



## **Optimal International Portfolio Strategy:**

### **Utilizing Different Caps Stocks in Emerging and Developed Countries**

Kuo-Hao Lee<sup>a</sup>, Wei-Jen Hsieh<sup>b</sup>

- a. Department of Finance, College of Business, Bloomsburg University of Pennsylvania
- b. Department of Mathematics, Computer Science and Statistics, College of Science & Technology, Bloomsburg University of Pennsylvania, Bloomsburg, PA

---

#### **ABSTRACT**

This research showed that the behavior of returns generated from Large- and Small- Cap stocks are different and should not be ignored by international portfolio investors. We found that Small-Cap markets indices have low correlations with both World market indices and among Small-Cap market indices themselves; while Large-Cap funds have high correlations including amongst each other. Investors can obtain additional gains from international diversification if they consider including Small-Cap stocks in their portfolio, especially in emerging countries.

**Keywords: Portfolio, International diversification, Market correlation, Emerging market, Developed market**

**JEL: G11**

---

## **1. Introduction**

With world markets becoming more and more interdependent, international portfolio managers are beginning to look for ways to better diversify away the correlated risk among these interdependent markets. Among many other reasons, portfolio managers prefer Large-Cap stocks as opposed to other smaller cap-sized stocks believing that Large-Cap stocks provide a greater defense against systematic risk. However, if managers believe that correlations between markets are best reduced by Large-Cap stocks, they may be mistaken. This research provides evidence to support the use of Small-Cap stocks for the purpose reducing the correlation between these interdependent markets. This research also finds that the degree of correlation also differ between emerging and developed markets.

### **1.1 Background**

Classic studies of international portfolio diversification have documented that the gains from international diversification are based on the premise that the correlation was relatively lower among international securities than domestic securities [Grubel (1968), Levy and Sarnat (1970), and Solnik (1974)]. Under the structure of international organization such like WTO (World Trade Organization) and NAFTA (North American Free Trade Agreement), international capital markets are integrated more than ever. Gradual liberalization of capital market of emerging countries and their increasing cross-border investments and international trades have made the global business integration even faster during recent decades. This phenomenon has led to a dramatic change in correlations between these markets, where the underpinnings of traditional international portfolio studies must be revised.

Recent studies have raised challenges that higher international correlations clearly throw doubt on the efficiency of international diversification argued by those classic international diversification studies. Longin and Solnik (1995) documented that international stock markets indices correlated among each other have increased between the period of 1960 to 1990. Goetzmann, Li, and Rouwenborst (2005) stated during periods of higher economic and financial

integration period that international stock markets tend to have higher correlations than normal times.

Large-Cap stocks have received the lion's share from international investors' diversification portfolios. The bias of Large-Cap stocks was because investors naturally gravitated to stock securities, in particular ones with good reputation as well as large foreign companies that are well known and most likely multinational. Kang and Stulz (1997) in their study of foreigners' equity holdings in Japan found that foreign investors prefer large, export oriented, liquid, and U.S. cross-listed firms. Another study from Ferreira and Matos (2006) showed that institutional investors strongly prefer large and liquid stocks with good governance practices too. Moreover, the same study points out institutional investors who prefer stocks that are cross-listed in the U.S. market and members of the MSCI (Morgan Stanley Capital International) all-country world index. The other factor that reinforces the Large-Cap bias was that most of cross-listed stocks were the Large-Cap stocks, and they also act as a stimulation for international investment. Foerster and Karolyi (1999) documented that the cross-listings of shares were often used by companies in order to enhance the level of investor recognition and expand the shareholder base. In Huberman (2001), the Large-Cap bias mostly acts in accordance with the proposition that familiarity breeds investment. Domestic institutional investors especially tend to track the home stock market, which would build up the Large-Cap bias, since the national market indices are dominated by Large-Cap stocks also.

Returns from Large-Cap stocks are mainly affected by common international factors. On the other hand, returns from Small-Cap stocks are mainly affected by local and idiosyncratic factors. This phenomenon occurs because, Large-Cap companies are more likely to be the international companies with a higher chance to be exposed to international customers and be driven by the global trend; while the Small-Cap companies tend to be more locally oriented and with more limited international exposure. Brooks and Del Negro's (2006) recent study showed that an increase in the international component of a firm's sales will increase (decrease) the exposure of the firm to global (country-specific) shocks. This finding indicated that multinational firms were more subject to global shocks than locally oriented firms. The benefit of diversification of international portfolios

with Large-Cap stocks can be modest since the returns of those companies are primarily affected by common global factors. However, the same result may not be applied to Small-Cap stocks since their returns are mainly affected by local and idiosyncratic factors. Hence, Small-Cap stocks become a potential factor and should be introduced into international portfolio in order to help investors gain more benefit from diversification.

Eun et al (2008) showed that the importance of diversification from Small-Cap stock to the international portfolio investors. On the other hand, from the practical business world point of view, many investment companies-such as Fidelity, ING, Lazard, Merrill Lynch, Morgan Stanley, Oppenheimer, and Templeton-currently offer Small-Cap oriented international mutual funds in the U.S. In terms of geographical coverage, some funds are global as well as international, while others are regional and national. These recent introductions of international Small-Cap funds are highly instructive and also suggested the unique role that Small-Cap stocks can play in global risk diversification.

The primary purpose of this research is to show that the behavior of returns generated from Large- and Small-Cap stocks are different both in developed and emerging markets, moreover should not be ignored by international portfolio investors.

## **2. Data and Basic Statistics**

In this study, we aim to access the potential benefits that can be gained from diversification of international portfolios if the investors include Small-Cap stocks and Large-Cap stocks.

We study from the perspective of U.S. investors who invest international portfolios with MSCI country or Large-Cap indices but desire to obtain the gain of including Small-Cap market indices from foreign countries.

We considered 7 developed countries: U.S., Canada, Japan, United Kingdom, Germany, France, and Italy, in addition, to 7 emerging countries: China, India, Taiwan, Brazil, Mexico, Russia, and South Africa. Our sample contains one

Optimal International Portfolio Strategy:  
Utilizing Different Caps Stocks in Emerging and Developed Countries

country from Africa, two countries from North America, two from South America, four countries from Asia/Pacific and five from Europe.

We assumed that international investors do not face formal barriers to investing in stocks of these countries. In order to maintain analytical tractability and consistency with industry practices, we examine the country indices and three market capitalization-based market indices, such as Large, Median and Small-Cap market indices from each country in our sample. In addition, we computed daily returns over most recent 5-year period from September 14, 2007-September 13, 2012. Our research contains two parts. First, we analyzed the difference of behaviors between returns that generated from country indices, Large, Median, and Small-Cap market indices, and we examined the correlation within each other plus their implications for diversification. Second, we applied the mean-variance analysis of international portfolio in introducing cap-based market indices.

From the data, we found that Small-Cap market returns have relatively low correlations with each other than Large-Cap market returns (Table 1: correlations). For example, during our sample period, the results showed that the correlation within the U.S. and U.K. Large-Cap market returns is 0.569 while the correlation between the Small-Cap market returns from those two countries is 0.509. All thirteen countries have lower correlations between Small-Cap market returns and U.S. Small-Cap market returns than Large-Cap market returns and U.S. Large-Cap market returns.

**[Insert Table 1 about here]**

Further, the correlation between Large-Cap market returns with the World market returns is relatively higher than the correlation between Small-Cap market returns and the World market returns. For instance (Table 2: Basic Statistics), the correlation between the U.K. Large-Cap market returns with the World market returns is 0.8402, and the correlation between U.K. Small-Cap market returns with the World market returns is 0.7957. As a result, all fourteen countries have higher correlations between Large-Cap market returns and the World market returns than the correlations between Small-Cap market returns and the World market returns. The same results also indicated for the U.S. Country market returns. From the prospective of U.S. investors, twelve out of thirteen other countries, except Japan,

have lower correlations between Small-Cap market returns and U.S. Country market returns than Large-Cap market returns and U.S. Country market returns.

**[Insert Table 2 about here]**

From above, our data result implies that Small-Cap market returns have lower correlations with the World market returns and U.S. Country market returns than Large-Cap and Mid-Cap market returns have with the World and U.S. Country market returns. This indicates that Small-Cap market returns are relatively less affected by global factors than Large and Mid-Cap affected by the same factors.

### **3. Preliminary Analysis**

In order to compare the performance of these cap-base market indices, we obtained the daily MSCI stock market indices of the world and fourteen countries during the period January 2004 to December 2008. We then evaluated the daily return from the indices by using the following formula:

We also assumed that in these fourteen countries we studied the investors would not have to face any interruptions such as government, politics, personal, or closed market.

We calculated the mean, standard deviation, skewness, and kurtosis of daily returns for each cap-based market indices and the correlation of cap-based market returns with U.S. Country market returns (corr us) and with World market returns (corr w). In the results shown in Table 2, we noticed that six out of seven developed countries, except Italy, have average returns from Large-Cap market higher than Small-Cap market.

As for the volatility, thirteen out of fourteen countries, except US, the Small-Cap market returns have lower volatility than the Large-Cap market returns. Among all the Large-Cap market returns, the lowest volatility is computed from the U.S. market indices. This is because that the U.S. has the largest stock market and the returns are usually computed in U.S. dollars terms. As for the Mid-Cap market returns, there is one developed countries, Japan, and none emerging

Optimal International Portfolio Strategy:  
Utilizing Different Caps Stocks in Emerging and Developed Countries

countries that have lower volatility than the U.S. Mid-Cap market. Among the Small-Cap markets indices, four developed countries (Japan, UK, France, and Italy) and three emerging countries (China, Taiwan, and South Africa) that have lower volatility than U.S. Small-Cap market returns.

We also noticed that in most countries, the Large-Cap market returns have the highest correlation with the U.S. countries market indices (corr us), while the Mid-Cap next and the Small-Cap have the lowest correlation. Using Canada as an example, the correlation is 0.741 from Large-Cap market returns with U.S. country market returns, 0.681 from the Mid-Cap market returns and 0.634 from the Small-Cap market returns. One exception is Japan. The correlations between Japan and the U.S. country market indices are very low, regardless if it is from the Large-Cap market returns (0.006), Mid-Cap market returns (0.021), or Small-Cap market returns (0.006). The correlations between US Country market returns and Small-Cap market returns of these two countries still have lower correlations with U.S. Country market returns than the Large-Cap market returns.

As for the correlations with the World market returns, we denoted as “corr W”, a similar result appeared. Twelve out of fourteen countries, except the U.S. and Japan, have the highest correlation from Large-Cap market returns. We can conclude that all the countries, no matter developed or emerging countries, Small-Cap market returns have lower correlations with U.S. Country market returns or the World market returns than Large-Cap market returns, except Japan.

## **4. Methodology and Results**

### **4.1 Mean-Variance Spanning Tests: Do Small-Caps Act Differently from Large-Caps?**

We first constructed a hypothesis test to check if the Small-Cap market returns can be spanned by all MSCI country indices by three groups; first group contains seven developed countries, second group for seven emerging countries, and the last group contains all fourteen countries. After the spanning test, we then examined the returns that generating from market-based indices and their risks affected by factors of global, local or Idiosyncratic.

Even though most countries with the Small-Cap market returns have lower correlations with U.S. Country market returns or World market returns compared with the Large-Cap market returns, the Small-Cap market returns may still be spanned by the countries market returns. If that is true, then the gain of diversification of introducing Small-Cap market returns into the international portfolio will be less significant. On the other hand, if the spanning test has been rejected, then introducing Small-Cap market returns may improve the minimum-variance frontier base international portfolio.

Using the study by Huberman and Kandel (1987) and Kan and Zhou (2008), we constructed a spanning test to examine of Small-Cap market returns can be spanned by MSCI country indices or not. In order to do so, we built a regression model of the Small-Cap market returns (“new risk asset”) on the MSCI countries indices (“benchmark assets”) as following in three groups, seven developed countries, seven emerging countries, and all fourteen countries:

- i.
- ii.
- iii.

where  $R_i$  represent the return computed from Small-Cap market returns of the  $i$ -th country,  $MSCI^{CA}$  ( $MSCI^{BZ}$ ) denotes the return on the MSCI Canada (Brazil) country index,  $\alpha_i$  represent the estimated regression intercept of the Small-Cap market returns, and  $\beta_i$  is the estimated regression coefficient associated with MSCI Canada (MSCI Brazil).

The null hypothesis of the spanning test is equivalent to the joint hypothesis that the regression intercept is equal to zero and the sum of all the regression coefficients is equal to one:



Optimal International Portfolio Strategy:  
Utilizing Different Caps Stocks in Emerging and Developed Countries

We assumed that the null hypothesis is true,, then we constructed a reduced model by substituting the last beta by one subtract all the other betas. Then we can rewrite the model to become:

- i.
- ii.
- iii.

After we remove the parenthesis and combine the like terms, the model then become:

- i.
- ii.
- iii.

Since here we only considered one “new risk asset” which is the Small-Cap market returns, the test statistics of exact distribution of the Likelihood ratio test under the null hypothesis is as the following:

We let  $V$  denote the ratio of the determinant of the maximum likelihood estimator of the error covariance matrix for the unrestricted model (no spanning) to that of the restricted model (spanning).  $T$  is the number of observations and  $K$  is the number of benchmark assets. The test statistic follows an  $F$  distribution with  $(2, T-K-1)$  degree of freedom. Result showed in Table 3. To compute the  $V$  we used the formula as following:

We found that in the first group, we rejected the null hypotheses of the spanning tests for six out of seven developed countries, except Germany, where the p-value is 0.58. Similar results appear in the second group; the p-values of the spanning test for all the seven emerging countries are all approximately approach zero. As for the third group, we then used all the fourteen countries market indices to be the benchmark assets. The results as we expected, like the combination of the

first and the second group, we reject all the spanning tests except for Germany. The Spanning test results are shown in Table 3.

**[Insert Table 3 about here]**

From the previous discussion, we know that most countries have lower correlation between Small-Cap market returns and U.S. Country market returns or World market returns than Large-Cap market returns. And the result of spanning tests showed that the Small-Cap market returns cannot be spanned by the countries indices. If an investor chooses portfolios based on mean and variance, then the question becomes whether adding a new set of risky assets can allow the investor to improve the minimum-variance frontier from a given set of risky assets.

#### **4.2 Return-Generating Mechanism for the Cap-based indices**

In order to catch the behavior of the returns generated from the market based indices more precisely, we extended the research to factors of global, local, and idiosyncratic, which affect the cap-based market indices.

We constructed a two-factor regression model to estimate the coefficients of global and the country indices for the Small-Cap market returns of each country as following:

We let  $r_{i,t}$  represent the daily return on the from the  $i$ -th country,  $r_{w,t}$  is the daily return on the MSCI the World market index, and  $r_{i,t}^*$  is the portion of the  $i$ -th country market index return that is uncorrelated to the return on the global market portfolio; which means that  $r_{i,t}^*$  is the residual from regressing the  $i$ -th country market index return on the MSCI World market index return. and  $\alpha$  and  $\beta$  in equation above denote the coefficients of global and orthogonalized country for the  $i$ -th country. In this model, we then can estimate the sensitivities of returns of the cap-based market indices to the global and country-specific factors. Once the coefficients of global and country have been measured, we then decomposed the variance of the cap-based market returns into the following three portions, the portion of the variance attributed to the global factor, the portion attributed to the country factor, and the idiosyncratic risk of the cap-based market returns, which is uncorrelated to either

Optimal International Portfolio Strategy:  
Utilizing Different Caps Stocks in Emerging and Developed Countries

global or country factor. We computed the three proportions of the variance by the following formulas:

(i) Global factor proportion =

(ii) Local factor proportion =

(iii) Idiosyncratic factor proportion =

We showed the result of the two factor regressions in Table 4 including the estimate coefficients of the global and country factors and the portions of the variance of the cap-base market returns. We noticed that all the cap-based market returns in the sample have the statistically significant coefficients of World and country factor, which confirms that the global and the country factor do affect the cap-base market returns.

**[Insert Table 4 about here]**

However, nine out of fourteen countries have highest coefficients from Large-Cap market returns; then followed by the coefficients from Mid-Cap market returns. The coefficients from Small-Cap market returns are the lowest. For example, Canada has the coefficients of the global (country) factor of 1.203 (1.013) for the Large-Cap market return, 1.098 (0.915) for the Mid-Cap market returns, and 1.139 (0.902) for the Small-Cap market returns. Five exceptions are U.K., U.S. Germany, Mexico and Taiwan. For the U.S., the coefficients of the global (country) factor is 1.013 (0.995) for the Large-Cap market return, 1.170 (1.047) for the Mid-Cap market returns, and 1.181 (1.155) for the Small-Cap market returns. In the last three rows of the table, the sample average of the coefficient of the global (country) is 1.061 (1.014) for the Large-Cap market returns, 1.013 (0.887) for the Mid-Cap market returns, and 0.882 (0.780) for the Small-Cap market returns.

The result for variance decompositions, the proportions of the variance for the global, country, and the idiosyncratic factors, are things of noteworthy.

Regardless of the country and the market-Cap categories, the idiosyncratic factors proportion is lowest compared with the global and country factors proportions. For example, U.S. Large-Cap (Small-Cap) market returns has the global factors proportion is 78.6% (72.1%), country factors proportion is 21.2% (19.4%), and the idiosyncratic factors proportion 0.2% (8.5%). However, by comparing with the Large-Cap market returns within the same country, Small-Cap market returns have larger idiosyncratic factors proportion. From the data, we noticed that the Small-Cap market returns has the largest sample average of the proportion for the idiosyncratic factors, which is 18.4%, followed by the Mid-Cap market returns, 13%, and Large-Cap market returns has the lowest one, 0.3%, among these three market-Cap categories. We then conclude that the Small-Cap market returns are driven more by the idiosyncratic factors than the Large-Cap market returns.

The average global (country) factors proportion is 51.2% (48.5%) for Large-Cap market returns, 47.8% (39.2%) for the Mid-Cap market returns, and 45.6% (36.0%) for the Small-Cap market returns. T shows that among three market-Cap categories, both global and country factors have similar proportions. We also noticed an interesting phenomenon; if we divide the countries in our sample into two groups, developed and emerging countries, we found that in all developed countries in our sample, except Japan, the global factors proportion is higher than the country factors proportion. Using Canada Large-Cap market returns as an example, the global factors proportion is 72.1%, which is higher than the country factors proportion, 27.6%. However, only two out of seven developed countries have the higher global factors proportion than country factors proportion, which means that the cap-based market returns in emerging countries are not driven by the global trend as much as in developed countries. This result may occur because the companies in emerging countries are not exposed to international customers as much as the ones in developed countries.

#### **4.3 Diversification of International Portfolio with Country Market Indices**

In order to assess the benefit of diversification of international portfolio with Small-Cap market indices, it would be useful to examine the benchmark case of international portfolio with the country market indices. We used the data of the MSCI country stock market indices of two groups, developed countries and

emerging countries, over 2008 to build a portfolio based on minimum variance frontier.

We can see the result in Table 5 that the highest of the correlations in the group of developed countries is 0.9587, from France and Italy, and the highest of the correlations in the group of emerging countries is 0.8482, from Mexico and Brazil. This reflects that the neighboring market tend to have high correlations with each other. Japan and U.S. have the correlation is -0.0022 which is the lowest in the developed group; this may be due to the insular economy of Japan.

**[Insert Table 5 about here]**

During our 2008 sample period, the average for the sample mean of country market daily returns is 0.00264 for the developed countries group, 0.00379 for the emerging countries group, and the average of the standard deviation is 0.02745 and 0.03529 for developed and emerging countries. We can conclude that emerging countries markets are high-risk and high-return markets. The last two columns shows the optimal asset allocation of international portfolios contain the MSCI countries daily returns, developed and emerging countries. With short sales, the developed (emerging) group have the portfolio expected return is 0.002 (0.002) and the standard deviation is 0.017 (0.018). This result suggests that investors should choose the international portfolio of the developed countries instead of the emerging countries. Without short sales, the optimal portfolio for the developed countries consists of the investing 43.41% in the U.S., 47.48% in Japan, and 9.20% in Italy, with an expected return of 0.002 and the standard deviation of 0.017. As for the emerging countries, the optimal portfolio suggests to invest 10.55% in India, 59.53% in Taiwan, and 29.92% in Mexico, with higher expected return of 0.003 and also a higher risk of 0.020.

#### **4.4 The Optimal International Portfolio Allocation**

In order to assess the potential gain of diversification by including the cap-base market returns, we build international portfolio with the MSCI country and Cap-based market daily returns in Markowitz model; results are presented in Table 6 (developed countries) and Table 7 (emerging countries). In Panel A of Table 6 and 7, we copy the result of the optimal portfolio of countries daily returns from

previous section for comparison. Then, we compute the optimal global allocation with MSCI countries market daily returns and Small-Cap market daily returns, in Panel B. With short-sales not allowed in the developed countries group, the result suggests to invest 22.69% in U.S. Country market, 5.58% in U.S. Small-Cap market, 46.78% in Japan Small-Cap market, and 24.96% in Italy Small-Cap market. By comparing with the portfolio only contains countries market returns and the portfolio with the country and the Small-Cap market returns, we shift about 77% of the investment from the country market to the Small-Cap market to gain the benefit of reduction risk from 0.017 to 0.016. As for the emerging group, optimal portfolio consists of investing 15.9% in Taiwan Country market, 17.51% in China Small-Cap market, 5.11% in India Small-Cap market, 9.26% in Taiwan Small-Cap market, 27.49% in Mexico Small-Cap market, and 24.74% in Russia Small-Cap market. We enhance the expected return from 0.003 to 0.005, and reduce the risk from 0.020 to 0.017 by investing about 84% in the Small-Cap markets. In Panel C, with countries and Mid-Cap market returns, the optimal portfolio of developed countries consist of investing 27.45% in U.S. Country market and shift 40.07% to Japan Mid-Cap market and 30.48% to Italy Mid-Cap market to reduce the risk to 0.016. As for the emerging countries, we only invest 12.05% to India Mid-Cap markets; remain about 88% in country markets, 58.52% in Taiwan country market, 5% in Brazil country market, and 29.44% in Mexico country market. The expected return and risk are about the same as the portfolio of only country markets. This result implies that the portfolio of emerging countries introducing Small-Cap markets can improve the return and risk more than introducing the Mid-Cap markets. In Panel D, we include not only Small-Cap but also the Mid-Cap market returns in the portfolio along with the country market returns, the result for the developed countries showed that 19.43% in U.S. Country market, 29.02% in Italy Mid-Cap market, and more than 50% in the Small-Cap markets (5.12% in US Small-Cap and 46.44% in Japan Small-Cap). By this optimal portfolio, we can reduce the risk to 0.015. As for the emerging countries, optimal global allocation consists of investing 15.9% in Taiwan country market, 84.1% Small-Cap markets, and none of the Mid-Cap in the emerging countries be selected, which provides identical result to the portfolio that contain only country market returns and Small-Cap markets returns. The optimal allocation with short-sales, regardless of developed or emerging countries, Mid-Cap markets receive

Optimal International Portfolio Strategy:  
Utilizing Different Caps Stocks in Emerging and Developed Countries

much more negative weight than Small-Cap markets. Also, by comparing the result for developed countries and emerging countries, Table 6 and Table 7, improvement level of introduction Small-Cap market into the portfolio for the emerging countries is higher than for the developed countries. In other words, the Small-Cap markets in emerging countries might be more independent of the global trend.

**[Insert Tables 6 and 7 about here]**

In order to observe the international market better, regardless of developing level, we then built an international portfolio, include all the developed countries, and all the emerging countries together. The result of optimal allocation is showed in Table 8. Without short sales, the international portfolio with only country market indices, expect daily return is 0.002% while the risk is 0.014%. With the Small-Cap market in the portfolio as well, expect daily return can be improved to 0.003% and risk can be reduced to 0.009%, by shifting the 41% of weight to developed Small-Cap markets and 32% weight to emerging Small-Caps. The benefit of inducing the Mid-Cap markets into the portfolio is not as good as inducing Small-Cap markets. Expect return of the portfolio with Mid-Cap market returns remains the same as the basic portfolio with only countries markets; and risk only reduce from 0.017% to 0.016% by shifting 56% of weight to developed Mid-Cap markets and none for the emerging Mid-Cap markets. Similar result as we separated the developed and the emerging countries, included the more benefit can be gained by including Small-Cap markets than Mid-Cap markets or with the country market returns only.

**[Insert Table 8 about here]**

## **5. Conclusion**

World markets are becoming more and more globalized and interdependent, and this interdependence has increased the correlations between these markets. International portfolio managers seek to find ways to better diversify away the correlated risk among these interdependent markets. Small-Cap stocks that have limited international footprints tend to reflect local risks, and therefore share

less of a correlation with Large-Cap stocks that share systemic ties to other international firms.

These results are particularly important to international portfolio managers as it provides an alternative investment strategy. Small-Cap stocks are relatively isolated from the broader market, and as such provide a damper to any systemic or systematic contingencies that diminish optimum portfolio performance. If international portfolio managers believe that correlations between markets are best reduced by Large-Cap stocks, they may be mistaken. We examined the potential gain of introducing Small-Cap stocks as a vehicle for diversification of international portfolios. We found that Small-Cap markets have lower correlations not only with World market returns but also with each other. In contrast, Large-Cap funds tend to have relatively high correlations with World market returns and with each other, due to the common exposures to international investors. We also found that thirteen out of fourteen Small-Cap markets cannot be ‘spanned’ by country stock market indices that are dominated by Large-Cap stocks.

Our results also indicate that the optimal portfolio only contains country indices and Small-Cap markets. When short sales are allowed, Mid-Cap funds tend to receive negative weights, allowing extra positive investments in Small-Cap funds and selective country indices. Overall, our findings indicate that investors can obtain additional gains from international diversification if they consider including Small-Cap stocks, especially in emerging countries.

## **6. Discussion and Further Research**

There are potential study issues in this area for future researchers: how Small-Cap stocks act in international diversification during financial crisis period and the characteristics/function changing of Small-Cap stocks in international portfolio during recent decade. It will be substantial importance for international investment study to further learn about the behavior of these Small-Cap stocks and build up a better return portfolio diversification by holding these Small-Cap stocks.

## **References**



- Optimal International Portfolio Strategy:  
Utilizing Different Caps Stocks in Emerging and Developed Countries
- Brooks, R., & Del Negro, M. (2006). Firm-Level Evidence on International Stock Market Comovement. [Article]. *Review of Finance*, 10(1), 69-98.
- DeSantis, G., Blake, C., Elton, E. J., Finnerty, J., Goetzmann, W. N., Gruber, M. J., et al. (2007). *The Investment Portfolio Users Manual and Software* (2 ed.). New York: Wiley.
- Elton, E. J., Gruber, M. J., Brown, S. J., & Goetzmann, W. N. (2006). *Modern Portfolio Theory and Investment Analysis* (7 ed.). New York: Wiley.
- Eun, Cheol S., Huang, Wei., Lai, Sandy (2008). International Diversification with Large- and Small- Cap Stocks. *Journal of Financial and Quantitative Analysis*, 43(2), 489-524.
- Ferreira, M. A., & Matos, P. R. (2006). The Colors of Investors' Money: Which Firms Attract Institutional Investors from around the World? University of Southern California.
- Foerster, S. R., & Karoly, G. A. (1999). The Effects of Market Segmentation and Investor Recognition on Asset Prices: Evidence from Foreign Stocks Listing in the United States. *Journal of Finance*, 54(3), 981-1013.
- Goetzmann, W. N., Lingfeng, L., & Rouwenhorst, K. G. (2005). Long-Term Global Market Correlations. *Journal of Business*, 78(1), 1-38.
- Grubel, H. G. (1968). Internationally Diversified Portfolios: Welfare Gains and Capital Flows. *American Economic Review*, 58(5), 1299.
- Huberman, G. (2001). Familiarity Breeds Investment. [Article]. *Review of Financial Studies*, 14(3), 659.
- Huberman, G. U. R., & Kandel, S. (1987). Mean-Variance Spanning. *Journal of Finance*, 42(4), 873-888.
- Kan, R., & Zhou, G. (2008). Tests of Mean-Variance Spanning. *SSRN eLibrary*.
- Kang, J.-K., & Stulz, R. M. (1997). Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan. *Journal of Financial Economics*, 46(1), 3-28.
- Levy, H., & Sarnat, M. (1970). International Diversification of Investment Portfolios. *American Economic Review*, 60(4), 668-675.
- Longin, F., & Solnik, B. (1995). Is the correlation in international equity returns constant: 1960-1990? [doi: DOI: 10.1016/0261-5606(94)00001-H]. *Journal of International Money and Finance*, 14(1), 3-26.



**Table 2: Basic Statistics and Correlations with World and Country Markets**

	Mean	Variance	Skewness	Kurtosis	Corr World	Corr USA
<b>CANADA Large Core</b>	0.0001	0.0004	-0.4411	6.3502	0.84892	0.74093
<b>FRANCE Large Core</b>	-0.0001	0.0005	0.3548	4.7155	0.85053	0.58475
<b>GERMANY Large Core</b>	0.0000	0.0004	0.2762	4.3027	0.85298	0.61633
<b>ITALY Large Core</b>	-0.0004	0.0006	0.3025	4.0174	0.80112	0.54306
<b>JAPAN Large Core</b>	-0.0002	0.0003	0.0810	5.6264	0.27552	0.00554
<b>UK Large Core</b>	0.0000	0.0004	0.2270	6.8691	0.84021	0.57201
<b>USA Large Core</b>	0.0001	0.0003	0.0025	7.6896	0.88681	0.9992
<b>BRAZIL Large Core</b>	0.0003	0.0007	0.1162	7.8772	0.80309	0.69892
<b>CHINA Large Core</b>	0.0001	0.0005	0.3698	5.9265	0.46094	0.24832
<b>INDIA Large Core</b>	0.0001	0.0005	0.6303	9.2557	0.47874	0.32375
<b>MEXICO Large Core</b>	0.0003	0.0004	0.3146	7.0648	0.81613	0.74017
<b>RUSSIA Large Core</b>	0.0002	0.0009	0.2820	13.5729	0.66046	0.44683
<b>S. AFRICA Large Core</b>	0.0004	0.0005	0.0763	3.6848	0.68341	0.41887
<b>TAIWAN Large Core</b>	0.0001	0.0003	0.0168	2.2225	0.36232	0.16176
<b>CANADA Mid Core</b>	0.0003	0.0004	-0.3885	4.3422	0.8213	0.6806
<b>FRANCE Mid Core</b>	0.0000	0.0004	-0.1217	2.5456	0.8442	0.5799
<b>GERMANY Mid Core</b>	-0.0002	0.0006	-0.1166	4.7917	0.8280	0.5745
<b>ITALY Mid Core</b>	-0.0005	0.0004	0.0083	1.7524	0.7683	0.5400
<b>JAPAN Mid Core</b>	-0.0001	0.0002	0.0087	6.1142	0.2769	0.0217
<b>UK Mid Core</b>	0.0000	0.0004	0.0116	3.4571	0.8303	0.5677
<b>USA Mid Core</b>	0.0002	0.0003	-0.2056	5.2427	0.8870	0.9816
<b>BRAZIL Mid Core</b>	0.0003	0.0006	-0.0122	8.9072	0.7769	0.6734
<b>CHINA Mid Core</b>	-0.0002	0.0004	-0.2713	3.8779	0.4198	0.1983
<b>INDIA Mid Core</b>	0.0003	0.0005	0.2138	7.0326	0.4245	0.2732
<b>MEXICO Mid</b>	0.0004	0.0006	-0.1724	10.2644	0.7618	0.6540

<b>Core</b>						
	<b>Mean</b>	<b>Variance</b>	<b>Skewness</b>	<b>Kurtosis</b>	<b>Corr World</b>	<b>Corr USA</b>
<b>RUSSIA Mid Core</b>	0.0001	0.0010	0.5144	10.5074	0.6073	0.4360
<b>S. AFRICA Mid Core</b>	0.0003	0.0004	-0.2882	4.7644	0.6766	0.4095
<b>TAIWAN Mid Core</b>	-0.0001	0.0004	-0.2705	1.7687	0.3372	0.1478
<b>CANADA Small Core</b>	0.0002	0.0004	-0.3740	4.4471	0.8034	0.6339
<b>FRANCE Small Core</b>	0.0000	0.0004	-0.2106	2.3915	0.8162	0.5367
<b>GERMANY Small Core</b>	0.0001	0.0004	0.0615	3.2979	0.8349	0.5684
<b>ITALY Small Core</b>	-0.0006	0.0004	-0.0725	1.5438	0.7731	0.5129
<b>JAPAN Small Core</b>	0.0000	0.0002	-0.2199	6.8838	0.2352	0.0064
<b>UK Small Core</b>	0.0001	0.0003	-0.2165	2.6610	0.7957	0.5210
<b>USA Small Core</b>	0.0003	0.0004	-0.2072	3.5722	0.8490	0.9567
<b>BRAZIL Small Core</b>	0.0005	0.0005	-0.5426	8.5110	0.7660	0.6091
<b>CHINA Small Core</b>	-0.0001	0.0003	-0.5348	3.1627	0.3762	0.1613
<b>INDIA Small Core</b>	-0.0001	0.0004	-0.1266	5.5423	0.4265	0.2749
<b>MEXICO Small Core</b>	0.0000	0.0004	-0.5322	5.5053	0.7867	0.6843
<b>RUSSIA Small Core</b>	-0.0004	0.0005	-0.4425	4.1952	0.5232	0.3260
<b>S. AFRICA Small Core</b>	0.0002	0.0003	-0.4270	5.2475	0.6774	0.3943
<b>TAIWAN Small Core</b>	0.0000	0.0003	-0.4335	2.1066	0.3225	0.1474

**Table 3: Spanning Test Results**

Estimate d Beta	Constant	CANA DA	FRA NCE	GER MAN Y	ITAL Y	JAPA N	UK	USA	HK	P-values
CANAD A SM	0.000129 6	<b>0.9094</b> <b>1</b>	0.052 28	0.019 62	0.011 86	<b>0.0267</b> <b>1</b>	<b>0.080</b> <b>51</b>	-- <b>0.14957</b>	4.24 97	<b>0.0144</b>
FRANC E SM	0.000115 6	<b>0.0926</b> <b>9</b>	<b>0.576</b> <b>99</b>	<b>0.186</b> <b>33</b>	<u>0.047</u> <u>57</u>	<b>0.1128</b> <b>9</b>	- 0.028 2	- <b>0.06824</b>	12.1 865	<b>0.0000</b>
GERM ANY SM	0.000200 9	<b>0.0822</b> <b>3</b>	<b>0.439</b> <b>45</b>	<b>0.309</b> <b>69</b>	0.041 49	<b>0.0882</b> <b>8</b>	<b>0.083</b> <b>3</b>	- 0.02581	0.55 12	0.5759
ITALY SM	- 0.000324 8	<b>0.0371</b> <b>8</b>	<b>0.132</b> <b>5</b>	<b>0.179</b> <b>91</b>	<b>0.531</b> <b>86</b>	<b>0.0566</b> <b>7</b>	<b>-0.072</b>	- <b>0.04398</b>	50.6 414	<b>0.0000</b>
JAPAN SM	0.000078 4	- 0.0050 3	0.034 59	<b>0.052</b> <b>64</b>	- <b>0.077</b> <b>51</b>	<b>0.8464</b> <b>34</b>	- <b>0.051</b> <b>65</b>	<b>0.02967</b>	84.7 137	<b>0.0000</b>
UK SM	0.000108 1	<b>0.0492</b> <b>5</b>	0.038 74	<u>0.051</u> <u>87</u>	0.020 15	<b>0.0819</b> <b>6</b>	<b>0.726</b> <b>13</b>	- <b>0.04435</b>	10.3 944	<b>0.0000</b>
USA SM	0.000197 7	<b>0.0509</b> <b>6</b>	<u>0.066</u> <u>24</u>	- <b>0.080</b> <b>4</b>	<b>0.052</b> <b>95</b>	- 0.0152 5	- <b>0.084</b> <b>9</b>	<b>1.12555</b>	34.8 080	<b>0.0000</b>
BRAZI L SM	0.000290 4	<b>0.6263</b> <b>3</b>	- 0.006 2	<b>0.033</b> <b>71</b>	0.016 82	<b>0.0310</b> <b>7</b>	<b>0.099</b> <b>36</b>	0.02882	48.9 755	<b>0.0000</b>
CHINA SM	- 0.000100 3	- 0.0266 3	<b>0.580</b> <b>1</b>	0.009 16	0.008 59	- 0.0185 1	- 0.000 92	<b>0.16346</b>	138. 380 0	<b>0.0000</b>
INDIA SM	- 0.000195 6	0.0031 8	<b>0.041</b> <b>19</b>	<b>0.839</b> <b>72</b>	0.005 71	<u>0.0226</u> <u>4</u>	- <b>0.062</b> <b>06</b>	- 0.00658	41.0 005	<b>0.0000</b>
MEXIC O SM	- 0.000224 8	0.0045 7	- 0.010 73	<b>0.033</b> <b>09</b>	<b>0.773</b> <b>64</b>	<b>0.0239</b> <b>3</b>	0.017 4	<b>0.03597</b>	27.2 445	<b>0.0000</b>
RUSSIA SM	- 0.000526 9	- <b>0.0674</b> <b>5</b>	- <b>0.081</b> <b>51</b>	<b>0.104</b> <b>93</b>	<u>0.070</u> <u>13</u>	<b>0.5428</b> <b>8</b>	0.012 43	<b>0.14974</b>	41.5 982	<b>0.0000</b>
S.AFRI CA SM	0.000009 8	- 0.0159 3	<b>0.032</b> <b>89</b>	<b>0.026</b>	<b>0.053</b> <b>15</b>	0.0105 88	<b>0.627</b> <b>14</b>	<b>0.02798</b>	174. 433 0	<b>0.0000</b>
TAIWA N SM	- 0.000002 7	<u>0.0285</u> <u>5</u>	- 0.015 23	<u>0.022</u> <u>49</u>	- 0.026 65	<b>0.0290</b> <b>3</b>	- <b>0.056</b> <b>57</b>	<b>0.93268</b>	13.5 728	<b>0.0000</b>

Estimated Beta	Constant	CANADA	FRANCE	GERMANY	ITALY	JAPAN	UK	USA	BRAZIL	CHINA	INDIA	MEXICO	RUSSIA	S.Africa	TAIWAN	HK	P-values
CANADA SM	0.000	<b>0.862</b>	0.021	-0.004	0.030	0.013	0.025	-0.195	<b>0.81</b>	<u>0.024</u>	<b>0.41</b>	<u>0.033</u>	-0.002	<u>0.028</u>	<b>0.39</b>	4.098	<b>0.017</b>
FRANCE SM	0.000	<b>0.068</b>	<b>0.568</b>	<b>0.157</b>	<b>0.055</b>	<b>0.074</b>	-0.075	-0.077	0.005	0.000	<b>0.59</b>	0.022	<b>0.20</b>	0.020	<b>0.44</b>	5.947	<b>0.003</b>
GERMANY SM	0.000	<b>0.054</b>	<b>0.424</b>	<b>0.273</b>	<u>0.050</u>	<b>0.044</b>	0.025	<u>0.038</u>	-0.007	0.016	<b>0.54</b>	<b>0.050</b>	0.014	<b>0.048</b>	<b>0.31</b>	2.068	0.126
ITALY SM	<u>0.000</u>	0.018	<b>0.127</b>	<b>0.157</b>	<b>0.530</b>	<b>0.044</b>	-0.110	-0.068	0.002	0.019	<b>0.59</b>	<b>0.054</b>	0.014	0.014	0.018	35.499	<b>0.000</b>
JAPAN SM	0.000	-0.005	0.029	<b>0.065</b>	-0.079	<b>0.881</b>	-0.043	0.002	<b>0.34</b>	-0.021	-0.005	0.020	-0.029	-0.003	-0.027	82.405	<b>0.000</b>
UK SM	0.000	0.026	0.030	0.018	0.020	<b>0.043</b>	<b>0.684</b>	<u>0.035</u>	-0.041	-0.020	<b>0.48</b>	<b>0.043</b>	<b>0.045</b>	<b>0.032</b>	<b>0.62</b>	3.056	<b>0.047</b>
USA SM	0.000	<b>0.036</b>	0.047	-0.088	<b>0.058</b>	-0.026	-0.095	<b>1.116</b>	-0.013	-0.035	-0.001	<b>0.048</b>	0.013	0.011	<b>0.64</b>	41.713	<b>0.000</b>
BRAZIL SM	0.000	-0.006	-0.007	-0.004	<b>0.077</b>	<b>0.039</b>	<b>0.078</b>	-0.083	<b>0.643</b>	-0.018	<b>0.30</b>	0.036	0.020	<u>0.036</u>	0.023	28.910	<b>0.000</b>
CHINA SM	0.000	<b>0.059</b>	0.056	-0.030	<u>0.061</u>	<b>0.049</b>	-0.046	-0.093	0.023	<b>0.570</b>	0.012	0.028	<b>0.029</b>	-0.008	<b>0.146</b>	77.909	<b>0.000</b>
INDIA SM	0.000	<u>0.040</u>	-0.020	<b>0.114</b>	-0.022	<b>0.048</b>	-0.052	-0.080	0.010	0.025	<b>0.846</b>	0.028	0.017	-0.008	-0.022	22.606	<b>0.000</b>
MEXICO SM	0.000	0.022	-0.011	0.017	<b>0.102</b>	-0.013	0.019	0.024	-0.020	0.010	0.019	<b>0.722</b>	0.004	-0.028	<b>0.38</b>	9.159	<b>0.000</b>
RUSSIA SM	0.000	-0.024	-0.142	<b>0.317</b>	<b>0.137</b>	-0.071	-0.089	-0.029	<u>0.056</u>	<u>0.050</u>	<b>0.86</b>	0.053	<b>0.520</b>	-0.004	<b>0.176</b>	38.925	<b>0.000</b>
S.AFRICA SM	0.000	0.013	0.002	0.044	<b>0.077</b>	<b>0.027</b>	0.008	-0.088	-0.012	<b>0.31</b>	<b>0.21</b>	<b>0.057</b>	-0.006	<b>0.561</b>	0.021	105.602	<b>0.000</b>
TAIWAN SM	0.000	0.027	0.009	0.038	0.008	0.002	-0.049	-0.019	0.026	-0.013	0.022	-0.030	<b>0.025</b>	-0.006	<b>0.930</b>	7.896	<b>0.000</b>

Significant p-value at 1 percent based on a two tailed test appear in bold, 5 percent appear in underline and 10 percent in italic.

Optimal International Portfolio Strategy:  
Utilizing Different Caps Stocks in Emerging and Developed Countries

**Table 4: Regression and Proportion of Global and Country Factors**

	Cap	World bata	P-value	Country beta	P-value	Global	Country	Idiosyncratic
CANADA	Large	1.20386	0	1.01377	0	72.1%	27.6%	0.3%
	Mid	1.09774	0	0.91486	0	67.4%	25.3%	7.2%
	Small	1.13922	0	0.90229	0	64.6%	21.9%	13.6%
FRANCE	Large	1.33378	0	1.03129	0	72.3%	27.5%	0.2%
	Mid	1.16757	0	0.79639	0	71.3%	21.1%	7.6%
	Small	1.11120	0	0.76330	0	66.6%	20.0%	13.4%
GERMANY	Large	1.26905	0	1.01014	0	72.8%	27.1%	0.2%
	Mid	1.43320	0	0.86877	0	68.6%	14.8%	16.6%
	Small	1.23409	0	0.74053	0	69.7%	14.7%	15.6%
ITALY	Large	1.36274	0	1.02899	0	64.2%	35.6%	0.2%
	Mid	1.14262	0	0.81821	0	59.0%	29.4%	11.5%
	Small	1.05497	0	0.69383	0	59.8%	25.1%	15.1%
JAPAN	Large	0.32316	0	1.01678	0	7.6%	92.2%	0.2%
	Mid	0.30405	0	0.92664	0	7.7%	87.3%	5.0%
	Small	0.24311	0	0.83805	0	5.5%	80.6%	13.9%
UK	Large	1.14213	0	1.01323	0	70.6%	29.2%	0.2%
	Mid	1.14654	0	0.92445	0	68.9%	23.5%	7.5%
	Small	1.01732	0	0.81846	0	63.3%	21.5%	15.2%
USA	Large	1.01310	0	0.99048	0	78.6%	21.2%	0.2%
	Mid	1.16988	0	1.04659	0	78.7%	17.8%	3.6%
	Small	1.18119	0	1.15503	0	72.1%	19.4%	8.5%
BRAZIL	Large	1.55275	0	1.02493	0	64.5%	35.3%	0.2%
	Mid	1.33962	0	0.81669	0	60.4%	28.2%	11.4%
	Small	1.16565	0	0.66367	0	58.7%	23.9%	17.4%
CHINA	Large	0.75425	0	1.02272	0	21.2%	78.5%	0.3%
	Mid	0.61727	0	0.85398	0	17.6%	67.7%	14.6%
	Small	0.45157	0	0.64627	0	14.2%	58.2%	27.6%
INDIA	Large	0.74515	0	1.00192	0	22.9%	76.7%	0.3%
	Mid	0.67782	0	0.98804	0	18.0%	70.9%	11.1%
	Small	0.61985	0	0.85187	0	18.2%	63.6%	18.2%
MEXICO	Large	1.18796	0	1.01264	0	66.6%	33.1%	0.3%
	Mid	1.27746	0	0.89357	0	58.0%	19.4%	22.5%
	Small	1.05865	0	0.71073	0	61.9%	19.1%	19.0%
RUSSIA	Large	1.40997	0	1.01053	0	43.6%	56.3%	0.0%
	Mid	1.33898	0	0.62877	0	36.9%	20.4%	42.7%
	Small	0.85284	0	0.55744	0	27.4%	29.4%	43.2%
S.AFRICA	Large	1.12158	0	1.03571	0	46.7%	52.7%	0.6%
	Mid	1.00742	0	0.85963	0	45.8%	44.1%	10.1%
	Small	0.81154	0	0.65191	0	45.9%	39.2%	14.9%
TAIWAN	Large	0.42953	0	0.98386	0	13.1%	86.2%	0.6%
	Mid	0.45818	0	1.07641	0	11.4%	78.6%	10.1%
	Small	0.40615	0	0.92532	0	10.4%	67.6%	22.0%
Average	Large	1.06064		1.01407		51.2%	48.5%	0.3%
	Mid	1.01274		0.88664		47.8%	39.2%	13.0%
	Small	0.88195		0.77991		45.6%	36.0%	18.4%

**Table 5: Correlations and Optimal Portfolio of Country Market**

Correlations of Developed Countries in 2008											
	USA	CANADA	JAPAN	UK	GERMANY	FRANCE	ITALY	Mean	s.d.	with short sales	without short sales
USA	1	0.7041	-0.0022	0.5088	0.5424	0.4834	0.4246	0.00218	0.02545	57.90%	43.31%
CANADA	0.7041	1	0.3085	0.6925	0.653	0.6708	0.6348	0.00287	0.03095	-24.78%	0.00%
JAPAN	-0.0022	0.3085	1	0.3321	0.2865	0.3194	0.3398	0.00169	0.02454	49.89%	47.48%
UNITED KINGDOM	0.5088	0.6925	0.321	1	0.8929	0.9483	0.9121	0.00309	0.02827	-4.98%	0.00%
GERMANY	0.5424	0.653	0.2865	0.8929	1	0.9317	0.8883	0.0028	0.02686	8.78%	0.00%
FRANCE	0.4834	0.6708	0.3194	0.9483	0.9317	1	0.9587	0.00268	0.02847	-23.07%	0.00%
ITALY	0.4246	0.6348	0.3398	0.9121	0.8883	0.9587	1	0.00319	0.02764	36.26%	9.20%
								Average	0.00264	0.02745	
								Portfolio Expected Returns		0.002	0.002
								Portfolio Standard Deviation		0.017	0.017
Correlations of Emerging Countries in 2008											
	CHINA	INDIA	TAIWAN	BRAZIL	MEXICO	RUSSIA	SA	Mean	s.d.	with short sales	without short sales
CHINA	1	0.6288	0.601	0.4496	0.4096	0.5493	0.5539	0.00344	0.03586	-11.03%	0.00%
INDIA	0.6288	1	0.4272	0.3949	0.383	0.4587	0.4819	0.00458	0.0317	16.73%	10.55%
TAIWAN	0.601	0.4272	1	0.2676	0.2048	0.4573	0.4589	0.00283	0.0235	63.66%	59.53%
BRAZIL	0.4496	0.3943	0.2676	1	0.8482	0.6053	0.6598	0.00423	0.04394	-21.33%	0.00%
MEXICO	0.4096	0.383	0.2048	0.8482	1	0.5572	0.6226	0.00268	0.03057	56.08%	29.92%
RUSSIA	0.5493	0.4587	0.4573	0.6053	0.5572	1	0.7254	0.0063	0.04812	-12.63%	0.00%
SA	0.5539	0.4819	0.4589	0.6598	0.6226	0.7254	1	0.0025	0.03332	8.25%	0.00%
								Average	0.00379	0.03529	
								Portfolio Expected Returns		0.002	0.003
								Portfolio Standard Deviation		0.018	0.02

**Table 6: Optimal Portfolio Allocation of Developed Countries**

	Panel A		Panel B		Panel C		Panel D	
	Country		Country+Small Cap		Country+Mid Cap		Country+Small+Mid	
	With Short Sales	Without Short Sales	With Short Sales	Without Short Sales	With Short Sales	Without Short Sales	With Short Sales	Without Short Sales
USA	57.90%	43.31%	45.19%	22.69%	81.18%	27.45%	79.86%	19.43%
CANADA	-24.78%	0.00%	-26.60%	0.00%	-55.58%	0.00%	-45.93%	0.00%
JAPAN	49.89%	47.48%	-21.73%	0.00%	-2.41%	0.00%	6.04%	0.00%
UK	-4.98%	0.00%	-21.94%	0.00%	0.72%	0.00%	-5.57%	0.00%
GERMANY	8.78%	0.00%	-9.79%	0.00%	-1.18%	0.00%	-3.47%	0.00%
FRANCE	-23.07%	0.00%	-5.27%	0.00%	-13.31%	0.00%	2.36%	0.00%
ITALY	36.26%	9.20%	10.57%	0.00%	-20.68%	0.00%	-14.22%	0.00%
USA Mid					-50.08%	0.00%	-72.46%	0.00%
CANADA Mid					57.12%	0.00%	43.06%	0.00%
JAPAN Mid					30.36%	40.07%	-36.34%	0.00%
UK Mid					11.48%	0.00%	-20.13%	0.00%
GERMANY Mid					-40.76%	0.00%	-32.50%	0.00%
FRANCE Mid					17.81%	0.00%	-0.91%	0.00%
ITALY Mid					85.35%	32.48%	55.24%	29.02%
USA Small			-3.48%	5.58%			22.81%	5.12%
CANADA Small			11.68%	0.00%			3.68%	0.00%
JAPAN Small			57.93%	46.78%			55.81%	46.44%
UK Small			34.67%	0.00%			46.05%	0.00%
GERMANY Small			-74.69%	0.00%			-27.24%	0.00%
FRANCE Small			15.16%	0.00%			17.47%	0.00%
ITALY Small			88.30%	24.96%			26.42%	0.00%
Expected Returns	0.002	0.002	0.002	0.002	0.001	0.002	0.002	0.002
Standard Deviation	0.017	0.017	0.012	0.016	0.012	0.016	0.011	0.015



Optimal International Portfolio Strategy:  
Utilizing Different Caps Stocks in Emerging and Developed Countries

**Table 7: Optimal Portfolio Allocation of Emerging Countries**

	Country		Country+Small Cap		Country+Mid Cap		Country+Small+Mid	
	With Short Sales	Without Short Sales	With Short Sales	Without Short Sales	With Short Sales	Without Short Sales	With Short Sales	Without Short Sales
CHINA	-11.03%	0.00%	-22.41%	0.00%	-42.95%	0.00%	-10.95%	0.00%
INDIA	16.73%	10.55%	3.04%	0.00%	-8.01%	0.00%	17.64%	0.00%
TAIWAN	63.66%	59.53%	12.21%	15.90%	67.83%	58.52%	43.76%	15.90%
BRAZIL	-21.33%	0.00%	-4.82%	0.00%	-44.26%	5.00%	-19.35%	0.00%
MEXICO	56.08%	29.92%	16.77%	0.00%	66.33%	29.44%	21.72%	0.00%
RUSSIA	-12.36%	0.00%	-22.23%	0.00%	-11.57%	0.00%	-20.18%	0.00%
SA	8.25%	0.00%	-14.00%	0.00%	17.49%	0.00%	-0.44%	0.00%
CHINA Mid					42.98%	0.00%	-16.79%	0.00%
INDIA Mid					24.10%	12.05%	-25.81%	0.00%
TAIWAN Mid					-13.99%	0.00%	-78.33%	0.00%
BRAZIL Mid					32.12%	0.00%	20.19%	0.00%
MEXICO Mid					-20.45%	0.00%	-27.86%	0.00%
RUSSIA Mid					-0.23%	0.00%	2.85%	0.00%
SA Mid					-9.39%	0.00%	-32.28%	0.00%
CHINA Small			29.61%	17.51%			36.18%	17.51%
INDIA Small			5.58%	5.11%			17.24%	5.11%
TAIWAN Small			10.36%	9.26%			59.83%	9.26%
BRAZIL Small			-5.92%	0.00%			-4.03%	0.00%
MEXICO Small			17.78%	27.49%			33.32%	27.49%
RUSSIA Small			38.32%	24.74%			26.40%	24.74%
SA Small			35.71%	0.00%			56.98%	0.00%
Expected Returns	0.002	0.003	0.004	0.005	0.002	0.003	0.003	0.005
Standard Deviation	0.018	0.02	0.013	0.017	0.017	0.02	0.011	0.017

Table 8: Optimal Portfolio Allocation of Developed and Emerging Countries

	Panel A		Panel B		Panel C	
	Country		Country+Small Cap		Country+Mid Cap	
	With Short Sales	Without Short Sales	With Short Sales	Without Short Sales	With Short Sales	Without Short Sales
USA	46.72%	38.76%	54.79%	27.12%	76.61%	25.56%
CANADA	-15.74%	0.00%	-15.84%	0.00%	-49.31%	0.00%
JAPAN	36.75%	31.00%	-20.27%	0.00%	-1.24%	0.00%
UK	6.08%	0.00%	2.54%	0.00%	26.89%	0.00%
GERMANY	11.14%	0.00%	-12.06%	0.00%	-6.35%	0.00%
FRANCE	-18.61%	0.00%	-6.14%	0.00%	-16.85%	0.00%
ITALY	22.88%	4.69%	-9.22%	0.00%	-18.52%	0.00%
CHINA	-16.51%	0.00%	-14.92%	0.00%	-26.10%	0.00%
INDIA	5.65%	0.13%	4.83%	0.00%	1.69%	0.00%
TAIWAN	28.77%	25.42%	-0.62%	0.00%	20.24%	18.99%
BRAZIL	-16.86%	0.00%	-2.51%	0.00%	-7.08%	0.00%
MEXICO	13.85%	0.00%	-4.76%	0.00%	25.88%	0.00%
RUSSIA	-8.73%	0.00%	-14.73%	0.00%	-1.29%	0.00%
SA	4.62%	0.00%	-7.30%	0.00%	7.05%	0.00%
USA Mid					-44.58%	0.00%
CANADA Mid					48.29%	0.00%
JAPAN Mid					23.59%	28.31%
UK Mid					-9.76%	0.00%
GERMANY Mid					-30.78%	0.00%
FRANCE Mid					21.65%	0.00%
ITALY Mid					7303.00%	21.15%
CHINA Mid					21.72%	0.00%
INDIA Mid					-1.13%	0.00%
TAIWAN Mid					-2.80%	0.00%
BRAZIL Mid					-3.57%	0.00%
MEXICO Mid					-20.66%	0.00%
RUSSIA Mid					-0.52%	0.00%
SA Mid					-6.40%	0.00%
USA Small			-14.72%	0.00%		
CANADA Small			9.21%	0.00%		
JAPAN Small			40.02%	34.11%		
UK Small			8.38%	0.00%		
GERMANY Small			-23.81%	0.00%		
FRANCE Small			2.89%	0.00%		
ITALY Small			52.03%	6.41%		
CHINA Small			17.21%	4.43%		
INDIA Small			-7.04%	0.00%		
TAIWAN Small			6.57%	7.01%		
BRAZIL Small			-9.20%	0.00%		
MEXICO Small			4.40%	0.00%		
RUSSIA Small			27.95%	20.92%		
SA Small			32.30%	0.00%		
Expected Returns	0.002	0.002	0.003	0.003	0.001	0.002
Standard Deviation	0.014	0.017	0.009	0.015	0.01	0.016