

The Risk-Return Profiles Of Global Portfolios: Some Evidence From Asia-Pacific And European Equity Markets

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ABSTRACT

As world financial markets are integrated, national stock markets tend to move together. Empirical evidence on correlations among equity markets worldwide suggests an increasing interdependence between most national markets in recent years. This is disconcerting, to say the least, to investors and portfolio managers seeking risk diversification via global equity investing. The objective of this study is to investigate whether there is still room for global portfolio diversification from the U.S. perspective. Specifically, this research examines the statistical significance and magnitude of diversification benefits arising from equity investments in Asia-Pacific (Australia, China, Hong Kong, India, Indonesia, Japan, Malaysia, Singapore, South Korea and Taiwan) and Europe (Austria, Belgium, Denmark, France, Germany, Italy, the Netherlands, Sweden, Switzerland and the United Kingdom) over the period of November 1998 through October 2006. The study provides insights about the extent to which the U.S. investors need to allocate their equity investments in Asia/Pacific and European stock markets so as to benefit from global diversification

INTRODUCTION

According to Markowitz (1952) modern portfolio theory, the overall portfolio risk is reduced if the two assets under consideration are not moving together in lock step. In fact, the less the two assets are correlated, the greater the benefit of risk diversification. This modern portfolio theory has been applied to international equity investments, offering investors risk-return profiles beyond what are achievable using only domestic equity portfolios. The benefits of international equity diversification have been well documented. For instance, this issue is discussed extensively in Levy and Sarnat (1970), Bailey and Stulz (1990), Harvey (1995), Errunza, Hogan, and Hung (1999), Li, Sarkar and Wang (2003), to name a few.

As the world financial markets are increasingly integrated, equity markets in both developed and emerging countries tend to move together in recent years. Empirical evidence on the evolving correlations among equity markets worldwide is substantial in the finance literature including, among others, Campbell, Koedijk and Kofman (2002), Butler and Joaquin (2002), Forbes and Rigobon (2002), Hon, Strauss and Yong (2004), Wong, Penm, Terrell and Lim (2004), and Fernandes (2005). In particular, Wong, et al. (2004) reported that the interdependence between the equity markets of Asian emerging markets and major developed countries of the United States, the United Kingdom and Japan intensified after the 1997 Asian Financial Crisis and concluded that with this phenomenon of increasing co-movement between developed and emerging markets, the benefits of international diversification become limited. Furthermore, Fernandes (2005) showed that the emerging equity markets are very much integrated with world capital markets and that aggregate emerging equity investment does not provide significant incremental diversification benefits during the period of 1998-2001. This is disconcerting, to say the least, to investors and portfolio managers seeking risk diversification via global equity investing. The objective of this study is to investigate whether there is still room for global portfolio diversification from the U.S. perspective over the period of December 1998 through October 2006. Specifically, this research examines the statistical significance and magnitude of diversification benefits arising from equity investments in Asia-Pacific (Australia, China, Hong Kong, India, Indonesia, Japan, Malaysia, Singapore, South Korea and Taiwan) and Europe (Austria, Belgium, Denmark,

France, Germany, Italy, the Netherlands, Sweden, Switzerland and the United Kingdom). The study provides insights about the extent to which the U.S. investors need to allocate their equity investments in Asia/Pacific and European stock markets so as to benefit from global diversification. The findings from this research have practical implications for both stock investors and portfolio managers interested in going global.

DATA AND ANALYSIS

This study utilizes historical monthly market index price data provided by Commodity Systems, Inc. for the period of December 1998 through October 2006. The one-month T-bill yield and foreign exchange rate data are collected from Federal Reserve Bank of New York for the same period. In addition to the U.S. stock market, ten markets in Asia-Pacific (Australia, China, Hong Kong, India, Indonesia, Japan, Malaysia, Singapore, South Korea and Taiwan), and ten markets in Europe (Austria, Belgium, Denmark, France, Germany, Italy, the Netherlands, Sweden, Switzerland and the United Kingdom) are included in the study. Table 1 contains a list of the stock markets, their corresponding market indices, and the index price descriptive statistics both in local currencies and in US dollars from December 1998 through October 2006.

To evaluate each market's performance from a US investor's perspective, the monthly rates of return are computed based on the time series market index prices in US dollars for each market. Table 2 reports the dollar-denominated rate of return summary statistics for each market over the study period from December 1998 through September 2006. It shows that the monthly mean returns in Asia-Pacific markets, varying from 0.32% in Japan to 1.76% in Indonesia, are all higher than the S&P 500 mean return of 0.2% during the study period. In fact, all markets included in the study (except for the Netherlands) yield higher mean returns than does the U.S. market over the period. Additionally, it is noteworthy from Table 2 that eighteen out of the twenty international markets are more volatile than the U.S. market during the sample period, with the exception of Denmark and the U.K., and that the standard deviation of the international market's time series monthly returns is higher than that of S&P 500 (= 4.13%). In a nutshell, Table 2 depicts that the purely domestic equity portfolio (represented by S&P 500) provides lower returns with lower risks as compared to the risk-return profiles of most equity portfolios in Asia/Pacific and European markets during the study period from December 1998 through September 2006. Now a question arises: Is it worthwhile for the US investors to go global in a foreign equity market? In other words, can the low risk and low return combination be improved if foreign equities are added to S&P 500?

Whether or not the risk-return profile can be enhanced via global diversification depends upon how the U.S. equity market is correlated with the foreign market in question. Instead of focusing on a specific foreign market, a naïve diversification strategy is adopted in which equal weights are assigned to each foreign market to construct three international equity portfolios. They are International AP consisting of ten equally weighted equity markets in Asia/Pacific, International EUR consisting of ten equally weighted markets in Europe, and International APEUR consisting of twenty equally weighted markets in Asia/Pacific and Europe. As the correlations between two markets vary over time, the correlations determined over the entire 94-month study period may not be meaningful. To examine the evolving characteristics of the co-movements between the U.S. and the various international markets through time, the 36-month rolling correlation coefficients are calculated using three years of monthly return data beginning in December 1998. Figure 1 portrays the 36-month rolling correlations of returns between S&P 500 and various international portfolios over the sample period. Among the three international portfolios, International AP (EUR) is least (most) correlated with S&P 500; the correlation coefficients between International AP (EUR) and S&P 500 range from 0.543 (0.65) to 0.739 (0.905). Figure 1 illustrates that all three international portfolios move together with S&P 500, but the correlations are less than perfect (not in lock step). Thus, it appears that combining S&P 500 with the international equity portfolio could enhance the risk-return characteristics.

To investigate the risk and return profile from a US investor's perspective, S&P 500 is combined with each international portfolio to construct twenty-seven Global portfolios with varying US components (10%, 20%, 30%, 40%, 50%, 60%, 70%, 80% and 90%). Table 3 presents a list of the twenty-seven Global portfolios; there are nine Global AP portfolios composed of International AP and S&P 500, nine Global EUR portfolios composed of International EUR and S&P 500, and nine Global ALL portfolios composed of International APEUR and S&P 500. The 36-month rolling mean returns and standard deviations for various Global portfolios and S&P 500 are

summarized in Table 3. Figure 2 shows the risk-return profile over the entire sample period by plotting the rolling mean returns of various Global portfolios on their returns volatilities. It is observed from Figure 2 and Table 3 that the Global portfolios with more than 50% invested in S&P 500 are inefficient in terms of risk-return tradeoffs; they offer lower return with the same (or higher) risk, or higher risk with the same (or lower) return. In addition, Global EUR portfolios are dominated by both Global ALL and Global AP portfolios as the returns yielded by Global EUR are inferior to those by Global ALL and Global AP at any given risk level. Furthermore, Table 3 depicts that with 50% invested in S&P 500 and 50% in international equity portfolios, Global AP portfolio dominates Global ALL portfolio; the monthly mean return of Global AP (= 0.3%) is higher than that of Global ALL (= 0.28%) while the standard deviation of Global AP (= 4%) is lower than that of Global ALL (= 4.05%). Moreover, Figure 2 portrays that Global ALL portfolios produce the most desirable risk-return profiles when the international equity investment is 60% or more. Now the question of interest is whether the superior risk-return performances of these Global portfolios are statistically significant.

To address this question, the Sharpe reward-to-volatility ratio is adopted to quantify the risk-return tradeoff of a portfolio and the Sharpe spread (the difference in Sharpe ratio between a Global portfolio and S&P 500) is employed to measure the superior performance of the Global portfolio. The one-month T-bill yield is used as the risk-free interest rate in computing the reward for bearing the investment risk, i.e., the return in excess of the T-bill rate to compensate the U.S. investors for taking the risk involved in the stock investments. The Sharpe performance measure is computed as the ratio of portfolio excess return over the sample period to the standard deviation of the returns over that period; it gives investment reward per unit of investment risk. The better the portfolio performs, the greater the risk-adjusted Sharpe ratio. Table 4 shows the 36-month rolling mean Sharpe ratios for all of the twenty-seven Global portfolios, ranging from -0.0042 to 0.1136, during the sample period. To investigate whether there are improvements in the reward per unit of investment risk, the spreads in the 36-month rolling Sharpe ratios between the various Global portfolios and S&P 500 (= -0.0163) are computed. To examine whether the improvements in the Sharpe measures are statistically significant, t-statistics are computed to test the hypothesis that the mean Sharpe spread is zero over the sample period. Table 4 provides the mean Sharpe spread between the various Global portfolios and S&P 500 along with the t-statistics. One interesting observation from Table 4 is that, without country/market selection, all Global portfolios outperform S&P 500; the mean spread in the Sharpe performance measure between each of those Global portfolios and S&P 500 is positive. This increase in the reward per unit of investment risk as a result of global diversification ranges from a low of 1.2% for Global EUR with 90% equity investment in S&P 500 to a high of 12.98% for Global AP with 10% in S&P 500. Table 4 also provides evidence that the Sharpe spread between each of the Global AP (Global ALL, Global EUR) portfolios and S&P 500 is substantial when the equity investment in S&P 500 is 50% (40%, 30%) or less. The superior performances of these Global portfolios are not by chance; they are statistically significant at the .05 or .01 level. The statistical significance of the Sharpe spreads generally vanishes when the equity investments in Asia/Pacific and European markets are not high enough. It is suggested that the U.S. investors and portfolio managers might want to include a substantial proportion of foreign equities (about 50% - 60%) in their equity portfolios to benefit from risk diversification.

CONCLUSION

This study finds that the benefit of global diversification continues in recent years, despite the increasingly integrated world financial markets. The study concludes that even naïve diversification in Asia/Pacific and European equity markets is a superior strategy for the U.S. investors during the study period from December 1998 through September 2006, delivering risk-return profiles that are otherwise unavailable by investing only in the U.S. market. The results from the study evince that the Global portfolios with more than 50% invested in S&P 500 are inefficient in terms of risk-return tradeoffs; they offer lower return with the same (or higher) risk, or higher risk with the same (or lower) return. It is demonstrated that with 50% invested in S&P 500 and 50% in international equity portfolios, Global AP portfolio dominates Global ALL and Global EUR portfolios. In addition, Global ALL portfolios produce the most desirable risk-return profiles when the international equity investment is 60% or more. It is reported that the Sharpe measures of these Global portfolios are significantly higher than that of S&P 500 over the sample period. That is, the excess returns of these Global portfolios are statistically significant even after adjusting for risk, providing evidence of global diversification benefits over the sample period. On the whole, the results from this

study suggest that the U.S. investors and portfolio managers might want to include a substantial proportion of foreign equities (about 50% - 60%) in their equity portfolios to benefit from risk diversification.

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Table 1: Monthly Market Index Descriptive Statistics for Various Stock Markets, December 1998 - October 2006

Panel A. Index Prices in Local Currencies

Stock Market	Market Index	Mean	Median	Standard Deviation	Minimum	Maximum	Count
Australia	All Ordinaries	3530.74	3270.80	682.46	2778.40	5304.40	95
China	Shanghai Composite	1545.36	1521.44	292.99	1060.74	2218.03	95
Hong Kong	Hang Seng	13123.85	13186.86	2482.42	8634.45	18113.55	95
India	BSE 30	5303.19	4477.31	2506.95	2811.60	12709.40	95
Indonesia	Jakarta Composite	694.02	567.03	328.65	358.23	1572.85	95
Japan	Nikkei 225	13098.14	11860.77	3184.37	7831.42	20337.32	95
Malaysia	KLSE Composite	780.34	779.28	120.44	502.82	982.24	95
Singapore	Straits Times	1899.11	1903.86	362.30	1267.82	2686.43	95
South Korea	Seoul Composite	835.90	796.40	252.10	479.68	1419.73	95
Taiwan	Taiwan Weighted	6152.84	6005.88	1292.65	3636.94	9854.95	95
Austria	ATX	1815.14	1231.74	978.37	1033.79	4174.12	95
Belgium	BEL-20	2857.29	2885.03	564.72	1635.22	4173.30	95
Denmark	OMXC20C	382.01	378.26	17.07	350.03	417.67	95
France	CAC 40	4465.60	4405.35	1014.74	2618.46	6625.42	95
Germany	DAX	4971.64	5039.08	1272.65	2423.87	7644.55	95
Italy	MIBTel	24310.57	23999.00	4492.48	16085.00	33830.00	95
Netherlands	AEX General	460.71	454.06	123.18	248.54	689.52	95
Sweden	Stockholm General	243.77	230.30	63.25	134.37	387.09	95
Switzerland	Swiss Market	6520.56	6600.90	1132.73	4085.60	8643.00	95
United Kingdom	FTSE 100	5292.09	5296.90	875.80	3567.40	6930.20	95
United States	S&P 500 Index	1189.82	1207.01	164.38	815.28	1517.68	95

Panel B. Index Prices in US Dollars

Stock Market	Market Index	Mean	Median	Standard Deviation	Minimum	Maximum	Count
Australia	All Ordinaries	3530.74	3270.80	682.46	2778.40	5304.40	95
China	Shanghai Composite	1545.36	1521.44	292.99	1060.74	2218.03	95
Hong Kong	Hang Seng	13123.85	13186.86	2482.42	8634.45	18113.55	95
India	BSE 30	5303.19	4477.31	2506.95	2811.60	12709.40	95
Indonesia	Jakarta Composite	694.02	567.03	328.65	358.23	1572.85	95
Japan	Nikkei 225	13098.14	11860.77	3184.37	7831.42	20337.32	95
Malaysia	KLSE Composite	780.34	779.28	120.44	502.82	982.24	95
Singapore	Straits Times	1899.11	1903.86	362.30	1267.82	2686.43	95
South Korea	Seoul Composite	835.90	796.40	252.10	479.68	1419.73	95
Taiwan	Taiwan Weighted	6152.84	6005.88	1292.65	3636.94	9854.95	95
Austria	ATX	1815.14	1231.74	978.37	1033.79	4174.12	95
Belgium	BEL-20	2857.29	2885.03	564.72	1635.22	4173.30	95
Denmark	OMXC20C	382.01	378.26	17.07	350.03	417.67	95
France	CAC 40	4465.60	4405.35	1014.74	2618.46	6625.42	95
Germany	DAX	4971.64	5039.08	1272.65	2423.87	7644.55	95
Italy	MIBTel	24310.57	23999.00	4492.48	16085.00	33830.00	95
Netherlands	AEX General	460.71	454.06	123.18	248.54	689.52	95
Sweden	Stockholm General	243.77	230.30	63.25	134.37	387.09	95
Switzerland	Swiss Market	6520.56	6600.90	1132.73	4085.60	8643.00	95
United Kingdom	FTSE 100	5292.09	5296.90	875.80	3567.40	6930.20	95
United States	S&P 500 Index	1189.82	1207.01	164.38	815.28	1517.68	95

Note: Close price adjusted for dividends and splits.

Table 2: Monthly Return Descriptive Statistics for Various Stock Markets, December 1998 - September 2006

Stock Market	Market Index	Mean	Median	Standard Deviation	Minimum	Maximum	Count
Australia	All Ordinaries	1.02%	1.13%	4.88%	-12.88%	12.75%	94
China	Shanghai Composite	0.75%	0.24%	6.89%	-15.15%	32.06%	94
Hong Kong	Hang Seng	0.82%	1.14%	6.35%	-13.71%	21.85%	94
India	BSE 30	1.75%	2.69%	7.63%	-17.71%	18.75%	94
Indonesia	Jakarta Composite	1.76%	2.20%	7.66%	-13.75%	25.81%	94
Japan	Nikkei 225	0.32%	0.25%	6.09%	-15.27%	12.07%	94
Malaysia	KLSE Composite	1.18%	0.94%	6.86%	-11.94%	34.23%	94
Singapore	Straits Times	0.96%	0.96%	6.51%	-19.65%	26.81%	94
South Korea	Seoul Composite	1.70%	1.19%	10.44%	-19.10%	34.97%	94
Taiwan	Taiwan Weighted	0.41%	0.12%	8.44%	-19.35%	28.03%	94
Austria	ATX	1.59%	1.52%	5.17%	-10.83%	13.20%	94
Belgium	BEL-20	0.40%	0.47%	5.37%	-17.99%	17.07%	94
Denmark	OMXC20C	0.24%	-0.07%	2.72%	-6.01%	7.22%	94
France	CAC 40	0.55%	0.66%	5.43%	-16.86%	15.37%	94
Germany	DAX	0.55%	0.16%	7.00%	-24.85%	24.14%	94
Italy	MIBTel	0.49%	0.80%	5.56%	-18.76%	17.20%	94
Netherlands	AEX General	0.15%	0.24%	5.88%	-19.64%	16.30%	94
Sweden	Stockholm General	0.97%	1.32%	6.82%	-16.51%	16.47%	94
Switzerland	Swiss Market	0.38%	0.30%	4.23%	-12.73%	10.80%	94
United Kingdom	FTSE 100	0.26%	0.12%	4.00%	-10.50%	9.86%	94
United States	S&P 500 Index	0.20%	0.51%	4.13%	-11.00%	9.67%	94

Note: Return is the sum of dividend yield and capital gain or loss.

Table 3: Rolling Returns and Standard Deviations for Various Global Portfolios and S&P 500, From December 2001 to September 2006

Portfolio	% Investment in		Mean Return	Standard Deviation	Count
	US	AP/EUR			
Global ALL	10%	90%	0.54%	4.11%	59
Global AP	10%	90%	0.58%	4.34%	59
Global EUR	10%	90%	0.45%	4.20%	59
Global ALL	20%	80%	0.48%	4.06%	59
Global AP	20%	80%	0.51%	4.21%	59
Global EUR	20%	80%	0.39%	4.14%	59
Global ALL	30%	70%	0.41%	4.03%	59
Global AP	30%	70%	0.44%	4.11%	59
Global EUR	30%	70%	0.34%	4.10%	59
Global ALL	40%	60%	0.35%	4.02%	59
Global AP	40%	60%	0.37%	4.04%	59
Global EUR	40%	60%	0.28%	4.08%	59
Global ALL	50%	50%	0.28%	4.03%	59
Global AP	50%	50%	0.30%	4.00%	59
Global EUR	50%	50%	0.23%	4.07%	59
Global ALL	60%	40%	0.22%	4.05%	59
Global AP	60%	40%	0.23%	4.00%	59
Global EUR	60%	40%	0.17%	4.08%	59
Global ALL	70%	30%	0.15%	4.09%	59
Global AP	70%	30%	0.16%	4.02%	59
Global EUR	70%	30%	0.12%	4.11%	59
Global ALL	80%	20%	0.08%	4.14%	59
Global AP	80%	20%	0.09%	4.08%	59
Global EUR	80%	20%	0.06%	4.16%	59
Global ALL	90%	10%	0.02%	4.21%	59
Global AP	90%	10%	0.02%	4.17%	59
Global EUR	90%	10%	0.01%	4.22%	59
S&P 500	100%	0%	-0.05%	4.30%	59

Notes: Global ALL Portfolios consist of International APEUR and S&P 500.
 Global AP Portfolios consist of International AP and S&P 500.
 Global EUR Portfolios consist of International EUR and S&P 500.

Table 4: Differences in Rolling Sharpe Measures between Various Global Portfolios and S&P 500, December 2001 to September 2006

Portfolio	% Investment in		Sharpe Mean	Sharpe Spread	t-stat	Significance Level
	US	AP/EUR				
Global ALL	10%	90%	0.1111	0.1274	2.7150	**
Global AP	10%	90%	0.1136	0.1298	2.9422	**
Global EUR	10%	90%	0.0809	0.0971	2.1098	*
Global ALL	20%	80%	0.0983	0.1146	2.4582	**
Global AP	20%	80%	0.1022	0.1185	2.6705	**
Global EUR	20%	80%	0.0710	0.0873	1.9057	*
Global ALL	30%	70%	0.0852	0.1014	2.1962	*
Global AP	30%	70%	0.0899	0.1062	2.3880	**
Global EUR	30%	70%	0.0610	0.0773	1.7011	*
Global ALL	40%	60%	0.0716	0.0879	1.9277	*
Global AP	40%	60%	0.0768	0.0930	2.0953	*
Global EUR	40%	60%	0.0509	0.0671	1.4940	
Global ALL	50%	50%	0.0578	0.0740	1.6502	
Global AP	50%	50%	0.0628	0.0790	1.7915	*
Global EUR	50%	50%	0.0405	0.0567	1.2813	
Global ALL	60%	40%	0.0436	0.0598	1.3605	
Global AP	60%	40%	0.0480	0.0642	1.4747	
Global EUR	60%	40%	0.0298	0.0460	1.0594	
Global ALL	70%	30%	0.0291	0.0453	1.0548	
Global AP	70%	30%	0.0326	0.0488	1.1415	
Global EUR	70%	30%	0.0188	0.0350	0.8241	
Global ALL	80%	20%	0.0142	0.0304	0.7289	
Global AP	80%	20%	0.0167	0.0329	0.7874	
Global EUR	80%	20%	0.0075	0.0237	0.5714	
Global ALL	90%	10%	-0.0009	0.0153	0.3784	
Global AP	90%	10%	0.0003	0.0165	0.4079	
Global EUR	90%	10%	-0.0042	0.0120	0.2975	

** Significant at .01 level.

* Significant at .05 level.

Figure 1: Rolling Correlations between S&P 500 and Each of the International Portfolios, December 2001 - September 2006

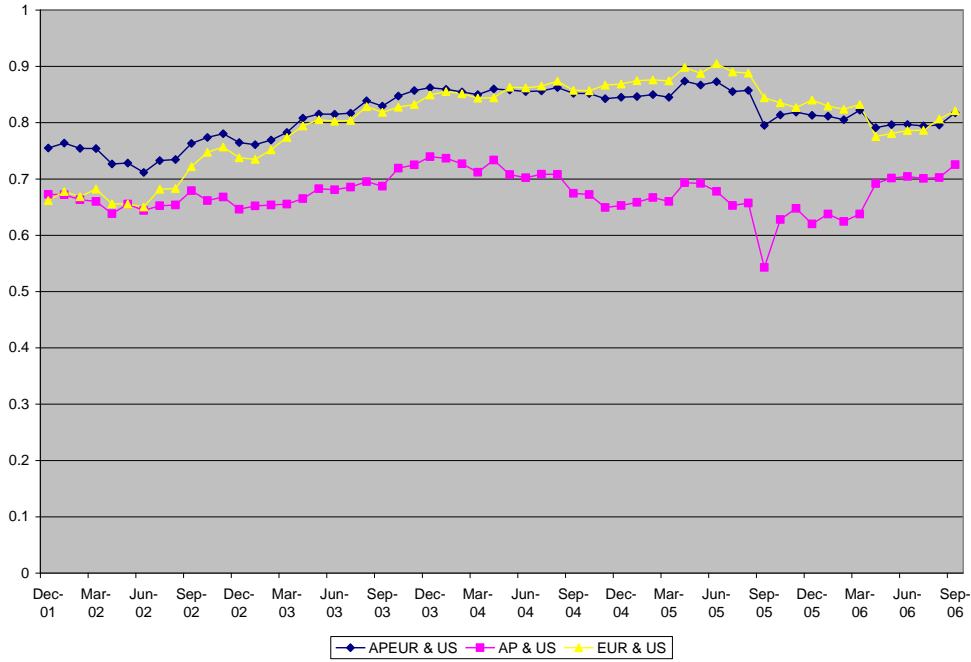


Figure 2: Risk Return Profile of Various Global Portfolios, 12/2001 – 09/2006

