Transmission Process of Financial Crises: Interdependence and Contagion Effects Across Turkey, Brazil, Russia and the Middle East Countries

Prof. Dr. Aysu INSEL
Doç. Dr. Abdurrahman KORKMAZ[1]*

Abstract
The first aim of the paper is to investigate the interdependence and/or contagion effect of an economic crisis across Turkey, Brazil and Russia as well as some Gulf Cooperation Council countries; Kuwait, Oman, Qatar, and Morocco covering the period from August 2004 to March 2012. The second aim is to present an alternative view on the transmission process of financial crises across the economies via any possible interaction channel between the interdependence effect and contagion. An exchange market pressure index and the outlier test of Favero and Giavazzi (2002) are used in this paper. The estimation results reveal that there are fifteen cases in which the interdependence and the contagion effects could be related to each other. Consequently, it can be suggested that the policy-makers are less likely to prevent the financial crises experienced outside being transmitted to their own country; even if they could exactly predict that, the interdependence effect exists.

JEL Codes: G01; C12; C32.

Keywords: *Financial crises; Contagion; Interdependence, Favero and Giavazzi Outlier Test, Simultaneous Equation System*

[1] * **Corresponding Author: Aysu INSEL,** Istanbul Aydın University, Faculty of Economics and Administrative Sciences, Department of Economics and Finance**,** Florya, Istanbul, TURKEY
E-mail: aysuinsel@aydin.edu.tr
Abdurrahman KORKMAZ, Izmir Katip Celebi University, Faculty of Economics and Administrative Sciences, Department of Economics, Izmir, TURKEY - E-mail: abdurrahman.korkmaz@ikc.edu.tr

1. INTRODUCTION

Since Masson (1998, 1999a, 1999b) propounded the monsoonal effect, it has been well-known that the emerging markets are nearly related to the economic climate of the advanced economies. Moreover, some emerging markets, especially BR(IC) countries and Turkey have been started to be classified separately due to their economic performances relative to the others. In keeping up with their economic performances, it has been brought up that new trade and financial linkages may appear between the above-mentioned emerging markets and other emerging markets (e.g. Mlachila and Takebe (2011), and IMF (2011)). However, the transmission of financial turbulences across the GCC economies is not given much concern in the related literature. To the best of our knowledge, there is a lack of research considering the GCC economies to test for the contagion. Therefore, the main purpose of the paper is to investigate the interdependence and/or contagion effect for some GCC economies though Turkey, Brazil and Russia as the core central economies. In other terms, this paper investigates the existence of second generation monsoonal effects from Turkey, Brazil and Russia to Kuwait, Oman, Qatar, and Morocco. Another purpose of the paper is to contribute to a new insight, the transmission mechanism of the financial turbulences across the economies.

This paper considers an exchange market pressure index and the outlier test of Favero and Giavazzi (2002) to identify financial turbulences. The contribution of the paper is to provide a new insight into the relationship between the interdependence and the contagion effects. This is structured by considering a possible interaction channel between the interdependence effect and the contagion phenomenon in such a way that an interdependence effect could weaken, disappear completely or veer during the crisis period as a result of the contagion phenomenon. In the paper, Turkey, Brazil and Russia are pre-determined as the core or central economies, while Kuwait, Oman, Qatar and Morocco are determined as the peripheral economies depending upon the data availability, covering the period from August 2004 to March 2012.

It is noteworthy to overview the impact of global crisis on the selected Gulf Cooperation Council (GCC) countries shortly. Insel and Tekce (2011)

analyse the trade flows of the GCC countries before and after the 2003 Custom Union Agreement. It is found that the trade of the GCC countries are mostly related to the Asian countries after 2003. Their results reveal important implications for the economic and political concerns across their partners. The 2003 Custom Union Agreement and the Common Market in 2008 have reinforced the economics integration among the GCC countries. In addition, decreasing vulnerability of the economies to the fluctuations in the oil and gas prices, high population growth and rising unemployment in the region increased the need for diversification, Insel and Tekce (2010). Since the capital intensive oil and gas industry offers only limited employment opportunities (Sturm et al., 2008: 14), industrial policies towards diversification have focused on different sectors in different GCC countries. Large current account surpluses with investments by corporations and wealthy individuals have allowed a significant portion of GCC investments to take place through Gulf-based sovereign wealth funds[2] (SWF). The GCC sovereign funds are diversified on global equities, hedge funds, real estate, and private equity[3].

Habibi (2009) states that the global crisis was transmitted to Arab economies through seven different markets: the financial markets, the crude oil market, Arab investments in global asset markets, tourism, the remittance income of Arab workers, and the region's non-oil exports, originating primarily in North Africa and intended for Europe. Noticeably, the impact of global economic crises on the GCC economies diverges depending upon the openness and involvement in the international financial markets. During the 1970s and 1980s, Gulf investments were mainly concentrated in the real estate sector and activities associated with the hydrocarbon sector. The upward trend in the oil prices strengthened the fiscal and current account surpluses and the foreign exchange reserves of the GCC countries. However, decreasing vulnerability of the economies to the fluctuations in the oil and gas prices, high population growth and rising unemployment in the region increased the need for diversification. Large current account

[2] A sovereign wealth fund (SWF) is a state-owned investment fund composed of financial assets such as stocks, bonds, property, precious metals or other financial instruments. The SWF includes stabilization funds, classical investment funds, and private-equity style government companies. These funds have allowed domestic financial sectors to develop.

[3] Detailed information is given by B. Setser and R. Ziemba, *GCC Sovereign Funds Reversal of Fortune*, Working paper, Council on Foreign Relations, Center for Geoeconomic Studies, January 2009.

surpluses with investments by corporations and wealthy individuals have allowed a significant portion of GCC investments to take place through Gulf-based sovereign wealth funds (SWF). The GCC sovereign funds are diversified on global equities, hedge funds, real estate, and private equity. The GCC countries started to diversify their economies; Qatar has focused its investments on natural gas industry, which is not considered as a solution for the volatile prices in the world energy markets. Oman is still concentrated on oil revenues, despite some efforts to develop manufacturing and tourism industries. Kuwait is highly dependent on oil and recently also develops its finance sector. The GCC countries are characterized with their highly open and liberal trade regimes. The share of total external trade to GDP reveals that Bahrain and the UAE have more open economies; whereas Kuwait is the least open one. Since November 2001, Morocco has received large investment from Gulf investment funds and also from Europe. In addition, agriculture, tourism and worker remittances coming from Europe are also very important sources of income for Morocco.

Orozco and Lesaca (2009) discuss the impact of global crisis on the Arab countries stressing the diversified structure of these economies. The main channels for the transmission of financial crisis are related to the remittances, foreign investment and exports. The 2008 global economic crisis brought about a higher level of speculative real estate investment in the GCC countries, increased the unemployment rate and lowered the income in Morocco. The effect of the crisis was not seriously detected in Qatar, since the country is the main natural gas exporter. In 2007 and 2008, the GCC countries invested more than 100 billion dollars on sovereign wealth funds in US and Europe. Kuwait and Qatar supplied large amount of funds to rescue the banks in the US. Orozco and Lesaca state that Gulf stock markets have followed a parallel path and a strong link with the European and North American markets. However, some Arab markets, such as Morocco and Jordan were not significantly affected by the global fluctuations, since several MENA countries, such as Morocco, depend heavily upon tourism as an important source of service sector jobs and foreign exchange revenue. Besides, during the summer of 2008, the fall in the oil prices distressed mainly Kuwait, Oman, Qatar, and other GCC economies. Despite the fall in the remittances, level of reserves, liquidity

and exports revenue, the economic turndown in the Arab region was less severe on the global level. According to the 2008 Economic Intelligent Unit of UEA Monthly Economic Report, Saudi Arabia and Kuwait have the lowest externally financed projects while UAE and Qatar have the highest percentage of projects financed by the international banks.

Saif and Choucair (2009) discuss the variety of policy responses to the crisis in GCC countries. According to them, Kuwait is the only country that has developed a comprehensive rescue package to sustain its economic program. Oman strengthened the manufacturing and construction sector to respond to the crisis due to limited financial resources. Qatar restructured the financial sector. The financial crisis had a serious impact on Morocco.

Ellaboudy (2010) analyses the impact of the global crisis on GCC countries and states that the effects of crisis were mild compared with the rest of the world due to implemented fiscal and monetary policies to strengthen the robustness of the economies to shocks. Marahdeh and Shrestha (2010) examine the stock market integration among the GCC countries. Among the GCC countries, Saudi Arabia and UAE have the largest stock market; whereas Oman's stock market is the smallest one. Over the period of 2002-2007, all the GCC stock markets grew remarkably and market capitalization reached the highest level in 2007.

A short overview of the impacts of global crisis on the countries of interest is given in the Introduction section. Section 2 reviews the literature on the transmission channels of financial turbulences. Section 3 includes empirical methodology and Section 4 demonstrates the empirical results. Section 5 provides the discussion on the empirical results and the research is concluded in Section 6.

2. Transmission Channels of Financial Turbulences

Dornbusch *et al.* (2000) states that the contagion can be explained by the macroeconomic fundamentals and these fundamentals can capture the interdependence among the economies. On the other hand, the term of contagion involves irrational phenomena which cannot be explained by the macroeconomic fundamentals.

Therefore, the transmission of financial crisis across the economies is explained by the two leading titles. The first is "interdependence" or "fundamentals-based contagion", and the second is "contagion" or "irrational phenomena". Channels of the interdependence or "fundamentals-based contagion" consist of spillover effect, monsoonal effect and financial linkages. The spillover effect originates from trade linkages and has a relatively larger effect on volatility than contagion. A competitive devaluation in an economy could -directly and/or indirectly- deteriorate trade balance of the other economy as discussed by Gerlach and Smetz (1995) and Fratzcher (2003).

The monsoonal effect offered by Masson (1998) is a result of the changes in macroeconomic policies of the industrialized economies which could have a potential to affect the economic conjecture of the world. Finally, the financial linkages stem from density of financial relations, for example the competition in banking credit and the borrowing relations, as discussed in Kaminsky and Reinhart (2000) and Fratzcher (2003). Masson (1999a, 1999b), the multiple equilibria approach to the contagion states that a stable equilibrium point on any economy may turn to an unstable one as a result of financial crisis experienced in another economy. Masson (1999b) emphasizes that the lending and investment booms and results of the financial crises experienced in emerging markets could be associated with explicit and implicit government guarantee and moral hazard. The political contagion approach offered by Drazen (1999) states that a financial crisis experienced in a potential member of any economic integration also increases the probability of experiencing several financial crises in the other potential members of the integration. It is defined by any dynamic adjustments to represent cross-market spillovers; and additional movements over and above market fundamentals during crisis periods which are typically called contagion.

Moser (2003) discusses that simultaneous crises are not a sufficient condition for contagion. Contagion requires causal connection. The (near) simultaneous occurrence of financial crises may instead result from coincidence or common cause rather than causal links. In the case of coincidence, independent shocks hit countries at about the same time

with no connection between the different crises, and diagnosing contagion would be a post hoc fallacy. With common cause, several countries are hit by a common global or regional external shock (other than a financial crisis). Candidates for such adverse common shocks with the potential of inflicting balance-of-payment difficulties, particularly in emerging market economies, are changes in global (US) interest rates, exchange rates between major currencies, commodity prices, or recessions in major industrial countries.

Dungey *et al.* (2005) highlight the key similarities and differences between the various approaches. They show that the Favero and Giavazzi (2002) approach is very similar to the Forbes and Rigobon (2002) correlation test as both tests are based on testing the significance of dummy variables in an augmented model. The similarities between the two testing frameworks are made more transparent by defining a crisis period to be where the dummy variable is non-zero. Observations when the dummy variables are not defined, by default correspond to pre-crisis periods. On the other hand, they found two differences between the Forbes and Rigobon and Favero and Giavazzi approaches. Forbes and Rigobon identify a crisis period as a period of higher volatility using a single dummy which has a non-zero value during the entire crisis period. The Favero and Giavazzi test identifies potentially many (short-lived) crisis periods associated with extreme returns. Secondly, the Favero and Giavazzi test assigns a different parameter to each dummy variable whereas the Forbes and Rigobon is based on a single parameter to represent contagion between two countries. However, an important assumption underlying Favera and Giavazzi framework is that variables exhibit autocorrelation. If this assumption is not valid, then the choice of instruments based on lagged returns will not be valid, and identification of the structural model via the inclusion of own lags will no longer be appropriate.

Dungey *et al.* (2010) formulate and implement an empirical model of financial crises both across asset classes and national borders. They review the definition of spillover and contagion effects drawing on the existing theoretical literature, such as Masson (1999a) who essentially views contagion as the effect of residual shocks once the usual linkages

have been accommodated. Overviews of the literature on contagion may be found in Dornbusch *et al*. (2000).

The empirical financial crisis literature tends to concentrate on cross-border transmissions, for instance, Eichengreen *et al*. (1995, 1996) look at currency markets; Bae *et al*. (2003), and Forbes and Rigobon (2002) analyse equity markets; and Favero and Giavazzi (2002) examine bond markets. Baur and Fry (2009) contributes to the literature on contagion testing by proposing a multivariate test based on the cross-sectional and time-series dimension of the data that controls for interdependencies. They indicate that contagion is relatively rare, and that the variables measuring interdependencies are significant. Their interpretation is consistent with Forbes and Rigobon (2002), revealing that there is no (or little) contagion, but only interdependence. They conclude that the detection of contagion depends on the adequate specification of the interdependencies and market fundamentals. The choice of fundamentals is dictated by views on the nature of the crisis and the frequency of data appropriate for the choice of modelling contagion. Korkmaz and Insel (2010) examine the existence of contagion effect among seven former Soviet economies in Eastern Europe and the contagion hypothesis with the exchange market pressure index tested across the EU member and non-member groups by the threshold test of Pesaran and Pick (2007). They find that the contagion dynamics among the EU non-member economies in the region are stronger and asymmetric after the accession of others to the EU.

This paper investigates any possible interaction channel between the interdependence effect and contagion effect for some GCC economies and Morocco through Brazil, Russia and Turkey, and then provides a new insight into the transmission mechanism of the financial turbulences across the economies following the Favera and Giavazzi (2002) approach. In the paper, the interdependency effect is explained through the EMP indexes whereas the contagion effect is explained by means of the crisis or mania dummies.

3. Empirical Methodology:

The Outlier Test of Favero and Giavazzi (2002) is the appropriate one to achieve the main purpose of this research due to the following reasons:

i) The Outlier Test focuses on each of the financial turbulence identified in the sample individually, so it is possible to compare a crisis period with non-crisis periods even for low frequency data similar to the one employed in this study.

ii) The Outlier Test allows us to take both crises and manias into account, thus the proposed hypothesis can be tested for both mania and crisis periods.

Favero and Giavazzi suggest that the contagion could be asymmetric across the economies, and a financial crisis (mania) experienced in an economy could lead to mania (crisis) in another economy. In addition, the transmission process of financial crises across the economies might be non-linear across economies. In view of the Favera and Giavazzi approach, a simultaneous system of equations is constructed and estimated by the 3SLS method to test the hypothesis that the interdependence effect could weaken, even disappear completely, or veer in a crisis period as a result of the contagion process.

The simultaneous equations system is constructed as follows:

$$\begin{bmatrix} \mathbf{1} & \cdots & -\boldsymbol{\beta}_{1i} \\ \vdots & \ddots & \vdots \\ -\boldsymbol{\beta}_{i1} & \cdots & \mathbf{1} \end{bmatrix} \begin{bmatrix} \mathbf{z}_{1,t} \\ \vdots \\ \mathbf{z}_{i,t} \end{bmatrix} = \begin{bmatrix} \boldsymbol{\gamma}_{11} & \cdots & \mathbf{0} \\ \vdots & \ddots & \vdots \\ \mathbf{0} & \cdots & \boldsymbol{\gamma}_{ii} \end{bmatrix} \begin{bmatrix} \mathbf{z}_{1,t-1} \\ \vdots \\ \mathbf{z}_{i,t-1} \end{bmatrix} + \left[\mathbf{I} + \begin{bmatrix} \mathbf{a}_{11} & \cdots & \mathbf{a}_{1i} \\ \vdots & \ddots & \vdots \\ \mathbf{a}_{i1} & \cdots & \mathbf{a}_{ii} \end{bmatrix} \begin{bmatrix} \mathbf{d}_{1,t} & \cdots & \mathbf{0} \\ \vdots & \ddots & \vdots \\ \mathbf{0} & \cdots & \mathbf{d}_{i,t} \end{bmatrix} \right] \begin{bmatrix} \boldsymbol{\varepsilon}_{1,t} \\ \vdots \\ \boldsymbol{\varepsilon}_{i,t} \end{bmatrix}$$

where ($\mathbf{z}_i$)s are the EMP indexes related to each of the economies included in the sample, (β's, γ's and **a**'s) are the parameter values of the system, (ε_i's) are the normally distributed econometric error terms, and ($\mathbf{d}_i$)'s are exogenous dummy variables.

The Outlier Test is applied to the exchange market pressure index (EMP), offered by the Eichengreen *et al.* (1996), in the analysis.[4] The EMP index for each economy is constructed as:

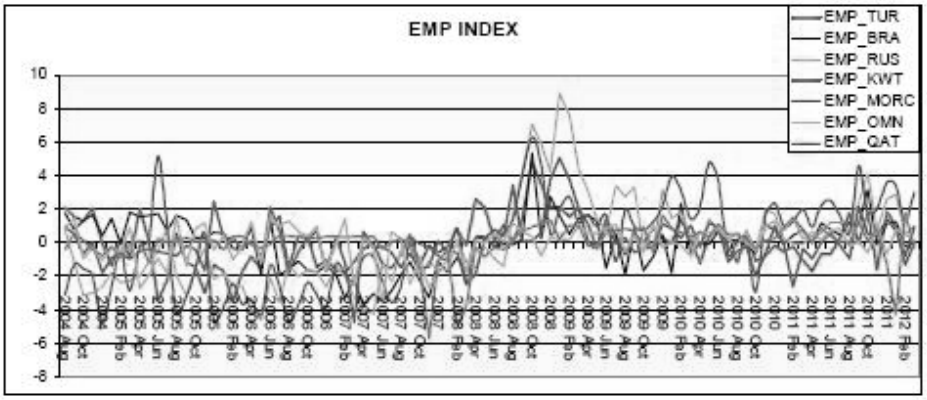
$$\mathbf{EMP}_{i,t} = \left[\left(\frac{\Delta \mathbf{E}_t}{\mathbf{E}_{t-1}} \right) + (\mathbf{i}_t - \mathbf{i}_t^{us}) - \left(\frac{\Delta \mathbf{NFA}_t}{\mathbf{M}_{t-1}} \right) \right]$$

[4] EMP index is similar to the Korkmaz and Insel (2010) index. India, China, Bahrain, UAE and Saudi Arabia are eliminated from the econometric analysis due to limitations on data.

where ($EMP_{j, t}$) is the exchange market pressure index for economy (j) at time (t). (E) is the nominal exchange rate per the U.S. dollar, (i) is the money market interest rates for each of the economy and the U.S. (NFA) is the net foreign assets, and (M) is the money stock.

Financial turbulence periods are identified by the help of exchange market pressure index (EMP) shown in Figure 1. Each EMP index is constructed as the sum of unweighted average of devaluation (or revaluation) rate and interest rate differential minus the contribution of net foreign assets to change in money stock. The EMP indexes are standardized (i.e. taking difference mean and divide by standard deviation) for each of the components.

Figure.1: Exchange Market Pressure Index Movements



Built on the above definitions; the financial turbulence periods are identified and the interdependence and contagion effects are examined for Turkey (TUR), Russia (RUS), Brazil (BRA), Kuwait (KWT), Qatar (QAT), Oman (OMN), and Morocco (MORC) covering the period from August 2004 to March 2012.

The first aim of this paper consists of five investigation stages:

First, the VAR (3) model is estimated for the EMP indexes, separately. The order of VAR is selected using the LR and AIC statistics.

Second, the residuals are obtained from each of the VAR (3) models. Favero and Giavazzi suggest that each of the positive and negative residuals from the VAR model should be focused on separately, since they can represent the financial crisis or mania periods. The each one of the crisis or mania periods is presented by dummy variables, which are constructed by filtering the residuals obtained from the VAR (3) model.

Standard deviation for each of the residual series is calculated to determine the threshold level for the outlier value for each of the economies; such as

$$\mathbf{d_{i,t}} = \begin{Bmatrix} \mathbf{1}: \ |\mathbf{u_{i,t}}| > 3\boldsymbol{\sigma}^{\mathbf{2}}_{\mathbf{u_{i,t}}} \\ \mathbf{0}: \ \text{Otherwise} \end{Bmatrix}$$

Furthermore, a dummy variable is defined separately by filtering the residuals from VAR (3) model. If a positive (negative) residual exceeds the three standard deviation of its sample distribution, then the dummy variable takes the value of one (minus one) for this period and zero for the other periods. In other words, a dummy variable is constructed for each of the crisis or mania periods separately considering the sign and value of thresholds for each country. Total 13 dummy variables are defined regarding the value of (+1) for crisis (if positive) or (-1) for mania (if negative) period; and 0 elsewhere.

Third, the VAR (3) model is re-estimated with the exogenous (13 dummy) variables, and the normality of the residuals are accepted for each of the indexes. In order to ensure the normality, in addition to the Jarque-Bera (JB) test statistics; the box-plots are used to confirm the outlier(s).

Fourth, the general form of seven equations are estimated for each EMP index simultaneously to capture the possible non-linear transmission process of financial crisis across economies. Seven equations including predetermined and exogenous variables[5] on the right hand side are estimated simultaneously by the 3SLS method. The method is applied to the general form of the system using adequate instruments1. Apparently, the specific form of the system with statistically significant coefficients is confirmed by the successive elimination of each insignificant variable with the highest p-value through the re-estimation of the system.

[5] Constant, 3 lags values of related country EMP index, other country EMP indexes; the 13 dummy variables.

Finally, the existence of the contagion is tested through the null hypothesis representing the non-existence of the contagion phenomenon while the alternative implies its existence.

4. Empirical Results

Descriptive statistics presented in Table 1, part (a) shows the distribution of each EMP index. The JB test statistic reveals that these indexes are not normally distributed. The Russian and Moroccan EMP indexes show the highest volatilities; whereas the lowest volatilities occur for Oman, Qatar, and Kuwait, respectively. Table 1, part (b) displays the descriptive statistics and the threshold values for the residuals obtained from VAR (3) models. The threshold value is calculated from 3 times the SD of residuals for each of the countries. Thus, it is 3.24 for Turkey, 3.48 for Russia, 2.94 for Brazil, 3.24 for Kuwait, 2.73 for Qatar, 2.50 for Oman, and 4.89 for Morocco.

Any outlier above the (+) threshold shows the "crisis period" whereas any value below the (-) threshold displays the "mania period". For example, the threshold value for Brazil is 2.94. Inspection of residuals from VAR (3) shows that there is only one outlier value 3.81 for the period 2008:10 whereas the box plot diagram indicates two values for the periods 2008:10 and 2011:10. Since these positive outliers are above the threshold, these two periods are accepted as crisis period for Brazil.

Table 1: Descriptive Statistics Sample: 2004M08 2012M03 (N=92) (a) EMP_ Indexes

	EMP_ TUR	**EMP_ RUS**	**EMP_ BRA**	**EMP_ KWT**	**EMP_ QAT**	**EMP_ OMN**	**EMP_ MORC**
Mean	**-0.023378**	**-0.002222**	**-0.013596**	**-0.006429**	0.004500	**-0.000446**	0.014178
Median	-0.061333	-0.274239	0.211108	-0.116127	0.214843	0.179729	0.268415
Maximum	4.831420	8.885007	5.314080	5.026518	1.763973	1.543064	6.314798
Minimum	-3.555280	-4.621303	-3.721791	-4.772387	-5.675954	-3.626383	-4.772989
Std. Dev.	1.473762	2.616287	1.581442	1.380056	1.186130	1.086316	2.567496
JB	2.681285	19.21552	1.357830	39.21884	472.2775	18.91712	1.751435
Probability	0.261678	0.000067	0.507167	0.000000	0.000000	0.000078	0.416563

(b) Residuals obtained from VAR (3) Model

	RES_ TUR	RES_ RUS	RES_ BRA	RES_ KWT	RES_QAT	RES_ OMN	RES_ MORC
Mean	**-3.99E-17**	7.48E-17	**-2.99E-17**	1.62E-17	**-3.99E-17**	**-7.48E-17**	8.98E-17
Median	-0.193308	-0.226332	-0.185030	-0.100121	0.018453	0.013405	-0.038054
Maximum	3.602587	3.416234	3.815731	3.362213	1.986159	1.627945	5.203563
Minimum	-1.997238	-2.512880	-2.074038	-3.274930	A-4.462201	-2.098461	-3.902244
Std. Dev.	1.079497	1.161084	0.982751	1.079213	0.910971	0.833282	1.631702
Threshold	**3.24**	**3.48**	**2.94**	**3.24**	**2.73**	**2.50**	**4.89**
JB	20.27989	6.801840	19.35941	9.631802	238.3987	0.712589	1.838412
Probability	0.000039	0.033343	0.000063	0.008100	0.000000	0.700266	0.398836

In some cases, outlier value shows the same period for different countries. As a result, only one dummy variable is constructed to represent the related period for these countries. For example, Dummy variable BRATURRUS_2008:10(+) represents three crises at the same period for Turkey, Russia and Brazil through their threshold values. The positive (+) sign shows the concurrent increase of the EMP indexes in these countries. Table A in the appendix shows the related events to the financial turbulences and manias for each of the economies. Accordingly, a dummy variable for Kuwait, KWT_2007:03 (-) displays that the residuals obtained from VAR (3) model has a negative value below the threshold (-3.24). This is an evidence for the mania period for Kuwait in 2007:03.

Table 2 shows the simple and cross correlation coefficients between the indexes. In part (a), the simple correlation coefficients show the strength of the co-movements between the EMP indexes. The values confirm the relatively strong relationship between Turkey, Russia and Brazil about the EMP indexes. As the core economies of this research, these three economies also move on the same direction. The Middle East economies also follow the similar patterns.

Table 3: Correlation Coefficients Sample: 2004M08 2012M03 (N=92)

(a) Correlation Coefficients:

	EMP_ TUR	EMP_ RUS	EMP_ BRA	EMP_ KWT	EMP_ QAT	EMP_ OMN
EMP_ RUS	**0.4915**					
EMP_ BRA	**0.4372**	0.4708				
EMP_ KWT	0.3515	0.5170	0.2770			
EMP_ QAT	-0.0165	0.1898	0.1844	0.2234		
EMP_ OMN	0.0843	0.2016	0.2276	0.2715	0.3078	
EMP_ MORC	0.3644	0.7145	0.3510	0.3331	0.1428	0.1202

(b) Cross Correlation Coefficients:

	EMP_ TUR	EMP_ RUS	EMP_ BRA	EMP_ KWT	EMP_ QAT	EMP_ OMN
EMP_ RUS	**0.5550 (+3)**					
EMP_ BRA	**0.4372 (± 0)**	**0.4709 (± 0)**				
EMP_ KWT	0.4153 (+3)	**0.5171 (± 0)**	0.3653 (+3)			
EMP_ QAT	-0.2953 (-8)	0.289 (+11)	0.3711 (+9)	0.2382 (-1)		
EMP_ OMN	0.1565 (+2)	0.2848 (+5)	0.3028 (+7)	0.2715 (± 0)	0.3805 (+5)	
EMP_ MORC	0.3836 (+6)	**0.7145 (± 0)**	0.3590 (-3)	0.4018 (-3)	0.1940 (-8)	0.2725 (-4)

(+) lead; (-) lag

In Part b, a positive cross correlation coefficient indicates the leading economy. This means a leader economy tends to move in advance of the other economy. A negative cross correlation coefficient indicates the follower economy, since it follows the leader in a systematic or unsystematic pattern. In both cases there is a period of movement. However, if there is

not any lag or lead interval, then the standard pattern of the index follows a persistent pattern at irregular and unpredictable intervals since an increase (decrease) in EMP index might be followed by further increase (decrease). For example, the Turkish EMP index is a leading index for Russia, Kuwait, Oman and Morocco. The Russian index is a leading index for Qatar and Oman. The Brazilian index is a leading index for Kuwait, Qatar, and Oman. It can be seen that the Turkish and Brazilian indexes move contemporaneously implying that their movement is not periodic but they follow a standard pattern. On the other hand, for the economies of the same region, Qatar index is the leading index for Turkey and Kuwait; Moroccan index is a leading for Brazil, Kuwait, and Oman. In addition, the Russian index has a contemporaneous relationship with the Brazilian, Kuwaiti and Moroccan indexes. The Kuwaiti index has the same pattern with Oman index.

It is assumed that the relationship between the EMP indexes shows the interdependence effect and the statistically significant dummies determines the contagion effect. Table 3 presents the estimation results regarding the interdependence and contagion effects. Considering the 3SLS estimation results for the Turkish economy, the EMP index for Turkey has a statistically significant and negative relationship with Russian EMP index whereas the Russian EMP index has a positive significant coefficient on the Turkish EMP index. The sizes of the coefficients are almost the same. This means that the interdependence effect from Turkey to Russia has a feed-back mechanism, but the feed-back mechanism occurs on the opposite direction. This means that a one-point increase (decrease) in the Russian EMP index results in approximately 0.248 points decrease (increase) in the Turkish EMP index. This can be interpreted as follows: when Russian economy experiences a financial crisis, some international funds are exiting from Russia to enter to Turkish economy whereas when Turkish economy experiences a financial crisis some international funds exit from not only Turkish economy but also Russian economy.

Moreover, the financial crisis experienced in the Turkish economy in June 2006 affected the Russian EMP index adversely by about 4 points. The above results imply that the Turkish economy affected the Russian

economy both linear (via the interdependence effect) and non-linear (via the contagion effect) manner in June 2006, but at the opposite ways. This case is an example of the "flight to quality" behaviour because the financial crisis experienced in the Turkish economy resulted in a decrease in the Russian EMP index.

Based upon the estimation results for the Russian economy, it can be suggested that the Russian EMP index is affected linearly by the EMP indexes of Kuwait, Oman, Morocco and Turkey at the same direction. A one-point increase (decrease) in the EMP indexes of those countries leads the Russian EMP index to rise (reduce) by about 1.286, 0.690, 0.686 and 0.262 points, respectively. Thus, this outcome shows that Russian economy have experienced interdependence effect from these countries because this mechanism works even in tranquil periods. Furthermore, the estimation results indicate the presence of the contagion effects from Turkey, Brazil, Kuwait, and Qatar to the Russian economy.

It must be highlighted that the direction of the interdependence and the contagion effects from Brazil to Russia are the same. In other words, the financial crisis experienced in Brazil in October 2011 caused the Russian EMP index to increase both linearly and non-linearly since the signs of the interdependence and the contagion coefficients are the same.

Table 3: Simultaneous Equations Estimation iterative 3SLS Results

	Dependent Variable						
	EMP_{TUR}	EMP_{RUS}	EMP_{BRA}	EMP_{KWT}	EMP_{QAT}	EMP_{OMN}	EMP_{MORC}
	INTERDEPENDENCE						
$EMP_{\_TUR}$		**0.262 (0.073)**			**-0.168 (0.081)**		
$EMP_{\_RUS}$	**-0.248 (0.092)**		**-0.222 (0.094)**	**0.640 (0.058)**	**0.125 (0.045)**	**0.435 (0.090)**	**1.037 (0.093)**
$EMP_{\_BRA}$					**-0.125 (0.069)**	**0.151 (0.076)**	
$EMP_{\_KWT}$		**1.286 (0.110)**	**0.436 (0.144)**			**-0.623 (0.141)**	**-1.420 (0.193)**
$EMP_{\_QAT}$	**0.217 (0.053)**		**-0.629 (0.142)**				

$EMP_{\_OMN}$		**0.690 (0.195)**	**0.373 (0.158)**	**-0.395 (0.151)**	**0.399 (0.114)**		**-0.655 (0.219)**
$EMP_{\_MORC}$		**0.686 (0.069)**	**0.252 (0.071)**	**-0.451 (0.069)**		**-0.337 (0.074)**	
	EMP_{TUR}	***EMP_{RUS}***	***EMP_{BRA}***	***EMP_{KWT}***	***EMP_{QAT}***	***EMP_{OMN}***	***EMP_{MORC}***
	CONTAGION						
TUR_2005:04 (+)	*2.696 (0.756)*		**2.020 (0.970)**		**1.983 (0.798)**	**-2.342 (0.807)**	
TUR_2006:06 (+)	*3.095 (0.951)*	**-3.998 (1.612)**		**2.286 (1.100)**		**2.405 (0.907)**	**4.054 (1.674)**
RUS_2010:11 (+)			**1.462 (0.746)**				
BRA_2011:10 (+)		**2.981 (1.472)**	*2.696 (0.839)*	**-1.846 (1.126)**		**-2.202 (0.945)**	**-3.225 (1.668)**
BRATUR-RUS_2008:10(+)	*2.637 (0.781)*		*5.244 (0.933)*		**1.477 (0.767)**		
KWT_2005:12 (+)							
KWT_2007:03 (-)		**6.716 (1.615)**	**2.237 (1.135)**	*-4.806 (1.182)*	**1.202 (0.748)**	**-4.192 (1.071)**	**-6.877 (1.881)**
KWT_2008:08 (+)		**-5.167 (1.507)**	**-1.710 (0.926)**	*3.651 (1.117)*		**3.135 (1.001)**	**5.447 (1.746)**
KWT_2011:02 (-)							
QAT_2007:11(-)			**-4.563 (1.124)**		*-4.514 (0.751)*	**-2.014 (0.815)**	
QAT_2012:01 (-)	**-1.503 (0.827)**		**-2.640 (1.136)**		*-4.323 (0.690)*		
OMN_2005:05 (-)						*-1.496 (0.760)*	
MORC_2005:06 (+)	**-3.332 (0.765)**						*3.088 (1.056)*

+: Crisis -: Mania
Interdependence in yellow
Contagion pink area in bold
Standard errors in parentheses

(1) **5. Discussion on the Empirical Results**The overall empirical analyses of the outlier(s) tests and the simultaneous equations estimations results reveal that:

(2) There are thirteen financial turbulence periods in the sample period.

(3) All of the financial turbulence periods display contagious at least one country.

(4) All of the countries have at least two interdependence relations from the others.

(5) All of the peripheral economies, i.e. Kuwait, Oman, Morocco and Qatar, are influenced by one of the core economies, i.e. Brazil, Russia and Turkey.

(6) Almost all of the five financial turbulence periods experienced in the core economies also influenced the peripheral economies, except November 2010 Russian turbulence.

(7) A second generation monsoonal effect does not matter for the peripheral countries.

The core economies are related to each other either linearly (interdependence effect) or non-linearly (contagious effect) or both. For example, both the Turkish and Russian economies and the Russian and Brazilian economies are related to each other and both in a linear and non-linear manner. However, the interaction mechanism between Brazil and Turkey works only at a non-linear fashion.

This paper proposes a new understanding of the relationship between the interdependence and the contagion effects. An alternative perspective[6] on the transmission process of financial crises across the economies is suggested considering any possible interaction channel between the interdependence effect and the contagion phenomenon. It is proposed that an interdependence effect could weaken, disappear completely or veer during the crisis period as a result of the contagion phenomenon. This proposed view brings about an important policy implication.

The empirical analysis reveals that there are fifteen cases in which the interdependence and the contagion effects could be related one to another.

[6] Korkmaz (2012).

Then we have defined the interdependence effect and the contagious effect as follows: The interdependence effect is equal to the interdependence coefficient (in Table3, above) times the current value of the EMP performance indicator when the economy experiences turbulence. The contagious effect equals the contagious coefficient (in Table 3, below) estimated by the 3SLS method. Net effect is the sum of the interdependence and contagious effects. These cases found in this paper are presented in Table 4.

Table 4: Test Results of the Hypothesis of the Paper

	Interdependence Effect	**Contagion Effect**	**Net Effect**	**Result**
from Turkey to Russia (in June 2006)	0.544 (0.262*2.076)	-3.998	-3.454	Veering
from Kuwait to Russia (in March 2007)	-7.568 (1.586*-4.772)	6.716	0.852	Veering
from Kuwait to Russia (in August 2008)	5.407 (1.586*3.409)	-5.167	0.240	Disappearing
from Russia to Brazil (in November 2011)	-0.437 (-0.222*1.968)	1.462	1.025	Veering
from Kuwait to Brazil (in March 2007)	-2.081 (0.436*-4.772)	2.237	0.156	Disappearing
from Kuwait to Brazil (in August 2008)	1.486 (0.436*3.409)	-1.710	-0.224	Veering
from Qatar to Brazil (in November 2007)	3.570 (-0.629*-5.676)	-4.563	-0.093	Disappearing
from Qatar to Brazil (in January 2012)	2.667 (-0.629*-4.240)	-2.640	0.027	Disappearing
from Turkey to Qatar (in April 2005)	-0.332 (-0.168*1.974)	1.983	1.649	Veering
from Brazil, Russia and Turkey to Qatar (in October 2008)	-0.596 (-0.125*5.314) (0.125*7.035) (-0.168*4.831	1.477	0.881	Veering
from Brazil to Oman (in October 2011)	0.474 (0.151*3.137)	-2.202	-1.728	Veering
from Kuwait to Oman (in March 2007)	0.474 (-0.623*-4.772)	-4.192	-1.219	Veering

from Kuwait to Oman (in August 2008)	-2.124 (-0.623*3.409)	3.135	1.011	Veering
from Kuwait to Morocco (in March 2007)	6.776 (-1.420*-4.772)	-6.877	-0.101	Disappearing
from Kuwait to Morocco (in August 2008)	-4.840 (-1.420*3.409)	5.447	-0.606	Veering

Notes: The interdependence effect is calculated as the interdependence coefficient from 3SLS estimation times the current value of the performance indicator of the economy experiencing the turbulence. The contagion effect equals to the related contagion coefficient from the 3SLS estimation. Net effect is the sum of the interdependence and the contagion effects. If the net effect is positive (negative) when the interdependence effect is negative (positive), it is concluded that the interdependence effect veered. At last, if the net effect is smaller than the ten percent of the interdependence effect, it can be concluded that the interdependence effect has disappeared.

As can be seen from Table 4, the Russian economy has interdependence effects from the Turkish economy. A point increase in the Turkish performance indicator leads to increase in the Russian performance indicator by 0.544 points. It is necessarily expected that the June 2006 Turkish turbulence leads to the Russian performance indicator to increase. However, surprisingly, the June 2006 Turkish turbulence resulted in decrease of the Russian performance indicator. Roughly speaking, the interdependence relation from Turkey to Russia turned to opposite direction during the crisis period. Another example is the August 2008 Kuwait case for Russia. According to the interdependence effect, the Russian performance indicators should have been increased by 5.407 points as calculated in Table 4. However, the impact of the Kuwait turbulence in August 2008 has never disappeared because the contagion effect almost completely removed the expected effect of the interdependence relation. Table 4 shows similar examples of thirteen other cases. Based upon the empirical results, it can be suggested that an interdependence effect could weaken, disappear completely or veer during the crisis period as a result of the contagion phenomenon.

6. Conclusion

This paper investigates whether a second generation monsoonal effect could be a matter for Kuwait, Qatar, Oman and Morocco through Turkey, Brazil and Russia to contribute to the transmission mechanism of the financial turbulences across the economies and test for the contagion. In the paper, Brazil, Russia and Turkey are pre-determined as the core or central economies while Kuwait, Qatar, Oman and Morocco are the peripheral economies.

The economies and the sample period in this paper are defined to test for the interdependence and contagion effects. The interdependency is explained through the EMP indexes however, the contagion is explained by means of the crisis or mania dummies. According to estimation results, there exist fifteen cases in which the interdependence and the contagion effects could be related to each other. There is enough evidence to suggest that a second generation monsoonal effect is matter for the peripheral countries.

This paper proposes an alternative perspective on the transmission process of financial crises across the economies by considering a possible interaction channel between the interdependence effect and the contagion phenomenon. That is, an interdependence effect could weaken, or disappear completely, or veer during the crisis period as a result of the contagion phenomenon. Hence, it can be suggested that the policy-makers are less likely to prevent the financial crises experienced outside from being transmitted to their own country, even if they could exactly predict that the interdependence effect exists.

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