Invited Editorial

How to time the commodities markets

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ABSTRACT In this article we construct and investigate the performance of elementary trading strategies that allow an investor to time between equities and commodities. Our strategies appear to capture time-varying risk premiums in the equity and commodity markets, enabling them to successfully time the market, outperforming the benchmark index as well as buy-and-hold and trend-based strategies.

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TIMING COMMODITY MARKETS USING RISK PREMIUMS

Commodity futures markets have recently come to the attention of financial investors, with the total investments of commodity index funds having grown from US\$13 billion to \$260 billion in the last 5 years. Much of the attraction comes from the fact that a diversified portfolio of commodities seems to produce equity returns

with low or even negative correlation with equities. The study by Gorton and Rouwenhorst¹ comes to this conclusion and finds considerable evidence supporting the inclusion of commodities in a portfolio. However, Harvey and Erb² point out that it is important to avoid naive extrapolation of historical returns and to strike a balance between dependable sources of return and possible sources of return.

Modern finance theory suggests that the most dependable source of return is the risk premium. There are three kinds of risk premiums that exist in the commodity futures markets where most of the institutional investors trade. The first is generated by the risk factors that affect the underlying asset and are transmitted to the futures price via the ‘cash-and-carry’ arbitrage pricing relationship between spot and futures prices. The evidence on this premium is mixed, with Bessembinder³ finding a strong relationship between the risk premiums in spot and futures markets for 22 commodities, whereas Dusak⁴ finds that the Capital Asset Pricing Model beta for a number of agricultural futures contracts is indistinguishable from zero. The second source of risk premium in futures markets arises from the term structure of futures prices leading to term premiums. These have been studied^{5,6} more recently by Harvey and Erb², who suggest that the ‘roll return’ that arises as a result of the shape of the term structure of futures prices explains much of the variation in expected returns across a wide range of commodities. The third source of risk premium is hedging demand by producers, following the hedging pressure hypothesis of Keynes.⁷ This premium has been empirically investigated in the last few decades.^{3,8,9} These studies find evidence for a time-varying hedging pressure risk premium particularly in commodity futures markets and also in financial futures markets, although the nature of the risk premium is different across these two sets of markets.

Our study focuses on the hedging pressure risk premium and we endeavor to exploit it to construct long-only timing strategies that time between the commodity market, the S&P500 index and a risk free asset (in this study we use the return on a short-term US Treasury bill). We

consider six commodities, crude oil, gold, silver, copper, soybeans and sugar, representing three major commodity sectors: energy, metals and agriculture. All have liquid futures markets. We use the Commitment of Traders (COT) report produced by the Commodity and Futures Trading Commission (CFTC) to construct measures of hedging pressure. ‘Hedging pressure’ is defined as the fraction of traders in each category who are long. The CFTC classifies large traders into ‘commercial traders’ and ‘non-commercial traders’, and we use the hedging pressure of both these categories. The futures positions of commercial traders reflects hedging demand, while that for non-commercial traders should reflect the response of speculators, but perhaps also the actions of momentum traders such as index or hedge funds. Thus, these two measures could provide different information for timing. The Keynesian hedging pressure hypothesis does not apply for the S&P500, and we consider commercial hedging pressure only for the S&P as it reflects the actions of a homogeneous group of traders. The COT report appears to be quite widely used by traders in commodities, equities and foreign exchange, who seem to regard it as a useful intermediate-to-long-term indicator. The importance of the COT report for industry practitioners was highlighted in 2006 when the CFTC announced that they were considering no longer publishing it, and received more than 4500 responses from industry professionals, virtually all of which urged the CFTC to continue publishing the report.

We construct elementary timing strategies based on the information contained in the hedging pressure reports. Specifically, our strategies will take a long position in any given commodity (futures) when commercial hedgers

are short or speculators are long, and we go long the S&P whenever commercial hedgers are also long in the S&P. The commodity timing signal is motivated by the hedging pressure hypothesis, whereas the signal for trading the S&P is inspired by the results of Basu and Stremme.¹⁰ Our strategies are similar in spirit to 'trigger' strategies used by traders who utilize the COT report. We assess the performance of our strategies using various common performance measures, and compare it to the performance of simple trend-following strategies.

DATA AND METHODOLOGY

When a reportable trader, that is, one whose positions are above a minimum threshold level, is identified to the CFTC, the trader is classified as either a 'commercial' or 'non-commercial' trader. A trader's reported futures position is determined to be commercial if the trader uses futures contracts for the purposes of hedging as defined by CFTC regulations. Specifically, a reportable trader is classified as commercial by filing a statement with the CFTC (using the CFTC Form 40) that he is commercially '... engaged in business activities hedged by the use of the futures and option markets'. However, to ensure that traders are classified consistently and with utmost accuracy, CFTC market surveillance staff members in the regional offices check the forms and reclassify the trader if necessary. A reportable participant may be classified by the CFTC as non-commercial in one market and commercial in another market, but cannot be classified as both in the same market. Having said this, a multi-functional organization that has multiple trading entities may have each entity classified independently. The two categories of 'commercial' and

'non-commercial' comprise between 70 and 90 per cent of open interest in any given futures market (the CFTC's third class of traders, 'non-reportable', makes up the remainder of the market interest).

Hedging pressure for any one market and any one group of traders is defined as the number of long contracts held by this group of traders, divided by the total number of contracts in that market. In other words, hedging pressure measures the imbalance in long and short positions between the different groups of traders, relative to the total volume of open interest. Our data are at weekly frequency and covers the period October 1992 (when the CFTC first released the COT report) to the end of 2006. The data are obtained from DataStream.

Our timing strategies are motivated by the hedging pressure hypothesis for commodity producers, which imply that investors should go long when either commercial hedgers are going short or speculators are going long. The investment strategy for the S&P is based on the findings of Basu and Stremme.¹⁰ Our strategies are constructed as follows. On Friday of any given week, we invest in a given commodity if the commercial hedging pressure for this commodity and for the S&P500 is below their 52-week averages. Conversely, we invest in the S&P if commercial hedging pressure for both the commodity and the S&P are higher than their 52-week averages. In all other cases we invest in the risk-free asset (in our case the 3-month US Treasury bill). We consider the performance of these real-time strategies over the 2000–2006 period.

As a comparison benchmark for our strategies, we chose trend-based strategies. As there is no commonly accepted theory to select such a

strategy (according to the paradigm of finance theory, no such strategy should generate any abnormal return), we sought to find the ‘hardest to beat’, ‘make it as hard as possible’ trend-based strategies. We thus tested a variety of trend-based strategies and selected the best-performing as the benchmark to beat. A ‘trend-reversal’ strategy proved most successful. This strategy invests in a given commodity if the previous week’s return on this commodity was *below* its 52-week average and at the same time last week’s return on the S&P500 was *above* its 52-week average. Conversely, the strategy invests in the S&P500 if its most recent return was below the 52-week average and the most recent return on the commodity was above its average. In all other cases, the strategy remains fully invested in the risk-free asset. This strategy is based on data-mining but is the most challenging benchmark for our risk-premium-based strategy. Of course, it could be argued that the choice of this strategy is based on data-mining, but the idea was to choose the strategy that is the ‘hardest-to-beat’ benchmark for our hedging-pressure-based strategies.

RESULTS

Table 1 summarizes the performance of the base assets (the S&P500 and the six selected commodities, as well as an equally weighted portfolio of the six commodities) over the entire sample period (2000–2006). We see that copper was the best performing of the individual commodities, with a Sharpe ratio of 0.66, whereas an equally weighted portfolio of all six commodities had lower volatility than any of the individual commodities, reflecting the benefit of diversification owing to the low correlation between the commodity groups, and a Sharpe

Table 1: Descriptive statistics of the assets

<i>Asset</i>	<i>Mean (%)</i>	<i>Volatility (%)</i>	<i>Sharpe ratio</i>
Copper	18.72	23.15	0.6580
Crude	18.60	31.34	0.4820
Gold	7.52	16.33	0.2469
Silver	9.67	27.28	0.2264
Soybeans	4.62	22.67	0.0500
Sugar	10.68	31.18	0.2306
Equally weighted	11.63	14.64	0.5565
S&P500	0.90	16.84	0.0532

This table presents the annualized mean, volatility and Sharpe ratios of the weekly returns on the individual assets, as well as an equally weighted portfolio of the six commodities over the 2000–2006 period.

ratio of 0.56. The S&P500 index had a Sharpe ratio of only 0.05 over this period. Any fixed weight combination of the S&P and the equally weighted portfolio of commodities is unlikely to have achieved a Sharpe ratio higher than that of the commodity portfolio alone.

Table 2 reports the performance of our timing strategy using commercial hedging pressure, for each of the individual commodities, and finally for an equally weighted portfolio of all six individual strategies. The timing strategies work best with gold and silver, with statistically significant alphas relative to the S&P of 11 per cent and 19 per cent, respectively, thus supporting a ‘flight to quality’ argument. The equally weighted portfolio has the lowest overall volatility, benefiting from the low correlations between the individual commodities, and its alpha of 11 per cent has the lowest *P*-value overall. These results broadly support the hedging pressure hypothesis in the commodity markets and a time-varying risk premium in the equity market, both of which are successfully captured by our timing strategies.

Table 2: Strategies based on commercial hedging pressure

<i>Asset</i>	<i>Mean (%)</i>	<i>Volatility (%)</i>	<i>Sharpe ratio</i>	<i>Alpha (%)</i>	<i>P-value (%)</i>
Copper	9.22	12.78	0.4483	6.73	10.81
Crude	10.73	14.04	0.5156	8.24	9.99
Gold	13.65	12.08	0.8407	11.16	0.57
Silver	21.61	15.18	1.1934	19.12	0.02
Soybeans	8.28	13.70	0.3495	5.79	24.64
Sugar	17.44	16.10	0.8666	14.95	1.24
Equally weighted	13.49	8.99	1.1117	11.00	0.01

This table presents the annualized mean, volatility, Sharpe ratios and the alphas and their *P*-values with respect to the S&P500 of the timing strategies between the individual commodities and the S&P index described in 'Data and methodology' section, based on commercial hedging pressure. The performance of an equally weighted portfolio of the individual timing strategies is also reported. The performance is over the 2000–2006 period.

Table 3 shows the performance of the strategies based on non-commercial hedging pressure. We find that using non-commercial hedging pressure (the positions of large speculators in the futures market) leads to broadly similar results overall, with the Sharpe ratio and alpha of the equally weighted strategy almost identical to that with commercial hedging pressure. There are, however, differences on the level of individual commodities, with the strategy using copper, crude oil and soybeans performing better with non-commercial hedging pressure than with commercial, while the opposite is true for silver and sugar. This indicates a difference in the nature of the risk premiums captured by commercial and non-commercial hedging pressure, with the latter reflecting the influence of speculators who are not necessarily responding to hedgers' demands but perhaps rather reflecting momentum trading.

The results of the trend-based strategy are shown in Table 4. The strategies using individual

Table 3: Strategies based on commercial hedging pressure

<i>Asset</i>	<i>Mean (%)</i>	<i>Volatility (%)</i>	<i>Sharpe ratio</i>	<i>Alpha (%)</i>	<i>P-value (%)</i>
Copper	11.72	13.57	0.6064	9.23	3.24
Crude	12.40	14.51	0.6145	9.91	4.93
Gold	13.73	12.78	0.8013	11.24	0.93
Silver	9.10	15.43	0.3635	6.61	21.14
Soybeans	12.28	12.66	0.6945	9.79	4.70
Sugar	17.64	16.85	0.8398	15.15	1.80
Equally weighted	14.20	9.08	1.1802	10.32	0.03

This table presents the annualized mean, volatility, Sharpe ratios and the alphas and their *P*-values with respect to the S&P500 of the timing strategies between the individual commodities and the S&P index described in 'Data and methodology' section, based on non-commercial hedging pressure. The performance of an equally weighted portfolio of the individual timing strategies is also reported. The performance is over the 2000–2006 period.

Table 4: Trend-following strategies

<i>Asset</i>	<i>Mean (%)</i>	<i>Volatility (%)</i>	<i>Sharpe ratio</i>	<i>Alpha (%)</i>	<i>P-value (%)</i>
Copper	9.96	12.69	0.5096	7.47	12.41
Crude	2.89	17.37	−0.0347	0.40	95.18
Gold	8.70	10.97	0.4750	6.21	11.92
Silver	16.51	12.61	1.0324	14.02	0.32
Soybeans	6.18	12.14	0.2215	3.69	41.62
Sugar	11.13	17.96	0.4253	8.64	18.87
Equally weighted	9.23	7.87	0.7285	6.74	1.68

This table presents the annualized mean, volatility, Sharpe ratios and the alphas and their *P*-values with respect to the S&P500 of the timing strategies between the individual commodities and the S&P index based on trend-following strategies described in ‘Data and methodology’ section. The performance of an equally weighted portfolio of the individual timing strategies is also reported. The performance is over the 2000–2006 period.

commodities underperform the hedging-pressure strategies, except for silver, which matches the performance of the corresponding hedging-pressure strategy. The equally weighted portfolio has an alpha of 6.7 per cent with a *P*-value of 1.6 per cent, indicating that trend-based strategies could add value but that over this time period strategies based on hedging pressure outperform them. The cumulative returns of the three sets of equally weighted strategies over the 2000–2006 period are shown in Figure 1. The figure shows that both hedging pressure strategies would have delivered almost identical cumulative returns, considerably higher than the trend-based strategy.

Finally, there is the issue of robustness, as the hedging pressure strategies are based on deviations from the 52-week mean. We explore robustness by varying the basis for deviations, that is, triggering a buy or sell signal if the most recent returns are below or above a certain percentile (instead of the mean) of the 52-week historical distribution. For example, for the

commercial hedging pressure strategies we go long the commodity if the commercial hedging pressure for both the commodity and the S&P is below a certain percentile of the previous year’s hedging pressure and long the S&P if both commercial hedging pressures are above a certain percentile. We examine the performance of three equally weighted strategies for the 60th and 80th percentiles. Table 5 shows that the Sharpe ratios and *P*-values for the commercial hedging pressure strategy are much the same at the two levels. The performance of the strategy based on non-commercial hedging pressure is similar at the 60th percentile, but declines somewhat at the 80th percentile. A contra-strategy at this level, going short instead of long, does not work, indicating that non-commercial hedging pressure is less reliable at extreme levels. The trend-based strategy has a similar performance at the 60th percentile level but achieves a negative Sharpe ratio and alpha at the 80th percentile level, indicating that it is less robust overall than the others.

Figure 1: Cumulative returns of the equally weighted portfolios.

Note: This figure shows the cumulative returns of the equally weighted portfolios of the individual timing strategies between the S&P500 index and the six commodities based on commercial hedging pressure (blue line), non-commercial hedging pressure (green line) and the trend-following strategy (red line). The timing strategies are described in detail in ‘Data and methodology’ section.

Table 5: Strategies based on different percentile levels

	<i>Mean (%)</i>	<i>Volatility (%)</i>	<i>Sharpe ratio</i>	<i>Alpha (%)</i>	<i>P-value (%)</i>
<i>60%/40% trigger</i>					
CHP	12.32	6.95	1.2701	9.68	0.00
NCHP	11.64	6.95	1.2098	8.50	0.01
TF	8.69	6.17	0.8429	6.05	1.20
<i>80%/20% trigger</i>					
CHP	6.60	3.34	0.9299	3.53	0.53
NCHP	5.47	3.34	0.5091	2.94	3.53
TF	3.03	11.73	-0.0391	-0.04	99.19

This table presents the annualized mean, volatility, Sharpe ratios and the alphas and their *P*-values with respect to the S&P500 of the equally weighted timing strategies based on different percentile levels using commercial hedging pressure (CHP), non-commercial hedging pressure (NCHP) and trend-following (TF) strategies. These timing strategies are described in detail in ‘Data and methodology’ section.

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