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Effects of speculation and interest rates in a “carry trade” model of commodity prices[☆]



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The paper presents and estimates a model of the prices of oil and other storable commodities, a model that can be characterized as reflecting the carry trade. It focuses on speculative factors, here defined as the trade-off between interest rates on the one hand and market participants' expectations of future price changes on the other hand. It goes beyond past research by bringing to bear new data sources: survey data to measure expectations of future changes in commodity prices and options data to measure perceptions of risk. Some evidence is found of a negative effect of interest rates on the demand for inventories and thereby on commodity prices and positive effects of expected future price gains on inventory demand and thereby on today's commodity prices.

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This paper presents and attempts to estimate a model of macroeconomic determinants of prices of oil and other commodities, with an emphasis on the intermediating role of inventories. It could be called the “carry trade” model in the light it shines on the trade-off between interest rates and speculation regarding future changes in the price of the commodity. Low real US interest rates are a signal that money is plentiful, with the result that funds venture far afield in search of higher expected returns, whether it is in mineral commodities or in foreign currencies.

The phrase “carry trade” is today primarily associated with speculation in international fixed-income markets, where the spot price of concern is the price of foreign exchange and the “cost of carry” is the international difference in interest rates. There is perhaps an irony here, because the original intuition comes from more tangible commodities, where the cost of carry includes storage costs (among other variables).

1. Macroeconomic influences

There are times when so many commodity prices move so much together that it becomes difficult to ignore the influence of macroeconomic phenomena. The decade of the 1970s was one such time. Recent history provides another. It cannot be a coincidence that prices of oil and almost all mineral and agricultural commodity prices rose in unison from 2001 to 2007, peaked jointly and abruptly in mid-2008, plunged together in 2009, and attained together a second peak in 2011. Three theories compete to explain increases in commodity prices in recent years.

First, and perhaps most standard, is the *global growth explanation*. This argument stems from the unusually widespread growth in economic activity after 2000 – particularly including the arrival of China and other entrants to the list of important economies and their rapid recovery from the 2008–09 global recession – together with the prospects of continued high growth in those countries in the future. This growth has raised the demand for, and hence the price of, commodities (See Kilian and Hicks, 2012).

The second explanation – also highly popular, at least among the public – is *speculation*. Many commodities are highly storable; a large number are actively traded on futures markets. We can define speculation as the purchases of the commodities, whether in physical form or via contracts traded on an exchange, in anticipation of financial gain at the time of resale. This includes not only the possibility of destabilizing speculation (bandwagon effects), which is what the public often has in mind, but also the possibility of stabilizing speculation. The latter case is the phenomenon whereby a rise in the spot price relative to its long run equilibrium generates expectations of a price decline in the future, leading market participants to sell or short the commodity today and thereby dampen the price increase today.

One kind of evidence that has been brought to bear on this argument is the behaviour of inventories. Krugman (2008a, b) and Wolf (2008), for example, argued that inventories were not historically high at the time of the 2008 price spike and therefore that speculators could not have been betting on price increases and could not have added to the current demand. Others have found evidence in inventory data that they interpret as consistent with an important role for speculation, driven for example by geopolitical fears of disruption to the supply of Mideastern oil (See Kilian and Murphy, 2013; Kilian and Lee, 2013).

The third explanation is that *easy monetary policy* has contributed to increases in commodity prices, via either high demand or low supply. Easy monetary policy often shows up as low real interest rates.² Barsky and Kilian (2002, 2004) and others have argued that high prices for oil and other commodities in the 1970s were not exogenous, but rather a result of easy monetary policy. The same could be argued for other mineral and agricultural commodities. Conversely, a substantial increase in real interest rates drove commodity prices down in the early 1980s, especially in the United States. High real interest rates raise the cost of holding inventories. Lower demand for inventories then contributes to lower total demand for commodities.³

² See Frankel (2008a, b), for example.

³ A second effect of higher interest rates is that they undermine the incentive for oil-producing countries to keep crude oil under the ground. By pumping oil instead of preserving it, OPEC countries could invest the proceeds at interest rates that were higher than the return to leaving it in the ground. Higher rates of pumping increase supply; both lower demand and higher supply contribute to a fall in oil prices. The same mechanisms apply to decisions about extracting minerals, logging forests, harvesting crops, etc.

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