FIERA CAPITAL

Getting on Base

Moneyballing your Portfolio Using Risk Factor Investing

> "You get on base, **we win.** You don't, we lose."
>
> – Billy Beane, General Manager of the Oakland Athletics, in the film *Moneyball*

Baseball scouts must have insanely good intuition to do their jobs well. They look for hundreds of miniscule traits in a prospect in order to determine if they're worthy of the big leagues: bat speed; arm strength; does he get a first step on the ball?; is he light on his feet?; even a player's character and his looks come into play. With all these traits to look for – each of which can make or break a player – how can scouts be expected to not make mistakes?

Billy Beane – formerly the General Manager of baseball's Oakland Athletics – decided they couldn't. With his team's shoestring budget, he couldn't afford to make mistakes when signing players. Was there a simpler way to find baseball talent?

Beane thought there was. After studying the application of statistical analysis to baseball records, Beane decided that he didn't need to consider hundreds of miniscule traits in each player in order to put together a winning team. In fact, he only needed to know two things: does the player get on base? and can he hit?

Beane's strategy helped the Athletics win their division in 2002. That season, they won the same number of games as the New York Yankees, though the A's did so with less than a third of the Yankees' payroll. Beane's exploits are well-documented in Michael Lewis' 2003 book *Moneyball: The Art of Winning an Unfair Game* and in the movie of the same name. A favourite excerpt comes in the film, at a meeting during which the scouts argue that Beane's target players don't have the traits that the scouts normally seek:

> Beane: **"He can't throw and he can't field, but what can he do? Guys, check your reports...he can get on base!"**
> Scout: **"So he walks a lot..."**
> Beane: **"He gets on base a lot, Rocco. Do I care if it's a walk or a hit?"**

Clearly, Beane understood the importance of filtering out the noise, reducing the potential for errors and simplifying problems to come to elegant solutions.

How does this relate to investing?

Subtraction by Addition

Once upon a time, a typical investor's portfolio would likely have just two or three asset classes. These days, thanks to the democratization of finance, it's not uncommon for a portfolio to select assets from a universe of dozens or even hundreds of potential strategies: emerging market debt; global small caps; real estate equity; agriculture; long/short equity; and infrastructure, just to name a few. Not to mention that each strategy's profile changes depending on the addition of a risk overlay, an FX hedge, an ESG filter, or a geographic, style or quality tilt, for example.

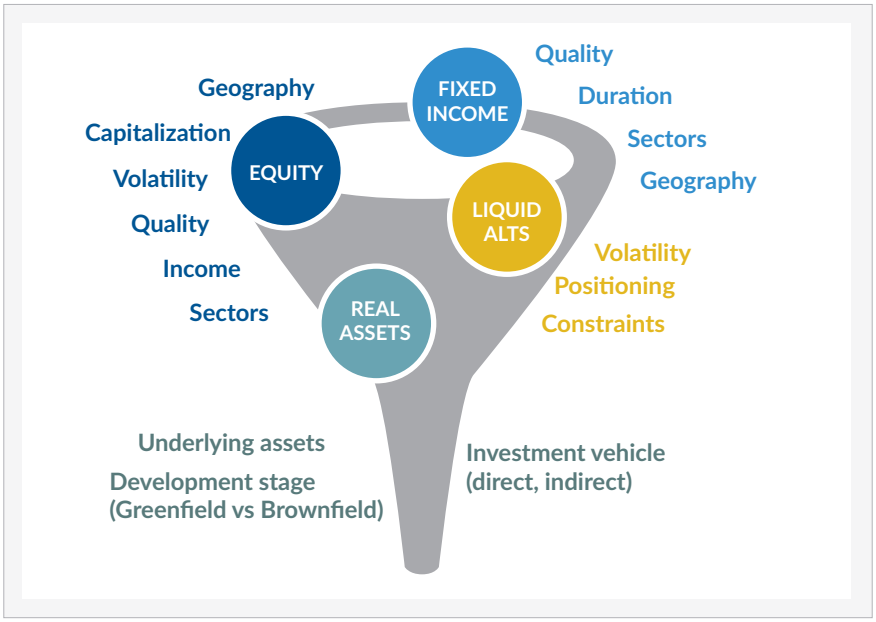
While investors undoubtedly benefit from increased choice, there are drawbacks; namely, having to choose from all these assets and create a cohesive portfolio becomes incredibly complicated. After all, when an investor goes through a typical optimization process, several assumptions need to be made for each asset class. Specifically, an assumption is needed for its future volatility, its return and its correlation with each of the other asset classes. For an investor with an investible universe of 40 strategies – which is not uncommon – that means forecasting 40 returns, 40 standard deviations and 780 pairs of correlations – 860 variables in total! With all those characteristics to forecast, there will inevitably be some errors, which means a portfolio could end up with a vastly different risk/return profile from its target.

All this to say that the key to building portfolios – and baseball teams – that meet your expectations is to sift through the noise and focus only on the elements that really matter to success. And, like Beane, if we could reduce the number of variables, we could also reduce the potential for error.

Enter Risk Factor Investing (RFI). This process gives us the ability to look through individual investment strategies to identify and understand the common economic forces – the risk factors – that drive each strategy's risk and return. Our Multi-Asset Class Solutions (MACS) team has identified 10 such factors that explain and drive each asset class's performance.

THE TEN MACS RISK FACTORS	
Developed Market Growth	Emerging Market Growth
Real Rates	Inflation
Credit Premium	Slope Premium
Commodity	Currency (FX)
Real Assets	Illiquidity

Unlimited Number of Variables and Assumptions

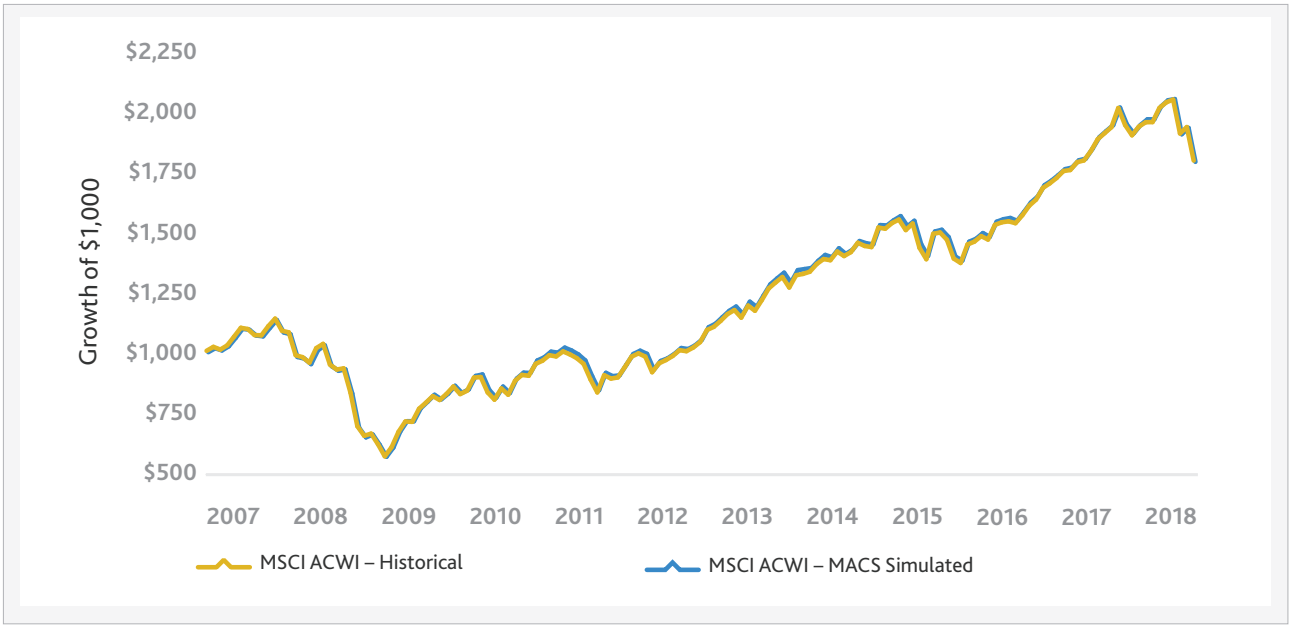


How does this process work and how does it improve portfolio optimization? We actually add a step to the traditional asset allocation process: mapping each strategy's exposure to each of our ten risk factors. That means that rather than starting the asset allocation work by going through an exhaustive list of assets and forecasting each one's risk, return and correlations with each other, we simply have to forecast the 10 underlying factors. It's a classic case of subtraction by addition, in which we materially reduce the number of assumptions needed by adding an extra step to the process. Remember that 40-asset class investible universe that would need 860 variables forecasted? With RFI, we bring that number down to only 65 forecasts. In baseball terms, instead of looking for players with nice-looking swings or big biceps, we just look for players who can get on base!

The Results You Expect

But can you really simplify the asset allocation process that much and still produce the results you expect? The MACS team can and does this with our clients every day. Below, we compare the performance of the MSCI All Country World Index in local currency with the performance results based on their risk factor exposures alone. We can see that our model is extremely efficient at explaining historical portfolio risk and return – it replicated the performance of the index exactly and its volatility within 1 basis point over a 12-year period.

MSCI All Country World Index (MSCI ACWI): Growth of $1,000, Historical Performance vs MACS Simulated



	MSCI ACWI - HISTORICAL	MSCI ACWI - MACS SIMULATED	CORRELATION
Return	4.98%	4.98%	99.91%
Volatility	13.87%	13.86%	
Sharpe Ratio	0.32	0.33	

Source: MSCI, Fiera Capital and Fiera MACS. Historical returns based on actual index performance since Dec. 31, 2006 in local currency. Factor-reconstructed index performance are based on actual historical factor returns and estimated exposures. Unexplained residual returns are randomly simulated. Cumulative asset value and performance statistics for simulated MSCI ACWI are averaged from each of the 20,000 simulated paths.

In utilizing RFI, our goal isn't to get to a single projection for a portfolio's risk and return; rather, the point is to get a better idea of the **direction** and **range** of potential results. We get these results by employing a number of techniques:

- **Stress and scenario testing:** How would your portfolio react if rates increase by 0.5%? How would your portfolio have weathered the Global Financial Crisis?

- **Stochastic projection:** Instead of looking at a single best estimate result, we forecast thousands of potential portfolio paths to get a more accurate potential range of results.

- **Regime-switching projection:** Volatility and correlations aren't static; they change over time. Thus, we project portfolio performance based on a regime-switching model through which we forecast thousands of scenarios across different futures. Some scenarios exhibit a normal economic outlook while others are representative of stressed investment periods where returns are low, volatility is high and correlations across asset-classes change.

We use these tools to project economic forecasts and portfolio outcomes, and subsequently use the data to answer various questions, depending on the investor type. For example,

How will the liability of a pension plan and its funded status or contribution evolve?

Will a foundation be able to keep up with its spending policy, considering inflation?

What is the probability of a family office being able to meet its bequest target?

What this all comes down to is that, using RFI as a base, our MACS system helps us get a complete picture of the robustness of the portfolio and how it is most likely to evolve over time, and meet our clients' needs.

A Better Understanding Of Your Portfolio

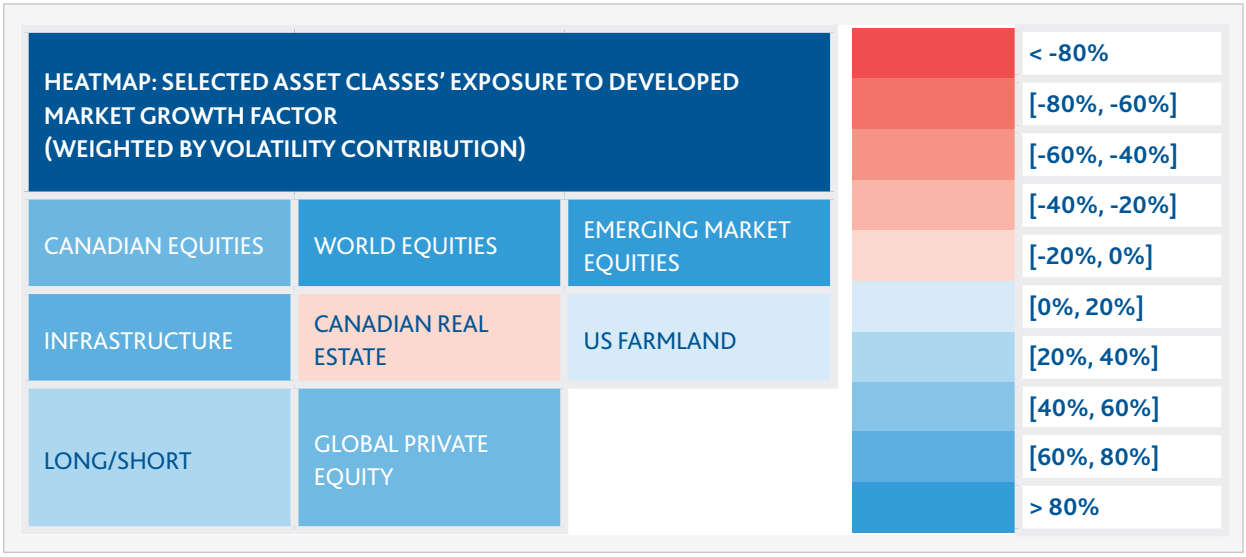
So we can break down multi-asset investing into 10 main factors that drive the vast majority of portfolio risk and return. Why should this matter to investors? The answer centers around having a **better understanding of the risks inherent in your portfolio.**

For example, you may think that having twenty strategies in a portfolio run by twenty different portfolio managers automatically means you're well diversified. But what if ten of those strategies each have a large exposure to, say the developed market growth factor? Traditional portfolio optimization wouldn't identify this common risk, so when developed market growth falters, you may find that your portfolio suffers, as those ten strategies suffer together. Diversified portfolio? Not so much…

In short, not only do risk factors simplify the asset allocation problem, they also provide investors with a deeper knowledge of their portfolios by digging through all strategies and getting to simple, understandable macroeconomic forces that govern the investments. More simply, we can identify which factors are driving risk and return, and use this knowledge to **build more efficient, diversified portfolios.**

This process becomes even more important as investors begin adding in alternative investments into their portfolios, which is becoming increasingly common. Why so? Adding in alternatives is said to help diversify a portfolio, **but only if you add in the right ones and in the right combination.** For example, you can see in the below chart that World Equities and Emerging Market Equities are both heavily influenced by the Developed Market Growth factor. An investor holding these asset classes might assume that adding in, say, some Infrastructure investments would help diversify the portfolio. However, Infrastructure in fact also has a strong correlation to developed market growth! Hence, in this case, it would be more beneficial to instead add an asset class such as Private Equity, Farmland or Real Estate, which have significantly lower correlations to Developed Market Growth and thus provide greater diversification benefits.

It's for this reason that it's essential to understand not just the risk/return profile of the asset classes being added to a portfolio, **but also the economic forces driving those asset classes.**



Source: Fiera MACS. Historical index performances from 2007 to 2018
Index data: Emerging Markets, MSCI Emerging Markets Index; Canadian Equities, S&P/TSX; World Equities, MSCI World Index; Infrastructure, Brookfield Global Infrastructure; Real Estate, IPD Canada Property Fund Index; US Farmland, NCREIF Farmland (US); Global Private Equity, Cambridge Private Equity (Global Buyout); Long/Short, Barclay Equity Long / Short. For illustrative purposes only

Moneyballing Your Portfolio

Beginning in 1919, the Boston Red Sox went 86 years without winning a World Series title. Entering the 2003 season, however, the team engaged in a *Moneyball* style of scouting, going so far as to hire Bill James, the father of advanced statistical analysis in baseball and, by association, one of the key players in *Moneyball* theory (the Sox also tried unsuccessfully to hire Beane as General Manager).

The following year, the Red Sox won the World Series title, and would go on to win three more championships in the next 14 years – all with James working in the team's front office, simplifying the team's scouting decisions.

Portfolio asset allocation is an extraordinarily complicated process involving hundreds of variables and thousands of data points. Sorting through the noise underlying the process helps build more efficient portfolios that better meet the needs and expectations of investors. With our Risk Factor Investing model, Fiera Capital's MACS team simplifies the process, breaking down portfolios into their most important risk elements and adjusting allocations as necessary. In short, we *Moneyball* a portfolio so that it becomes its most efficient and effective self, and better meets investor expectations.

More simply, Risk Factor Investing lets us build portfolios that get on base.

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