The stock market price of commodity risk

Summary of Inquire Europe research proposal

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Commodity futures have been attracting increasing attention over the last decade as exchange-traded volume grew six fold from 0.6 billion contracts in 1998 to 3.5 billion contracts at the peak of the June 2008 commodity boom. In parallel, the share of open interest attributable to institutional index investment grew from 6% (10 billion dollar) to 35% (250 billion dollar). These changes revived the academic debate on what explains the cross-section of commodity futures returns. (See e.g., Erb and Harvey (2006), Gorton and Rouwenhorst (2006), Szymanowska et al. (2010) and Hong and Yogo (2010)). Both commodity-specific (basis, hedging pressure, open interest and momentum) and macroeconomic (inflation, business cycle) factors are found to play a role. In contrast, the traditional, portfolio return-based stock market factors proposed in Fama and French (1992, 1993, 1996) and Carhart (1997) seem to play no role, suggesting that the commodity futures market has historically been segmented from the stock market. (See, e.g., Dusak (1973), Bessembinder (1992) and Erb and Harvey (2006).)

We intend to shed more light on this debate by exploring whether a stock's exposure to aggregate commodity risk is priced. Commodity prices are a risk factor that influences inflation for consumers as well as input and output prices for firms. Since commodity prices are readily available at high frequencies, flexible relative to broader price indices (e.g., CPI) and forward-looking they may also be useful as indicators of monetary policy. Thus, because investment, production and consumption decisions are to be conditioned on commodity prices, one would expect innovations in these prices to be among the shocks to which the stock market reacts sensitively.

We sort stocks according to their beta with respect to an index of 33 commodity futures and find a cross-section of expected returns that cannot be explained by the traditional asset pricing models. Pre-2004, stocks with low commodity betas outperform those with high commodity betas by 8% to 11% per year in average and risk-adjusted returns. Post-2003, stocks with low commodity betas underperform those with high commodity betas by -11%. We find that a novel commodity factor captures these spreads in time-series regressions and our cross-sectional regressions imply a commodity risk premium of around 5% pre-2004 and -8.5% post-2003 per unit of exposure. Combining, our results suggest that the commodity factor is an additional risk factor, not replacing the traditional Fama-French (-Carhart) factors.

We link the reversal in the commodity risk premium to investors' incentives to hedge inflation. A simple CAPM-type model builds on results verifying that the commodity index represents a timely, aggregate measure of relevant parts of inflation. In particular, pre-2004, this incentive motivates investors to pay high prices for stocks that move in-sync with commodities, because these stocks pay off in the face of inflation, unexpected inflation and unfavorable changes in expected inflation. Post-2003, however, many, large institutional investors are hedging this risk directly by investing in commodity index related instruments. Given that these investments are attractive from a speculative point of view as well; our model implies the observed reversal in the commodity risk premium. In fact, this link marks an important contribution: recent evidence suggests that the impact of institutional index investment on commodity futures prices might be weak; the impact on stock prices is not.

Our findings are particularly relevant for stocks that are strongly exposed to commodity risk and suggest that commodity betas are useful in devising strategies that use stocks to hedge or speculate on commodity prices. Moreover, commodity betas are shown to be informative of a stock's inflation hedging potential. This finding is particularly interesting for those institutions that may be prevented or restricted, in any way, to invest in commodities.

As a natural extension, we investigate the role of inflation directly. We plan to build on the long-standing idea that mimicking portfolios of non-returns factors improve on asset-pricing tests. (See, e.g.: Breeden (1979), Breeden et al. (1989) and Balduzzi and Robotti (2005, 2010).) In line with these arguments, the first results from various asset-pricing tests are weak when we use raw measures of inflation as the risk factor of interest. In contrast, when we use a novel set of base assets to construct a linear mimicking portfolio, i.e., commodity beta sorted portfolios, we find that inflation is relevant for stock prices. In line with the findings above, the observed inflation risk premium is positive historically and falls to zero in the last decade: the availability of TIPS and commodity index investments might provide for relatively efficient inflation hedges, alleviating the need to hedge in the stock market. By exploring a number of additional methods to construct the mimicking portfolio, such as news-tracking portfolios as in Lamont (2001) or sorts on historical and predicted betas as in Pastor and Stambaugh (2003), we intend to add to discussions on how best to construct the hedge portfolio for a general risk factor.