



A Systematic Approach to Discretionary Alpha Generation in Commodity Markets

Matthew J Piselli, Chief Investment Officer

July 8, 2015

Key Points:

- A mismatch in the timing, duration and nature of hedges required by the four parties in the commodity production chain creates a need for a community of merchants to effectively disseminate price risk.
- We identify the risk and return attributes of prospective trades by understanding the three drivers of price: fundamental value, flow and momentum.
- By feeding a systematic portfolio construction engine discretionary trade ideas based upon current market conditions, one is able to harness the ingenuity of the adaptive human brain while maintaining proper risk allocations to ensure the long term profitability of the strategy.

Since the inception of the Chicago Mercantile Exchange from the Egg and Butter Exchange in 1898, commodity markets have proliferated as a global forum where Producers, Processors, Shippers and Distributors of raw material could lock in price risk to best fit their financial needs. A mismatch in the timing, duration and nature of hedges required by the four parties in the production chain created a need for a community of merchants to effectively disseminate price risk. These mismatches in flow as well as fundamental changes in the supply/demand dynamic and market momentum can result in transient mispricing of commodity futures. However, the nature of futures contracts, which are marketed to market on a monthly basis in most cases, means that a reversion to fundamental value in commodity markets happens much more quickly than in others. Those markets with excess supply will price to incent storage of the commodity as well as curtailment of production and additional demand where possible, while the converse holds true for periods of time when demand outpaces supply. Given this structure, successful alpha generation in the commodity space requires a methodology for interpreting price signals as either moving a market towards or away from fundamental value. It is the accurate determination of the time to and price from which a reversion to fundamental value occurs that makes a successful trade. The aggregation of multiple trades in the most



efficient manner then yields a successful strategy. In this article we highlight the systematic framework we use to identify opportunities and manage the risk inherent to discretionary trading.

Trade Identification

We identify the risk and return attributes of prospective trades by understanding the three drivers of price: fundamental value, flow and momentum. Understanding the fundamental value of a commodity market entails knowing its balance sheet, or the amount of product being produced and consumed at various regions around the globe. We are then able to project balance sheets forward by understanding the economic behavior of the four participants in the commodity chain (Producers, Processors, Shippers and Distributors) in the short term and long run. Part of this is achieved by maintaining an intimate knowledge of market flows with respect to the transactions that occur both in the physical spot market and financial futures. We actively manage all of our positions, not only to generate additional return, but also to maintain this knowledge of the marketplace and how various players are disseminating price risk. Market momentum is then monitored to better assess the risk of a trade. Despite the fact that a trade may look attractive from the perspective of fundamental value, a market can remain irrational far longer than an individual can remain solvent, therefore, we watch for signals that irrationality is waning. The combination of these three types of market analysis enables us to monitor and highlight low risk, high reward opportunities across the commodity complex.

Risk Assessment and Portfolio Construction

Commodity trading history has taught us that even traders with the best ideas and prescient assessments of economic conditions can sustain massive losses, which makes risk management and portfolio construction the most important ingredients for long term success. Risk assessment begins at the trade level where our discretionary strategy in each commodity¹ is composed of futures and options positions that leave us with a net exposure to idiosyncratic risk in each market. By getting net exposures we are able to bucket risk into highly correlated groups of markets: Petroleum, Grains, Livestock, Precious and Industrial Metals. The matrix in Figure 1 shows the correlation of daily returns for the prompt contract of each commodity since 2005. This approach yields a consolidated risk measure for each bucket.

Commodity markets are naturally uncertain as unpredictable events like weather patterns, geopolitics and future growth trends have a material impact on their pricing. While we can assess the risk attributes of a trade from historical data and current market conditions, it's very difficult to determine return expectations for strategies. A warehouse fire may make our sugar positions immensely profitable while a geopolitical event results in losses in our crude oil positions. Both markets presented high probability return

¹ Given the dynamic nature of trade management, we limit number simultaneous traded markets to 5.



propositions but exogenous events that could not be predicted with any level of accuracy resulted in a material dispersion in the returns of the two strategies.

| | WTI | Brent | Gasoline | Heating Oil | Gas Oil | Natural Gas | Corn | Wheat | Kansas Wheat | Soybeans | Soybean Meal | Soybean Oil | Live Cattle | Feeder Cattle | Lean Hogs | Coffee | Cocoa | Cotton | Gold | Silver | Platinum | Palladium | Copper LME | Copper CME | Nickel | Lead | Zinc | Aluminum |
|---------------|------|-------|----------|-------------|---------|-------------|-------|-------|--------------|----------|--------------|-------------|-------------|---------------|-----------|--------|-------|--------|-------|--------|----------|-----------|------------|------------|--------|------|------|----------|
| WTI | 1.00 | 0.94 | 0.85 | 0.88 | 0.60 | 0.28 | 0.30 | 0.27 | 0.27 | 0.38 | 0.24 | 0.48 | 0.20 | 0.15 | 0.14 | 0.22 | 0.23 | 0.28 | 0.30 | 0.36 | 0.34 | 0.34 | 0.43 | 0.46 | 0.34 | 0.35 | 0.34 | 0.38 |
| Brent | 0.94 | 1.00 | 0.89 | 0.93 | 0.64 | 0.27 | 0.31 | 0.28 | 0.28 | 0.39 | 0.25 | 0.49 | 0.20 | 0.15 | 0.13 | 0.22 | 0.23 | 0.29 | 0.30 | 0.36 | 0.36 | 0.34 | 0.43 | 0.45 | 0.33 | 0.33 | 0.34 | 0.37 |
| Gasoline | 0.85 | 0.89 | 1.00 | 0.87 | 0.59 | 0.27 | 0.28 | 0.24 | 0.24 | 0.34 | 0.22 | 0.45 | 0.16 | 0.12 | 0.11 | 0.19 | 0.19 | 0.25 | 0.26 | 0.31 | 0.32 | 0.30 | 0.38 | 0.40 | 0.31 | 0.30 | 0.30 | 0.33 |
| Heating Oil | 0.88 | 0.93 | 0.87 | 1.00 | 0.68 | 0.31 | 0.29 | 0.25 | 0.25 | 0.37 | 0.24 | 0.47 | 0.16 | 0.12 | 0.12 | 0.20 | 0.20 | 0.27 | 0.28 | 0.33 | 0.33 | 0.32 | 0.39 | 0.41 | 0.30 | 0.31 | 0.32 | 0.35 |
| Gas Oil | 0.60 | 0.64 | 0.59 | 0.68 | 1.00 | 0.18 | 0.21 | 0.17 | 0.17 | 0.28 | 0.16 | 0.39 | 0.14 | 0.12 | 0.08 | 0.18 | 0.22 | 0.23 | 0.25 | 0.32 | 0.34 | 0.33 | 0.40 | 0.39 | 0.30 | 0.34 | 0.34 | 0.35 |
| Natural Gas | 0.28 | 0.27 | 0.27 | 0.31 | 0.18 | 1.00 | 0.15 | 0.12 | 0.11 | 0.15 | 0.12 | 0.18 | 0.08 | 0.05 | 0.04 | 0.10 | 0.08 | 0.07 | 0.07 | 0.11 | 0.09 | 0.09 | 0.12 | 0.11 | 0.07 | 0.07 | 0.07 | 0.12 |
| Corn | 0.30 | 0.31 | 0.28 | 0.29 | 0.21 | 0.15 | 1.00 | 0.66 | 0.63 | 0.65 | 0.58 | 0.54 | 0.18 | -0.11 | 0.09 | 0.21 | 0.16 | 0.30 | 0.21 | 0.26 | 0.24 | 0.23 | 0.26 | 0.27 | 0.22 | 0.19 | 0.21 | 0.24 |
| Wheat | 0.27 | 0.28 | 0.24 | 0.25 | 0.17 | 0.12 | 0.66 | 1.00 | 0.95 | 0.52 | 0.44 | 0.46 | 0.16 | -0.05 | 0.10 | 0.21 | 0.16 | 0.29 | 0.19 | 0.23 | 0.22 | 0.19 | 0.25 | 0.25 | 0.19 | 0.18 | 0.19 | 0.20 |
| Kansas Wheat | 0.27 | 0.28 | 0.24 | 0.25 | 0.17 | 0.11 | 0.63 | 0.95 | 1.00 | 0.50 | 0.43 | 0.45 | 0.16 | -0.04 | 0.10 | 0.20 | 0.15 | 0.28 | 0.18 | 0.22 | 0.22 | 0.19 | 0.25 | 0.25 | 0.19 | 0.17 | 0.19 | 0.20 |
| Soybeans | 0.38 | 0.39 | 0.34 | 0.37 | 0.28 | 0.15 | 0.65 | 0.52 | 0.50 | 1.00 | 0.91 | 0.78 | 0.16 | -0.01 | 0.10 | 0.23 | 0.21 | 0.34 | 0.23 | 0.30 | 0.29 | 0.28 | 0.32 | 0.34 | 0.25 | 0.25 | 0.26 | 0.28 |
| Soybean Meal | 0.24 | 0.25 | 0.22 | 0.24 | 0.16 | 0.12 | 0.58 | 0.44 | 0.43 | 0.91 | 1.00 | 0.53 | 0.12 | -0.03 | 0.07 | 0.18 | 0.16 | 0.27 | 0.16 | 0.22 | 0.20 | 0.20 | 0.22 | 0.25 | 0.17 | 0.17 | 0.18 | 0.20 |
| Soybean Oil | 0.48 | 0.49 | 0.45 | 0.47 | 0.39 | 0.18 | 0.54 | 0.46 | 0.45 | 0.78 | 0.53 | 1.00 | 0.17 | 0.02 | 0.10 | 0.24 | 0.22 | 0.36 | 0.28 | 0.35 | 0.35 | 0.34 | 0.38 | 0.40 | 0.29 | 0.30 | 0.31 | 0.33 |
| Live Cattle | 0.20 | 0.20 | 0.16 | 0.16 | 0.14 | 0.08 | 0.18 | 0.16 | 0.16 | 0.16 | 0.12 | 0.17 | 1.00 | 0.77 | 0.36 | 0.13 | 0.10 | 0.15 | 0.06 | 0.12 | 0.12 | 0.14 | 0.18 | 0.19 | 0.13 | 0.11 | 0.13 | 0.16 |
| Feeder Cattle | 0.15 | 0.15 | 0.12 | 0.12 | 0.12 | 0.05 | -0.11 | -0.05 | -0.04 | -0.01 | -0.03 | 0.02 | 0.77 | 1.00 | 0.28 | 0.08 | 0.06 | 0.07 | -0.01 | 0.06 | 0.06 | 0.10 | 0.12 | 0.13 | 0.08 | 0.07 | 0.09 | 0.10 |
| Lean Hogs | 0.14 | 0.13 | 0.11 | 0.12 | 0.08 | 0.04 | 0.09 | 0.10 | 0.10 | 0.10 | 0.07 | 0.10 | 0.36 | 0.28 | 1.00 | 0.09 | 0.06 | 0.07 | 0.05 | 0.07 | 0.08 | 0.09 | 0.11 | 0.11 | 0.10 | 0.12 | 0.12 | 0.10 |
| Coffee | 0.22 | 0.22 | 0.19 | 0.20 | 0.18 | 0.10 | 0.21 | 0.21 | 0.20 | 0.23 | 0.18 | 0.24 | 0.13 | 0.08 | 0.09 | 1.00 | 0.22 | 0.21 | 0.19 | 0.24 | 0.23 | 0.23 | 0.22 | 0.23 | 0.19 | 0.18 | 0.20 | 0.21 |
| Cocoa | 0.23 | 0.23 | 0.19 | 0.20 | 0.22 | 0.08 | 0.16 | 0.16 | 0.15 | 0.21 | 0.16 | 0.22 | 0.10 | 0.06 | 0.06 | 0.22 | 1.00 | 0.18 | 0.21 | 0.25 | 0.26 | 0.24 | 0.25 | 0.25 | 0.19 | 0.20 | 0.22 | 0.22 |
| Cotton | 0.28 | 0.29 | 0.25 | 0.27 | 0.23 | 0.07 | 0.30 | 0.29 | 0.28 | 0.34 | 0.27 | 0.36 | 0.15 | 0.07 | 0.07 | 0.21 | 0.18 | 1.00 | 0.18 | 0.23 | 0.24 | 0.26 | 0.28 | 0.29 | 0.23 | 0.22 | 0.22 | 0.23 |
| Gold | 0.30 | 0.30 | 0.26 | 0.28 | 0.25 | 0.07 | 0.21 | 0.19 | 0.18 | 0.23 | 0.16 | 0.28 | 0.06 | -0.01 | 0.05 | 0.19 | 0.21 | 0.18 | 1.00 | 0.81 | 0.66 | 0.52 | 0.37 | 0.40 | 0.26 | 0.28 | 0.33 | 0.33 |
| Silver | 0.36 | 0.36 | 0.31 | 0.33 | 0.32 | 0.11 | 0.26 | 0.23 | 0.22 | 0.30 | 0.22 | 0.35 | 0.12 | 0.06 | 0.07 | 0.24 | 0.25 | 0.23 | 0.81 | 1.00 | 0.66 | 0.59 | 0.45 | 0.48 | 0.32 | 0.35 | 0.40 | 0.40 |
| Platinum | 0.34 | 0.36 | 0.32 | 0.33 | 0.34 | 0.09 | 0.24 | 0.22 | 0.22 | 0.29 | 0.20 | 0.35 | 0.12 | 0.06 | 0.08 | 0.23 | 0.26 | 0.24 | 0.66 | 0.66 | 1.00 | 0.71 | 0.45 | 0.45 | 0.33 | 0.38 | 0.40 | 0.42 |
| Palladium | 0.34 | 0.34 | 0.30 | 0.32 | 0.33 | 0.09 | 0.23 | 0.19 | 0.19 | 0.28 | 0.20 | 0.34 | 0.14 | 0.10 | 0.09 | 0.23 | 0.24 | 0.26 | 0.52 | 0.59 | 0.71 | 1.00 | 0.48 | 0.48 | 0.38 | 0.41 | 0.44 | 0.45 |
| Copper LME | 0.43 | 0.43 | 0.38 | 0.39 | 0.40 | 0.12 | 0.26 | 0.25 | 0.25 | 0.32 | 0.22 | 0.38 | 0.18 | 0.12 | 0.11 | 0.22 | 0.25 | 0.28 | 0.37 | 0.45 | 0.45 | 0.48 | 1.00 | 0.93 | 0.62 | 0.66 | 0.76 | 0.71 |
| Copper CME | 0.46 | 0.45 | 0.40 | 0.41 | 0.39 | 0.11 | 0.27 | 0.25 | 0.25 | 0.34 | 0.25 | 0.40 | 0.19 | 0.13 | 0.11 | 0.23 | 0.25 | 0.29 | 0.40 | 0.48 | 0.45 | 0.48 | 0.93 | 1.00 | 0.59 | 0.62 | 0.71 | 0.67 |
| Nickel | 0.34 | 0.33 | 0.31 | 0.30 | 0.30 | 0.07 | 0.22 | 0.19 | 0.19 | 0.25 | 0.17 | 0.29 | 0.13 | 0.08 | 0.10 | 0.19 | 0.19 | 0.23 | 0.26 | 0.32 | 0.33 | 0.38 | 0.62 | 0.59 | 1.00 | 0.54 | 0.60 | 0.54 |
| Lead | 0.35 | 0.33 | 0.30 | 0.31 | 0.34 | 0.07 | 0.19 | 0.18 | 0.17 | 0.25 | 0.17 | 0.30 | 0.11 | 0.07 | 0.12 | 0.18 | 0.20 | 0.22 | 0.28 | 0.35 | 0.38 | 0.41 | 0.66 | 0.62 | 0.54 | 1.00 | 0.69 | 0.59 |
| Zinc | 0.34 | 0.34 | 0.30 | 0.32 | 0.34 | 0.07 | 0.21 | 0.19 | 0.19 | 0.26 | 0.18 | 0.31 | 0.13 | 0.09 | 0.12 | 0.20 | 0.22 | 0.22 | 0.33 | 0.40 | 0.40 | 0.44 | 0.76 | 0.71 | 0.60 | 0.69 | 1.00 | 0.69 |
| Aluminum | 0.38 | 0.37 | 0.33 | 0.35 | 0.35 | 0.12 | 0.24 | 0.20 | 0.20 | 0.28 | 0.20 | 0.33 | 0.16 | 0.10 | 0.10 | 0.21 | 0.22 | 0.23 | 0.33 | 0.40 | 0.42 | 0.45 | 0.71 | 0.67 | 0.54 | 0.59 | 0.69 | 1.00 |

Figure 1: Intermarket Correlation of Daily Prompt Commodity Returns Since 2005

Therefore a diversified approach mitigates the systemic risk inherent to commodity markets. Due to this systemic risk we weight all strategies according to their volatility by assuming a static tradeoff between risk and return while limiting the risk allocated to any single bucket to 33% of the total portfolio (i.e. we assume all of the discretionary strategies that we execute have the same Sharpe Ratio). A key component to any portfolio optimization is the covariance matrix; it has to be accurate to work properly. To ensure a stable and efficient optimization, we utilize a discretionary matrix that incorporates historical data, seasonal shifts in market volatility and tail risks as they arise. Figure 2 shows the efficient frontier for a portfolio of 4 commodity strategies with a static Sharpe Ratio of 1. The most efficient portfolio is denoted as “Sharpe” while the “Equal” portfolio demonstrates the decreased efficiency of an even 25% allocation to each strategy. Such an approach gives us the optimal risk allocation to each of our discretionary strategies; however, to ensure the long term profitability of the strategy we also need to scale the aggregate risk levels appropriately.

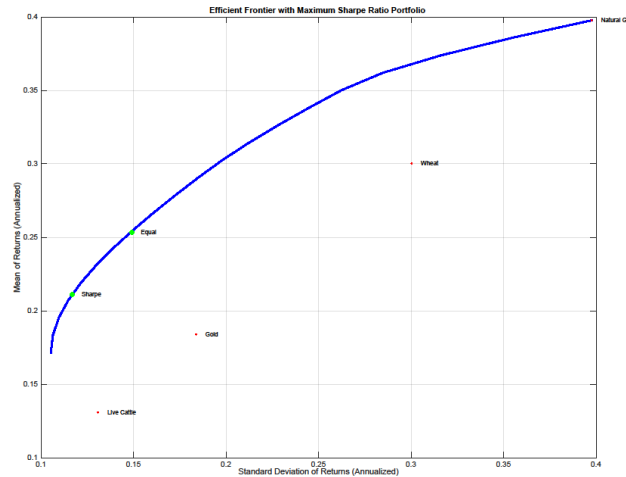


Figure 2: Efficient Frontier of Maximum Sharpe Ratio of an Example Four Commodity Portfolio

Portfolio Risk Scaling and Drawdown Limits

Loss is the permanent impairment of capital. An investment in a commodity alpha generation strategy provides the manager with trading capital. To ensure that the operation is run profitably over the long run, managers must adhere to strict max drawdown constraints. By lowering maximum portfolio VAR during periods of drawdown a manager can effectively eliminate the probability of catastrophic loss from which the strategy would not be able to recover. The chart in figure 3 shows expected max drawdown of strategies over various time periods (1, 2 and 3 years). Even strategies with high Sharpe Ratios are expected to hit unacceptable drawdown levels over a long enough time periods. For this reason the target max volatility of the portfolio must be lowered during periods of drawdown to ensure the longevity of the strategy as show in Figure 4.

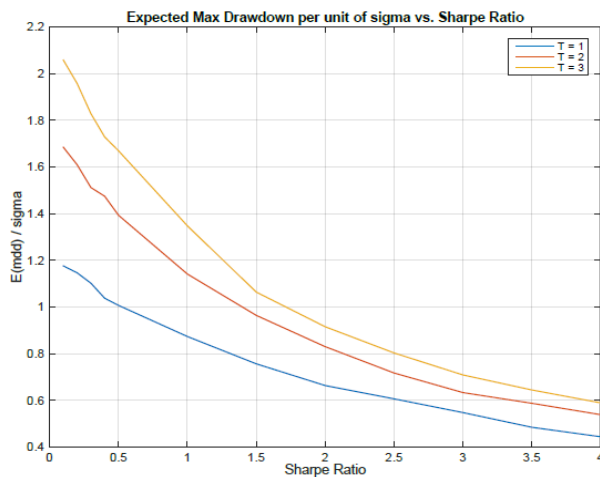


Figure 3: Expected Max Drawdown of Various Sharpe Ratio Strategies Over Varying Time Frames

| | YTD Performance | Daily Target Max Volatility of Returns |
|----------------|-----------------|--|
| Domain of Gain | >20% | 1.5% |
| | 10% to 20% | 1.25% |
| | 5% to 10% | 1.00% |
| Domain of Loss | -3% to 5% | 0.75% |
| | -6% to -3% | 0.50% |
| | -8% to -6% | 0.35% |
| | <-8% | 0.25% |

Figure 4: Scaled Risk to Achieve a Max Drawdown of 10%



Mark Twain once noted that: “history rhymes, it does not repeat.” In financial markets this adage manifests itself in a phenomenon that practitioners have long called regime shift whereby pricing relationships change with the passing of time. Regime shift renders pure static systematic strategies unprofitable over the long run as the underlying relationships only exist fleetingly. While pure discretionary strategies have the capacity to adapt to shifting regimes but often fail as the main decision maker deviates from sound risk management, often echoing the fatal last sentiment: “This time is different.” By feeding a systematic portfolio construction engine discretionary trade ideas based upon current market conditions, one is able to harness the ingenuity of the adaptive human brain while maintaining proper risk allocations to ensure the long term profitability of the strategy.

Contact: Info@ButtonwoodMerchants.com

Disclaimer:

The information contained in this report has been compiled by Buttonwood Merchants from sources believed to be reliable, but no representation or warranty, express or implied, is made by Buttonwood Merchants, its affiliates or any other person as to its accuracy, completeness or correctness. All opinions and estimates contained in this report constitute Buttonwood Merchants' judgement as of the date of this report, are subject to change without notice and are provided in good faith but without legal responsibility. Nothing in this report constitutes legal, accounting or tax advice or specific investment advice. This material is prepared for general circulation and has been prepared without regard to the individual financial circumstances and objectives of persons who receive it. This report is not an offer to sell or a solicitation of an offer to buy any securities. Past performance is not a guide to future performance, future returns are not guaranteed, and a loss of original capital may occur. Every province in Canada, state in the U.S., and most countries throughout the world have their own laws regulating the types of securities and other investment products which may be offered to their residents, as well as the process for doing so. As a result, the securities discussed in this report may not be eligible for sale in some jurisdictions. This report is not, and under no circumstances should be construed as, a solicitation to act as securities broker or dealer in any jurisdiction by any person or company that is not legally permitted to carry on the business of a securities broker or dealer in that jurisdiction. To the full extent permitted by law neither Buttonwood Merchants nor any of its affiliates, nor any other person, accepts any liability whatsoever for any direct or consequential loss arising from any use of this report or the information contained herein. No matter contained in this document may be reproduced or copied by any means without the prior consent of Buttonwood Merchants.