

**BUSINESS CYCLE SYNCHRONIZATION IN THE ARAB REGION: RECYCLING PETRODOLLARS IN  
THROUGH TRADE, FINANCE AND REMITTANCES\***

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**Abstract**

This paper contributes to the literature on the determinants of Business Cycle Synchronization with the aim of assessing the impact of several channels (trade, finance and remittances) on international business cycle co-movements. Using a novel methodology, suggested by Imbs (2004) that allows the simultaneous incorporation of bilateral trade, financial flows and cross-country differences in production structures and therefore captures the different interactions, we examine the determinants of business cycles in the MENA region. Our preliminary findings show that while trade integration does not affect BCS in the MENA countries given the low level of bilateral trade among them, similarity between two countries exerts a positive and significant impact on the correlation between the cyclical components of the countries' GDP. Finally, remittances have a negative and significant impact on the correlation of the business cycle between different economies.

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## 1. Introduction

Within the Arab region, the growth of both commodity-exporters and importers seems to be connected and dependent on the oil cycle, suggesting that *economic links* between these two groups could lead to more synchronized business cycles. What are these links and are they significant determinants of BSC in the Arab world?

Theoretically, there is a long-standing interest in understanding the drivers of business cycle synchronization (BSC). The literature has proposed different channels which were empirically evaluated with mixed results. Early on, conventional linkages like trade and finance were identified as major drivers of BSC. In addition, they both interacted with specialization of production structures to determine whether they made business cycles become more or less synchronous. Theory suggests they could have both positive and negative effects. First, bilateral trade was put forward as the foremost candidate expected to influence business cycle synchronization. On the one hand, it could increase business cycle correlations to the extent that investment and consumption booms in one country spill over to others through trade. On the other hand, if trade triggers increased inter-industry specialization among countries (a la Ricardo and/or Heckscher-Ohlin), then industrial structures of trading economies will diverge and will become prone to industry-specific shocks, leading the co-movement in business cycle to decouple (Kose and Yi, 20012). The second conventional determinant of BSC is financial linkages through international capital movements, either FDI or portfolio (such as equity and bond international movements and cross-border credit relations). The impact of financial integration on output correlations is also unclear from a theoretical standpoint. On the one hand, it could increase co-movement in business cycles by generating demand-side effects. Output correlations tend to be high if cross-border stock market exposure between countries is high, then a decline in one country's stock market could induce a simultaneous decline in the demand for domestic consumption and investment goods in another (Kose et al., 2003). This is especially true for countries which are not able to use the mechanisms of international risk-sharing thus limiting the transfer of resources across countries. Furthermore, financial contagion could also result in heightened cross-country spillovers (Calvo and Reinhart, 1996). On the other, liquidity constraints, imperfect information or regulatory limits to capital flows may result in capital flows' reversals as investors herd, leading to decreased output correlations. Financial linkages could stimulate production specialization through capital reallocation in a manner consistent with countries' comparative advantage in the production of different goods. Such specialization, which could result in more exposure to industry or country-specific shocks, would be expected to be accompanied by the use of financial markets to diversify consumption risks. This implies that financial integration should result in stronger correlation of consumption across countries (Kose et al., 2003). Empirically, the results have been also conflicting reflecting the two strands in theory.

To our knowledge, theory has not treated remittances as an important determinant of RBC. Even though, the remittances literature provides evidence that they should be pro-cyclical with the host country, suggesting that output correlations with the home countries should be positive. Only a small number of recent research papers has attempted to empirically assess the role of remittances in connecting business cycles.

Against this backdrop, this paper contributes to the literature on the determinants of BSC with the aim of assessing the impact of several channels (trade, finance and remittances) on international business cycle co-movements. Previous research on real business cycle correlations in the case of Arab countries exists. Cashin et al. (2015) find that a positive GCC GDP shock generates output spillovers in some Arab countries but not others. Ilahi and Shendy (2008) go a step further and empirically establish that financial surpluses' accumulation in and remittances outflows' from Saudi Arabia (as a proxy for GCC growth) affect regional growth.

This paper complements the few studies that examined the impact of remittances on BSC (Barajas et al, 2012 and World Bank, 2015) and the only study on the Arab region (Abdih et al., 2012). It adds to the existing literature in several ways. First, to our knowledge, this is the first attempt to study the drivers of BSC in the Arab world using bilateral flows. Second, the paper recognizes that the Arab region is actually more integrated through labor mobility and associated remittance flows, which are thus explicitly introduced as a determinant of BSC. To illustrate the importance of remittances, the Arab region received 13 percent of the developing countries' remittance inflows versus only 6 percent in FDI and 4 percent of global trade over the period 2005–2010. In most of the region, remittances account for 7 percent of GDP and therefore rival FDI, accounting for only 4 percent of GDP. Moreover, most of the Arab region's migrants are also located in the region, with remittances from the GCC to Egypt and Jordan accounting for more than two-thirds and half of total incoming remittances, respectively. This suggests that for two countries, remittances might be an important transmission channel between their business cycles and the GCC's oil-driven cycle. Third, the paper also uses a novel methodology, suggested by Imbs (2004) that allows the simultaneous incorporation of bilateral trade, financial flows and cross-country differences in production structures and therefore captures the different interactions.

The paper is organized as follows. Section 2 presents some stylized facts on remittances and trade and financial integration in the Arab region. Section 3 presents the data used and the econometric specification of our model. Section 4 is devoted to the empirical findings. Section 5 concludes and provides some policy recommendations.

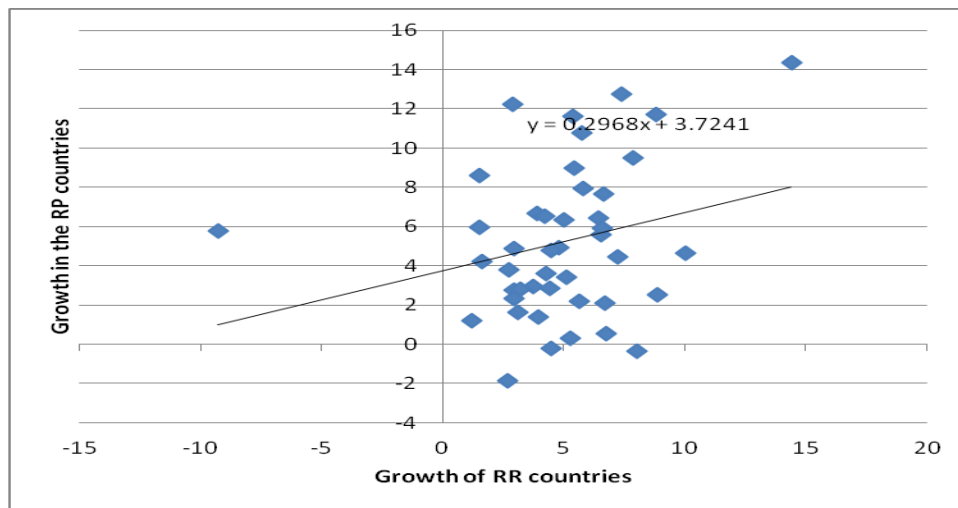
## 2. Stylized Facts: Correlations

This section establishes the stylized facts on output correlations between Arab countries since the 1970s', how they are evolved and how they are influenced by the various channels. The sample comprises  $x$  economies from the region broken down into 5 non-oil economies (Egypt, Jordan, Lebanon, Morocco and Tunisia) and 12 oil-rich economies which are the 6 GCC economies, Algeria, Libya, Iraq, Iran, Sudan and Yemen.

### *Output Correlations and overview of channels*

Notwithstanding the adverse effects of high oil prices on their economies, oil-importing economies have experienced large positive growth spillovers from their oil exporting neighbors. Higher economic growth in oil-exporters is associated with higher growth in oil importers,, suggesting that economic growth in the resource-poor economies is promoted through economic links with the oil-rich countries, or in other words, that their business cycles are synchronized (figure 1). Correlation between their output growth rates remained relatively low through much of the past decades, estimated around 25 percent, though correlations of GDP levels is much stronger ( table x on pair-wise correlations of real GDP of countries in the Arab region).

Figure 1: Correlation between real growth rates, 1975-2013



More importantly, while oil booms and busts seem to have an economic impact on the growth of the overall Arab region, correlations of GDP growth rates tend to slightly rise during oil booms (during the 1970s's and the post-2004 oil price boom) while growth rates seem to move more independently of each other when oil prices decline like what happened between 1980-2003 (Figures 2 and 3). In fact, correlation between oil rents and growth in the resource-poor countries is over 40 percent and increased to over 50 percent after 2004. One potential explanation for this observation is that output spillovers from the oil-rich group to the oil-

importing group tend to become more important during booms due to strengthening of all or some of the economic linkages, whether they are trade, finance or remittances.

Figure 2: Natural resource rents and growth by country groups 1975-2013

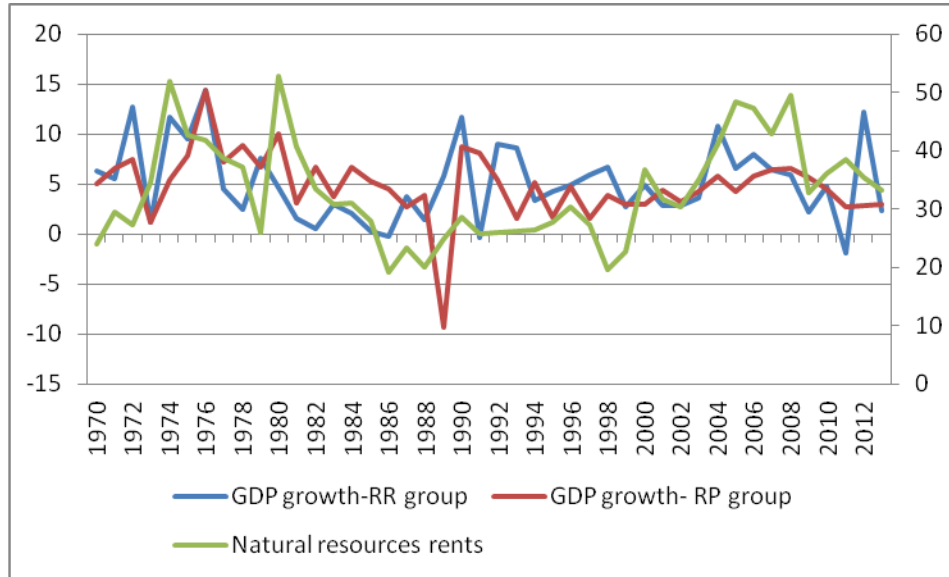
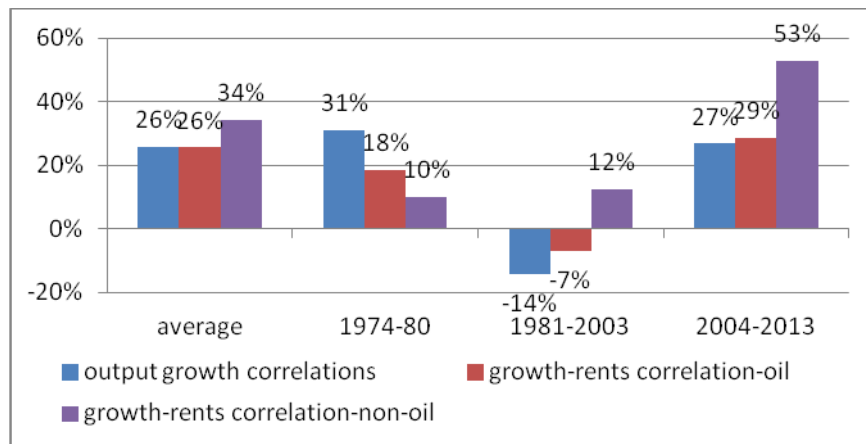


Figure 3: Correlations between output, growth and rents 1975-2013



In addition to regional trade (of goods and services), this paper recognizes that the Arab region is more integrated with the global economy through labor mobility and associated remittance flows than through the financial openness (figure 4). In fact, exports of oil-importing countries account for around a third of GDP and have increased during the last oil boom to close to 40 percent of GDP. Meanwhile, financial flows, mainly FDI, are relatively marginal and have only increased to recent years to around 7 percent of GDP. Remittances on the other hand, account for around 10 percent of GDP and have been rather sustainable over time. Correlations between external flows to oil-importing economies and GDP growth rates of oil-rich economies,

which are also low for the overall period have increased significantly during the last oil boom, particularly FDI flows and remittances (Figure 3).

Figure 4: External flows to non-oil economies and growth in RR economies (redo with bilateral data), need export of merchandise only

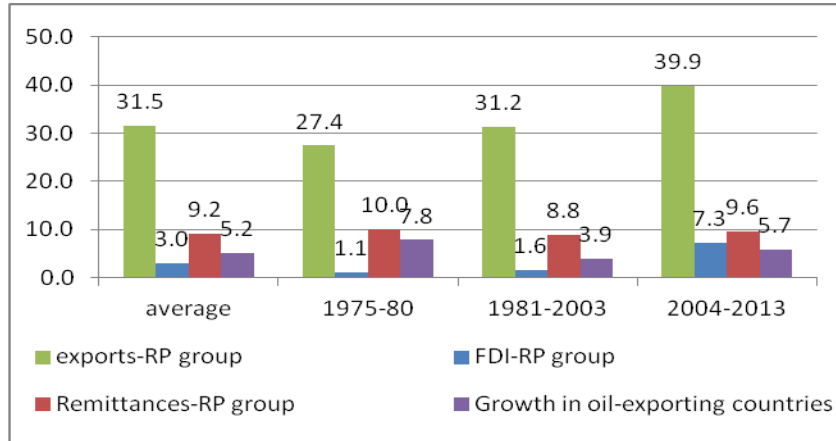
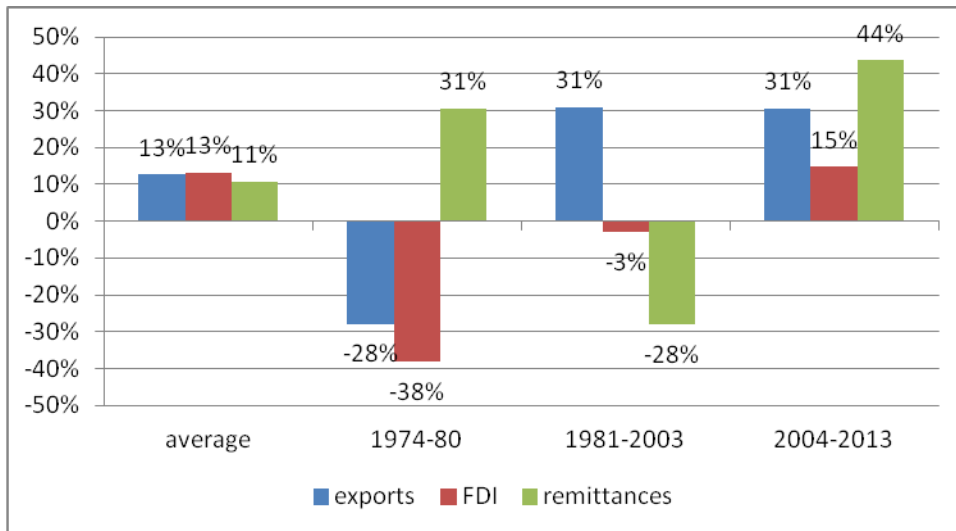


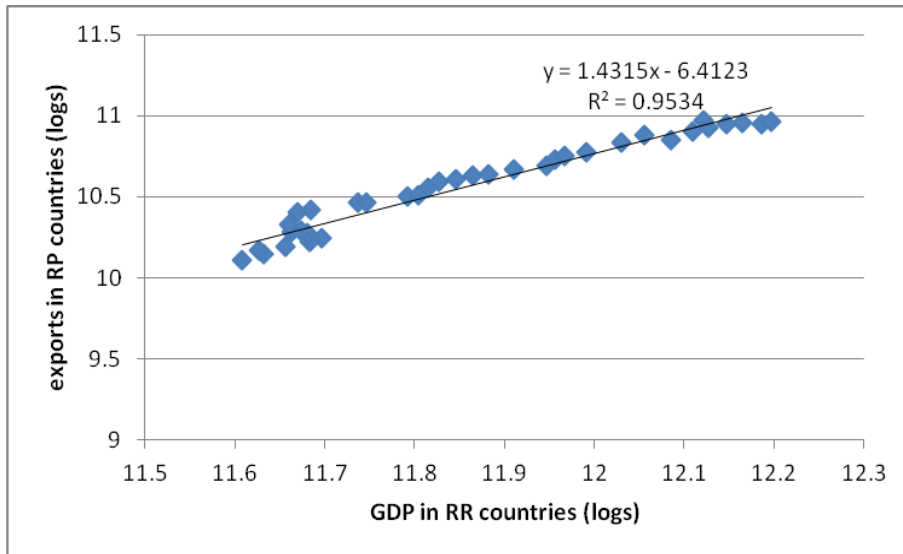
Figure 5: Correlation of external flows to non-oil economies and growth in RR economies (redo with bilateral data)



*The role of trade, finance and remittances linkages*

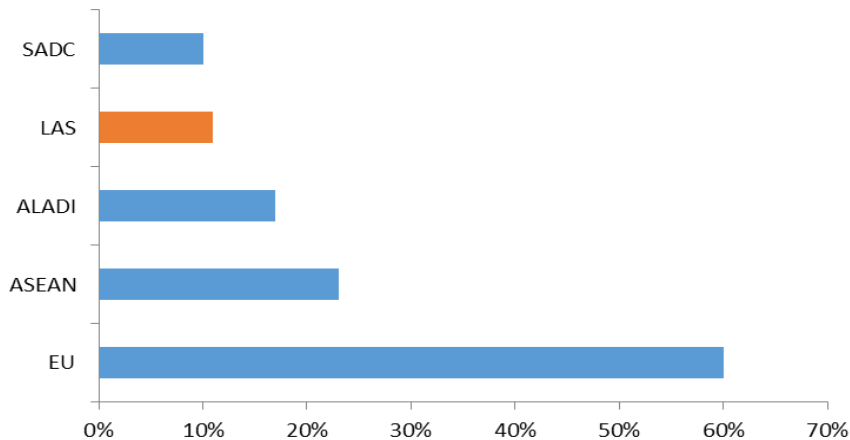
On the one hand, Arab countries’ trade integration with the world economy has increased rapidly over time. Exports of goods and services of both groups increased from around 37 and percent of GDP in 1970 to over 50 percent of GDP in 2013 in the oil-rich group and from 17 to close to 40 percent of GDP in the oil-poor group. Trade which is dominated by oil exports in the oil-rich group is very sensitive to oil prices. Overall, exports in non-oil economies is correlated with GDP in resource-rich economies (figure 5). Something on bilateral trade.

Figure 5: Correlation of external flows to non-oil economies and growth in RR economies (redo with bilateral data)



Trade within the Arab region is not significant. Indeed, intra-regional trade for the League of Arab States does not exceed 11 percent, while that of the EU and ASEAN is 60 and 23 percent respectively. As a result of the lack of shared common technical regulations and conformity measures between Arab countries, intra-trade among the Leagues of Arab States is quite low. Consequently, most of the trade takes place with either the USA or other European countries.

Figure 6: Intra-Regional Trade Shares around the World (2010 – excluding oil)

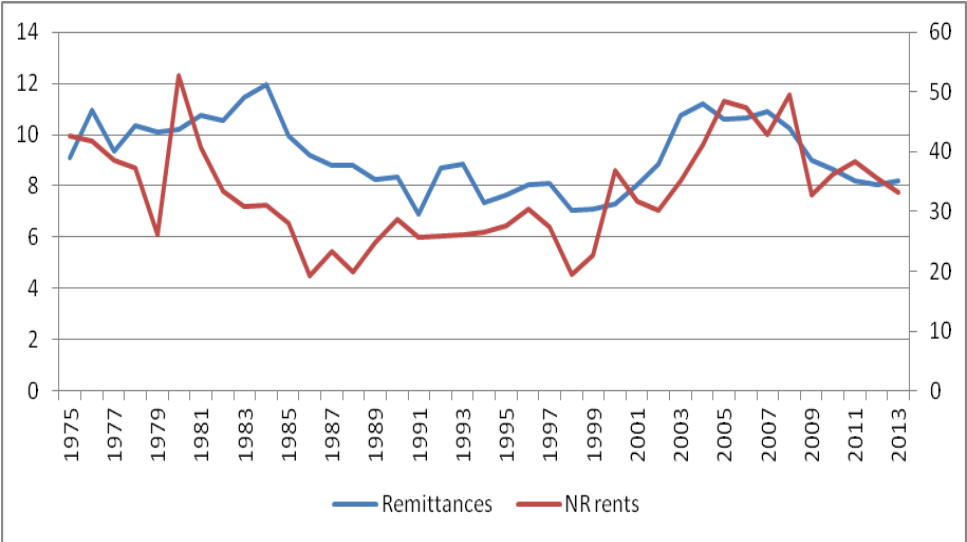


Note: ITC staff calculations. Data comes from CEPII’s BACI database. Interregional trade is given as a percentage of total trade by region. Total trade is defined as (exports + imports). Data is for 2010 and excludes oil. The European Union is the group of the 27 current member states except Belgium and Luxembourg. The Association of Southeast Asian Nations comprises all 10 member states. ALADI (Asociacion Latinoamericana de Integracion) is a trade agreement among 12 Latin American countries. The South African Development Community comprises 15 member states.

Traditionally, the large GCC financial surpluses accumulated from oil booms have been channeled to oil-importing countries through remittances and to a lesser extent capital inflows, though the latter have grown, particularly during the recent oil boom (2004-present).

The GCC has a prime destination for migrants from many Arab labor exporting countries such as Egypt, Jordan and Lebanon but it is less the case for Maghreb countries. In fact, significant intraregional labour flows emerged after the oil boom in the 1970s. In 2010, the MENA region hosted around 18.1 million migrants (5.3% of population) and intra-regional migration accounted for 31.5% of total migrants. Some 3.2 million migrants from MENA countries are in the GCC alone (World Bank, 2011). Moreover, Average remittance inflows seem to mirror oil rents since 1975, increasing in the late 1970s followed by a dip, which was accentuated during the first Gulf war, until the mid-2000s before spiking again with the oil boom in 2004 (figure 7).

Figure 7: Remittances and NR rents, 1975-2013 (redo with bilateral data)



For some countries, remittances inflows in Jordan and Lebanon are as high as 10 percent of GDP while they are lower in other countries and they are much higher than FDI (except in Lebanon) (figure 8 and 9).



Figure 8: Remittances in selected oil-importing countries

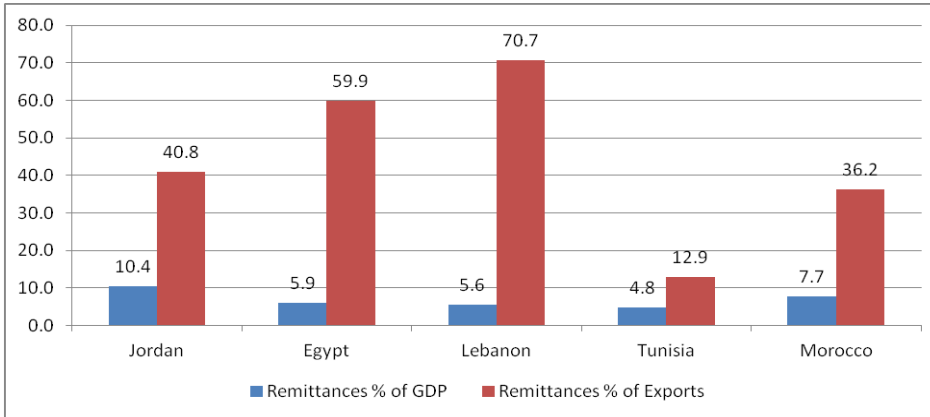
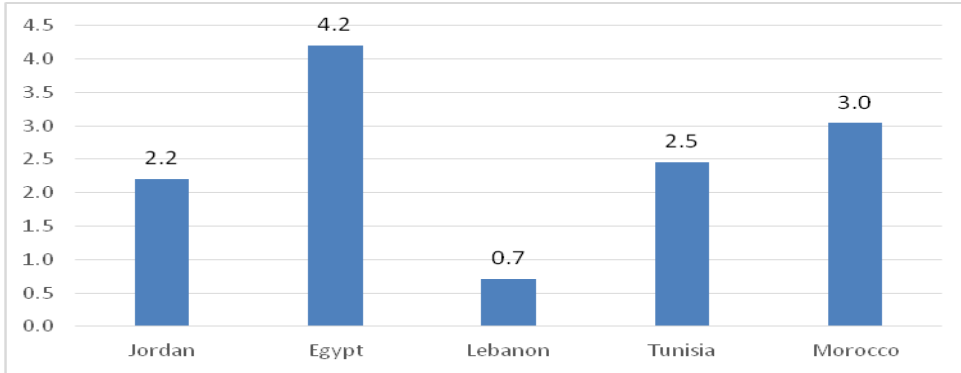


Figure 9: Remittances /FDI ratio



Correlation of incoming remittances to non-oil economies with GDP of resource-rich economies is much higher (figure 10).

Figure 10: Relationship between remittances and GDP

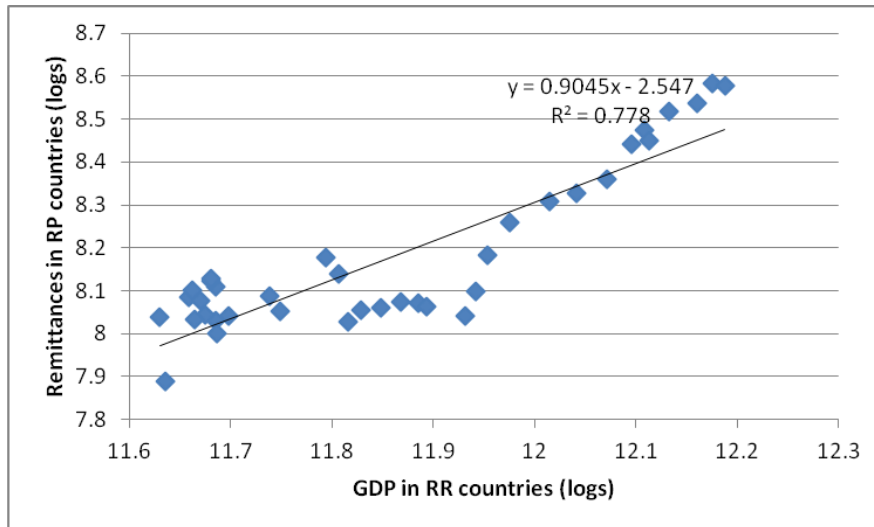
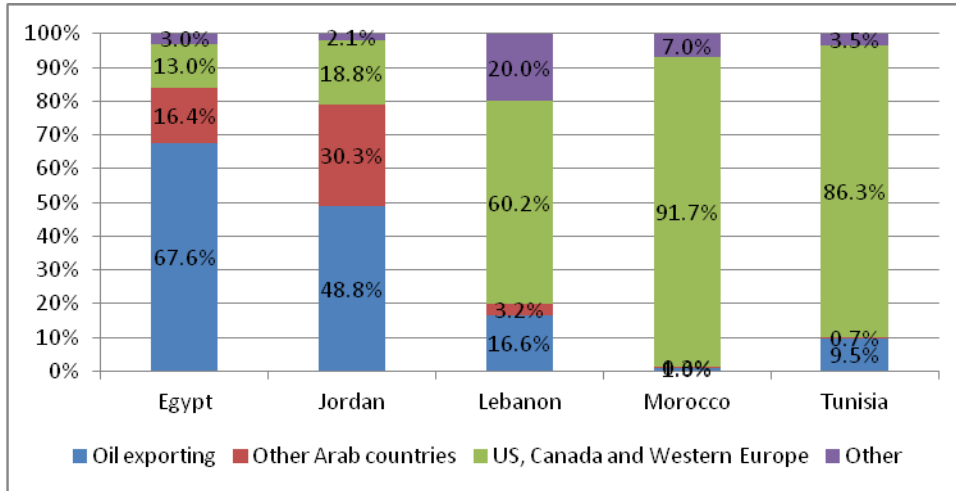
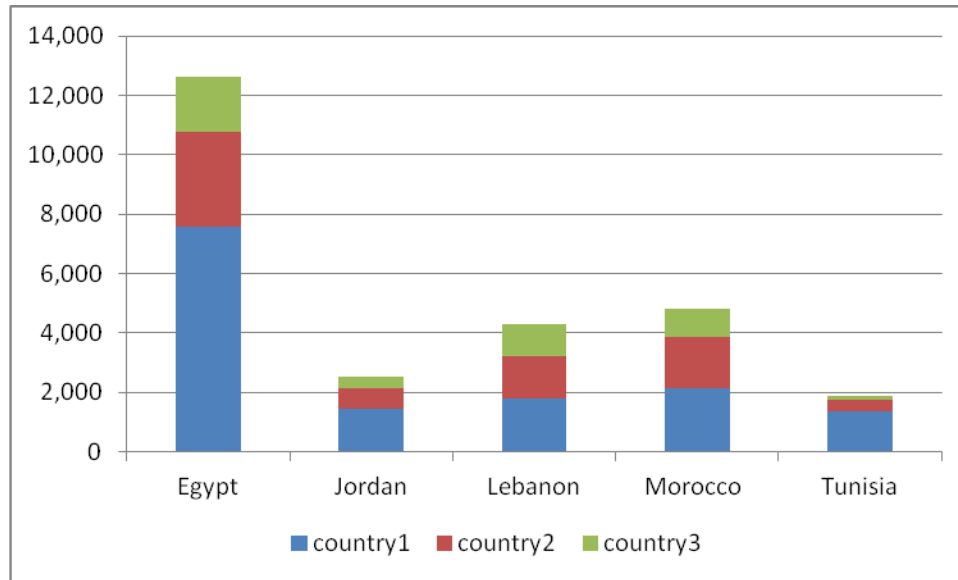


Figure 11: Incoming remittances by sending country



Two main characteristics are worth mentioning. First, at one end of the spectrum, remittances in labor-exporting economies (like Egypt and Jordan) are very dependent on GCC labor markets, accounting for at least half of the total remittances received in those countries. Remittances from Saudi Arabia alone are a bit less than 10 percent of total remittances (figure 10). This suggests that these two countries are particularly vulnerable to the GCC's economic cycle or any risks stemming from shocks to these economies, which would have implications on their current account, their foreign exchange earnings, unemployment rate and other macroeconomic variables. It was claimed that the his 9.2 percent decline in inflows of remittances to Egypt was due in large part to a sharpened labor inspection campaign and amnesty period in Saudi Arabia (the country of destination for about 37 percent of Egyptian migrants), which precipitated the departure of 300,000 migrants back to Egypt in the second half of 2013 (World Bank, 2014). At the other end, Tunisian and Moroccan migrants are more exposed to the European continent which is the source of close to 90 percent of total remittances received by these two countries, with France sending 6 and 12 percent of total remittances respectively. Lebanon's remittances are better diversified but around two-thirds originate from Europe, US and Canada, though Saudi Arabia is the largest source.

Figure 12: Top remitting countries to non-oil economies



Second, remittances sent from the GCC to Arab countries account for less than 20 percent of total remittances sent, as at least two-thirds of outgoing remittances to the GCC go to India alone and this figure rises to 75 percent in Oman. Egypt remains the top second countries migrants remit to from Bahrain, Kuwait and Saudi Arabia. It is worthwhile to note that during the 1960s's remittances from the GCC to Arab oil-importing countries accounted for three-quarters of total remittances while remittances to Asia were barely 5 percent of total remittances.



Table 1: Pairwise Real GDP correlation in the Arab region

	DZA	BHR	DJI	EGY	IRN	IRQ	ISR	JOR	KWT	LBN	LBY	MLT	MAR	OMN	QAT	SAU	SYR	TUN	ARE	WBG	YEM	
DZA	1.00																					
BHR	0.98	1.00																				
DJI	0.85	0.84	1.00																			
EGY	0.98	0.99	0.84	1.00																		
IRN	0.96	0.99	0.81	0.96	1.00																	
IRQ	0.94	0.94	0.79	0.96	0.93	1.00																
ISR	0.97	0.99	0.75	0.99	0.97	0.96	1.00															
JOR	0.99	0.99	0.85	0.99	0.96	0.95	0.97	1.00														
KWT	0.97	0.97	0.85	0.96	0.96	0.89	0.95	0.97	1.00													
LBN	0.95	0.98	0.85	0.98	0.96	0.90	0.97	0.98	0.93	1.00												
LBY	0.29	0.28	0.15	0.25	0.32	0.02	0.19	0.30	0.38	0.18	1.00											
MLT	0.96	0.95	0.65	0.97	0.92	0.91	0.98	0.94	0.93	0.92	0.23	1.00										
MAR	0.98	0.99	0.87	1.00	0.97	0.95	0.99	0.99	0.96	0.97	0.22	0.97	1.00									
OMN	0.98	0.96	0.80	0.98	0.93	0.92	0.98	0.95	0.92	0.98	0.15	0.99	0.98	1.00								
QAT	0.94	0.97	1.00	0.99	0.90	0.94	0.99	0.97	0.86	0.99	0.04	0.98	0.98	0.99	1.00							
SAU	0.96	0.97	0.92	0.96	0.96	0.95	0.95	0.97	0.94	0.97	0.18	0.90	0.96	0.92	0.99	1.00						
SYR	0.97	0.99	0.25	0.99	0.95	0.92	0.99	0.98	0.97	0.97	0.96	0.99	0.99	0.98	0.97	0.95	1.00					
TUN	0.98	1.00	0.81	1.00	0.97	0.96	0.99	0.99	0.97	0.97	0.32	0.97	1.00	0.98	0.97	0.96	0.99	1.00				
ARE	0.98	0.99	0.79	0.98	0.96	0.94	0.98	0.98	0.99	0.94	0.35	0.95	0.98	0.94	0.90	0.96	0.97	0.99	1.00			
WBG	0.91	0.89	0.82	0.91	0.87	0.94	0.93	0.88	0.85	0.86	0.02	0.93	0.90	0.90	0.91	0.88	0.81	0.91	0.89	1.00		
YEM	0.94	0.94	0.65	0.94	0.95	0.85	0.95	0.94	0.93	0.90	0.65	0.97	0.92	0.91	0.72	0.86	0.98	0.96	0.96	0.83	1.00	

Table 2: Bilateral Correlation between GDP and Remittances

remm	DZA	BHR	IRN	IRQ	KWT	LBY	OMN	QAT	SAU	SYR	ARE	YEM	DJI	EGY	JOR	LBN	MAR	TUN	WBG
DZA	-0.47	-0.42	-0.44	-0.55	-0.74		-0.34	-0.59	-0.47	0.00	-0.43	-0.65	-0.63	-0.43	-0.49	-0.52	-0.42	-0.42	-0.63
BHR																			
IRN	-0.31	-0.32	-0.30	-0.55	-0.24		-0.44	0.43	-0.23	-0.48	-0.39	-0.45	0.07	-0.36	-0.30	-0.30	-0.33	-0.39	-0.29
IRQ	-0.54	-0.67	-0.56	-0.48	-0.66		-0.59	-0.56	-0.54	-1.00	-0.71	-0.52	-0.56	-0.64	-0.67	-0.54	-0.58	-0.67	-0.10
KWT																			
LBY	0.67	0.78	0.72	0.65	0.78		0.73	0.80	0.83	0.74	0.78	0.73	0.74	0.77	0.77	0.69	0.68	0.75	0.84
OMN	-0.86	-0.87	-0.81	-0.77	-0.96		-0.95	-0.95	-0.76	-0.90	-0.84	-0.98	-0.68	-0.90	-0.84	-0.92	-0.90	-0.90	-0.92
QAT	-0.04	-0.19	0.94	0.01	0.26		0.07	-0.14	0.11		-0.12	-0.22	-0.22	-0.07	-0.10	0.16	-0.22	0.08	0.71
SAU	0.87	0.93	0.91	0.80	0.63		0.93	0.91	0.89	1.00	0.75	0.48	0.91	0.95	0.95	0.94	0.91	0.94	0.57
SYR	-0.01	0.26	0.13	-0.02	0.72		-0.24	0.85	0.18	-0.33	0.03	0.62	0.89	-0.07	0.02	0.61	-0.05	-0.04	0.53
ARE																			
YEM	0.24	0.23	0.19	0.41	0.33		0.28	0.57	0.35	-0.63	0.20	0.00	0.49	0.24	0.22	0.24	0.27	0.20	0.48
DJI	0.82	0.79	0.81	0.60	0.82		0.68	0.70	0.80	0.51	0.78	0.72	0.81	0.76	0.80	0.75	0.79	0.77	0.74
EGY	0.56	0.54	0.57	0.58	0.63		0.46	0.97	0.68	-0.32	0.50	0.39	0.91	0.53	0.59	0.66	0.55	0.51	0.75
JOR	0.77	0.76	0.80	0.78	0.93		0.67	0.81	0.78	0.60	0.81	0.96	0.58	0.76	0.81	0.91	0.73	0.77	0.78
LBN	0.75	0.75	0.74	0.55	0.76		0.65	0.66	0.70	0.51	0.76	0.77	0.69	0.73	0.75	0.70	0.72	0.77	0.55
MAR	0.93	0.93	0.94	0.85	0.94		0.83	0.78	0.93	0.79	0.92	0.86	0.85	0.91	0.93	0.87	0.92	0.91	0.76
TUN	0.96	0.96	0.95	0.92	0.97		0.87	0.89	0.96	0.88	0.96	0.93	0.84	0.95	0.97	0.94	0.95	0.95	0.84
WBG	0.49	0.56	0.54	0.77	0.42		0.70	0.76	0.61	-0.14	0.46	0.36	0.62	0.60	0.55	0.63	0.57	0.55	0.66

Source: Constructed by the authors using the World Development Indicators.

### 3. Literature review

There is a long-standing interest in understanding the drivers of BSC. Different channels have been purposed and evaluated with mixed results. Early on, conventional linkages like trade and finance were identified as major drivers of BSC. In addition, they both interacted with specialization of production structures to determine whether they made business cycles become more or less synchronous. Economic theory does not provide definitive answers concerning the impact of these linkages on BSC. First, bilateral trade was put forward as the foremost candidate expected to influence business cycle synchronization. On the one hand, it could increase business cycle correlations to the extent that investment and consumption booms in one country spill over to others through trade. On the other hand, if trade triggers increased inter-industry specialization among countries (a la Ricardo and/or Heckscher-Ohlin), then industrial structures of trading economies will diverge and will become prone to industry-specific shocks, leading the co-movement in business cycle to decouple (Kose and Yi, 20012). The second conventional determinant of BSC is financial linkages through international capital movements, either FDI or portfolio (such as equity and bond international movements and cross-border credit relations). The impact of financial integration on output correlations is also unclear from a theoretical standpoint. On the one hand, it could increase co-movement in business cycles by generating demand-side effects. Output correlations tend to be high if cross-border stock market exposure between countries is high, then a decline in one country's stock market could induce a simultaneous decline in the demand for domestic consumption and investment goods in another (Kose et al., 2003). This is especially true for countries which are not able to use the mechanisms of international risk-sharing thus limiting the transfer of resources across countries. Furthermore, financial contagion could also result in heightened cross-country spillovers (Calvo and Reinhart, 1996). On the other, liquidity constraints, imperfect information or regulatory limits to capital flows may result in capital flows' reversals as investors herd, leading to decreased output correlations. Financial linkages could stimulate production specialization through capital reallocation in a manner consistent with countries' comparative advantage in the production of different goods. Such specialization, which could result in more exposure to industry or country-specific shocks, would be expected to be accompanied by the use of financial markets to diversify consumption risks. This implies that financial integration should result in stronger correlation of consumption across countries (Kose et al., 2003). Third, specialization has a direct effect on the business cycle that is independent of trade and finance factors. To the extent that countries have a similar production structure, they would be prone to similar sector-specific shocks and therefore their outputs should be more synchronized.

This characterization, however, does not adequately capture the entire picture for countries like those in the Arab region that are large recipients of remittances from abroad. To our knowledge, theory has not treated remittances as an important determinant of RBC, as much of the theoretical work has been devoted to the primary motive of migrants to remit. From a theoretical point of view, remittances should be pro-cyclical with the host country, suggesting

that output correlations with the home countries should be positive. However, this effect depends on the extent to which such remittances are effectively used to finance and/or smooth consumption and/to enhance investment in physical capital, facilitate, human capital formation and deepen the recipient economy's financial system. Overall, the impact of remittances on growth hinges on whether remittances are more invested than consumed and on the fact that they are not associated with adverse effects on growth through Dutch disease effects on the real exchange rate (Chami et al., 2008). The literature also shows that output correlations could be negative particularly during economic downturns in host countries, pushing migrants to return to their home countries with their savings (Galor and Stark 1990). This sudden return is relevant in cases where migrants have temporarily contracts and are easily fired during downswings. This argument is also reinforced by the fact that migrant workers make more precautionary savings than native workers (Dustmann 1997).

Empirically, the results on determinants of BSC have not been conclusive reflecting the opposite strands in theory. The early literature has empirically investigated these effects separately focusing on bilateral trade and finance only, confirmed that they are amongst the main determinants of business cycle co-movements, while others have provided evidence to the contrary. The seminal article by Frankel and Rose (1998) in addition to work by Clark and van Wincoop (2001), Imbs (2004, 2006) and Cerqueira and Martins (2009) provide evidence that countries with higher levels of *bilateral trade also have higher BSC*. Calderón, Chong and Stein (2007) also find that the impact of trade intensity on business cycle correlation among developing countries is positive and significant, but substantially smaller than that among industrial countries. In contrast, Kose and Yi (2001) show that high trade intensity is associated with lower business cycle correlations. On the *financial channel*, Imbs (2004, 2006) finds that more financially integrated countries are more synchronous but Kose et al. (2003) find that financially open developing economies are more prone to international spillovers of macroeconomic fluctuations leading to more synchronized cycles. Déés and Zorell (2011) are unable to establish an empirical link between financial linkages and output correlation. A considerable amount of empirical work lends support to the claim that financial flows are correlated internationally and that financial integration tends to synchronize business cycles, especially during financial crisis (Calvo and Reinhart, 1996). On *specialization*, Imbs (2004, 2006) finds that the direct impact of specialization on business cycles is positive significant and independent of finance and trade, suggesting that countries with similar industrial structures should be more synchronous. The results of Déés and Zorell (2011) similar patterns of sectoral specialization also lead to closer business cycle co-movement. Baxter and Koupiratsas (2004) find that this hypothesis is not robust and Clark and van Wincoop (2001) find that this relationship is not significant. Cerqueira and Martins (2009): industrial similarity is non-significant. The results of work that investigated the indirect impact of specialization through trade and finance, on output correlations are also not clear-cut. Imbs (2004) is also able to empirically confirm that the positive effect of trade and finance on BSC takes place through specialization. The findings of Calderón, Chong and Stein (2007) suggest that differences in the



responsiveness of cycle synchronization to trade integration between industrial and developing countries are explained by differences in the patterns of specialization and bilateral trade. Duval et al. (2014) find that bilateral intra-industry trade and trade specialization correlation also appear to increase co-movement, indicating that not only the intensity but also the type of trade matters. Kalemli-Ozcan et al. (2003) find that countries with a high degree of financial integration tend to have more specialized industrial patterns and less synchronized business cycles. Déés and Zorell (2011) provide evidence that financial integration leads more synchronized cycles indirectly through raising similar sectoral specialization.

There are a very few studies examining the impact of remittance flows on the BSC. Using both aggregate and bilateral remittances data in a panel data setting, Barajas et al. (2012) provide evidence that remittance flows significantly increase BSC between remittance-recipient countries and the rest of the world. Some research attempted to assess the effects of business real business cycle correlations in the case of Arab countries exists. Abdih et al. (2012) find that shocks in the sending economies are transmitted via remittances to public finances (via tax revenues) of receiving economies. Ilahi and Shendy (2008) empirically establish that financial surpluses' accumulation in and remittances outflows' from Saudi Arabia (as a proxy for GCC growth) affect regional growth of real GDP, private consumption and private investment and find a strong association. Cashin et al. (2015) find that a positive GCC GDP shock generates output spillovers in some Arab countries but not others.

Other than the 3 studies which explicitly linked remittances to the business cycle of the sending countries, the literature focused on the determinants of remittances or its impact on domestic growth of recipient countries. Vargas-Silva and Huang (2006) provide evidence indicating that remittances respond more to changes in the macroeconomic conditions of the host countries than those in the home countries. Frankel (2011) finds that remittances are pro-cyclical with respect to income in the host country. Lueth and Ruiz-Arranz (2006) find a small effect of per capita income growth of the host country on remittances. In the case of the Arab world, Kandil and Mirzaie (2008) quantified the impact of global financial flows (remittances and FDI inflows) on domestic (or the recipient countries') macroeconomic aggregates. A number of time-series studies investigate the remittance response to the output of host countries. Sayan (2004) finds that remittance receipts to Turkey are not correlated with the German national output. El-Sakka and McNabb (1999) focused on remittance flows to Egypt and suggest that source country conditions were important, with a lag, albeit with a very low elasticity of around 0.03.

#### 4. Methodology and Data

The paper follows Imbs (2004) to investigate the determinants of synchronization. Imbs (2004) was the first to investigate the determinants of business cycle synchronization in a context of a system of simultaneous equations. More on why simultaneous is best. It simultaneously estimates a system of equations relating bilateral output correlations to measures of trade and financial integration as follows:

$$\rho_{ij} = \alpha_0 + \alpha_1 T_{ij} + \alpha_2 S_{ij} + \alpha_3 F_{ij} + \alpha_4 I_{1ij} + \varepsilon_{1ij} \quad (1)$$

$$T_{ij} = \beta_0 + \beta_1 S_{ij} + \beta_2 I_{2ij} + \varepsilon_{2ij} \quad (2)$$

$$S_{ij} = \gamma_0 + \gamma_1 T_{ij} + \gamma_2 F_{ij} + \gamma_3 I_{3ij} + \varepsilon_{3ij} \quad (3)$$

$$F_{ij} = \delta_0 + \delta_1 I_{4ij} \quad (4)$$

where  $i$  and  $j$  index country pairs,  $p$  is bilateral business cycle correlation,  $T$  is bilateral trade intensity,  $F$  is bilateral financial integration that includes remittances, and  $S$  is a specialization index capturing how different the sectorial allocations of resources are between countries  $i$  and  $j$ . Business cycle correlations, bilateral trade, financial integration, and specialization all are endogenous variables, and  $I_1$ ,  $I_2$ ,  $I_3$ , and  $I_4$  contain the vectors of their exogenous determinants, respectively. Identification of the system requires differences between at least  $I_2$  and  $I_3$ , as well as instruments for  $F$ .

Following Imbs (2004), we compute  $p$ ,  $T$ ,  $F$  and  $S$  as follows. Bilateral correlations in business cycles  $p$  are computed on the basis of the cyclical component of annual GDP using the Hodrick-Prescott filter. Bilateral trade is computed using the sum of bilateral exports and imports. Bilateral trade data from the Trade Map (International Trade Center, Geneva).

The specialization index is measured as follows:

$$S_{ij} = \frac{1}{T} \sum_t \sum_n^N |s_{ni} - s_{nj}| \quad (5)$$

where  $s_{ni}$  denotes the GDP share of industry  $n$  in country  $i$ . Thus,  $S_{ij}$  is the time average of the discrepancies in the economic structures of countries  $i$  and  $j$ .  $S$  reaches its maximal value for two countries when there is no similarity between them. Sectoral production comes from Trade and Production datasets.

Concerning the trade equation, a gravity type equation is used where  $I_2$  includes bilateral distance, whether the two countries share common borders, common language, and whether they have been colonized by the same colonizer. Gravity variables come from the CEPII dataset. We also include the product of their GDP. For the specialization equation, the vector  $I_3$  includes the product of their GDP/capita and the GDP gap between the two countries (obtained from WDI). The last vector  $I_4$  includes some institutional variables measuring the rule of law and the investment climate in country  $i$  and  $j$ .

## 5. Empirical Findings

Our system of equations has been estimated using different techniques namely 2 Stages Least Squares (2SLS), Ordinary Least Squares (OLS), Seemingly Unrelated Regressions (SURE) and sure with OLS degrees-of-freedom adjustment (MVREG).

For the first equation, we found that business cycles are chiefly affected by the similarity index between two countries. The latter exerts a positive and significant impact on the correlation between the cyclical components of the countries' GDP. Second, remittances have a negative and significant impact on the correlation of the business cycle between different economies. Surprisingly, trade does not affect business cycle. Yet, this result is mainly attributed to the trivial share of intra-Arab trade. This is why trade does not amplify business cycles between our countries of interest.

As per the trade equation, our results are in line with those of the gravity models literature. Indeed, we found appositive and significant impact of both the exporter and the importer GDP and the coefficient is close to one. Moreover, distance has a negative effect on trade given that the transport cost is still a non-trivial impediment to trade. Finally, time to trade (being the product of time to export of the exporter and that to import of the importer) has a significantly negative impact on trade.

Third, the similarity equation points out the fact that the product of the GDP/capita of the two partners is the only significant variable. Similarities in economic structure result in correlated business cycles.

Finally, the remittances equations shows that the higher the share of oil rents to GDP in the sending country, the higher the share of remittances to GDP. By contrast, the higher the share of oil rents to GDP in the receiving country, the lower the share of remittances. This finding is intuitive given that the most important remitting countries are highly dependent on oil.

Table 3: Empirical Results 1

	SUREG				MVREG			
	Bus. Cycle	Trade	Similarity	Rem.	Bus. Cycle	Trade	Similarity	Rem.
Ln(Trade)	-0.0222 (0.0223)				-0.0221 (0.0225)			
Similarity	0.00375** (0.00184)				0.00375** (0.00186)			
Rem/GDP	-13.74* (7.968)				-13.74* (8.047)			
Ln(GDP exp)		0.971*** (0.117)				0.971*** (0.120)		
Ln(GDP imp)		0.757*** (0.114)				0.757*** (0.117)		
Ln(Dist)		-1.580*** (0.149)				-1.580*** (0.153)		
Contig		0.117 (0.377)				0.118 (0.386)		
Com. Lang		-17.32*** (4.457)				-17.34*** (4.558)		
Colony		0.765 (0.836)				0.767 (0.855)		
Com. Col		0.332 (0.398)				0.333 (0.408)		
Time to trade		-0.231*** (0.0772)				-0.231*** (0.0790)		
Product of Ln(GDP/cap)			0.364** (0.146)			0.364** (0.148)		
GDPdiff			0.894 (1.183)			0.894 (1.194)		
Time to st. bus.			-1.057 (4.051)			-1.055 (4.091)		
Oil rents/GDP imp				-6.18e-05*** (2.22e-05)				-6.19e-05*** (2.24e-05)
Oil rents/GDP exp				7.04e-05*** (1.98e-05)				7.03e-05*** (1.99e-05)

Constant	0.0416 (0.298)		24.05** (10.80)	0.00143** (0.000714)	0.0400 (0.300)		24.06** (10.91)	0.00143** (0.000719)
Observations	205	205	205	205	205	205	205	205
R-squared	0.049	0.524	0.030	0.105	0.049	0.524	0.030	0.105

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 4: Empirical Results 2

	OLS				2SLS			
	Bus. Cycle	Trade	Similarity	Rem.	Bus. Cycle	Trade	Similarity	Rem.
Ln(trade)	-0.0126 (0.0225)				-0.0645 (0.0419)			
Similarity	0.00422** (0.00186)				-6.06e-05 (0.00459)			
Rem/GDP	-16.62** (8.054)				-6.946 (18.30)			
Ln(GDP exp)		0.959*** (0.121)				0.959*** (0.121)		
Ln(GDP imp)		0.711*** (0.118)				0.711*** (0.118)		
Ln(Dist)		-1.580*** (0.154)				-1.580*** (0.154)		
Contig		0.0651 (0.391)				0.0651 (0.391)		
Com. Lang		-15.97*** (4.613)				-15.97*** (4.613)		
Colony		0.677 (0.865)				0.677 (0.865)		
Com. Col		0.270 (0.413)				0.270 (0.413)		
Time to trade		-0.216*** (0.0799)				-0.216*** (0.0799)		
Product of Ln(GDP/cap)			0.348** (0.149)				0.348** (0.149)	
GDPdiff			1.081 (1.196)				1.081 (1.196)	
Time to st. bus.			-0.996 (4.128)				-0.996 (4.128)	
Oil rents/GDP imp				-6.94e-05*** (2.25e-05)				-6.94e-05*** (2.25e-05)
Oil rents/GDP exp				6.85e-05*** (2.00e-05)				6.85e-05*** (2.00e-05)

Constant	-0.0921 (0.301)		25.17** (10.99)	0.00160** (0.000721)	0.730 (0.632)		25.17** (10.99)	0.00160** (0.000721)
Observations	205	205	205	205	205	205	205	205
R-squared	0.050	0.525	0.030	0.106	0.007	0.525	0.030	0.106

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## **6. Conclusion and Policy Implications**

The existence of more synchronized business cycles among countries in the region may shed light on the broader impact of higher oil prices on oil importers, as increased more oil-induced financial or trade flows may compensate the adverse effects on their external finances. Moreover, these flows can help buffer the effect of global shocks originating from other areas.

## **References**