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Commodity Markets and Commodity Mutual Funds

KEY FINDINGS

- » **Fundamentals, not funds, drive commodity prices.** Fundamental economic factors—market demand and supply conditions—provide the most consistent explanation for recent trends in commodity prices. The rise and fall of commodity prices on a monthly basis since 2004 has been strongly linked to the value of the U.S. dollar and the world business cycle—in particular, to the strength or weakness in emerging market economies such as China, Brazil, India, and Russia.
- » **"Financialization" has not driven commodity prices.** Despite concerns raised by some policymakers that increased commodity index investment (the financialization of commodities) has driven commodity price movements, numerous academic studies have concluded that index-based investing has not moved prices or exacerbated volatility in commodity markets in recent years.
- » **Investing in commodity mutual funds provides important benefits for investors.** Commodity mutual funds typically invest in a broad basket of commodities. Investing in a broad index of commodities can help investors offset the risk of investing in stocks or bonds. Commodity mutual funds also allow retail investors to offset or hedge against increases in their costs of living, especially increases in food and energy prices.
- » **Flows to commodity mutual funds have little or no influence on commodity prices.** An examination of ICI data on weekly and monthly net flows into commodity mutual funds reveals that these flows have little or no effect on the overall growth rate of commodity prices. In particular, weekly flows into commodity mutual funds do not lead to future commodity price changes. These results are consistent with academic papers that find little or no impact of commodity index investors on commodity prices in individual markets.
- » **Three key factors illustrate why flows into commodity mutual funds cannot explain commodity price movements since 2004.** First, commodity mutual funds experienced net outflows on average from January 2006 to June 2008 while commodity prices rose. Second, flows into commodity mutual funds are spread across a wide range of markets and thus do not concentrate investment in a particular commodity. Finally, the \$47.7 billion in commodity mutual funds as of December 2011 is miniscule relative to the size of global commodity markets.

Introduction

Products such as gold, silver, crude oil, natural gas, corn, wheat, and soybeans are generally thought of as “commodities.” These and hundreds of other types of commodities are traded daily around the world.¹ Commodities are traded in the spot market, where a buyer takes immediate (“physical”) delivery of the commodity. Commodities are also traded in derivatives markets through such instruments as forwards, futures, options, or swaps. These derivatives allow buyers and sellers to set prices for exchanges of commodities at a future date, in the case of forwards and futures, or to hedge against price changes and other risks.²

Over the past decade, the prices of many commodities have risen dramatically and have varied widely (Figure 1). In December 1998, crude oil prices troughed at around \$10 per barrel, gold was less than \$300 per ounce, and corn was less than \$100 per metric ton. From there, commodity prices rose considerably, and in 2008 the prices of many commodities hit all-time highs. For example, oil rose above \$130 per barrel, gold cost more than \$900 per ounce, and corn rose to about \$280 per metric ton. As the recent

global financial crisis hit global growth, commodity prices plummeted in late 2008 and early 2009. They quickly rebounded with the world’s economic recovery.

The rise in raw material prices has raised production and distribution costs for many manufacturers. On the other hand, some U.S. producers, such as corn growers, have benefitted from higher commodity prices. For consumers, the rise in commodity prices has pushed up the cost of living and increased uncertainty over the future cost of food and energy.

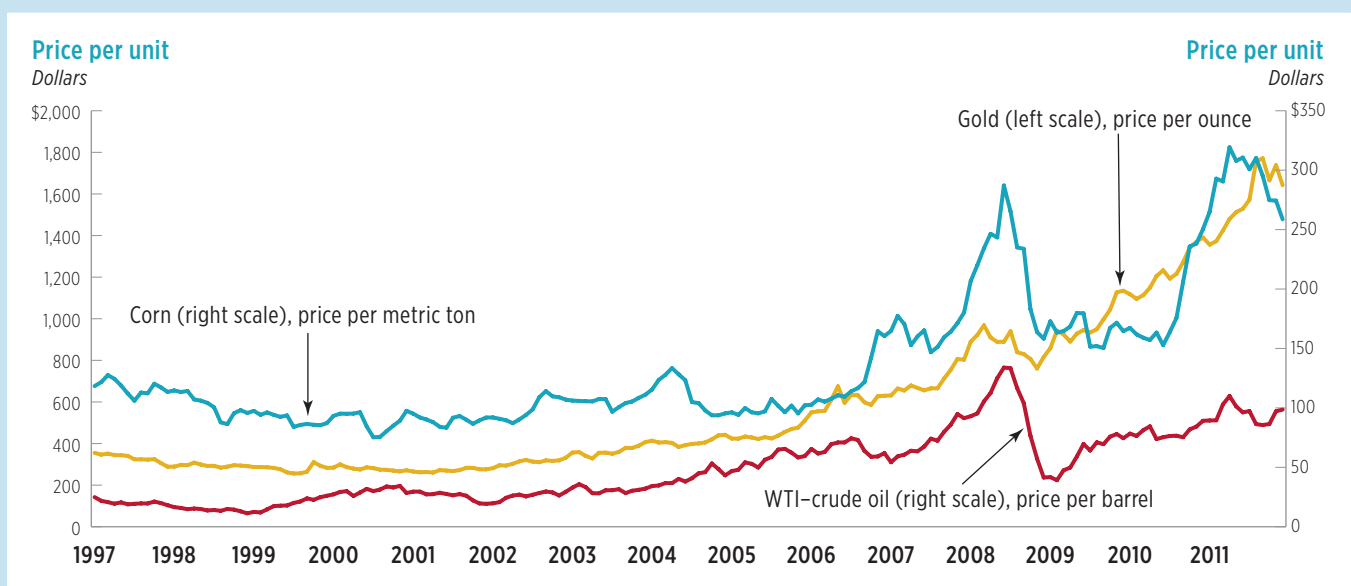
Recent developments in commodity prices have raised concerns among policymakers and sparked widespread debate over the causes of these price changes. Many market participants, economists, and analysts believe that economic fundamentals—market demand and supply conditions, including special conditions affecting specific commodities—account for this pattern of change.

Other analysts, however, point to a trend sometimes referred to as the “financialization” of commodity markets—the increase in commodity investment by participants other than producers and users of commodities. In recent

FIGURE 1

Commodity Prices Rose over the Last Fifteen Years

Monthly, 1997–2011*



*Data to December 2011.

Source: World Bank

years, hedge funds, pension funds, university endowments, and others, including mutual fund investors, increasingly have sought exposure to commodity investments to diversify their portfolios and to protect against inflation. Some commentators have called these investors “massive passives,” because they use commodity index–linked instruments, such as commodity index swaps, to establish long-term diversified positions in commodity markets. Critics of the trend toward the financialization of commodities, including some policymakers, argue that excessive speculation by these long-term passive investors is responsible for rising and volatile commodity prices.³ Their argument is that the large increase in long-term passive investments is driving commodity prices higher and de-linking commodity prices from fundamentals.

This paper examines these two competing explanations for the pattern of commodity prices during the last decade. It concludes that fundamental factors—market demand and supply conditions—provide the most consistent explanation for recent trends in commodity prices. The paper shows that the rise and fall in commodity prices on a monthly basis since 2004 has been strongly linked to the value of the U.S. dollar and the world business cycle—in particular, to strength or weakness in emerging market economies such as China.⁴ When world growth accelerates, so too does production of goods such as automobiles and consumer

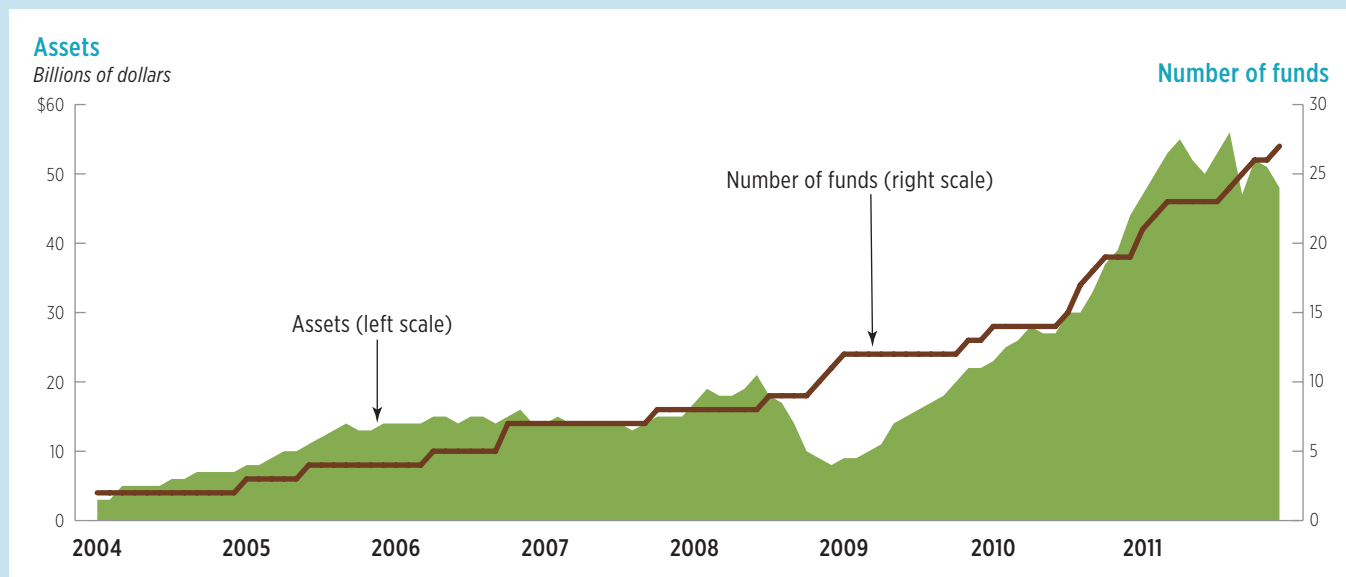
electronics, the need for raw materials, and worldwide demand for commodities. Moreover, rising incomes in emerging market economies rapidly have improved standards of living in such countries as China, India, and Brazil, where increased demand for food and energy has served to boost commodity prices. Strong global and emerging market growth dramatically reduced inventory levels and spare capacity in many commodity markets from 2003 to 2008. This diminished spare capacity combined with supply-side factors—bad weather, crop failures, and political uncertainties in some oil-producing countries—to produce high and volatile commodity prices.

The paper briefly reviews the academic literature on financialization to determine whether commodity index swaps or traders of these swaps might explain recent patterns in commodity prices. As discussed, the literature does not support the view that investment in commodity index swaps is behind the rise in commodity prices. On the contrary, the view that flows into commodity index investments explain the patterns in commodity prices is largely circumstantial and anecdotal, arising primarily from the increasing popularity and availability of commodity-related investments such as commodity mutual funds, commodity exchange-traded funds (ETFs), and commodity exchange-traded notes (ETNs).

FIGURE 2

Number and Assets of Commodity Mutual Funds

Monthly, 2004–2011*



*Data to December 2011.

Source: Investment Company Institute

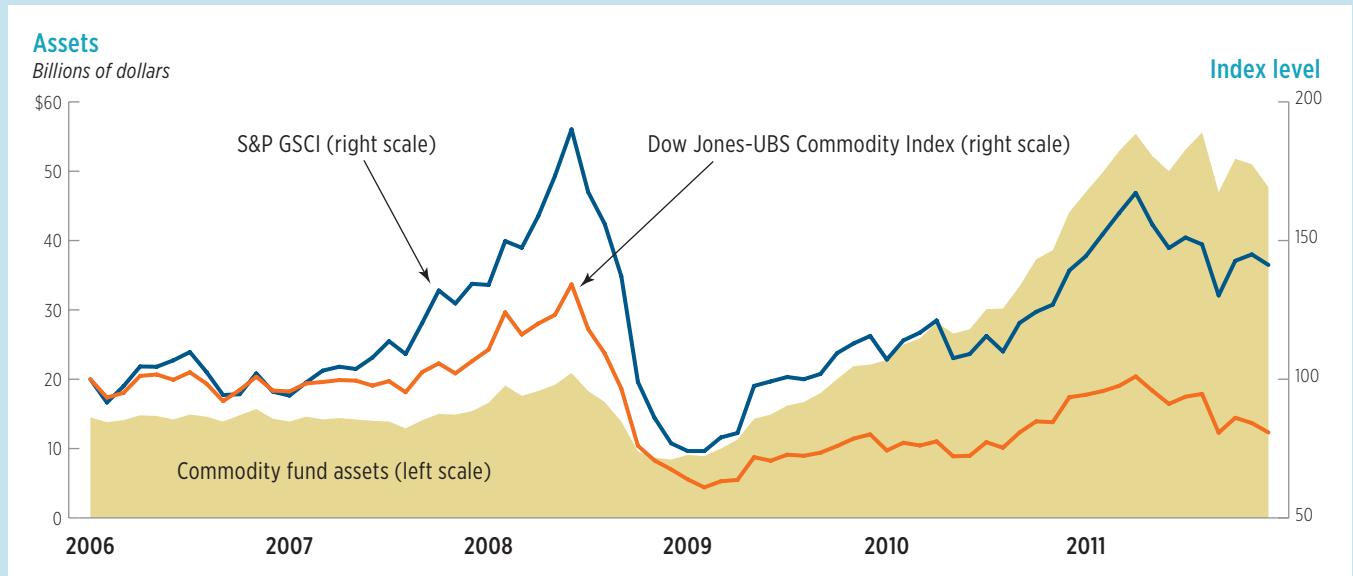
This paper’s chief contribution to the current policy debate is to examine the growth of commodity mutual funds, put this growth in its appropriate context, and assess the impact of this growth on commodity markets and prices. The assets and number of such funds have grown substantially (Figure 2), in parallel with the rise in commodity prices. The relationship between the assets of commodity mutual funds and commodity prices has led some to argue that commodity mutual funds are responsible for rising and volatile commodity prices.

As the paper discusses, commodity mutual funds are a relatively new development. They allow investors, especially retail investors, to obtain the diversification benefits of commodity investments, benefits that were historically much harder to achieve. But there is little if any evidence indicating that commodity mutual funds have caused rises in commodity prices over the past decade. As this paper explains, the apparent relationship between commodity prices and assets in commodity mutual funds is mostly mechanical (Figure 3), arising because the value of a fund’s holdings must rise when the prices of commodities rise, even without any new investment on the part of mutual fund shareholders.⁵

FIGURE 3

Commodity Mutual Fund Assets and Commodity Price Indexes

Monthly, 2006–2011*



*Data to December 2011.

Note: Prices were indexed to 100 in January 2006.

Sources: Investment Company Institute and Bloomberg

The paper explores whether new investment to commodity mutual funds might be responsible for rising commodity prices.⁶ The answer is no. An in-depth statistical analysis based on regression techniques indicates that flows to commodity mutual funds, at either a monthly or a weekly frequency, have little or no influence on commodity prices.

Finally, the paper explains why it is so unlikely that commodity mutual funds have influenced commodity prices. Commodity mutual funds comprise only a very small portion

of global commodity markets. By the end of 2011, these funds held \$47.7 billion in assets, while global commodity markets measured in the trillions of dollars (see “Size and Composition of Global Commodity Markets” on page 6). Further, the assets of commodity mutual funds are spread across a wide range of individual commodities, amounting to no more than \$8 billion in any individual commodity, which greatly limits any potential influence on commodity prices in those markets.

Size and Composition of Global Commodity Markets

Hundreds of commodities trade daily on dozens of exchanges around the world. The amount of commodity trading that occurs in spot, futures, and options markets on these exchanges on a monthly basis is massive, measured in trillions of dollars globally. The size of particular markets, however, varies for different commodities, and some commodity markets see more trading than others do.

Figure 4 shows 12 highly traded commodities and the estimated value of the physical market for 2010, estimated futures and options monthly volume as of October 2011, and the estimated value of futures contracts and options outstanding as of October 2011. These numbers demonstrate that the spot market is much larger than the assets in commodity mutual funds. The figure also demonstrates that futures and options monthly trading is quite large relative to the size of physical markets. In fact, the value of monthly trading volumes in futures and options is in many cases much greater than the estimated value of the physical market for the entire year.

FIGURE 4

Commodity Market Size

Billions of dollars

Commodity	Total sales in spot market <i>Annual</i>	Trading volume in futures and options markets <i>Monthly</i>	Futures and options market open interest
West Texas Intermediate (WTI) and Brent crude oil	\$2,500	\$2,800	\$279
Live cattle CME	1,500	76	21
Heating oil and gas oil	800	982	74
Unleaded gasoline	705	318	33
Gold	182	2,067	145
Silver	21	369	30
Zinc	27	1,910	13
Copper	144	1,228	58
Aluminum	89	484	47
Corn	104	291	64
Wheat CBOT	165	61	17
Soybean	120	375	55
Totals	6,357	10,964	835

Note: Spot (physical) market value is calculated using a quantity supplied and average price for 2010 for each individual commodity. Futures and options data as of October 2011.

Source: Barclays Capital

Over the past decade, some have pointed to the large increase in “open interest”—the value of futures contracts outstanding—or the large increase in trading in futures markets as a sign that speculation is driving commodity markets.⁷ That view ignores crucial differences between spot and futures markets. While trading volume in spot markets is limited by the production of physical commodities, there is no supply constraint on the number of futures or option contracts that can be created. Indeed, futures contracts are a zero-sum product; for every contract, one investor is “long” in the commodity, and another is “short.” The vast majority of futures contracts never lead to delivery of the physical product. Instead, longs and shorts are offset, and the contracts cancelled on the contracts’ delivery dates.

Irwin, Sanders, and Merrin 2009 point out that money flows to derivatives markets are not the same as demand for other assets, since derivative contracts are zero-sum markets that can respond to increased flows by creating a large number of identical contracts without moving prices. Indeed, one mark of a properly functioning futures market is that price increases will be accompanied by an increase in open interest as the supply of contracts expands. During the first decade of the 2000s, nearly every market included in the major commodity indexes experienced an increase in open interest, suggesting that these markets were functioning properly during the period when investment flows into commodity investments were growing rapidly.

U.S. commodity mutual funds are small relative to the size of the global commodity market. With almost \$50 billion in assets under management, U.S. commodity mutual funds constitute less than 10 percent of the value of futures and options market open interest. Each month, the \$50 billion in U.S. commodity mutual funds must be effectively rolled forward in futures markets, but this would constitute less than 0.5 percent of the monthly turnover in futures and options markets.

Fundamentals Drive Commodity Prices

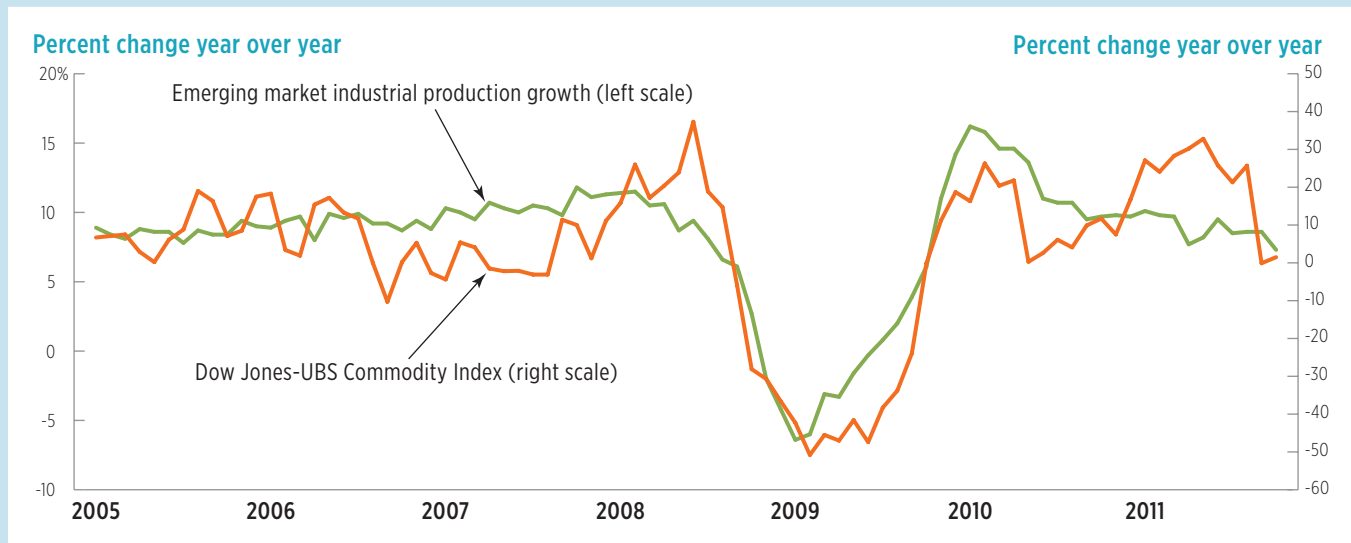
Evidence strongly indicates that global growth, especially rapid growth in emerging market countries, is the primary source of commodity price pressure over the past decade. Figure 5 plots the year-over-year growth rate in emerging market industrial production versus the year-over-year percent change in the Dow Jones-UBS Commodity Index. The statistical relationship is quite strong (correlation is 0.82), indicating that growth in emerging market countries has been the primary source of demand growth for commodities.⁸ A recent report on commodity markets by the Group of Twenty Finance Ministers and Central Bank Governors (G20) emphasized that “demand growth for metals, oil, and major food crops in the 2000s was largely driven by ... emerging market economies.”⁹

According to the International Monetary Fund (IMF), the annual real GDP growth in emerging markets averaged 6.5 percent from 2002 to 2011, with growth in developing Asia averaging almost 9 percent over this period. For example, China grew faster than 10 percent per year on average and significantly increased its imports of many commodities. This widespread growth in emerging economies was marked by industrialization and rapid expansion of living standards; resource-intensive processes directly led to a huge increase in the physical demand for many commodities, including oil and other energy products, metals like copper and aluminum, and major food crops. The rapid increase in demand reduced inventories and spare capacity in many commodity markets in the precrisis period, and led to significant commodity price pressure.

FIGURE 5

Emerging Market Industrial Production Growth and Commodity Price Growth

Monthly, 2005–2011*



*Data to October 2011.

Note: The correlation between the two growth rates is 0.82.

Sources: Netherlands Bureau for Economic Policy Analysis and Bloomberg

This strong economic growth will remain a key source of demand growth going forward. It explains why commodity prices recovered so quickly after the global recession, even as economic growth remains subdued in many advanced economies.

Supply factors have added to the pressure on prices from emerging market demand. As Hamilton 2009 notes, “Some degree of significant oil price appreciation during 2007–2008 was an inevitable consequence of booming demand *and* [emphasis added] stagnant production.” After years of low oil prices in the 1990s, many oil producers were reluctant to increase capacity, due in part to a fear of creating overcapacity; in addition, they were concerned that

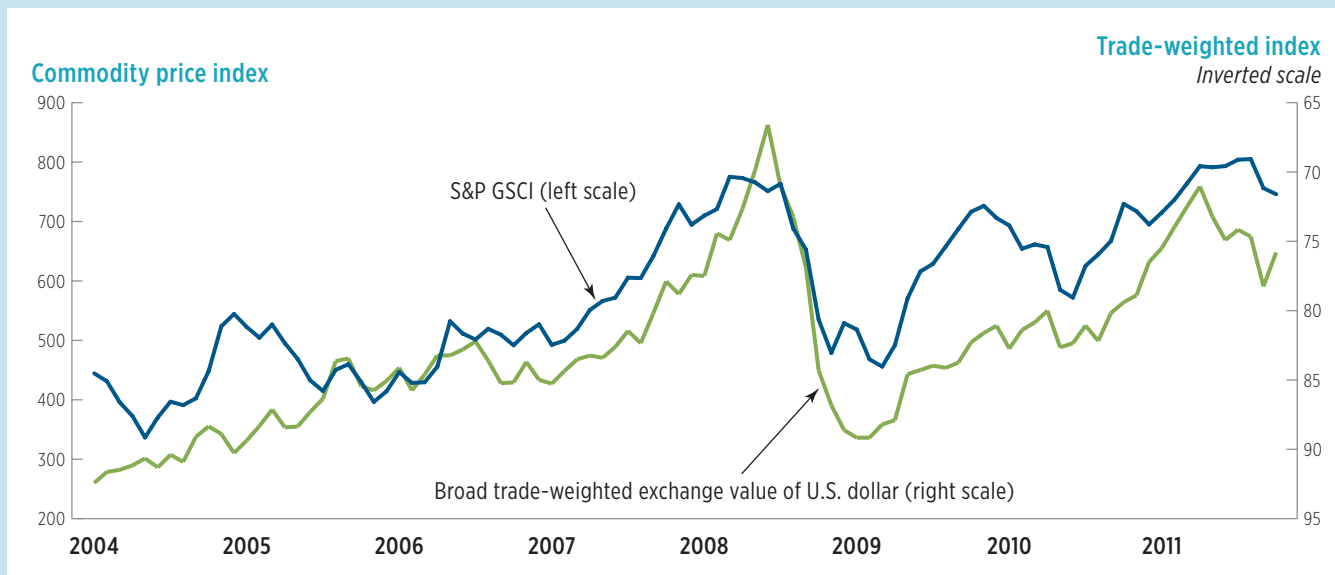
higher prices in the 2000s might only be temporary (which would not justify significant new investment). Also, as prices rose for many key soft commodities (e.g., wheat), some countries implemented export restrictions or bans, limiting supply to the rest of the world. Bad harvests and political uncertainties added further price pressure.¹⁰

The U.S. dollar is an important factor in explaining developments in commodity prices. Specifically, research by the International Monetary Fund (IMF) confirms that the U.S. dollar does affect commodity prices.¹¹ As Figure 6 shows, there is a close connection between commodity prices (as measured by the S&P GSCI) and the strength or weakness of the exchange value of the U.S. dollar.

FIGURE 6

Commodity Prices and Value of the U.S. Dollar

Monthly, 2004–2011*



*Data to October 2011.

Note: The correlation between the two series is -0.87.

Sources: Bloomberg and the Federal Reserve Board

The inverse relationship between commodity prices and the U.S. dollar operates in this way—commodities are typically priced in U.S. dollars throughout the entire world, regardless of whether they are bought or sold in New York, London, Dubai, São Paulo, or Sydney. When the dollar depreciates, foreign commodity producers, whose costs are in their own currencies rather than U.S. dollars, will want to receive more dollars to cover their local currency production costs, and thus will demand higher prices.¹² Also, because commodities like oil are priced in U.S. dollars across the world, if a country's currency appreciates against the U.S. dollar, its consumers will find oil more affordable and will buy more, thus pushing prices upward.

Another factor that undoubtedly has played a role in both boosting commodity prices and encouraging investment flows recently is fear that inflation will reemerge in the near future. Historically, holdings in commodities, especially gold, have been thought of as a hedge against inflation.¹³ Thus, during periods when inflation is high or expected to rise, prices of and demand for commodities may rise. Concerns about inflation have resurfaced in the aftermath of the global financial crisis. After the global financial crisis hit, major central banks moved rapidly to stimulate economies

by lowering interest rates and pursuing policies that multiplied the size of their balance sheets. This development has prompted questions on whether monetary policy is too loose and might reignite inflation around the world.

Such concerns have been stoked by the deteriorating fiscal positions of the governments of many advanced economies in the postcrisis world. The outstanding debt of the governments of many advanced economies increased sharply after 2008 as these governments ran substantial budget deficits to stimulate their economies and to provide support to banks and other financial institutions in danger of collapse. This massive increase in government debt among advanced economies has led some economists—and no doubt many market participants—to worry that these governments might chose a politically easier expedient of “inflating their way out” of this massive debt burden, rather than risking voter displeasure by cutting expenditures or raising taxes. Whether or not this concern is justified, it has factored into the decisions of market participants, likely putting upward pressure on commodity prices.

Estimating the Explanatory Power of Economic Fundamentals

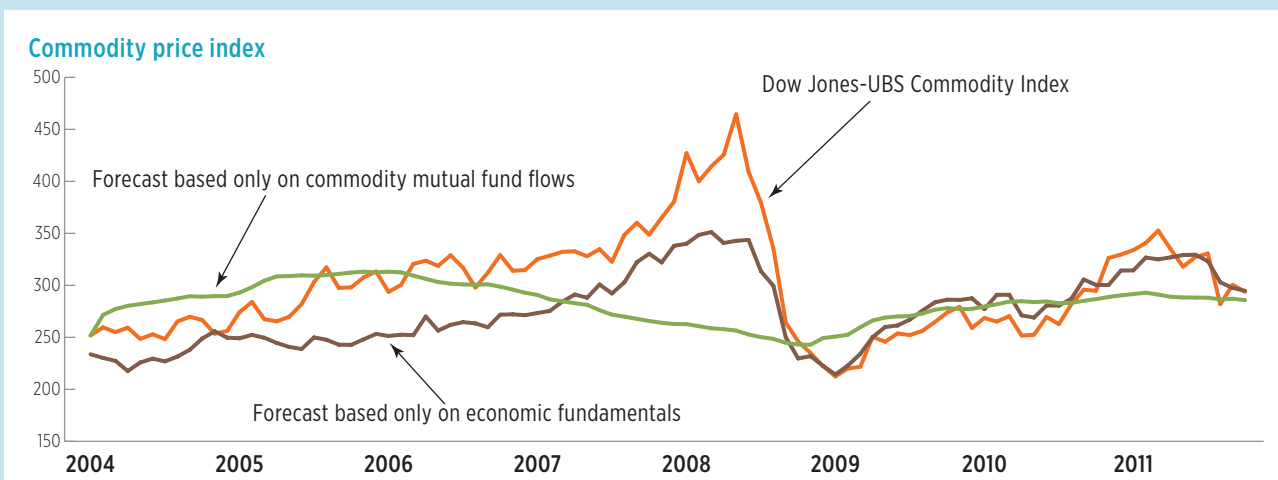
The appendix of this paper presents a statistical analysis (i.e., regression models) to demonstrate the relative power of economic and financial factors in explaining changes in commodity prices (as measured by the Dow Jones-UBS Commodity Index Total Return).¹⁴ The analysis strongly supports the view that economic fundamentals drive commodity price movements, and demonstrates that the U.S. dollar and emerging market growth both played a key role in commodity price fluctuations from February 2004 to December 2011. In fact, these two fundamental factors are able to explain more than one-third of the month-to-month variation in commodity prices and more than 90 percent of the movement in the level of commodity prices over this period.¹⁵

Several regressions were run to show the relative importance of economic fundamentals compared to net new cash flows into commodity mutual funds. In all cases, the economic fundamentals explain much more of the monthly percent changes in commodity prices than do commodity mutual fund flows, and the explanatory power of the economic fundamentals is not diminished by the inclusion or exclusion of net new cash flows into commodity mutual funds.

FIGURE 7

Forecasts: Economic Fundamentals Versus Commodity Mutual Fund Flows

Monthly, 2004–2011*



*Data and dynamic forecasts are from February 2004 to November 2011.

Note: The correlation between the Dow Jones-UBS Commodity Index and the forecast based on economic fundamentals is 0.80. The correlation is -0.05 for the forecast based on flows.

Source: Bloomberg

Figure 7 illustrates the relative power of economic fundamentals to explain commodity prices changes since 2004 and the inability of mutual fund flows to explain these movements. The figure plots commodity prices (as measured by the Dow Jones-UBS Commodity Index Total Return) against the commodity prices predicted by two different statistical models. The first uses only flows to commodity mutual funds to predict changes in commodity prices (green line). The second uses economic fundamentals—the exchange value of the U.S. dollar and growth in emerging markets—to predict commodity prices. It is evident that the forecast based on the statistical model of economic fundamentals captures the broad pattern in commodity prices. By contrast, the model based only on flows to commodity mutual funds does not match the general pattern in commodity prices. Indeed, it incorrectly predicts that commodity prices should have fallen in 2007 and 2008, when in fact they rose. This odd result stems from the fact that while commodity prices rose until mid-2008, commodity mutual funds experienced net *outflows* from January 2006 to June 2008.

Did Financialization of Commodities Drive Commodity Prices?

Numerous market participants—commodity producers, such as farmers and oil producers, and commodity users, such as auto manufacturers and airlines—employ futures, forwards, and other derivatives to hedge against changes in commodity prices. In the past, these market participants were often labeled “hedgers”—producers or end users of the commodity who had a commercial interest in locking in prices to reduce their risks.

Other market participants—such as broker-dealers, commercial banks, hedge funds, pension funds, and university endowments—also seek exposure to commodities for various reasons. These other participants are neither commodity producers nor end users and thus have been labeled by some as “speculators.” Speculators, thus defined, are viewed by some as necessary counterparties; while they do not have a commercial interest in physical commodities, their trading can improve the liquidity of futures and other derivatives markets, thus improving market conditions for hedgers. Because every futures, forward, or derivatives position in commodities by definition has two offsetting positions (a long position and a short position), hedgers must interact with a counterparty on the other side of the trade.

In discussions of commodity price trends, hedgers are frequently characterized as seeking stable prices with little volatility, while so-called speculators are viewed as destabilizing markets by causing volatility and unfavorable price trends. This view does not match reality, however, especially as the type and motivations of traders have multiplied. For instance, “fundamental” traders seek to take short or long positions depending on whether a particular commodity market is overvalued or undervalued relative to fundamental demand and supply factors. Fundamental traders typically are speculating, not hedging, because they usually do not have a commercial interest in commodities. Nonetheless, they will likely have a stabilizing influence on commodity markets and improve market liquidity.

In a similar vein, many non-hedging investors in today’s markets are described as “massive passives” because they use commodity index-linked instruments, such as commodity index swaps, to establish long-term diversified positions in commodity markets.¹⁶ A recent report by Irwin and Sanders 2010 for the Organisation for Economic Co-operation and Development suggests that commodity index investors may reduce commodity price volatility because the indexes’ fixed weights force them to sell into markets with the greatest price increases and buy into markets with falling prices.

Despite these potentially positive impacts of long-term passive commodity investors, concerns have emerged as the assets in commodity investments have grown over the last several years. Much of this concern relates to the amount of money being directed through index-linked commodity investments into commodity markets after 2004, and whether this financialization of these markets boosted commodity prices and added to volatility. According to Barclays Capital, worldwide assets under management in pooled commodity investment products (which includes exchange-traded products, commodity index swaps, and medium-term notes) stood at \$426 billion in November 2011, compared to \$156 billion in November 2008. Most of the increase (\$170 billion) represents net inflows from

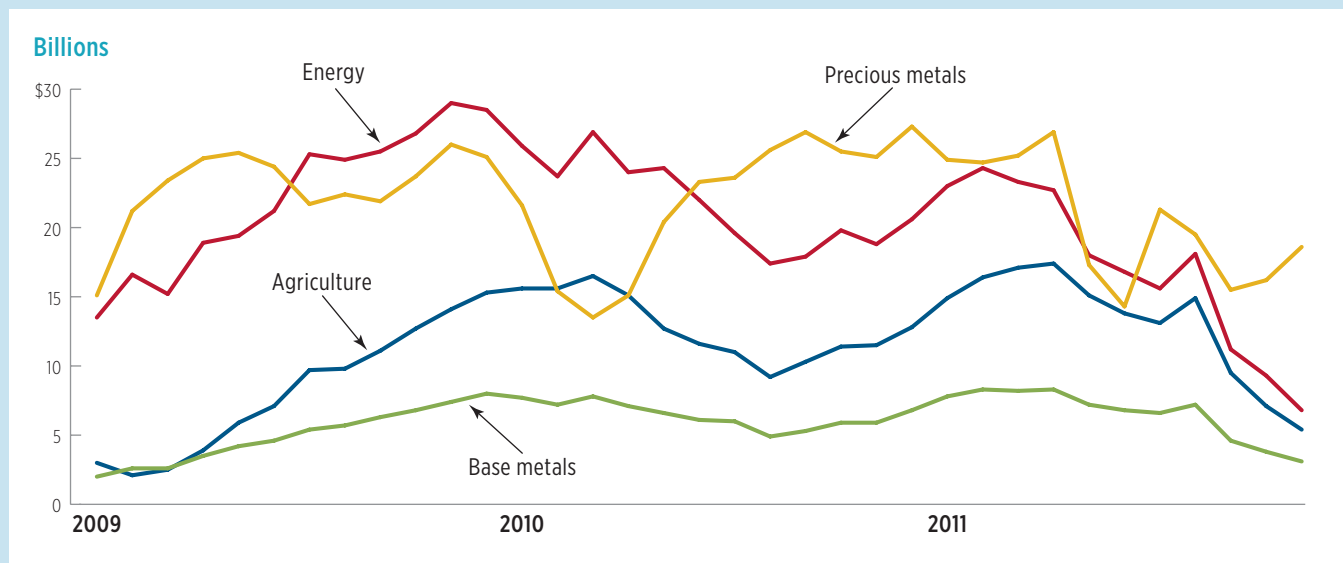
investors; the remainder—\$100 billion—reflects the recovery in commodity prices since 2008.

While \$170 billion in total net inflows is not small, that amount is spread across a number of commodity markets. Figure 8 shows Barclays Capital’s estimates of the 12-month flow into global commodity markets into each sector over the last three years. On average, the bulk of the flow is to energy and precious metals markets. Flows to agriculture and base metals have generally been much more limited. The fact that this investment is spread across numerous markets suggests that it is important to look at individual markets to understand whether such flows have influenced commodity prices.

FIGURE 8

Investment Flow into Global Commodity Markets by Sector, 12-Month Sum

Monthly, 2009–2011*



*Data to November 2011.
Source: Barclays Capital

Data collected by the Commodity Futures Trading Commission (CFTC) tracks commodity index traders, and this data can be used to address the impact of the massive passives on particular commodity markets. Through its Commodity Index Trader Supplement, the CFTC collects rich and detailed data that can be used to help understand the size and effect of index fund investing on commodity prices. Numerous studies using this data largely have concluded that index-based investing has not moved prices or exacerbated volatility in commodity markets in recent years (see, for example, Stoll and Whaley 2010 and Irwin and Sanders 2011a).

These studies reveal that, despite the recent growth in index-linked investment, current levels of so-called speculative interest remain well within historical norms for commodity markets and that index-linked positions (as a percentage of total open interest) have remained relatively stable since 2005. In this regard, the links between price levels, volatility, and fund flows ought to be most evident before 2006, but existing research also examines more-recent data.

In theory, index-linked investment might affect both the level and variability of commodity prices if fund flows overwhelm hedging demand. Additionally, the fact that index-linked investments “roll” their positions forward each month—replacing expiring contracts with new positions—might raise concerns that these monthly “rolls” temporarily disrupt markets. Stoll and Whaley 2010, however, find that neither commodity index-linked flows nor monthly rolls cause futures price levels to change across a wide variety of commodity markets. Likewise, Irwin and Sanders 2011b find little evidence that index-linked investment affects commodity market returns or volatility. Using internal CFTC data, Aulerich, Irwin, and Garcia 2010 find negligible evidence that daily index-linked investment affects commodity returns in 12 agricultural markets, while index-linked investment significantly reduces volatility in some markets.

Other research using a different data set—the internal daily CFTC Commitment of Traders data—also fails to find any adverse impact of index-linked investments in commodity

markets. Brunetti, Büyükşahin, and Harris 2011, for instance, examine daily swap dealer positions (a proxy for index investment) and find no evidence that these positions contribute systematically to price changes or volatility in the crude oil, natural gas, corn, and E-Mini Dow futures markets. Additionally, Büyükşahin and Harris 2011 thoroughly examine lead-lag relations at various measurement intervals, and find little evidence that swap dealer positions lead price changes in the crude oil market.

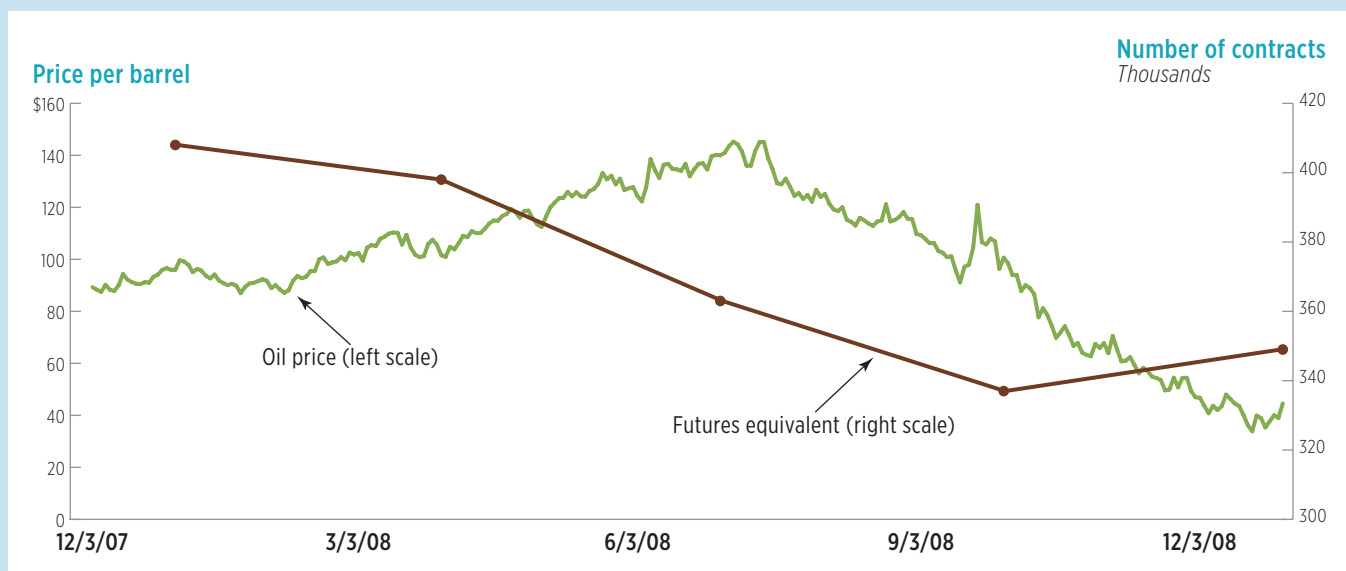
Both Mou 2010 and Frenk and Turbeville 2011 examine in detail the period when index investors typically exit futures positions and roll into new positions. They find that the spread between prices for nearby and next-nearby contracts widens during the roll, but that these effects do not raise average price levels. Aulerich, Irwin, and Garcia 2010 show that index investors can dampen volatility. Similarly, Kastner 2010, specifically examining the roll period, shows that United States Natural Gas (a commodity ETF) appears to reduce volatility in the natural gas market. The fund’s positions in natural gas futures are estimated to have a dampening effect on market volatility overall, and no significant effect during the time the monthly roll occurs. While this is direct evidence of a stabilizing effect, it is an indication that such effects may be present more generally, especially for more diversified commodity mutual funds.

Importantly, commodity index funds aim to replicate the returns on the portfolio of commodities included in the index. Any price impact from index funds likely stems from two sources—new flows and the rebalancing of positions over time—with the net effect depending on the relative impact of each source. In theory, fund flows could impact prices as some critics argue. Rebalancing behavior, however, naturally stabilizes commodity market prices, since increases in prices of individual commodities cause those commodities to become overweight in a fund and create the need to sell off positions. Likewise, when a commodity price falls, the fund will increase positions to rebalance, creating a countercyclical, stabilizing effect. This effect is illustrated in Figure 9, which shows prices for West Texas Intermediate (WTI) crude oil during 2008, when funds sold out of crude oil as prices rose and did not begin repurchasing crude oil until prices fell significantly.¹⁷

FIGURE 9

Oil Price Versus Futures Equivalent Position of Commodity Index Traders

Daily, December 2007 to December 2008



Sources: Federal Reserve and the U.S. Commodity Futures Trading Commission

The Market for Commodity Mutual Funds

Large institutional investors—hedge funds, university endowments, defined benefit pension funds, and others—have long been able to hedge against or take advantage of changes in commodity prices through financial derivatives. For example, an institutional investor might invest in futures contracts on a particular commodity such as gold, silver, or oil. Alternatively, the institution might invest in a total return commodity swap to gain exposure to a broad commodity index.

Individual investors pursuing portfolio diversification or wanting to hedge against inflation also may wish to accomplish those goals by investing in commodities (see “Understanding the Benefits of Investing in Commodity Mutual Funds” on page 18). For retail investors, however, these strategies traditionally have been neither easily accessible nor cost effective. Using futures contracts to gain exposure to commodities requires expertise and active management. For example, such contracts must be continually “rolled forward” when they expire to

achieve a continuous and seamless commodities exposure. Commodity swaps, the most common tool for gaining broad commodities exposure, historically have not been traded on exchanges. Rather, commodity swaps are usually set in bilateral contracts between two parties, typically between large commercial banks and other institutional investors.¹⁸ Furthermore, both futures and swaps generally are packaged only in large sizes. One WTI-crude oil futures contract, for example, is written on 1,000 barrels of oil, with a value of more than \$100,000.

Given these factors, retail investors, until recently, typically only obtained commodity exposures indirectly—by buying shares in gold mining companies or by investing in mutual funds that bought shares in such companies. Until about a decade ago, there were no products designed specifically to allow retail investors to benefit directly from or to hedge against commodity price movements. The needs of retail investors have led to the creation of products that these investors can use to achieve exposure to commodity prices.

FIGURE 10

Number of Commodity Exchange-Traded Products and Mutual Funds

	Commodity ETFs ¹	Commodity ETNs ¹	Commodity mutual funds ²	Managed futures strategy mutual funds ³
December 1, 2004	1 (0)	0 (0)	2	0
December 1, 2006	6 (2)	3 (2)	7	0
December 1, 2008	18 (3)	42 (6)	12	2
December 1, 2010	28 (4)	43 (7)	23	13
September 30, 2011	34 (4)	61 (8)	30	20

¹ Number in parentheses denotes number of broad-based commodity ETFs or ETNs.

² Commodity mutual funds are mutual funds whose primary investment objective is to give investors broad exposure to commodities by benchmarking to commodity indexes that are diversified across a wide array of commodities.

³ Managed futures strategy mutual funds are those that seek to give investors exposure to commodities, interest rates, and exchange rates through derivatives such as futures and swaps. To date, these funds have not been invested predominantly in commodities; they are included in this table purely for completeness.

Source: Morningstar

The most popular and best-known products are commodity ETFs, commodity ETNs, and commodity mutual funds. The number and variety of these products have increased significantly since 2004 (Figure 10).

Commodity mutual funds, ETFs, and ETNs differ in their regulation, investor access, and investment approach.

- » **Regulation:** Commodity mutual funds are regulated under the Investment Company Act of 1940 (ICA) and have all the features of other mutual funds. As with other mutual funds, commodity mutual funds pool the investments of a large number of investors, so that a portfolio can be constructed in a cost-effective manner. Like other mutual funds, commodity mutual funds are regulated by the Securities and Exchange Commission (SEC) as investment companies under the ICA; additionally, as a result of recent regulatory developments, they also may become subject to CFTC regulation. By contrast, commodity ETFs are not regulated like mutual funds and non-commodity ETFs. ETFs that invest in commodities through the derivatives markets are regulated primarily by the CFTC as commodity pools. Those that hold physical commodities such as gold are registered under the Securities Act of 1933 and are subject to exchange regulation, as are ETNs.

- » **Investor access:** Like common stocks, commodity ETFs and ETNs may be purchased on stock exchanges. Commodity mutual funds may be purchased directly from fund sponsors or through financial intermediaries (brokers or financial planners, for example).

- » **Investment approach:** As shown by the tallies of “broad-based” funds in Figure 10, commodity ETFs and ETNs tend to focus on single-commodity markets. Indeed, as measured by assets under management, commodity ETFs are focused predominantly on precious metals. For example, the largest commodity ETF, SPDR Gold Shares (GLD), holds more than 50 percent of the assets under management in all commodity ETFs, as of September 2011, and invests in physical holdings of gold. A number of other commodity ETFs also hold physical commodities, while others track commodity prices through the derivatives market. Commodity mutual funds, in contrast, only invest through the derivatives market and typically focus on a diversified basket of commodities, including energy products, precious metals, agricultural goods, and base metals.^{19, 20} Commodity mutual funds thus provide an efficient and inexpensive way for investors to gain exposure to a basket of commodities.

Almost all commodity mutual funds pursue their investment objectives by seeking to track the returns on one of two commodity indexes: the Dow Jones-UBS Commodity Index or the S&P GSCI. Of the top 12 commodity mutual funds by asset size (which hold 97 percent of the assets in commodity mutual funds), nine funds judge their performance relative to the Dow Jones-UBS Commodity Index and three benchmark to the S&P GSCI. The nine commodity

mutual funds that link to the Dow Jones-UBS Commodity Index account for more than 90 percent of the assets in commodity mutual funds. Both indexes are intended to provide exposure to a broad basket of commodities, but their compositions differ considerably (Figure 11): the S&P GSCI has a much heavier weight on oil and other energy products than does the Dow Jones-UBS Commodity Index.²¹

FIGURE 11

Commodity Index Weights, 2011

Percent

Commodity	S&P GSCI	Dow Jones-UBS Commodity Index
WTI-crude	29.9%	14.7%
Brent crude	16.8	0.0
Gas oil	7.2	0.0
Heating oil	5.3	3.6
Corn	5.1	7.0
Unleaded gasoline	4.9	3.5
Copper	3.6	7.5
Wheat CBOT	3.4	4.6
Gold	3.4	10.5
Natural gas	2.8	11.2
Soybean	2.7	7.9
Live cattle CME	2.5	3.4
Aluminum	2.4	5.2
Sugar	2.4	3.3
Lean hogs CME	1.4	2.0
Cotton	1.3	2.0
Coffee	1.1	2.4
Wheat (KBOT)	0.9	0.0
Nickel	0.7	2.3
Silver	0.6	3.3
Zinc	0.6	2.9
Lead	0.5	0.0
Feeder cattle CME	0.4	0.0
Cocoa	0.3	0.0
Soybean oil	0.0	2.9
Tin	0.0	0.0
Palladium	0.0	0.0

Note: Weights on tin and palladium are zero in both indexes.

Sources: Dow Jones-UBS and Barclays Capital

Commodity mutual funds use futures, forwards, options, total return swaps, structured notes, and other strategies to deliver a return that is highly correlated with their chosen benchmark index. Unlike pure index funds, however, commodity mutual funds may use judgment in how best to achieve this objective, and may not seek to match the index exactly. Before 2004, there were only two commodity

mutual funds. By September 2011, however, there were at least 30 commodity mutual funds according to Morningstar, Inc. classifications. ICI received monthly data from 27 of these funds in December 2011 (Figure 2). According to ICI data, the assets of these funds have grown significantly, from \$2.6 billion in January 2004 to \$47.7 billion in December 2011.

Understanding the Benefits of Investing in Commodity Mutual Funds

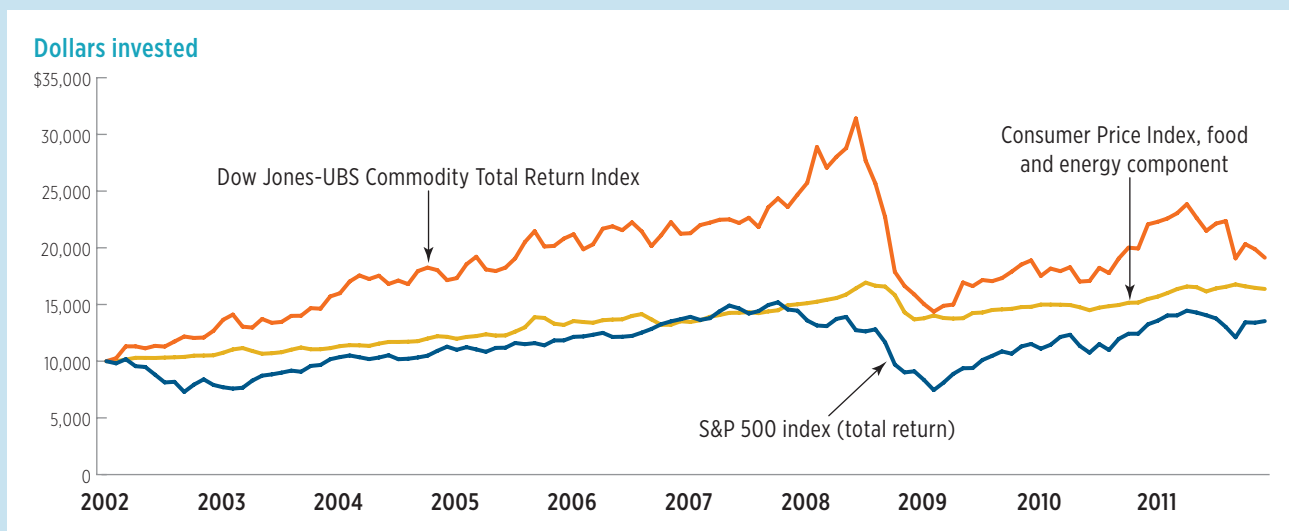
Investor demand for commodity mutual funds has grown significantly for at least two important reasons. First and most importantly, commodity mutual funds typically invest in a broad basket of commodities, and thus can help investors offset the risk of investing in stocks or bonds. Historically, the returns from commodity investments are not highly correlated with stock and bond returns.²² Second, commodity mutual funds allow retail investors to offset or hedge against increases in their costs of living, especially increases in the prices of food and energy.²³

A simple example illustrates investors' incentives. Figure 12 compares the relative performance of the S&P 500 equity index and the Dow Jones-UBS Commodity Index—the commodity index used by commodity mutual funds with more than 90 percent of the assets in this category—from January 2002 to December 2011. The figure shows the return over time of \$10,000 invested in the S&P 500 and the same amount invested in the Dow Jones-UBS Commodity Index Total Return.²⁴ The monthly returns of these two indexes have had a relatively low correlation historically. Thus, investors who included some commodity index exposure in their portfolios over this period would have reduced the variability in their

FIGURE 12

Commodity Index and S&P 500 Index Versus Consumer Price Index Food and Energy Component

Monthly, 2002–2011*



*Data to December 2011.

Sources: Bloomberg and U.S. Bureau of Labor Statistics

overall returns. This is very important, as it helps address “point-in-time risk,” where an investor must access his or her portfolio holdings at a given point in time because of a life event such as retirement, spending on college tuition, buying a house, or medical payments.

A second observation from Figure 12 is that commodity index exposure can help retail investors hedge against increases in the cost of living. The cost of food and energy (as measured by the food and energy component of the Consumer Price Index) has risen steadily over the past decade.²⁵ Assume that, as of January 2002, a household was spending \$10,000 annually on food and energy. The figure shows how this expenditure would have grown as the cost of food and energy rose over the past 10 years. A \$10,000 investment in a commodity mutual fund tied to the Dow Jones-UBS Commodity Index Total Return would have returned significantly more than the increase in the price of food and energy for this hypothetical consumer. The commodity index investment would have increased in value by more than 200 percent from January 2002 to June 2008, helping to offset some of the nearly 70 percent increase in the annual cost of food and energy. Investment in a commodity index that includes agricultural and energy products can therefore provide a natural hedge to food and energy price inflation.

Finally, it is important to distinguish between commodity mutual funds, which invest in derivatives to obtain exposure to commodity markets for their investors, and other mutual funds and ETFs whose investment objectives are exposure to equities, bonds, or money markets, and that employ derivatives (typically financial futures, options, or swaps) to manage risks or improve returns in a cost-effective manner.

For example, a stock fund may purchase S&P 500 index futures to gain equity returns on cash it is holding prior to investment in individual stocks. Funds holding non-dollar-denominated stocks or bonds may use currency swaps to hedge against exchange-rate risk. These activities occur in the futures markets, but are not intended to provide commodity exposure for these funds’ investors. While these uses of derivatives have been a focus by some analysts and policymakers,²⁶ they are not implicated in the discussion over commodity price trends and thus are not a topic of this paper.

Commodity Mutual Funds and Commodity Prices

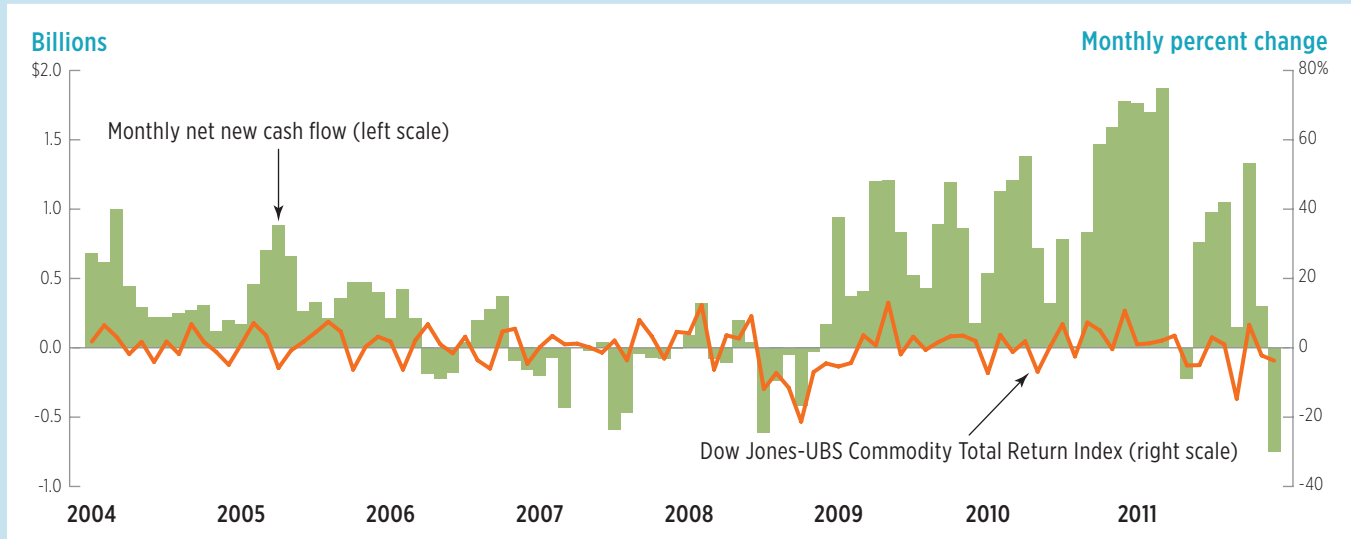
The remainder of this paper will focus on whether commodity mutual funds have an impact on commodity prices. This focus reflects the direction of the debate over financialization of commodity markets. ETFs’ large concentration in precious metals, physical rather than futures-based positions, and small emphasis on energy and agricultural goods suggest that they cannot easily be linked to rising food and energy prices. The question remains whether the broad investment exposure of commodity mutual funds may have influenced commodity prices generally.²⁷

To understand correctly whether demand for commodity mutual funds could be influencing commodity prices, one must look at the relationship between commodity prices and net new cash flowing to such funds. Net new cash flowing into commodity mutual funds represents the additional dollars flowing into such funds and thus the new additional demand that, in theory, could boost commodity prices. Examining net new cash flow eliminates the misleading mechanical relationship between the level of commodity mutual fund assets and the level of commodity prices (see Figure 3 and the discussion in the introduction).

FIGURE 13

Net New Cash Flow to Commodity Mutual Funds and Monthly Commodity Price Changes

Monthly, 2004–2011*



*Data to December 2011

Sources: Investment Company Institute and Bloomberg (Dow Jones-UBS Commodity Total Return Index)

Figure 13 plots monthly percent changes in the Dow Jones-UBS Commodity Index Total Return against monthly net new cash flowing into commodity mutual funds. The figure covers both the precrisis period, which many commentators cite as evidence that investment flows cause commodity price increases, as well as the financial crisis and the postcrisis period.

The data in Figure 13 demonstrate that the relationship between new investor demand for commodity mutual funds and commodity prices is rather weak.²⁸ During the precrisis period, there was *no* statistical correlation between these flows and the commodity price index. In the precrisis period, commodity prices posted increases in 21 of the 30 months from January 2006 to June 2008 (as measured by the Dow Jones-UBS Commodity Index Total Return). By comparison, commodity mutual funds experienced outflows in 17 of those 30 months; cumulatively, these outflows amounted to \$610 million.

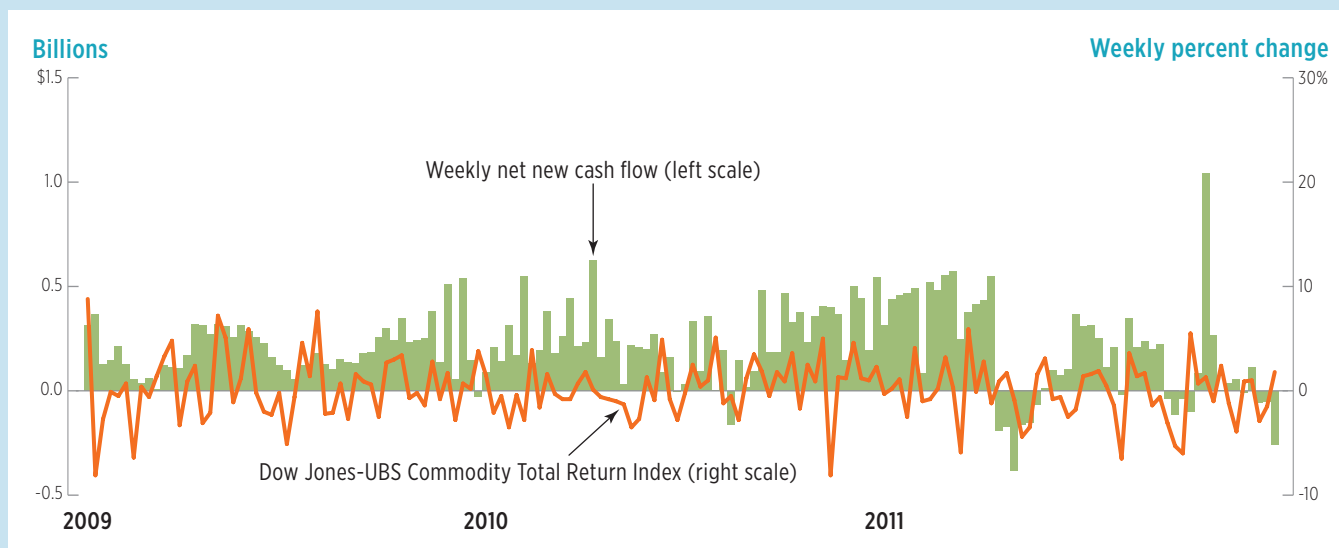
In contrast, commodity mutual funds received inflows in almost every month of 2011, with inflows over this period totaling \$8.9 billion. Despite these inflows, commodity prices fell by 13.6 percent in 2011 because commodity markets became concerned the global economic recovery might falter, thus slowing emerging market demand for commodities.

Statistical analysis of weekly data, as explained in the appendix, underscores the fact that flows to commodity mutual funds do not cause commodity price changes. Figure 14 plots weekly flows to commodity mutual funds from January 2009 to December 2011 against the Dow Jones-UBS Commodity Index Total Return. Visual inspection reveals little contemporaneous relationship between net new cash flows to commodity mutual funds and commodity price changes—while the cash flows are almost entirely positive, commodity index returns are frequently negative. Statistically, there is no evidence that increases in weekly flows to commodity mutual funds drive future commodity

FIGURE 14

Net New Cash Flow to Commodity Mutual Funds and Weekly Commodity Price Changes

Weekly, 2009–2011*



*Data to December 2011.

Sources: Investment Company Institute and Bloomberg (Dow Jones-UBS Commodity Total Return Index)

price changes.²⁹ Using regression analysis, weekly commodity price changes cannot be explained by past flows into commodity mutual funds, and past commodity price changes are not statistically significant drivers of future flows to commodity mutual funds. Thus, from week to week, net inflows to commodity mutual funds cannot explain future, or even current, changes in commodity prices well.³⁰

That commodity mutual fund flows have little or no influence on commodity prices is hardly surprising. Compared to the size of the commodity markets, both flows and assets in commodity mutual funds are very small. Spot or physical commodity markets deal with trillions of dollars of product each year, and futures and options commodity markets trade trillions of dollars of notional value every month.

To demonstrate this, it is helpful to estimate the size of the exposure that commodity mutual funds hold in individual commodity markets. Figure 15 shows the implied position that commodity mutual funds hold in particular commodity markets. The first column shows the implied weight that U.S. commodity mutual funds place on particular commodities.³¹ The second column estimates the implied position in dollars that commodity mutual funds have in each market, based on multiplying the percentage in the first column by the \$47.7 billion invested in these funds at the end of December 2011. The last column divides the implied dollar position by the monthly turnover in futures and options markets for that commodity (as measured by Barclays Capital).

FIGURE 15

Commodity Mutual Funds' Implied Position in Commodity Markets, December 2011

Market	Implied weight in individual commodities¹ <i>Percent</i>	Implied dollar position in commodities, assets² <i>Billions</i>	Share of index in market volume <i>Percent</i>
WTI-crude	16.2%	\$7.7	0.5%
Natural gas	10.4	4.9	1.5
Gold	9.7	4.6	0.2
Soybean	7.3	3.5	0.9
Copper	7.1	3.4	0.3
Corn	6.8	3.2	1.1
Aluminum	4.9	2.3	0.5
Wheat CBOT	4.5	2.1	3.5
Heating oil	3.7	1.8	0.5
Unleaded gasoline	3.6	1.7	0.5
Live cattle CME	3.3	1.6	2.1
Sugar	3.2	1.5	1.8
Silver	3.0	1.4	0.4
Soybean oil	2.6	1.3	N/A
Zinc	2.6	1.3	0.1
Coffee	2.2	1.1	1.3
Nickel	2.1	1.0	1.1
Lean hogs CME	1.9	0.9	2.3
Cotton	1.9	0.9	3.6
Brent crude	1.7	0.8	0.1
Gas oil	0.7	0.3	0.1
Wheat (KBOT)	0.1	0.0	0.1
Lead	0.0	0.0	0.0
Feeder cattle CME	0.0	0.0	0.2
Cocoa	0.0	0.0	0.1
Tin	0.0	0.0	0.0
Palladium	0.0	0.0	0.0

¹ Implied weight is calculated from the weights in the Dow-Jones UBS and S&P GS commodity indexes. Each is weighted according to the assets of commodity mutual funds tied to the underlying index. For example, over 90 percent of commodity mutual fund assets are linked to the Dow Jones-UBS Commodity Index and less than 10 percent to the S&P GSCI. Each index has a weight, respectively, of 29.9 percent and 14.7 percent on WTI-crude oil. That implies an average weight for commodity mutual funds of 16.2 percent as of December 2011.

² Implied dollar position is the corresponding weight multiplied by total assets in commodity mutual funds as of December 2011 (\$47.7 billion). For example, commodity mutual funds have an implied weight of 16.2 percent of their \$47.7 billion in assets invested in WTI-crude oil, for an estimated dollar position of \$7.7 billion.

N/A = not available

Note: Based on December 2011 assets of \$47.7 billion.

Sources: Dow Jones-UBS and Barclays Capital

The largest implied position by dollar amount is \$7.7 billion in the WTI-crude oil market, followed by \$4.9 billion in natural gas and \$4.6 billion in gold markets. In relation to options and futures markets through which commodity mutual funds gain exposure, none of these three largest positions constitutes more than 2 percent of the monthly turnover in options and futures markets, as shown in the last column. In many cases, the effective dollar position in particular commodity markets is very small (zinc, nickel, cotton, and Brent crude oil) or zero (lead, tin, and palladium).

Conclusion

Fundamental factors, including rapid growth in emerging markets, sluggish global supply growth, and U.S. dollar depreciation, provide a much better explanation for the general pattern in commodity prices since 2004 than does increased financial investment in commodities. The growth in financial investment in U.S. commodity mutual funds and in other commodity investments largely reflects the financial innovation seen in the last decade, and much of the increased investment occurred after the rapid increase in commodity prices to mid-2008. In particular, commodity mutual funds experienced net outflows from January 2006 to June 2008. It was only after the financial crisis that U.S. commodity mutual funds began to receive steady inflows.

Commodity mutual funds received nearly \$9 billion in net inflows during 2011, but commodity prices (as measured by the Dow Jones-UBS Commodity Index Total Return) fell in 2011 based on concerns that the global economic recovery might falter.

The timing of this large increase in commodity investments probably says more about investors' desire to tap into emerging market growth and their general lack of confidence in the current mix of fiscal and monetary policy in major advanced economies. Investors understand that much of global growth is coming from emerging markets and this increases demand for many commodities. Investors also appear to be concerned that excessively large budget deficits and loose monetary policy in major advanced economies will eventually lead to higher inflation. Restricting commodity investment through additional regulation or legislation will not change the fundamental drivers of global commodity price developments. However, doing so would reduce liquidity in commodity markets to the detriment of participants in these markets.

Appendix: Regression Analysis of Monthly and Weekly Data

ICI collects monthly and weekly data from its members on mutual fund sales, redemptions, assets, cash positions, exchange activity, and portfolio transactions. The number of funds in ICI's monthly sample is slightly lower than Morningstar's data because a few small funds do not report data to ICI's monthly data collection. However, ICI's weekly data has 29 commodity mutual funds reporting data as of the end of 2011. Using monthly and weekly data, this study examines the relationship between net new cash flows into commodity mutual funds and commodity prices from January 2004 to December 2011.

With the monthly regressions, this study estimates the impact of monthly net new cash flows and compares this basic regression to regressions that contain two economic fundamentals: the monthly percent change in value of the U.S. dollar and the monthly growth rate of industrial production in emerging market countries.

The basic regression explores only the contemporaneous relationship between net new cash flows into commodity mutual funds, C_t , and commodity prices, $\Delta \ln(P_t)$, where $\Delta \ln$ denotes the rate of change in the natural log (the percent change) and P stands for the Dow Jones-UBS Commodity Index Total Return at time t . Because net cash flows into commodity mutual funds, C , grow over the sample period, this study divides C_t by the total net assets in commodity

mutual funds at time $t-1$, A_{t-1} . This normalization does not affect the direction of the results. Note that C_t does not equal ΔA_t due to changes in the net asset value of commodity mutual funds and distributions for those funds.

Equation (1) specifies the first regression to be estimated on monthly data,

$$(1) \quad \Delta \ln(P_t) = \alpha + \beta * C_t / A_{t-1},$$

where α is the intercept or average growth rate of commodity prices, and β is the estimated impact of a 1 percent increase in net new cash flows into commodity mutual funds relative to their total net assets. This regression assumes that there is only a contemporaneous relationship between flows and prices, and does not allow for other variables to impact commodity price changes or flows.

The more general specification in the table below includes four variables,

$$(2) \quad \Delta \ln(P_t) = f(\Delta \ln(P_{t-1}), C_t / A_{t-1}, \Delta \ln(USD_t), \Delta \ln(EM_t)),$$

where USD_t is the Federal Reserve's broad trade-weighted value of the U.S. dollar at time t and EM_t is the emerging market industrial production index at time t . To focus on short-term movements, both variables enter the regression as monthly percent changes. This also solves the spurious regression problem that arises when levels of assets and levels of commodity prices are used.

FIGURE A.1

	Equation 1 <i>Fund flows, C_t</i>	Equation 2 <i>USD only</i>	Equation 2 <i>EM only</i>	Equation 2 <i>All</i>	Equation 2 <i>Without C_t</i>
Intercept	-0.0062 (0.0093)	-0.0464 (0.5370)	-1.3131 (0.8889)	-1.8066 ² (0.7105)	-1.1895 ¹ (0.6807)
$\Delta \ln(P_{t-1})$		-0.1819 (0.1198)	-0.0296 (0.1044)	-0.3140 ³ (0.0836)	-0.2944 ³ (0.0969)
C_t/A_{t-1}	0.2876 ² (0.1385)			0.2609 ³ (0.0717)	
$\Delta \ln(USD_t)$		-2.5333 ³ (0.5625)		-2.4282 ³ (0.4500)	-2.3703 ³ (0.5285)
$\Delta \ln(EM_t)$			2.4242 ³ (0.8163)	1.6917 ² (0.6472)	1.8948 ³ (0.6327)
R-squared	0.0557	0.2985	0.1115	0.3955	0.3512
Adjusted R-squared	0.0456	0.2832	0.0920	0.3683	0.3296
Durbin-Watson statistic	1.738	1.946	2.106	2.012	1.995

¹ Denotes statistical significance at the 10 percent level.

² Denotes statistical significance at the 5 percent level.

³ Denotes statistical significance at the 1 percent level.

Note: For the first and second column of results, samples run from February 2004 to December 2011. For the third, fourth, and fifth column of results, samples run from February 2004 to November 2011.

The results in Figure A.1 demonstrate that monthly movements in the U.S. dollar and growth in emerging market industrial production can explain 35 percent of the monthly percent changes in commodity prices seen from early 2004 to late 2011. Specifically, these two economic variables together are able to explain significantly more of the variation in commodity prices (the R-squared is 0.3512 in the last column) than do net new cash flows into commodity mutual funds alone (the R-squared is 0.0557 in the first column of results). The weak association between flows and prices at the monthly frequency could very well reflect the effect of news on supply and demand developments or some other economic variable that might simultaneously encourage flows and raise prices.

Weekly Regressions

The weekly regressions explore the relationship between net new cash flows into commodity mutual funds and commodity prices both on a contemporaneous basis and by applying leads and lags. Net new cash flows into commodity mutual funds are denoted as C_t and commodity prices as $\Delta \ln(P_t)$, where $\Delta \ln$ denotes the rate of change in the natural log (the percent change) and P stands for the Dow Jones-UBS Commodity Index Total Return at time t .

The study reestimates Equation (1) below using weekly data,

$$(1) \quad \Delta \ln(P_t) = \alpha + \beta * C_t / A_{t-1},$$

where α is the intercept or average growth rate of commodity prices and β is the estimated impact of a 1 percent increase in net new cash flows into commodity mutual funds relative to their total net assets. This regression assumes that there is only a contemporaneous relationship between flows and prices, and does not allow for other variables to impact commodity price changes or flows.

FIGURE A.2

	Equation 1 Fund flows, C_t	Equation 1 With S&P GSCI
α, intercept	-0.00157 (0.00173)	-0.00217 (0.00243)
β, slope	0.2776* (0.1188)	0.3209* (0.1611)
R-squared	0.0195	0.0138
Adjusted R-squared	0.0171	0.0114
Durbin-Watson statistic	2.002	1.996

* Denotes statistical significance at the 5 percent level.

Note: For both columns of results, samples run from January 12, 2004, to December 26, 2011.

For the first column of results in Figure A.2, β is significant at the 5 percent level, and the very low R-squared suggests that weekly commodity mutual fund flows do not explain weekly changes in commodity prices well. As a robustness check, Equation (1) was also estimated using the S&P GSCI Total Return Index as the commodity price change. For Equation (1) with the S&P GSCI, the results in the second column are even weaker. The R-squared falls, and β is marginally significant at the 5 percent level. Finally, it is worth remembering that some third variable, like economic data or news, may explain the weak association that remains between these two variables.

Exploring the Lead/Lag Relationship Using Weekly Regressions

In order to investigate the dynamic relationship between flows and commodity price changes, this study also estimates a vector autoregression (VAR) that uses lags of both variables to explain future movements of flows and commodity price changes. The general specification is as follows:

$$(3) \quad \Delta \ln(P_t) = f(\Delta \ln(P_{t-k}), C_{t-k}/A_{t-1-k}),$$

$$(4) \quad C_t/A_{t-1} = f(\Delta \ln(P_{t-k}), C_{t-k}/A_{t-1-k}),$$

where k is the number of lagged regressors used to explain current movements in commodity prices and net new cash flows into commodity mutual funds. Lag exclusion tests selected $k = 3$ as the appropriate number of lags. This specification allows us to see whether flows have any impact on future price changes and whether price changes have any impact on future flows. The results are shown in Figure A.3.

FIGURE A.3

	Equation 3 $\Delta \ln(P_t)$	Equation 4 C_t/A_{t-1}
Intercept	-0.00008 (0.0016)	0.0012 ² (0.0005)
Coefficient on $\Delta \ln(P_{t-1})$	0.0016 (0.0502)	0.0189 (0.0149)
$\Delta \ln(P_{t-2})$	-0.0530 (0.0503)	-0.0121 (0.0149)
$\Delta \ln(P_{t-3})$	0.0334 (0.0500)	-0.0018 (0.0148)
Coefficient on C_{t-1}/A_{t-2}	-0.0200 (0.1656)	0.2474 ³ (0.0490)
C_{t-2}/A_{t-3}	0.3049 ¹ (0.1606)	0.3106 ³ (0.0475)
C_{t-3}/A_{t-4}	-0.1482 (0.1516)	0.2172 ³ (0.0448)
R-squared	0.0125	0.5515
Adjusted R-squared	-0.0021	0.5448

¹ Denotes statistical significance at the 10 percent level.

² Denotes statistical significance at the 5 percent level.

³ Denotes statistical significance at the 1 percent level.

Note: For both columns of results, samples run from February 2, 2004, to December 26, 2011.

The first column shows results for Equation (3), which seeks to explain commodity price changes. In that column, none of the lagged regressors is statistically significant at the 5 percent level, the R-squared is similar to the Equation (1) results, and the adjusted R-squared is negative. These results indicate that neither past commodity mutual fund flows nor past commodity price changes are useful in explaining weekly changes in commodity prices.

Instead, the second column of results (Equation 4) shows that flows into commodity mutual funds are explained primarily by previous flows and that commodity price changes do not cause future flows. All of the lagged flow

variables are statistically significant at the 1 percent level, the R-squared is 0.5515, and the adjusted R-squared is 0.5448. In general, this regression is able to explain well over 50 percent of the week-to-week variation in net new cash flow to commodity mutual funds, and almost all of the explanatory power comes from the lagged values of past flows. In fact, almost 55 percent of the variation in weekly flows is explained by the three lagged terms of flows. In other words, even though the first lag of commodity price changes is positively signed, there is no statistically significant evidence that flows respond to past price changes (i.e., return chasing) at the weekly frequency.

Notes

- ¹ A commodity is generally thought of as a homogeneous product with all units selling at an identical price. A particular type of commodity, however, may have differences in characteristics or qualities that can affect the commodity's price. For example, lighter grades of crude oil tend to trade at higher prices per barrel than heavier grades of crude oil.
- ² Forwards are “over-the-counter” trades in which a buyer and seller individually come together and agree now to exchange in the future a given commodity at a prespecified price. With futures contracts, investors also agree now to buy or sell a commodity at a future date, but such contracts are traded on exchanges, are highly specified, and are regulated and monitored in the United States by the Commodity Futures Trading Commission (CFTC).
- ³ See Opening Statement of Senator Carl Levin (D-MI), Chairman, Senate Permanent Subcommittee on Investigations, Hearing on Excessive Speculation and Compliance with the Dodd-Frank Act, Nov. 3, 2011. Available at <http://www.levin.senate.gov/newsroom/press/release/opening-statement-at-psi-hearing-on-excessive-speculation-and-compliance-with-the-dodd-frank-act>.
- ⁴ The IMF regularly discusses these trends in its biannual World Economic Outlook. See www.imf.org for details. A recent paper by IMF staff emphasizes the importance of global growth in explaining commodity price movements for commodities that trade in financial markets, like oil, and ones that do not, like wine. See <http://www.imf.org/external/pubs/ft/wp/2011/wp1101.pdf>.
- ⁵ The correlation is highest for the S&P GSCI at 0.62, and is much lower and statistically insignificant for the Dow Jones-UBS Commodity Index at -0.01. This pattern holds even though the majority of commodity mutual funds, holding more than 90 percent of assets under management in the category, judge their performance relative to the Dow Jones-UBS Commodity Index. This finding suggests caution in using correlation between asset levels and commodity price levels to infer any relationship.
- ⁶ As discussed in “Understanding the Benefits of Investing in Commodity Mutual Funds” on page 18, many mutual funds and exchange-traded funds whose investment objectives are exposure to equities, bonds, or money markets also employ derivatives (typically financial futures, options, or swaps) to manage risks or improve returns in a cost-effective manner. These funds are not intended primarily to provide commodity exposure for their investors. While these uses of derivatives have been a focus by some analysts and policymakers, they are not implicated in the discussion over commodity price trends and thus are not a topic of this paper.
- ⁷ Irwin and Sanders (2010) define open interest as “the total number of futures contracts, long or short, in a delivery month or market that has been entered into and not yet liquidated by an offsetting transaction or fulfilled by delivery.” See Frenk and Turbeville (2011) for their claim that the increase in open interest is a measure of excessive speculation.
- ⁸ A perfect positive correlation is 1.00. A perfect negative correlation is -1.00.
- ⁹ See graph 2.3 on page 13 of the G20 study group report on commodities for the emerging market contribution to global growth and overall commodity demand growth in China and other emerging markets. Available at <http://www.g20.org/images/stories/canalfinan/gexpert/01reportG20.pdf>.
- ¹⁰ See Carter and Smith (2011) for an analysis of how the interaction of demand and supply factors has influenced boom and bust cycles in commodities in the past.
- ¹¹ See box 1.4 in Chapter 1 of the International Monetary Fund's April 2008 *World Economic Outlook*, available at <http://www.imf.org/external/pubs/ft/weo/2008/01/pdf/cl.pdf>.
- ¹² To be sure, the relationship can also work in the opposite direction: rising commodity prices can depress the value of the dollar. For instance, a rise in oil prices may put downward pressure on the U.S. dollar, since the United States is a major oil importer and rising oil prices worsen the terms of trade for the United States.
- ¹³ See Gorton and Rouwenhorst (2006).
- ¹⁴ Commodity indexes can measure commodity prices or total returns to commodity markets. For clarity in this paper, this study uses “Dow Jones-UBS Commodity Index” to denote the price index and “Dow Jones-UBS Commodity Index Total Return” to denote the total return index. See <http://www.djindexes.com/commodity/>. For the Dow Jones-UBS Commodity Index, the correlation between percent changes in the price index and its total return version is higher than 0.999 in both weekly and monthly regressions. This study therefore uses the total return index in the regressions.
- ¹⁵ The fundamental regression can explain over 90 percent of the price level if one uses last period's price level and the two economic fundamentals to forecast the next period's price level (i.e., a static forecast). To be more rigorous, this study also uses a dynamic forecast that uses last period's forecast of the price level, rather than the actual price level. The dynamic forecasts are shown in Figure 7.
- ¹⁶ Index-based investment strategies are often referred to as “passive” investments because they require following an index's formula when buying or selling securities or other assets, as opposed to “active” strategies that involve discretionary selection of securities or assets.

- ¹⁷ Existing commodity price indexes (such as the Dow Jones-UBS Commodity Index) maintain fixed weights in the underlying index components (i.e., the individual underlying commodities) during the year. Commodity mutual funds that seek to mimic the index, therefore, will be forced to sell positions in commodities that are rising in price and buy positions in commodities that are falling, helping to stabilize commodity prices. For example, suppose that a commodity mutual fund links to an index composed of only two commodities, oil and gold, which contribute equally (i.e., 50 percent each) to the index. Suppose that today the commodity mutual fund is “in balance,” in the sense that 50 percent of the fund’s value is exposure to gold and 50 percent to oil. Next, suppose that oil prices rise 10 percent tomorrow. In that case, the fund is now “out of balance” with the index because it has weights of 55 percent in oil (50 percent times 1.10) and 45 percent in gold. To rebalance, the fund must reduce its exposure to oil, potentially helping to offset that day’s rise in oil prices.
- ¹⁸ This paper focuses primarily on commodity mutual funds because they invest in a diversified basket of commodities. That focus reflects the direction of the debate over “financialization” of commodity markets, which is concerned less with investments directed at individual commodities (e.g., commodity ETFs, which are concentrated in precious metals) and more on “massive passives”—investors and investment vehicles like commodity mutual funds that seek broad exposure to commodity prices through commodity indexes.
- ¹⁹ ICI’s definition of commodity mutual funds is consistent with the Morningstar, Inc. classification titled “Commodities Broad Basket,” but this study uses ICI data on assets under management and flows for this category. Morningstar states that “Commodities Broad Basket portfolios can invest in a diversified basket of commodity goods including but not limited to grains, minerals, metals, livestock, cotton, oils, sugar, coffee, and cocoa. Investment can be made directly in physical assets or commodity-linked derivative instruments, such as commodity swap agreements.” See http://corporate.morningstar.com/us/documents/MethodologyDocuments/MethodologyPapers/MorningstarCategory_Classifications.pdf.
- ²⁰ The Dodd-Frank Wall Street Reform and Consumer Protection Act established a comprehensive new regulatory framework for swaps and security-based swaps. Among other things, the Dodd-Frank Act imposed clearing and trade execution requirements on standardized derivatives products. See Core Principles and Other Requirements for Swap Execution Facilities, 76 Fed. Reg. 1214 (Jan. 7, 2011).
- ²¹ Index weights are usually adjusted annually. For discussion of the Dow Jones-UBS index weights and a primer, see the following links: <http://press.djindexes.com/index.php/dow-jones-indexes-and-ubs-announce-2012-weights-of-dow-jones-ubs-commodity-index/> and http://www.djindexes.com/mdsidx/downloads/brochure_info/Dow_Jones_UBS_Commodity_Index_Calculation_Primer.pdf.
- ²² See Gorton and Rouwenhorst (2006).
- ²³ In addition, investors can gain exposure to emerging market growth indirectly by investing in a diversified commodity mutual fund, since commodity price returns are highly correlated with emerging market growth over the last decade. The ability to gain indirect exposure to emerging markets also helps overcome capital controls that emerging markets countries sometimes enforce, which can make it difficult to invest directly in those countries.
- ²⁴ For simplicity, this study ignores the expense ratios of both mutual fund investments and focuses on gross return.
- ²⁵ The food and energy component of the Consumer Price Index is often excluded from measures of inflation because it is more volatile. However, it also has been one of the key drivers of overall inflation over the last decade and reflects price changes for an important part of household consumption.
- ²⁶ In February 2012, the CFTC amended its Rule 4.5 to limit sharply an exemption granted in 2003 to mutual funds, ETFs, and other registered investment companies from registration and regulation by the CFTC as commodity pool operators. On April 17, 2012, ICI and the U.S. Chamber of Commerce filed a legal challenge to that rulemaking, asking the U.S. District Court for the District of Columbia to set aside the CFTC’s amendments. That action is pending.
- ²⁷ Mutual funds that pursue a managed futures strategy may invest partly in commodity futures, either directly or indirectly via commodity index swaps. This study includes these in Figure 10 for the sake of comparison only. This study excludes these managed futures mutual funds in the rest of the analysis because they do not invest exclusively in commodities and remain relatively small in terms of assets compared to commodity ETFs and commodity mutual funds.
- ²⁸ In statistical terms, the contemporaneous correlation between net new cash flows to commodity mutual funds and the monthly percent change in the Dow Jones-UBS Commodity Index Total Return is 0.30 for monthly data from January 2004 to December 2011.

²⁹ The contemporaneous correlation between net new cash flows to commodity mutual funds and the weekly percent change in the Dow Jones-UBS Commodity Index Total Return falls to 0.167 for weekly data from January 2004 to December 2011. See the regression appendix for the results of weekly regressions.

³⁰ A simple regression that regresses the weekly percent change in the Dow Jones-UBS Commodity Index Total Return against the contemporaneous net new cash flows to commodity mutual funds produces an R-squared of 0.0195, confirming that weekly flows to commodity mutual funds, at best, can explain less than 2 percent of weekly commodity price changes, leaving 98 percent of that variation unexplained.

³¹ This study estimates the implied percentage that commodity mutual funds invest in various commodity markets by using the Dow Jones-UBS Commodity Index and S&P GSCI. This calculation uses the fact that more than 90 percent of assets under management are tied to the Dow Jones-UBS Commodity Index, and thus assumes that only 10 percent of assets are tied to the S&P GSCI to arrive at the estimates.

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