Portfolio Effects of Foreign ETF's

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In a recent article, I discussed the portfolio impacts of investing in foreign ETF's and funds. I am more cautious about investing in foreign funds than the perspective espoused in most of what I read. Of course I realize that foreign investments have been a phenomenally outperforming asset class in recent years, but this is not the whole story. The unbridled enthusiasm that I see in many articles about foreign funds is quite similar to what we saw during the dot-com era. At that time, a buying frenzy was driven by the fact that people forgot that what goes up can also come down and ignored standard risk measures that warned that the highest-gaining asset class of the day (then internet stocks) also had potential for fast declines. The same effect is now showing up with many foreign markets. Take, for example, one family of international ETF's:

Fund Name	Ticker	Category	1 yr Return (Mkt)	3 yr Return (Mkt)
BLDRS Emerging Markets 50 ADR Index	ADRE	Diversified Emerging Mkts	55.9%	45.2%
BLDRS Developed Markets 100 ADR Index	ADRD	Foreign Large Blend	20.7%	25.5%
BLDRS Europe 100 ADR Index	ADRU	Europe Stock	18.0%	27.1%
BLDRS Asia 50 ADR Index	ADRA	Diversified Pacific/Asia	24.3%	25.7%

BLDRS ETF's

We all like to get these kinds of returns, but what about risk—the other part of the risk-return balance? One of the standard arguments to help motivate enthusiasm for foreign markets is that adding foreign investments to a domestic portfolio tends to 'diversify' your portfolio, which implicitly means that these foreign funds will lower your portfolio's exposure to the U.S. markets and increase return relative to total portfolio risk. What is typically ignored by advocates of the positive portfolio effects of foreign investing is that many foreign funds are highly volatile and many have values of Beta greater than 100%:

Ticker	Beta	SD in Annual Return
ADRE	183%	19%
ADRD	115%	15%
ADRU	72%	14%
ADRA	118%	15%
SPY	102%	8%
QQQQ	166%	15%

Historical Beta and SD in Returns (last three years)

We provide statistics for SPY, which tracks the S&P500, and QQQQ, which tracks the NASDAQ 100, for reference. Beta is a measure of how the return on a stock, fund, or portfolio responds to fluctuations in the S&P500. If Beta is greater than 100%, the stock fund or portfolio tends to amplify variability in the S&P500. Bond funds have Betas at or around 0%, the S&P500 index funds have Beta very close to 100%, and tech funds tend to have Betas greater than 100%. When we think about adding an asset class to a portfolio for diversification effects, it is reassuring to see a low value of Beta on that asset class because low Beta means that the asset is not highly responsive to the S&P500. In the table above, which uses trailing three year statistics, we see that SPY has a Beta of 102%--very close to the S&P500, as we would expect. The fact that it is not exactly equal to 100% is the result of the specific data window used, the calculation method, etc. QQQQ, which tracks the NASDAQ 100, has a Beta of 166%, which means that investing in QQQQ will tend to increase your portfolio's reactions to changes in the S&P500. Note that three of the four BLDRS ETF's have Beta greater than 100%, which means that these ETF's amplify your exposure to the U.S. market. This is an important strike against the diversification effects of these foreign ETF's.

The next thing to look at in terms of the portfolio effects of foreign ETF's is the total volatility—the total stand-alone risk for each of these funds. Volatility is measured using the *Standard Deviation* in returns. The Standard Deviation is a measure of the typical size of fluctuations in return over a specified period and I usually look at the Standard Deviation in ***annual*** returns (hereafter referred to as SD). SD shows the variation in returns relative to average that you can expect. Over the last twenty years or so, the S&P500 has delivered an annual average return of around 10% with a standard deviation (SD) of about 15%. This means that in any given year, you will expect a return of 10% plus or minus 15%. Lower SD means less volatility, less risk. When I read articles advocating including foreign ETF's as a way to manage total portfolio risk via diversification, I look at the SD values (as shown in the table above). The Standard Deviation in annual return (SD) for many foreign funds, including those above, is a lot more similar to QQQQ than it is to SPY, which means that from a risk standpoint, these funds look a lot more like tech funds than like broad U.S. market indices. Do investors

currently enjoying the tremendous run-ups in foreign markets understand that many of their investments in these markets are two to three times as risky as the S&P500? There is considerable value to be had in emerging markets, but **investors need to understand that many of the funds that exploit these returns look a lot like tech-laden funds in terms of their volatility (measured by SD), and also because of their high Betas which tend to amplify exposure to U.S. markets.**

There is a notable statistical difference between foreign ETF's and tech funds, however, and this factor is what provides some valuable portfolio effects of these funds. One of the important statistical measures of funds is R^2 (pronounced R-squared). R^2 is formally defined as the fraction of the variance in returns on the fund (or stock or portfolio) that is due to Beta (i.e. the correlation between the fund and the market as a whole). High R^2 means that the majority of the variability in returns in the fund can be explained by Beta and volatility in the S&P500. Low R^2 means that Beta and the S&P500 cannot explain much of the return on the fund in question. For some background on R^2, see Investopedia's entry at http://www.investopedia.com/terms/r/r-squared.asp. SPY, along with having Beta close to 100% has R^2 close to 100%, as we expect (see below).

Fund or Stock Ticker	Beta	R^2
ADRE	183%	53%
ADRD	115%	34%
ADRU	72%	15%
ADRA	118%	40%
SPY	102%	98%
QQQQ	166%	76%

Comparing Beta and R^2

Tech funds typically have high Beta and fairly high R^2 (as with QQQQ above), which means that the along with amplifying the variability in the S&P500 (high Beta), these effects are the predominant driver of returns. By contrast, ***many foreign funds with high Beta have low R^2*** (such as ADRE above). This means that even though a change in the S&P500 tends to drive a bigger change in ADRE (high Beta), this effect can only explain about half of the variability in ADRE (i.e. 53%). Now, given that ADRE has had an

historical value of SD that is more than twice that of the S&P500, we could say that ADRE shows all the risk of the S&P500 plus an additional component—the other 47% of the variance not explained by Beta. That said, if we compare ADRE to QQQQ, the low R^2 of ADRE provides some nice portfolio effects. ***For a given Beta and SD, low R^2 tends to provide us with some good portfolio diversification effects***. Low R^2 means that there may be a high fraction of the variability in return on the asset that is uncorrelated to other portfolio assets. This is a very important factor. Low correlation means that you get more diversification—more return on your portfolio for the risk you bear. To account for the combined effects of Beta, SD, and R^2 of individual assets on the total portfolio requires a portfolio management tool, and I use our ***Quantext Portfolio Planner***.

Quantext Portfolio Planner is a portfolio management solution that accounts for both Beta effects and non-Beta correlation between assets. You can quantify the size of non-Beta effects as (1-R^2). For ADRE, 47% of the variability is non-Beta. The simplest thing to do with the component of returns not explained by Beta is to assume that they are un-correlated between portfolio assets. If these components of return are not un-correlated to one another, you will under-estimate total portfolio risk. Ignoring potential correlations in the non-Beta component of returns can lead to sub-optimal asset allocation.

Any asset with Beta greater than zero is somewhat correlated to every other asset with Beta greater than zero. If two assets are correlated to the S&P500 (via Beta), they are also correlated to each other. But what about correlations between assets that are not explained by their individual correlations to the S&P500? ***Quantext Portfolio Planner*** calculates a portfolio Diversification Metric (called DM) that measures how correlated the non-Beta components of return are. If DM equals zero, there is no diversification at all between portfolio components—returns are 100% correlated even after correcting for their mutual correlation to the broader market. A positive DM means that the non-Beta components of return are somewhat un-correlated, which means that we have positive diversification effects. You can have a high Beta portfolio with a low DM or a low Beta

portfolio with low DM and vice versa. While investors may prefer a higher-Beta portfolio to a lower-Beta portfolio because of the potential for higher returns, higher DM is always better than lower DM.

DM provides a useful measure for looking at the portfolio effects of foreign ETF's. For a foreign ETF with high SD and high Beta like a tech fund, it is only by looking at a metric like DM that you can see the additional diversification value associated with the foreign fund. I have verified that ***Quantext Portfolio Planner*** accounts for these diversification effects but none of the other commercially available portfolio planning tools that I have tested fully captures these effects.

I have calculated DM values for a variety of simple portfolio combinations to benchmark the diversification effects of the BLDRS ETF's. Our simple portfolios (shown below) are equal-weight of each ticker with SPY (50% the ETF and 50% SPY—labeled *w/SPY*), equal-weight of each ticker with QQQQ (labeled *w/QQQQ*), or one-third the ticker, one third SPY and one-third QQQQ (the column marked *w/SPY and QQQQ*).

Diversification Metric

Ticker	w/SPY	w/QQQQ	w/SPY&QQQQ
ADRE	13%	10%	14%
ADRD	14%	14%	16%
ADRU	18%	19%	21%
ADRA	13%	13%	16%
SPY	0%	7%	
QQQQ	7%	0%	

Equal weight mixes of components

The table above gives the diversification metric for a portfolio including each of the BLDRS foreign ETF's with SPY and QQQQ. As a point of reference, we show that the value of DM for a portfolio that combines SPY and QQQQ in equal measures is 7%. The DM for adding any of these foreign ETF's to SPY is twice that of adding QQQQ to SPY. A portfolio combining SPY with any of the foreign ETF's has substantially higher portfolio diversification value than combining QQQQ with SPY. This is where foreign ETF's are more attractive than other high-Beta / high-SD alternatives.

Higher (lower) DM means that, aside from Beta effects, the components of the portfolio provide more (less) total diversification. When determining the right balance of foreign investment, it is important to consider Beta effects, total volatility of the foreign asset (SD), and non-Beta diversification effects. Non-Beta diversification as measured by DM is a portfolio variable—there is no way to discuss DM for individual assets. Emerging markets are particularly tricky because they have high Beta and high SD but often exhibit low R^2. Only by accounting for all of these effects is it possible to find the best allocation into foreign funds.

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