Frontier Markets – A source of diversification

January 2019

In our paper "Frontier Markets – A unique asset class" we analysed Frontier Markets' main features in terms of risk, return and correlation compared to Developed and Emerging Markets. We highlighted that this group of countries has their own characteristics that, along with their low level of market development, make them to be considered a unique asset class very different from Developed and Emerging Markets. In this study our aim is to analyse the role that this asset class may play in portfolio construction.

Theoretical framework

H. M. Markowitz is called the father of the modern portfolio theory. However A.D. Roy also developed similar ideas at the same time period. There are two main differences between these two papers published in 1952. The first is that Roy recommended a specific portfolio for investors, while Markowitz made it possible for investors to choose the portfolio that was most desired depending on risk and return along the efficient frontier. Secondly Roy allowed both positive and negative investments in securities while Markowitz only allowed positive investments.

An investor should see expected return as desirable while variance of return should be seen as undesirable. The investor has a choice of different combinations of expected returns and variance for the portfolio he wishes to create. He should seek to maximise the expected return for the level of variance he is willing to take on in the form of risk, or minimise the variance for the level of expected return he is seeking. This would lead to the construction of an efficient portfolio. The various efficient portfolios together form the efficient frontier. A rational investor should pick one of these portfolios, choosing the mix of assets in order to obtain a well-diversified portfolio.

Sharpe (1964) created the first market equilibrium theory of asset prices that took risk into consideration: it was named the Capital Asset Pricing Model (CAPM). He explained that a rational investor should choose any desired point along a capital market line. The investor can only obtain a higher expected rate of return by increasing the risk, which is shown in the CAPM (Sharpe 1964).

Goetzmann, Li and Rouwenhorst (2005) studied the long-term correlation of global equity markets between 1850 and 2000. They stated that when an investor increases the number of securities in a portfolio the variance of the portfolio will drop rapidly. The larger the number of securities in the portfolio the lower the marginal diversification benefits. They studied the correlation across markets to determine the diversification benefits from investing in different international markets instead of in a single domestic market. Goetzmann, Li and Rouwenhorst pointed out two main factors of benefits of the international diversification: the average covariance or correlation between markets and the number of available markets that an investor faces. A low covariance between markets, as well as a large amount of markets that are available to invest in, will create more possibilities for the investor to lower his portfolio's variance.

Empirical research method

The purpose of this study is to examine the benefits of investing in Frontier Markets. Equity risk premia and correlations will be measured for Developed, Emerging and Frontier Markets. Equity risk premium gives the investor an indication of what he can expect in return when investing in a market while the correlation can be used to diversify an investment portfolio to decrease the risk. We use the historical series of MSCI Indices for Developed, Emerging and Frontier Markets from 31 May 2002 (first date of calculation of the Frontier Markets index) to 31 December 2018. In this study, using a long data series of monthly observations instead of annual, gives the results a higher degree of confidence in the estimate. The more years that are used, the more likely that the variable correlations are accurate. In this way temporary trends due to downturns or upturns are avoided. In this study US 3-month Treasury bills (source Bloomberg) is used as Risk-free rate since the US was considered one of the most credit trustworthy governments in the world.

In this period US Treasury Bills have an annualised return of 0.89% with an annualised standard deviation 0.32%.

Empirical results and analysis

As a first step we calculated returns and standard deviation for Developed, Emerging and Frontier Markets from May 2002 to December 2018.

Exhibit 1: Annualised Returns and Standard Deviation of MSCI Emerging Markets (EM), MSCI Developed Markets (DM), MSCI Frontier Markets (FM) Indices and US Treasury Bills 3-Months (RF)

	Ann. Return	Ann. Std Dev
DM	6.16%	14.87%
EM	8.95%	21.31%
FM	7.24%	17.99%
RF	0.89%	0.32%

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Analysing the historical figures we noticed that the annualised return for Developed Markets is 6.16% with a standard deviation of 14.87% while in the Emerging Markets is 8.95% with a standard deviation of 21.31%. This is in line with theoretical assumption that return and risk are inversely proportional to development of the market (less development higher return but also more risk). This is not true for Frontier Markets whose figures for return and standard deviation sit between Developed and Emerging Markets. The explanation for this is that Frontier Markets have low and in some cases negative correlation among themselves.

Looking at historical correlations between Markets we found out that correlations between Developed Markets and Emerging Markets was rather high (0.86) but both were less correlated to Frontier Markets (both around 0.60).

Exhibit 2: Correlation of MSCI Emerging Markets (EM), MSCI Developed Markets (DM) and MSCI Frontier Markets (FM) Indices from May 2002 and December 2018

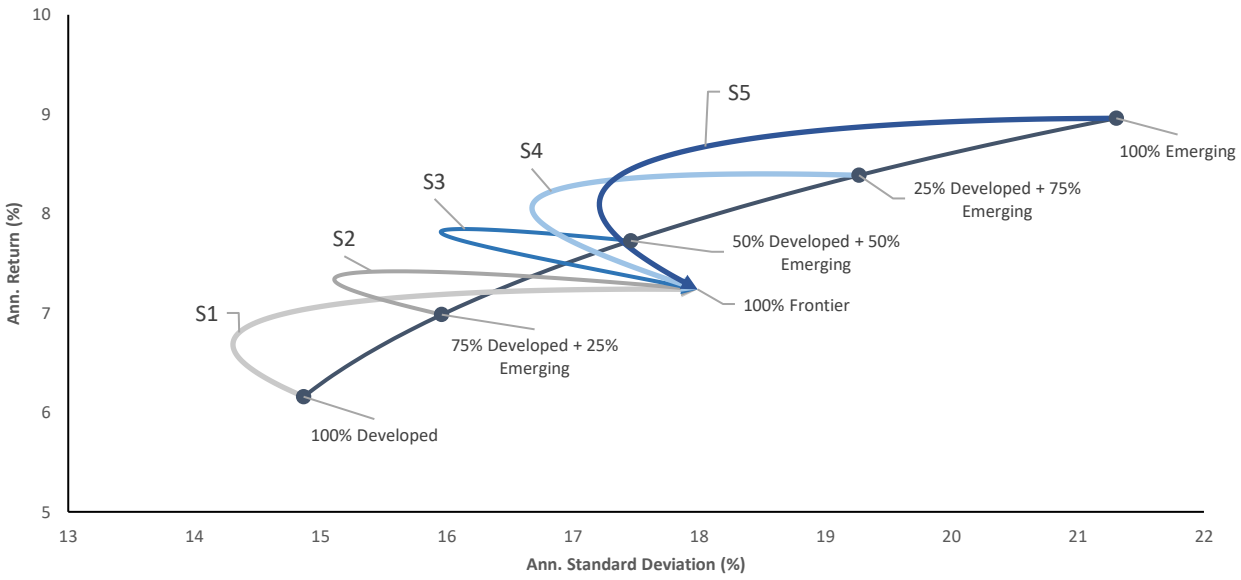
	Correlation
DM vs EM	0.8594
EM vs FM	0.6005
DM vs FM	0.6012

The results indicate that there is a difference in correlation between markets with different levels of market development: the larger the gap, the weaker the correlation. Therefore investors in both Developed and Emerging Markets can obtain diversification benefits by investing in Frontier Markets.

We started from the efficient frontier for an equity portfolio composed by Developed and Emerging Markets. To see how the risk-return profile and the efficient frontier change when Frontier Markets are added, we performed five simulations based on data from May 2002 to December 2018. We built the efficient frontier for five initial portfolios with a different mix of Developed and Emerging Markets adding Frontier Markets and leaving unchanged the ratio between Developed and Emerging. The five initial portfolios composed by Developed and Emerging markets are: 100% Developed (S1), 75% Developed and 25% Emerging (S2), 50% Developed and 50% Emerging (S3), 25% Developed and 75% Emerging (S4), 100% Emerging (S5).

Exhibit 3 shows the figures of the simulations along with the weight of each asset class that maximised the Sharpe ratio[1].

Exhibit 3: Simulations



[1] The Sharpe ratio is equal to (Rm – Rf)/SDm where Rm and SDm is the return and standard deviation of the portfolio m while Rf is the risk free rate (in this study the return of Treasury Bills

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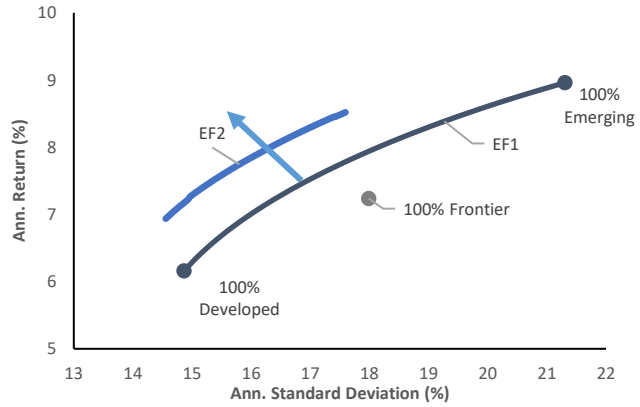
	Starting Ann. Return	Starting Ann. Std Dev	Starting Sharpe ratio	Ann. Return optimised portfolio	Ann. Std Dev. opt portfolio	Sharpe Ratio opt. portfolio	Developed Weight opt. portfolio	Emerging Weight opt. portfolio	Frontier Weight opt. portfolio
S1	6.16%	14.87%	0.355	6.94%	14.55%	0.416	55%	0%	45%
S2	6.98%	15.96%	0.382	7.37%	15.13%	0.428	45%	15%	40%
S3	7.73%	17.46%	0.392	7.83%	15.98%	0.435	30%	30%	40%
S4	8.39%	19.27%	0.389	8.22%	16.83%	0.436	14%	41%	45%
S5	8.96%	21.31%	0.379	8.52%	17.59%	0.434	0%	50%	50%

Performing the same simulations for all portfolios composed of Developed and Emerging Markets and choosing the portfolios on each position along the efficient frontier with Frontier Markets that maximise the Sharpe Ratio, it is possible to draw the efficient frontier of a global equity portfolio that includes Frontier Markets.

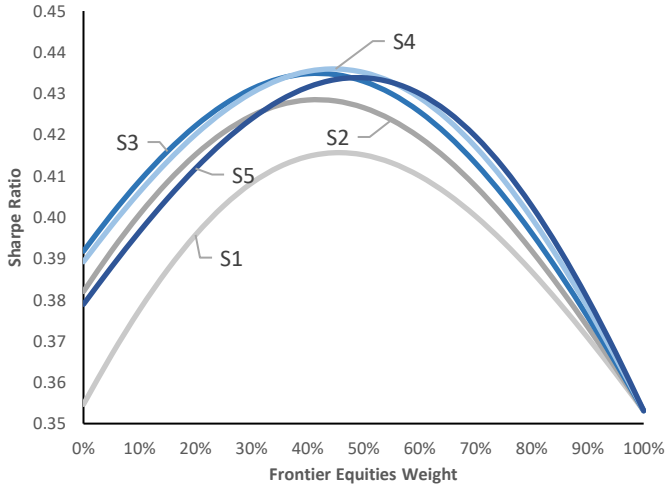
Exhibit 4: Efficient frontier from May 2002 and December 2018 EF1 is the efficient frontier combining only Developed and Emerging Markets, EF2 is the efficient frontier including Frontier Markets



This leads to the conclusion that including Frontier Markets allows to build more efficient portfolios. The benefit of creating a global diversified portfolio is the improvement of the overall risk-return profile. This is shown in Exhibit 4 by the blue arrow: adding Frontier Markets shifts the efficient frontier in a positive direction upwards to the left. The interpretation is that diversification benefits can be obtained by including markets of various stages of development.

Other evidence from our study is that from a theoretical point of view, the Frontier Markets' weight in the efficient frontier (EF2) is between 40% and 50% for all portfolios. This highlights the fact that weighting the asset classes by their capitalisation is not enough to capture the return and diversification benefits. In fact the capitalisation weight in MSCI ACWI+Frontier is 0.30% being very far from an optimal weight. We are aware that a weight of 40%-50% it is not feasible for all investors, but a weight of 10%-20% is already enough to capture the diversification benefits. Exhibit 5 shows the change in the Sharpe ratio adding more Frontier Markets to the starting portfolios S1, S2, S3, S4 and S5.

Exhibit 5: Sharpe ratio in simulations



Conclusion

Based on a CAPM theoretical framework, this study found evidence that the market development level has an effect on the correlation between markets. The results suggest that Developed Markets have a strong correlation to Emerging Markets but not to Frontier Markets. Therefore it might not be efficient for a Developed Markets investor to solely diversify between Developed and Emerging markets. The difference in correlation between markets of different stages of development suggests that greater diversification benefits can be obtain in less developed markets. When Frontier Markets are included in a global equity portfolio the efficient frontier shifts upwards to the left, therefore Frontier Markets should be included in a portfolio to improve the overall portfolio's risk-return profile.

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