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EQUITY MARKET INTEGRATION AND DIVERSIFICATION: EVIDENCE FROM EMERGING AND DEVELOPED COUNTRIES

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ABSTRACT

This study examined the role of the US market on the portfolio of emerging stock markets in Asia, Europe, and S. America from the foreign investors' perspectives. The Lambda is used to separate impacts of exchange rates from stock returns in local currencies. Notable findings are as follows. First, there is no additional diversification gain for the portfolio of six emerging regional markets when the US market is added as a representative of developed markets. Second, there are some potential diversification benefits (lower risk) to be exploited in the portfolio of regional emerging markets if the US market is added: the US market seems to play an important role in reducing risk in the portfolio of regional emerging markets. The results could be of value to advance risk management for portfolio managers and individuals alike in emerging markets.

JEL: G110, G140, G150

KEYWORDS: Lambda, Integration, Diversification, Contagion, Emerging Markets, and Crisis

INTRODUCTION

In recent years, financial markets around the world became more integrated because of gradual abolition of regulations, advancement of new technology, fast flow of information, and increase of cross-border investments. Financial market integration and openness may discipline domestic financial sector and increase market efficiency. The benefits of market integration lie in a more efficient way of allocating assets and sharing investment risks thereof. Such benefits depend on the degree of interdependence between the economies concerned because the integrated economic/financial system results in a series of interdependencies that make contagion inevitable during financial crises. The additional risks beyond any fundamental economic ties have long been of great concern to fund managers and policymakers alike due mainly to serious impacts on investment activities and risk sharing. There has been substantial literature on the benefits of international diversification. Asset managers, when constructing portfolios, have employed such strategies as the mean-variance efficient portfolios (Markowitz 1952), dividend-weighted portfolios (Hsu and Campollo 2006), and equally-weighted portfolios (DeMiguel et al. 2009).

In empirical tests, it has long been debated how any innovation (or "shock"), originated from some economic/financial events in one economy, affects others in the integrated system. Since the fully integrated financial markets tend to co-move more closely, innovations in one market are likely to be fast transmitted to other markets. This would accentuate the market volatility, spillovers, and financial contagion during financial crises. Thus, empirical studies focus on the impacts of economic/financial events on stock market volatility and the co-movements of national stock markets. The objective of this study is to examine the impacts of the US market, as one of developed markets, on portfolios of

regional emerging markets. Empirical studies thus far indirectly examine the benefits of diversification by using pair-wise inter-market correlations. In reality, correlation is only one of the elements, which affect the portfolio risk. If foreign stocks are added, the portfolio return depends not only on the intermarket correlations but also on the total risk of foreign stocks which would be compounded with additional risk from exchange-rate changes. This study uses Lambda (λ) (Fooladi and Rumsey 2006) to separate impacts of exchange-rate changes from stock returns (local currencies). This study will provide answers to the question if adding the US market to a portfolio of emerging market stocks could affect portfolio risk. Empirical findings will be of some value to advance risk management practices and the application of various hedging strategies for portfolio managers, individual investors, and policymakers alike. This paper is organized as follows. Section II reviews empirical literature, and Section III discusses data and methodology. Section IV discusses empirical results, and Section IV concludes this study with suggestions for future studies.

LITERATURE REVIEW

In the integrated financial system, financial markets are highly interdependent, and extensive networks link financial markets across national borders. Especially, the 2008 global financial crisis hit many economies by squeezing credit, falling house prices and stock markets, a slump in consumer confidence, and investments thereof. Sectors dependent on consumer credit (e.g., construction, auto industry) have seen their markets sharply deteriorate. Investments and consumer purchases had been put off, followed by a vicious cycle of falling demand, downsized business plans, and job cuts. In the end, high volatility and correlations breakdown thereof resulted in the unstable transmission of volatility spillover, comovements, and financial contagion. Empirical studies on market interdependency have been pursued in four different ways. The first group examined diversification benefits across financial markets; the second group tested for intermarket linkages and dynamic comovements; the third group analyzed volatility spillovers across equity markets and industries; and the fourth group checked the role of developed markets on volatility spillovers of emerging markets.

In the first group, Roca et al (1998) note that ASEAN-5 markets are closely linked each other in the short run but not in the long run. Cifarelli and Giannopoulos (2002) provide evidence of strong intermarket relationships between Asia and Europe, and of the pivotal role of the US market in the transmission of innovations (“news”) among major stock markets in the 1990s. Aquino et al. (2005) find that 1) a US domestic portfolio with either ADRs or their underlying shares provide superior return and lower risk than a US domestic portfolio, and 2) portfolios with ADRs do not provide any significant advantage over portfolios diversified with underlying foreign shares in sense of the mean-variance efficiency. Yan and Zhao (2013) note that for a global equity portfolio with country's indices, the simple allocation strategies deliver better out-of-sample performance even with short-sale and over-weighting constraints by providing higher risk-adjusted returns than the portfolio optimization. Thus, it is suggested to keep portfolio construction strategies simple. Najeeb et al. (2015) provide evidence of effective diversification opportunities for short holding periods (less than one year), but for longer investment horizons the markets appear to be highly correlated with minimal portfolio diversification benefits.

In the second group, Eun and Sim (1989) note that the US market had significant impacts on foreign markets, innovations in the US markets were rapidly transmitted to other markets, but foreign markets had no impact on the US market. Lau and McInish (1993) find a big increase in international stock market comovements after the 1987 US crash. Parhizgari et al. (1994) show that the NYSE is dominant, and the uni-directional causality is strong from the NYSE to other markets. Forbes and Rigobon (2002) find strong inter-market comovements after the 1994 Mexican peso crisis and the 1997 Asian crisis. Worthington et al. (2003) report that Asian markets became more integrated during the Asian crisis (1997), but developed and emerging markets became less integrated. Yang et al. (2003) note that the short-run causal linkages and the long-run cointegration became stronger during the Asian crisis (1997),

and the US market had significant impacts on Asian markets. Hsin (2004) finds strong information-transmission effects among major developed markets in terms of returns and volatility, and the US market is the leading market with persistent and significant impacts. Darrat and Zhong (2005) show long-run strong relationships among Asian markets before the North-America Free Trade Agreement (NAFTA), but not after the NAFTA implementation. Fooladi and Rumsey (2006) report that strong co-movement and integration between stock markets had been counterbalanced by additional exchange-rate changes, but there are still diversification benefits (in US dollars) to be exploited. Haque and Kouki (2010) provide evidences of strong comovements in returns, volatility and stock-markets correlations in both developed and emerging markets and of increased comovements for a short term (i.e., 3 months for developed markets and 6 months for emerging markets). The comovements are mainly influenced by three factors, namely the global, economic, and geographical factors. Machuga and Wahab (2011) report that Asia-Pacific stock markets display asymmetry, and Asia-Pacific markets highly co-move with the US when the US returns are positive. Bekaert et al. (2014) find that: 1) countries with high political risk, large current account deficits, large unemployment, and a high government budget deficit, experienced a high degree of contagion, but financially integrated countries experienced less contagion from the US market.

In the third group, Huang and Yang (2002) note that after the 1997 Asian crisis, the volatility of the London and New York markets leads that of Tokyo, and New York market leads London market. Rim and Setaputra (2012) show that the US market became less integrated with Asian markets during the 2008 US crisis, suggesting the existence of more diversification benefits. Rim et al. (2012) find strong uni-directional volatility spillovers from the US market to Asian markets. Li and Giles (2015) provide strong evidences of 1) uni-directional volatility spillovers from the US to the Japanese and other markets but bi-directional volatility spillovers between the US and Asian markets during the 1997 Asian crisis; 2) uni-directional spillovers from the US market to the Japanese and other Asian markets during the 2007 US crisis; and 3) strong bi-directional volatility spillovers between the Japanese and other Asian markets. Jebran et al. (2017) find significant bi-directional volatility spillover between stock markets in India and Sri Lanka, Hong Kong and India, and Pakistan and India before the 2007 US crisis.

The fourth group examined the role of emerging markets on global investments. Heston and Rouwenhorst (1995) suggest investors pay more attention to the geographical, rather than industrial, composition. If emerging markets are not fully integrated with developed markets, external shocks might have limited impacts on emerging markets. Then investors in developed markets may gain additional benefits by adding emerging market stocks to their portfolios. If both emerging and developed markets are highly integrated, low volatilities of developed markets could reduce the volatility of emerging markets, and investors in emerging markets may gain more benefits from reduced volatility and risk (Goetzmann et al. 2005; Worthington and Higgs 2004). Bae et al. (2019) show that accessing emerging economies through investments in developed markets delivers the best of both worlds with emerging market-like returns and developed market volatility due to fewer challenges and lower investing costs in emerging markets.

DATA AND METHODOLOGY

This study uses six emerging market indexes for China and India (Asia); Spain and Turkey (Europe); and Argentina and Brazil (S. America) in addition to the US as a representative of developed markets. The data are collected from the Bloomberg Market Data for a period of 2006 and January 2018 because of several economic/financial crises such as the 2008 sub-prime mortgage crisis in the US, the 2009 Greek sovereign debt crisis, and European debt crises (2011, 2016). To better account for these impacts, this period is divided into four sub-periods: Period 1(P_1: 2006.1-2008.6); Period 2 (P_2: 2008.7–2010.7); Period 3 (P_3: 2010.8–2012.6); Period 4 (P_4: 2012.7–2014.10); and Period 5 (P_5: 2014.11–2018.1). First, stock market indexes are tested for unit roots by following the spirit of the Augmented Dickey-Fuller test (1981). Empirical tests show that all the index series have unit roots, but the first-differenced series are stationary: Daily returns are expressed in the first difference of a logarithm of closing indexes. Nelson

and Plosser (1982) note that most financial time series (including stock prices) contain unit roots, dominated by stochastic trends. Thus, economic variables need to be measured in changes rather than absolute values. First, differencing facilitates comparison with stock returns. Second, first-differencing is applied to render the series stationary (Eun and Shim 1989). Second, Lambda (λ) is calculated as follows. The first step is to form a portfolio of equally-weighted indices (in local currency) for a portfolio of market indexes for every ten days. The second step is to compute Lambda as a ratio of the standard deviation (STD) of an equal-weight global portfolio to the STD average of all market indexes (Eq. (2), p. 228, Fooladi and Rumsey (2006)) as follow:

$$\lambda_{SD,T} = S_{p,t}/\acute{S}_T \quad (1)$$

where $S_{p,t}$ is the STD of the portfolio, and $\acute{S}_T$ is the average of STD of the m-market indexes for a period from T to T+n.

In empirical tests, it is easier to use Lambda (λ) values rather than many pair-wise correlations (i.e., N(N-1)/2) in previous studies. As financial markets become more integrated, Lambda (λ) increases in value up to 1. If financial markets are fully integrated, Lambda gradually increases to one as the STD of equal-weight portfolio approaches to the average STD of the indexes. If financial markets are integrated with a less degree, the Lambda value declines to below one. The benefits of diversification can be measured by the extent how small the Lambda (λ) becomes: The smaller the Lambda ($0 < \lambda < 1$) becomes, the more diversification benefits to investors are guaranteed.

From foreign investors' perspectives, Lambda (λ) is calculated for the following four scenarios:
Scenario 1: Invest in six emerging regional markets without the US market (λ_{11}) and with the US (λ_{12});
Scenario 2: Invest in Argentina-Brazil markets without the US market (λ_{21}) and with the US (λ_{22});
Scenario 3: Invest in China-India markets without the US market (λ_{31}) and with the US (λ_{32}); and
Scenario 4: Invest in Spain-Turkey markets without the US market (λ_{41}) and with the US (λ_{42}).

RESULTS AND DISCUSSION

Table 1 provides the means of Lambda, and Table 2 shows p-values to test for mean differences of Lambdas for various scenarios. For Scenario 1, the means of λ_{11} and λ_{12} are not significantly different, which is supported by the p-values in Table 2. The results suggest that adding the US market to the portfolio of six emerging regional markets has no impact on portfolio risk for the whole period. This is further supported by the graph in Figure 1 (Appendix). This result is very interesting in the sense that investors could have reduced enough portfolio risk by investing in the regional emerging markets across three continents without making investments in the US market as a representative of developed markets.

Table 1: Mean Values for Lambdas

Mean	λ_{11}	λ_{21}	λ_{31}	λ_{41}	$\lambda_{(1,1)}$	λ_{12}	λ_{22}	λ_{32}	λ_{42}	$\lambda_{(1,2)}$
P_1	0.634	0.912	0.774	0.875	0.799	0.628	0.879	0.667	0.789	0.741
P_2	0.703	0.925	0.816	0.892	0.834	0.702	0.894	0.706	0.827	0.782
P_3	0.641	0.884	0.784	0.843	0.788	0.654	0.865	0.682	0.805	0.752
P_4	0.584	0.82	0.784	0.816	0.751	0.586	0.778	0.671	0.763	0.700
P_5	0.607	0.877	0.79	0.793	0.767	0.603	0.824	0.679	0.746	0.713

(Note) The mean is the average of Lambdas for every 10-day returns. Lambda is computed for: λ_{11}&λ_{12}: Lambdas for six emerging regional markets without and with the US market; λ_{21}&λ_{22}: Lambdas for Argentina-Brazil portfolio without and with the US market; λ_{31}&λ_{32}: Lambdas for China-India portfolio without and with the US market; λ_{41}&λ_{42}: Lambdas for Spain -Turkey portfolio without and with the US market. The sub-periods are as follow: P_1: 2006.1~ 2008.6; P_2: 2008.7~2010.7; P_3: 2010.8~2012.6; P_4: 2012.7~ 2014.10; and P_5: 2014.11~2018.1.

Table 2: P-Values for Mean-Difference Tests

P-values	**λ_{11} vs λ_{12}**	**λ_{21} vs λ_{22}**	**λ_{31} vs λ_{32}**	**λ_{41} vs λ_{42}**
P_1	0.7435	0.0038**	0.0000**	0.0000**
P_2	0.9878	0.0138*	0.0000**	0.0000**
P_3	0.5416	0.2379	0.0000**	0.0357*
P_4	0.9347	0.0060**	0.0000**	0.0121*
P_5	0.8638	0.0003**	0.0000**	0.0191*

*(Note) Superscripts ** and * denote the significance at the 1% and 5% levels, respectively.*

For Scenario 2, the means of λ_{21} and λ_{22} are significantly different except Period 3, which is during the 2008 US financial crisis. During Period 3, investors could cut or avoid losses without making any investments in the US market. The results suggest that in other sub-periods, investors could gain more diversification benefits in the Argentina-Brazil portfolio by adding the US market. Similar results have been observed for Scenarios 3 and 4 because the means of Lambdas are significantly different from each other for the whole period. The results support the existence of additional benefits of diversifications to be exploited by adding the US market to the portfolios of regional emerging markets. These results are strongly supported by the graphs in Figures 2, 3, and 4 (Appendix). Table 3 provides the STDs of Lambdas with p-values, testing differences between standard deviations in Table 4. For Scenario 1, the STDs of λ_{11} and λ_{12} are not significantly different with insignificant p-values in Table 4. These results suggest that adding the US market to the portfolio of six regional emerging markets has no impact on the portfolio risk for the whole period. However, investors could reduce portfolio risk with only regional emerging stocks by adding the US market. Interestingly, the standard deviations of Lambdas gradually increase over time. (Other tables are available upon request.)

Table 3: Standard Deviations (STD) for Lambdas

STD	**λ_{11}**	**λ_{21}**	**λ_{31}**	**λ_{41}**	**$\lambda_{(1,1)}$**	**λ_{12}**	**λ_{22}**	**λ_{32}**	**λ_{42}**	**$\lambda_{(1,2)}$**
P_1	0.101	0.058	0.117	0.075	0.088	0.099	0.068	0.111	0.088	0.092
P_2	0.106	0.053	0.097	0.075	0.083	0.111	0.074	0.113	0.082	0.095
P_3	0.113	0.076	0.118	0.086	0.098	0.106	0.085	0.114	0.094	0.100
P_4	0.129	0.080	0.101	0.118	0.107	0.127	0.087	0.106	0.115	0.109
P_5	0.131	0.086	0.117	0.125	0.115	0.130	0.100	0.124	0.131	0.121

(Note) $\lambda_{(1,1)}$ and $\lambda_{(1,2)}$ denote the average of Lambdas without and with the US market, respectively.

Table 4: P-Values for Testing STD-Differences

P-values	λ_{11} vs λ_{12}	λ_{21} vs λ_{22}	λ_{31} vs λ_{32}	λ_{41} vs λ_{42}
P_1	0.7435	0.0038**	0.0000**	0.0000**
P_2	0.9878	0.0138*	0.0000**	0.0000**
P_3	0.5416	0.2379	0.0000**	0.0357*
P_4	0.9347	0.0060**	0.0000**	0.0121*
P_5	0.8638	0.0003**	0.0000**	0.0191*

*(Note) Superscripts ** and * denote the significance at the 1% and 5% levels, respectively.*

CONCLUDING COMMENTS

In this study, Lambda (λ) is used to examine diversification benefits on portfolios of regional emerging stock indexes from foreign investors' perspectives. Some of the important empirical findings are as follows. First, the US market has minimal impact on the portfolio of regional emerging markets. That is, there is no additional benefit of diversifications even if the US market is added to the portfolio of all six regional emerging market stocks across three continents. Second, investors in specific region(s) could reduce the portfolio risk by adding the US market to the portfolios of regional (e.g., Asia) emerging market stocks. The results suggest that the US market, a representative of developed markets, plays an important role in managing portfolio risk for specific regional emerging markets. These findings are of good use to advance risk management for portfolio managers and individuals alike. Finally, it is

suggested that future studies need to further investigate the role of other developed markets (e.g., Germany, France, Japan, and Canada) on portfolio risk for the periods with different economic and/or financial crises.

APPENDIX: FIGURES FOR EMPIRICAL RESULTS

Figure 1: Values of λ_{11} (—) and λ_{12} (—) (Period 1)

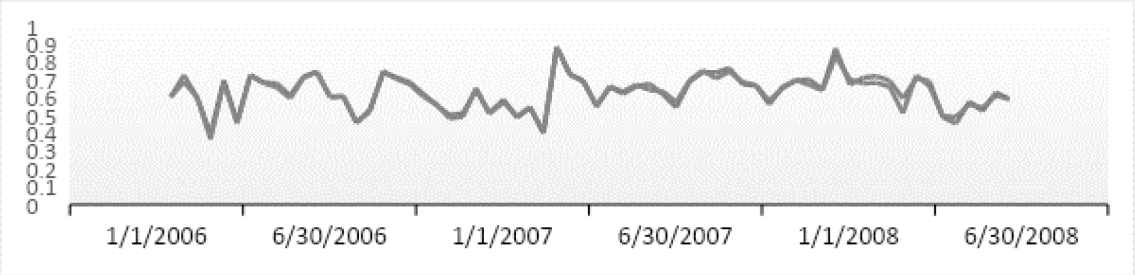


Figure 2: Values of λ_{31} (—) and λ_{32} (—) (Period 1)

Figure 3: Values of λ_{31} (—) and λ_{32} (—) (Period 2)

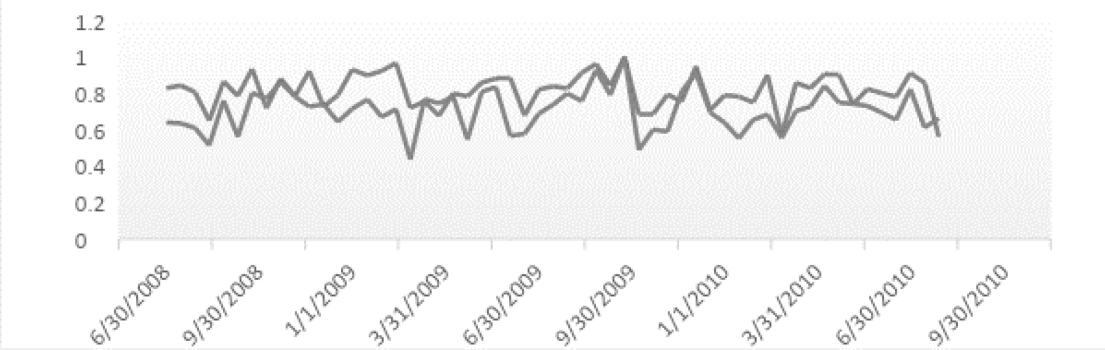
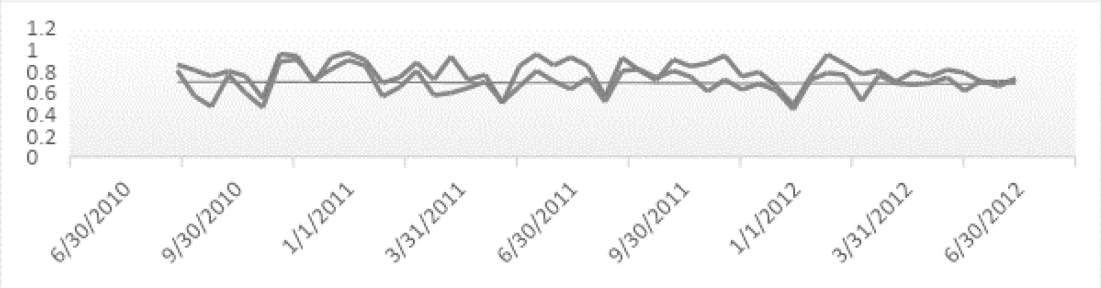


Figure 4: Values of λ_{31} (——) and λ_{32} ((——) (Period 3)



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BIOGRAPHIES

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