Equity market contagion during global financial and Eurozone crises: Evidence from a dynamic correlation analysis

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Sabur Mollah[1], A.M.M. Shahiduzzaman Quoreshi[2], and Goran Zafirov[3]

ABSTRACT

The devastation resulting from the recent global financial and Eurozone crises is immense. Most researchers commonly believe that the global financial crisis originated in the United States, and spread immediately to global financial hubs where it eventually became the Eurozone crisis. Several studies have been conducted on financial market contagion during both global and Eurozone crises; however, the issue of whether equity market contagion spreads from the United States to the world equity markets during these crises has not been addressed yet. Using US dollar-denominated MSCI daily indices from fifty-five equity markets for the period 2003–2013, we have found evidence of contagion in developed and emerging markets during the global and Eurozone crises. We show that contagion spread from the United States to the world markets during both crises. Our regression results identify that the bank risk transfer between the United States and other countries is the key transmission channel for cross-country correlations. This study has an important policy implication for portfolio diversification between the United States and other countries during these crises.

Keywords: Contagion, Financial markets, Global financial crisis, Eurozone crisis

JEL classification: F36, G01, C58

[1] Stockholm University, School of Business, SE-106 91, Stockholm, Sweden. Tel: +468163034, Fax: +4686747440, e-mail: sabur.mollah@sbs.su.se **(Corresponding Author)**

[2] Blekinge Institute of Technology, Department of Industrial Economics, SE- 371 79 Karlskrona, Sweden. E-mail: shahiduzzaman.quoreshi@bth.se

[3] Stockholm University, School of Business, SE-106 91, Stockholm. Sweden. E-mail: gz@sbs.su.se

1. Introduction

The world financial system has experienced two interrelated crises in recent years– the global financial crisis (hereafter GFC) and the Eurozone crisis (hereafter EZC). The source of the GFC was the subprime credit crisis in the United States. The bankruptcy of Lehman Brothers was the world's first indication of the imminent global financial crisis. The Lehman bankruptcy was followed by the takeover of Merrill Lynch by Bank of America, and the consequent rescue of AIG. The crisis inevitably spread throughout the world, especially to Europe. Although the PIIGS (Portugal, Italy, Ireland, Greece and Spain) countries were severely affected, the situation in Greece has been worse since the EZC hit the Euro area in 2010. Analysts agree that the world has experienced the deepest recession since World War II.

Financial market contagion[4] is a widely discussed term within financial market research. The empirical studies investigate equity market contagions in the 1987 US stock market crash, the Asian, Russian, Mexican, Brazilian, global, and Eurozone crises. King and Wadhwani (1990) show that the correlations between the United States, the United Kingdom, and other developed markets increased significantly following the 1987 crash. Lee and Kim (1993), extending this analysis to a dozen countries that include emerging markets, confirmed increased correlations, and thus contagion, during the 1987 crash. Calvo and Reinheart (1996) investigate the 1994 Mexican crisis, and show that correlations increased in a group of emerging markets. Forbes and Rigobon (2002), studying the 1994 Mexican and the 1997 Asian crises, report no contagion but find interdependence in both episodes among 24 developed and emerging countries. However, Chiang et al. (2007) show contagion during the two phases of the Asian crisis, using a longer sample period. Baig and Goldfajn (1998) also find the presence of a contagion effect between equity and currency markets during the Asian currency crisis. Caporale et al. (2005) study the Asian crisis, and find a significant increase in co-movements among a group of South East Asian countries, and thereby conclude the co-movements are contagion. The study by Corsetti et al.

[4] Researchers define contagion as an excessive increase in the correlation among the countries causing the crisis and all other countries (see Masson, 1998 and 1999; Masson and Mussa, 1995; Calvo and Reinhart, 1996; Forbes and Rigobon, 2002; Pesaran and Pick, 2003; Pericoli and Sbracia, 2003; and Corsetti et al., 2005). Dornbusch et al. (2000) and Pritsker (2001) adopt the definition of contagion as the dissemination of market disturbances, primarily with negative consequences, from one market to another. Bekaert et al. (2005) also identify contagion in equity markets as the idea that markets move more closely together during periods of crisis. However, Sachs et al. (1996) illustrate financial market contagion as a significant increase in cross-country correlations of stock market returns and volatilities.

(2005) is somewhat different from the existing studies on Asian crisis. Their study offers contagion for only five countries from a sample of seventeen countries (developed and emerging).

Goldfajn and Baig (2000) examine whether there was contagion during the Russian crisis with regard to Brazil, and conclude that contagion occurred, and that the mechanism of propagation was the debt securities market. Hon et al. (2004) test whether the terrorist attacks on the United States of September 11, 2001, resulted in contagion in the financial market. Their results indicate that international stock markets, particularly in Europe, responded closely to the US stock market shocks during the three to six months following the attacks. Cappiello et al. (2006) also conclude that, during periods of financial turmoil, equity market volatilities show important linkages, and conditional equity market correlations among similar regional groups increase dramatically.

Furthermore, by pursuing a contagion analysis on BRIC (Brazil, Russia, India and China) countries, UK, and US data, Kenourgios et al. (2011) conclude that contagion spreads from the crisis country to other countries during the Brazilian, Asian, and Russian crises. Chudik and Fratzscher (2011) study 26 economies (defining the European Union area as a single economy) by using weekly data, and find that the tightening of financial conditions was the key transmission channel in advanced economies, whereas the real side of the economy was the main channel in emerging economies. Samitas and Tsakalos (2013) examine the correlation dynamics between Greek and European markets during the GFC and Greek crises, and report contagion during GFC, but not during the Greek crisis. Nevertheless, Kenourgios (2014) investigates volatility contagion across the United States and European stock markets during GFC and EZC, and finds the evidence of volatility contagion during both crises. In a nutshell, researchers have come to different conclusions depending on the econometric methods[5] they use to identify contagion, even though the general definition of contagion is the same.

[5] Using a correlation analysis, Lee and Kim (1993) find evidence of contagion in the global stock markets after the 1987 US stock market crash. Chiang et el. (2007) use the dynamic conditional correlation (DCC) model of Engle (2002) to capture contagion in nine Asian stock markets (using daily stock-returns) during the 1997 crisis. Their study provides evidence of contagion in terms of increasing correlations. However, Boyer et al. (1999) and Forbes and Rigobon (2002) develop a measure of interdependence in order to test the change in correlation due to co-movements in the volatility of asset prices. A linear transmission mechanism is used where restrictions on the variance of the common factors relative to the variance of the country-specific shock are imposed. On the other hand, Corsetti et el. (2005) define contagion for asset prices as the observed pattern of co-movements that is too strong (or too weak) compared to the predicted co-movements that are conditional on a linear transmission mechanism across countries. Corsetti et el. (2005) argue that enhanced correlations across countries during a financial crunch does not provide evidence for contagion. Samarakoon (2011) uses a VAR framework on 63 emerging and frontier markets to produce counterintuitive results that contagion does not spread from the United States to emerging markets (except for Latin America), but from emerging markets to the US market.

The purpose of our paper is to investigate market contagion across countries due to the GFC and the EZC. Although a large number of studies have been conducted on the 1987 US stock market crash and the Asian, Russian, Mexican, Brazilian, global (GFC), and Eurozone (EZC) crises, the studies on equity market contagion due to the GFC and the EZC are still scarce, especially considering the United States as the source of contagion; however several recent studies examine sovereign bond and CDS contagion (for example Arghyrou and Kontonikas, 2012; Kalbaska and Gatkowski, 2012: Metiu, 2012; Mink and Haan, 2013; Claeys and Vasicek, 2014; and Gunduz and Kaya, 2014). We adopt a definition of contagion as the significant increase in the conditional correlations between the pre-crisis and crisis periods. By using daily MSCI US-dollar denominated price indices for 55 stock markets for the period from 2003 to 2013, we find that the evidence of contagion in developed and emerging markets during both the GFC and the EZC indicates the United States as a source of contagion. We find that Latin American emerging countries are affected during both crises, but Asian emerging countries are partially affected by the GFC. Conversely, African and Middle Eastern emerging countries are unaffected by the GFC, although they are partially affected by the EZC. We also report that crises (either GFC or EZC) are common phenomena for developed countries. We additionally show bank risk transfer between the United States and other countries as the primary transmission channel for the cross-country correlation, even though an exception is reported in African and Middle Eastern countries. We further show that the difference in the real interest rates between the United States and other countries is the secondary transmission channel only for the cross-country correlations in developed markets.

This paper contributes to the literature in several ways: **First**, our study builds on Forbes and Rigobon (2002) and extends to Hon et al. (2004) and Chiang et al. (2007) for the GFC and the EZC. Forbes and Rigobon (2002) emphasize that correlation coefficients are subject to market volatility, and hence, after adjusting this bias, there is no increasing correlation (contagion). However, by employing a similar heteroskedasticity adjustment, Hon et al. (2004) and Chiang et al. (2007) show contagion during the 9/11 terrorist attack and Asian crisis respectively. We show a similar result as Hon et al. (2004) and Chiang et al. (2007) during GFC and EZC, after taking into account Forbes and Rigobon's heteroskedasticity adjustment. We also distinguish the contagion effect between developed and emerging markets, and classify differences in contagion behaviour between five emerging market groups. **Second**,

our study complements Caporale et al. (2005), Carrieri et al. (2007), Wälti (2011), and Christoffersen et al. (2012) by offering empirical evidence on transmission channels of contagion. These studies illustrate that the channel of transmission can vary during the crisis due to a change in the investors' behaviour. Our study tests several economic and financial channels as possible sources for the changes in the correlations during both the GFC and the EZC, and identify bank risk transfer between the United States and other countries as the primary transmission channel for contagion. **Third**, our study also complements Christoffersen et al. (2012) with regards to co-movement and portfolio diversification. Christoferssen et al. (2012) highlight that the diversification opportunities in the developed markets have diminished in recent years, while the emerging markets still possess some diversification benefits for global investors. However, our results indicate that diversification benefits decay for most of the countries during the GFC and for European countries during the EZC.

The remainder of the paper is structured as follows: In Section 2 we describe the correlation analysis, which is the backbone of the contagion research. Section 3 presents the vector autoregressive framework, while in Section 4 we describe the dynamic conditional correlations and how they are obtained. In Section 5 we present the determinants of contagion, and Section 6 concludes the paper.

2. Correlation analysis

A correlation analysis is widely used for measurement of financial market contagion. Contagion is defined as the significant increase in the conditional correlations between the pre-crisis and crisis periods. This correlation refers to when volatility transmits from a crisis-affected country to another country. However, Forbes and Rigobon (2002) argue that heteroskedasticity (changing volatility) in the market returns cause increasing correlation, or contagion, and disappear fully through the adjustment of the correlation coefficients for the heteroskedasticity. As we consider the United States to be the source of the contagion, we generate bi-variate conditional correlations between the United States and other countries. We conduct the heteroskedasticy-adjusted correction of the coefficients to test for contagion[6].

[6]Forbes and Rigobon (2002) propose an adjusted correlation coefficient, ρ*, as: $\rho^* = \rho/\sqrt{1+\delta[1-\rho^2]}$ with $\delta = \left(\frac{Var(r_2)_h}{Var(r_2)_l}\right) - 1$, where ρ is the unadjusted correlation coefficient varying with the high volatility period (crisis) or low-volatility period (pre-crisis); $\rho = Corr(r_1, r_2) = \frac{Cov(r_1,r_2)}{\sqrt{Var(r_1)Var(r_2)}} = \frac{\beta_1 Var(r_2)}{\sqrt{[\beta_1^2 Var(r_2)+var(v_1)]var(r_2)}} = \left[1+\frac{Var(v_1)}{\beta_1^2 Var(r_2)}\right]^{-1/2}$, where $r_{1,t}$ and $r_{2,t}$ are stock returns in markets 1 and 2 at time t, respectively, in

However, we use the Fisher Z transformation[7] of the correlation coefficients to test the pairwise cross-country significance. For the contagion test, we consider the one year before the beginning of the GFC as the pre-GFC period, and 01 January 2010 to 01 May 2010 as the pre-EZC period. We use daily MSCI US-dollar denominated stock price indices from 01 January 2003 to 31 December 2013 for 55 stock markets[8].

The test results are reported in Table 1. The heteroskedasticity adjusted Z-statistics confirm contagion in 19 (30) countries during the GFC (EZC). These results support Chiang et al. (2007) and Hon et al. (2004), who argue that there is contagion even after the heteroskedasticity adjustment. The adjusted Z-statistics show that 10 (9) developed (emerging) countries are affected by contagion out of 21 (34) sample countries during the GFC, whereas 17 (13) developed (emerging) countries are affected by contagion out of 21 (34) sample countries during the EZC. These results demonstrate that the United States is a source of contagion during the EZC compared to the GFC. Among the European countries, of the 23 (15 developed and 8 emerging) in the sample, 11 (8 developed and 3 emerging) are affected during the GFC and 22 (14 developed and 8 emerging) are affected during the EZC. These results show that the GFC spread across global countries, whereas the EZC is more specific to European countries. However, Latin American emerging countries are equally affected during both crises. The Asian emerging countries are partially affected by the GFC, but are untouched during the EZC. African and Middle Eastern emerging countries are unaffected by the GFC, but partially affected by the EZC.

[Insert Table 1 about here]

3. Vector autoregressive and endogeneity problem

To estimate the cross-market correlations, we follow Hon et al. (2004) and use the unrestricted vector auto regression (VAR), which was originally developed by Forbes and Rigobon (2002). We use five

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the equation $r_{1,t} = \beta_0 + \beta_1 r_{2,t} + v_{1,t}$; and $v_{1,t}$ is the stochastic noise independent of $r_{2,t}$; δ is the relative increase in variance of r_2. The $Var(r_2)_h$ and $Var(r_2)_l$ are the variance of r_2 in a high-volatility period and a low-volatility period, respectively.

[7] Morrison (1983) suggests that test statistics for the null hypothesis of no increase in the correlations, $T = \frac{(Z_0 - Z_1)}{\sqrt{\left[\frac{1}{(N_0-3)} + \frac{1}{(N_1-3)}\right]}}$, where Z_0=0.5*ln((1+ρ_0)/(1-ρ_0)) and Z_1=0.5*ln((1+ρ_1)/(1-ρ_1)) are Fisher transformations in the pre- and crisis periods; N_0 and N_1 are the number of observations in the pre- and crisis periods. The test statistics are approximately normally distributed and are fairly robust to the non-normality of the correlation coefficients after the Fisher transformation. Hon et al. (2004), Chiang et al. (2007), Basu (2002), and Corsetti et al. (2005) use the Fisher Z transformation in their studies.

[8] We collect the data from Thomson Reuters' Datastream. Out of 55 countries, 21 are developed and 34 are emerging. We classify the developed markets by region as European, Asian, and American developed markets. We also classify the emerging countries by following Wang and Moore (2012) as African and Middle Eastern, American, Asian, and European emerging markets. By following Mobarek et al. (2014) and Ahmed et al. (2009), we determine the GFC as the period from 09 August 2007 to 31 December 2009 and the EZC as for the period from 02 May 2010 to 09 June 2013.

lags to filter out the possible autocorrelations in trading patterns, and we implement the VAR framework as specified below to estimate the variance-covariance matrix for pre-crisis and crisis periods. The model is specified as follows:

$$R_t = m + \Phi(L)R_t + \Gamma_t \dots\dots\dots (1)$$

$$R_t = \{r_t^{US}, r_t^i\} \dots\dots\dots (2)$$

where R_t is the vector of returns in two markets, m is the constant, $\Phi(L)$is the vector of the lags, $\Gamma_t$is the vector of disturbances, r_t^{US} is the US market return as a global factor[9], and r_t^i is the market return in market i.

Due to the fact that the global crisis originated in the United States, we assume that the observable shock on the US market transmits to the other countries during both the GFC and the EZC. We use the VAR-Granger causality approach to test the significance of off-diagonal elements. The VAR process is adjusted for heteroskedasticity in the sample. By following Hon et al. (2004), we report the results for VAR-Granger causality in Table 2. We find that the null hypothesis of no causality is rejected in all of the countries except for Nigeria and Pakistan during the GFC and in Spain, Morocco, Argentina, Brazil, and Mexico during the EZC. However, we find a low degree of reverse causality for some developed countries like Canada, Australia, France, Germany, and the United Kingdom during the GFC, but none during the EZC. These results indicate that there is no feedback effect from other markets during the EZC and a weak feedback effect during the GFC. Nevertheless, they support weak exogeneity and also confirm that the GARCH specification does not suffer from endogeneity problems.

[Insert Table 2 about here]

4. Dynamic conditional correlation

We test whether the correlations are static or dynamic in nature. Testing the model for constant correlations is difficult, because testing for dynamic correlations requires using data with time-varying volatilities that can result in a misleading conclusion (Engle and Sheppard, 2001), and rejection of a true constant correlation because of mis-specified volatility models. On the one hand, Tse (2000) conducts a null constant conditional correlation (CCC) against an autoregressive conditional heteroskedasticity

[9]By following Chiang et al. (2007) and Dungey et al. (2003), we use lagged US return as a global disturbance factor in our mean model.

(ARCH) as a correlation alternative. Bera and Kim (1996) also test a null CCC against a diffuse alternative. Engle and Sheppard (2001) stress that both alternatives fail to generalize the vector at a higher order, which has been identified as a limitation in the testing procedure of a null CCC against a dynamic (DCC) alternative; therefore, they suggest testing a null CCC against a DCC within a vector autoregressive framework.

Following Engle and Sheppard (2001), we use a null CCC against a DCC alternative in a higher order vector autoregressive (VAR) to satisfy the condition that the specific return series and the US returns experience a dynamic correlation. We apply a seemingly uncorrelated regression (SUR) between individual series; US returns have a null H_0: $\alpha=1-\beta$ against the DCC alternative. Under the null, the constant and all of the lagged parameters in the model should be zero. The primary conditions of a DCC are satisfied through the estimations,[10] thus we apply the DCC framework to identify the presence of contagion at the country level and augment this model with asymmetric influences, as shown by Cappiello et al. (2006).

For each country *i* at time *t,* we specify the return equation as:

$$r_{i,t} = \alpha_0 + \beta_i r_{i,t-1} + \beta_2 r_{t-1}^{us} + \varepsilon_{i,t} \qquad (3)$$

where $r_{i,t}$ is the country-specific return, $r_{i,t-1}$ is the country-specific lag return, r_{t-1}^{US} is the US market return at time *t–1*, and $\varepsilon_{i,t} | \Im_{t-1} \approx \mathrm{N}(0, \mathrm{H_t})$. By following our earlier definition, we use lagged US return as a global disturbance factor in our mean model (see Chiang et al., 2007; and Dungey et al., 2003).

Following Engle (2002) and Cappiello et al. (2006), we estimate the multivariate DCC-GARCH using the following equations:

$$r_{i,t} | \Im_{t-1} \approx \mathrm{N}(0, \mathrm{D_t R_t D_t}) \qquad (4)$$

$$D_t = diag\{\sqrt{h_{i,t}}\} \qquad (5)$$

$$Q_t = (1 - a - b)\bar{R} + a\varepsilon_{t-1}\varepsilon'_{t-1} + bQ_{t-1} \qquad (6)$$

$$R_t = Q_t^{*-1} Q_t Q_t^{*-1} \qquad (7)$$

where $D_t = diag\{\sqrt{h_{i,t}}\}$ is an nxn diagonal matrix with the square roots of the conditional variances in the diagonal, $h_{i,t}$ is obtained by a GARCH(1,1), $\varepsilon_{it} = r_{it}/\sqrt{h_{it}}$ is the standardized residual, r_{it} is the

[10]The results are available on request.

return of series *i* at time *t*, and $\bar{R} = E[\varepsilon_t \varepsilon'_t]$; $Q_t^* = [q_{iit}^*] = \left[\sqrt{q_{iit}}\right]$. We obtain the *a* and *b* by maximizing the log-likelihood of the DCC process given by the following equation:

$$L = -\frac{1}{2}\sum_{t=1}^{T}(n\log(2\pi) + 2log|D_t| + log|R_t| + \varepsilon'_t R_t^{-1}\varepsilon_t + r_t' D_t^{-1} D_t^{-1} r_t' - \varepsilon_t'\varepsilon_t) \quad (8)$$

An imposed restriction on the model is that $a + b < 1$. We obtain the pattern of the dynamic correlations by using Eq. (7), for which the dynamic correlation between series *i* and *j* at time *t* is equal to R_{ijt}. We proceed to apply the DCC framework to identify the presence of contagion at the country level.

Table 3 reports the estimates of the returns by using Eq. (3) and the conditional variance by using Eq. (6). We report the estimates of the returns in Panel A. We find that the AR (1) is negative (significant) for all of the developed countries that indicate the presence of positive feedback trading in these markets. However, the AR(1) is positive (significant) in emerging markets with a few exceptions, which indicates that price friction or partial adjustment exists in the emerging markets. These results are consistent with Antoniou et al. (2005) and Chiang et al. (2007), who find that advanced markets have a positive feedback effect, and emerging markets have price friction. The lagged US coefficients (r_{t-1}^{US}) are large (positive) and highly significant for all of the countries. These coefficients show that the United States is a global disturbance factor that has a significant influence on the returns of other countries.

We report conditional variance GJR estimates from the DCC-GARCH (1,1) model in Panel B of Table 3. The coefficients for the lagged variance and shock-squared terms in the DCC-GARCH equation (Eq. 6) are highly significant, and indicate a time-varying volatility. These results also justify the specification of the GARCH (1,1). However, the sum of the lagged variance and the shock-squared terms ($\alpha+\beta$) is close to one. This result shows the presence of volatility persistence in both developed and emerging markets. We report the DCC coefficients in column 9. We find from this column that the dynamic correlations are generally high in developed countries; diverse correlations are reported in emerging markets. Specifically, the dynamic correlations between the United States and the emerging countries of Africa, the Middle East, and Asia are very low; they are high with the Latin American emerging markets, and moderate with European emerging markets.

[Insert Table 3 about here]

We also present the pairwise regional DCC graphs in Figure 1. The graph illustrates that developed markets have a high degree of correlation with the United States, whereas emerging markets have a low degree of correlation. However, market contagion is visible during both the GFC and EZC periods.

[Insert Figure 1 about here]

Furthermore, we estimate the dynamic feature of the correlation changes during the GFC and the EZC. We introduce GFC and EZC dummies to capture the crises regimes in the mean equation (Eq. 9) as below:

$$\widehat{\rho}_{i,US,t} = \gamma_0 + \gamma_1 \widehat{\rho}_{i,US,t-1} + \delta_1 GFC + \delta_2 EZC + v_t \quad (9)$$

where $\hat{\rho}_{i,US,t}$ is the DCC coefficient between market *i* and the US market at time t, the GFC and EZC are dummy variables for the crises period, and v_t is the error term. The ARCH-LM test statistics are rejected for all countries. This result confirms the significant heteroskedasticy in the DCC coefficient, and indicates that the conditional variance equation follows a GARCH (1,1) process. Thus, we propose Eq. (10) for the variance equation:

$$h_t = \omega + \alpha h_{t-1} + \beta \varepsilon_{t-1}^2 + \delta_1 GFC_t + \delta_2 EZC_t + \varepsilon_t \ldots\ldots (10)$$

where, h_t is $\rho_{i,US}^2$. The presence of contagion is identified with the significant positive coefficient of δ.

The significance of the estimated coefficients of the dummy variables indicates structural changes in mean/variance shifts of the correlation coefficients, due to external shocks during the GFC and/or EZC. Table 4 reports the results for the mean model (Panel A: Eq. 9) and the variance model (GARCH) (Panel B: Eq. 10).

In Panel A, we find that both the GFC and EZC coefficients are highly significant for developed markets. This significance indicates that crises are common phenomena for developed countries, and structural shifts in the correlation coefficients are due to external shocks during the GFC and the EZC. However, the coefficients for the crises are largely insignificant for African, Middle Eastern, and Asian emerging markets with some exceptions, but the coefficients for the European emerging markets are

highly significant during the EZC. In Panel B, the estimates of the GARCH (1,1) model are reported. The coefficients for both crises are positive and highly significant except for Egypt, Lebanon, Mauritius, and Pakistan. The results indicate more volatile changes in the correlation coefficients during the crises. The evidence thus suggests that when the crisis hits the market, the correlation coefficients could vary greatly, and this variability could be prolonged for a significant period of time. The test statistics for the robustness checks for crisis dummies are rejected for all countries except for Egypt, Lebanon, Mauritius, and Pakistan, indicating that the results are robust between the crisis periods[11].

[Insert Table 4 about here]

5. Determinants of cross-country correlation

Despite the fact that the noise of the correlation coefficients could be sensitive to cross-country variation in the macroeconomic variables and country characteristics, we apply the multivariate regression analysis in Eq. (11) to the country-year setting, to determine the driving forces behind the cross-country correlation:

$$\rho_{i,US,t} = \alpha_0 + \alpha_1\rho_{i,US,t-1} + \beta_1 Risk_{i,t} + \beta_2 Interest_{i,t} + \beta_3 Trade_{i,t} + \beta_4 GDP_{i,t} + \beta_5 Spread_{i,t} + \beta_6 Market_{i,t} + \beta_7 Corruption_{i,t} + \gamma_1 GFC_t + \gamma_2 EZC_t + \varepsilon_t \ldots . (11)$$

Where the yearly average of the DCC coefficient ($\rho_{i,US,t}$) is the dependent variable. The independent variables are the difference in the net bank risk transfers between the United States and other countries (risk)[12], the difference in the real interest rates between the United States and other countries (interest),the difference in the trade balances between the United States and other countries (trade), the difference in the GDP growth rates between the United States and other countries (GDP), the difference in the term spreads between the United States and other countries (spread), the difference in the market capitalizations between the United States and other countries (market), the difference in the perceptions of corruption between the United States and other countries (corruption), and the GFC and EZC dummies.

[11]The results for the robustness tests are available on request.

[12]Net risk transferis the proxy for country risk exposure. Bank for International Settlements (BIS) reports annualized data for banks' financial claims for one country on other countries. We have calculated the difference of net risk transfer between the United States and other countries in the sample on an immediate borrower basis (i.e. the claims allocated to the country where the original risk lies). We have collected net risk transfer data from Thomson Reuters.

The results are reported in Table 5. Models 1–3 report the results for the full sample; model 4 reports the results for developed countries; model 5 is for results from emerging countries; and models 6–9 are for results from African, American, Asian, and European emerging countries. In general, our results illustrate that the United States' bank risk transfer is a key driving force for the cross-country conditional correlations, with the exceptions of African and Middle Eastern emerging countries. The difference in real interest rates influences the cross-country correlations in developed countries.

[Insert Table 5 about here]

6. Conclusion

The purpose of this paper is to investigate market contagion across countries due to the GFC and the EZC. By using daily MSCI US-dollar stock price indices for 55 stock markets for the period from 2003 to 2013, we find evidence of contagion in developed and emerging markets during the GFC and the EZC. This evidence shows that the United States is a source of contagion during both crises. These results also indicate that the GFC is more of a global phenomenon than the EZC. However, Latin American emerging countries are equally affected during both crises, but Asian emerging countries are partially affected by the GFC and untouched by the EZC. African and Middle Eastern emerging countries are unaffected by the GFC but partially affected by the EZC. We find that both the GFC and EZC dummies are highly significant for developed markets, but the EZC dummy is particularly significant for European emerging markets. Finally, we find that the net bank risk transfers between the United States and other countries are a key driving force for changes in the cross-country conditional correlations for markets, except those in Africa and the Middle East. Our findings are robust across the crisis periods.

The paper has a major implication for international portfolio diversification. The findings of the paper indicate that the benefits of portfolio diversification were significantly decayed during both crises. Our contagion results between the United States and developed countries illustrate that diversification was not beneficial during either crisis. The contagion results for the emerging markets have different implications on portfolio diversification. For example, diversification decays equally between both crises for the Latin American emerging countries. On the other hand, the benefits of diversification partly mitigate the GFC in Asian emerging countries, but they affect African and Middle Eastern emerging

countries during the EZC. Nevertheless, bank risk transfer leaves an important implication for cross-country banking portfolios.

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Figure 1 -Dynamic Conditional Correlation (DCC) of the stock returns between US, Develope
Countries for the period 2003-2013.

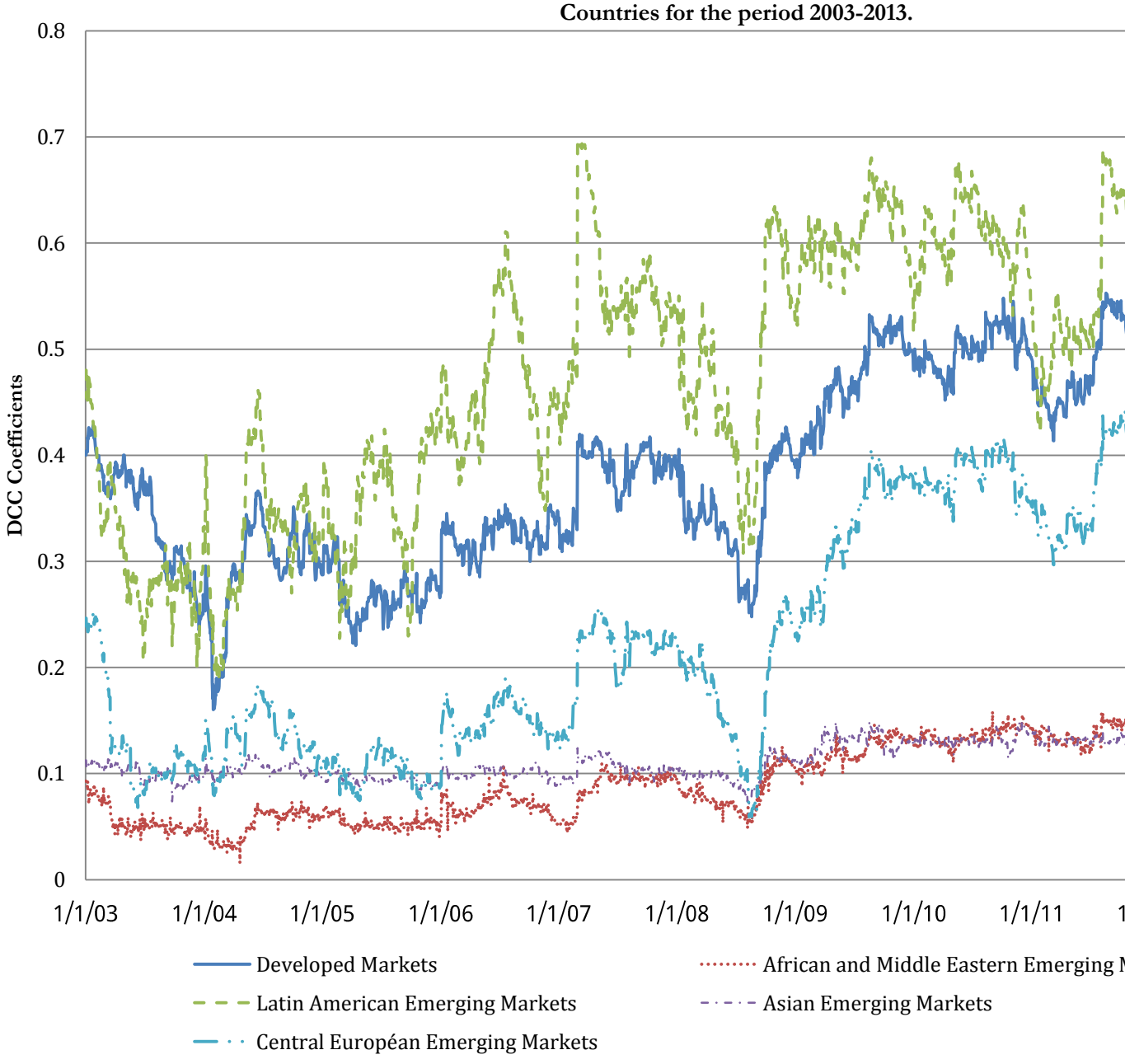

Table 1

Test of significant increases in conditional correlation coefficients between the US and other countries

This table reports the test statistics for contagion. We define contagion as a significant increase in the conditional correlations between pre-crisis and cr
contagion. The *,**, and *** represent the p-values <0.10,<0.05, and <0.01.

		Conditional Correlations (Adjusted FR)				Z-statistics (adjusted)						
		Global Crisis		Eurozone Crisis								
Country	Category	Pre-crisis Period	Crisis Period	Pre-crisis Period	Crisis Period	Global Crisis	Contagion?	Eurozone Crisis	Contagion?	Country	Category	
Canada	Developed America	0,252	0,413	0,474	0,706	-2,463***	C	-3,161***	C	South Africa	Emerging Africa & Middle East	
Australia	Developed Asia	0,045	0,097	0,144	0,350	-0,711	N	-1,913**	C	Turkey	Emerging Africa & Middle East	
Japan	Developed Asia	-0,001	-0,010	-0,059	0,053	0,119	N	-0,971	N	Argentina	Emerging America	
New Zealand	Developed Asia	0,011	0,085	0,151	0,261	-1,005	N	-1,000	N	Brazil	Emerging America	
Singapore	Developed Asia	0,055	0,146	0,128	0,342	-1,240	N	-1,971**	C	Chili	Emerging America	
Austria	Developed Europe	0,091	0,206	0,234	0,532	-1,582*	C	-3,074***	C	Colombia	Emerging America	
Belgium	Developed Europe	0,141	0,226	0,261	0,539	-1,196	N	-2,913***	C	Mexico	Emerging America	
Denmark	Developed Europe	0,122	0,204	0,214	0,451	-1,143	N	-2,328***	C	Peru	Emerging America	
Finland	Developed Europe	0,127	0,215	0,162	0,562	-1,219	N	-4,098***	C	China	Emerging Asia	
France	Developed Europe	0,181	0,268	0,299	0,608	-1,237	N	-3,442***	C	Hong Kong	Emerging Asia	
Germany	Developed Europe	0,175	0,295	0,313	0,606	-1,724**	C	-3,285***	C	India	Emerging Asia	
Greece	Developed Europe	0,111	0,145	0,163	0,266	-0,476	N	-0,938	N	Indonesia	Emerging Asia	
Ireland	Developed Europe	0,120	0,210	0,166	0,517	-1,248	N	-3,509***	C	Korea	Emerging Asia	
Italy	Developed Europe	0,145	0,245	0,284	0,554	-1,404*	C	-2,878***	C	Malaysia	Emerging Asia	
Netherlands	Developed Europe	0,155	0,270	0,294	0,593	-1,624*	C	-3,298***	C	Pakistan	Emerging Asia	
Norway	Developed Europe	0,097	0,218	0,294	0,554	-1,682**	C	-2,788***	C	Philippine	Emerging Asia	
Spain	Developed Europe	0,156	0,253	0,278	0,510	-1,371*	C	-2,405***	C	Sri Lanka	Emerging Asia	
Sweden	Developed Europe	0,127	0,245	0,322	0,583	-1,653**	C	-2,889***	C	Taiwan	Emerging Asia	
Switzerland	Developed Europe	0,133	0,229	0,239	0,527	-1,335*	C	-2,966***	C	Thailand	Emerging Asia	

UK	Developed Europe	0,155	0,265	0,350	0,584	-1,548*	C	-2,626***	C	Croatia	Emerging Europe	
Egypt	Emerging Africa & Middle East	-0,022	0,045	0,053	0,008	-0,910	N	0,393	N	Czech Republic	Emerging Europe	
Jordan	Emerging Africa & Middle East	0,005	-0,015	-0,071	-0,035	0,279	N	-0,312	N	Estonia	Emerging Europe	
Kenya	Emerging Africa & Middle East	-0,042	0,014	0,074	0,036	-0,746	N	0,328	N	Hungary	Emerging Europe	
Lebanon	Emerging Africa & Middle East	-0,015	0,042	0,037	0,015	-0,773	N	0,184	N	Poland	Emerging Europe	
Mauritius	Emerging Africa & Middle East	0,029	0,014	0,039	0,006	0,209	N	0,284	N	Portugal	Emerging Europe	
Morocco	Emerging Africa & Middle East	-0,029	0,058	0,012	0,200	-1,167	N	-1,656**	C	Russia	Emerging Europe	
Nigeria	Emerging Africa & Middle East	0,024	-0,011	-0,029	0,033	0,475	N	-0,543	N	Slovenia	Emerging Europe	

Table 2
Granger Causality
This table reports the bi-directional Granger causality test statistics between the US and other countries before and during both the GFC and t
no Granger causality. A significant value (with White's [1980] correction for heteroskedasticity) rejects no causation and implies that the l
movements in the other countries. The *,**, and *** represent p-values <0.10,<0.05, and <0.01.

Direction of Causality	Country Category	Before GFC	During GFC	Before EZC	During EZC	Direction of Causality	Country Categ
		F-Statistic	F-Statistic	F-Statistic	F-Statistic		
US → Canada	Developed America	2,224*	7,939***	2,817**	4,309***	US → Kenya	Emerging Afric
Canada→ US	Developed America	0,452	4,825***	2,590**	0,674	Kenya→ US	Emerging Afric
US → Australia	Developed Asia	22,177***	90,613***	5,143***	52,767***	US → Lebanon	Emerging Afric
Australia→ US	Developed Asia	3,679***	3,087***	2,242*	0,850	Lebanon → US	Emerging Afric
US → Japan	Developed Asia	8,477***	78,965***	4,846***	47,261***	US → Mauritius	Emerging Afric
Japan→ US	Developed Asia	2,966**	1,493	1,681	1,728	Mauritius→ US	Emerging Afric
US→ New Zealand	Developed Asia	15,389***	70,565***	3,399***	25,042***	US → Morocco	Emerging Afric
New Zealand→ US	Developed Asia	1,773	1,880*	1,233	1,040	Morocco → US	Emerging Afric
US → Singapore	Developed Asia	23,417***	23,125***	3,050**	33,817***	US → Nigeria	Emerging Afric
Singapore → US	Developed Asia	4,940***	1,413	2,376**	0,246	Nigeria→ US	Emerging Afric
US → Austria	Developed Europe	18,691***	24,967***	2,331*	7,764**	US → South Africa	Emerging Afric
Austria→ US	Developed Europe	4,135***	1,261	2,114*	0,927	South Africa → US	Emerging Afric
US → Belgium	Developed Europe	8,501***	11,066***	2,096*	7,279***	US→ Turkey	Emerging Afric
Belgium→ US	Developed Europe	2,278**	3,414***	2,591**	0,326	Turkey → US	Emerging Afric
US→ Denmark	Developed Europe	9,902***	27,147***	2,206*	6,821***	US → Argentina	Lati
Denmark→ US	Developed Europe	2,667**	2,603**	2,796**	1,041	Argentina→ US	Lati
US → Finland	Developed Europe	9,935***	18,702***	0,623	5,663***	US → Brazil	Lati

Finland→ US	Developed Europe	2,842**	2,233**	3,668***	0,907	Brazil→ US	Lati
US → France	Developed Europe	8,605***	29,786***	2,349**	7,509***	US → Chili	Lati
France→ US	Developed Europe	2,299**	2,603**	2,347**	0,409	Chili→ US	Lati
US → Germany	Developed Europe	9,120***	15,631***	2,048*	8,328***	US→ Colombia	Lati
Germany → US	Developed Europe	2,585**	2,766**	2,478**	0,883	Colombia → US	Lati
US → Greece	Developed Europe	7,331***	15,724***	1,293	4,366***	US → Mexico	Lati
Greece→ US	Developed Europe	1,130	3,914***	1,009	1,662	Mexico → US	Lati
US→ Ireland	Developed Europe	10,088***	15,625***	4,768***	6,266***	US → Peru	Lati
Ireland→ US	Developed Europe	2,556**	1,597	0,638	1,658	Peru → US	Lati
US → Italy	Developed Europe	8,185***	23,299***	2,990**	3,155***	US→ China	Em
Italy→ US	Developed Europe	3,026**	3,405***	2,608**	0,364	China→ US	Em
US → Netherlands	Developed Europe	8,841***	23,900***	1,719	7,862***	US → Hong Kong	Em
Netherlands→ US	Developed Europe	4,194***	3,270***	1,630	0,591	Hong Kong→ US	Em
US→ Norway	Developed Europe	7,270***	17,698***	2,469**	9,642***	US → India	Em
Norway → US	Developed Europe	1,669	1,297	3,457***	1,128	India→ US	Em
US → Spain	Developed Europe	7,868***	21,908***	2,614**	0,976	US → Indonesia	Em
Spain → US	Developed Europe	2,224	3,183***	2,950**	0,131	Indonesia → US	Em
US→ Sweden	Developed Europe	9,700***	18,609***	1,610	8,740***	US → Korea	Em
Sweden → US	Developed Europe	0,818	1,965*	1,303	1,053	Korea→ US	Em
US → Switzerland	Developed Europe	9,240***	29,681***	3,302***	9,322***	US → Malaysia	Em
Switzerland→ US	Developed Europe	1,869*	1,746	1,669	0,376	Malaysia → US	Em
US → UK	Developed Europe	11,300***	29,029***	3,195**	16,401***	US → Pakistan	Em
UK→ US	Developed Europe	3,696***	2,515**	2,499**	0,932	Pakistan→ US	Em
US → Egypt	Emerging Africa & Middle East	9,552***	21,729***	1,376	4,575***	US→ Philippines	Em
Egypt→ US	Emerging Africa & Middle East	0,615	3,183***	1,408	0,548	Philippines→ US	Em
US → Jordan	Emerging Africa & Middle East	0,457	12,158***	0,572	3,100***	US→ Sri Lanka	Em
Jordan→ US	Emerging Africa & Middle East	0,767	0,600	1,439	0,564	Sri Lanka → US	Em
US → Taiwan	Emerging Asia	9,788***	30,869***	5,028***	48,778***	US → Hungary	Emerg
Taiwan→ US	Emerging Asia	5,322***	1,515	2,731**	0,441	Hungary → US	Emerg
US → Thailand	Emerging Asia	2,871**	18,365***	2,409**	26,323***	US → Poland	Emerg
Thailand→ US	Emerging Asia	0,402	2,142*	0,892	1,648	Poland→ US	Emerg
US → Croatia	Emerging Europe	2,372**	33,318***	2,562**	8,001***	US → Portugal	Emerg
Croatia → US	Emerging Europe	0,392	2,228**	0,567	1,145	Portugal → US	Emerg
US → Czech Republic	Emerging Europe	4,403***	22,650***	1,394	2,889**	US → Russia	Emerg
Czech Republic→ US	Emerging Europe	1,356	1,242	1,462	0,329	Russia→ US	Emerg
US → Estonia	Emerging Europe	3,871***	22,729***	1,020	13,752***	US → Slovenia	Emerg
Estonia→ US	Emerging Europe	0,404	0,854	3,134**	1,376	Slovenia → US	Emerg

Table 3

Estimation of results from returns and DCC-GARCH model

This table reports the return estimates by using Eq. (3) (Panel A) and the GJR variance estimates by using the DCC-GARCH (1,1) model (Panel B represent the p-values <0.10,<0.05, and <0.01.

Country	Category	**Panel A: Return Equation** $r_{i,t} = \alpha_0 + \beta_1 r_{i,t-1} + \beta_2 r_{t-1}^{us} + \varepsilon_{i,t}$			**Panel B: Variance Equation: Multivariate DCC GARCH Model** $h_{ii,t} = c_i + \alpha_i h_{ii,t-1} + b_i \varepsilon_{i,t-1}^2$				Country	Category	**P** $r_{i,t}$ =
		α_0 (T-value)	β_1 (T-value)	β_2 (T-value)	Alpha (T-value)	Beta (T-value)	Persistence	DCC Coefficient			α_0 (T-valu
Canada	Developed America	0.001* (1.82)	-0.153** (-2.49)	0.288*** (3.80)	0.962*** (106.10)	0.029*** (4.45)	0.992	0.635	South Africa	Emerging Africa & Middle East	0.000 (0.97
US	Developed America	0.000 (1.58)	-0.127*** (-6.58)	-	-	-	-	-	Turkey	Emerging Africa & Middle East	0.001 (1.55
Australia	Developed Asia	0.000 (0.33)	-0.121*** (-3.68)	0.745*** (17.24)	0.993*** (376.80)	0.006*** (3.03)	0.999	0.210	Argentina	Emerging America	0.001 (-1.55
Japan	Developed Asia	0.000 (0.27)	-0.110*** (-3.53)	0.533*** (16.49)	0.370*** (3.65)	0.042*** (2.62)	0.972	0.038	Brazil	Emerging America	0.001 (1.58
New Zealand	Developed Asia	0.000 (0.16)	-0.065** (-2.49)	0.537*** (17.30)	0.989*** (228.40)	0.009*** (2.83)	0.998	0.158	Chili	Emerging America	0.001* (2.95
Singapore	Developed Asia	0.001** (2.02)	-0.100*** (-3.08)	0.387*** (10.13)	0.993*** (302.90)	0.005** (2.26)	0.998	0.246	Colombia	Emerging America	0.001* (3.41
Austria	Developed Europe	0.000 (0.36)	-0.071** (-1.98)	0.487*** (8.10)	0.989*** (246.30)	0.009*** (3.10)	0.998	0.395	Mexico	Emerging America	0.000 (1.38
Belgium	Developed Europe	0.000 (0.59)	-0.101** (-2.48)	0.327*** (4.38)	0.988*** (240.90)	0.008*** (2.99)	0.996	0.474	Peru	Emerging America	0.001 (1.97
Denmark	Developed Europe	0.000 (1.42)	-0.118*** (-3.63)	0.404*** (8.95)	0.982*** (152.20)	0.011*** (2.94)	0.993	0.359	China	Emerging Asia	0.000 (0.70
Finland	Developed Europe	0.000 (0.13)	-0.143***	0.456*** (8.55)	0.988*** (187.30)	0.009** (2.58)	0.997	0.433	Hong Kong	Emerging Asia	0.000 (0.80

			(-4.81)								
France	Developed Europe	0.000 (0.80)	-0.238*** (-7.48)	0.498*** (9.13)	0.983*** (158.60)	0.011*** (2.98)	0.994	0.545	India	Emerging Asia	0.001 (1.76
Germany	Developed Europe	0.000 (1.13)	-0.186*** (-5.85)	0.399*** (7.80)	0.975*** (105.60)	0.015*** (2.96)	0.990	0.557	Indonesia	Emerging Asia	0.001* (2.88
Greece	Developed Europe	0.000 (0.01)	-0.015 (-0.47)	0.408*** (7.54)	0.977*** (104.00)	0.011*** (2.64)	0.988	0.234	Korea	Emerging Asia	0.000 (0.70
Ireland	Developed Europe	-0.000 (-0.07)	-0.094** (-2.26)	0.440*** (6.89)	0.989*** (275.70)	0.009*** (3.17)	0.998	0.399	Malaysia	Emerging Asia	0.000* (2.62
Italy	Developed Europe	0.000 (0.54)	-0.156*** (-4.51)	0.410*** (7.10)	0.981*** (214.70)	0.012*** (3.93)	0.994	0.496	Pakistan	Emerging Asia	0.001* (2.38
Netherlands	Developed Europe	0.000 (0.67)	-0.203*** (-5.95)	0.432 (8.19)	0.987*** (179.10)	0.008** (2.47)	0.996	0.533	Philippines	Emerging Asia	0.001 (2.47
Norway	Developed Europe	0.000 (0.90)	-0.169*** (-5.34)	0.504*** (8.33)	0.979*** (143.40)	0.017*** (3.36)	0.997	0.383	Sri Lanka	Emerging Asia	0.001 (2.53
Spain	Developed Europe	0.001 (1.42)	-0.102*** (-2.78)	0.369*** (6.01)	0.981*** (122.60)	0.011*** (2.57)	0.992	0.494	Taiwan	Emerging Asia	0.000 (0.75
Sweden	Developed Europe	0.000 (1.00)	-0.177*** (-5.38)	0.477*** (8.16)	0.984*** (145.40)	0.012*** (2.61)	0.996	0.470	Thailand	Emerging Asia	0.001 (2.51
Switzerland	Developed Europe	0.000* (1.66)	-0.179*** (-5.88)	0.360*** (9.65)	0.982*** (111.40)	0.012** (2.34)	0.995	0.432	Croatia	Emerging Europe	0.000 (1.08
UK	Developed Europe	0.000 (0.53)	-0.261*** (-7.13)	0.484*** (9.20)	0.991*** (235.30)	0.007** (2.38)	0.998	0.515	Czech Republic	Emerging Europe	0.000 (0.66
Egypt	Emerging Africa & Middle East	0.000 (1.27)	0.083*** (3.24)	0.316*** (9.24)	0.836*** (2.47)	0.000 (0.18)	0.936	0.019	Estonia	Emerging Europe	0.000 (1.01
Jordan	Emerging Africa & Middle East	0.000 (0.73)	0.062** (2.26)	0.138*** (5.80)	0.815*** (6.19)	0.000** (1.98)	0.915	-0.003	Hungary	Emerging Europe	0.000 (-0.4
Kenya	Emerging Africa & Middle East	0.001*** (2.79)	0.312*** (6.40)	0.092*** (3.19)	0.833*** (2.70)	0.000 (0.21)	0.933	0.046	Poland	Emerging Europe	-0.00 (-0.1
Lebanon	Emerging Africa & Middle East	0.000 (0.80)	0.078* (1.78)	0.107*** (3.54)	0.000 (0.00)	0.031 (0.24)	0.931	0.023	Portugal	Emerging Europe	0.000 (0.17
Mauritius	Emerging Africa & Middle East	0.001** (2.35)	0.091* (1.90)	0.180*** (5.33)	0.836*** (3.32)	0.000 (0.08)	0.936	0.041	Russia	Emerging Europe	-0.00 (-0.02
Morocco	Emerging Africa & Middle East	0.000 (1.10)	0.159*** (5.79)	0.096*** (3.96)	0.987*** (179.30)	0.009*** (2.66)	0.996	0.071	Slovenia	Emerging Europe	0.000 (1.31
Nigeria	Emerging Africa & Middle East	0.001*** (2.01)	0.408*** (12.29)	0.088*** (2.82)	0.847 (0.76)	0.000 (0.01)	0.947	0.007			

Table 4

Changes in dynamic correlations between market stock returns during different crises

This table reports the impact of the GFC and the EZC on the dynamic conditional correlations. We estimate the effect both at the mean (Eq. 9) and variance (Eq. 10) levels. We im
and variance models. Q(5) is the Ljung-Box Q-statistics up to fivedays, testing the serial correlation of the residuals. ARCH(5) is the ARCH LM test up to five days, testing the het
parentheses. The *,**, and *** represent the p-values <0.10,<0.05, and <0.01.

		Panel A: Mean Model $\hat{\rho}_{i,US,t} = \gamma_0 + \gamma_1 \hat{\rho}_{i,US,t-1} + \delta_1 GFC + \delta_2 EZC + v_t$				Panel B: Variance Model (G $h_t = \omega + \alpha h_{t-1} + \beta \varepsilon_{t-1}^2 + \delta_1 GF$			
Country	Category	Constant (T-Value)	$\rho_{i,USt-1}$ (T-Value)	GFC_t (T-Value)	EZC_t (T-Value)	Constant (T-Value)	Alpha (T-Value)	Beta (T-value)	GFC (T-Value)
Canada	Developed America	0.009*** (4.55)	0.984*** (291.97)	0.002* (1.74)	0.003** (2.52)	0.000*** (12.39)	1.036*** (18.19)	0.001 (0.04)	0.214*** (232.78)
Australia	Developed Asia	0.000 (1.48)	0.996*** (660.13)	0.001* (1.91)	0.001** (2.24)	0.000*** (12.31)	1.058*** (23.29)	-0.022 (-1.05)	0.033*** (64.10)
Japan	Developed Asia	0.023*** (18.72)	0.432*** (25.64)	-0.005*** (-2.77)	0.000 (0.05)	0.001*** (20.55)	0.246*** (13.46)	0.147*** (4.49)	-0.009*** (-5.37)
New Zealand	Developed Asia	0.000 (0.83)	0.994*** (526.81)	0.001*** (2.68)	0.001** (2.39)	0.000*** (9.06)	1.033*** (16.66)	-0.001 (-0.07)	0.103*** (132.89)
Singapore	Developed Asia	0.000 (1.20)	0.998*** (654.03)	0.000 (1.34)	0.000 (0.57)	0.000*** (9.46)	1.025*** (10.72)	-0.001*** (-5.63)	0.010*** (13.08)
Austria	Developed Europe	0.001** (2.32)	0.995*** (569.10)	0.001* (1.84)	0.001** (2.15)	0.000*** (10.65)	1.024*** (17.59)	-0.005 (-0.19)	0.078*** (103.17)
Belgium	Developed Europe	0.002** (2.51)	0.995*** (540.36)	0.001* (1.68)	0.001* (1.75)	0.000*** (11.11)	1.112*** (15.27)	-0.018*** (-7.75)	0.073*** (107.11)
Denmark	Developed Europe	0.003*** (3.43)	0.990*** (386.41)	0.001** (2.00)	0.001** (2.20)	0.000*** (12.52)	0.969*** (11.50)	0.027 (0.93)	0.121*** (127.56)
Finland	Developed Europe	0.003*** (3.19)	0.993*** (475.29)	0.001* (1.78)	0.001*** (2.85)	0.000*** (8.57)	1.001*** (14.15)	0.036 (0.94)	0.069*** (72.67)
France	Developed Europe	0.003*** (3.05)	0.993*** (443.52)	0.001 (1.50)	0.000* (1.90)	0.000*** (12.10)	0.982*** (9.55)	0.002 (0.06)	0.051*** (68.84)
Germany	Developed Europe	0.005*** (3.60)	0.990*** (369.67)	0.001 (1.02)	0.001 (1.49)	0.000*** (13.80)	1.018*** (16.39)	-0.002 (-0.22)	0.026*** (20.61)
Greece	Developed Europe	0.003*** (4.11)	0.986*** (310.85)	0.001 (1.26)	0.000 (0.93)	0.000*** (12.68)	0.983*** (16.73)	0.022 (0.96)	0.074*** (83.04)
Ireland	Developed Europe	0.002*** (2.73)	0.994*** (552.52)	0.001** (2.40)	0.001** (2.55)	0.000*** (10.28)	1.011*** (14.47)	0.009 (0.44)	0.166*** (241.71)
Italy	Developed Europe	0.004*** (3.21)	0.992*** (405.89)	0.001 (1.56)	0.001* (1.69)	0.000*** (13.11)	0.995*** (12.46)	-0.008 (-0.61)	0.024*** (21.72)
Netherlands	Developed Europe	0.003*** (2.68)	0.995*** (508.08)	0.001* (1.83)	0.001* (1.83)	0.000*** (7.86)	0.974*** (10.96)	0.035 (1.24)	0.026*** (37.46)
Norway	Developed Europe	0.002*** (2.61)	0.992*** (422.32)	0.001 (1.43)	0.002** (2.09)	0.000*** (18.06)	1.027*** (15.60)	-0.017** (-2.38)	0.168*** (139.45)
Spain	Developed Europe	0.004*** (3.56)	0.991*** (381.00)	0.001 (1.46)	0.001 (1.51)	0.000*** (21.31)	0.996*** (12.27)	-0.019 (-0.93)	0.046*** (46.99)
Sweden	Developed Europe	0.002*** (2.85)	0.993*** (442.05)	0.001 (1.44)	0.001* (1.94)	0.000*** (12.45)	1.013*** (12.88)	-0.008 (-0.32)	0.088*** (96.57)
Switzerland	Developed Europe	0.003***	0.990***	0.001*	0.001**	0.000***	1.006***	-0.002***	0.054***

		(3.42)	(381.12)	(1.94)	(2.33)	(17.81)	(13.80)	(-8.43)	(62.91)
UK	Developed Europe	0.001** (1.97)	0.997*** (661.28)	0.001* (1.68)	0.001 (1.50)	0.000*** (10.81)	1.069*** (13.07)	-0.002 (-0.41)	0.089*** (167.17)
Egypt	Emerging Africa & Middle East	0.003*** (16.91)	0.818*** (76.23)	0.000 (0.90)	0.000 (-0.16)	0.000 (0.43)	0.150*** (3.38)	0.600*** (5.80)	0.000 (1.32)
Jordan	Emerging Africa & Middle East	-0.001*** (-18.00)	0.797*** (70.51)	-0.000* (-1.88)	0.000 (-1.59)	0.000*** (44.54)	0.150*** (22.68)	0.600*** (46.36)	-0.000*** (-14.67)
Kenya	Emerging Africa & Middle East	0.008*** (14.06)	0.832*** (69.65)	0.000 (-0.45)	0.000 (0.34)	0.000*** (59.04)	0.150*** (25.79)	0.600*** (58.40)	-0.000*** (-3.45)
Lebanon	Emerging Africa & Middle East	0.023*** (27.42)	0.030 (1.62)	0.000 (-0.31)	0.000 (-0.24)	0.001* (1.92)	0.009** (2.54)	0.294 (0.80)	0.000 (-0.35)
Mauritius	Emerging Africa & Middle East	0.008*** (17.67)	0.803*** (72.24)	0.000 (-0.37)	0.000 (-0.25)	0.000 (1.17)	0.150*** (3.23)	0.600*** (4.52)	0.000 (-0.51)
Morocco	Emerging Africa & Middle East	0.000 (0.10)	0.991*** (405.09)	0.001 (1.17)	0.001** (2.53)	0.000*** (12.93)	1.039*** (24.42)	0.000*** (0.02)	0.059*** (52.15)
Nigeria	Emerging Africa & Middle East	0.001*** (16.42)	0.828*** (78.96)	0.000 (-1.32)	0.000 (0.69)	0.000 (0.59)	0.150*** (2.88)	0.600*** (3.82)	-0.000** (-2.33)
South Africa	Emerging Africa & Middle East	0.001** (2.12)	0.995*** (578.93)	0.001* (1.78)	0.001* (1.95)	0.000*** (12.47)	1.006*** (12.44)	-0.001 (-0.08)	0.102*** (192.44)
Turkey	Emerging Africa & Middle East	0.000 (1.21)	0.998*** (607.86)	0.000 (0.87)	0.000 (-0.12)	0.000*** (17.81)	1.001*** (14.17)	-0.006 (-0.35)	0.241*** (270.49)
Argentina	Emerging America	0.007*** (4.41)	0.981*** (269.02)	0.002 (1.37)	0.002 (1.35)	0.001*** (22.82)	0.928*** (15.75)	-0.045*** (-12.17)	0.135*** (53.78)
Brazil	Emerging America	0.006*** (3.64)	0.989*** (336.40)	0.001 (1.25)	0.001 (1.29)	0.000*** (12.35)	0.957*** (14.79)	0.040* (1.70)	0.163*** (138.84)
Chili	Emerging America	0.002*** (2.90)	0.992*** (423.20)	0.002** (2.37)	0.001** (2.06)	0.000*** (19.34)	0.997*** (15.82)	-0.008 (-0.58)	0.155*** (119.59)
Colombia	Emerging America	0.002*** (2.71)	0.991*** (391.65)	0.001 (1.08)	0.001 (1.42)	0.000*** (17.58)	0.991*** (12.97)	-0.001 (-0.02)	0.105*** (61.77)
Mexico	Emerging America	0.006*** (3.55)	0.989*** (339.08)	0.001* (1.69)	0.001 (1.20)	0.000*** (11.23)	1.050*** (13.41)	-0.005 (-0.49)	0.116*** (226.12)
Peru	Emerging America	0.005*** (3.61)	0.984*** (303.31)	0.004*** (2.61)	0.005*** (2.92)	0.001*** (15.41)	1.007*** (16.50)	0.000 (-0.02)	0.264*** (92.41)
China	Emerging Asia	0.001** (2.26)	0.995*** (519.99)	0.000 (1.13)	0.002* (1.87)	0.000*** (16.32)	1.001*** (10.72)	-0.018 (-0.73)	-0.031*** (-117.06)
Hong Kong	Emerging Asia	0.087*** (31.59)	0.479*** (29.18)	0.000 (0.51)	0.001* (1.78)	0.000*** (53.09)	0.293*** (12.36)	-0.113*** (-16.41)	0.001** (2.01)
India	Emerging Asia	0.000 (1.12)	0.998*** (900.03)	0.000** (2.45)	0.000 (1.25)	0.000*** (13.49)	0.969*** (10.82)	0.015 (0.52)	0.006*** (15.58)
Indonesia	Emerging Asia	0.018*** (13.72)	0.840*** (72.24)	0.000 (1.59)	0.000 (1.53)	0.000*** (14.56)	0.150*** (13.99)	0.600*** (22.54)	0.000*** (7.31)
Korea	Emerging Asia	0.028*** (14.94)	0.822*** (68.83)	0.000 (0.38)	0.000** (2.21)	0.000*** (7.80)	0.150*** (10.66)	0.600*** (15.88)	0.000** (2.47)
Malaysia	Emerging Asia	0.000** (2.13)	0.994*** (469.67)	0.000 (0.92)	0.000 (0.74)	0.000*** (21.61)	1.189*** (13.91)	-0.007 (-2.10)	-0.001*** (-3.76)
Pakistan	Emerging Asia	0.004*** (17.36)	0.810*** (73.81)	0.000 (0.62)	0.000 (-0.82)	0.000 (1.13)	0.150*** (2.99)	0.600*** (4.29)	0.000 (0.64)
Philippine	Emerging Asia	0.011***	0.820***	0.000	0.000*	0.000***	0.150***	0.600***	0.000

		(14.65)	(66.75)	(0.30)	(1.83)	(3.99)	(7.33)	(10.51)	(-0.80)
Sri Lanka	Emerging Asia	0.000 (-0.72)	0.955*** (172.73)	0.001* (1.65)	0.000 (0.70)	0.000*** (17.35)	0.836*** (15.41)	0.101*** (4.02)	0.004*** (7.69)
Taiwan	Emerging Asia	0.019*** (13.59)	0.842*** (72.47)	0.000 (0.95)	0.000* (1.64)	0.000*** (11.63)	0.150*** (12.89)	0.600*** (20.06)	0.000*** (4.41)
Thailand	Emerging Asia	0.006*** (7.70)	0.949*** (161.02)	0.001** (2.44)	0.001** (2.14)	0.000*** (25.35)	0.974*** (18.47)	-0.006 (-0.31)	0.018*** (20.18)
Croatia	Emerging Europe	0.001** (1.97)	0.989*** (368.51)	0.001** (1.97)	0.002*** (2.68)	0.000*** (23.03)	1.033*** (20.50)	-0.008*** (-8.96)	0.068*** (53.68)
Czech Republic	Emerging Europe	0.001** (2.50)	0.993*** (449.58)	0.000 (0.62)	0.001* (1.79)	0.000*** (11.95)	1.005*** (15.94)	0.010 (0.35)	0.071*** (61.09)
Estonia	Emerging Europe	0.000** (2.01)	0.994*** (438.20)	0.000 (0.44)	0.001** (2.18)	0.000*** (14.81)	1.012*** (13.08)	0.009 (0.40)	-0.008*** (-19.10)
Hungary	Emerging Europe	0.001** (2.17)	0.994*** (500.88)	0.002*** (2.68)	0.002** (2.42)	0.000*** (13.98)	0.997*** (11.00)	0.002 (0.08)	0.221*** (159.27)
Poland	Emerging Europe	0.001* (1.94)	0.996*** (596.44)	0.001 (1.58)	0.001* (1.68)	0.000*** (11.12)	0.902*** (12.26)	0.115*** (6.14)	0.115*** (125.62)
Portugal	Emerging Europe	0.001* (1.92)	0.995*** (494.67)	0.001* (1.66)	0.001 (1.30)	0.000*** (13.90)	1.015*** (12.12)	-0.010 (-0.72)	0.093*** (67.05)
Russia	Emerging Europe	0.001 (1.53)	0.997*** (684.77)	0.001** (2.03)	0.001 (1.49)	0.000*** (15.32)	0.990*** (11.31)	-0.001*** (-7.81)	0.139*** (156.26)
Slovenia	Emerging Europe	0.000 (1.15)	0.995*** (587.77)	0.001** (2.17)	0.001** (2.52)	0.000*** (13.98)	0.992*** (14.12)	0.003 (0.16)	0.045*** (72.95)

Table 5

Determinants of cross-country dynamic conditional correlation (DCC)

This table reports the regression results for the determinants of the cross-country dynamic conditional correlation by following the Eq. (11):

$$\rho_{i,US,t} = \alpha_0 + \alpha_1\rho_{i,US,t-1} + \beta_1 Risk_{i,t} + \beta_2 Interest_{i,t} + \beta_3 Trade_{i,t} + \beta_4 GDP_{i,t} + \beta_5 Spread_{i,t} + \beta_6 Market_{i,t} + \beta_7 Corruption_{i,t} +$$

Where, $\rho_{i,US,t}$ is the DCC coefficient between the US and other countries, DCC_{t-1} is the lagged DCC coefficient, Bank Risk Transfer is the difference in the bank risktransfers bet the real interest rates between the US and other countries, Trade Balance is the difference in the trade balances between the US and other countries, GDP Growth Rate is the countries, Term Spread is the difference in the termspreads between the US and other countries, Market Capitalization is the difference in the market capitalizations between perceptionsof corruption between the US and other countries, and the GFC and the EZC are the crises dummies. T-values are reported in the parentheses. The ** and *** represe

	Full Sample			Developed Countries	Emerging Countries	Africa-Middle Eastern Emerging Countries	Lati E C
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Mode
DCC_{t-1}	0.540	0.636	0.646	0.530	0.665	0.889	
	(12.83)***	(15.19)***	(12.70)***	(3.14)***	(12.45)***	(8.62)***	
GFC	0.042	0.030	0.023	0.042	0.016	0.008	
	(5.53)***	(4.26)***	(2.41)**	(1.67)*	(1.58)	(0.56)	
EZC	0.041	0.062	0.049	0.099	0.038	0.010	
	(4.78)***	(7.07)***	(4.71)***	(2.87)***	(3.38)***	(0.78)	
Bank Risk Transfer		0.022	0.018	0.019	0.017	0.004	
		(7.20)***	(5.17)***	(2.40)**	(4.35)***	(0.72)	
Real Interest		0.003	0.003	0.007	0.001	-0.001	
		(2.99)***	(2.03)**	(2.31)**	(0.63)	(0.63)	
Trade Balance		-0.001	-0.001	-0.002	0.000	-0.000	
		(1.26)	(1.13)	(1.06)	(0.20)	(0.30)	
GDP Growth Rate			0.001	-0.000	0.001	-0.000	
			(0.60)	(0.06)	(0.40)	(0.16)	
Term Spread			-0.003	0.003	-0.002	0.001	
			(0.78)	(0.28)	(0.55)	(0.11)	
Market Capitalization			0.010	0.007	0.008	0.003	
			(1.19)	(0.33)	(0.80)	(0.17)	
Corruption			0.002	0.001	0.001	-0.000	
			(1.35)	(0.24)	(0.98)	(0.27)	
Constant	0.108	-0.137	-0.162	-0.095	-0.160	-0.009	
	(11.39)**	(3.95)**	(3.04)***	(0.84)	(2.53)**	(0.10)	
R^2	0.55	0.68	0.63	0.72	0.62	0.71	
Observations	540	474	318	74	244	56	
Country Fixed Effect	Y	Y	Y	Y	Y	Y	
Year Fixed Effect	Y	Y	Y	Y	Y	Y	
F-stat	196.36***	146.04***	45.18***	13.28***	33.17***	9.72***	

Appendix: Descriptive Statistics

By following a conventional approach, we calculate stock returns as the first difference of the natural log of each stock-price index, and the returns are expressed as percentages. Appendix Table A1 presents the descriptive statistics of the daily returns in three panels (A–C)[13]. Panel A reports the **descriptive** statistics for the full sample period, Panel B reports the descriptive statistics for the GFC, and Panel C reports the descriptive statistics for the EZC. The mean return of the MSCI indices for the full period is 0.04%, whereas the mean return for the GFC declines to -0.05% and declines to -0.01% for the EZC. The standard deviations for these periods are 1.69%, 2.42%, and 1.52% that indicate the GFC is more volatile than the EZC. The table also reports excess kurtosis for the stock return series for all three panels that indicates that big shocks in either sign (+/-) are more likely to be present and that the stock-return series might not be normally distributed. The Jarque-Bera (JB) statistics are significant in all three periods that indicates abnormality in the distribution and that series autocorrelation exist, which is usual for time-series data. However, almost all of the stock-return series in the full sample (53 out of 55 indices: Panel A) have autocorrelations (LB) in lag 16 for the daily data, which gradually decreases in the GFC (35 out of 55 indices: Panel B) and in the EZC (17 out of 55 indices: Panel C). These decreases how nonsynchronous trading in the stocks that make up the index. It could also be due to price limitations imposed on the index or other types of market friction that produce a partial adjustment process.

[13]We use the daily returns instead of the rolling average of the two-day returns because neither Forbes and Rigobon (2002) nor Chiang et al. (2007) find any difference between the daily and two-day returns. However, Chiang et al. (2007) notes that using two-day returns tends to generate serial autocorrelation and hence, this type of returns is not compatible for examining announcement effects.

Appendix Table A1
Descriptive statistics
This table reports the descriptive statistics for our data. Panel A presents the descriptive statistics for the full sample (2003–2013), Panels B and C pres
crisis (GFC) and the Eurozone crisis (EZC) respectively.

Panel A: FullSample									Panel B: Global Crisis							
Country	Category	Mean (%)	Std. Dev. (%)	Skewness	Kurtosis	Jarque-Bera	Q-stat (16)	Observations	Mean (%)	Std. Dev. (%)	Skewness	Kurtosis	Jarque-Bera	Q-stat (16)	Observations	Mean (%)
Canada	Developed America	0.040	1.492	-0.829	13.789	14249.720***	107.300***	2870	-0,021	2,492	-0,649	7,470	565.0672***	45.870***	626	-0,00
US	Developed America	0.027	1.247	-0.332	14.166	14962.770***	81.454***	2870	-0,046	2,028	-0,146	8,133	689.5817***	37.416***	626	0,04
Australia	Developed Asia	0.037	1.656	-0.871	12.194	10471.740***	27.474**	2870	-0,025	2,678	-0,740	7,241	526.198***	18.441	626	0,00
Japan	Developed Asia	0.019	1.419	-0.211	7.994	3003.524***	46.202***	2870	-0,060	1,986	-0,006	6,533	325.6191***	43.584***	626	0,00
New Zealand	Developed Asia	0.021	1.398	-0.487	8.083	3202.817***	30.779***	2870	-0,080	2,142	-0,357	5,586	187.7936***	17.180	626	0,03
Singapore	Developed Asia	0.039	1.366	-0.270	8.467	3609.054***	51.996***	2870	-0,018	2,121	-0,090	5,488	162.2634***	26.433**	626	0,01
Austria	Developed Europe	0.019	1.965	-0.189	9.791	5531.284***	36.404***	2870	-0,142	3,050	-0,032	5,960	228.7045***	17.148	626	-0,02
Belgium	Developed Europe	0.020	1.585	-0.569	11.662	9128.254***	31.759***	2870	-0,121	2,394	-0,671	7,870	665.5594***	27.775***	626	0,03
Denmark	Developed Europe	0.054	1.513	-0.340	10.719	7179.814***	56.497***	2870	-0,053	2,297	-0,195	7,508	534.1077***	44.025***	626	0,02
Finland	Developed Europe	0.009	1.908	-0.205	7.696	2656.960***	33.816***	2870	-0,103	2,628	0,120	5,494	163.7165***	19.676	626	-0,02
France	Developed Europe	0.023	1.663	-0.014	9.678	5333.755***	58.119***	2870	-0,052	2,342	0,132	7,883	623.7654***	52.528***	626	0,00
Germany	Developed Europe	0.039	1.659	-0.066	8.523	3650.199***	27.141**	2870	-0,054	2,291	0,154	7,565	546.1538***	21.184	626	0,02
Greece	Developed Europe	-0.024	2.267	0.074	7.162	2074.339***	46.394***	2870	-0,123	2,715	-0,052	5,622	179.6606***	25.382*	626	-0,15
Ireland	Developed Europe	-0.008	1.989	-0.681	11.891	9674.503***	52.990***	2870	-0,229	3,154	-0,505	7,116	468.5783***	23.176*	626	-0,00
Italy	Developed Europe	0.001	1.761	-0.066	9.104	4456.948***	63.653***	2870	-0,083	2,378	0,150	7,496	529.4768***	67.142***	626	-0,03
Netherlands	Developed Europe	0.024	1.561	-0.126	9.831	5588.066***	53.728***	2870	-0,056	2,256	-0,028	7,783	596.7446***	42.460***	626	0,01
Norway	Developed Europe	0.042	2.089	-0.449	9.686	5441.829***	32.311***	2870	-0,060	3,357	-0,288	5,689	197.1896***	19.482	626	0,01
Spain	Developed Europe	0.025	1.799	0.073	10.135	6089.866***	39.051***	2870	-0,028	2,370	0,013	7,762	591.4057***	45.416***	626	-0,03
Sweden	Developed Europe	0.048	1.920	0.039	8.249	3296.041***	41.084***	2870	-0,059	2,885	0,260	5,473	166.5744***	26.063*	626	0,02
Switzerland	Developed Europe	0.035	1.255	-0.014	8.553	3688.102***	56.169***	2870	-0,028	1,810	0,215	6,939	409.5674***	54.064***	626	0,03
UK	Developed Europe	0.019	1.449	-0.125	12.657	11159.840***	74.117***	2870	-0,065	2,317	0,025	7,837	610.2655***	47.707***	626	0,01
Egypt	Emerging Africa & Middle East	0.078	1.813	-0.593	10.330	6594.205***	47.985***	2870	-0,034	2,206	-1,134	10,706	1682.885***	31.575**	626	-0,06
Jordan	Emerging Africa & Middle East	0.009	1.228	-0.526	11.335	8439.822***	40.968***	2870	-0,047	1,594	-0,749	10,084	1367.42***	43.523***	626	-0,04
Kenya	Emerging Africa & Middle East	0.070	1.405	-0.056	12.774	11424.300***	356.550***	2870	-0,062	1,802	0,425	10,985	1681.921***	119.870***	626	0,05
Lebanon	Emerging Africa & Middle East	0.027	1.515	-0.438	20.084	34995.110***	72.080***	2870	0,065	1,874	0,882	9,766	1275.278***	43.809***	626	-0,05
Mauritius	Emerging Africa & Middle East	0.066	1.207	0.272	16.596	22141.530***	83.289***	2870	0,018	1,856	0,056	8,928	916.9779***	37.543***	626	0,01
Morocco	Emerging Africa & Middle East	0.030	1.128	-0.245	6.461	1461.089***	99.145***	2870	-0,024	1,360	-0,302	6,634	354.0379***	43.369***	626	-0,05
Nigeria	Emerging Africa & Middle East	0.045	1.473	-0.028	8.699	3884.463***	486.090***	2870	-0,165	1,844	-0,236	5,491	167.7306***	265.630***	626	0,05
South Africa	Emerging Africa & Middle East	0.043	1.870	-0.330	7.854	2869.515***	41.782***	2870	-0,003	2,698	-0,235	6,160	266.2008***	19.390	626	-0,00
Turkey	Emerging Africa & Middle East	0.051	2.499	-0.373	8.259	3373.873***	40.576***	2870	-0,035	3,140	-0,069	6,147	258.8609***	25.237*	626	0,00
Argentina	Emerging America	0.051	2.184	-0.673	9.735	5640.865***	27.850**	2870	-0,067	2,972	-0,684	8,953	973.0384***	28.020**	626	-0,06
Brazil	Emerging America	0.060	2.213	-0.401	11.562	8843.483***	44.993***	2870	0,030	3,446	-0,291	7,990	658.4194***	22.332	626	-0,04
Chili	Emerging America	0.050	1.417	-0.301	16.158	20747.850***	78.126***	2870	0,018	2,088	-0,076	12,830	2520.987***	31.337**	626	0,00
Colombia	Emerging America	0.095	1.697	-0.371	13.813	14046.510***	75.478***	2870	0,033	2,187	-0,528	8,940	949.4315***	26.309**	626	0,03
Mexico	Emerging America	0.055	1.685	-0.132	10.598	6912.151***	53.740***	2870	-0,031	2,566	0,109	7,421	510.9734***	13.626	626	0,02
Peru	Emerging America	0.063	1.994	-0.452	10.077	6086.839***	22.080	2870	0,002	2,991	-0,155	6,117	255.8639***	17.229	626	0,00
China	Emerging Asia	0.052	1.822	-0.047	9.671	5322.397***	41.924***	2870	-0,002	2,890	0,081	6,035	240.9004***	19.655	626	-0,01
Hong Kong	Emerging Asia	0.036	1.345	-0.182	10.962	7596.217***	27.823**	2870	-0,012	2,146	-0,055	6,742	365.5124***	20.182	626	0,02
India	Emerging Asia	0.051	1.816	-0.038	11.388	8415.237***	78.183***	2870	-0,001	2,747	0,256	7,946	644.9697***	33.048***	626	-0,02
Indonesia	Emerging Asia	0.068	1.925	-0.298	9.326	4827.626***	57.688***	2870	0,029	2,686	-0,178	7,692	577.4251***	42.587***	626	0,02
Korea	Emerging Asia	0.045	1.961	-0.194	20.043	34753.600***	28.801**	2870	-0,046	2,979	-0,024	15,913	4349.619***	17.209	626	0,01
Malaysia	Emerging Asia	0.040	0.980	-0.540	12.158	10169.200***	56.379***	2870	-0,005	1,392	-0,666	10,557	1535.895***	14.786	626	0,03

Pakistan	Emerging Asia	0.024	1.630	-0.460	6.604	1654.835***	76.352***	2870	-0,131	2,180	-0,450	5,422	174.1384***	79.528***	626	0,04
Philippine	Emerging Asia	0.061	1.563	-0.500	8.649	3935.681***	59.425***	2870	-0,030	2,079	-0,530	8,370	781.6284***	30.389**	626	0,07
Sri Lanka	Emerging Asia	0.044	1.488	-0.025	26.800	67736.350***	150.500***	2870	0,019	1,796	2,208	22,264	10188.06***	89.282***	626	0,04
Taiwan	Emerging Asia	0.022	1.480	-0.218	5.839	986.261***	65.833***	2870	-0,023	2,024	-0,074	4,453	55.63696***	29.934**	626	0,00
Thailand	Emerging Asia	0.054	1.699	-0.653	12.564	11142.820***	45.337***	2870	-0,016	2,195	-0,583	8,558	841.1436***	23.950*	626	0,06
Croatia	Emerging Europe	0.010	1.533	-0.161	10.411	6580.201***	64.734***	2870	-0,082	2,014	-0,141	6,936	406.2087***	61.361***	626	-0,01
Czech Republic	Emerging Europe	0.043	1.842	-0.223	16.097	20537.430***	64.268***	2870	-0,031	2,814	-0,069	12,158	2188.234***	38.920***	626	-0,04
Estonia	Emerging Europe	0.033	1.720	0.113	8.390	3479.700***	34.745***	2870	-0,168	2,408	0,150	6,427	308.7593***	15.163	626	0,02
Hungary	Emerging Europe	0.019	2.393	-0.046	10.765	7210.422***	82.476***	2870	-0,078	3,482	0,038	8,390	757.9481***	78.891***	626	-0,05
Poland	Emerging Europe	0.032	2.088	-0.256	7.513	2466.659***	19.990	2870	-0,075	2,999	-0,114	5,645	183.8313***	17.674	626	-0,01
Portugal	Emerging Europe	0.006	1.461	-0.134	10.967	7599.435***	61.729***	2870	-0,076	1,959	-0,028	9,877	1233.726***	58.161***	626	-0,02
Russia	Emerging Europe	0.037	2.413	-0.503	18.576	29132.250***	109.500***	2870	-0,073	3,814	-0,308	12,274	2253.12***	69.964***	626	-0,02
Slovenia	Emerging Europe	0.019	1.464	-0.218	9.034	4376.834***	78.195***	2870	-0,130	2,057	-0,268	6,964	417.3356***	41.408***	626	-0,05