of the producing companies searching for economies of scale and prevents in turn the diversity of production (Fontagné and Freudenberg 1999). In that case, business cycle correlations can be hampered.

On the other hand, the low (high) openness of each country vis-à-vis the other maghrebian partners (European partners) as well as the low (high) shares of intra-industry trade in bilateral relations seems to decrease (increase) the harmonization of business cycles in these countries (compared with Europe). Incidentally, *Grubel-Lloyd index* has been low and sometimes near 0 (except for the pair Morocco-Tunisia), showing a quasi complete specialization and a weakness in intra-industry trade (see table 4). So, asymmetries in economic and trade structure as well as dissimilarity of shocks across these countries can explain this result.

Basically, countries tend to respond similarly (differently) to productivity shocks or shocks to the composition of import demand from other countries if they have similar (different) structures of production, and therefore, they tend to exhibit higher (lower) cyclical output correlation. This is not the case for MCs since in Algeria and Libya, economic growth and exports depend heavily on the hydrocarbon sector while in Morocco and Tunisia it depends heavily on foodstuffs, semi-finished products and consumer goods.

It follows that further commercial ties can then probably results in countries becoming more specialized in trading a category of product such as energy in Algeria and Libya, textile, agriculture and food products in Morocco and chemicals and mechanics in Tunisia. Such specialization can render these countries more sensitive to specific shocks and not help to harmonize business cycles in this region.

Section 4- Conclusion and some policy implications

This paper tries to examine the effect of current economic integration process on the correlation of business cycles in MCs. For that purpose, we test the Frankel and Rose (1998) endogeneity hypothesis of OCA which shows the effect of trade intensity on the co-movement of business cycles.

Our results suggest that trade intensity has positive effects on business cycles harmonization in these countries. This increase in co-movements could translate the increasing role of trade relations between them during the latest years.

However, by extending this relation to intra-industry trade, we find a negative relationship between this variable and the correlation of business cycles while trade intensity becomes of less magnitude and sometimes insignificant.

This result supports the view that integration process is likely to encourage specialization of participating countries and then the desynchronization of their business cycles. It also shows that trade links alone do not ensure the convergence of business cycles if countries are not similar.

So, unlike Frankel and Rose (1998), there are reasons to believe that the effect of trade on the correlation of business cycles could be different among MCs. In fact, patterns of trade among these countries are quite different than those among industrial countries suggesting that, in these cases, the impact of trade intensity on cycle correlation should be weaker or even negative.

Based on these results, we consider that anchoring the currency of these Countries to the euro will be more useful than adopting a common currency. An important share of maghrebian trade is done with the European Union and such a regime can offer better allocation of resources and amplify convergence of these countries.

By the same token, many other steps towards successful economic and monetary integration process in the long run are worth making. In fact, further liberalization of trade and adoption of complementary economic policies such as liberalization of trade in services, increasing trade facilitation initiatives and reinforcement of business climate will improve trade diversification and increase the harmonization process in this region.

In the same frame, improving coordination of financial, monetary and exchange rate policies will reduce uncertainty and improve efficiency gains and resources allocation.

Finally, turning away political conflicts and further considering the economic benefits of the integration process will be very useful for these countries, notably in terms of improving convergence.

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Table 1: Data definitions and sources

Variables	Definitions	Sources
$\mathbf{Corr(i,j)t}$	Bilateral GDP correlation. Two filters are used for de-trending GDP: HP filter and Band-Pass filter.	Chelem Database
$\mathbf{Trade(i,j)t}$	Moving average of the quotient bilateral trade /total trade	Direction of Trade Statistics of IMF
$\mathbf{Intra-Industry\ Trade(i,j)t}$	Moving average of the Grubel-Lloyd index	Chelem Database
Instrumental variables		
GDP difference	Log of GDP difference in absolute value	Chelem Database
Distance	Log of the distance between capitals	CEPII Database
Border	Dummy variable: 1 if a pair of countries share a common border; 0 otherwise.	

Table 2: Descriptive statistics for key variables

Key variables	Mean	Standard deviation	Minimum	Maximum
Bilateral GDP (HP filtered) correlation	**-0,04733572**	**0,4985117**	**-0,93751551**	**0,99545716**
Bilateral GDP (BP filtered) correlation	**-0,01718081**	**0,51724482**	**-0,96619279**	**0,96802643**
Bilateral trade intensity	**0,00262757**	**0,00384674**	**0**	**0,02108691**
Bilateral intra-industry trade	**0,21008481**	**0,14718807**	**0,00166399**	**0,50474909**

Table 3: Overview of trade orientation in MCs (1980-2004)

	Export share (%)					Import share (%)				
	80-84	**85-89**	**90-94**	**95-99**	**2000-04**	**80-84**	**85-89**	**90-94**	**95-99**	**2000-04**
Africa	**0.4**	**0.18**	**0.05**	**0.01**	**0.00**	**0.08**	**0.21**	**0.19**	**0.06**	**0.00**
Asia	**0.14**	**0.09**	**0.04**	**0.00**	**0.00**	**0.07**	**0.24**	**0.12**	**0.02**	**0.00**
EU	**62.4**	**71.99**	**72.61**	**68.36**	**69.1**	**64.7**	**64.91**	**64.34**	**62.55**	**63.59**
EE, USRR	**0.17**	**0.24**	**0.07**	**0.06**	**0.34**	**1.15**	**0.88**	**0.39**	**0.13**	**0.08**
MENA	**1.42**	**3.12**	**5.28**	**4.23**	**3.43**	**5.52**	**4.47**	**6.51**	**5.33**	**6.28**
Maghreb	**0.44**	**1.48**	**2.35**	**1.57**	**1.21**	**0.51**	**1.42**	**2.15**	**1.24**	**1.38**
USA	**23.35**	**11.54**	**10.27**	**8.92**	**11.31**	**7.27**	**8.15**	**8.76**	**7.06**	**5.41**
Others	**12.12**	**12.83**	**11.68**	**18.4**	**15.83**	**21.19**	**21.15**	**19.69**	**24.86**	**24.64**

Source: World Bank (2006)

Table 4: *Grubel-Lloyd index* (*GL*) average in MCs (1980-2006)

	Algeria	Libya	Morocco	Tunisia
Algeria	**-**	**0.21**	**0.09**	**0.14**
Libya	**0.21**	**-**	**0.09**	**0.22**
Morocco	**0.09**	**0.09**	**-**	**0.37**
Tunisia	**0.14**	**0.22**	**0.37**	**-**

Source: Chelem, authors' calculation