Did September 11, 2001 increase the co movements among the developed and the emerging markets?

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April 28, 2008

JEL classification: G15 International Financial Markets, F36 Financial Aspects of Economic Integration, F37 International Finance.

Key words: Developed Markets, Emerging Markets, Comovements, Linkage, Integration, Volatility and Correlation.

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Abstract

In this study, we investigate how the developed and the emerging markets may have similar co movements after September 11, 2001 in US. Our aim in this paper is to confirm the very premise of stated hypothesis that markets have become more integrated following September11, 2001. The main findings of the study confirm the co-movement in returns, volatility and correlation of stocks markets. Irrespective of market type, there is a global factor that explains the integration between markets. However, our results reject the positive linkage between volatility and correlation, as we find the relation to be negative and insignificant. On other hands, we find especially after the September 11, 2001, the co-movement of markets is by returns and volatility and not by correlation. Also, the economic and geographical factors seem to be the main basis of integration and co-movement of the markets. Indeed, the integration of US and Europe seems to be strong over the period, particular after September 11, 2001.

1. Introduction

September 11, 2001 is considered as one the deadliest day in US history, the tragic event lead to economic downturn and increased volatility in the stock markets not only in US, the vibrations were felt all across both in the developed and the emerging markets. A shock in the US market leads to changes in investor's investment behavior of the other financial markets and increases the interdependence across international financial markets during periods of crises. Hence, many researches have focused on the dynamic co movements of financial markets before and after an economic shock. During the last decade the financial markets have become increasingly integrated in the world economy. This trend, which has affected emerging countries, has largely been the result of deliberate policies aimed at reducing financial "repression" and liberalizing national capital markets (World Bank, 1997). The main objective of international diversification is to avail the opportunity to improve portfolio performance on the low correlations across international stock markets. A fallout of the markets integration results in the erosion of the gains from international diversification by making them to co-move more closely and enhancing spillovers. Financial market integration create risks and entails costs. Market integration accentuates the risk of contagion as problems in one market segment are likely to be transmitted to other markets leading to global financial market instability caused by a strong movement on extreme markets which was evident in the case of East Asian crises of 1997.

In this study, we investigate how the developed and the emerging markets may have similar co movements after September 11, 2001. The impact of September11, 2001 was visible worldwide as major equity markets experienced sharp and rapid declines, demonstrating that market participants perceived the event as a global shock. Though it primarily affected the major industrial countries, emerging markets too were affected by the slowing down in external demand and a flight to quality in financial markets as IMF study, 2001b suggest. Our aim in this paper is to confirm the very premise of stated hypothesis that markets have become more integrated following September11, 2001. In prelude to the main findings, the study confirms the co-movement in returns, volatility and correlation of stocks markets. Irrespective of market type, there is a global factor that

explains the integration between markets. However, our results reject the positive linkage between volatility and correlation, as we find the relation to be negative and insignificant. We find especially following September 11, 2001, the co-movement of markets is by return and volatility and not by correlation. Also, the economic and geographical factors seem to the main basis of integration and co-movement of stocks markets. Indeed, the integration of US and Europe seems to be strong over the period, particular after September 11, 2001. The findings seem to be coherent with the results of Morana and Beltratti (2008).

The paper is organized as follows. Section 2 presents the main contributions of the literature. Section 3 discusses the dataset. Section 4 describes the methodology. Section 5 reports the empirical results, while Section 6 concludes the study.

2. Literature Review

The literature of financial markets integration have contributed to the study the interdependence across international stock markets, considering issues such as volatility spillovers, correlation breakdowns, trends in correlation patterns. Also, the interdependence can be assessed by the association between correlation and volatility and the existence of an increasing trend among correlation coefficients. Hence, the integration can found by the conditional expected returns, this later decrease if the volatility of the non-diversifiable risk factor is lower than the volatility of the idiosyncratic risk factors and the betas are not too high. The co movement in volatility across markets increases due to the increased importance of the global volatility. The co movement is found if the betas have the same sign, or a positive relationship between volatility and correlation, then correlation between markets increases. Finally, the co movements in conditional correlation may increase due to a dominant common volatility factor. Researches have focused on the dynamic co movements of financial markets before and after an economic shock. The traditional approach used to measure the price movements involves the examination of the change in correlation between international

stock returns[1]. Many authors [Bennet and Kelleher (1988), Von Furstenberg and Jeon (1989), Bertero and Mayer (1990) and Longin and Solnik (1995)] have found instability in the correlation between international markets associated by an increase on both volatility and correlation after the October 1987 stock market crash. They have also confirmed that the correlation remains high even afterwards when volatility reverts to pre-crash level. However, the problem of correlation between international stock return approaches is that during crises there is an increase in volatility of stock returns, and in turn induces a false increased correlation. To resolve this problem, many authors have proposed a model in which they have corrected the bias by adjusting the correlation coefficients and showed that cross-correlations of international market are higher in periods of volatile markets[2]. The positive linkage between correlation and volatility depend on the sample selection and have been confirmed, [King et al., 1994; Karolyi et Stulz, 1996; Solnik et al., 1996; Ramchand and Susmel, 1998; Ang and Bekaert, 2002; Rockinger and Jondeau, 2001; Ball and Touros, 2000; Morana and Beltratti (2002)]. However, others authors [Ronn et al. (2000), Forbes and Rigobon (1999), and Boyer et al. (1997)] suggest a non spurious positive association between stock market volatility and correlation[3].

Many studies demonstrate that the shock in the U.S market can induce price movements in other financial markets and cause contagion and increase the financial market integration. In others words, the contagion exist when cross-country correlations increase during crises times (World Bank, 2004). Using stock prices from 25 economies and intrinsic heteroskedasticity model, Hon et al. (2004) tested whether the terrorist attack in the U. S on September 11, 2001, resulted in an increase in correlation across global financial markets. They found that international stock markets, particularly in Europe, responded more closely to shocks in U.S. stock market in the three to six

[1] Agmon (1972).
[2] [Ronn's (1998), Boyer et al. (1997), Loretan et al (2000), Forbes and Rigobon (2002)].
[3]Morana and Beltratti (2008) have studied the linkages between the four most international stock markets (US, UK, Germany, and Japan). Using a monthly data of the four stock markets over the period from 1973 through 2004, they found an evidence of a positive linkage between volatility and correlation, and a trend increase in correlation coefficients over time. All the above mentioned linkages seem to be particularly strong for the US and Europe, while the persistent stagnation of the economy and the weak fundamentals over the 1990s may have been the cause of the more idiosyncratic behavior of the Japanese stock market.

months after the crisis than before. Hsin (2006) investigates the co movement in stock indices among major developed markets and found the existence of significant international transmission effects among major world markets, both in terms of returns and volatility, and mostly in a positive direction. The U.S. market, as expected, is the leading market in the sense that it has the most pervasive and significant impact on all markets across continents[4].

3. Data

Extracted from Data Stream, the dataset employed in this study are daily returns of indices from Morgan Stanley Capital International (MSCI) in U.S. dollar (US$) for the developed and the emerging markets. For the developed markets, the data covers the period from 1980 to mid 2006, while for the emerging markets data period starts from 1988 to mid 2006. The indices representing the developed markets are US (DUS), Europe (DEUR), Far East (DFARE), and Pacific (DPAC) and for the emerging markets, the indices are Latin American (EMLA), Europe (EMERP), Far East (EMFAR), and Asia (EMAS). As we have two types of market, the developed and the emerging, we first study the co-movement among the developed markets, then among the emerging markets themselves. We analyse the correlation among the developed, the emerging markets, and then between developed and the emerging and finally we test the co-movement between all markets. We also analyse the integration between the emerging markets and US.

4. Methodology

We consider that the market return is evaluated with CAPM model which takes one factor model (F_t). The integration between stocks market is measured by the betas, the integration is full (beta=1), the different moment are taken the non-diversifiable risk factor (σ_F). Hence, we have

$$E(r_{it}) = \lambda \beta_{it} \sigma_{Ft} \qquad (1)$$

[4]Yang et al (2008) found that the crash 1987 originated in the US market, that an upward movement in the Japanese market after the crash helped the recovery in the US market.

$$V(r_{it}) = \beta^2_{it}\sigma^2_{Ft} + \sigma^2_{it} \quad (2)$$

$$\rho(r_{it}, r_{jt}) = \frac{\beta_{it}\beta_{jt}\sigma^2_{Ft}}{\sqrt{\beta^2_{it}\sigma^2_{Ft} + \sigma^2_{jt}}\sqrt{\beta^2_{it}\sigma^2_{Ft} + \sigma^2_{it}}} \quad (3)$$

Where 'σ^2_{Ft}' is the volatility of the common factor. 'σ^2_{it}' and 'σ^2_{jt}' are respectively the volatilities of market return i and j (idiosyncratic factor). The β_h (h=i, j) is the beta of market h. The three equation show return, volatility and correlation change due to; (1) shocks to conditional beta and (2) shocks to volatility of non-diversifiable factors. Also, for volatility and correlation, they change due to the idiosyncratic factors. Hence, the return is likely to increase with the common factor. Also, the volatility seems to increase by the higher level of the common factor and the contribution of the idiosyncratic factor tends to disappear with the higher integration. The correlation also increases with the common factor if the two betas have the same sign. Finally, the relationship between correlation and volatility should be positive. According to equation 3 and taking the derivative, we have

$$1/2\beta_{it}\beta_{jt}\frac{\beta^2_{it}\sigma^2_{Ft}\sigma^2_{jt} + \beta^2_{jt}\sigma^2_{Ft}\sigma^2_{it} + 2\sigma^2_{jt}\sigma^2_{it}}{\left(\sqrt{\beta^2_{it}\sigma^2_{Ft} + \sigma^2_{jt}}\right)^3\left(\sqrt{\beta^2_{it}\sigma^2_{Ft} + \sigma^2_{it}}\right)^3}$$

This value is positive, if the beta has the same sign. Hence the correlation coefficient should increase with the volatility of the common factor.

In order to test the co-movements between stocks markets; we have used the Principal Component Analysis (PCA) as our analysis is in a spirit similar to that used by Morana and Beltratti (2008). Consider the analysis of a data set of a vector process X_t. From this data set, a corresponding squared covariance or correlation matrix can be calculated as $\Sigma_x = \mathbf{B}\Psi\mathbf{B}'$. Where Ψ is the diagonal matrix of the eigenvalues of the variance-covariance matrix and B is the matrix of the associated orthogonal eigenvectors. The principal component is then a linear combination of the vector process X_p, as $\mu_t = B'y_t$, the proportion of total variance accounted by the *i*-th principal component is computed as $\alpha_i = \frac{\Psi_i}{\Sigma\Psi}$, where Ψ_i is the *i*-th element on the diagonal of the matrix Ψ. Hence the proportion of i-th principal component on the proportion of variance of j- th variable is

computed as $\alpha_{j,i} = \frac{a_{ij}^{2}\Psi_i}{\Sigma_i a_{ij}^{2}\Psi_i}$, where a_{ji} is the *ji*th entry in the B matrix. The α_i and α_{ji} are computed by sub sample in order to asses whether the degree of co-movement has increased or decreased over time. The variance-covariance Σ_x is a reduced rank if there are common unobserved components and the eigenvalues are larger than zero. The number of non zero eigenvalues, which is determined by the matrix Ψ, is the number of common factors, noted h.

Our estimated model is written as:

$$X_t = \beta\mu_{\times p} + \varepsilon_p \qquad (4)$$

Where $\beta = B_{\times}\Psi_{\times}^{1/2}$ is the N*h factor loading matrix, is an N*1 vector of idiosyncratic components and $\mu_{\times t} = \Psi_{\times}^{-1/2}B_{\times}'X_t$. $\Psi_{\times}$ and $B_{\times}$ are respectively the h*h sub matrix of the non zero eigenvalues and the N*h matrix of the associated eigenvectors. $\mu_{\times t}$ is the standardized principal component which used to as the common factor. This factor measures the contribution provided by each factor to explain the total variance.

On other hands, we use weekly returns ($R_{i,t}$), variance ($V_{i,t}$) and correlation ($C_{i,t}$) processes which are computed from daily observations as follow:

$$R_{i,t} = \sum_{j=1}^{K} r_{i,j,t}$$

$$V_{i,t} = \sum_{j=1}^{K} r^{2}{}_{i,j,t}$$

$$Cov_{im,t} = \sum_{j=1}^{K} r_{i,j,t} * r_{m,j,t}$$

$$C_{i,t} = \frac{Cov_{im,t}}{\sqrt{V_{i,t} * V_{m,t}}}$$

Where $R_{i,j,t}$ is the returns on asset I at daily j for the week t, k is the number of trading days in the week and $Cov_{i\,m,\,t}$ is the covariance of the assets i and m for the week t.

5. Empirical Results

The co-movement between markets are analysed by returns, variance, correlation and the association of variance and correlation. First, we test for the linkage among the

developed markets. In our empirical analysis we find for the first 209 weeks, the linkage of the return of Pacific market with other the developed markets to be very negligible, leading the variance and covariance to be negligible too. The initial result establishes the relationship of the correlation with the other markets for the period. When we conduct further empirical tests and report our findings, we exclude Pacific market for the linkage by the correlation. We do our analysis in linkage by return and variance for the developed market first for all the markets and then exclude Pacific market. Next we test for the linkage among the emerging markets and then for the co-movement between the emerging markets and US. And finally, we analyse the co-movement between the developed and the emerging markets together. For the developed markets, we have four different sample periods - the full period, pre October 1987 period, post October 1987 pre September11, 2001 period and finally the post September 11, 2001 period. For the emerging markets, we have full period, pre and post September 11, 2001 periods. All the findings for the different sample periods are reported in the tables.

5.1 Linkage in returns

The co-movement by returns between markets is tested by the equation (4) as:

$$R_t = \beta\mu_{\times p} + \varepsilon_p \qquad (5),$$

where R_t is the weekly market return.

Table 1A reports the results of the equation (4) for all markets. We find that there are two dominant factors during the period of our study for the developed markets, which explain 88% (62% first factor and 26% second factor) of total variance. Though the third factor accounts for 10%, the fourth factor seems insignificant in explaining the linkage of the returns. We infer the first factor as the global factor and accounts for 62% of total variance. Except for the US market more than the half of the total variance of market is explained by the first factor. It accounts almost for 80% for DFARE, 75% for DPAC, 58% for DEUR and only 35% for DUS. The second factor, which accounts for 26% of total variance, is inferred as the US factor and explains for 49% of the return of US market. The US factor accounts 20% for DPAC and 18% and 16% for DEUR and DFARE respectively. The dominance of the two first factors is confirmed over the three sub periods. The first factor accounts for 55%; 63% and 71%. It is accounting for 36% (DUS), 59% (DEUR), 76% (DFARE) and 47% (DPAC) during the period 1980 - October 10,

1987. On the other hand, for the second sub sample period (post-crash 1987 stock market crash and before September 11, 2001), the proportion of the first factor falls to 30% (RDUS), 55 % (DEUR), but increases to 82% (DFARE) and 84% (DPAC). After September 11, 2001, the proportion of the first factor increases to 58 %(DUS) and 70 % (DEUR), but decreases to76 % (DFARE) and 80 % (DPAC). However, an idiosyncratic behaviour is detected for the US market caused by the crisis. After the crash 1987, we find the integration did increase between US and the other markets because of the decline of the proportion of the first factor and the rise of the second factor. During the last sub sample period, we notice a progression of integration between DUS and DEUR markets. The result also shows an opposite co movement between the four markets. When the first factor increases on DEUR and DUS, it decreases on the two other markets. These findings are coherent with the result of previous studies (Hon et al. 2004, Morana and Beltratti 2008) to separate the geographic areas of internationals markets, when the DUS and DEUR co move very closely, particularly during the last sub sample period and DFARE and DPAC co move together also. The lower proportion of variance explained by the first factor for US and the total variance of US is explained by the second factor; 44%, 54%, and 33% over the three sub sample periods. The share of the second factor seems to be stable, about 25% over the three sub sample periods. The two remaining factors are idiosyncratic over the three sub sample periods. A growth in the integration of the markets with US and the effect of September 11, 2001 on the behaviour of their returns are noted.

Insert Table 1A Here

Next, we study the co-movement among the emerging markets and then between emerging and the developed markets. The common period data for both the markets spans from 01/01/1988 to 07/07/2006; we do our analysis for the stated period and then split sample period into two sub sample periods; pre and post September 11, 2001.

Table 1B reports the results of the linkage among the emerging markets. For the full period, the total variance of returns is explained by the two first factors, like the developed markets. The first factor explains 62% of the total variance, interpreted as the global factor. It explains 86% and 85% of total variance for EMAS and EMFAR. We find this percentage to be higher for the two sub sample periods and are reported in the

table. However, the percentage of the first factor is low for EMERP (40%) and EMLA (37%). We find in the pre September 11, 2001 sub sample period, the percentage is also low but increases in the post September 11, 2001 sample period [EMLA (62%) and for EMERP (57%)]. The results confirm, first the geographical integration between markets as Asia and Fare East comove more closely and second the US shock has consolidated the integration among the emerging markets. Our results are reconfirmed when we include US with the emerging markets and results are reported in the next table.

Insert Table 1B Here

Table 1C reports the findings for the co-movement between the emerging markets and US. Similar to findings reported in the earlier tables, the linkages relationships are also explained by the first and the second factor. These two factors seem to dominate in all the three different period under study. The first factor is interpreted as US, principally after the September 11, 2001. In the post September 11, 2001 period the first factor explains 66%, while the second factor accounts for 15% of the total. The dominance of the first factor is clearly reflected for all the emerging markets as reported in the table.

Insert Table 1C Here

Table 1D reports the findings of the co-movement between the developed and the emerging markets. This table shows that the total variance is dominated by the first factor which is interpreted as the global factor. This factor explains 51%, 48%, and 63% respectively for full period, first and the second sub sample period. Also, we find the US factor; the second factor explains 15%, 16% and 13% for the three different periods under study. The influence of the second factor seems to be negligible for all the markets. It seems that the shock of September 11, 2001 can be interpreted as a factor of integration between the developed and the emerging markets.

Insert Table 1D Here

5.2 Linkage in variance

The co-movement between markets by variance is tested by the equation (4) as:

$$V_t = \beta \mu_{\times p} + \varepsilon_p \qquad (6),$$

Where '*V*' is the weekly market variance.

Table 2A presents the results of co-movement between the developed markets by variance. As shown, the first factor is, also, the dominant factor over the full period. It explains about 77% of the total variance. We find the proportion of this factor not to be stable over the three sub sample periods. It explains only 48% over the first period. After that, it increases to 85% after the stock market crash of October 1987, and then falls to 63% after September 11, 2001. We find two dominant factors the first and the second for the full period, post October 1987 pre September 2001 and post September 2001. The two factors explain 91% and 95% respectively for the other two sub sample periods (post 1987 pre September 11, 2001 and post September 11 2001). The first factor accounts above 75% on the average for the total variance for DUS, DEUR, DEUR and DPAC for the full and third sub sample period, while the results are somewhat mixed for the other two sub sample periods. The first factor is interpreted as the global factor, independent of the period and the second factor captures the dynamics in the various markets. In contrast with the findings of Morana and Beltratti (2008) that the second factor interpreted as the Japanese factor for their sub period, we find that this factor depends on the time frame, and for the first sub sample period we interpret this as the Pacific factor and US factor for the third sub sample period. When we exclude the Pacific market, the findings reported in Table 2B, the first factor still displays the dominance for all the different sample periods. The three markets seem to commove together by variance, however for the post October 1987 pre September 2001, and the post September 2001, the second factor represents about 25% of total variance. The second factor essentially explains the variance of US market. It shows the influence of US market on the other markets and confirms that September 11, 2001 did strengthen the growth of integration of the markets with US.

Insert Table 2A and 2B Here

The results for the emerging markets are reported in Table 2C. This table also shows the dominance of the first and the second. The first factor explains 58% of total variance and 23% for the second for the first two periods and 64% and 26% for the third period. Like our previous analysis, the first factor is interpreted as the global factor. The second factor, we find to be EMLA for the full period (73%) and the first sub sample period (81%) and EMERP for the second sub sample period (40%). Again, the comovement between

markets on variance is confirmed by the geographic area, EMSA and EMFAR seem to comove closely. When we include US market, the findings are presented in Table 2D, it reaffirms the previous findings of the emerging markets (Table 2C). The two dominant factors are the first and the second, interpreted as EMLA on the full period and first sub sample period and EMERP after September 11 2001. Conversely, the volatility of US market has no effect on the co-movement between the emerging markets and US; particularly after September 2001 (the second factor is 6% of total variance of US markets).

Insert Table 2C and 2D Here

Table 2E presents the co-movement between the developed and the emerging markets. Again it confirms the dominance of the first factor and this dominance is independent of the time periods. The second factor accounts for 47% of total variance of US market in the post September 2001 sub sample period and this integration can be inferred as an indirect integration between the emerging markets and US.

Insert Table 2E Here

5.3 Linkage in conditional correlation

The co-movement between markets by correlation is tested by the equation (4) as:

$$C_t = \beta\mu_{\times p} + \varepsilon_p \qquad (7),$$

where 'C' is the weekly market correlation between two markets.

For the developed markets, we study only three correlations; correlation between DUS & DEUR; DUS & DFARE and DEUR & DFARE. We exclude DPAC from our analysis as it has negligible impact on the returns. As reported in Table 3 A, the linkage in the conditional correlation is dominated by the two first factors. They together explain about 81% (47% & 34%) of the total variance. We observe the same trend for the other three sub sample periods. We find the proportion of the two factors differs when we look at the correlation between DEUR& DFARE, it is more explained by the second factor (65%). The dominance is also noted on the first two sub sample period, but in third sub sample period (9/11/01-2006) the first factor and the second factor are the dominant and represents 80%. The correlation between DUS& DEUR is explained by the two factors,

except for the third sub sample period where the second factor accounts for about 80%, and the first factor is 86%. It seems the event on September 11, 2001 had an affect on the integration between markets by correlation. Finally, the correlation between DUS& DFARE is only explained by the first factor; about 71% for all the sample periods.

Insert Table 3A Here

Table 3B reports the results of the linkage in the emerging markets by correlation. We note that for the emerging markets too the dominant factors are the first and the second. The first and the second factor explains 68% (42% &26%), 67% (39%&28%), and 70% (47%&23%) of total variance for the full period and two sub sample periods under the study. When we analyse the correlation by type of markets, we find the third factor plays a dominant role in explaining the results for the correlation between EMAS and EMFAR almost 100% for all the three different sample periods.

Insert Table 3B Here

In Table 3 C, we report the findings by including US with the emerging markets in our analysis. These results seem to follow the previous trend as reported in Table 3B. The first two factors account for 50 % (31% & 19%), 48 %(29% &19%) and 54 %(34% & 20%) for the three different sample periods on the total variance. The third factor also has a significant role in explaining the correlation between EMERP and DUS for all the three sample period. We find that the correlation between EMLA and DUS is explained by the sixth factor for all the three sample periods. These two factors can be interpreted as the economic factor of these markets, and our finding seems to confirm the geographic integration.

Insert Table 3C Here

5.4 Linkage between correlation and variance

Here the co-movement between markets by variance and correlation are tested by the equation (4) as:

$$\varphi_t = \beta\mu_{\times p} + \varepsilon_p \qquad (8),$$

where ‘φ’ is a 3*1 vector composed of variance of two markets (X_1 and X_2) and the correlation between X_1 and X_2, the weekly market correlation between two markets. Table 4A reports the linkage in variance and correlation among the developed markets. We observe again the dominance of the first factor (56% to 59%) in explaining the total variance during the full period. This factor is interpreted as the volatility fluctuation over the period and has no significant effect on the correlation. It explains a proportion near to zero of its variance (between 0.09% and 6%). The second factor, which explains about 33% of total variance, has a significant impact on the correlation and is over than 93%. Yet this factor has a small effect on volatilities and its proportion is less than 3%. The third factor explains between 8% and 12% of total variance, affecting volatilities between 12% and 17% and has no effect on correlation. On the contrary, this tendency is not reflected over the other three sub sample periods. For the developed markets, we find a negative relationship between volatilities and correlation. When the proportion of the first increases (decreases) on volatilities, it decreases (increases) on correlation. The co-movement of correlation and variance of the emerging and the developed markets has been studied by geographical factor. We study the co-movement of US, Europe and Asia markets and between US and the emerging markets and the results are presented in Table 4B. The first factor is dominant; it explains between 46% and 52% of total variance, and in the developed markets and this factor is inferred as the volatility fluctuation. The first factor has a significant effect on the correlation except between EMAS with DUS, and EMFAR and DUS. For the other, this factor explains between 30% and 36%.The correlation between DUS and EMLA markets is explained by the volatility fluctuation , which is about 47% for the full period and 49% for the other two sub sample periods. Also, the correlation between DFARE and EMAS, DFARE and EMFAR are affected by the volatility fluctuation around 31%. The correlation seems to decrease with the increase in volatility. The proportion of the first factor seems to decline after September 11, 2001, with EMAS, the proportion decreases from 38% to 27% and for EMFAR 35% to 26% respectively**.** We find the shock of the US is not a factor in increasing the co-movement between US and EMLA or between developed and EMAS. This characteristic is not the same between EMERP and DUS. In fact, the first factor explains 29%, for the full period and 25% for the first sub period. The volatility fluctuation, caused by the shock of September 11, 2001 did increase the correlation between the

two markets. The correlation between EMERP and DEUR is affected by the volatility fluctuation, 35% for the full period. However, the correlation is not affected by the higher fluctuation of volatility since; the percentage of the first factor seems to be stable between the two other sub sample periods. Finally, the volatility fluctuation has no effect on the correlation between DUS and the EMAS or EMFAR. The proportion is near zero for the three sample periods. In addition, the linkage on variance and correlation is explained by the second factor, which is about 28 to 33% of the total variance; this factor seems to be significant on the correlation between emerging and the developed markets, independently of the time period and the geographical factor. Therefore, this factor can be interpreted as the contributing factor for the correlation of the emerging and the developed markets. However, the proportion of the second factor on total variance seems to stable over the three different periods. Hence, the integration between the emerging and the developed market measured by correlation is not reinforced by the events of September 11, 2001 in US.

Insert Table 4A and 4B Here

6. Conclusion

In this study, we have attempted to asses the integration and the co-movement of the developed and the emerging markets using different approach. Independent of the markets type, our study confirm there is comovement in returns, volatility and correlation of stocks markets influenced by a dominant factor (global) that explains the integration between markets. Also, the integration of stocks markets by returns or volatility seems to be explained by a second factor, this later depends of the period and the type of markets. The US market is interpreted as the factor of integration of the developed market, particularly after September 11, 2001. For the emerging markets, EMLA is regarded as the factor for the pre September 11, 2001 (1/01/1988-9/11/2001) period, while EMERP factor explains the integration of the emerging markets for the post September 11, 2001 (9/11/2001 - 07/07/2006) period. Also, the US factor increases the integration by returns between the emerging markets and US, and between the developed and the emerging markets; this integration is consolidated mostly after September 11, 2001. However, the US factor had no effect of the integration of the

emerging markets and US and the developed and the emerging markets by volatility. Also the co-movement of the markets by volatility and returns are reinforced by the economic and geographical factors. In contrast, the co-movement in returns is supported by the US crises; the co-movement in correlation is explained only by the global factor for all the markets. And for the emerging markets, the integration by correlation is explained by the economic factor. Although our results reject the positive linkage between volatility and correlation, we find the relationship to be negative and insignificant. On other hands, we find mainly after September 11, 2001, the co-movement of markets is by returns and volatility and not by correlation. In addition, the economic and geographical factors seem to the main factors of integration and co-movement of the markets. In fact the integration of US and Europe seems to be strong over the period, particular after September 11, 2001.

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Table 1 A : Linkage in Returns Among Developed Markets.

Period	1980-2006				Period	1980 - 10/10/1987			
	F1	F2	F3	F4		F1	F2	F3	F4
Indices	62%	26%	10%	2%	Indices	55%	25%	13%	7%
DUS	0,359	0,489	0,153	0,000	DUS	0,365	0,441	0,186	0,009
DEUR	0,582	0,181	0,238	0,000	DEUR	0,589	0,105	0,292	0,014
DFARE	0,796	0,157	0,006	0,041	DFARE	0,761	0,060	0,003	0,176
DPAC	0,754	0,201	0,006	0,039	DPAC	0,470	0,406	0,023	0,102
Period	10/10/1987- 9/11/2001				Period	9/11/2001 - 2006			
	F1	F2	F3	F4		F1	F2	F3	F4
Indices	63%	26%	10%	1%	Indices	71%	24%	5%	0%
DUS	0,301	0,546	0,154	0,000	DUS	0,585	0,330	0,085	0,000
DEUR	0,557	0,191	0,251	0,000	DEUR	0,697	0,200	0,103	0,000
DFARE	0,821	0,169	0,009	0,001	DFARE	0,765	0,231	0,001	0,003
DPAC	0,839	0,154	0,007	0,001	DPAC	0,805	0,191	0,000	0,003

Note: Indices are described in Section 3 Data .

Table 1 B : Linkage in Returns Among Emerging Markets.

Period	1988-2006				Period	1988-9/11/2001			
	F1	F2	F3	F4		F1	F2	F3	F4
Indices	62%	22%	16%	0%	Indices	59%	23%	17%	1%
EMAS	0,860	0,127	0,000	0,012	EMAS	0,869	0,116	0,000	0,015
EMLA	0,369	0,340	0,291	0,000	EMLA	0,288	0,409	0,303	0,000
EMFAR	0,848	0,138	0,002	0,012	EMFAR	0,859	0,122	0,003	0,015
EMERP	0,399	0,256	0,346	0,000	EMERP	0,335	0,266	0,399	0,000
Period	9/11/2001-2006								
	F1	F2	F3	F4					
Indices	73%	17%	10%	0%					
EMAS	0,863	0,135	0,001	0,002					
EMLA	0,622	0,159	0,219	0,000					
EMFAR	0,848	0,149	0,001	0,002					
EMERP	0,574	0,254	0,172	0,000					

Note: Indices are described in Section 3 Data .

Table1 C : Linkage in Returns Between Emerging Markets and US.

Period	1988-2006				
	F1	F2	F3	F4	F5
Indices	55%	19%	14%	11%	1%
EMAS	0,788	0,192	0,008	0,000	0,012
EMLA	0,422	0,277	0,001	0,300	0,000
EMFAR	0,782	0,190	0,016	0,001	0,012
EMERP	0,384	0,034	0,536	0,046	0,000
DUS	0,370	0,273	0,166	0,190	0,000
Period	1988 - 9/11/2001				
	F1	F2	F3	F4	F5
Indices	52%	21%	15%	11%	1%
EMAS	0,783	0,195	0,006	0,000	0,015
EMLA	0,349	0,326	0,017	0,308	0,000
EMFAR	0,784	0,185	0,016	0,000	0,015
EMERP	0,331	0,043	0,612	0,014	0,000
DUS	0,342	0,290	0,108	0,259	0,000
Period	9/11/2001 - 2006				
	F1	F2	F3	F4	F5
Indices	66%	15%	13%	6%	0%
EMAS	0,823	0,165	0,010	0,000	0,002
EMLA	0,654	0,138	0,014	0,193	0,000
EMFAR	0,804	0,183	0,011	0,000	0,002
EMERP	0,535	0,032	0,353	0,080	0,000
DUS	0,474	0,217	0,256	0,053	0,000

Note: Indices are described in Section 3 Data .

Table 1 D : Linkage in Returns Between Emerging and Developed Markets.

Period	**1988-2006**						
	F1	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**
Indices	**51%**	**15%**	**13%**	**9%**	**8%**	**4%**	**0%**
EMAS	0,638	0,001	0,343	0,005	0,001	0,000	0,012
EMLA	0,343	0,175	0,031	0,000	0,444	0,008	0,000
EMFAR	0,639	0,000	0,337	0,012	0,000	0,000	0,012
EMERP	0,358	0,053	0,004	0,543	0,012	0,030	0,000
DUS	0,358	0,230	0,102	0,164	0,044	0,103	0,000
DEUR	0,565	0,061	0,088	0,000	0,112	0,173	0,000
DFARE	0,582	0,349	0,060	0,001	0,004	0,003	0,000
DPAC	0,608	0,324	0,061	0,001	0,003	0,002	0,000
Period	**1988 - 9/11/2001**						
	F1	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**
Indices	**48%**	**16%**	**14%**	**10%**	**8%**	**5%**	**0%**
EMAS	0,604	0,017	0,362	0,001	0,001	0,000	0,015
EMLA	0,273	0,172	0,074	0,100	0,370	0,011	0,000
EMFAR	0,616	0,013	0,349	0,007	0,001	0,000	0,015
EMERP	0,312	0,069	0,021	0,527	0,029	0,043	0,000
DUS	0,313	0,205	0,129	0,104	0,146	0,104	0,000
DEUR	0,534	0,030	0,102	0,026	0,104	0,204	0,000
DFARE	0,571	0,386	0,032	0,003	0,003	0,005	0,000
DPAC	0,591	0,366	0,033	0,003	0,002	0,003	0,000
Period	**9/11/2001 - 2006**						
	F1	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**
Indices	**63%**	**13%**	**9%**	**8%**	**4%**	**3%**	**0%**
EMAS	0,739	0,034	0,183	0,041	0,001	0,000	0,000
EMLA	0,583	0,079	0,012	0,097	0,226	0,002	0,000
EMFAR	0,717	0,040	0,195	0,046	0,001	0,000	0,000
EMERP	0,504	0,000	0,009	0,390	0,088	0,009	0,000
DUS	0,494	0,331	0,026	0,076	0,001	0,072	0,000
DEUR	0,622	0,214	0,033	0,009	0,037	0,086	0,000
DFARE	0,655	0,180	0,159	0,002	0,002	0,000	0,003
DPAC	0,710	0,146	0,138	0,001	0,002	0,000	0,003

Note: Indices are described in Section 3 Data .

Table 2 A : Linkage in Variance Among Developed Markets.

Period	**1980 - 2006**			
	F1	**F2**	**F3**	**F4**
Indices	**77%**	**14%**	**6%**	**3%**
VDUS	0,761	0,104	0,135	0,001
VDEUR	0,721	0,171	0,107	0,001
VDFARE	0,839	0,082	0,000	0,078
VDPAC	0,764	0,178	0,001	0,057
Period	**1980 - 10/10/1987**			
	F1	**F2**	**F3**	**F4**
	48%	**24%**	**17%**	**11%**
VDUS	0,330	0,358	0,312	0,000
VDEUR	0,616	0,035	0,173	0,176
VDFARE	0,682	0,017	0,055	0,247
VDPAC	0,267	0,553	0,148	0,032
Period	**10/10/1987 - 9/11/2001**			
	F1	**F2**	**F3**	**F4**
	85%	**10%**	**5%**	**0%**
VDUS	0,804	0,103	0,093	0,000
VDEUR	0,800	0,109	0,091	0,000
VDFARE	0,892	0,108	0,000	0,000
VDPAC	0,918	0,081	0,000	0,001

Period	9/11/2001 - 2006			
	F1	F2	F3	F4
	63%	32%	4%	1%
VDUS	0,533	0,380	0,087	0,000
VDEUR	0,569	0,341	0,089	0,000
VDFARE	0,694	0,300	0,000	0,006
VDPAC	0,737	0,257	0,000	0,006

Table 2 B: Linkage in Variance Among Developed Market without Pacific

Period	1980-2006			Period	1980 - 10/10/1987		
	F1	F2	F3		F1	F2	F3
	80%	12%	8%		58%	25%	17%
VDUS	0,834	0,025	0,141	VDUS	0,423	0,572	0,005
VDEUR	0,809	0,095	0,096	VDEUR	0,685	0,056	0,259
VDFARE	0,760	0,235	0,005	VDFARE	0,644	0,136	0,220
Period	**10/10/1987- 9/11/2001**			**Period**	**9/11/2001 - 2006**		
	F1	F2	F3		F1	F2	F3
	84%	10%	6%		66%	27%	6%
VDUS	0,861	0,048	0,091	VDUS	0,842	0,071	0,087
VDEUR	0,863	0,043	0,093	VDEUR	0,860	0,051	0,089
VDFARE	0,805	0,195	0,000	VDFARE	0,291	0,709	0,000

Table 2 C: Linkage in Variance Among Emerging Markets.

Period	1988 - 2006				Period	1988 - 9/11/2001			
	F1	F2	F3	F4		F1	F2	F3	F4
	58%	23%	18%	1%		58%	23%	17%	1%
VEMAS	0,859	0,090	0,028	0,023	VEMAS	0,864	0,065	0,047	0,024
VEMLA	0,196	0,727	0,078	0,000	VEMLA	0,165	0,812	0,023	0,000
VEMFAR	0,879	0,053	0,045	0,023	VEMFAR	0,887	0,030	0,059	0,024
VEMERP	0,405	0,034	0,561	0,000	VEMERP	0,421	0,003	0,576	0,000
Period	**9/11/2001 - 2006**								
	F1	F2	F3	F4					
	64%	26%	9%	1%					
VEMAS	0,814	0,179	0,002	0,005					
VEMLA	0,542	0,249	0,209	0,000					
VEMFAR	0,791	0,203	0,001	0,005					
VEMERP	0,431	0,399	0,170	0,000					

Table 2D : Linkage in Variance Between Emerging Markets and US.

Period	1988 - 2006				
	F1	F2	F3	F4	F5
	52%	19%	15%	13%	1%
VEMAS	0,807	0,135	0,012	0,023	0,023
VEMLA	0,219	0,568	0,010	0,202	0,000
VEMFAR	0,826	0,095	0,012	0,044	0,023
VEMERP	0,383	0,002	0,486	0,129	0,000
VDUS	0,356	0,148	0,218	0,278	0,000
Period	**1988 - 9/11/2001**				
	F1	F2	F3	F4	F5
	52%	19%	14%	14%	1%
VEMAS	0,799	0,127	0,048	0,002	0,024
VEMLA	0,199	0,612	0,039	0,150	0,000
VEMFAR	0,822	0,083	0,063	0,008	0,024
VEMERP	0,407	0,001	0,552	0,040	0,000
VDUS	0,409	0,149	0,004	0,439	0,000
Period	**9/11/2001 - 2006**				
	F1	F2	F3	F4	F5
	56%	21%	16%	7%	0%
VEMAS	0,793	0,119	0,083	0,000	0,005
VEMLA	0,543	0,241	0,035	0,181	0,000
VEMFAR	0,783	0,144	0,068	0,000	0,005
VEMERP	0,372	0,479	0,017	0,132	0,000
VDUS	0,304	0,066	0,604	0,027	0,000

Table 2 E: Linkage in Variance Between Emerging and Developed Markets.

Period	1988 - 2006						
	F1	F2	F3	F4	F5	F6	F7
	46%	16%	13%	10%	9%	5%	1%
VEMAS	0,623	0,103	0,234	0,001	0,014	0,003	0,023
VEMLA	0,173	0,045	0,145	0,625	0,001	0,010	0,000
VEMFAR	0,632	0,099	0,221	0,004	0,020	0,002	0,023
VEMERP	0,350	0,034	0,001	0,001	0,582	0,032	0,000
VDUS	0,336	0,124	0,225	0,053	0,109	0,154	0,000
VDEUR	0,433	0,015	0,201	0,153	0,002	0,197	0,000
VDFARE	0,554	0,439	0,000	0,001	0,002	0,002	0,000
VDPAC	0,567	0,426	0,000	0,001	0,002	0,003	0,000
Period	**1988 - 9/11/2001**						
	F1	F2	F3	F4	F5	F6	F7
	46%	16%	13%	10%	9%	5%	1%
VEMAS	0,610	0,159	0,174	0,029	0,000	0,005	0,023
VEMLA	0,154	0,048	0,493	0,179	0,119	0,006	0,000
VEMFAR	0,630	0,153	0,131	0,057	0,002	0,004	0,024
VEMERP	0,390	0,035	0,002	0,285	0,145	0,143	0,000
VDUS	0,341	0,086	0,143	0,001	0,372	0,057	0,000
VDEUR	0,454	0,001	0,039	0,239	0,004	0,263	0,000
VDFARE	0,544	0,433	0,001	0,016	0,000	0,005	0,000
VDPAC	0,557	0,421	0,001	0,016	0,000	0,005	0,000
Period	**9/11/2001 - 2006**						
	F1	F2	F3	F4	F5	F6	F7
	53%	16%	15%	10%	4%	2%	0%
VEMAS	0,717	0,031	0,019	0,228	0,000	0,000	0,003
VEMLA	0,445	0,022	0,319	0,003	0,210	0,001	0,000
VEMFAR	0,708	0,022	0,029	0,234	0,000	0,000	0,003
VEMERP	0,277	0,000	0,584	0,000	0,133	0,006	0,000
VDUS	0,362	0,472	0,072	0,021	0,000	0,072	0,000
VDEUR	0,457	0,422	0,015	0,009	0,021	0,077	0,000
VDFARE	0,613	0,194	0,035	0,151	0,000	0,000	0,004
VDPAC	0,662	0,156	0,025	0,151	0,000	0,000	0,004

Table 3 A : Linkage in Correlation Among Developed Markets.

Period	1980-2006			Period	1980 - 10/10/1987		
	F1	F2	F3		F1	F2	F3
	47%	34%	19%		49%	33%	18%
CDUSDEUR	0,458	0,358	0,184	CDUSDEUR	0,590	0,180	0,230
CDUSDFARI	0,719	0,000	0,281	CDUSDFARI	0,714	0,002	0,285
DERPDFAR	0,241	0,655	0,105	DERPDFAR	0,165	0,794	0,041
Period	**10/10/1987 - 9/11/2001**			**Period**	**9/11/2001 - 2006**		
	F1	F2	F3		F1	F2	F3
	48%	32%	20%		46%	36%	18%
CDUSDEUR	0,491	0,309	0,200	CDUSDEUR	0,086	0,801	0,112
CDUSDFARI	0,694	0,001	0,305	CDUSDFARI	0,740	0,018	0,242
DERPDFAR	0,265	0,653	0,081	DERPDFAR	0,527	0,273	0,200

Note: C for Correlation.

Table 3B : Linkage in Correlation Among Emerging Markets.

Period	1988 - 2006					
	F1	F2	F3	F4	F5	F6
	42%	26%	17%	14%	1%	0%
EMASEML	0,577	0,398	0,000	0,014	0,004	0,007
EMASEMFA	0,004	0,001	0,985	0,011	0,000	0,000
EMASEMEF	0,592	0,369	0,003	0,023	0,010	0,003
EMLAEMFA	0,566	0,407	0,002	0,013	0,004	0,007
EMLAEMEF	0,216	0,002	0,009	0,774	0,000	0,000
EMFAREME	0,585	0,380	0,001	0,021	0,010	0,003

Period	1988 - 9/11/2001					
	F1	F2	F3	F4	F5	F6
	39%	28%	17%	15%	1%	0%
CEMASEML	0,556	0,418	0,001	0,012	0,003	0,010
EMASEMFA	0,000	0,001	0,999	0,000	0,000	0,000
EMASEMEF	0,560	0,404	0,001	0,019	0,014	0,002
EMLAEMFA	0,549	0,426	0,000	0,011	0,004	0,010
EMLAEMEF	0,142	0,001	0,001	0,856	0,000	0,000
CMFAREME	0,554	0,416	0,000	0,014	0,014	0,002
Period	**9/11/2001 - 2006**					
	F1	F2	F3	F4	F5	F6
	47%	23%	17%	13%	0%	0%
CEMASEML	0,622	0,367	0,002	0,004	0,004	0,001
EMASEMFA	0,016	0,000	0,955	0,029	0,000	0,000
EMASEMEF	0,660	0,303	0,004	0,028	0,002	0,002
EMLAEMFA	0,613	0,371	0,004	0,007	0,004	0,001
EMLAEMEF	0,261	0,016	0,025	0,699	0,000	0,000
CMFAREME	0,651	0,304	0,006	0,035	0,002	0,002

Table 3 C: Linkage in Correlation Between Emerging Markets and US .

Period	1988 - 2006									
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
	31%	19%	13%	11%	10%	9%	6%	1%	0%	0%
CEMASEML	0,612	0,013	0,284	0,066	0,010	0,002	0,003	0,009	0,000	0,003
EMASEMFA	0,005	0,000	0,023	0,005	0,936	0,030	0,000	0,000	0,000	0,000
EMASEMEF	0,257	0,632	0,000	0,092	0,002	0,000	0,004	0,001	0,012	0,000
CEMASDUS	0,474	0,288	0,059	0,162	0,003	0,000	0,003	0,007	0,001	0,003
EMLAEMFA	0,607	0,015	0,290	0,067	0,003	0,002	0,004	0,009	0,000	0,003
EMLAEMEF	0,210	0,047	0,149	0,205	0,000	0,073	0,317	0,000	0,000	0,000
CEMLADUS	0,119	0,007	0,053	0,101	0,035	0,684	0,000	0,000	0,000	0,000
CMFAREME	0,252	0,635	0,001	0,096	0,000	0,000	0,002	0,001	0,012	0,000
CEMFARDU	0,473	0,290	0,053	0,162	0,008	0,000	0,004	0,007	0,001	0,003
CEMERPDUS	0,137	0,000	0,359	0,164	0,000	0,074	0,267	0,000	0,000	0,000
Period	**1988 - 9/11/2001**									
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
	29%	19%	13%	11%	10%	9%	8%	1%	0%	0%
CEMASEML	0,599	0,010	0,351	0,009	0,014	0,002	0,002	0,010	0,000	0,003
EMASEMFA	0,001	0,000	0,017	0,023	0,832	0,125	0,001	0,000	0,000	0,000
EMASEMEF	0,183	0,727	0,012	0,054	0,001	0,005	0,003	0,001	0,015	0,000
CEMASDUS	0,510	0,211	0,152	0,104	0,007	0,000	0,004	0,008	0,001	0,003
EMLAEMFA	0,600	0,012	0,353	0,011	0,005	0,003	0,003	0,010	0,000	0,003
EMLAEMEF	0,141	0,031	0,069	0,389	0,008	0,018	0,344	0,000	0,000	0,000
CEMLADUS	0,097	0,019	0,005	0,087	0,105	0,679	0,008	0,000	0,000	0,000
CMFAREME	0,180	0,730	0,016	0,053	0,000	0,004	0,001	0,001	0,015	0,000
CEMFARDU	0,515	0,211	0,144	0,098	0,014	0,000	0,004	0,008	0,001	0,003
CEMERPDUS	0,100	0,003	0,206	0,309	0,025	0,056	0,301	0,000	0,000	0,000
Period	**9/11/2001 - 2006**									
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
	34%	20%	15%	10%	9%	7%	5%	0%	0%	0%
CEMASEML	0,693	0,003	0,106	0,003	0,181	0,006	0,002	0,004	0,000	0,001
EMASEMFA	0,000	0,045	0,127	0,560	0,019	0,247	0,001	0,000	0,000	0,000
EMASEMEF	0,322	0,559	0,000	0,065	0,038	0,013	0,001	0,001	0,003	0,000
CEMASDUS	0,491	0,354	0,001	0,005	0,141	0,002	0,002	0,002	0,000	0,001
EMLAEMFA	0,689	0,005	0,111	0,001	0,182	0,005	0,004	0,004	0,000	0,001
EMLAEMEF	0,234	0,081	0,191	0,206	0,000	0,115	0,173	0,000	0,000	0,000
CEMLADUS	0,044	0,046	0,372	0,042	0,123	0,340	0,033	0,000	0,000	0,000
CMFAREME	0,313	0,558	0,000	0,072	0,041	0,011	0,001	0,001	0,003	0,000
CEMFARDU	0,478	0,348	0,005	0,003	0,159	0,003	0,002	0,002	0,000	0,001
CEMERPDUS	0,147	0,001	0,551	0,086	0,000	0,010	0,205	0,000	0,000	0,000

Table 4 A : Linkage in Correlation and Variance Among Developed Markets.

Period	1980 - 2006			Period	1980 - 10/10/1987		
	F1	F2	F3		F1	F2	F3
	59%	33%	8%		47%	31%	22%
VDUS	0,855	0,024	0,121	VDUS	0,651	0,005	0,344
VDEUR	0,866	0,011	0,123	VDEUR	0,503	0,260	0,237
CDUSDEUR	0,061	0,939	0,000	CDUSDEUR	0,260	0,677	0,062
	F1	F2	F3		F1	F2	F3
	56%	34%	10%		44%	32%	24%
VDUS	0,841	0,005	0,153	VDUS	0,597	0,034	0,369
VDFARE	0,845	0,001	0,154	VDFARE	0,575	0,074	0,351
CDUSDFARI	0,009	0,991	0,000	CDUSDFARI	0,142	0,855	0,003
	F1	F2	F3		F1	F2	F3
	56%	32%	12%		54%	31%	15%
VDEUR	0,811	0,018	0,171	VDEUR	0,767	0,003	0,229
VDFARE	0,813	0,016	0,171	VDFARE	0,611	0,217	0,173
DEURDFAR	0,058	0,942	0,000	DEURDFAR	0,238	0,724	0,038
Period	10/10/1987 - 9/11/2001			Period	10/10/1987 - 9/11/2001		
	F1	F2	F3		F1	F2	F3
	61%	33%	6%		63%	31%	6%
VDUS	0,887	0,023	0,090	VDUS	0,893	0,018	0,088
VDEUR	0,902	0,006	0,092	VDEUR	0,867	0,048	0,085
CDUSDEUR	0,050	0,950	0,001	CDUSDEUR	0,127	0,873	0,001
	F1	F2	F3		F1	F2	F3
	58%	34%	8%		43%	34%	23%
VDUS	0,863	0,007	0,130	VDUS	0,531	0,191	0,278
VDFARE	0,868	0,001	0,131	VDFARE	0,659	0,001	0,341
DEUSDFAR	0,011	0,989	0,000	CDUSDFARI	0,110	0,817	0,072
	F1	F2	F3		F1	F2	F3
	60%	32%	8%		43%	35%	22%
VDERP	0,838	0,033	0,129	VDERP	0,652	0,066	0,282
VDFARE	0,846	0,024	0,130	VDFARE	0,654	0,063	0,283
DERPDFAR	0,107	0,893	0,000	DERPDFAR	0,000	0,921	0,079

Table 4 B : Linkage in Correlation and Variance Between Emerging and Developed Markets.

Period	1988 - 2006			Period	1988 - 2006		
	F1	F2	F3		F1	F2	F3
	46%	33%	21%		47%	30%	23%
VEMAS	0,677	0,004	0,318	VDUS	0,612	0,005	0,383
VDUS	0,646	0,051	0,303	VEMLA	0,460	0,329	0,211
CEMASDUS	0,059	0,933	0,008	CEMLADUS	0,348	0,567	0,085
	F1	F2	F3		F1	F2	F3
	46%	33%	21%		45%	30%	25%
VDUS	0,648	0,045	0,307	VDUS	0,513	0,135	0,352
VEMFAR	0,673	0,007	0,320	VEMERP	0,539	0,068	0,393
CEMFARDU	0,062	0,933	0,005	CEMERPDU	0,296	0,700	0,004
	F1	F2	F3		F1	F2	F3
	52%	28%	20%		51%	29%	20%
VEMERP	0,575	0,158	0,267	VDFARE	0,603	0,095	0,301
VDEUR	0,625	0,048	0,326	VEMFAR	0,611	0,079	0,309
DEUREMER	0,356	0,634	0,010	EMFARDFA	0,304	0,696	0,000
	F1	F2	F3				
	51%	28%	21%				
VEMAS	0,601	0,081	0,317				
VDFARE	0,591	0,104	0,305				
CEMADFAR	0,329	0,671	0,000				
Period	1988 - 9/11//2001			Period	1988 - 9/11//2001		
	F1	F2	F3		F1	F2	F3
	47%	33%	20%		49%	29%	22%
VEMAS	0,693	0,002	0,305	VDUS	0,634	0,004	0,363
VDUS	0,662	0,047	0,290	VEMLA	0,470	0,340	0,190
CEMASDUS	0,051	0,941	0,009	CEMLADUS	0,371	0,541	0,088

	F1	F2	F3		F1	F2	F3
	47%	**33%**	**20%**		**47%**	**30%**	**23%**
VDUS	0,662	0,045	0,293	VDUS	0,538	0,163	0,299
VEMFAR	0,688	0,007	0,305	VEMERP	0,252	0,729	0,019
CEMFARDU	0,063	0,932	0,005	CEMERPDU	0,606	0,029	0,365
	F1	**F2**	**F3**		**F1**	**F2**	**F3**
	54%	**28%**	**18%**		**51%**	**28%**	**21%**
VEMERP	0,621	0,139	0,240	VDFARE	0,588	0,092	0,320
VDEUR	0,674	0,044	0,282	VEMFAR	0,584	0,103	0,314
DEUREMER	0,327	0,665	0,007	EMFARDFA	0,352	0,647	0,000
	F1	**F2**	**F3**				
	50%	**28%**	**22%**				
VEMAS	0,567	0,110	0,323				
VDFARE	0,572	0,096	0,331				
EMASDFAR	0,378	0,622	0,000				

Period	**9/11//2001 - 2006**			**Period**	**9/11//2001 - 2006**		
	F1	**F2**	**F3**		**F1**	**F2**	**F3**
	46%	**33%**	**21%**		**49%**	**30%**	**21%**
VEMAS	0,677	0,002	0,321	VDUS	0,523	0,246	0,231
VDUS	0,633	0,067	0,299	VEMLA	0,654	0,010	0,336
CEMASDUS	0,064	0,922	0,015	CEMLADUS	0,296	0,654	0,050
	F1	**F2**	**F3**		**F1**	**F2**	**F3**
	47%	**33%**	**20%**		**41%**	**30%**	**29%**
VDUS	0,663	0,044	0,293	VDUS	0,469	0,031	0,500
VEMFAR	0,693	0,001	0,307	VEMERP	0,349	0,605	0,046
CEMFARUSI	0,038	0,952	0,010	CEMERPDU	0,418	0,275	0,307
	F1	**F2**	**F3**		**F1**	**F2**	**F3**
	48%	**28%**	**24%**		**57%**	**29%**	**14%**
VEMERP	0,532	0,101	0,366	VDFARE	0,714	0,073	0,213
VDEUR	0,526	0,123	0,351	VEMFAR	0,719	0,064	0,216
DEUREMER	0,386	0,613	0,000	EMFARDFA	0,269	0,731	0,000
	F1	**F2**	**F3**				
	57%	**29%**	**14%**				
VEMAS	0,719	0,070	0,211				
VDFARE	0,720	0,069	0,211				
EMASDFAR	0,276	0,724	0,000				

Note: V for Variance and C for Correlation.