



Country Size Premiums and Global Equity Portfolio Structure

This paper examines the relation between aggregate country equity market capitalizations and country-level market index returns. Our results indicate that small countries have reliably higher average returns, higher volatility and lower correlations to the world market index when compared to large countries. Size in this context is measured in terms of aggregate market capitalization, or the sum of all (developed country non-US) stocks' market capitalizations in a given country. We analyze equity strategies that vary country exposures. As we show, reducing the weights for large countries and reallocating to smaller countries in a multi-country equity portfolio can improve risk-adjusted performance.

Introduction

Over the past 10 years, domestic equity mutual funds experienced net outflows totaling \$647 billion, while international equity funds received net inflows of \$639 billion, accounting for 25% of all equity mutual fund assets at the end of 2014.¹ The proliferation of long-only strategies that invest in multiple countries necessitates a country allocation policy that takes into account the trade-offs of investing in different financial markets.

Starting with Banz (1981), academics and practitioners alike have come to embrace the concept of the size premium, or the tendency for smaller capitalization securities to outperform their larger cap counterparts. In a similar vein, a number of papers have also looked at whether the same concept can be used to explain country return differences. Keppler and Traub (1993) examine multi-country portfolios using the 18 equity markets included in the MSCI World Index. They show that a value-weighted portfolio that invests in the six smallest markets (of the 18) has 19.2% annual compounded returns over December 31, 1975 through June 30, 1992, outperforming the capitalization-weighted MSCI World Index by 6.5%. Later papers, including Keppler and Traub (2011), Asness, Liew and Stevens (1997), Angelidis and Tessaromatis (2014), and Li and Pritamani (2015) report economically similar results.

In this paper, we add to the literature by exploring how country size affects portfolio diversification through examinations of volatility and correlations to the MSCI World Index. Throughout the paper, we use the Sharpe

ratio as a measure of risk-adjusted performance. The Sharpe ratio is equal to the excess portfolio return (above the risk-free rate) divided by the standard deviation of the excess portfolio return.

As we show, smaller countries have higher returns, higher standard deviations, and lower correlations to the MSCI World Index when compared to larger countries. According to the definition of the Sharpe ratio, higher country returns, lower volatilities and lower correlations should increase the Sharpe ratio; while lower country returns, higher volatilities and higher correlations should decrease the Sharpe ratio. Thus, using country aggregate market capitalization to form over/under-weights relative to the market index can lead to predictable changes in the Sharpe ratio.

Based on our empirical results, we consider one alternative to a value-weighted portfolio that takes advantage of the size premium by limiting the capitalization of large countries in the portfolio and then re-distributing the weights to other countries in the portfolio according to market capitalization. In our analysis, we limit the largest country weight to a range of maximums varying from 10% to 15% of the total portfolio, which causes under-weights relative to the capitalization-weighted index in two countries: Japan and the United Kingdom. The multi-country portfolios formed using this technique improve the risk-adjusted performance measured by the Sharpe ratio by 13.5% to 22.5% over the sample period from January 1997 to July 2015.

¹ Source: ICI 2015 Factbook.

The rest of the paper is organized as follows: Section I explains the data sources and presents country-level analysis. Section II presents the test on our global portfolio after implementing the country capitalization limit strategy, and the last section concludes.

Section I: Data Sources and Country-Level Analysis

Our research examines stock markets that MSCI defines as being either a developed or an emerging market.² Morgan Stanley Capital International (MSCI) data provide US dollar monthly returns for each equity market from January 1989 to December 2014, and the World Bank reports year-end market capitalizations of listed companies in current US dollars for each equity market from 1988 to 2012.³

Each month, we regress the country return on the log of the country's aggregate market capitalization. Using an approach known as a Fama MacBeth regression, we average the monthly slopes and estimate the t-statistics using 5-year lagged Newey-West corrected standard errors. We also include a dummy variable that equals 1 for emerging market countries and 0 for developed market countries to capture variation in stock returns for markets at different stages of financial development.

We report results separately for all markets, all markets excluding the US, developed markets only, and emerging markets only. Due to data limitations, our emerging market results start in 1995. As we show in Exhibit 1, the empirical results indicate a reliably negative relation between log country market cap and average country stock returns. A t-statistic of 2 can be used as a rule-of-thumb to indicate a reliable difference. We find a reliable difference for the log (Country Aggregate Market Cap) variable in all tests, except for Developed Markets.

Our next analysis illustrates the relations between country market capitalization and country stock returns, using a scatter plot covering all the countries in our stock universe as shown in Exhibit 2A. The x-axis represents log of the country market capitalization in USD billions as of the end of 2000; the y-axis represents annual compound country returns from January 2001 to December 2014.⁴ The chart displays a clear negative correlation between country stock returns and country market capitalizations, with R² of a log-liner regression of average return on beginning-of-period market capitalization equal to 0.08.

Exhibit 1: Fama-MacBeth Regressions of Country Market Returns on Market Size

| Countries | Time Period | Intercept | T-stat | Log (Country Size) | T-stat | EM Dummy | T-stat | R2 |
|-------------------|------------------------|-----------|--------|-----------------------|--------|-------------|--------|------|
| All Markets | Jan. 1989 to Dec. 2014 | 0.0634 | 2.99 | -0.0021 | -2.83 | 0.0003 | 0.12 | 0.15 |
| All Markets ex-US | Jan. 1989 to Dec. 2014 | 0.0807 | 3.16 | -0.0028 | -3.02 | -0.0001 | -0.05 | 0.16 |
| Developed Markets | Jan. 1989 to Dec. 2014 | 0.0429 | 2.05 | -0.0014 | -1.86 | | | 0.11 |
| Emerging Markets | Jan. 1995 to Dec. 2014 | 0.1285 | 2.79 | -0.0047 | -2.52 | | | 0.11 |

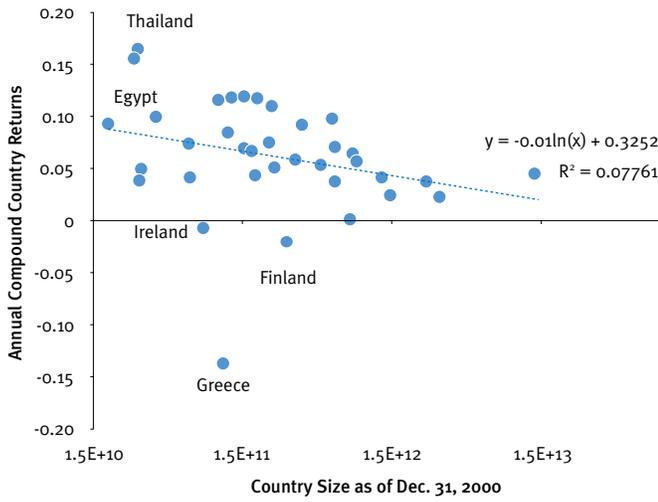
Source: MSCI, WorldBank and Gerstein Fisher Research.

² The market classification of developed, emerging and frontier markets is based on current MSCI ACWI & FRONTIER MARKETS INDEX. During our research timeframe of January 2001 through July 2015, three countries in our stock universe were reclassified by MSCI. Greece was reclassified from emerging market to developed market effective in May of 2001, and then back to emerging market in November of 2013. Argentina was reclassified from emerging market to frontier market effective in May of 2009. Israel was reclassified from emerging market to developed market effective in May 2010.

³ Market capitalization (also known as market value) is the share price times the number of shares outstanding. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. Listed companies do not include investment companies, mutual funds, or other collective investment vehicles. Data are in current US dollars. Source for market capitalization data for Taiwan is World Federation of Exchanges members. Data on country-level market capitalizations end in the beginning of 2013. We assume that the country-level market capitalization for the beginning of 2014 is equal to the country market capitalization at the beginning of 2013 multiplied by one plus the country return for 2013.

⁴ The World Bank provides year-end market capitalizations for listed companies in current US dollars for each equity market from 1988 to 2012. For years 2013 and 2014, we take the market capitalization at the end of the previous year, and multiply one plus the realized returns for that year to estimate the year-end market capitalization. Our results start in 2000 to include as many countries as possible into the analysis.

Exhibit 2A: Scatter Plot of Country Returns (y-axis) and Country Size (x-axis) – Jan. 1, 2001 to Dec. 31, 2014

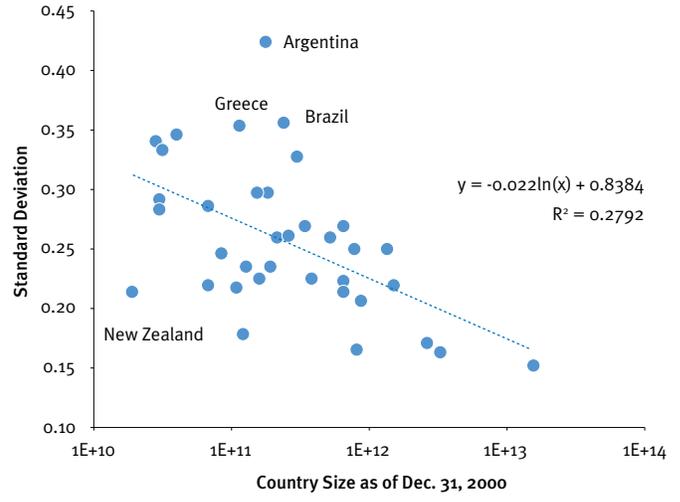


Source: MSCI, WorldBank and Gerstein Fisher Research.

We then explore the relation between a) country market capitalization and country stock return volatilities (represented by standard deviation of country stock returns from January 2001 to December 2014); and b) country market capitalization and country stock returns' correlations to the MSCI World Index, a market capitalization-weighted index consisting of stocks from over forty countries. In Exhibits 2B and 2C, the x-axis represents log (country market capitalization) in billions as of the end of 2000; the y-axis for Exhibit 2A represents standard deviation of country stock returns from January 2001 to December 2014, and the y-axis for Exhibit 2B represents the correlations between country stock returns and MSCI World Index (from January 2001 to December 2014). Both scatter plots cover all the countries in our stock universe.

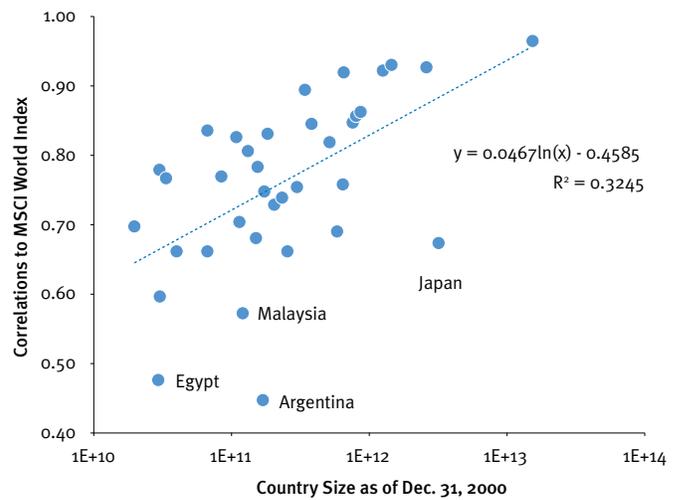
Exhibit 2B displays a clear negative relation between country stock return deviations and country market capitalizations, while Exhibit 2C shows a positive relation between country stock return correlations to the MSCI World Index and country market capitalizations.

Exhibit 2B: Scatter Plot of Country Volatility (y-axis) and Country Size (x-axis) – Jan. 1, 2001 to Dec. 31, 2014



Source: MSCI, WorldBank and Gerstein Fisher Research.

Exhibit 2C: Scatter Plot of Country Correlations (y-axis) and Country Size (x-axis) – Jan. 1, 2001 to Dec. 31, 2014



Source: MSCI, WorldBank and Gerstein Fisher Research.

The R^2 of the log-linear relations between country aggregate market capitalization with volatility and correlations are 0.28 and 0.32, respectively.

Tilting towards small countries for a global portfolio has an uncertain effect on a portfolio's Sharpe ratio. Smaller countries have higher returns and lower correlations to other countries, both of which increase risk-adjusted performance. These countries also have higher country-specific volatility, which decreases risk-adjusted performance. Additionally, tilting towards small countries provides a more even distribution of country weights, which also increases the Sharpe ratio. To further explore which inputs have the strongest impact on the global portfolio's overall performance, we consider one alternative to a value-weighted portfolio that limits the capitalization of large countries in the portfolio and re-distributes the weights to other countries in the portfolio according to market capitalization.

Section II: Portfolio Construction

In this section, we examine how a passively constructed international portfolio that weights stocks by their market capitalization can be improved by limiting the weight of larger countries, such as Japan and the United

Kingdom, and redistributing weights to smaller countries. The two main benefits of this approach are the greater diversification associated with a more even distribution of country weights and a larger allocation to smaller countries that have higher average returns when compared to larger countries.

We begin with examining a capitalization-weighted basket of developed market country indices (excluding the US) that resemble the MSCI EAFE Index. We use this index as our benchmark and the weights of this index are reported in the right-most column of Exhibit 3. We then limit the maximum weight of any one country in the portfolio. The weights are then re-distributed to all other countries according to market capitalization. For example, if we limit the maximum country weight to 15% and Japan's current weight is 18%, the 3% weight will be allocated to other countries that are not over the capitalization limit pro-rata according to relative market capitalization. If, after the re-allocation, any country exceeds the maximum portfolio weight, we repeat the process and re-allocate the additional weight. As shown in Exhibit 3, this process generally reduces the weight of Japan and the United Kingdom, and often adds the most

Exhibit 3: Average Country Weights Relative to the Benchmark – Jan.1, 1997 to Jul. 31, 2015

| Country | Exposure | | | | | | Benchmark Average Weight |
|----------------|-----------|-----------|-----------|-----------|-----------|-----------|--------------------------|
| | 10% Limit | 11% Limit | 12% Limit | 13% Limit | 14% Limit | 15% Limit | |
| Japan | 0.1 | 0.11 | 0.12 | 0.13 | 0.14 | 0.15 | 0.24 |
| United Kingdom | 0.1 | 0.11 | 0.12 | 0.13 | 0.14 | 0.15 | 0.2 |
| France | 0.1 | 0.11 | 0.12 | 0.13 | 0.14 | 0.14 | 0.11 |
| Germany | 0.1 | 0.11 | 0.11 | 0.11 | 0.11 | 0.1 | 0.08 |
| Switzerland | 0.1 | 0.1 | 0.1 | 0.09 | 0.09 | 0.09 | 0.07 |
| Australia | 0.08 | 0.07 | 0.07 | 0.07 | 0.06 | 0.06 | 0.05 |
| Italy | 0.07 | 0.06 | 0.06 | 0.06 | 0.05 | 0.05 | 0.04 |
| Netherlands | 0.07 | 0.06 | 0.06 | 0.05 | 0.05 | 0.05 | 0.04 |
| Spain | 0.06 | 0.06 | 0.06 | 0.05 | 0.05 | 0.05 | 0.04 |
| Hong Kong | 0.05 | 0.05 | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 |
| Sweden | 0.05 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 |
| Belgium | 0.03 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 |
| Singapore | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 |
| Finland | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 |
| Denmark | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Norway | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

Source: MSCI, WorldBank and Gerstein Fisher Research.

Exhibit 4: Performance of Portfolios formed by Limiting the Weight of Large Countries – Jan.1, 1997 to Jul. 31, 2015

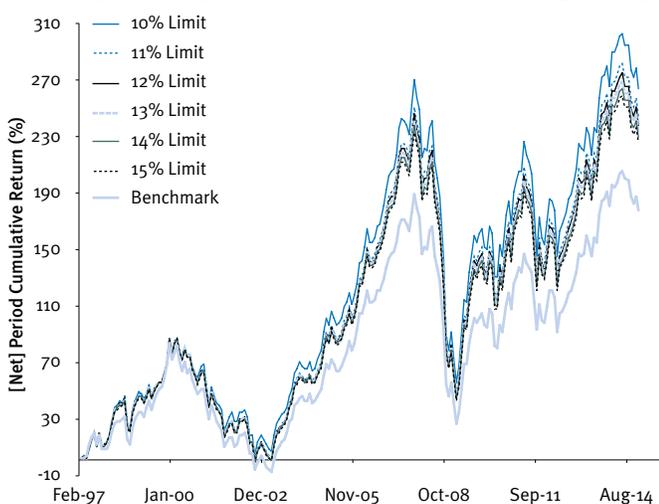
| | Country Capped Portfolios | | | | | | Benchmark |
|-------------------------|---------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| | 10% Limit | 11% Limit | 12% Limit | 13% Limit | 14% Limit | 15% Limit | |
| Cumulative Return | 290.94% | 270.19% | 263.93% | 259.57% | 255.01% | 250.94% | 201.18% |
| Compound Annual Return | 7.65% | 7.33% | 7.23% | 7.16% | 7.09% | 7.02% | 6.14% |
| Annualized Std Dev | 18.45% | 18.35% | 18.26% | 18.15% | 18.04% | 17.92% | 17.14% |
| Monthly Min | -21.86% | -21.58% | -21.40% | -21.28% | -21.16% | -21.04% | -20.28% |
| Monthly Max | 13.66% | 13.53% | 13.48% | 13.41% | 13.34% | 13.28% | 12.67% |
| Annualized Sharpe Ratio | 0.373 | 0.357 | 0.353 | 0.351 | 0.348 | 0.345 | 0.304 |

Source: MSCI, WorldBank and Gerstein Fisher Research.

weight to the larger of the smaller countries – France, Germany, Switzerland and Australia. Portfolios are rebalanced monthly. Through this process, the larger of the small countries are allocated most of the additional weight, resulting in a more even distribution of country weights in the modified portfolio.

Exhibit 3 provides the net average exposures of each country in each of the different country-capped portfolios and the benchmark over the sample period of January 1997-July 2015. For example, limiting the largest country weight to 13% leads to average over-weights of 2% for France, Switzerland and Australia and 3% for Germany, and under-weights of 9% for Japan and 7% for the United Kingdom.

Exhibit 5: Performance of Portfolios formed by Limiting the Weight of Large Countries – Jan.1, 1997 to Jul. 31, 2015



Source: MSCI, WorldBank and Gerstein Fisher Research.

There is a trade-off associated with tilting toward small countries by using this technique. Exhibit 2B shows that larger countries have less volatility when compared to smaller countries, so increasing the weight of smaller countries should increase volatility. Also, Exhibits 2A and 2C show that smaller countries have higher average returns and lower correlations to the market index, which lead to higher risk-adjusted returns. Exhibit 4 reports the performance of our strategy on a cumulative and annualized basis relative to the benchmark, while Exhibit 5 shows results on a cumulative basis over time.

As shown in both Exhibits 4 and 5, all of the capped approaches have proven successful compared to the benchmark, delivering modestly better monthly-period cumulative returns and annualized returns and relatively low turnover rates⁵ (turnover is less than 10.72%) over the period from January 1997 to July 2015. Portfolios are rebalanced once per month. The outperformance is achieved with higher volatility as measured by the annualized standard deviation shown in Exhibit 4. Volatility is highest for the portfolio applying a 10% country-weight limit (18.45%) and lowest for the portfolio applying a 15% country-weight limit (17.92%). Standard deviation for the benchmark is 17.14%. Despite the higher volatility, the Sharpe ratios of all the capped approaches are better (ranging from 0.345 to 0.373) than the Sharpe ratio of the benchmark (0.304). Overall, a max-country weight strategy is a robust portfolio construction methodology that improves the portfolio's performance, as shown by increased Sharpe ratios as compared to the benchmark.

⁵ A measure of how frequently assets within a fund are bought and sold by the manager. Portfolio turnover is calculated by taking either the total amount of new securities purchased or the amount of securities sold - whichever is less - over a particular period, divided by the total net asset value (NAV) of the fund.

Section III. Conclusion

This paper examines how to best structure a multi-country portfolio by considering varying the allocation to different countries based on equity market capitalization. Our results indicate that tilting towards small countries relative to large countries is beneficial due to higher

returns, lower correlations to other markets, and more even capital distribution, all of which improve risk-adjusted performance despite smaller countries having higher country-specific volatility. As we show, redistributing some of the weight of larger countries to smaller countries can improve risk-adjusted performance.

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