Frontier Markets: Punching Below their Weight?
A Risk Parity Perspective on Asset Allocation

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Abstract

Are frontier markets the next emerging markets? And if so, should global equity investors include them in their portfolios? From a risk parity perspective, investors could benefit from a frontier markets allocation well in excess of the market weight of the asset class. A risk parity portfolio tends to outperform a market cap-weighted portfolio during periods of positive equity returns while delivering comparable returns during crisis periods. Even if portfolio managers could not follow a risk parity asset allocation strategy due to benchmark tracking considerations, overweighting frontier markets could help them outperform their benchmarks during upside periods without increasing downside risks significantly.

Keywords: frontier markets, equity markets, asset allocation, risk parity, equity portfolios

JEL Codes: G11, G15, F13

Disclaimer: The views in this paper represent only those of the author and do not necessarily represent those of the International Monetary Fund (IMF) nor IMF policy.
I. WHY INVESTING IN FRONTIER MARKETS MATTERS

The term “frontier market” was first introduced by the International Finance Corporation (IFC), the World Bank, to define equity markets in developing countries which, albeit smaller, less liquid and with more investment restrictions than the typical emerging market, are still regarded investable countries from the perspective of foreign investors. Based on the experience of emerging market countries, frontier markets offer prospects of higher returns especially as economic growth accelerates on increased capital and infrastructure investment. Indeed, prior to the onset of the global financial crisis, frontier markets posted the strongest equity performance, edging up emerging markets (Figure 1).

Figure 1. US dollar equity performance, by country grouping (June 2002=100)

Several factors contribute to the growth potential of frontier markets, including but not limited to fast economic growth, favorable demographics, and abundant natural resources (Howell and Gratsova, 2011; Speidell, 2011). These markets, however, are vulnerable to large price corrections during severe distress periods as investors are more prone to reduce exposure in riskier asset classes first. This was the experience during the 2008 global financial crisis. Nevertheless, in the aftermath of the crisis, frontier markets recovered rapidly in spite of the ongoing debt crisis in peripheral Europe.

Investing in frontier markets is facilitated by the existence of benchmark investable indices constructed by Morgan Stanley Capital International (MSCI) and Standard and Poor’s (S&P). The MSCI Frontier Markets Index is a free-float adjusted market capitalization index that consists of 25 frontier market country indices. The index market capitalization as of end-
November 2011 was $371.4 billion. The S&P Frontier BMI is a broad benchmark index that tracks the equity return performance of 496 stocks publicly traded in 35 frontier countries. As of end-November 2011, the adjusted market capitalization of the index was $183 billion.

The potential diversification benefits of frontier equity markets are appealing to investors in developed and emerging market countries alike. The argument can be supported informally by examining equity return correlation across different market, as advanced by Speidell and Krohne (2007). Even accounting for the fact that equity return comovements are stronger during periods of declining equity prices, the average return correlation of frontier markets with the world portfolio has been on average less than 0.3 since mid-2002. Moreover, the average correlation has been slightly less than 0.6 in the post-crisis period, including the ongoing European debt crisis (Figure 2).

Figure 2. US dollar equity return correlation with world portfolio (1-year moving window)

1 Argentina, Bahrain, Bangladesh, Bulgaria, Croatia, Estonia, Jordan, Kazakhstan, Kenya, Kuwait, Lebanon, Lithuania, Mauritius, Nigeria, Oman, Pakistan, Qatar, Romania, Serbia, Slovenia, Sri Lanka, Tunisia, Ukraine, United Arab Emirates, and Vietnam. Calculations reported herein are based on this index.

2 The index, in addition to the countries in the MSCI FM index, includes Botswana, Cote d’Ivoire, Cyprus, Ecuador, Ghana, Jamaica, Latvia, Namibia, Panama, and Slovakia.


4 Cross-market correlation, while helpful to highlight diversification benefits, may not be accurate enough. See, for instance, Carrieri, Errunza, and Hogan (2007) and Pukthuantong and Roll (2009).
Two factors could reduce the diversification benefits of frontier markets. First, as it has been the case with emerging markets, increased integration of frontier market countries with the world economy and the global financial system could lead to diminished diversification. However, a recent study by Berger, Pukthuanthong and Yang (2011) finds no evidence that frontier markets are becoming increasingly integrated over time even after allowing for structural breaks and suggests that they could help diversify global investors’ portfolios.

Second, higher transaction costs, due to lower liquidity and depth, could offset the diversification benefits. Bid-ask spreads in frontier markets can be as high as 10-12 percent, as is the case in Kenya and Ukraine (Speidell, 2011), and in general, transaction costs in frontier markets are three times higher than in the United States. Notwithstanding the high transaction costs, investors can benefit from investing in frontier markets. Marshall, Nguyen, and Visaltanachoti (2011) find that including frontier market equities in value- and equal-weighted international portfolios can yield higher Sharpe ratios. Frontier markets, therefore, appear better suited as a diversifying asset than emerging markets, as the diversification benefits of the latter could vanish once transaction costs are accounted for (De Roon, Nijman, and Werker, 2001).

In addition to transaction costs, there are other risks involved in frontier markets investments (Shoenholz, 2010; Speidell, 2011). Regulatory and trading/execution risk arises from ownership restrictions, domestic registration requirements, custody rules and the need to use domestic brokers. Foreign exchange risk is ever present as some of the frontier countries are very volatile, global custodians may require sizable foreign exchange conversion charges, and the ever-present possibility that capital controls could be imposed. Investors also have to deal with settlement systems more prone to errors, weak corporate governance standards, and political instability. Despite these obstacles, the case for investing in frontier markets remains valid. The next section analyzes in detail the frontier market allocation in global equity portfolios from a risk parity approach.

II. Risk Parity Asset Allocation to Frontier Markets

A. Risk Parity Portfolios

The role of frontier equity markets in a world equity portfolio is discussed in the context of a particular risk-based strategy, risk parity, which equalizes risk contribution across different equity classes.\(^5\) In other words, risk parity involves assigning the same risk budget to each

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\(^5\) Risk-based strategies only require forecasting the variance-covariance matrix of returns and avoid the need to forecast expected returns. In addition to risk parity, risk-based strategies include minimum variance portfolio theory and maximum diversification. Minimum variance portfolios tend to deliver corner solutions (Black and Litterman, 1992; Litterman and Quantitative Resources Group, 2002; and Meucci, 2009) while maximum diversification is not as robust as risk parity to changes in correlation estimates.
asset in the portfolio, where the only driving risk factor is the comovement between the asset’s return and the return on the portfolio.\(^6\)

The choice of risk parity is guided by the fact that is less sensitive to correlation estimates, especially when the number of assets in the portfolio is small (Alvarez et al, 2011). Risk parity is also supported empirically by the observation that high beta, high volatility stocks underperform low beta, low volatility stocks, and observation referred to as the low volatility anomaly.\(^7\) Finally, it can be shown that risk parity, while allowing investors to reach their desired risk targets using leverage, is the preferred strategy when investors exhibit leverage aversion.\(^8\)

In a risk parity strategy, the weights of the different assets are determined in such a way that they contribute equally from a risk perspective. In the narrow definition of risk budgeting, following Alvarez et al (2011), in a portfolio \(P\), the risk contribution, \(CTR\), of asset \(k\) depends on its portfolio weight, \(w\), and its return correlation with the portfolio returns:

\[
CTR_k = w_k \frac{\text{cov}(r_k, r_P)}{\sigma_P}.
\]

Risk parity requires equalizing the risk contribution across all assets in the portfolio:

\[
CTR_k = CTR_j, \ j \neq k, \ j, k = 1, \ldots, N
\]

where \(N\) is the number of assets in the portfolio. Given the return variance-covariance matrix, Maillard, Roncalli and Teiletche (2010) showed that the asset weights in the risk parity portfolio in a long-only portfolio can be calculated as the solution to the problem:

\[
\text{argmin}_{w_k, k=1, N} \sum_{j=1}^{N} \sum_{k=1}^{N} \left(CTR_j - CTR_k\right)^2,
\]

subject to the long-only constraint \(\sum_{j=1}^{N} w_j = 1, \ w_j > 0 \ \forall \ j\). Alvarez et al (2011) describe how the portfolio allocation problem can be extended to alpha risk-parity strategies that factor in the investor’s priors on expected returns for each asset class: problem (3) is solved replacing the risk contribution per unit of expected return, or alpha, for the absolute risk contributions in equation (3).

\(^6\) For textbook treatments of risk budgeting, see Pearson (2002) and Scherer (2002).

\(^7\) As noted in Alvarez et al (2011). For recent references on the low volatility anomaly, see Baker, Bradley and Wurgler (2011), and Frazzini and Pedersen (2010).

\(^8\) Frazzini and Pedersen (2010), and Asness, Frazzini and Pedersen (2011).
B. Data and Results

The asset allocation exercise assumed that the global equity portfolio comprises five major equity classes: U.S. equities, European equities, including U.K. equities, East Asia Far East equities, emerging market equities, and frontier market equities. For the period June 26, 2002 to November 29, 2011, weekly equity returns in US dollars were constructed for each equity class using the corresponding Morgan Stanley Capital Indices (MSCI). The analysis below, therefore, is relevant for global equity portfolios denominated in US dollars.

Portfolio weights

The global equity portfolio was constructed by weighting the returns of each equity class by its market capitalization. Figure 3 shows how the weights of each equity class would have evolved in market cap-weighted portfolio, where market capitalization data for frontier markets only start in mid-2008.

In the market cap-weighted portfolio, the frontier market allocation never exceeds 2 percent of the portfolio. From 2007 onwards, the U.S. equity allocation is about 40 percent of the portfolio, down from 50 percent in 2002. The decline in the U.S. equity allocation has been matched by in increased allocation to emerging markets equity, which rallied strongly from 2002 to early 2008, just prior to the start of the global financial crisis (see Figure 1).

The results remain essentially the same if the MSCI All World Equity Index is set as the global equity portfolio.
European and Far East Asia allocations have remained relatively flat during the sample period.

The calculation of the weights in the risk-parity strategy required estimates of the variance-covariance matrix. Rather than relying on forecasts, the matrix was calculated using the standard but backward looking approach of using past observations over a 5-year rolling window.

Under risk parity, the asset allocation departs substantially from that suggested by market capitalization weights (Figure 4). Prior to the global crisis, a risk parity equity portfolio would allocate about 70 percent of assets under management to frontier markets compared with only 2 percent in the market cap-weighted portfolio. Europe and the United States would be allocated 10 percent each with the remainder distributed equally between East Asia and Far East and emerging markets. The pre-crisis allocation reflects the low volatility of frontier market returns during this period.

Because crises tend to have a higher impact on stock return volatility in markets outside the core developed markets, the risk parity portfolio allocation is less stable than a market-cap weighted portfolio allocation (Figure 4 and Table 1). From 2007 to 2011, the frontier market allocation declines to about 40 percent from 70 percent while the allocation to East Asia and Far East climbs to about 20 percent from 6 percent. The allocation to US equities rises to about 17 percent from 10 percent. Emerging markets and European equities are allocated about 13 percent each, up from 7 percent and 8 percent respectively.
Table 1 shows that while the market cap-weights remain little changed since 2008, the risk parity weights change substantially in the aftermath of the 2008 global financial crisis. The weight changes are explained by the impact of the crisis on the equity return correlations, especially between frontier markets and the global equity portfolio, and the jump in equity return volatility, which affected mainly frontier and emerging markets. The latter two markets are generally regarded as riskier equity markets and tend to underperform during flight-to-safety episodes as investors reduce their exposure. Because frontier and emerging markets are less deep and liquid relative to developed equity markets, equity prices and returns respond more strongly to selling and trading pressures.

<table>
<thead>
<tr>
<th>Year</th>
<th>Risk parity</th>
<th>Frontier markets</th>
<th>United States</th>
<th>East Asia and Far East</th>
<th>Emerging markets</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2007</td>
<td>68.9</td>
<td>10.0</td>
<td>6.3</td>
<td>6.7</td>
<td>8.1</td>
<td></td>
</tr>
<tr>
<td>December 2007</td>
<td>67.9</td>
<td>n.a.</td>
<td>10.8</td>
<td>6.5</td>
<td>6.3</td>
<td>8.6</td>
</tr>
<tr>
<td>June 2008</td>
<td>74.3</td>
<td>8.6</td>
<td>5.3</td>
<td>5.0</td>
<td>6.8</td>
<td></td>
</tr>
<tr>
<td>December 2008</td>
<td>45.5</td>
<td>n.a.</td>
<td>16.0</td>
<td>15.4</td>
<td>10.8</td>
<td>12.3</td>
</tr>
<tr>
<td>June 2009</td>
<td>40.1</td>
<td>16.9</td>
<td>17.8</td>
<td>12.1</td>
<td>13.0</td>
<td></td>
</tr>
<tr>
<td>December 2009</td>
<td>38.7</td>
<td>17.2</td>
<td>18.5</td>
<td>12.5</td>
<td>13.2</td>
<td></td>
</tr>
<tr>
<td>June 2010</td>
<td>38.1</td>
<td>17.2</td>
<td>19.0</td>
<td>12.5</td>
<td>13.1</td>
<td></td>
</tr>
<tr>
<td>December 2010</td>
<td>37.5</td>
<td>17.1</td>
<td>19.5</td>
<td>12.7</td>
<td>13.1</td>
<td></td>
</tr>
<tr>
<td>June 2011</td>
<td>36.5</td>
<td>17.1</td>
<td>20.1</td>
<td>13.1</td>
<td>13.2</td>
<td></td>
</tr>
<tr>
<td>November 2011</td>
<td>36.9</td>
<td>16.7</td>
<td>20.5</td>
<td>12.9</td>
<td>12.9</td>
<td></td>
</tr>
</tbody>
</table>

Source: MSCI and author’s calculations.

**Investment performance**

Since equity prices in frontier markets can be subject to large swings, especially when investor sentiment deteriorates rapidly, it is necessary to evaluate whether they could effectively contribute to improve the performance of a global equity portfolio. This section first analyzes the performance of frontier markets in isolation and then within a global equity portfolio.

**Individual market performance**

The individual performance of equity markets is reported in Table 2. From July 2002 to November 2011 emerging equity markets outperformed other markets, posting a mean annualized return of 12.3 percent (0.22 percent weekly return) and a Sharpe ratio of 0.06
Frontier markets were the second best performing, with a mean annualized return of 6.3 percent (0.12 percent weekly return) and a Sharpe ratio of 0.05, slightly below emerging markets. Developed equity markets lagged behind other markets, with the U.S. (3.1 percent annualized return, 0.02 Sharpe ratio) outperforming Europe (2.3 percent annualized return, 0.01 Sharpe ratio) and East Asia and Far East (1.1 percent annualized return, 0.01 Sharpe ratio).

The strong performance of frontier markets over the sample is mainly driven by the high returns observed prior to the 2008 global crisis. Frontier markets were the best performing asset class from the perspective of absolute returns, 22 percent on an annualized basis, and risk-adjusted returns, with a Sharpe ratio of 0.22. While emerging markets also posted impressive gains in line with those of frontier markets, the gains came at the expense of higher volatility, as reflected in a lower Sharpe ratio.

The strong performance of frontier markets was reversed during the 2008 crisis and its aftermath. Weekly equity returns in frontier markets fell, on average, 18.4 percent on an annualized basis, almost twice as much as the next worst performing equity market, the United States. Frontier markets also underperformed from a risk-adjusted perspective, with a negative Sharpe ratio one order of magnitude above those in other markets. Notably, emerging markets ended this period flat on strong inflows driven by expectations of growth decoupling from mature economies up to the worsening of the debt crisis in peripheral Europe in early 2010.

We can conclude that, on a stand-alone basis, frontier equity markets are characterized by low correlation with other equity markets during quiet and upswing periods, and by a substantial increase in correlation during global correction periods.
Portfolio performance

Notwithstanding the jump in correlation after the 2008 global crisis, frontier markets could still offer diversification benefits since they remain the less correlated among all equity markets. While economic arguments suggest frontier markets should become more integrated over time, so far this has not been the case, as found by Berger, Pukthuanthong and Yang (2011). Moreover, Marshall, Nguyen, and Visaltanachoti (2011) show that including frontier market equities lead to higher Sharpe ratios in global equity portfolios.

This section does not repeat or update the results reported by Berger et al (2011) and Marshall et al (2011). Instead, it compares the performance of global equity portfolios, which include frontier markets, under two different weighting schemes: market capitalization weights and risk parity weights.

The comparison covers the period June 2007 – November 2011 as market capitalization data for frontier markets are available only since mid-2007. Two different rebalancing strategies are considered. The first scheme assumes that the portfolio is rebalanced at the end of each week, while the second strategy assumes that the portfolio is rebalanced only at the end of the year. Table 3, and figures 5 and 6 summarize the performance of the market cap-weighted and risk parity based portfolios under weekly and annual rebalancing respectively.

Table 3. Weekly equity returns of global equity portfolios: mean, standard deviation, and Sharpe ratio

<table>
<thead>
<tr>
<th>Rebalancing period:</th>
<th>Risk parity portfolio</th>
<th>Market cap-weighted portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weekly</td>
<td>Annual</td>
</tr>
<tr>
<td></td>
<td>Weekly</td>
<td>Annual</td>
</tr>
<tr>
<td>Mean, in percent</td>
<td>-0.18</td>
<td>-22.12</td>
</tr>
<tr>
<td>Standard deviation, in percent</td>
<td>2.76</td>
<td>266.89</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>-0.07</td>
<td>-0.08</td>
</tr>
<tr>
<td>A: All sample, June 2007 to November 2011</td>
<td>-16.72</td>
<td>351.50</td>
</tr>
<tr>
<td>Mean, in percent</td>
<td>-0.18</td>
<td>-10.39</td>
</tr>
<tr>
<td>Standard deviation, in percent</td>
<td>1.63</td>
<td>137.27</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>-0.11</td>
<td>-0.08</td>
</tr>
<tr>
<td>B: Pre-2008 crisis period, July 2002 to August 2008</td>
<td>-27.00</td>
<td>219.86</td>
</tr>
<tr>
<td>Mean, in percent</td>
<td>-0.19</td>
<td>-26.33</td>
</tr>
<tr>
<td>Standard deviation, in percent</td>
<td>3.08</td>
<td>300.31</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>-0.06</td>
<td>-0.09</td>
</tr>
<tr>
<td>Mean, in percent</td>
<td>-0.06</td>
<td>-0.03</td>
</tr>
<tr>
<td>Standard deviation, in percent</td>
<td>-0.06</td>
<td>-0.03</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>-0.06</td>
<td>-0.03</td>
</tr>
</tbody>
</table>

Source: MSCI and author’s calculations.
During the run-up to the crisis, risk parity portfolios outperform market cap-weighted portfolios by 9 bps, if rebalanced weekly, and by 16 bps, if rebalanced annually. Under annual rebalancing, the risk parity portfolio has a better Sharpe ratio, -0.08 vs. -0.12. The analysis of the pre-crisis period, which covers June 2007-August 2008 due to data limitations, together with the evidence presented above (Figure 1; Table 1; and Table 2, panel B) suggest that the risk parity portfolio could have easily outperformed a market cap-weighted portfolio during the June 2002 – August 2008 period.
During the 2008 global financial crisis and its aftermath, the debt crisis in peripheral Europe, the tables are turned and risk parity portfolios underperform market-cap weighted portfolios by 6 bps, if rebalanced weekly, and by 14 bps, if rebalanced annually (Table 3, panel C). Nevertheless, by end-November 2011, there are no substantial differences in the values of the risk parity and market cap-weighted portfolios (Figures 5 and 6).

III. LESSONS FOR INVESTORS

The analysis herein holds some important lessons for global equity investors. Frontier equity markets exhibit low correlation with other equity markets, including emerging markets, which could help diversify global equity portfolios, as noted in the recent empirical studies briefly reviewed here.

More importantly, an asset allocation strategy based on risk parity shows that deviating from a market capitalization allocation strategy by overweighting frontier markets could help portfolios to outperform when global equity prices are rising. Notably, the outperformance is not achieved at the expense of larger losses during downturns relative to market cap-weighted benchmarks. This claim is supported by the performance of frontier markets during the 2008 global financial crisis, and more recently, the ongoing debt crisis in peripheral Europe.

For long-only global equity portfolios with large assets under management, one practical problem for implementing a risk parity allocation strategy is that small market capitalization of frontier markets could not accommodate the required allocation. In addition, many long-only portfolios are managed relatively to a benchmark, restricting the scope for risk parity allocations that could differ substantially from market capitalization weights. Even under these constraints, portfolio managers could increase their chances to beat their benchmarks without increasing the downside risk of the portfolio by overweighting modestly their frontier market allocations.

References


