Moving the Needle
The Optimization Opportunity with Frontier Markets
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E motion is a bad guide to asset allocation. Behavioral finance research has shown that many investors overpay for growth, react inefficiently to change, overestimate their forecasting abilities, hold losers too long and sell winners. Over time financial markets have become more efficient as the extremes of some investors' irrational exuberance have been arbitraged away. Yet markets will never become entirely rational because investors remain human.

While rational yardsticks are imperfect, we believe there are some that can help us develop insights that will gain an edge. At the overall global portfolio level, a helpful yardstick can be portfolio optimization which combines expected returns with correlation and volatility. This creates a boomerang shaped efficient frontier, where we can solve for our personal appetites by adding our own dish shaped utility function.

"Work is like the color black, mixed with anything it turns to black"

– Lynda Obst,
"Hello, He Lied", 1996

In this paper, we consider the merits of including frontier markets in a developing country portfolio composed mainly of emerging market stocks. This exercise may be still-born if the total portfolio size is so large relative to frontier market liquidity that it is impossible to "move the needle" - or make much difference in the overall result.

Our opening quote makes a case that work mixed with anything flavors the result. The same is true when a few grains of salt are added to a glass of water. In asset allocation, even small amounts of a diversifying asset can have an important influence on the results Before considering the impact of frontier markets in a portfolio mix, let's look at the reality of frontier market liquidity and its capacity for potential investment.

Capacity

We have tracked the 90-day average of daily trading volume data from Bloomberg across a universe of more than 1,000 frontier market stocks. Our sample universe does not include the entire frontier opportunity set, because it does not include all stocks in every country or the stocks of companies in other countries that have a significant presence in the frontier. Also, the universe continues to grow through new offerings.

Finally, we have found that Bloomberg data understate actual potential liquidity, because local frontier brokers can tap larger buyers and sellers when they receive orders bigger than the typical daily retail tickets. The data in table 1 show that frontier stocks have a total market capitalization of more than $700 billion and average daily trading volume of more than $650 million.

Table 1 – Frontier Market Trading Volume

$ Millions	# Stocks	Market Cap	Avg. Daily Vol
Africa	235	$154,713	$36
Asia	378	$241,164	$262
E. Europe	203	$80,296	$31
Lat Am	65	$146,309	$233
Mid-East	107	$69,456	$44
GCC	75	$30,134	$66
Total	1,063	$722,071	$672

Table 2 – Frontier Market Trading Volume by Country

	$ Milions	# Stocks	Market Cap	Avg Daily Vol		$ Milions	# Stocks	Market Cap	Avg Daily Vol
Africa	BENIN	1	$222	$0.02	E Europe	BULGARIA	19	$1,939	$0.30
Africa	BOTSWANA	13	$3,088	$0.86	E Europe	CROATIA	30	$23,689	$1.14
Africa	BURKINA FASO	1	$261	$0.02	E Europe	CYPRUS	14	$7,674	$6.82
Africa	GABON	1	$831	$0.14	E Europe	ESTONIA	12	$2,574	$0.58
Africa	GHANA	15	$1,894	$0.20	E Europe	LATVIA	10	$932	$0.10
Africa	IVORY COAST	13	$2,109	$0.29	E Europe	LITHUANIA	19	$1,032	$0.42
Africa	KENYA	31	$21,177	$6.18	E Europe	MACEDONIA	4	$535	$0.11
Africa	MALAWI	7	$379	$0.03	E Europe	MALTA	7	$3,179	$6.49
Africa	MAURITIUS	17	$5,332	$1.50	E Europe	Montenegro	5	$300	$0.12
Africa	MOROCCO	29	$57,904	$10.86	E Europe	ROMANIA	29	$22,245	$10.40
Africa	MOZAMBIQUE	3	$407	$0.01	E Europe	Serbia	7	$2,113	$0.06
Africa	NAMIBIA	9	$2,218	$0.35	E Europe	SLOVAKIA	6	$4,612	$0.01
Africa	NIGERIA	51	$34,221	$10.28	E Europe	SLOVENIA	12	$5,305	$0.88
Africa	RWANDA	3	$412	$0.03	E Europe	UKRAINE	29	$4,167	$3.65
Africa	SENEGAL	2	$3,994	$0.56	Lat Am	ARGENTINA	31	$123,272	$197.23
Africa	TANZANIA	8	$3,495	$1.22	Lat Am	COSTA RICA	2	$1,558	$0.25
Africa	TOGO	2	$1,874	$0.12	Lat Am	ECUADOR	1	$127	$0.00
Africa	UGANDA	5	$786	$0.06	Lat Am	JAMAICA	15	$5,858	$1.05
Africa	Zambia	9	$928	$0.13	Lat Am	PANAMA	4	$5,551	$29.69
Africa	ZIMBABWE	15	$13,181	$2.98	Lat Am	TRINIDAD AND T	10	$5,686	$0.18
Asia	CAMBODIA	1	$3,057	$3.31	Lat Am	URUGUAY	2	$4,256	$5.04
Asia	GEORGIA	7	$3,167	$3.24	Mid East	EGYPT	29	$24,204	$21.47
Asia	PAPUA N.GUINEA	3	$176	$0.07	Mid East	IRAQ	4	$404	$0.27
Asia	BANGLADESH	93	$37,060	$58.70	Mid East	JORDAN	28	$20,346	$18.26
Asia	KAZAKHSTAN	16	$25,084	$5.27	Mid East	LEBANON	10	$15,626	$2.01
Asia	LAOS	4	$1,303	$0.84	Mid East	PALESTINE	5	$1,419	$0.86
Asia	MONGOLIA	4	$556	$0.54	Mid East	TUNISIA	31	$7,458	$0.98
Asia	PAKISTAN	119	$73,171	$83.73	GCC	BAHRAIN	8	$10,211	$5.35
Asia	SRI LANKA	43	$12,802	$3.98	GCC	KUWAIT	46	$6,062	$56.72
Asia	VIETNAM	88	$84,787	$102.52	GCC	OMAN	21	$13,861	$3.87
						Total	1,063	$722,071	$672.32

Table 2 shows the same data across sixty of the frontier countries, where trading volume ranges from nearly $200 million a day in Argentina to only a few hundred thousand in Ghana and Iraq down to only a few thousand in Malawi. We can do several extrapolations from these data, starting with some guidelines for capacity at individual money management firms. AXA Rosenberg refers to a rule of thumb that "capacity is 1% of market size", which would imply that the maximum size for a money manager in the frontier would be $7 billion.

However, they were referring to more liquid developed markets where turnover is higher than in the frontier and where a greater percentage of market capitalization is floating.

Another approach is to consider a single money manager owning ten days trading volume of 10% of the names in the universe. This would mean owning roughly 106 stocks with $67 million average daily volume. Positions equal to ten days of volume would give the firm capacity of $670 million AUM.

At the plan sponsor level, several organizations are deploying significant assets in the frontier by using a team approach across three or more managers. Given that some estimates of the frontier universe size are as many as 2,500 stocks, more than double ours, we believe that an institutional investor using a multi-manager strategy could deploy a $1 billion or more in frontier equities.

Optimization Inputs

Turning to frontier asset allocation, we examine developing market asset-mix options that combine frontier market and emerging market investment portfolios using a simple two asset optimizer built in Excel. For our inputs, we make estimates of the standard deviations and returns of each plus the correlation between them.

Standard deviations can be estimated based on the historical standard deviations of the indexes, shown in exhibit 1.

Our naïve forecasts are simply the latest 36-month standard deviations: 15.7% for emerging markets and 10.5% for frontier markets.

The low standard deviation of frontier may seem surprising, given that it is close to the U.S. standard deviation of 10.2%. This is the result of the low cross-correlation of frontier markets compared with emerging and developed markets, shown in exhibit 2. Because individual frontier markets are relatively independent of one another, the

Exhibit 1
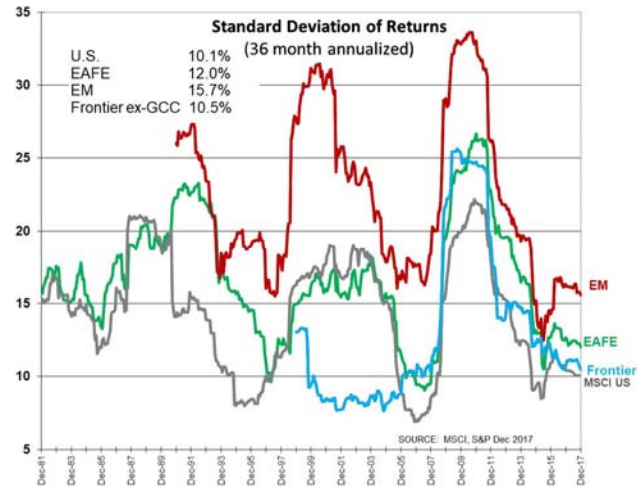**Standard Deviation of Indexes over Rolling 36-month Periods**

Exhibit 2
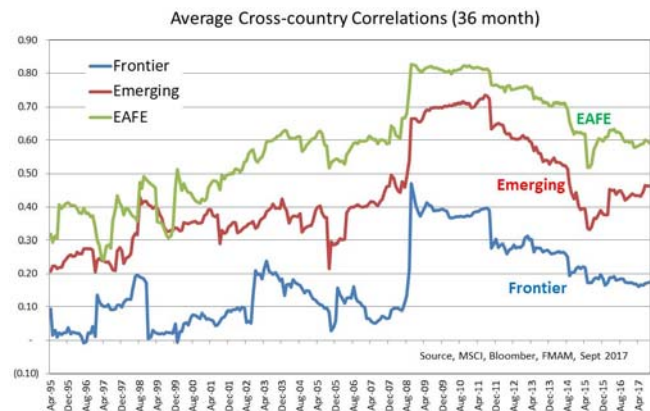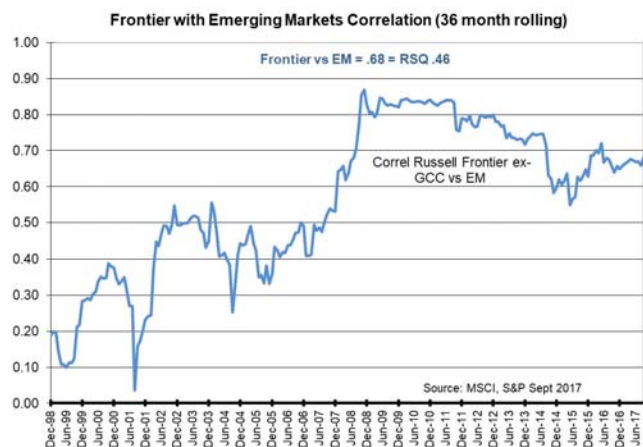**Average Cross-country Correlations (36 month)**

Exhibit 3
Correlation of Frontier with Emerging Markets

overall volatility of an index or portfolio combining them is low.

Exhibit 3 shows the historical rolling correlation of the Russell Frontier ex-GCC Index with MSCI Emerging Markets, and in our optimizations, we use the latest 36-month correlation of 0.68.

The final piece of the optimization puzzle is expected returns, which are hard to estimate. With this in mind, we decided to use an 8.1% expected return for emerging markets, which was the nominal long term expected return being used by two large institutional investment plans in the fall of 2017. From an asset mix perspective, however, the most important question is the return differential between the two assets. We have used different inputs for expected returns and standard deviations in the following examples.

Optimization Results
For our first optimization example, Case 1 in exhibit 4, we have used the 8.1% emerging market return estimate mentioned above with the actual recent 15.7% standard deviation of the emerging market index. For frontier, however, we used a low return estimate of 2.7% and a high standard deviation estimate of 14.2% (versus the recent level of 10.5%)

The reason is that we wanted to show an efficient frontier curve (A) in exhibit 4 with a classic textbook boomerang shape. This frontier is the outer boundary of possible portfolios that trade off risk and return. The minimum variance is a point B, which would be achieved with an allocation of 35% in emerging markets and 65% in frontier markets. Also shown are the upward curves of utility functions (C & D) that represent greater or lesser risk aversion. An investor with high aversion to risk wants much greater returns for each percent increase in standard deviation.

In practice, the optimal asset allocation point on the efficient frontier is the intersection of the investor's utility function with the efficient frontier, shown by point E. In Case 1, the slope of the two curves at this point turns out to be 1.1, which we call the "lambda". Given the assumptions in this example, this point would be achieved with an 85% allocation to emerging markets and 15% to frontier. A lambda of 1.1 means that our risk tolerance is such that we would demand a 1.1% increase in return for another 1% increase in risk, or standard deviation.
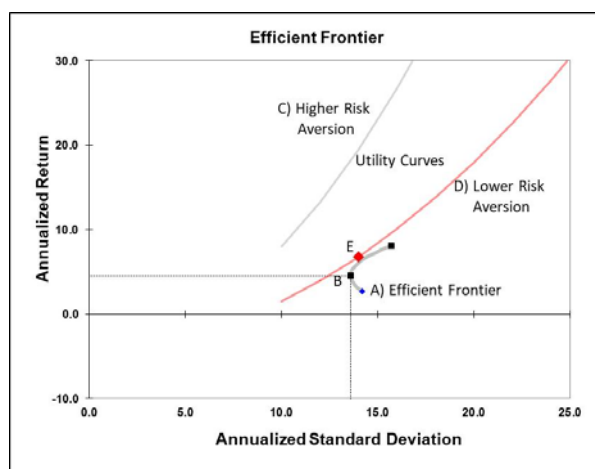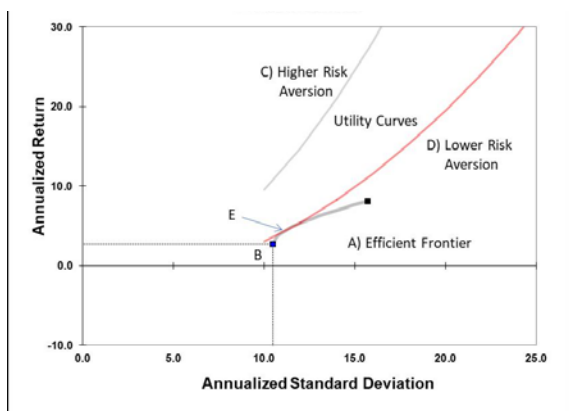

Exhibit 4 – Efficient Frontier – Case 1

	Emerging	Frontier
1 Expected Returns	8.1% (Est)	2.7% (Est)
2 Standard Deviations	15.7% (Actual)	14.2% (Est)
3 Correlation	0.68 (Actual)	
4 Optimal Utility (Lambda)=Slope of Return Change/Risk Change Tangent to Efficient Frontier		
Minimum Variance	35% EM	65% Frontier
Lambda = 1.1	85% EM	15% Frontier

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Exhibit 5 – Efficient Frontier – Case 2

	Emerging	Frontier
1 Expected Returns	8.1% (Est)	2.7% (Est)
2 Standard Deviations	15.7% (Actual)	10.5% (Est)
3 Correlation	0.68 (Actual)	
4 Optimal Utility (Lambda)=Slope of Return Change/Risk Change Tangent to Efficient Frontier		
Minimum Variance	35% EM	65% Frontier
Lambda = 1.1	85% EM	15% Frontier

In exhibit 5, Case 2, we hold all our previous assumptions constant except for lowering the standard deviation estimate for frontier markets to the actual level of 10.5% over the 36 months ended December 2017.

As shown in exhibit 5, this change causes a dramatic flattening of the efficient frontier. The minimum variance point now would be achieved by holding 100% in frontier markets. And a risk tolerance lambda of 1.1 would result in allocating 45% to emerging markets and 55% to frontier.

Next, in Case 3, we move the expected return for frontier markets up from 2.7% to 6%, which is still 2.1% lower than the 8.1% expected return for emerging markets.

As shown in exhibit 6, the efficient frontier has flattened further. The minimum variance point is with a 100% allocation to frontier markets and a lambda of 1.1 is achieved with 13% in emerging markets and 87% in frontier markets.

In practice, however, most investors have very low allocations to the frontier - or none at all. Thus, it makes sense to consider the implied risk/return tradeoffs at the extreme right tail of the efficient frontier in Case 3, shown in table 3.
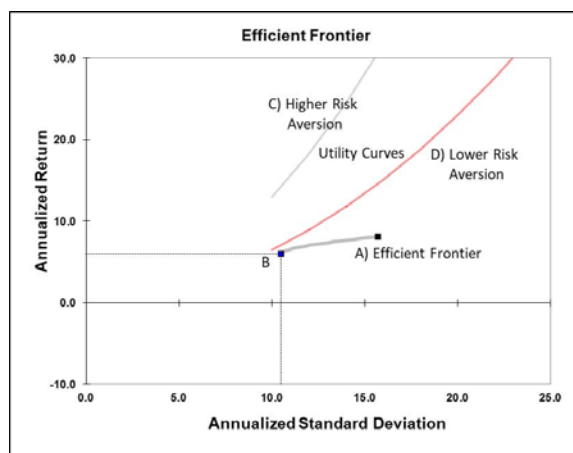

Exhibit 6 – Efficient Frontier – Case 3

	Emerging	Frontier
1 Expected Returns	8.1% (Est)	6.0% (Est)
2 Standard Deviations	15.7% (Actual)	10.5% (Est)
3 Correlation	0.68 (Actual)	
4 Optimal Utility (Lambda)=Slope of Return Change/Risk Change Tangent to Efficient Frontier		
Minimum Variance	35% EM	65% Frontier
Lambda = 1.1	85% EM	15% Frontier

Table 3 – Efficient Frontier Allocations – Case 3

%EM / %FM	Stdev	Return	Stdev Chg	Rtn Chg	Risk/Rtn Slope	Risk/Reward
100/0	15.7%	8.1%				
95/5	15.3%	8.0%	0.42%	0.11%	0.2	4.03x
90/10	14.9%	7.9%	0.41%	0.11%	0.3	3.93x
85/15	14.5%	7.8%	0.40%	0.11%	0.26	3.83x
80/20	14.1%	7.7%	0.39%	0.11%	0.27	3.71x
75/25	13.7%	7.6%	0.38%	0.11%	0.3	3.59x

Table 3 starts with a 100% portfolio weight in emerging markets and considers the impact of reducing this to 95% emerging with 5% in the frontier. This results in a 0.42% reduction in standard deviation for a 0.11% drop in expected return. The lambda is almost flat at 0.2, and the risk/return tradeoff is 4.03x.

Moving down the rows of table 3 illustrates the continuing favorable risk/return tradeoffs for investors who choose 10% to 25% exposure to frontier markets.

A final set of scenarios considers changes in the correlation of frontier with emerging markets. Exhibit 7 shows an enlarged section of the efficient frontier chart, with curves representing correlations of 0.00, 0.68, 0.85 and 1.00. All of these curves use the returns and standard deviations from exhibit 6.

Moving to a correlation of 0.00 flattens the top of the curve and results in an increasingly favorable risk/return tradeoff. With zero correlation, adding 5% frontier to an emerging portfolio would reduce the return by 0.11% while reducing the standard deviation by 0.78% (a risk/return tradeoff of 7.39x).

On the other hand, an increased correlation changes the risk return tradeoff in the other direction. Moving from the current 0.68 correlation to 0.85 changes the risk/return tradeoff of adding 5% frontier from 4.03x to 3.20x. Finally, using the extreme case of a 1.00 correlation, the efficient frontier becomes a straight line from the frontier point (10.5%

standard deviation and 6.0% return) to the emerging market point (15.7% standard deviation and 8.1% return). Along this efficient frontier line, the risk/return tradeoff is consistently 2.48x. In other words, each 5% increment in the frontier weighting would result in an 11-basis point drop in expected return but a 26-basis point drop in risk.

These correlation scenarios illustrate that the case for frontier is not as dependent on correlation as it is on the relative standard deviations of emerging and frontier. We believe that frontier countries are so diverse that they are likely to remain relative uncorrelated among themselves. Accordingly, a diversified portfolio across the frontier should continue to have a low standard deviation relative to emerging markets, and thus an attractive diversification benefit.

Exhibit 7 – Frontiers with Varying Correlation
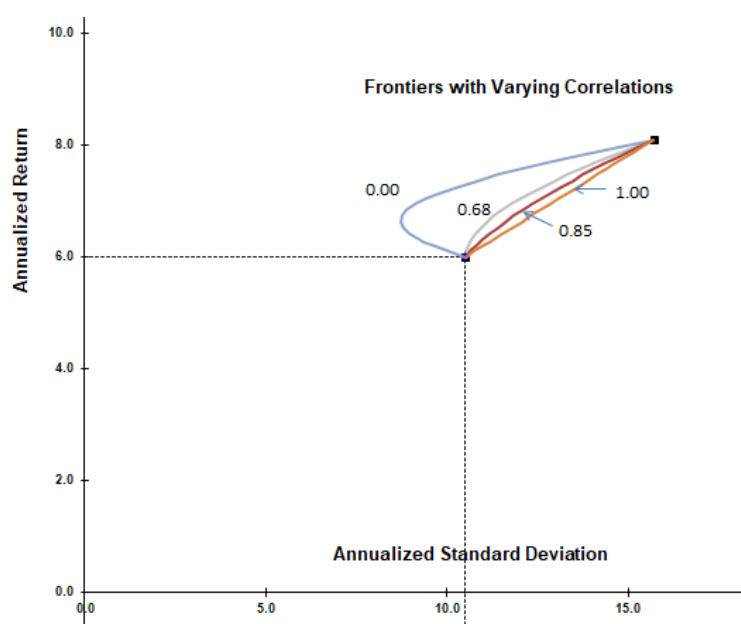
Conclusion

While any optimization solutions need to be taken with a "grain of salt", these do suggest that even small commitments to diversified frontier market portfolios can make a compelling contribution to the risk/return tradeoffs.

Furthermore, the optimization scenarios are based on assumptions which we believe are very conservative for the relative return of frontier versus emerging markets. If one estimates parity of returns for frontier and emerging market, the frontier allocation becomes even more compelling. Furthermore, actively managed frontier portfolios often achieve lower standard deviations than the frontier index, which can add to their attractiveness.

Thus, given that frontier markets are sufficiently liquid for even the largest institutions to make a small commitment, we believe that frontier investing can definitely "move the needle" for investors and that the frontier deserves a place in developing market equity portfolios.

i. *Estimating Capacity for Equity Investment Processes, AXA Rosenberg, 2008*
ii. *"ExmpleOptimizerFrontier.xls" is available on request, Graves & Speidell 1999*
iii. *"The Magic of 'Low-Vol' in Frontier Markets, Frontier Market Asset Management, January 2018*
iv. *Asset Management Forum for Pension Plans, Endowments and Foundations, Elkind Economics, January 2018*

About Frontier Global Partners

Frontier Global Partners manages a focused set of investment solutions covering international, global and frontier market equities, asset allocation and alternative investments. Under the direction of managing partners Lawrence Speidell, CIO, and Horacio Valeiras, CEO, the organization sustains a dynamic investment culture rooted in behavioral finance. The firm's investment strategies reflect a shared commitment to investing in high-quality securities at prices that represent good value and to managing portfolios that exhibit low turnover. Born of twin organizations that covered separate and distinct global market segments with common approaches, the firm manages concentrated equity portfolios drawn from the breadth of the world's markets. Frontier Global Partners is an independent, employee-owned organization with offices in La Jolla, California and Boston. A majority of the firm's equity is held by women and minority partners.

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