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Recent Surge in Global Commodity Prices

– Impact of financialization of commodities and globally accommodative monetary conditions –

International Department

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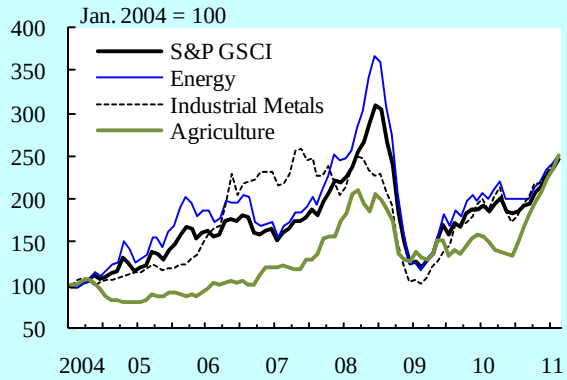
Global commodity prices have been rising again since 2009, and particularly rapidly since the fall of 2010. While the strong increase in commodity prices has been driven by global economic growth propelled by emerging economies, speculative investment flows into commodity markets have amplified the intensity of the price surge. The dynamics of global commodity prices has been changing as well, in accordance with the growing presence of financial investors in commodity markets. The entry of new financial investors has paved the way for the "financialization of commodities". Consequently, global commodity markets have become more sensitive to portfolio rebalancing by financial investors, which has made commodity markets more correlated with other asset markets, including major equity markets. Furthermore, globally accommodative monetary conditions have played an important role in the surge in commodity prices, both by stimulating physical demand for commodities and driving more investment flows into financialized commodity markets.

Introduction

Global commodity markets have experienced significant price swings in recent years. Following a prolonged rise that peaked in mid 2008, led by soaring crude oil prices, global commodity markets fell sharply and bottomed out in early 2009. Since then, prices have been rising again, with the speed of the rise accelerating since the fall of 2010 (Chart 1). The re-emergence of surging commodity prices, alongside the higher levels of resource utilization, has stoked inflationary pressure in emerging economies. Against this backdrop, central banks in emerging economies have taken effort to tame mounting inflationary pressure by tightening their monetary policies, including the use of policy rate hikes and the increase in the deposit reserve requirement ratio.

How far should a central bank tighten monetary policy when faced by surging commodity prices causing inflationary pressure? The answer depends on the cause and persistence of the price increases. Recent developments on the rise in commodity prices seem to indicate that various factors are acting in a very complex way, including supply-demand fundamentals, speculative market forces and geopolitical concerns. There is no consensus at this moment on which factor dominates the rise in commodity prices. Some policy makers, especially in emerging countries, point to an extremely

Chart 1: Global Commodity Prices



Note: The figure shows S&P GSCI and its sub-indices (monthly average).

accommodative monetary policy in developed countries and its impact on speculative investment flows into commodity markets. This viewpoint argues that tighter monetary policies in emerging economies alone cannot resolve the problem, because investment flows into commodity markets will continue to increase unless developed countries tighten their monetary policies. Other policy makers highlight physical demand for commodities propelled by the high economic growth of emerging economies. This viewpoint leads to the claim that emerging economies alone can curb commodity price inflation as long as they exert sufficiently tight monetary policies.

Although it is difficult to say which view describes reality better, it is safe to say that globally accommodative monetary conditions are a key driver of the rise in commodity prices by stimulating both physical demand for commodities and investment flows into commodity markets. Equally, the financialization of commodities, as demonstrated by the rapid increase in commodity futures investments by financial investors, has amplified the fluctuation of fundamental factors, thereby amplifying the price fluctuations. The following sections review these issues in detail.

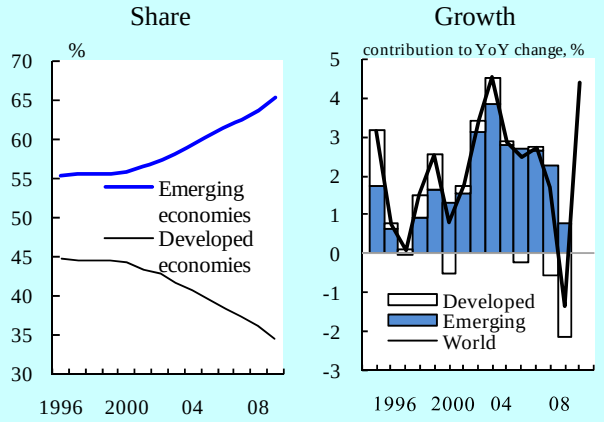
Background behind the surge in commodity prices

Commodity supply and demand conditions

To be sure, geopolitical concerns in the Middle East and weather-related supply shocks have contributed to the sharp rise in global commodity prices. But, these temporary factors alone cannot explain the sustained upward trend in global commodity markets since 2009. The primary factor driving up worldwide demand for commodities has been the robust recovery of the global economy, in particular the rising demand for commodities in emerging countries.

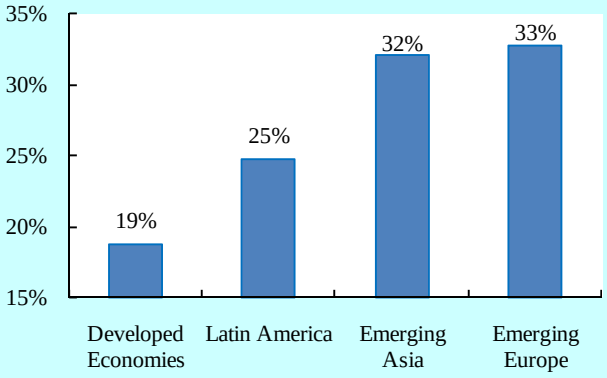
The rapidly rising demand for commodities in emerging countries reflects several structural factors. Emerging economies can be characterized by the low efficiency of energy use and the high ratio of intermediate inputs in production. For example, the input-output table shows that the ratio of intermediate inputs in China was 68% (as of 2007), which is much higher than 48% in Japan (as of 2005). Accordingly, the growing importance of emerging economies in the global economy has entailed a rapid increase both in the aggregate energy consumption and the price of intermediate inputs (Chart 2). Copper and iron ore are typical examples: since China currently accounts for roughly 40% of the world aggregate demand for both materials[1], China's high economic growth naturally contributes to the increase in global demand.

Chart 2: Global Energy Consumption



Note: Energy here includes crude oil, coal, natural gas, nuclear energy and hydro-electricity.
Source: British Petroleum

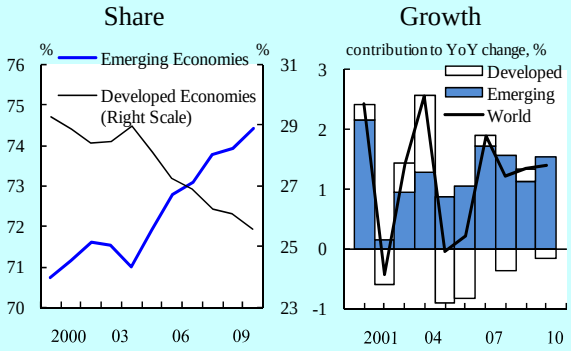
Chart 3: Share of Food in Total Consumer Expenditure



Notes: The figure shows the weighted average of Engel coefficient (from CPI statistics) in each country with its corresponding GDP (PPP-basis) used as a weight.
Food here includes "food away home" and excludes "alcohol".
Sources: Statistical Bureau, Eurostat, IMF

The similar arguments apply to food and grain. The proportion of household expenditure on food, or Engel coefficient, is high in emerging countries (Chart 3). Thus, strong economic growth in emerging economies is a critical determinant of the rise in food prices (Chart 4). Demand is also rising for feed grain in emerging countries as the consumption of meat increases with rising income levels.

Chart 4: Global Grain Consumption



Notes: Developed economies include US, Japan, Canada and EU-27.
Grain means wheat, coarse cereals and rice.
Both grain for food and grain for forage are included.
Source: OECD

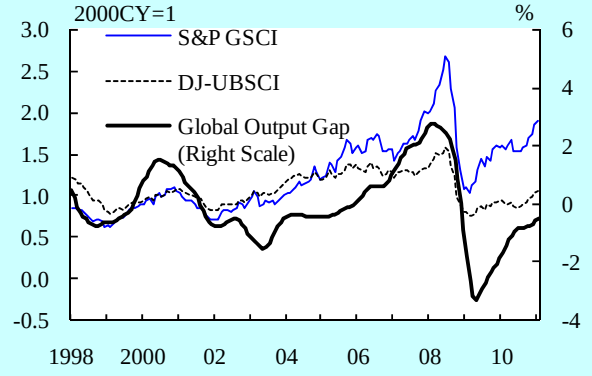
Relationship between global output gap and commodity prices

Chart 5 shows a time-series relationship between the global economic cycle and global commodity price indices. The former is proxied by the global output gap, while the latter utilizes the relative price of commodities to the global headline CPI[2]. S&P GSCI and DJ-UBSCI are selected for commodity indices because they are the two most popular indices in commodity markets[3]. As the chart shows, the relative price of the commodity indices moves roughly in tandem with the global output gap. This co-movement can be explained as follows. First, demand for commodities mirrors real economic activities, since commodities such as energy are used as intermediate inputs for production. Second, prices of standardized commodities traded in centralized markets reflect changes in supply-demand conditions much more flexibly than those of differentiated goods and services which are included in CPI.

The movement of individual commodity prices may look unsynchronized due to the effects of idiosyncratic factors such as geopolitical concerns or transitory commodity-specific supply shocks. However, the fact that the relative price of aggregated commodity indices roughly moves in a pro-cyclical way suggests the existence of a common factor in the price movement, which reflects various activities in the global real economy. In this sense, global commodity prices can be compared to "a thermometer" for the global economy, and the recent rise in global commodity prices, in conjunction with the recovery of the global output gap, reflects supply-demand fundamentals in the global economy.

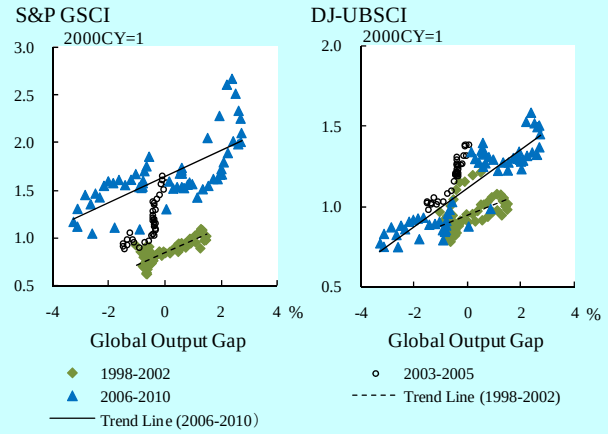
However, the recent surge in the relative price of global commodities appears to have diverged from its historical relationship with the global output gap. The scatter chart of the global commodity indices and the global output gap shows that a positively sloped regression line has shifted upward (Chart 6)[4]. The key

Chart 5: Global Output Gap and Global Commodity Prices



Note: S&P GSCI and DJ-UBSCI are shown as relative prices to the global headline CPI.

Chart 6: Upward Shift in Global Commodity Prices



Note: S&P GSCI and DJ-UBSCI are shown as relative prices to the global headline CPI.

to understanding this change is that commodities have two different aspects: they are both consumption goods and financial assets for investment. The positive correlation between global commodity indices and the global output gap reflects one aspect as consumption goods. If the demand for a commodity increases relative to its supply, it leads to a higher equilibrium price of that commodity.

Commodities as an investment asset class

In contrast, when viewed as financial assets, commodities are affected by current supply-demand condition, by future supply-demand balances, and by speculative factors not governed by fundamentals. The steady recovery of the global economy suggests that future demand for commodities will increase. This prospect strengthens market expectations for further appreciation in commodity prices. These enhanced expectations may induce capital-gain oriented investment flows into commodity markets, leading to a sharper rise in spot commodity prices. Still, this positive feedback process can be interpreted as a result of changes in fundamentals, in the sense that the whole process is based on supply and demand, albeit *expectations* of supply and demand. However, as is frequently observed in equity and real estate markets, when coupled with a prolonged low-interest rate environment, enhanced market expectations may entail a reduction in risk perception of investors who view commodities as an investment asset class. This causes commodity prices to significantly deviate from the level explained by fundamentals, otherwise called a "bubble".

It is difficult to assess whether the rise in commodity prices is attributed to bullish market expectations for future supply-demand conditions or to speculative factors not governed by fundamentals. However, the recent commodity markets do not simply reflect tight supply-demand conditions for consumption goods alone. The current situation also reflects the aspect of changes in asset prices, which have been surely affected by the globally accommodative monetary conditions. The next section explores this point in more detail.

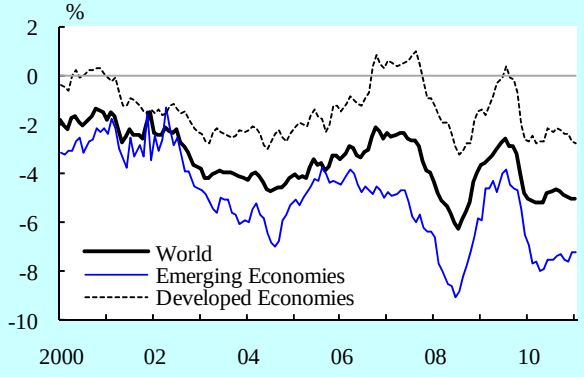
Impacts of globally accommodative monetary conditions on commodities

Negative interest rate gap

In order to assess the relationship between changes in monetary conditions and developments in commodity markets, a good proxy is the "global interest rate gap", which is the weighted average of the interest rate gap in each country with its corresponding GDP used as a weight. The interest rate gap itself denotes the difference between the real interest rate, defined as the nominal short-term interest rate minus headline CPI inflation, and the potential growth rate of an economy. If the interest rate gap is positive, meaning that the real interest rate is higher than the potential growth rate, then the financial condition is tight. Conversely, if the interest rate gap is negative, it means that the financial condition is lax, as the real interest rate is lower than the potential growth rate.

As shown in Chart 7, the global interest rate gap has become more negative, albeit fluctuating, which suggests that global monetary conditions have become accommodative over the observation period. The interest rate gap in developed countries turned negative through the mid 2000s during the so-called "Great Moderation" period, and has remained in negative territory, reflecting accommodative monetary policies since the Lehman crisis. Also, the

Chart 7: Interest Rate Gaps



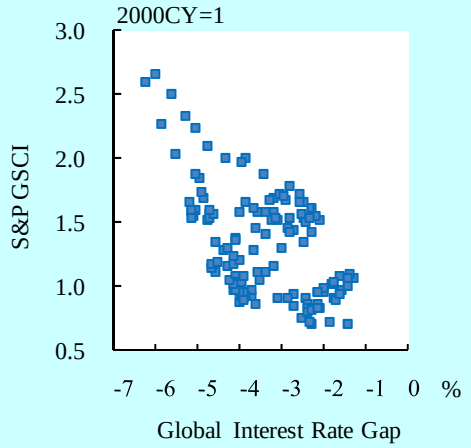
Note: Interest rate gaps are estimated with relevant data published by the International Financial Statistics and the World Economic Outlook of the International Monetary Fund.

interest rate gap in emerging countries has become more negative throughout the observation period[5]. Admittedly, by a nominal measure, monetary policies in emerging economies have been tightened with rate hikes since late 2009, preceded by a series of rate cuts after the Lehman crisis as was seen in developed countries. However, rates in emerging economies have not been hiked sufficiently fast, given the strong inflationary pressure and increase in real output growth. This "behind the curve" situation has caused the negative interest rate gap to widen in emerging economies.

Relationship between global interest rate gap and commodity prices

Global commodity prices are negatively correlated with the global interest rate gap, as seen in Chart 8. This is because rising commodity prices increase inflation, decreasing the real interest rate as a result. If the rise in commodity prices is driven by the narrowing of the global output gap and the intensity of the price surge is too strong, however, the real interest rate needs to be raised by central banks in order to tame inflationary pressure. Such a principle of central banks would lead to a positive correlation between global commodity prices and interest rate gap, and the increase in real interest rate then would cool physical demand for commodities and dampen the rise in commodity prices. But what Chart 8 shows is that monetary policy stance of central banks have not satisfied that principle on a global basis, and hence easier monetary conditions have boosted commodity prices[6].

Chart 8: Global Interest Rate Gap and Global Commodity Prices



Note: S&P GSCI is shown as a relative price to the global headline CPI.

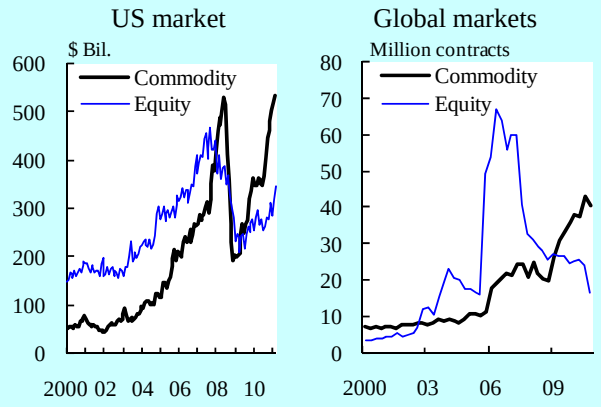
For individual central banks, the fluctuation in global commodity prices may be an exogenous supply shock. Even if a single central bank attempts to counter the fluctuation in commodity markets, it may achieve nothing other than making the domestic economy more unstable. In other words, for each central bank, an independent action to tame global commodity markets may not be an optimal choice. This reluctance of each central bank to counter rising commodity prices, however, could cause them all to be collectively worse off, because it is likely to accelerate the surge in commodity prices and thus to expand the negative global interest rate gap. The failure of this collective action leads to a higher-than-expected increase in demand for commodities. This vicious cycle may develop self-fulfilling expectations of a further appreciation in commodity prices, thereby driving commodity prices above the equilibrium level justified by supply-demand conditions (as proxied by global output gap). The experiences in several countries also suggest that accommodative monetary conditions, as characterized by the negative interest rate gap, enhance the risk-appetite of investors and induce "yield-seeking" investment flows into financial asset markets. Eventually, this process may increase the probability of an economy becoming trapped in a bubble.

Expectations for appreciation of commodity prices

Regardless of whether the current surge in commodity prices is caused by supply-demand fundamentals or speculative investment inflows, more and more investors have entered commodity futures markets, reflecting market expectations for a further appreciation of commodity prices. In recent years, the size of commodity futures markets, as measured by the market value of open interests, has become larger

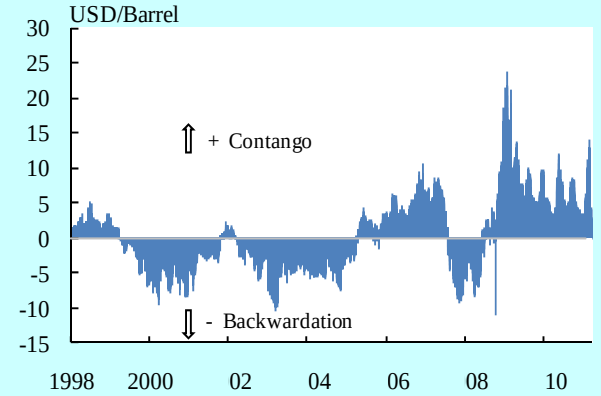
than that of equity-index linked futures markets (Chart 9). In addition, the shape of the commodity futures curve appears to have changed. For example, in the past, the shape of the oil futures curve was normally "backwardation", where the spot price was higher than the futures price (Chart 10). However, since the mid 2000s, the shape of the commodity futures curve has become "contango", where the futures price is higher than the spot price, reflecting strong expectations for appreciation in prices.

Chart 9: Open Interests in Futures Markets



Note: In the left chart, commodity futures cover 16 major commodities such as crude oil and wheat, traded on the CME, CBOT and NYMEX. Equity futures include S&P, NASDAQ and dollar-denominated Nikkei 225 (including E-Mini). The right chart shows the number of contracts in commodity futures and equity futures, collected from major commodity and stock exchanges (number of contracts).
Sources: CFTC, Bloomberg (Left Chart), BIS (Right Chart)

Chart 10: Crude oil futures curve



Note: The figure shows the difference between the twelve-month futures price and front-month futures price.
Source: Bloomberg

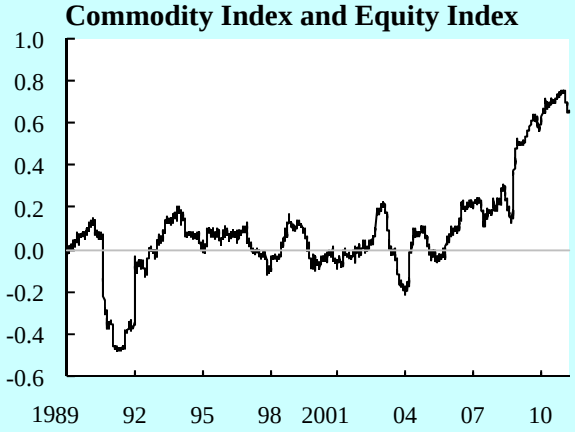
In addition to the effects of a globally low interest rate environment, the enhancement of the commodity market infrastructure has also led to the advent of "vehicles" for commodity investment, spurring the expansion of commodity markets mentioned here. The following section discusses this point.

Financialization of commodities

Diversification and market infrastructure

Short-term speculative investments in search of higher yields have strengthened investment flows into commodity futures markets. An equally important factor is the market entry of institutional investors with a long-term investment horizon, including pension funds and insurance companies. In the mid 2000s, long-term investors began to appreciate the benefits of diversification through commodity investments, convinced by the fact that the average return on commodity investments was roughly equal to that on equity investments, while the return on commodity investments was uncorrelated (or negatively correlated) with that on equities or bonds (Chart 11). Furthermore, market investors started to recognize that commodity investments might serve as a better hedge against inflation risk than traditional equity investments, given the positive linear correlation between commodity returns and the inflation rate. Thus, these benefits of commodity investments matched the strong preference of institutional investors for diversification and inflation hedging.

Chart 11: Return Correlation between Commodity Index and Equity Index



Note: The figure shows the one-year rolling correlation between the daily return of the global equity index (MSCI AC-World) and that of the commodity index (S&P GSCI).
Source: Bloomberg

Another key driver behind the expansion of the investor universe in commodity investments was the enhancement of market infrastructure for commodity futures markets. There was progress during the period between 2003 and 2004, including the development of commodity indices and the creation of ETFs. Furthermore, the improvement of trading-related platforms, such as the introduction of an electronic trading platform by the NYMEX in 2006, reduced transaction costs and accelerated transaction settlements in commodity futures markets.

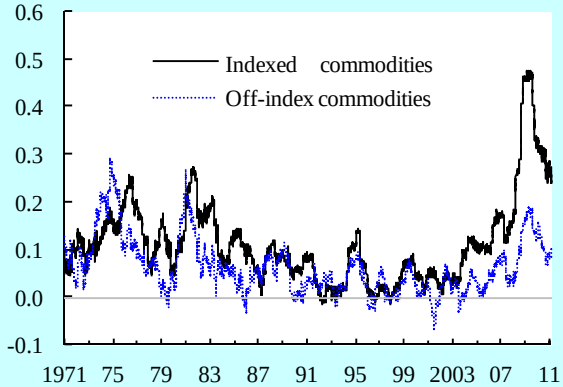
Changing nature of commodity price fluctuations arising from financialization

Equity markets and bond markets have traditionally been interconnected with one another, but global commodity markets were not so interconnected with these asset markets at least until the mid 2000s. The decoupling of commodity futures markets from other financial markets in the past is largely attributed to the fact that there were few financial investors with direct exposure to commodities at that time. However, the growing presence of financial investors in commodity markets generated a link between commodity markets and other financial markets, naturally leading to changes in the way commodity prices fluctuate. Indeed, commodity returns have become more correlated with those on equities since the mid 2000s, in conjunction with the entry of institutional investors into the commodity markets (Chart 11).

Financial investors, including institutional investors, who have increased their exposure to commodity index investments, viewed commodity futures markets as vehicles for enjoying the benefits of diversification and thereby improving the risk-return profile of their portfolios. The growing interest of financial investors in alternative investments to traditional financial assets, such as bonds and equities, paved the way for the "financialization of commodities". As a result, once financial investors face a mounting risk of incurring losses on their balance sheets, market-wide selling pressure is likely to affect prices of risky assets. Also, if the risk-appetite of financial investors increases, it is likely to stimulate market-wide demand for risky assets. These amplifying effects have been manifested in the increasing positive correlation between the return on commodities and that on other financial assets such as equities. The corollary of this changing process is that commodity prices are becoming less related to supply-demand conditions of each commodity, but increasingly subject to the effects of portfolio rebalancing by financial investors.

Index investors in commodity futures markets are less concerned about the supply-demand fundamentals than commercial investors, such as producers or consumers of commodities. This is reflected in the fact that the returns on commodities included in the S&P GSCI and DJ-UBSCI have become more correlated with one another since the mid 2000s, while those on commodities not included in those indices have stayed relatively less correlated over time (Chart 12)[7]. Thus, the increasing share of investors who are less concerned about the fundamentals of each commodity has diluted the link between the return on commodities included in the major indices and supply-demand fundamentals. Given such evidence, the financialization of commodities has caused commodity prices to diverge from the level explained by fundamentals.

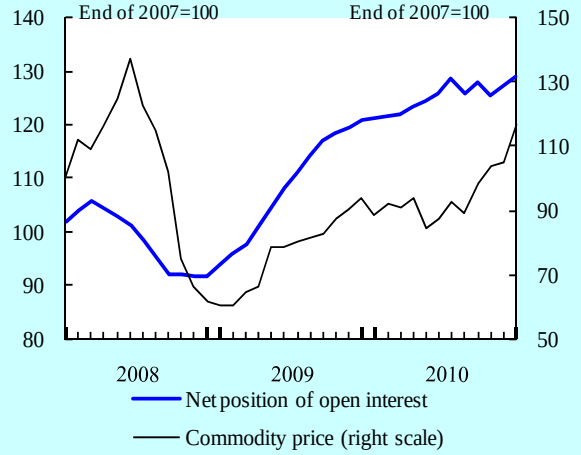
Chart 12: Average Correlations of Indexed and Off-index Commodities



Note: The figures show one-year rolling correlations of daily returns on indexed commodities and off-index commodities.

Index investors in commodity futures markets are characterized by their long-only positions and their dominance in the market. These characteristics of index investors seem to impose upward pressure on commodity prices, which can be augmented by trend-following momentum strategies by CTA (Commodity Trading Advisers). The effects of portfolio rebalancing by index investors may act in the opposite direction too; once index investors start to unwind their long positions facing an exogenous shock, commodity prices can fall dramatically. In fact, this may be exactly what happened in the latter half of 2008, when the global economy entered a serious downturn triggered by the financial crisis; the price fall in the commodity markets during that period may have been exacerbated by the reaction of index investors (Chart 13).

Chart 13: Net Position of Commodity Index Investors

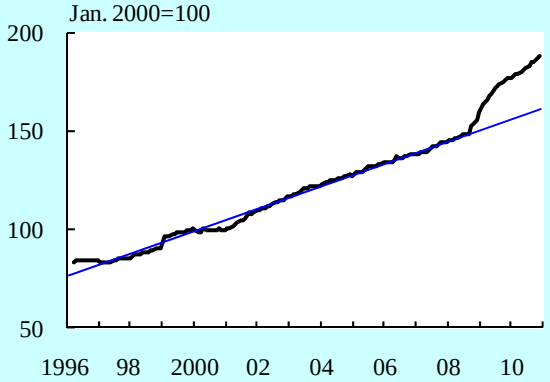


Note: The figures are based on the weighted average of prices and net positions of open interest (number of contracts) in 18 major commodity futures, reported to CFTC, utilizing the weight defined by S&P GSCI. The weighted averages are standardized with the end of 2007 being equal to 100.
Source: CFTC

Conclusion

Current discussion on rising global commodity prices tends to focus on whether the price surge is driven primarily by supply-demand fundamentals or financial effects including the advent of commodity index investors. However, given that it is difficult to capture these effects separately and accurately in the empirical analysis, a dualistic thinking between fundamentals and financial factors may not be relevant. Regardless of which factor is more dominant, accommodative monetary conditions play a crucial role by causing prices to surge through both channels. Globally accommodative monetary conditions have become unprecedented. The relative size of global money stock (M1) measured against the real GDP has surpassed its historical trend (Chart 14)[8]. This sustained global excess liquidity not only increases physical demand for commodities thereby affecting fundamentals, but also amplifies speculative factors, both of which are contributing to the sharp rise in global commodity prices.

Chart 14: Global M1 to Global Real GDP Ratio



Note: The thin line is the trend line of the ratio from March 1996 to December 2007.

As commodities become financialized under the loose monetary environment, global commodity markets are likely to overheat and to have destabilizing effects on the global economy. If the rise in commodity prices continues to escalate, it may cause distortion in income distribution between resource producing countries and consumer countries, and threaten price stability globally. Although global commodity prices have been increasing faster than the global CPI, as seen in the rise in the relative prices of commodities, globally accommodative monetary conditions could stoke inflationary pressures, causing the global CPI to catch up and rise more rapidly. This interaction might lead to a vicious, self-fulfilling cycle, in which growing inflationary pressure drives more financial investors toward commodity index investments for an inflation hedge, which further accelerates inflationary pressures.

Fluctuations in global commodity prices affect the global economy in a significant way, while fluctuations in the real economy and shocks in the financial markets are likely to amplify the movement of commodity prices. Moreover, the progress in financialization of commodities has increased the co-movement between commodity markets and other traditional markets, through the effects of portfolio rebalancing by financial investors. Given these changes in commodity markets, the supply-demand conditions of each commodity are not sufficient for understanding the recent developments in global commodity markets. A broader view is needed to grasp commodity markets, including the economic and financial situations in both developed and emerging countries, as well as the possible impacts of upheavals in commodity markets on the financial system.

[1] The demand for copper in 2010 is calculated using data from the International Copper Study Group for the first half of 2010. The demand for iron ore is based on the forecast for 2010 by the World Steel Association.

[2] The global output gap is defined as the difference between the global GDP and its HP-filtered trend. The data source of the global GDP is from the International Financial Statistics, while that of the global CPI is from the World Economic Outlook of the International Monetary Fund.

[3] S&P GSCI and DJ-UBSCI are abbreviations for Standard & Poor's Goldman Sachs Commodity Index and Dow Jones-Union Bank of Switzerland Commodity Index, respectively. These indices have different weights for individual commodities; S&P GSCI has larger weights on energy, while DJ-UBSCI has larger weights on industrial metals and agricultural products.

[4] The structural upward shift in agricultural prices may be triggered by the increase in demand for grain in emerging Asian countries, caused by changes in their dietary habits, while it may also be affected by the heightened pricing power of major grain firms. However, considering the fact that S&P GSCI with larger weights on energy shows a wider upward shift than DJ-UBSCI with larger weights on agriculture, certain common factors are likely to have pushed the global commodity prices upward, rather than any idiosyncratic factor within grain markets.

[5] In emerging economies, the risk premium, arising from the immature infrastructure of their financial markets, could raise bank lending rates and long-term interest rates. Given the existence of this risk premium, the negative interest rate gap does not necessarily imply that the monetary condition is accommodative. Even after adjusting the risk premium, however, we would reach the same conclusion that the negative interest rate gap has widened.

[6] Based on globally aggregated data, the policy reaction function of a hypothetical "global central bank" is estimated by the regression model below. Given that commodity prices are pro-cyclical, the "global central bank" should stabilize the global inflation affected by the fluctuation in commodity prices. However, the estimation results show that the coefficient on the global headline CPI inflation (i.e., α) is below 1. That is, the "Taylor principle"--- the proposition that central banks can stabilize the macroeconomy by raising their interest rate instrument more than one-for-one in response to higher inflation --- is not satisfied on a global basis, implying that the "global central bank" has not conducted monetary policy so as to stabilize the global inflation. This result holds regardless of whether the sample data include the period from 2008 to 2010 when commodity prices fluctuated significantly.

$$\begin{pmatrix}\text{Global short - term}\\ \text{interest rate}\end{pmatrix} = \alpha \times \begin{pmatrix}\text{Global CPI}\\ \text{inflation}\end{pmatrix} + \beta \times \begin{pmatrix}\text{Global}\\ \text{output gap}\end{pmatrix} + \gamma$$

Sample period	Estimated parameters			
	α	β	γ	
Jan. 2000 – Dec. 2007	0.90*	0.51*	0.96	Adj-R^2=0.53, SE=0.74
Jan. 2000 – Dec. 2010	0.11	0.57*	3.78*	Adj-R^2=0.46, SE=0.92

Note: * denotes statistical significance at the 1 percent level.

[7] See Tang and Xiong (2010) for details.
Tang, Ke and Wei, Xiong, "Index Investment and Financialization of Commodities," NBER Working Paper Series, No.16385, September 2010.

[8] The Global M1 is a weighted average of M1 in each country with its corresponding GDP (PPP-basis) used as a weight. The data source is from the World Economic Outlook of the International Monetary Fund.

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