



THE EFFECT OF TRADE, SPECIALIZATION AND FINANCIAL INTEGRATION ON BUSINESS CYCLES SYNCHRONIZATION IN SOME MEDITERRANEAN COUNTRIES

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ABSTRACT

The aim of this paper is to study if bilateral trade, similarity of specialization and capital flows between some Mediterranean countries (Egypt, Morocco, Tunisia and Turkey) and their main European partners (Germany, France and Italy) have an impact on Business cycles synchronization. Using the system Generalized Method of Moments (GMM) for dynamic panel over the period of 1980 to 2010, the study found a positive relationship between bilateral trade and similarity of specialization on one hand and business cycle correlation on the other hand. However, financial flows remain without significant effect on business cycle synchronization.

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Contribution/ Originality

The paper contributes the first logical analysis of the effect of commercial and financial flows and specialization on the business cycles synchronization between some Mediterranean countries and the principal European Union countries.

1. INTRODUCTION

For theoretical perspective the relationship between closer trade links and business cycle synchronization is ambiguous. On the one hand, closer linkages trade may lead to specialization in production, which can increase the structural differences between economies and industry-specific

shocks in one economy, would be less likely to affect economies partners, and thus increase the asynchronous business cycles (Krugman, 1993); (Kose and Yi, 2002).

On the other hand, Frankel and Rose (1998) argue that countries that trade more with each other tend to have their business cycles more synchronized. The authors argue that more trade should lead to stronger spill-over of demand shocks from one country to another, thereby increasing synchronization – as one economy is experiencing a period of recession on its import demand addressed to her trading partners fall and thus leading to reduce production of the latter. They add that the argument of specialization is only relevant when it is an inter-industry trade, it should play a marginal role in the case of intra-industry trade. So, given the difference in trade structures, the ambiguity of the synchronization effect may be stronger in developing countries and for industrial-developing country pairs than just for industrial countries (Calderón *et al.*, 2007).

Given the ambiguity of the economic theory on the link between trade and business cycle synchronization, a large empirical study has been developed to analyze the effect of trade linkages on business cycle synchronization. Over all, those studies tend to provide evidence of a positive effect of economic integration on business cycle synchronization, especially for advanced economies. Clark and Van Wincoop (2001) find that States within the United States (US) are much more closely synchronized than countries within Europe. According to the authors, this result is due to the profound integration between US regions than the one between European countries. For emerging and developing economies, the evidence of the positive effect of integration on business cycle synchronization is not very important (Calderón *et al.*, 2007).

Choe (2001) and Shin and Wang (2003), get a positive relationship between trade linkages and synchronization for the Asian region. And the major channel through which the business cycles are correlated is the relatively high share of intra-industry trade within the region. This result has been confirmed by Rana (2007) and Shin and Sohn (2006).

However, and while the above papers suggest that trade, particularly the important share of intra-industry, is an important determinant of business cycle synchronization, some authors have suggested that this effect is quite small if other determinants of synchronization are properly controlled. In this regards, Imbs (2000) states that the structural similarity is an important determinant of business cycle synchronization. Using sectoral employment shares as a measure of structural similarity, Imbs showed that this latter explains much more of the cross country synchronization than trade.

In this line, (Crosby, 2003) shows that trade does not appear as a determining factor of a high correlation between economic cycles, and that structural similarity between countries influences positively business cycle synchronization. In the same way, (Kumakura, 2006) demonstrates that similarities in the production structure are a much more important explanatory variable for bilateral growth synchronization than bilateral trade links.

Moreover, (Moneta and Ruffer, 2009) argue that a number of common external factors like oil and commodity price movements and changes in the USD/JPY exchange rate, have a significant role in explaining the synchronization of Asian activity. Also, (Inklaar *et al.*, 2005) provide

evidence that specialization, similar monetary and fiscal policies have at least as strong effect on the business cycle synchronization of OCDE economies as trade intensity.

Thus, according to these above studies, it appears that trade is able to explain only a small part of the variability in business cycle correlation.

Like the effect of trade linkages on business cycle correlation, the financial integration is ambiguous. It has not been conclusively identified in the literature. Theoretical models predict that financial integration increase sector specialization which implies a negative impact on the synchronization of business cycles. By contrast, [Imbs \(2004\)](#) finds a positive correlation of financial integration and business cycles which relates to an increased transmission of supply shocks between financial integrated economies.

In addition, on the one hand, if financial integration increases, consumers can lend and borrow to cushion against adverse domestic shocks and volatility of consumption would decrease. On the other hand, the increase of foreign capital flow due to financial integration increases the potential that the domestic financial market distortions get magnified. Therefore, volatility of output and investment would increase.

Although there are a number of papers that examine the effect of trade, financial integration, specialization on business cycle synchronization among OECD economies, East Asian and Pacific-Asian economies, there is no paper that explores this issue for Mediterranean economies. The present paper investigates this issue taking into account the economy of Egypt, Morocco, Tunisia and Turkey and that of France, Germany and Italy.

The rest of the paper is structured as follows. Section 2 outlines the modeling approach. Section 3 presents the measures of business cycle correlation, bilateral trade, specialization and financial integration. Section 4 reports our principal results. Finally, in section 5, we summarize the principal conclusions and recommendations.

2. METHODOLOGY

To study the degree of business cycle synchronization, different methods have been used. However, the most basic approach is the correlation analysis which has been adopted by a wide number of studies (e.g. [Baxter and Stockman \(1989\)](#); [Backus et al. \(1992\)](#); [Bordo and Helbling \(2003\)](#); [Crosby \(2003\)](#); [Grace and Azali \(2010\)](#); [Fidrmuc et al. \(2012\)](#)). The dependent variable in the regression model is the bilateral correlation between de-trended real GDP¹. Hence, we investigate the following equation:

$$Y_{ij,t} = \alpha_0 + \alpha_1 T_{ij,t} + \alpha_2 S_{ij,t} + \alpha_3 FI_{ij,t} + \varepsilon_{ij,t} \quad (1)$$

i: Egypt, Morocco, Tunisia, Turkey

j: France, Germany, Italy

$Y_{ij,t}$: denotes bilateral business cycle correlation between countries i and j, de-trended with Hodrick-Prescott and Baxter and King filters.

¹We used Hodrick-Prescott and Baxter and King filters.

$T_{ij,t}$: denotes the bilateral trade intensity between countries i and j , using trade intensity concept (corresponding to total bilateral trade normalized by GDP or a measures based on [Deardoff \(1998\)](#)).

$S_{ij,t}$: a specialization index capturing how different the sectorial allocations of resources are between countries i and j .

$F_{ij,t}$: a measure of financial integration for each country pairs.

For Eq. (1) we assume that ε_{it} follows a one-way error component model.

$$\varepsilon_{it} = \eta_i + \upsilon_{it}$$

Where $\eta_i \sim \text{i.i.d. } (0, \sigma_\eta^2)$ and $\upsilon_{it} \sim \text{i.i.d. } (0, \sigma_\eta^2)$, independent of each other and among themselves.

The proposed linear regression Eq. (1) poses some challenges for estimations as heteroscedasticity, autocorrelation and endogeneity problems [Grace and Azali \(2010\)](#). To control these problems, we use the Generalized Method of Moment (GMM) estimators suggested by [Arellano and Bond \(1991\)](#). However, the presence of random walks in the series will cause the breakdown of the conventional GMM estimators ([Binder et al., 2005](#)). Thus, before estimate Eq. (1) we check if variables have a unit root. For this we use: (i) [Levin et al. \(2002\)](#), (ii) [Im, Pesaran, Shin](#) and (iii) [Hadri \(2000\)](#) tests.

3. THE MEASUREMENT

Bilateral correlation in business cycles is computed on the basis of the cyclical component of real GDP². Thus, real GDP of each country is transformed to the natural logarithm, after it is de-trended. Two methods are used to de-trended the real GDP: the [Hodrick and Prescott \(1997\)](#) and [Baxter and King \(1999\)](#) filters.

In addition, we use two measures of trade intensity. The first one denoted T^1 used by [Frankel and Rose \(1997\)](#), [Frankel and Rose \(1998\)](#), [Clark and Van Wincoop \(2001\)](#), and [Imbs \(2004\)](#). It is defined as the average ratio of exports and imports, X and M , respectively, related to output, Y :

$$T_{ij}^1 = \frac{1}{T} \sum_{t=1}^T \frac{X_{ij,t} + M_{ij,t}}{Y_{i,t} + Y_{j,t}} \quad (2)$$

Where $X_{ij,t}$ denotes total nominal exports from country i to j over period T . $M_{ij,t}$ represents imports to j from i . And $Y_{i,t}$ denotes the level of nominal GDP in country i at period t . The second measure employed by [Clark and Van Wincoop \(2001\)](#) and [Imbs \(2004\)](#) among other, is suggested by gravity models, having advantage that is independent of country size. This measure is defined as follows:

$$T_{i,j}^2 = \frac{1}{2} \frac{1}{T} \sum_{t=1}^T \frac{X_{i,j,t} + M_{i,j,t}}{Y_{i,t} \times Y_{j,t}} (Y_t^w) \quad (3)$$

²Most of the researchers use the real GDP as a measure of real economic activity, an index of industrial production, total employment, and the unemployment rate sometimes used as measures of real economic activity. In this paper we use the real GDP for two reasons. Firstly, data restriction constrains us to employ only the real GDP. Secondly, GDP is the most comprehensive measure of economic activity.

Where Y_t^W is world GDP over period T. We take the natural logarithm of T^1 and T^2 .

As measure of similarity in industry specialization, we use the index employed by Imbs (2004) and Inklaar *et al.* (2005), defined as follow:

$$S_{i,j} = \frac{1}{T} \sum_t \sum_k |S_{ki} - S_{kj}| \quad (4)$$

Where S_{ki} and S_{kj} denote the GDP shares for industry k in countries i and j. This index computes the average deviation of industrial shares for countries i and j. $S_{i,j}$ is equal zero, if countries i and j have the same industrial structures. $S_{i,j}$ is measured in natural logarithm in practice.

To measure the financial integration, there are few methods. However, due to data restriction, we use the following equation defined by Abbott *et al.* (2008) as:

$$FI_{ij,t} = \ln \left[\frac{1}{T} \sum_{t=1}^T \left(\frac{FDI_{Inward,ijt} + FDI_{Outward,ijt}}{FDI_{Inward,jt} + FDI_{Outward,it} + FDI_{Inward,jt} + FDI_{Outward,jt}} \right) \right] \quad (5)$$

Where $FDI_{Inward,ijt}$, it is a bilateral foreign direct investment inward position data from a country i to country j and $FDI_{Outward,ijt}$ is FDI outward position data from country i to country j. $FDI_{Inward,it}$ ($FDI_{Outward,it}$) and $FDI_{Inward,jt}$ ($FDI_{Outward,jt}$) are total FDI inward (outward) position for country i and j, respectively. All these data are denoted by US dollars and come from OECD International Direct Investment Statistics.

For each Mediterranean country (Egypt, Morocco, Tunisia and Turkey), we compute bilateral correlations for the cyclical components of real activity (real GDP) with one European country (France, Germany and Italy). These correlations are estimated over the period 1980 - 2008. We follow the standard procedure of splitting our sample into six parts: 1980 – 1984; 1985 – 1989; 1990 -1994; 1995 – 1999; 2000 – 2004; 2005 – 2008.

The bilateral trade data are from the CHELEM database (2012). We use data on real GDP and gross value added classified into 7 broad categories (ISIC one digit) from United Nation's National Account Main Aggregates Database to compare the difference in the sector composition of GDP between one Mediterranean economy and a European one. The 7 broad industries are agriculture, mining, manufacturing, construction, wholesale, transport and other activities. Output is measured by the log-difference of real GDP.

4. ESTIMATION AND RESULTS

We present in this section the empirical results and discuss the effect of trade, specialization and financial integration on business cycle synchronization. First, we test the presence of random walks by using the panel unit root tests. Then we report the system GMM estimation.

4.1. Panel Unit Root Tests

The first column of table 1 reports the results of LLC test. The last one indicates that all variables are stationary at level. The Hadri test (column 2) could not be rejected the null hypothesis for series S and F. In spite of these results, we can consider that all variables are I (0).

Table-1. Panel Unit Root Tests

Variable		Level		
		LLC	IPS	Hadri
GDP (detrended by Hodrick-Prescott (HP) filter)	Intercept	-5.605*** (0.000)	-5.404*** (0.000)	-0.097 (0.538)
	Intercept and trend	-3.4*** (0.000)	-3.363*** (0.000)	2.131** (0.016)
Y (detrended by Baxter and King filter)	Intercept	-5.879*** (0.000)	-6.205*** (0.000)	1.011 (0.155)
	Intercept and trend	-4.664*** (0.000)	-4.599*** (0.000)	7.372*** (0.000)
Trade intensity (T ¹)	Intercept	-1.483* (0.069)	-1.848** (0.032)	0.024 (0.490)
	Intercept and trend	-0.680 (0.248)	-1.344* (0.089)	2.460*** (0.006)
Trade intensity (T ²)	Intercept	-1.866** (0.031)	-1.902** (0.028)	-0.010 (0.504)
	Intercept and trend	-1.806** (0.035)	-2.332*** (0.009)	2.388*** (0.008)
Specialization index (S)	Intercept	-1.928** (0.026)	-2.003** (0.022)	3.139*** (0.000)
	Intercept and trend	-1.559* (0.059)	-1.387* (0.082)	1.730** (0.041)
Financial Integration (FI)	Intercept	-2.641*** (0.004)	-1.300* (0.096)	2.721*** (0.003)
	Intercept and trend	-2.186** (0.014)	-0.115 (0.454)	1.317* (0.093)

Panel unit root test are based on (Levin *et al.*, 2002) and (Hadri, 2000). The null hypothesis of LLC is the presence of unit root, while that of Hadri is no unit root. Figure in parentheses () indicate p-values. Asterisks ***, **, * indicate significance at 1%, 5% and 10% levels, respectively. The bandwidth selected for all series under the LLC is one (using Bartlett kernel). The bandwidth selection under the Hadri test is using quadratic spectral kernel.

4.2. System GMM Estimation

This study employs the system GMM estimation to analyze the effect of trade, sectoral specialization and financial integration for business cycle synchronization between some Mediterranean countries and their principal European partners.

Table 2 reports the results of the system GMM estimated of Eq.(1) corresponding to different de-trended methods of real GDP and different measures of bilateral trade. We report two sets of estimation. The first one (model 1) corresponds to the results where real GDP has been de-trended by HP filter. The second one (model 2) presents results where real GDP has been de-trended by BP filter.

The sign of the trade coefficient α_1 in Eq. (1) is estimated to be positive and statistically significant for both models and trade measures . The size of the coefficient is 0.645 in model (1a) where bilateral trade has been normalized by GDP, and 0.652 in model (1b) where we have

considered Deardoff's trade measure. The size of α_1 is larger and more significant in model 2. It is equal to 0.837 where trade has been normalized by GDP (model 2a) and 0.871 if Deardoff's trade measure has been adopted (model 2b).

These estimations signify that an increased bilateral trade increases the business cycle synchronization. The sign of α_1 is robust to different methods of calculating trade intensity and detrending real GDP. This result confirms the ones of Frankel and Rose (1998), Gruben *et al.* (2002), Inklaar *et al.* (2005) and Grace and Azali (2010), with a difference in the size of the effect which may be explained by the nature of the sample. Indeed, we investigate the business cycle synchronization between some developed countries and other developing countries.

About specialization similarity results suggest that it has a positive effect on business cycle synchronization (model 2). This result is consistent with findings of Inklaar *et al.* (2005) who find that the industry similarity has a positive effect on the business cycle synchronization.

Finally, financial integration does not seem to have a significant effect on business cycle synchronization. This phenomenon can be explained by the absence of technology transfer derived from foreign direct investment.

Table-2. System GMM estimation

	Model 1		Model 2	
	GDP de-trended by HP		GDP de-trended by BP	
	Model 1a	Model 1b	Model 2a	Model 2b
	<i>Trade normalized by GDP</i>	<i>Deardorff's trade measure</i>	<i>Trade normalized by GDP</i>	<i>Deardorff's trade measure</i>
Trade	0.645** (0.023)	0.652** (0.048)	0.837*** (0.001)	0.871*** (0.003)
Specialization	0.964 (0.11)	0.951 (0.134)	0.965* (0.079)	0.972* (0.091)
Financial integration	0.061 (0.65)	0.066 (0.484)	0.109 (0.195)	0.115 (0.177)

The number in parenthesis is the standard error of the estimate. ***, **, * denotes the level of significance 1%, 5% and 10%, respectively.

5. CONCLUSIONS AND RECOMMENDATIONS

The aim of this paper was to explain the effect of trade, specialization and financial integration on the business cycle synchronization between a group of Mediterranean countries composed by (Egypt, Morocco, Tunisia and Turkey) and a second one composed by their more important European partners (France, Germany and Italy) during the period 1980 - 2010.

To conduct this research successfully this paper employed GMM system approach for two different methods of de-trended real GDP and two different measures of bilateral trade. The overall effect of trade and industry similarity on business cycle synchronization is found to be positive implying that increased trade and industry similarity leads to more synchronization in the business cycle.

The variable that measures financial integration is not affecting the business cycle synchronization which implies that Mediterranean countries are not sufficiently integrated.

Our recommendation is that efforts should be made to increase the financial integration between the two groups of countries thus leading to more business cycle synchronization.

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