

Essential Beta: More Than Leveraged Bonds

FQ Insight

by Ed Peters

Introduction

“Risk parity” is an asset allocation approach based upon risk rather than capital. In particular, it does not add a leverage constraint (all assets must add up to 100%) if an asset is diversifying and can be leveraged. Typically, such leverage is done cheaply in the exchange traded futures markets. Since the primary cyclical growth asset in a multi-asset portfolio is equities and the most diversifying asset with equities is sovereign bonds, most portfolios that use “risk parity” concepts end up leveraging sovereign bonds to diversify equities since sovereign bonds have roughly a third of the volatility of equities. Unfortunately, this has made “leveraged bonds” synonymous with risk parity and has led to discussions that center mostly on the risk of leveraging bonds. A recent article in *Pension and Investments* appeared to discuss the growth of risk parity strategies, but much of the content centered on the dangers of leveraging bonds. Risk parity has also been simplistically dismissed because the secular bull market in bonds that began in 1983 would make any strategy that leveraged bonds look good.

However, leveraging bonds is just one aspect of most “risk parity” portfolios. First Quadrant’s risk parity strategy, Essential Beta (EB), seeks to balance risk across three dimensions, with only one of them involving leveraging bonds. EB is not only designed to balance risk across stocks and bonds, but also across other asset classes, such as commodities. In addition, it seeks to balance risk within the asset classes instead of cap weighting, and to also balance risk over time, taking into account the fact that markets have long periods of chronically high and low volatility when correlations also change.

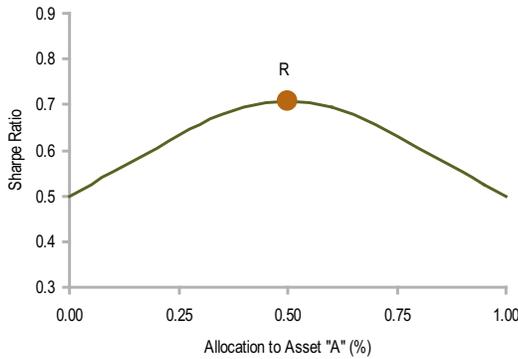
In this article, we will contrast basic stock/bond risk parity with Essential Beta’s multi-asset, dynamic approach. We believe that while basic risk parity does not always result in the optimal portfolio, it generally creates a near optimal portfolio that is not dependent upon any one asset class outperforming. For Essential Beta, we will see from this study that, if bonds do indeed have poor performance, then the “risk parity” allocation across stocks and bonds does not tend to add value to the total portfolio. However, the other risk balancing components of Essential Beta do not depend upon risk parity between stocks and bonds. Since they have a low correlation to the “risk parity” part of the portfolio, up to 60% of the performance tends to remain if risk parity were to “fail.” In addition, if bonds do not outperform stocks, we may still be able to achieve stock market-like returns at lower risk and a lower correlation to equities.

Risk Parity Basics

Basic risk parity is a fairly simple idea, which does not necessarily involve stocks and bonds, or leverage. Let us say that we have two assets called A and B. A and B have the same risk and zero correlation. We will assume for this example that the standard deviation of returns is 15% and that A and B both have annualized excess returns to cash of 7.5%. The efficient frontier for portfolios of A and B would be a straight line since all portfolios have the same expected return. However, because A and B have zero correlation, the portfolios have different total standard deviations, with the minimum variance portfolio being the one that is at “risk parity.” That is where 50% of the capital, and, in this case, 50% of the risk, is in each asset. In this example, where each asset has the same risk, capital allocation and risk allocation are the same. If we were to plot the Sharpe Ratio of each portfolio vs. allocation in A, we would get Figure 1.

Past performance is no guarantee of future results. Potential for profit is accompanied by possibility of loss. Commodities trading involves substantial risk of loss.

FIGURE 1

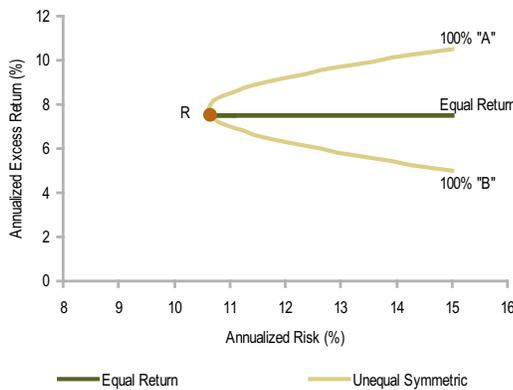


Source: First Quadrant, LP

If we used B rather than A, the graph would look the same. Here, we see the idealized risk parity construct. If two assets have the same expected return and the same risk, then the risk parity portfolio (point R) is the optimal portfolio.

But suppose A and B have different excess returns of 10.5% and 5% respectively. In that case the efficient frontier would be a parabola, as we can see in Figure 2.

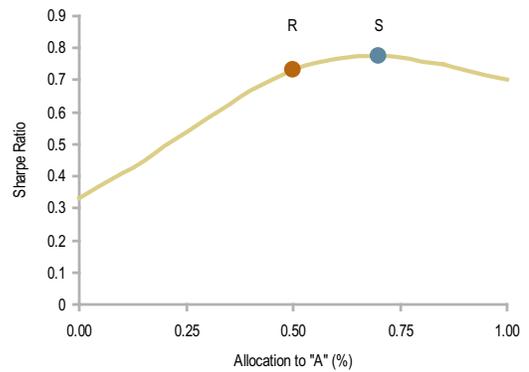
FIGURE 2



Source: First Quadrant, LP

The graph of Sharpe ratios in Figure 1 would change to that in Figure 3.

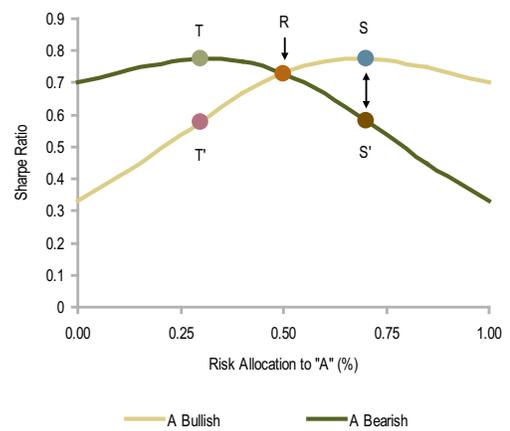
FIGURE 3



Source: First Quadrant, LP

Now let us suppose that the returns are reversed for A and B. A has excess return of 5% and B has excess return of 10.5%. In that case, the graph of Sharpe ratios in Figure 4 is a mirror image of Figure 3.

FIGURE 4



Source: First Quadrant, LP

The optimal mean variance portfolio is now 70% B and 30% A (point T). However, the risk parity portfolio is still a near-optimal portfolio while the portfolio that is 70% A and 30% B (point S') is far from optimal. In fact, the spread between S and S' is a range of uncertainty, which comes from making a bet on S. R is the same in both graphs though and, in both cases, it is near-optimal. Contrast this with the portfolio marked S and S', which has 70% of its risk budget concentrated in asset A. This portfolio is betting on A in order to obtain the returns of portfolio S, but the risk is that it will, instead, achieve S', which is very different and far from optimal. This graph in fact understates the real world where most portfolios will put 90% of their risk budget in one asset class like stocks, as described in Peters (2008).

This is the basic idea behind risk parity. The risk parity portfolio is the best estimate of the optimal portfolio because, general speaking, it is expected to give a near-optimal result. Concentrating your risk may sometimes pay off, but it may as well not. As we can see above, the difference between the risk parity portfolio R and the risk-concentrated portfolios S and T do not seem worth the risk of achieving S' or T' instead.

Now suppose A is stocks and B is bonds. The green line in Figure 4 shows the result when we have a bull market in bonds and a mediocre period for stocks. Alternatively, the yellow line shows a bull market for stocks and a mediocre period for bonds. However, the risk parity portfolio, R, does not depend on stocks or bonds being the best performer. It merely assumes that the risk parity portfolio will, in general, be near-optimal. For a long-term investor that should be enough.

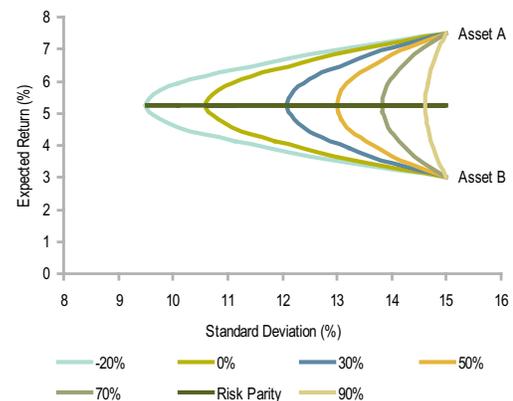
Please note that this discussion does not involve leverage. It merely says that A and B have the same risk. If we have two assets which diversify one another and they have the same risk, the implementation is straightforward. We merely put 50% of our capital in each. On the other hand, if we do have two assets with a low correlation but very different volatilities, then we will have to leverage one or de-lever the other depending upon our risk target. In the case of stocks and bonds, a risk parity portfolio does not require leverage if our risk target is in the neighborhood of 5%, but if it increases to 9% or more, bonds, as the low risk asset, will need to be leveraged. However, since this leverage is achieved in the futures markets, it is inexpensive and without counter-party risks. This type of leverage is called "economic leverage" as opposed to "financial leverage", which involves borrowing securities and all its associated costs and counter-party risks.

Beyond Stocks and Bonds

Risk parity does not require that we use only stocks and bonds. As we can see from the above example, risk parity

concepts can be applied to any set of assets which have low correlation and access to economic leverage. The power of the risk parity approach depends on the correlation across the assets. Figure 5 below illustrates the efficient frontiers for combinations of A and B with different correlation assumptions. As we can see, how far the parabola goes to the left depends upon the level of correlation.

FIGURE 5



Source: First Quadrant, LP

To take full advantage of this property in EB, we also risk balance across two other dimensions. First, we risk balance within the asset classes, which in this case are stocks, bonds and commodities. Within asset class, risk balancing adds some value within stocks and bonds, where the correlations are fairly high. However, the real benefit comes from risk balancing across commodities, which have a very low correlation with one another as we have already discussed in Peters (2010) and Peters and Davis (2012). This dimension also benefits from the inclusion of commodities and inflation linked bonds to the basic stock and bond components of the first dimension.

The third dimension of risk balancing in EB is "through time." That is, we shift the capital allocation as the markets go through volatility regimes tied to the business cycle, as discussed in Peters (2009b). In this dimension, we assume that the level of stock and commodity volatilities increase systematically during periods of economic uncertainty, decrease during periods of economic expansion, and persist at these high and low levels over long periods of time. To keep the portfolio risk stable, EB increases the capital allocation to equities and commodities during periods of expansion when their volatility falls to low levels (such as from 2003 – 2007), and decreases capital allocations to these assets during peri-

ods of economic uncertainty (such as 2008 – 2011). The goal is to keep the risk stable by changing the capital allocation. This contrasts with most portfolios that keep their capital allocation static and let their volatility level go up and down with the market passively.

The table below is an EB simulation from Jan 1988 – Dec 2011 of the three dimensions of risk balancing where we add each dimension to the previous portfolio. That is, the “Through Time” portfolio includes “Across Markets,” “Within Markets,” and “Through Time” dimensions of risk, while the “Across Markets” portfolio includes only that one dimension. The 60/40 portfolio consists of 60% MSCI World Equity Index and 40% Citigroup World Government Bond Index (WGBI).

TABLE 1: SIMULATION¹

	60/40	Across Markets	Within Markets	Through Time
Excess Return (%)	2.85	3.69	6.41	7.23
Risk (%)	8.70	8.56	9.44	8.59
Sharpe Ratio	0.33	0.43	0.68	0.84
Equity Correlation	98.8%	71.1%	71.7%	63.2%

Source: First Quadrant, LP, Global Financial Data

The “Across Markets” attribution is basic stock/bond risk parity. We can see that basic risk parity outperforms the 60/40 by 84 basis points per year over the simulation period. The “Within Markets” aggregates an additional 272 basis points, while “Through Time” adds a further 82 basis points. Therefore, basic risk parity accounts for about 19% of EB’s total value added to a 60/40 mix based on simulation. Please note that all three risk parity portfolios have a lower correlation to equities than the 60/40 portfolio, reflecting their better diversification.

What if “Risk Parity” Fails?

Major concerns about risk parity center on the current historically low nominal sovereign bond yields. Many investors are concerned that, after a secular decline in interest rates with the collapse of the 1979 – 1983 era of hyperinflation, bond yields can only go up at this stage. Aside from the fact that the 1983 level of yields was a historical anomaly, we can address the impact of a long period of negative real and excess sovereign bond returns on Essential Beta. Such a period should incorporate a prolonged stretch of increasing inflation over many years. Typically, such a study would require a historical simulation. However, such a simulation would have to, unfortunately, go back in time to an era where most of the inflation hedging vehicles we have today, such as TIPS and commodity futures, did not exist.

Instead, in order to address this issue, we have decided to investigate how much of the return in our regular historical simulation comes from the fact that bond yields had a prolonged decline over the simulation period. That is, what would performance be like if we took out the bull market in bonds?

This type of simulation is relatively easy to perform. We subtract the average bond return across all portfolios over the simulation period, so that the cumulative bond return would be zero. This also produces a negative real and excess return for bonds. However, this still preserves the rise and fall of bonds with the business cycle as well as their “flight-to-quality” tail-risk hedging qualities. Table 2 below shows the results of the simulation which, like Table 1, was performed over the Jan 1988 – Dec 2011 time period.

TABLE 2: SIMULATION¹ (Excluding Bond Return)

	60/40	Across Markets	Within Markets	Through Time
Excess Return (%)	0.32	-0.86	2.71	3.46
Risk (%)	8.70	7.63	9.44	8.60
Sharpe Ratio	0.04	-0.11	0.29	0.40
Equity Correlation	98.8%	78.0%	71.7%	63.2%

Source: First Quadrant, LP, Global Financial Data

Compared to Table 1, we can see that the return attribution to “Across Markets” or basic risk parity does become negative, but the 60/40 return also decreases. This means that the basic risk parity allocation between stocks and bonds does underperform the 60/40 as critics of risk parity contend. However, the excess returns from the “Within Markets” and “Through Time” dimensions are still strongly positive over the period. We can see that, for Essential Beta, the concern that “the bull market in bonds is over” does not mean that risk balancing will not continue to add value. Even without a bull market in bonds, as simulated results show, EB has a potential for excess return to cash of almost 4% over 24 years, which is close to the return goals of most funds and is still higher than the 60/40 mix.

Of course, this simulation has its own issues. For instance, it is unlikely that stocks and commodities would have the same returns if bonds did have a cumulative return of zero. However, it does show that the simplistic idea that risk parity portfolios have achieved all of their value added during simulations because bonds have had a bull market is in error, at least when referring to Essential Beta. There is more than just “leveraged bonds” in Essential Beta returns.

In addition, we can see that the diversification effect in Essential Beta may also be unchanged. Over this 24-year simulation period, EB outperforms the 60/40 by a wide margin at similar risk. But EB does so with a 63% correlation to stocks, unlike the 60/40 and most other multi-asset portfolios which, on average, still have over a 98% correlation to stocks.

It is this finding that supports the idea that EB and other risk parity strategies are not necessarily dependent upon a bull market in bonds. Our research shows that EB exhibits a consistent correlation of 50% to 60% with many asset classes reflecting its greater diversification. EB does not depend upon one outperforming asset class to create value. This was shown theoretically in the section of Risk Parity Basics and is illustrated in this study. This contrasts with most multi-strategy portfolios that do depend upon a bull market in stocks as is illustrated by their concentration of 90% risk in one asset class. Essential Beta is designed to give true diversification and participate in the returns of all its asset classes over all parts of the business cycle.



Endnotes

¹Essential Beta simulation is supplemental information. Please see **Simulation Disclosures: Essential Beta – Simulated Performance (Gross and/or Net of Fees)** and **Essential Beta Strategy Composite Information and Essential Beta Strategy** disclosures found at the end of this paper for information concerning this simulation, the live composite, and the effect of fees on the performance.

References

Darnell, M. Peters, E. and Ye, J. "Rethinking Beta" FQ Perspectives, January 2009

Davis, J. and Peters, E. "Commodities Total Return" FQ White Paper, December 2011

Levanoni, D. "Did Diversification Fail? – Part 2" FQ Perspectives, October 2010

Peters, E. "Does Your Portfolio Have Bad Breadth?" FQ Perspectives, December 2008

Peters, E. "Balancing Betas – Essential Risk Diversification" FQ Perspectives, February 2009a

Peters, E. "Using Volatility Regimes: The FQ MRI (Market Risk Index)" FQ Perspectives, September 2009b

Peters, E. "Balanced Risk Commodities" FQ Perspectives, October 2010

Essential Beta – Simulated Performance (Gross and/or Net of Fees) *Unless otherwise noted, performance figures do not reflect the deduction of investment advisory fees. These fees are described below. The returns shown will be reduced by the advisory fees and any other expenses the advisor may incur in the management of an investment advisory account. Simulated performance is no guarantee of the future results in a live portfolio using the strategy. Potential for profit is accompanied by possibility of loss.* **General Disclosures:** Hypothetical or simulated performance results have certain inherent limitations. Unlike an actual performance record, simulated results do not represent actual trading. Also, since the trades have not actually been executed, the results may have under or over compensated for the impact, if any, of certain market factors, such as lack of liquidity or positions need to be rounded based upon contract size when futures trades are being executed. Simulated trading programs in general are also subject to the fact that they are designed with the benefit of hindsight. Further, backtesting allows the security selection methodology to be adjusted until past returns are maximized. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. Unless otherwise noted, performance returns for one year or longer are annualized. Performance returns for periods of less than one year are for the period reported. Simulations are constructed on the basis of historical data and based on assumptions integral to the model. The simulated performance in this presentation will differ from live performance that would have been experienced using the strategy during that time period for the following reasons: • The simulated performance was derived from the “backtesting” or the retroactive application of FQ’s current proprietary model as of June 2012. • The simulated performance includes the use of TIPS throughout its history; however they were not available until 1997. A live portfolio managed before 1997 would not have included TIPS. • The simulation assumes that we adjust the risk and capital allocated to each sub-strategy on a monthly basis after the close on the last day of each month, whereas the live product may not adjust the allocations exactly at that time due to intra-month market movement and risk regime shifts. • The simulation assumes that the strategy and sub-strategy guidelines are constant through the life of the portfolio, whereas, the guidelines for live portfolios may have changed over the life of each portfolio. • The simulation assumes fixed transaction costs whereas live portfolio transaction costs will be variable. • The simulation uses a synthetic long duration zero coupon bond for each bond country allocation. The cash return for the synthetic bond can vary by broker. • The simulation assumes all trading takes place once a month (on the last day of the month) whereas live portfolios may trade often during the month. **Disclosures Specific to Simulation:** This simulation was created in June of 2012 and updated every month end or quarter end. The simulation is constructed with the goal to diversify risk in a portfolio by strategically allocating risk to several sub-strategies/asset classes including, without limitation: Developed Market Equities; US Small Cap Equities; Emerging Market Equities; Real Estate Investment Trusts (“REITS”); Diversified Commodities; US Treasury Inflation-Protected Securities (“US TIPS”), Long Duration Zero Coupon Synthetic Bonds (“Synthetic Treasuries”), High Yield, and Options. The simulation replicates the hypothetical return of TIPS between 1988 and 1996 through the combination of ten year interest rates and the 12 month trailing CPI. From 1997 onward actual TIPS returns were used. The simulation assumes Synthetic Treasuries are created by using futures on various developed country sovereign bonds. The simulation additionally attempts to balance risk relative to country and sector weightings. The simulation targets overall portfolio risk allocations based on pre-determined indicators of market risk which may change over time. All income is reinvested monthly, no external cash flows are assumed. **Investment Management Fees:** Simulated performance results presented are net of investment management fees and gross trading costs. The FQ investment management asset-based fee schedule for this strategy, which is negotiable, is as follows: \$0–\$100 million, 0.40%; \$100–\$350 million, 0.35%; and more than \$350 million, 0.20%. Asset-based fees are charged incrementally. **Market Impact on Returns:** Stocks, bonds, and commodities markets had exceptional performance from 2009-2011. The Essential Beta Strategy participated in these returns throughout the period by holding long positions within all three markets.

The MSCI World IndexSM is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of developed markets. The MSCI World IndexSM is a registered trademark of Morgan Stanley Capital International.

The Citigroup World Government Bond IndexTM is a market capitalization weighted index consisting of the government bond markets. Citigroup World Government Bond IndexTM is a trademark of Citigroup.

The strategy is not managed to a specific benchmark but is compared to the benchmarks shown for illustrative purpose.

COMPOSITE INFORMATION

Essential Beta Strategy	Total Return Gross	Total Return Net	Composite 3-Year Standard Deviation Gross (Annualized)	Benchmark 3-Year Standard Deviation (Annualized)	Number of Portfolios ⁴	Composite Dispersion (%)	Total Composite Assets ^{3,4} (Millions USD)	% of Firm Assets ⁴	Total Firm Assets ⁴ (Millions USD)	Total Essential Beta Strategy Assets ^{1,4,7} (Millions USD)	Actively Managed AUM ^{1,4,5} (Millions USD)	Total Firm Assets (Including Notional Values) ^{1,4,8} (Millions USD)
2009 (Mar-Dec)	+23.9%	+23.3%	–	–	<5	–	6	0.1	7,867	89	17,342	17,427
2010	+18.1%	+17.8%	–	–	<5	–	277	3.2	8,558	380	18,713	18,789
2011	+8.9%	+8.7%	–	–	<5	–	514	6.5	7,967	619	16,725	16,725
2012 (Jan-Jul) ²	+5.5%	+5.4%	8.2%	–	<5	–	305	3.7	8,155	866	17,202	17,202

See additional disclosures for important information concerning this composite. ¹Supplemental Information. ²All performance and AUM data is preliminary. ³Includes market values for fully funded portfolios and the notional values for margin funded portfolios, all actively managed by First Quadrant. ⁴At end of period reported. ⁵Includes market values for fully funded portfolios and the notional values for margin funded portfolios, all actively managed by First Quadrant and non-discretionary portfolios managed by joint venture partners using First Quadrant, L.P. investment signals. First Quadrant is defined in this context as the combination of all discretionary portfolios of First Quadrant, L.P. and its joint venture partners, but only wherein FQ has full investment discretion over the portfolios. ⁶Includes market values for fully funded portfolios and the notional values for margin funded portfolios managed by First Quadrant and non-discretionary portfolios managed by joint venture partners using First Quadrant, L.P. investment signals. First Quadrant is defined in this context as the combination of all discretionary portfolios of First Quadrant, L.P. and its joint venture partners, but only wherein FQ has full investment discretion over the portfolios. ⁷Includes other Essential Beta composite assets, including those based in foreign currencies.

Essential Beta Strategy Past performance is no guarantee of future results. Potential for profit is accompanied by possibility of loss. GENERAL DISCLOSURES: First Quadrant, L.P. claims compliance with the Global Investment Performance Standards (GIPS[®]) and has prepared and presented this report in compliance with the GIPS standards. First Quadrant, L.P. has been independently verified for the period 1995-2011. Verification assesses whether (1) the firm has complied with all the composite construction requirements of the GIPS standards on a firm-wide basis and (2) the firm's policies and procedures are designed to calculate and present performance in compliance with the GIPS standards. The Essential Beta Strategy composite has been examined for 2010. The verification and performance examination reports are available upon request. First Quadrant ("FQ" or the "Firm") is defined as the combination of all discretionary portfolios of First Quadrant, L.P. and its joint venture partners, but only wherein FQ has full investment discretion over the portfolios. First Quadrant L.P. is a registered investment adviser and is an affiliate of Affiliated Managers Group, Inc. A complete list and description of the Firm's composites is available upon request. **COMPOSITE DETAILS: Composite Description:** (Creation Date: March 2010) The portfolios in this composite invest in the Essential Beta strategy targeting an 8-10% tracking error. The strategy seeks to provide long-term market returns through exposure to essential markets in order to participate in global economic growth. The strategy includes exposure to global equity, global sovereign bonds, and commodities primarily through futures contracts, and may also use Exchange Traded Funds (ETFs) and physical securities when liquid futures contracts are not available or are illiquid. The strategy will also include exposure to commodities and Treasury Inflation Protected securities (TIPS) to hedge against inflation. Portfolios in the composite have a target risk level of between 8% and 10%, which is balanced among the asset classes. This is a total return strategy which is not managed against any benchmark or universe. Presenting the composite returns with no benchmark demonstrates clearer accountability by removing the distortions caused by blending strategy specific total and benchmark returns. **Portfolio Criteria:** There is no minimum balance requirement for a portfolio to be included in a composite. The strategy utilizes leverage at FQ's discretion. The returns presented reflect this leverage. **Calculation Methodology:** Valuations and returns are computed and stated in U.S. dollars. One portfolio within the composite (March 2009 through March 2010) used the daily valuation method to calculate the time-weighted monthly portfolio return while the other portfolio (February 2010 to present) uses a dollar-weighted rate of return formula to calculate the monthly return. Annual portfolio returns are calculated by linking the monthly returns. The dispersion of a composite is calculated using the asset-weighted standard deviation formula. Only portfolios managed for the full calendar year are included in the dispersion calculation. Where a composite contains five or fewer portfolios, a measure of dispersion is not statistically representative and is therefore not shown. The three-year annualized standard deviation measures the variability of the composite and the benchmark returns (if applicable) over the preceding 36-month period. The standard deviation is not presented for periods in which 36 months of historical composite returns are not available. Policies for valuing portfolios, calculating performance, and preparing compliant presentations are available upon request. **Derivatives:** The underlying investment process composing this composite uses derivative instruments in both long and short positions to achieve desired returns. Derivatives are financial instruments whose value is derived from another security, an index or a currency. Futures contracts are derivatives that specify a purchase or sale of an asset at a specified price on a specified date in the future. Forward contracts are derivatives that allow the purchase or sale of currency in the future at a currently agreed-upon rate of exchange. There is a risk that a derivative may not perform as expected, thereby causing a loss or amplifying a gain or loss for a portfolio. With some derivatives there is also the risk that the counterparty may fail to honor its contract terms causing a loss for a portfolio. **Investment Management Fees** Performance results presented net of investment management fees are based upon the actual average-weighted management fee charged each portfolio in the composite. These net of fee results also reflect the effect of any negotiated fee arrangements, which are different than FQ's fee schedule. All performance results presented include trading commissions. The FQ investment management asset-based fee schedule for this strategy, which is negotiable, is as follows: \$0-\$100, 0.40%; \$100-\$350, 0.35%; and more than \$350, 0.20%. Asset-based fees are charged incrementally. For example, a \$200 million dollar portfolio will be charged 0.40% for the first \$100 million, and 0.35% for the next \$100 million. **Market Impact on Returns:** Stocks, bonds, and commodities markets had exceptional performance from 2009-2011. The Essential Beta Strategy participated in these returns throughout the period by holding long positions within all three markets.

This material is for your private information. The views expressed are the views of First Quadrant, L.P. only through this period and are subject to change based on market and other conditions. All material has been obtained from sources believed to be reliable, but its accuracy is not guaranteed. This material is for private use only and cannot be distributed without express written consent of First Quadrant.