



Efficient Commodity Exposure through Commodity Producer Equities

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Executive summary

Equities of commodity producer businesses provide a uniquely diversifying exposure to traditional portfolios of equities and fixed income because they offer protection against rising inflation. Most equities and fixed income tend to perform well when inflation is falling (something we have experienced for most of the last 30 years in the US). In contrast, assets linked to commodity prices tend to perform well in the opposite environment, when inflation is rising. Hence commodity exposures tend to be diversifying to traditional portfolios.

Many think of commodity producer equities as behaving more like equities than commodities and therefore utilize futures markets to obtain commodity exposure. While it is true that the historical monthly correlation between commodity producers and broad equity indices is around 0.5, when we separate the equity exposure from the embedded commodity exposure in these businesses, we find that the embedded commodity exposure is highly correlated to commodity futures and comes with additional implementation advantages as well. The commodity risk exposure of equities varies by sector, some commodity sectors offer a levered exposure to commodities and others a delevered exposure to the underlying commodity. These differences need to be taken into account in implementation.

Though often underappreciated, robust implementation is critical for the success of any strategy. It is especially important for an exposure intended to diversify against volatile market environments when liquidity can be scarce and banks' willingness to fairly price derivatives declines. In the futures markets, investors must frequently roll contracts, in turn paying transaction and financing costs. They also must efficiently manage collateral and counterparty risk. Unlike derivatives, **commodity producer equities embed leverage by giving investors exposure to commodities and equities, without the associated risks of short term borrowing.** Furthermore, for taxable investors, futures contracts incur higher tax rates compared to that for long term holders of equities.

The implementation advantages of equities also include a broader range of commodities across which to diversify. For example, iron ore exposure is easily obtained through a number of large mining companies. In comparison the iron ore futures market is too small for most pools of capital to use efficiently. This greater ability to diversify in the equity market should allow for a lower risk commodity exposure through equities.

This is not to say that there are no advantages to using commodity futures over equities. Futures are liquid in larger markets and offer low cost leverage to short term traders. They might potentially offer a small return premium compared to the commodity exposure available through equities, though the costs involved in trading futures may overwhelm any small return which might be available.

In investing, complexity is often inversely related to performance. What looks "interesting" often results in worse outcomes than what is simple and can withstand the most difficult market environments. We believe the operational robustness and low cost of buying and holding commodity producer equities makes them

an ideal asset class through which to obtain inflation protection and dependable diversification within any long term portfolio.

Commodity producers – Equities, commodities, or both?

Commodity producers are businesses whose profits are directly linked to commodity prices through ownership, extraction and production of commodities such as energy, metals, and agriculture products. For example, an energy company like Chevron owns oil and gas wells and therefore has exposure to oil and gas stored in the ground. As a result, their earnings are linked to their ability to profitably extract these commodities at the prevailing market price.

The question we aim to answer is whether these commodity producer companies provide protection against rising inflation. Some studies mistakenly conclude from the monthly correlation of returns between equities and commodity producers, which is roughly 0.5, that commodity producers are too much like equities to provide adequate inflation protection (since equities tend to perform poorly in periods of rising inflation). Our research shows that commodity producers provide exposure to both equities and commodities. Figure 1 compares the rolling 3-yr returns of energy sector equities and the S&P 500 against inflation. At first glance it looks as though the energy sector is highly correlated to the S&P 500, but if one looks closely, you will see that during periods of rising inflation like the 1970s, the energy sector outperforms the S&P 500 and similarly underperforms during periods of falling inflation. ***The embedded commodity exposure in energy sector equities increases their correlation to inflation, compared to a broad index.***

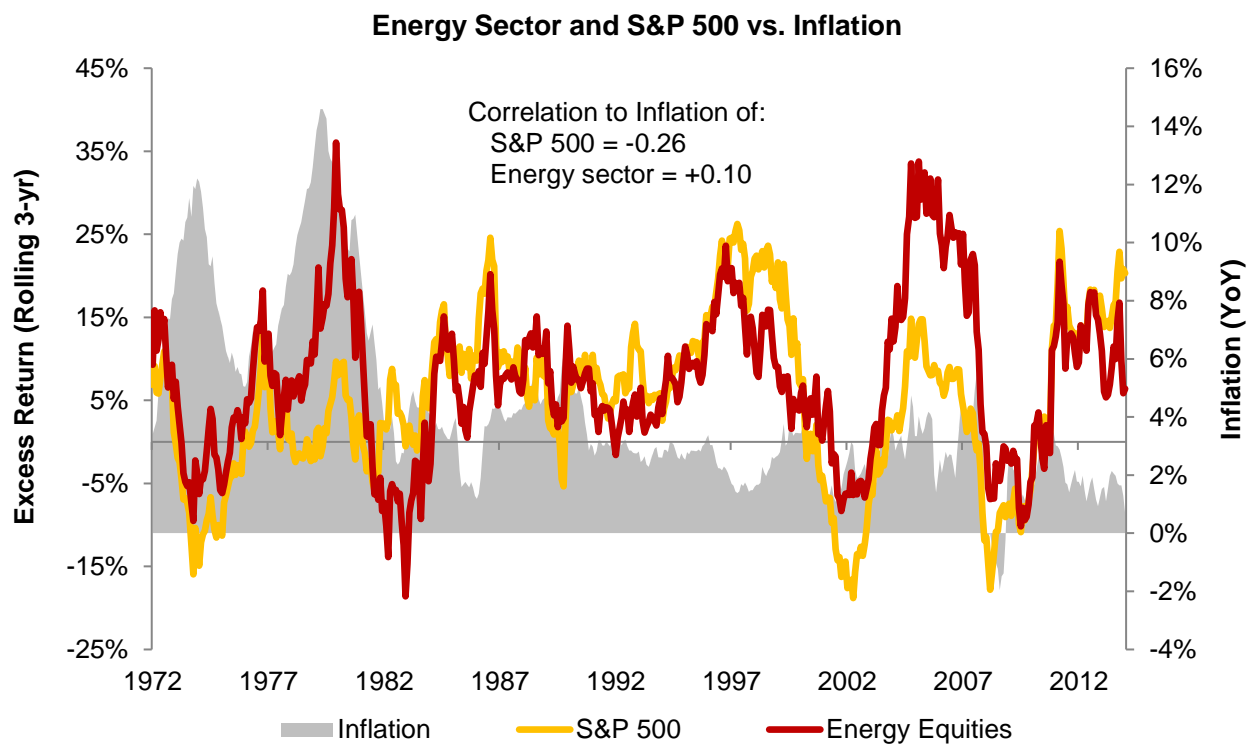


Figure 1. Source: Bloomberg, Federal Reserve, Greenline Partners analysis

In the next section, we show how we consider the exposure of commodity producers in relation to both equities and commodities. Separating these two exposures we believe is critical to properly constructing diversified portfolios.

Commodity exposure from equities is similar to that of commodity futures

To correctly analyze any asset class or bet, we must separate it into its primary exposures. For example, a corporate bond has two primary exposures: interest rates and a credit spread. Similarly, we think of commodity producers as having two primary exposures: equities and commodities. Figure 2 illustrates this separation of exposures. Considered another way, **commodity producer equities come embedded with a leveraged exposure without the risks of using short term borrowing.**

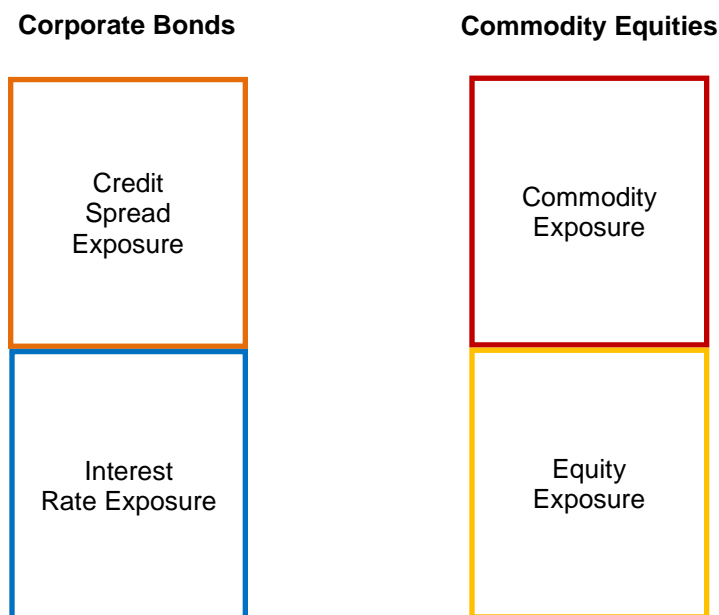


Figure 2. For illustrative purposes only

Separating each exposure allows us to more clearly understand how each one should perform across different economic environments. What the above diagram does not tell us about these asset classes is how much risk we have to the underlying exposure. With a 10-year maturity investment grade corporate bond, this security behaves more like a Treasury bond than an equity because most of its risk is to interest rates and only a small amount to credit spreads. In contrast a 5-year maturity junk rated bond behaves more like an equity because it has more risk to credit spreads than interest rates. The same notion applies across different sectors of commodity producer equities, which we will touch on later in this paper.

Our research shows that growth and inflation define the primary economic environments. In Figure 3, we illustrate the linkage between growth, inflation, equity and commodity prices. Equities should outperform during environments of rising growth because rising growth drives earnings up and in turn stock prices. Commodities should also outperform during such environments because rising growth increases demand for inputs (raw materials) into businesses. Therefore **equities and commodities have a tendency to perform similarly when growth expectations are driving markets. Conversely, when inflation expectations are driving markets, commodities and equities tend to perform opposite to each other.** As inflation expectations are rising, this drives up the price of inputs to production, lowering corporate profit margins (in the absence of also rising growth expectations). In this environment, commodity prices are rising due to inflation, and equity prices tend to be falling as a result of cost pressures and higher discount rates and vice versa during opposite environments.

Performance in Different Environments	Higher Growth	Higher Inflation
Equities	+	-
Nominal Government Bonds	-	-
Commodities	+	+

Figure 3. For illustrative purposes only.

Given the fundamental linkage between inflation and commodity prices, we should expect commodities to dependably protect against inflation surprises. Figure 4 compares metals futures¹ and equity returns against US inflation since 1973. We chose metals prices because of their long data history going back before the 1970s. In comparison, energy futures market data begins around 1980. We see that metals prices track changes in inflation quite well. In contrast, equities move opposite to these changes in inflation, as expected. **A mining company delivers both of these exposures in a single package with costless leverage.**

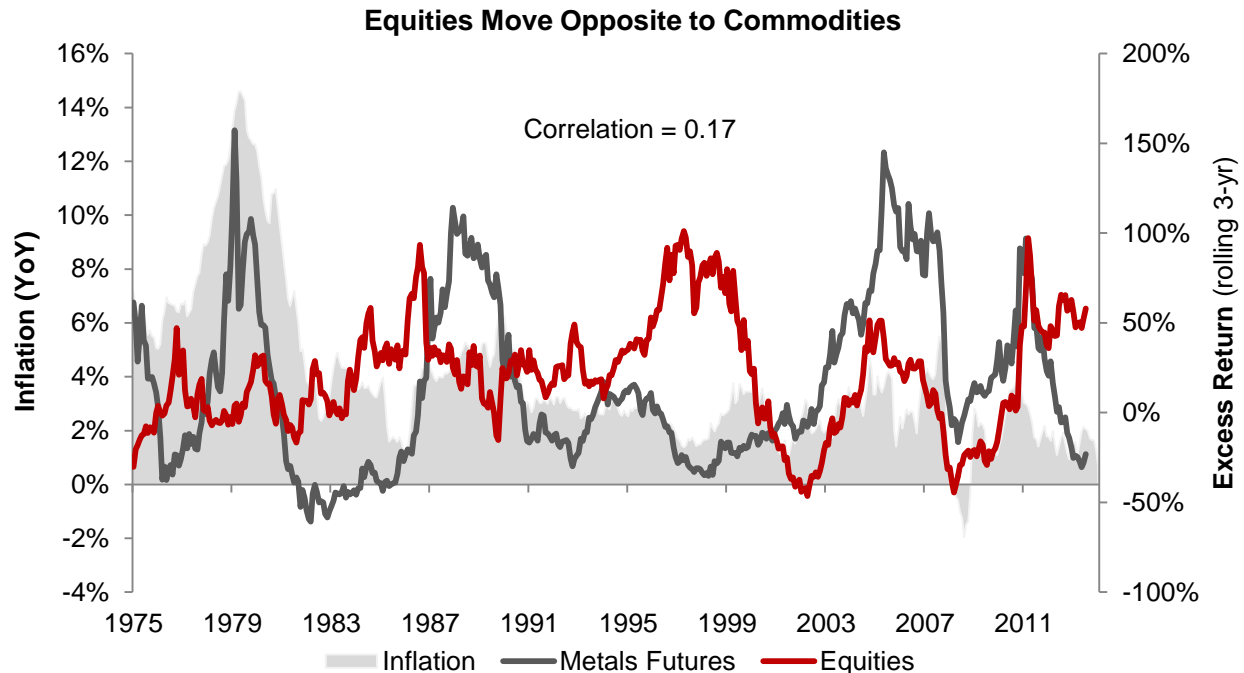


Figure 4. Source: Bloomberg, Federal Reserve, Greenline Partners analysis

It is well known that traditional fixed income tends to perform poorly during periods of rising inflation. As we can see above, equities tend to also perform poorly during such periods. Therefore, inflation protecting commodities should be dependably diversifying to traditional portfolios of equities and fixed income.

As discussed, commodity exposure can be obtained through both the futures markets and the commodity producer companies. The question that follows is whether the commodity exposure embedded in the energy, metals and agriculture equity sectors, is comparable to that provided by commodity futures.

¹ Based on equal weight basket of S&P GSCI Industrial Metals and Precious metals futures indices from Jan 1973-Dec 2014.

We have already seen that commodity prices track changes in inflation. We would not expect the exposures to be identical but they should move together as macro pressures such as inflation and other supply and demand dynamics for a commodity drive its price in one direction or another. Figure 5 compares the spot price of energy, risk adjusted, to that of the energy sector minus the S&P 500 since the inception of the Bloomberg Commodity index data in January 1991. We can see that both exposures are highly correlated to each other.

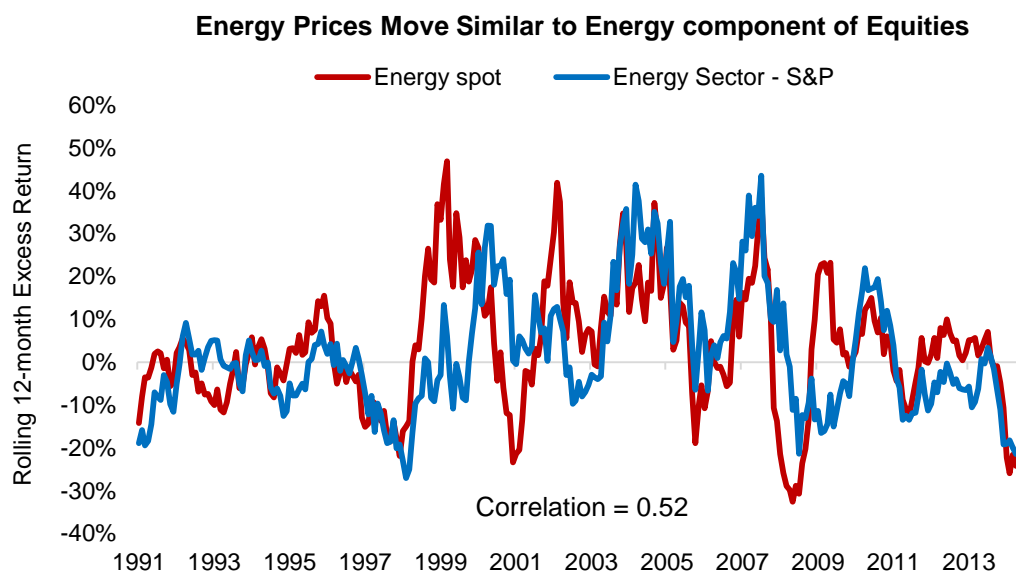


Figure 5. Source: Bloomberg, Greenline Partners analysis. Data from Jan 1991 – Dec 2014.

This is, by no means, a perfect comparison for some of the following reasons. First, the S&P 500 has some weight to the energy sector, therefore it is not a pure equity exposure. If we wanted to be more precise, we would construct an equity benchmark that excluded commodity sectors and subtract its return from the energy sector to calculate the embedded commodity exposure. Second, the S&P 500 also has different biases to value and growth styles as compared to the energy sector. For example, during the Dot.com boom of 1998-2000, the S&P 500 outperformed the energy sector significantly due to the gross overvaluation of technology stocks in the S&P 500. As a result, subtracting the S&P 500 returns from the Energy sector returns made it seem like the result did not keep up with spot energy prices, when in reality it was the growth style bias of the S&P 500 that drove this relative result. The reverse also happened in the fallout from the Dot.com bubble as valuations returned to normal in 2000-2002. During the remainder of the history shown, we can see that energy exposure through equities tracks that of spot energy prices quite well. Of course, ***the costs of storage and complexities associated with trading spot energy are not accounted for in the above comparison and would favor implementation through energy sector equities.*** Implementation costs and complexities are discussed later in this paper.

Another angle from which to compare the commodity exposure provided through the equity market is to construct a replication portfolio. We compare energy sector equities to a portfolio of S&P 500 overlaid with energy futures (50% weight to energy futures to roughly match the volatility of both portfolios). In Figure 6, we compare the rolling 12-month returns of each of these two portfolios. While the comparison is not perfect due to similar reasons discussed above, it shows that energy sector equities are similar to a portfolio of equities and energy futures. To us, this further confirms that commodity exposure from equities is substitutable for commodity futures.

1991-2015	S&P Energy Sector	S&P 500 + Energy futures
Annual Return	10.9%	9.7%
Standard Deviation	18.6%	21.9%
Sharpe Ratio	0.43	0.31

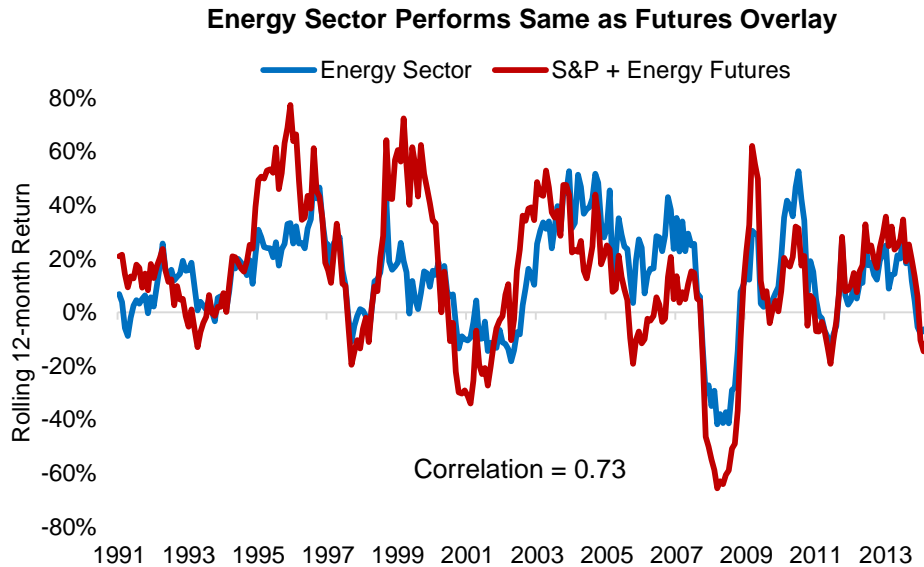


Figure 6. Source: Bloomberg, Greenline Partners analysis. Data from Jan 1991 – Dec 2014.

Both of the above examples have only focused on the energy market but we know commodities span a much broader spectrum including industrial metals (e.g. aluminum, iron, zinc), precious metals (e.g. gold and silver) and agricultural commodities (e.g. corn, soy, coffee, cotton). Our logic for why the underlying commodity exposure from equities in these industries should be similar to that from the futures or spot markets applies equally to these other commodity sectors.

Now that we see that the commodity exposure embedded in commodity producer equities is substitutable for commodity futures, the question is what amount of commodity exposure do we get from equities? Let's take a brief look at considerations for how much risk exposure to commodities a sector may have.

Risk exposure to commodities is different by equity sector

When building portfolios, knowing the amount of commodity exposure achieved via equity sectors, is just as important as understanding whether the exposure is a substitute for commodity futures. The amount of exposure, or riskiness, to commodities will vary from equity sector to sector based on two primary factors: 1) operating leverage of the business and 2) hedging.

A business with very low cost access to a commodity relative to its peers, and therefore a steady flow of profits no matter the underlying commodity price has low operating leverage. The earnings of such a company will rise less quickly as commodity prices are rising than a high cost producer that is more highly leveraged to the price of the underlying commodity. In the oil business, we can compare an oil major like Chevron (ticker: CVX) with low cost access to oil, to a small oil producer like Emerald Oil (ticker: EOX) with production primarily in the high cost Bakken shale. As oil prices rise from \$50/barrel to \$100/barrel, Chevron remains profitable at all points but more profitable as oil prices rise. In comparison, Emerald Oil is only profitable when oil prices are closer to \$100/barrel, but risks bankruptcy if oil prices stay low for a long time.

In Figure 7 we compare the energy exposure from a market cap weighted energy sector index to spot oil over rolling 1-yr periods. The large oil producers that this index is heavily weighted to, like Chevron and its peers, are the low cost producers and less levered to changes in the price of oil. We can see from the chart below that oil prices are approximately twice as volatile as the energy exposure from these equities.

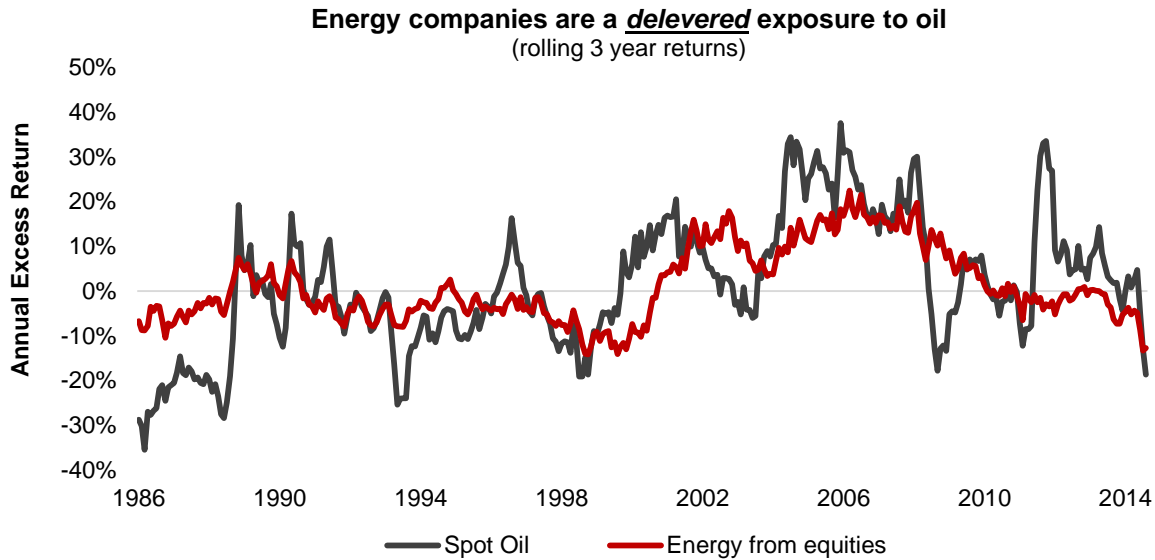


Figure 7. Source: Ken French research data, Bloomberg, Greenline Partners analysis. Data from Jun 1983-Dec 2014.

In contrast to the large cap energy companies, we look at the example of gold miners compared to the spot price of gold in Figure 8. Mining is a very capital intensive business, even more so than oil production. This makes these businesses highly levered to the price of the underlying commodity. The chart below compares the gold exposure from a market cap weighted index of gold miners to spot gold. Here it is the opposite where the spot price of gold is less than half as volatile as the gold exposure from miners.

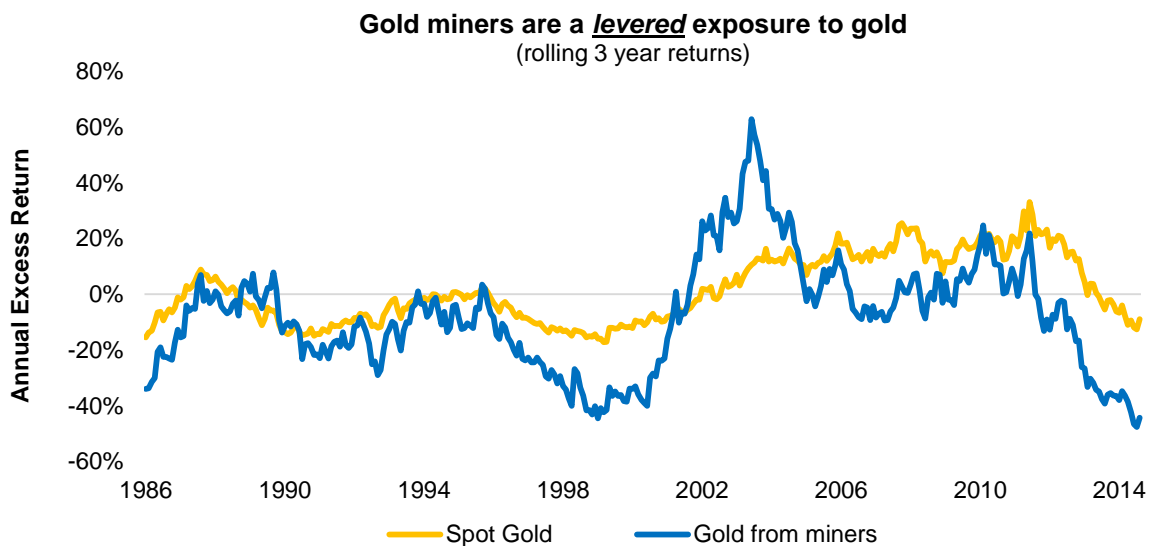


Figure 8. Source: Ken French research data, Bloomberg, Greenline Partners analysis. Data from Jun 1983-Dec 2014.

Whether a company hedges their commodity production and to what degree also drives the risk exposure to commodities from these equity sectors. If a gold miner hedges all of their expected gold production from

swings in gold prices, then their earnings should not be impacted by changes in the price of gold. From the standpoint of an investor looking for commodity exposure, we do not want this. This is another factor that should be taken into account when constructing commodity exposure from equity sectors.

Before we discuss implementation considerations between equities versus futures, we should first address the expected returns of each. While the commodity exposure from futures and equities are highly correlated to each other, if the expected returns significantly differ, then this would need to be taken into consideration.

Futures Should Deliver Higher Return Than Equity Commodity Exposure But Have Not Historically

An asset class should deliver a positive return over time (a risk premium) if the sellers of the asset must incentivize an investor to assume that risk. In commodity futures markets, the sellers of risk are hedgers (e.g. farmers hedging future corn prices, airlines hedging fuel prices, etc...) and buyers of the risk are investors such as pension funds, and speculators such as hedge funds looking to diversify their portfolios.

There is much debate in the investment community about whether commodity futures markets should pay such a risk premium or not. In theory, they should if the demand to transfer risk from hedgers is greater than the capital speculators are willing to supply in order to solely achieve diversification benefits. In practice, there has been very little risk premium delivered by commodity futures and going forward we think the return available should be even smaller as more institutional investors (supply of capital) have come into the market over the last decade².

One way to estimate the availability of a risk premium is to compare the return of longer dated futures contracts to near dated contracts. The longer the term over which a seller is able to lock in a price, the more risk they are able to transfer. Hence there should be more risk premium in longer dated futures contracts. Figure 9 compares the excess return of 3-month futures contracts to the first nearby contract by subtracting one from the other for two portfolios. We show both energy futures as well as a broadly diversified basket of commodity futures. As can be seen, the result over the almost 25 year period is positive pointing towards the existence of a risk premium. But we can also see that almost all of this return came during the 2004-2008 period when many institutional investors made their initial allocations to the asset class. When we exclude the returns from this five year period, the risk premium is closer to 0%. This brings into question the true size of the available risk premium and whether implementation costs overwhelm any small return.

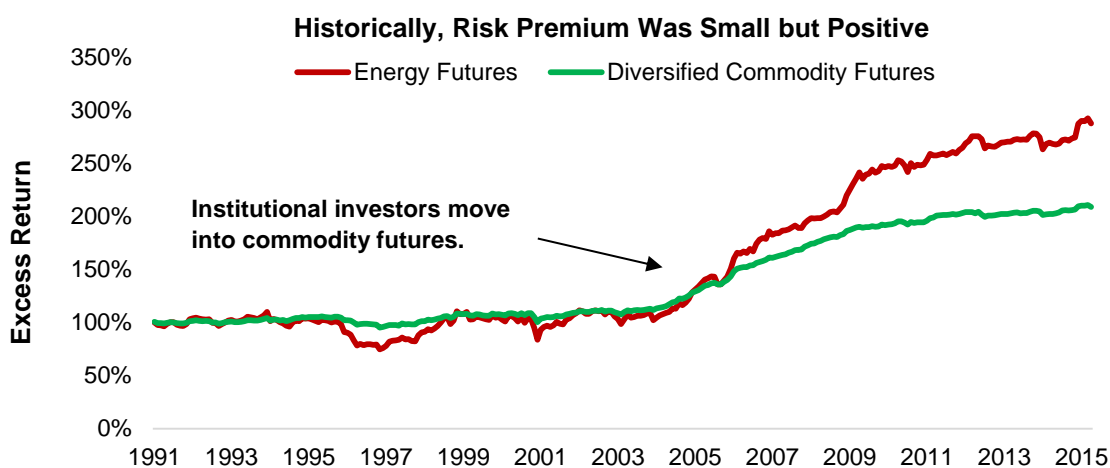


Figure 9. Source: Bloomberg, Greenline Partners analysis. Data from Jan 1991 to April 2015.

² Black, H. Keith, *The Role of Institutional Investors in Rising Commodity Prices*, The Journal of Investing, Fall 2009, pp. 21-26. Summary here: <http://www.cfapubs.org/doi/full/10.2469/dig.v40.n1.36>

1991-2015	Energy	Diversified Commodities
Return	4.4%	3.1%
Volatility	8.8%	3.2%
Ratio	0.51	0.95
Excluding 2004-2008		
Return	1.51%	1.19%
Volatility	9.05%	3.18%
Ratio	0.17	0.37

We do not believe a similar risk premium exists for commodity exposure obtained through equity markets. If we did, it would be saying we expect all commodity producer sectors to inherently offer higher returns than other sectors of the equity market. Therefore, if one believes there is a dependable risk premium in commodity futures then they would choose this market over implementing via equities *before* considering implementation costs.

Any potential risk premium may be more than overcome by implementation costs. For taxable investors, the largest implementation cost is the tax treatment of futures compared to equities. Futures are taxed at a blended rate, 60% long term gains and 40% short term gains, annually. In addition, any collateral held against futures positions will also be taxed. This collateral tends to be fixed income and hence taxed at income tax rates. This is compared to taxes on equities at long term gains rates. On an asset delivering a 5% return, this difference in tax treatment results in an almost 100bp advantage to equities and should be enough for most taxable investors to choose equities over futures for implementation. We review additional implementation considerations in the next section.

Low Cost and Operational Robustness Favor Equities over Futures

When implementing any position, there are two dimensions to consider 1) implementation costs including trading costs, financing costs, operational risks, and taxes, and 2) diversification impact. For trading positions that are only held for short periods of time, trading costs (bid/offer spread + commissions) are often most important. For longer term holdings such as for an investor's strategic asset allocation, the cost of *holding* the position is more important.

We are examining the role of commodities in a strategic asset allocation. Therefore we are primarily concerned with the costs to hold a position, while trading cost considerations are a distant second. The table below compares the costs to hold equities to commodity futures. The cost to hold equities is simply the cost of custody. These costs are generally only a couple basis points, if not close to zero, depending on your asset base and where and how you choose to custody the assets. There are no financing costs or counterparty risk associated with buying and holding physical equities. Last but definitely not least for the taxable investor, is equities' preferential tax treatment because investors are able to defer taxes until the time of sale and additionally will pay the lower long term capital gains rates on positions held for a year or longer.

Costs to Hold	Equities	Commodity Futures
Custodian	<5bp	n/a
Financing cost	n/a	~50bp
Roll costs	n/a	~10-80bp
Taxation	Long term / Deferral	60/40 blended rate / No deferral ability
Counterparty risk	No	Yes, for OTC derivatives
Total costs	<5bp	Approaching 100+bp

Figure 10. Source: CME, Greenline Partners analysis

In comparison, commodity futures incur a much higher cost to hold positions because futures are a leveraged exposure and therefore are implicitly financed and contracts need to be rolled. The financing rate built into most derivatives, including many futures contracts, is LIBOR (the rate at which banks lend to each other). And the collateral backing these contracts tends to be risk-free government bills. This is because futures exchanges and banks set requirements on the quality of collateral that can be used to back derivatives and cash equivalents like T-Bills are always the most readily accepted for such purposes. The yield spread between LIBOR and T-Bills is the financing cost or lost return from holding futures in place of physical securities. This financing cost has averaged 0.5% historically as shown in the chart below. Worse still is that this financing cost tends to spike during times when diversification is most needed, during periods of financial market stress (when equity prices tend to fall).

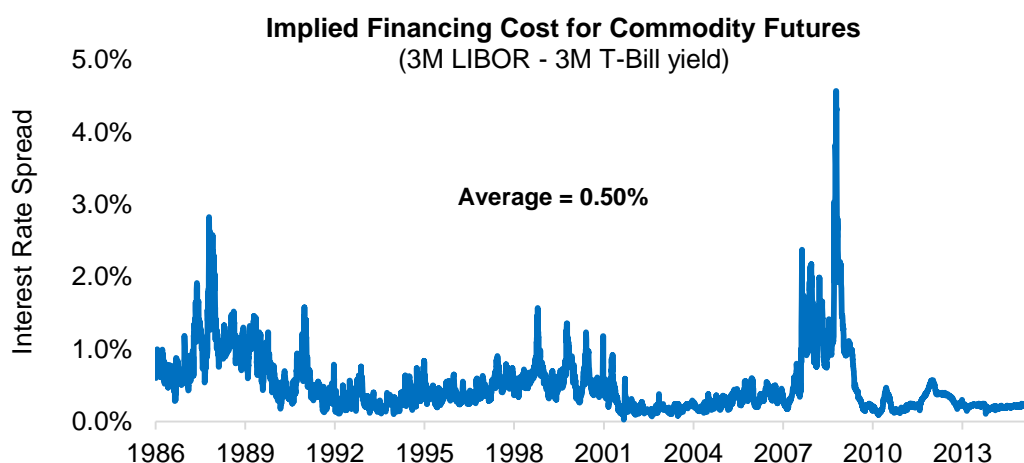


Figure 11. Source: Federal Reserve, Greenline Partners analysis. Data from Jan 1986 – May 2015.

In addition to the implied financing cost, futures positions mature every few months and incur transaction costs to roll into longer dated contracts. While these costs are small for the largest futures markets such as corn and oil, they can be over 0.5% per year for less liquid markets. The costs involved are significantly more than holding equities at a custodian. Counterparty risk is a significant consideration in the derivative markets, less so with futures, but more so with over-the-counter derivatives such as forwards and swaps. Unless investors are able to diversify their exposure across multiple banks, and manage collateral within tight tolerances, most investors should stay away from these contracts. Many suffered deep and permanent losses from counterparty exposure to banks that went under in 2008 including Lehman Brothers and Bear Stearns. Last, but not least, is the consideration of taxes. Derivatives are short term trading instruments and the gains from many contracts are taxed at short term income tax rates. Some futures contracts receive special treatment and incur taxes at a blended rate of 60% long term gains and 40% short-term gains rate. In either case, the taxes paid are higher than long term gains rates and worse yet there is no ability to defer taxes on derivatives.

Where commodity futures have an advantage relative to equities is their lower trading costs in large sizes. But this will not be relevant for any but the largest investors, especially in managing a strategic exposure to commodities within a diversified asset allocation as the cost savings can add up to well over 100bp per year from roll cost, financing cost, and tax savings.

Equities allow exposure to a broader range of commodities

Diversification should improve the consistency of returns. In commodities this is even more so than other asset classes because of the lack of correlation between different commodity sectors. For example, the

supply/demand dynamics of oil are largely unrelated to those of sugar and hence the two assets should be uncorrelated to each other. While the relatively recent financialization of commodity markets should increase correlations between markets, the underlying fundamentals that drive different commodity markets should drive their returns in the longer term, and therefore their diversifying power. To illustrate the power of diversification, Figure 12 compares the returns of oil futures, sugar futures and a 50/50 portfolio of the two. Sugar had a lower return than oil over the last 25 years, but adding the two in a portfolio delivers a higher return and lower volatility than holding either commodity alone. **A commodity investor should prefer the diversified portfolio of these two commodities unless they are placing large, high confidence bets.**

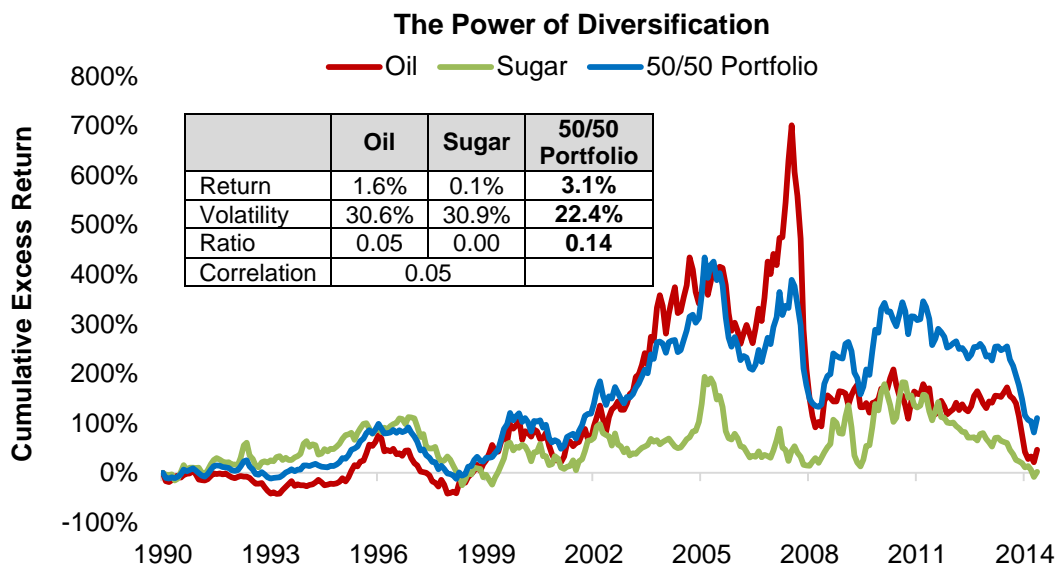


Figure 12. Source: Bloomberg

Equities offer another advantage over futures, greater diversification ability. For example, iron ore exposure is available through companies such as BHP Billiton and Rio Tinto and investors are not size constrained by the related small futures markets. This should improve the diversification ability available through equities. Note that sizing precise exposure to each commodity is more difficult through equities since company balance sheets and production volumes are always changing, but to achieve most of the benefits of diversification does not require precision in any portfolio.

Active commodity futures managers can exploit (temporary) structural inefficiency

Index fund investors are susceptible to front running by active traders and give up returns as a result. This is because any published index of assets must disclose its rules for portfolio construction and rebalancing. Traders get ahead of rebalancing and index reconstitution trading, which drags down the returns of the index funds. This is especially true with commodity futures index funds since futures need to be rolled frequently (up to monthly) and hence require a lot of trading to maintain their target exposure. The most common indices, like the S&P GSCI and Bloomberg Commodity Index are forced to roll, for example, from a June oil contract into September contracts during a short window of time. Active traders get ahead of this activity by trading against the index managers in turn lowering the returns of the indices. These issues though are well known and capitalized on by many managers front running the indices, as a result, we would expect any excess return from such activities to be eaten away over time. More importantly, **outperformance of a bad benchmark is not value adding.** We prefer to start with an intelligently

constructed portfolio that combines only the exposures we want (i.e. equities and commodities) and none that we do not.

The problem of poor index construction is not only an issue for futures indices but for equities as well, though to a much lesser degree. The most common equity indices are market cap weighted in which the largest companies get the largest weight. For example, energy sector exposure through an energy sector ETF such as the iShares US Energy ETF (ticker: IYE), gives exposure to Exxon Mobil and Chevron in weights of 21% and 11% respectively. One third of your portfolio in two stocks is not proper diversification. We can construct a more diversified exposure by simply equal weighting a group of energy companies and rebalancing periodically.

With the knowledge that implementation considerations favor commodity producer equities over futures, we put it all together into using commodity equities to construct better asset allocations.

Constructing Diversified Portfolios with Commodity Producers

We have discussed above how commodities add a fundamentally diversifying exposure to a traditional portfolio of equities and fixed income. Commodities tend to go up when inflation surprises up, opposite to how stocks and bonds perform, and therefore holding commodities should reduce losses in an environment of rising inflation.

Constructing a portfolio with commodities involves deciding how much commodity exposure to add and what amount of stocks and bonds the commodity allocation should replace. Implementing commodity exposure with commodity producer equities means we get both equity and commodity exposures from this one position (as shown in the figure on page 3). For the sake of this example, we will arbitrarily target a commodity exposure of 20%. With commodity producer equities, since they have equity exposure, we can replace part of our equity allocation with them and this gives us the additional exposure to commodities that we desire without giving up anything in our original portfolio. This is like leverage through the derivative markets but without any of the costs and complexities. Figure 13 compares the allocation of a traditional portfolio of 60% equities and 40% bonds to one with the added commodity exposure. **Notice that the diversified portfolio allocation adds up to more than 100% because of the embedded leverage in commodity sector equities.**



Figure 13

Adding commodities should improve diversification and therefore either increase return, reduce risk, or some combination of both. Figure 14 compares the performance of the traditional portfolio shown above on left, to a more diversified portfolio that includes commodity exposure (above right). As you can see, the portfolio with commodity exposure delivers higher returns and the drawdowns are shallower and tend to be of shorter duration. Our example diversified portfolio is geared towards higher returns through the added commodity exposure, which is achieved without any additional risk. Similarly a portfolio could be constructed that reduces risk without giving up return. This is the power of diversification at work.

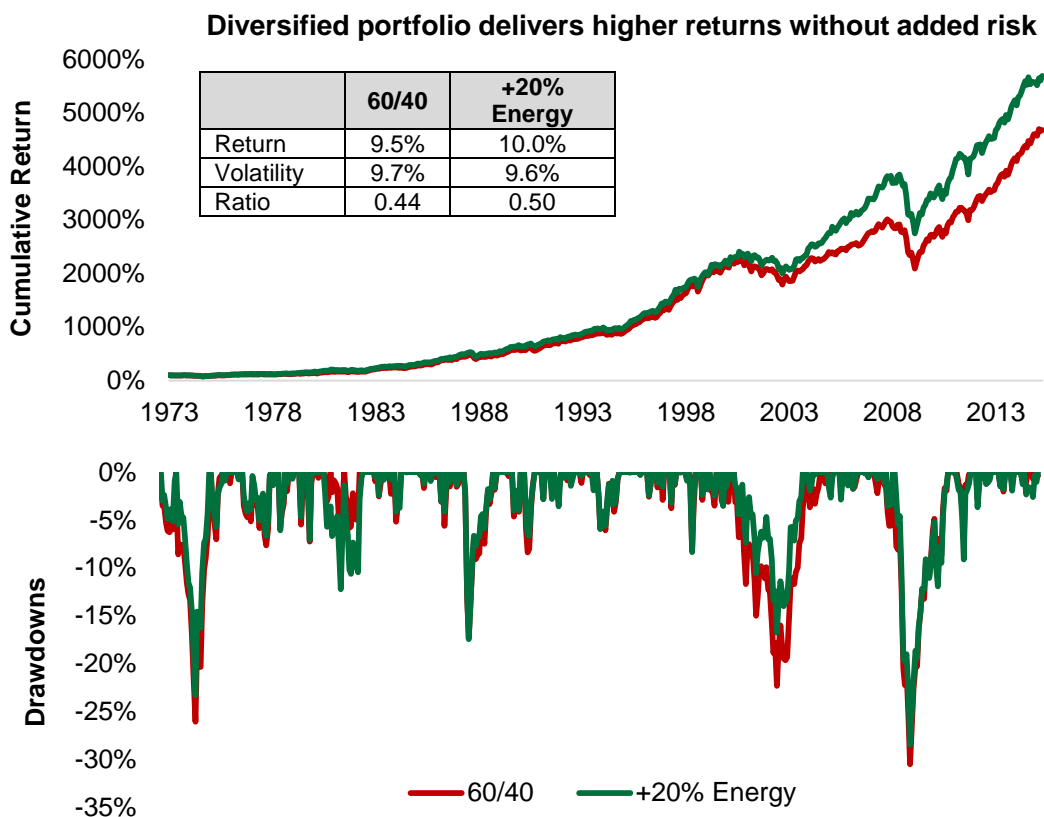


Figure 14. Past performance is not a guarantee of future results. 60/40 portfolio is 60% S&P 500 and 40% Barclays US Treasury Bond Index. +20% Energy portfolio is 40% S&P 500, 40% Barclays US Treasury Bond Index and 20% S&P 500 Energy Index. Data from Jan 1973-Apr 2015. Source: Bloomberg, Barclays, Ken French research data, Greenline Partners analysis.

Our framework of separating exposures into their component parts is applicable across all asset classes, not just equities. Investors looking for inflation protection who have restrictions against investing in fossil fuels can still apply the concepts discussed in this paper. For example, an investor could replace commodities with foreign assets in commodity producer countries such as Canada and Australia. Equities and fixed income from these countries would provide the additional diversification through the embedded currency exposure. This additional inflation protection should lead to either higher return or lower total portfolio risk as in the example above.

In summary, commodity exposure through equities is similar to that from commodity futures and should provide similar protection from inflation surprises. The commodity exposure through equities provides multiple advantages to futures including lower cost implementation, operational simplicity and robustness, and improved tax efficiency. While commodity futures might be expected to deliver an additional risk premium over equities, historical data does not clearly confirm the existence of such a risk premium and we do not believe a significant risk premium exists going forward. Even if a risk premium does exist, we

expect it to be small and therefore implementation costs and complexities of futures over equities should negate any return benefit. Substituting commodity producer equities for part of an equity allocation can fundamentally diversify portfolios and improve the consistency of returns through a wide range of economic environments.

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