March 18, 2014

Metal Detector

Days numbered for Chinese commodity financing deals

Goldman Sachs

Commodities Research

Financing deal concerns mounting as CNY volatility rises

Concerns on an unwind of commodity financing deals trigger selloff

The recent sell-off in copper and iron ore prices reflects the market's ongoing concerns regarding the impact of a potential unwind of Chinese commodity financing deals, though the weak underlying market fundamentals should not be discounted. The concerns intensified following the recent CNY depreciation which has raised uncertainty regarding the profitability of the deals and the impact on different asset classes were they to unwind. Up to 1mt of copper and 30mt of iron ore could be released were the deals to unwind, which would be bearish given the relatively limited physical liquidity to absorb the shock.

CCFDs are facilitating China's total credit growth

We believe CCFDs are ongoing and facilitating 'hot money' inflows into China by providing a mechanism to import low-cost foreign financing. In general, the profitability of most hedged commodity financing deals remains substantial (iron ore is the exception), due to a still positive CNY and USD interest rate differential, limited depreciation in the CNY forward curve and available commodity supply. In 2013, 'hot money' accounted for c. 42% of the growth in China's monetary base of which we estimate that CCFDs contributed US$81-160 bn or c.31% of China's total FX short-term loans. Given this, it is crucial for the government to manage the immediate impact of 'hot money' flow changes on the economy and markets.

More commodities are used; a medium-term unwind is bearish

An increasing range of commodities are being used to raise foreign financing, which now includes iron ore, soybeans, palm oil, rubber, zinc, and aluminum, as well as gold, copper, and nickel. CCFDs create excess physical demand and tighten the physical markets artificially; in contrast, an unwind creates excess supply and thus is bearish to prices. We think CCFDs will be unwound over the medium term, mainly triggered by an increase in Chinese FX volatility, as indicated by recent CNY depreciation and PBOC's latest move to widen the daily trading band. FX volatility could result in a higher cost of currency hedging, effectively closing the interest rate arbitrage. Higher US rates are another likely catalyst for an unwind in the long run. A continuous CNY depreciation in the short term, however, would trigger some deals to be unwound sooner than expected, and hence place downside risks to our short-term commodity price forecasts.

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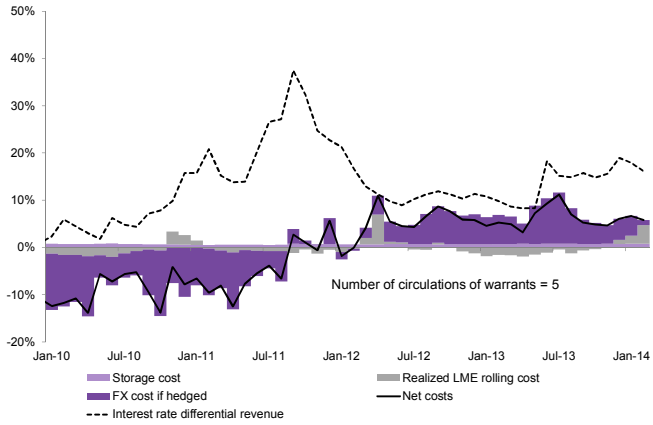
Days numbered for Chinese commodity financing deals

As part of a broader shift in China's funding base from domestic to various foreign funding vehicles, Chinese commodity financing deals[1] have become increasingly prevalent, owing to the combination of the relatively high level of Chinese interest rates and the existence of Chinese capital controls. Financing deals use commodities and other goods as a tool to unlock the interest rate differential, with potential implications for Chinese growth, China's linkage with ex-China interest rates, CNY volatility and commodity market pricing.

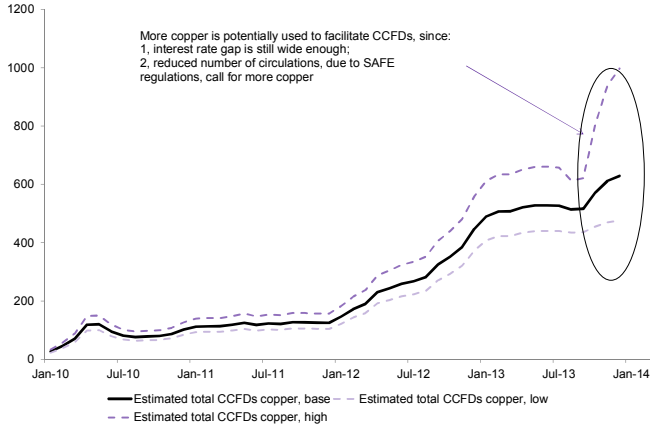
In contrast to some media reports, we find that the bulk of Chinese commodity financing deals are ongoing, facilitating 'hot money'[2] inflows into China and providing a mechanism to import low cost foreign financing. In general, the profitability of most currency and commodity hedged Chinese commodity financing deals remains substantial, owing to a still positive CNY and USD based interest rate differential (>4%), limited depreciation in the CNY over the past month (<2%) and the CNY forward curve (limited cost of hedging the currency exposure), and a lack of tightness in the underlying commodity (i.e. limited cost of hedging the commodity). Returns in copper are still >10% (Exhibit 1), and up to 1mt of physical copper could still be tied up in deals (Exhibit 2).

Exhibit 1: Chinese commodity financing deals are still profitable - annual return for copper still well over 10%
$/t of copper profit on CCFD per annum as% of copper price



Source: LME, Wind, Bloomberg, Goldman Sachs Global Investment Research.

Exhibit 2: No sign of any reduction in Chinese copper financing deals as yet
kt



Source: Goldman Sachs Global Investment Research.

While triggered by concerns about Chinese credit following the Chaori default, an unwind in iron ore financing deals[3], and concerns about an unwind in copper financing deals, the recent copper price weakness has reflected the combination of sluggish Chinese demand growth and strong global copper supply growth, rather than a financing deal unwind.

Supporting this assertion is the fact that nickel (to an even greater extent than copper), and zinc both have a sizeable amount of exposure to financing deals, and their prices have substantially outperformed copper. Further, were this a true copper financing deal unwind, Chinese bonded copper prices[4] would have led the price declines (instead they lagged the

[1] There are two primary types of Chinese "financing deals". In this note we focus on the most impactful variant– which in copper's case we have previously referred to as Chinese Copper Financing Deals (CCFDs). CCFDs involve holding the physical material and corresponding future hedges for a sustained period. They enable Chinese corporates to get financing at near foreign interest rates, for sums greater than the value of the underlying commodity. The second type of financing deal is simpler and less impactful – in copper we call it Cash for Copper financing deals (CFCs). These deals result in stock shifting from ex-China to China – for details please see "*Copper: Beware the red herring* ", July, 9, 2013.

[2] Hot money inflows are those fund flows into China that are not associated with the current account flows or FDI.

[3] Iron ore was a special case as the lack of a liquid futures market for iron ore meant that the commodity exposure could not readily be hedged.

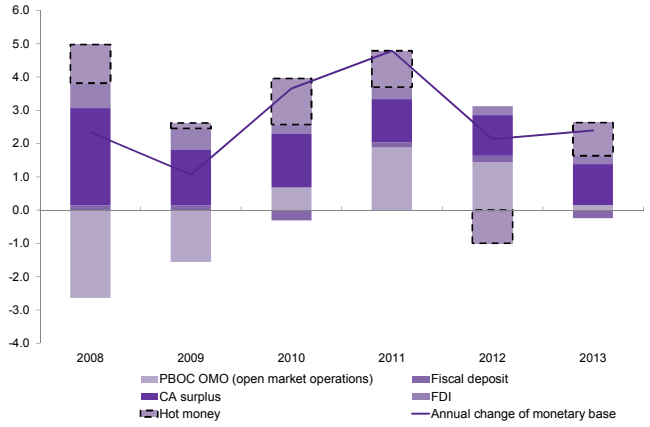
[4] Commodities used for Chinese commodity financing deal purposes are mostly held in Chinese bonded warehouses, which is a special customs zone on the mainland. Bonded stocks trade at the LME price plus the China bonded physical premium, and were counted as imports into China.

domestic Shanghai copper price declines), Chinese bonded stocks would have declined (instead they have risen) and the LME futures curve would likely have moved into contango (it remains in backwardation).

More broadly, the main reason why the government has not shut down 'hot money' inflows in an abrupt fashion to date, in our opinion, is that a complete shutdown could have major consequences for China's short-term liquidity. Indeed, China's economic growth is increasingly supported by different types of FX inflows, including those from commodity financing deals, as they can bring in low cost foreign funding and increase China's monetary base[5], the foundation of both China's rapid credit growth and solid economy growth. In 2013, we estimate that c.42% of the increase of China's monetary base can be attributed to the low cost foreign funding or the 'hot money' inflows (Exhibit 3).

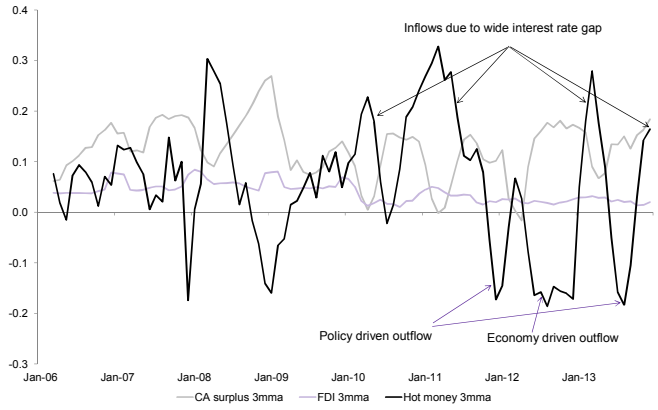
These FX / hot money inflows are of substantial size and high volatility (Exhibit 4) and the government attempts to smoothly manage the short-term liquidity cycle in response to these flows. When these flows are very strong China tends to respond (Exhibit 5), as in June and December 2013, as well as February/March 2014, with bearish implications for equities and commodities (Exhibit 6).

Exhibit 3: Low cost foreign funding is an influential driver of the growth in China's monetary base…
Trillion rmb



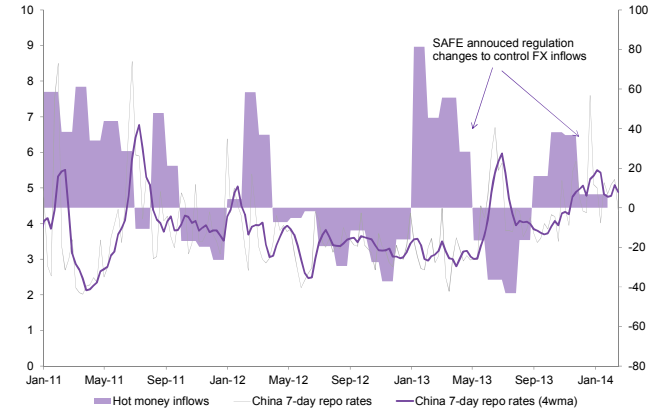
Source: Haver, CEIC, Goldman Sachs Global Investment Research.

Exhibit 4: …and it is much more volatile than other FX inflows
Trillion rmb



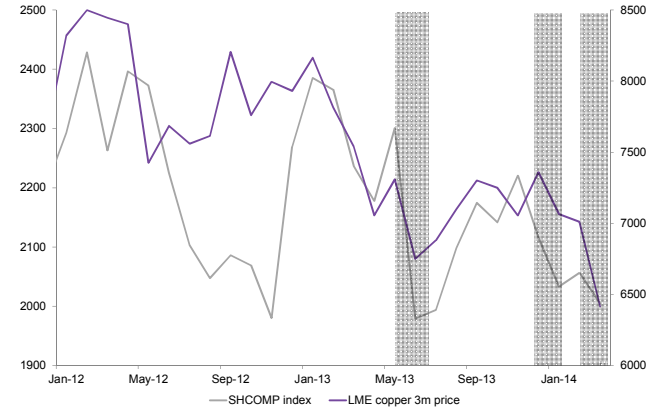
Source: Haver, CEIC, Goldman Sachs Global Investment Research.

Exhibit 5: China's liquidity tightened up in June and Nov-13, following policy moves to control strong FX inflows…
%; bn USD



Source: Wind, CEIC, Goldman Sachs Global Investment Research.

Exhibit 6: …and it led to a sell-off in both equity and commodity markets
index; $/t



Source: Bloomberg.

[5] The monetary base comprises commercial banks' deposits at the PBOC and their cash in vaults.

There are three main drivers of 'hot money' inflows: commodity financing deals, over-invoicing exports, and the black market. In this article, we focus on the Chinese commodity financing deal channel, which has by our estimates facilitated roughly US$81-160 bn of FX inflows since 2010, which is c.31% of China's total FX short-term borrowings (duration < 1 year) (Exhibit 7). Of these deals, gold, copper and iron ore are three leading commodities, followed by soybean, palm oil, natural rubber, nickel, zinc and aluminum.

Exhibit 7: FX loans via different commodity financing deals

	Total	precious metals and jewelry	Copper	Iron ore	Soybean	Natural rubber	Palm oil	Nickel	Zinc	Aluminum
Inventory (million tons)			0.63	30	5	0.3	1.2	0.01	0.01	0.01
Price ($/t)			7300	115	515	2500	850	14000	2000	1800
Number of circulations (low)			3	2	2	3	2	5	5	3
Number of circulations (high)			10	4	4	7	3	10	10	7
Number of circulations (base)			5	3	3	5	2.5	7	7	4
Total notional value (bn USD, low)	**81**	50	13.8	6.9	5.2	2.3	2.0	0.7	0.1	0.1
Total notional value (bn USD, high)	**160**	80	46.0	13.8	10.3	5.3	3.1	1.4	0.2	0.1
Total notional value (bn USD, base)	**109**	60	23.0	10.4	7.7	3.8	2.6	1.0	0.1	0.1

Source: Goldman Sachs Global Investment Research.

One reason why the range of commodities and the amount of each of those commodities being used for financing purposes has increased since mid-2013 is that the Chinese government moved to reduce the amount of money that can be borrowed per commodity unit. This reduction in apparent financing deal 'leverage'[6] (to c.3-10 times the value of the commodity from much higher levels a year ago), has meant that larger amounts of commodities are needed to raise the same amount of low cost foreign funding. In copper's case for example, the amount of copper used in financing deals could have risen from 500kt to 1mt over the past nine months, as shown in Exhibit 2.

Looking ahead, our view is that Chinese commodity financing deals will gradually unwind over the medium term (the next 12-24 months), driven by an increase in FX hedging costs, which would slowly erode financing deal profitability and eventually close the interest rate arbitrage. Indeed, we expect that the government will continue to increase FX volatility in order to manage the hot money inflow cycle, thus increasing FX hedging among broader market participants, and raising the cost of hedging the currency for commodity financing deals. This FX policy outlook would be in line with the government's policy targets of gradually increasing the CNY trading band before eventually loosening the nation's capital controls, and is likely to occur before the CNY/USD interest rate differentials close, based on our Economists' forecasts. Finally, an abrupt government crackdown on Chinese commodity financing deals, even with an offsetting monetary stimulus package, is unlikely in our view, given the potential negative impact this could have on credit and thus economic growth.

[6] The primary collateral used to back financing deals are the Chinese corporates balance sheets, not the underlying commodity.

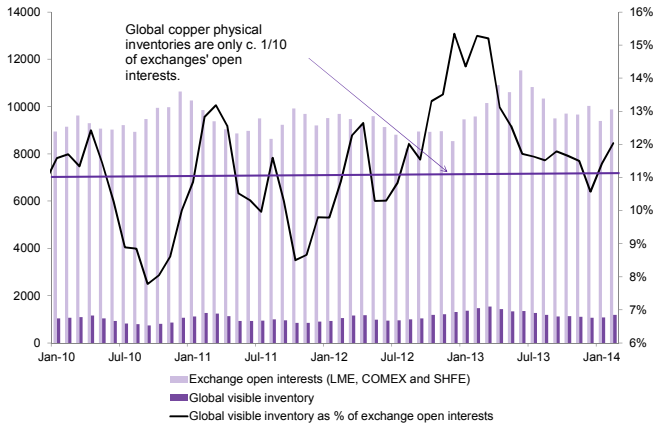
Exhibit 8: The recent managed CNY depreciation is a signal that the government wants to increase FX volatility and reduce the hot money inflow pressure gradually
implied vol (lhs), USDCNY (rhs)

Source: Bloomberg, Goldman Sachs Global Investment Research.

With respect to the impact of an unwind in Chinese commodity financing deals on China's economic growth, we expect that the government will actively manage the impact on domestic credit creation, however we note that this process, if not managed perfectly, will not be without downside risks to Chinese growth.

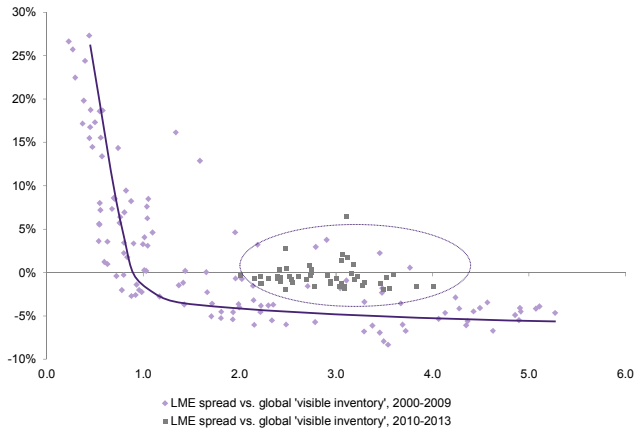
From a commodity market perspective, financing deals create excess physical demand and tighten the physical markets, using part of the profits from the CNY/USD interest rate differential to pay to hold the physical commodity. While commodity financing deals are usually neutral in terms of their commodity position owing to an offsetting commodity futures hedge, the impact of the purchasing of the physical commodity on the physical market is likely to be larger than the impact of the selling of the commodity futures on the futures market. This reflects the fact that physical inventory is much smaller than the open interest in the futures market (Exhibit 9). As well as placing upward pressure on the physical price, Chinese commodity financing deals 'tighten' the spread between the physical commodity price and the futures price (Exhibit 10).

Exhibit 9: Commodity financing deals' impacts on physical and paper markets are asymmetric since paper market has much bigger capabilities to digest the shock of position changes
KT; visible inventory as % of exchange open interests



Source: Bloomberg, Goldman Sachs Global Investment Research.

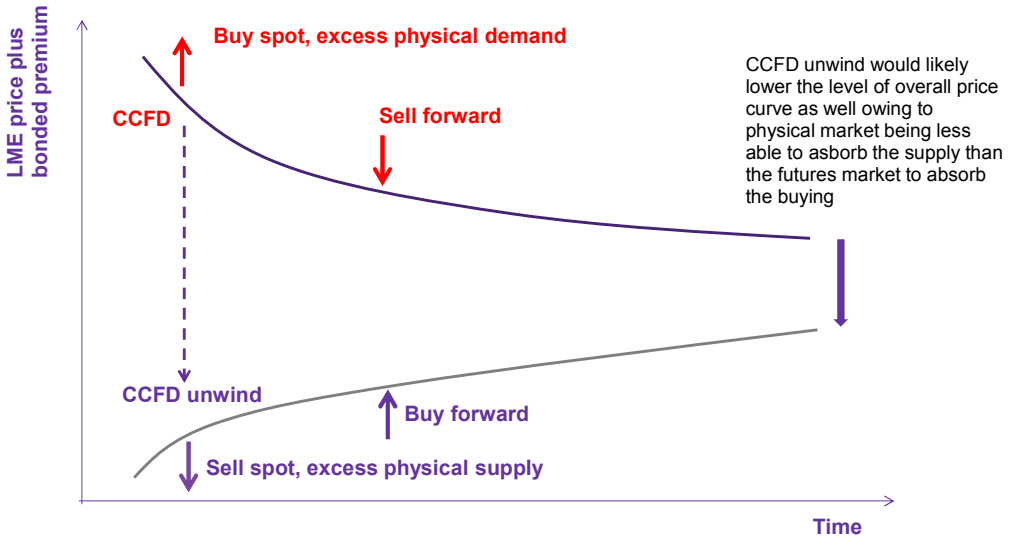
Exhibit 10: LME copper spread is tighter than otherwise would be the case since 2010 when copper financing deals started to gain prevalence
LME cash-3m as % of cash price; inventory as weeks of global consumption



Source: LME, SHFE, COMEX, Bloomberg, Goldman Sachs Global Investment Research.

In this context, an unwind of Chinese commodity financing deals would likely result in an increase in availability of physical inventory (physical selling), and an increase in futures buying (buying back the hedge) – thereby resulting in a lower physical price than futures price, as well as resulting in a lower overall price curve (or full carry) (Exhibit 11).

Exhibit 11: Stylized chart of an unwind in Chinese commodity financing deals – this example assumes a natural state of a balanced-surplus commodity market



Source: Goldman Sachs Global Investment Research.

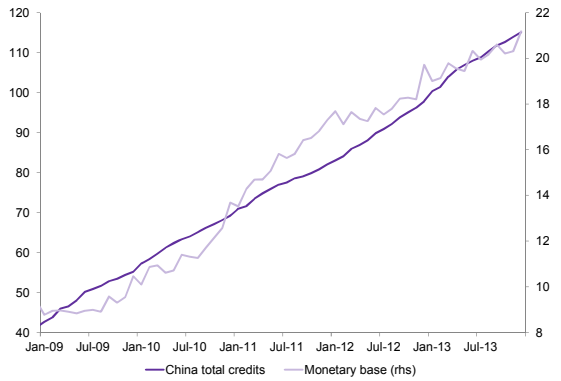
Chinese commodity financing deals and the macroeconomy

Commodity financing deals facilitate low cost foreign capital flows (or 'hot money') into China, affecting China's monetary base, which in turn is the foundation of domestic lending. To understand the importance of commodity financing deals to the Chinese economy, we first outline how the banking system works in a modern economy. Theoretically, there are two ways to accelerate credit growth:

1. Increase the monetary multiplier (where monetary multiplier equals China's total credit divided by the monetary base), i.e., higher leverage with the same monetary base
2. Expand the monetary base, i.e., central banks print more money

China has done both since 2009, contributing to a 170% increase in total social financing (total credit) over the period. China's monetary base has risen by 140% during the same period (Exhibit 12), while China's monetary multiplier has risen by 12% (Exhibit 13), thanks to the emergence of the shadow banking system (primarily over the period 2012-14).

Exhibit 12: Sharp increase of monetary base has lent strong support to China's total credit growth…
trillion RMB



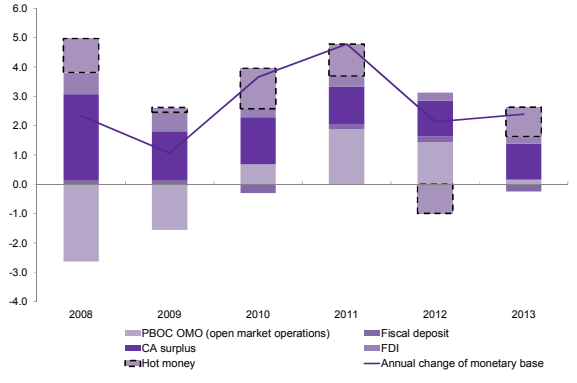
Source: CEIC, Goldman Sachs Global Investment Research.

Exhibit 13: … While the monetary multiplier has only increased marginally.
index

Source: CEIC, Goldman Sachs Global Investment Research.

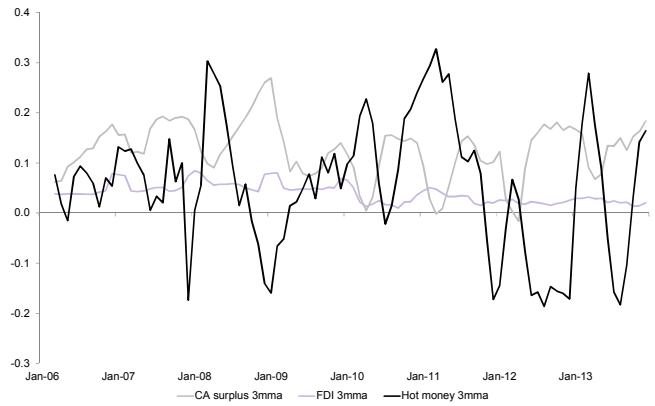
The rapid expansion of China's monetary base has been supported by a steady current account surplus, relatively smooth FDI inflows, robust liquidity injection by the central bank via different open market operations, and volatile but strong overall inflows of 'hot money' (Exhibits 14 and 15).

Exhibit 14: 'Hot money' inflow has been an important driver for the growth of China's monetary base…
trillion RMB



Source: CEIC, Haver, Goldman Sachs Global Investment Research.

Exhibit 15: …and it has been volatile, relative to other FX inflows
trillion RMB



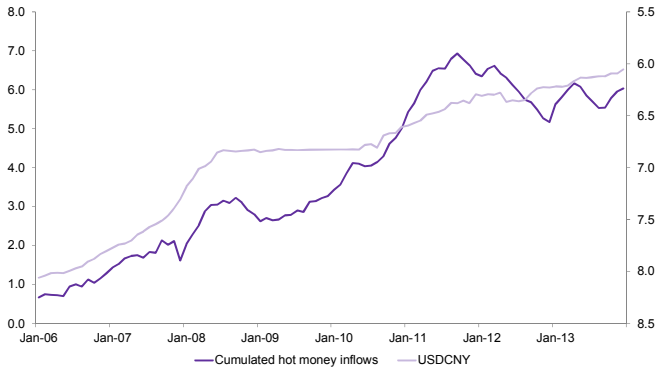
Source: CEIC, Haver, Goldman Sachs Global Investment Research.

As background, the concept of 'hot money' originates from the observation that China's foreign reserve growth is consistently different from that of current account surplus and FDI, though China's capital account is controlled by the government. (i.e., capital cannot flow into or out of China freely). 'Hot money' represents the 'non-visible' financing channels, such as commodity financing deals.

Generally speaking, 'hot money' is the foreign capital that chases interest rate arbitrage opportunities between CNY and USD via different practical channels. It is similar to the "carry trade" in the FX market, and has the following features:

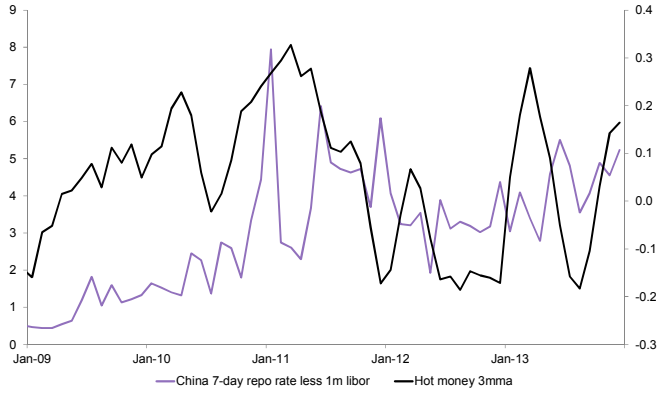
1. **'Hot money' is generally exposed to CNY/USD FX risk** – CNY has been appreciating against USD in the last 10 years with relatively low volatility (Exhibit 16)– the consensus has generally been that China would allow the CNY to steadily appreciate against USD. As a result, the arbitrageurs historically have not tended to hedge their CNY/USD exposures, as they have tended to expect gains from CNY appreciation.
2. **'Hot money' flows are highly volatile.** Hot money usually focuses on liquid assets with relatively short durations such as CNY deposits (Exhibit 17), trust products or other wealth management products in order for it flow out of China quickly, when necessary.
3. **'Hot money' flows tend to be self-reinforcing** – strong hot money inflows tend to place upward pressure on the CNY, which tends to attract more inflows given that CNY appreciation expectations tend to be ongoing.

Exhibit 16: 'Hot money' inflow is in the context of CNY's steady appreciation against USD…
trillion RMB; FX rate



Source: Bloomberg, CEIC, Goldman Sachs Global Investment Research.

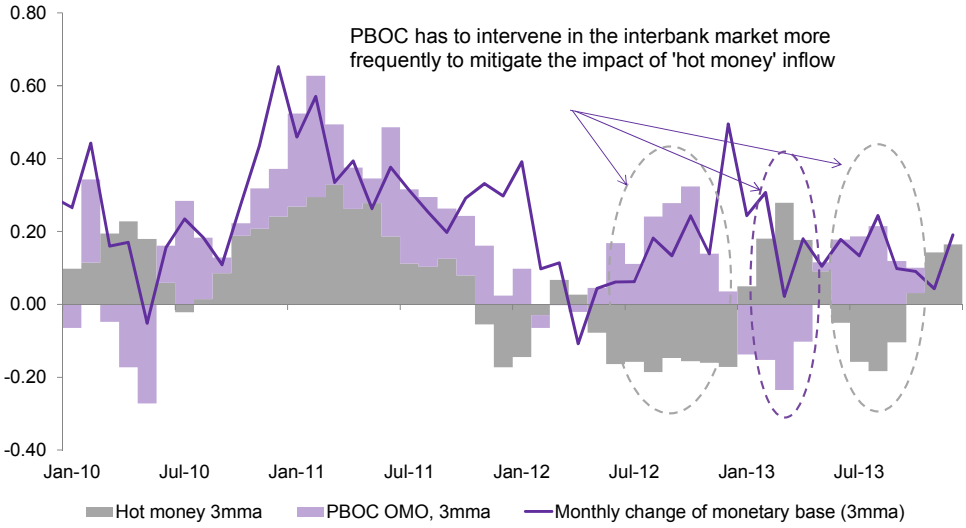
Exhibit 17: …and it correlates with China's onshore interest rate movements
%; trillion RMB



Source: Bloomberg, CEIC, Goldman Sachs Global Investment Research.

Owing to hot money's significance as a proportion of the growth of China's monetary base and its much higher volatility than other components, it is important for the government to manage it flexibly to prevent short-term damage to the economy, should too much 'hot money' flow into or out of China quickly (Exhibit 18). Having said this, from a stock perspective China's external debt is still relatively small at less than 5% of China's 2013 GDP (lowest among the EMs). For instance, SAFE's policy shifting to control commodity financing driven FX inflows last June and December led to a non-trivial impact on China's short-term liquidity situation (Exhibit 5) and triggered a broad-based sell-off across different asset classes (Exhibit 6).

Exhibit 18: Big swings led by hot money have made it more challenging for the government to manage China's liquidity situation
trillion RMB

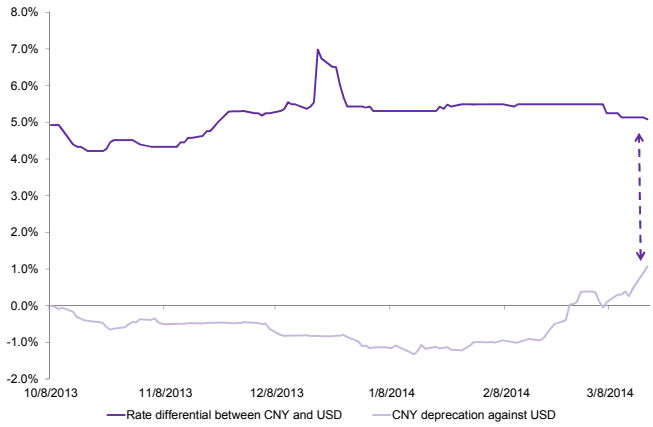


Source: CEIC, Haver, Goldman Sachs Global Investment Research.

We believe the recent depreciation of CNY against USD, combined with PBOC's recent initiative to widen the daily trading band, are further proactive moves by the government to control hot money inflows and are in line with China's policy target to gradually increase CNY volatility before eventually loosening capital control. **The FX movement, in our opinion, is an efficient way to reduce 'hot money' inflows over the medium term, though the short-term impact is much more limited.**

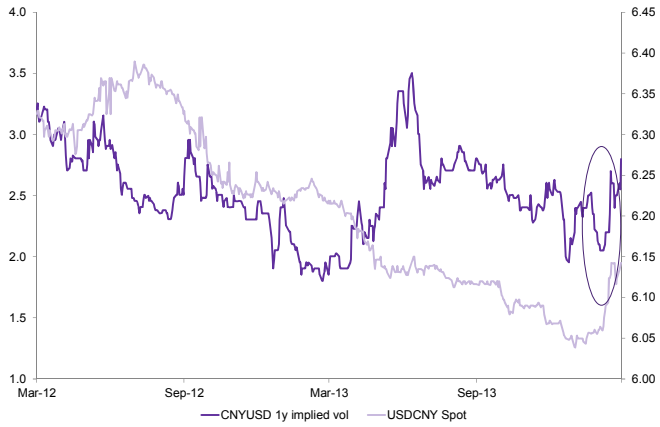
- In the short term, the recent CNY depreciation has limited impact on arbitraging profit relative to the CNY/USD rates differential (Exhibit 19).
- In the medium term, the recent increase in CNY volatility may deliver a strong signal to the market participants that FX risk is increasing and it will lead to higher FX hedging cost, and diminishing profits from the cross-border interest rate arbitrages (Exhibit 20).

Exhibit 19: Recent CNY depreciation is not enough to offset the CNY/USD interest rate differential…
% interest rates and % change of CNY against USD



Source: Bloomberg, Goldman Sachs Global Investment Research.

Exhibit 20: …however, the movement sends a strong signal that FX hedging costs will likely increase further
implied vol, USDCNY



Source: Bloomberg.

Chinese commodity financing deals and the commodity markets

There are many ways to bring hot money into China. **Commodity financing deals, over-invoicing exports, and the black market** are the three main channels. While it is extremely hard to estimate the relative share of each channel in facilitating the hot money inflows, we attempt to 'ballpark' the total notional amount of low cost foreign capital that has been brought into China via **commodity financing deals**.

While commodity financing deals are very complicated, the general idea is that arbitrageurs borrow short-term FX loans from onshore banks in the form of LC (letter of credit) to import commodities and then re-export the warrants (a document issued by logistic companies which represent the ownership of the underlying asset) to bring in the low cost foreign capital (hot money) and then circulate the whole process several times per year. As a result, the total outstanding FX loans associated with these commodity financing deals is determined by:

- the volume of physical inventories that is involved
- commodity prices
- the number of circulations

Our understanding is that the commodities that are involved in the financing deals include gold, copper, iron ore, and to a lesser extent, nickel, zinc, aluminum, soybean, palm oil and rubber. Below are the desired features of the underlying commodity:

- China is heavily reliant on the seaborne market for the commodity
- the commodity has relatively high value-to-density ratio so that the storage fee and transportation cost are relatively low
- the commodity has a long shelf life, so that the underlying value of the commodity will not depreciate significantly during the financing deal period
- the commodity has a very liquid paper market (future/forward/swap) in order to enable effective commodity price risk hedging.

Gold in particular is an obvious candidate for commodity financing deals, given it has a high value-to-density ratio, a well-developed paper market and very long 'shelf life'. In contrast, iron ore is not as suitable, based on most of these metrics.

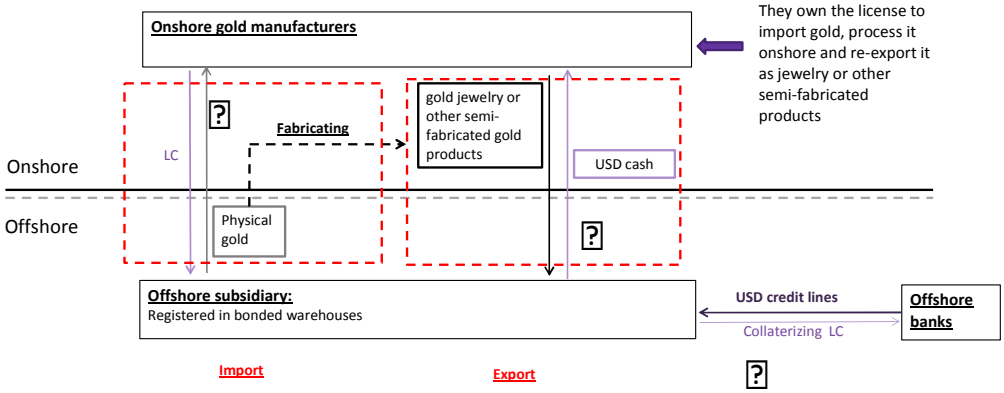
Chinese gold financing deals – a quick demonstration

Chinese gold financing deals are processed in a different way compared with copper financing deals, though both are aimed at facilitating low cost foreign capital inflow to China. Specifically, gold financing deals involve the physical import of gold and export of gold semi-fabricated products to bring the FX into China; as a result, China's trade data does reflect, at least partially, the scale of China gold financing deals. In contrast, Chinese copper financing deals do not need to physically move the physical copper in and out of China as explained in our previous note *"Copper curve ball – Chinese copper financing deals likely to end", published May 22, 2013*, so it is not shown in trade data published by China customs. In detail, Chinese gold financing deals includes four steps:

1. onshore gold manufacturers pay LCs to offshore[7] subsidiaries and import gold from bonded warehouses or Hong Kong to mainland China – **inflating import numbers**
2. offshore subsidiaries borrow USD from offshore banks via collaterizing LCs they received
3. onshore manufacturers get paid by USD from offshore subsidiaries and export the gold semi-fabricated products to bonded warehouses – **inflating export numbers**
4. repeat step 1-3

[7] The offshore here is mainly referring to Hong Kong or China's Shenzhen bonded warehouses.

Exhibit 21: Flow chart of Chinese gold financing deals – they inflate China's import/export data



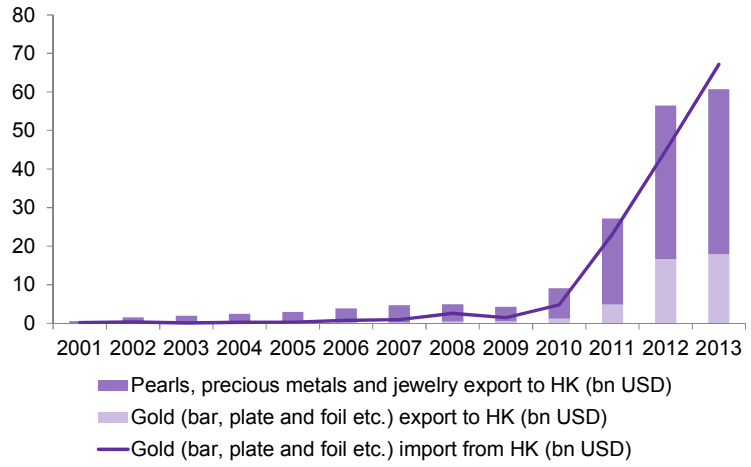
Note: **Step-4** is a circulation of step 1-3.

Source: Goldman Sachs Global Investment Research.

As illustrated in Exhibit 21, gold financing deals should theoretically inflate China's import and export numbers by roughly the same size. For imports, they inflate China's total physical gold imports, but inflate exports that are mainly related to gold products, such as gold foils, plates and jewelry. In this context, we note that the value of China's imports of gold from Hong Kong has risen more than 10 fold since 2009 to roughly US$70bn by the end of 2013 while exports of gold and other products[8] have increased by roughly the same amount (Exhibit 22). This is in line with the implication of the flow chart on Chinese gold financing deals: the deals inflate both imports and exports by roughly equal size. Given this, we think that the rapid growth of the market size of gold trading between China and Hong Kong created from 2009 (less than US$5bn) to 2013 (roughly US$70bn) is most likely driven by gold financing deals. However, we don't know how many tons of physical gold are used in the deals since we don't know the number of circulations, though we believe it is much higher than that for copper financing deals.

[8] We don't have firm numbers on: 1) the detailed breakdown of gold exports by product, and 2) gold inventory data. We roughly gauge the market size of gold financing deals by comparing the dollar value of gold imports from HK with a combination of official gold export data and the much broader export data series (export of pearls, precious metals and jewelry), both in dollar value import, to see whether the import value is roughly equal to export values. If the answer is yes, we know that most of China's gold trade data is associated with gold financing deals. This is how we estimate the current market size of Chinese gold financing deals at c.US$60bn.

Exhibit 22: Chinese gold financing deals inflate both gold related products' import and export dramatically, by roughly equal size
USD in bn



Source: CEIC, Goldman Sachs Global Investment Research.

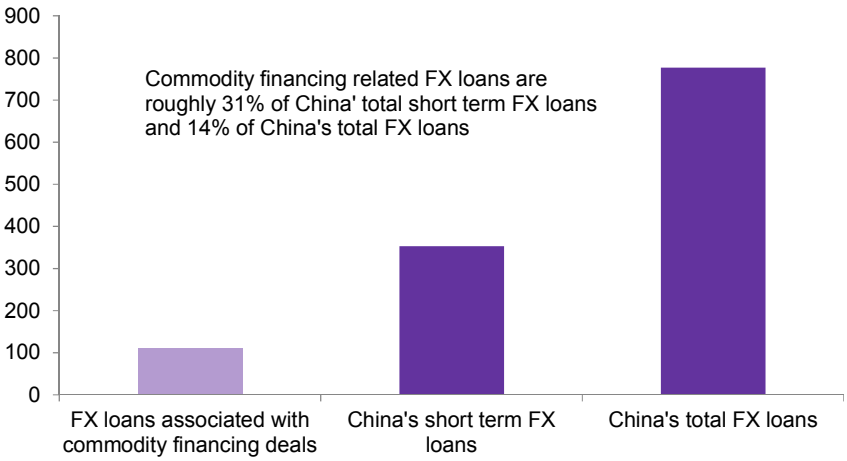
We estimate, albeit roughly, that there are c.US$81-160 bn worth of outstanding FX loans associated with commodity financing deals – with the share of each commodity shown in Exhibit 23. To put it into context, the commodity-related outstanding FX borrowings are roughly 31% of China's short-term FX loans (duration less than 1 year) (Exhibit 24).

Exhibit 23: FX loans via different commodity financing deals

	Total	precious metals and jewelry	Copper	Iron ore	Soybean	Natural rubber	Palm oil	Nickel	Zinc	Aluminum
Inventory (million tons)			0.63	30	5	0.3	1.2	0.01	0.01	0.01
Price ($/t)			7300	115	515	2500	850	14000	2000	1800
Number of circulations (low)			3	2	2	3	2	5	5	3
Number of circulations (high)			10	4	4	7	3	10	10	7
Number of circulations (base)			5	3	3	5	2.5	7	7	4
Total notional value (bn USD, low)	**81**	50	13.8	6.9	5.2	2.3	2.0	0.7	0.1	0.1
Total notional value (bn USD, high)	**160**	80	46.0	13.8	10.3	5.3	3.1	1.4	0.2	0.1
Total notional value (bn USD, base)	**109**	60	23.0	10.4	7.7	3.8	2.6	1.0	0.1	0.1

Source: Goldman Sachs Global Investment Research.

Exhibit 24: Commodity financing related FX loans are c. 35% of China's total short term FX loans.
US$ bn



Source: CEIC, Goldman Sachs Global Investment Research.

Whether Chinese commodity financing deals occur depends on:

- the China and ex-China interest rate differential (the primary source of revenue),
- CNY future curve (CNY appreciation is a revenue, should the currency exposure be not hedged),
- the cost of commodity storage (a cost),
- the commodity market spread (the spread is the difference between the futures
- China's capital controls remain in place (otherwise CCFD would not be necessary).

All of these components are exogenous to the commodity market, except one – the commodity market spread. This reveals an important point that financing deals are, in general, NOT independent of commodity market fundamentals. If the commodity market moves into deficit, or if the financing demand for the commodity is greater than its finite supply of above ground inventory, the commodity market spread adjusts to disincentivize financing deals by making them unprofitable (thus making the physical inventory available to the market).

Via 'financing deals', the positive interest rate differential between China and ex-China turns commodities such as copper from negative carry assets (holding copper incurs storage cost and financing cost) to positive carry assets (interest rate differential revenue > storage cost and financing cost). This change in the net cost of carry affects the spreads, placing upward pressure on the physical price, and downward pressure on the futures price, all else equal, making physical-future price differentials higher than they otherwise would be.

As such, we can conclude that the beneficiaries of financing deals' impact are near-dated consumer hedgers, spot physical sellers, and investors with near-dated rolling long positions; on the other hand, the losers are near-dated producer hedgers, spot physical buyers, and investors with near-dated rolling short positions.

Q&A: Chinese Copper Financing Deals (CCFDs)

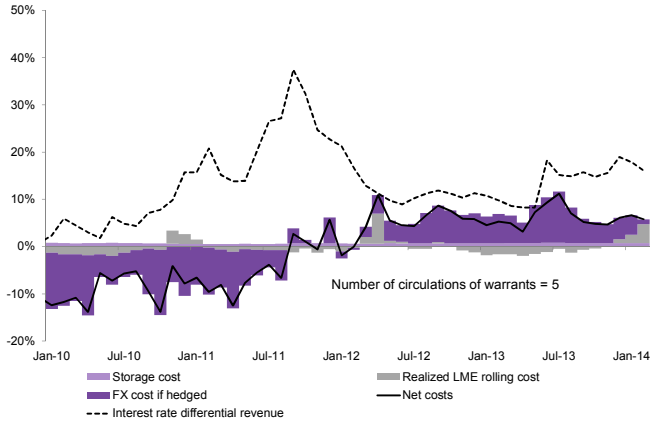
Though this section specifically addresses Chinese copper financing deals, the bulk of the Q&A applies to other commodities being used for Chinese financing purposes.

Are CCFDs ongoing?

We find that CCFDs and other financing deals are ongoing, outside of financing deals where the underlying commodity exposure is unhedged and the commodity prices have declined sharply (i.e. iron ore). Supporting this are numerous factors:

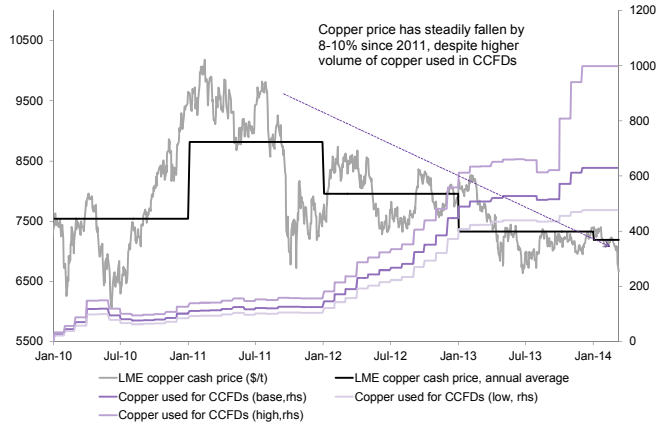
- CCFDs remain profitable (Exhibit 25). Based on our very conservative assumption of 5 Letter of Credit (LC) circulations (see the next section "How do CCFDs work and how have they changed?" for details), CCFDs participants can make an annualized return of c.$600-800/t of copper.
- Nickel – to an even greater extent than copper – and zinc both have a sizeable amount of exposure to financing deals, and their prices have substantially outperformed copper.
- Were this a government policy led copper financing deal unwind, Chinese bonded copper prices would have led the price declines (instead they lagged the domestic Shanghai copper price declines), Chinese bonded stocks would have declined (instead they have risen) and the LME futures curve would likely have moved into contango (it remains in backwardation).

Exhibit 25: CCFDs' annual return can be well over 10%
$/t of copper profit on CCFD per annum as % of copper price, assuming 5 Letter of Credit (LC) circulations



Source: LME, Wind, Bloomberg, Goldman Sachs Global Investment Research.

Exhibit 26: Copper prices have fallen despite a sharp rise in CCFD copper use, since copper fundamentals continue to deteriorate…
kt



Source: Goldman Sachs Global Investment Research.

Are CCFDs real demand for copper?

- Yes, CCFDs are real demand for physical copper, driven by potential profits generated primarily from the interest rate arbitrage.
- However, CCFDs typically involve a futures hedge with notional value equal to the value of the copper.
- Given the net neutral position of CCFDs, it is not surprising to find that CCFDs have not been the dominant stand-alone driver of copper prices, at least during a surplus

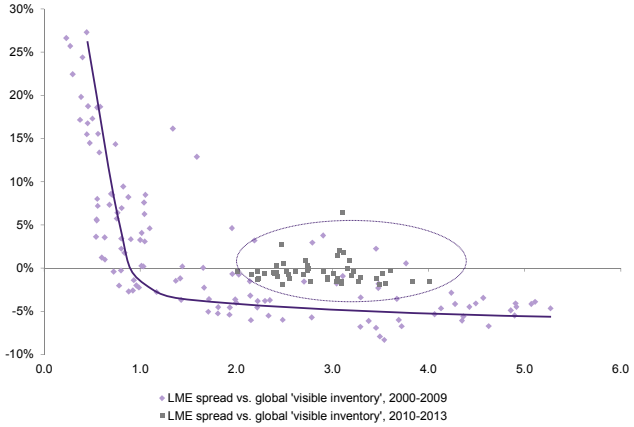
market (Exhibit 26). Specifically, copper prices are down by over 35% since mid 2011, over which period copper used in CCFDs may have increased from c.100kt to c.630kt[9].

- The arbitrageurs participating in CCFDs need to intentionally hold more physical inventories than otherwise would be held for a given contango/backwardation, which creates excess demand and leads to an artificial tightness in the physical market.

Do CCFDs affect LME prices and spreads?

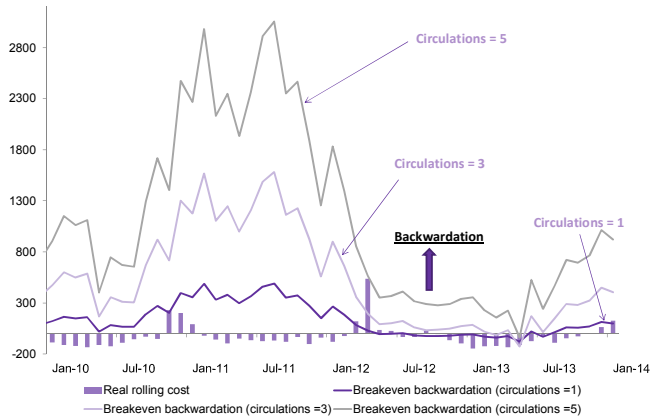
- Yes. CCFDs place upward pressure on physical copper prices and downward pressure on futures prices, thus acting to tighten copper spreads, all else equal (Exhibit 27). Empirically, we can see some evidence of this in the copper market, with the cash less 3-month copper spread as a % of price trading at tighter ratios since CCFDs began in 2010, relative to historical periods of similar visible inventory levels.

Exhibit 27: LME copper spreads have been tighter (more backwardated/in smaller contango) than would be expected since CCFDs began in 2010
LME cash-3m as % of cash price; inventory as weeks of global consumption



Source: LME, SHFE, COMEX, Bloomberg, Goldman Sachs Global Investment Research.

Exhibit 28: As CCFD demand for copper runs up against finite inventories of copper, LME spreads have tightened and remain less than full carry
$/t



Source: LME, Wind, Bloomberg, Goldman Sachs Global Investment Research

Indeed, LME spreads have been very tight (backwardated) for the past three months despite "visible" inventories being over 1mt (or 3 weeks of consumption). In this environment one would expect to see contango in LME, given the relatively sizable inventories that are sitting in the global supply chain now. However CCFDs have changed the cost of carry from negative to positive.

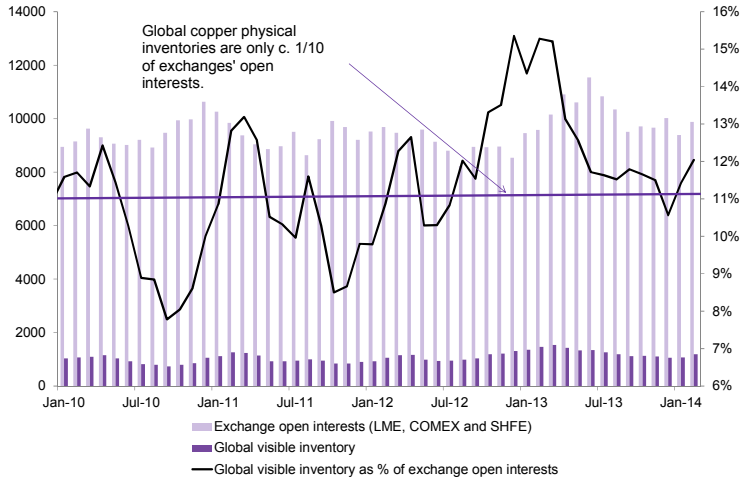
Although CCFDs have neutral positions on commodities, the impacts of the deals on the physical price and paper price are likely to be asymmetric. The impact of CCFDs on the physical market is likely to be bigger than the impact on the futures market, since the futures market has a larger capacity to absorb the futures selling (or buying) from the establishing (or unwinding) of CCFDs. Specifically, Exhibit 29 shows that global physical copper inventory only accounts for c.10%-15% of LME and SHFE exchange open interest, on average. This asymmetry may result in a higher physical and futures price than would otherwise be the case.

Furthermore, CCFDs also impact market sentiment in a bullish manner. This is because a backwardated market is traditionally a sign of bullish fundamentals, and is a cost (revenue)

9 By assuming a certain share of hot money inflows (5% as our base case and 2.5%/10% as our bear/bull case scenarios, respectively) that is facilitated by CCFDs and the number of circulations (5 times per annum as our base case and 3/7 as our bear/bull case scenarios, respectively), we can derive the range of the amount of copper that is physically used for CCFDs. And based on our assumptions above, our estimation indicates that roughly 630kt (480/980kt for bear/bull case) of copper is stored among various locations to facilitate the CCFDs right now.

of holding a short (long) near dated futures position if holding that position over a significant period. As a result, CCFDs may result in paper market short positions being lower, and long position being higher, than would otherwise be the case.

Exhibit 29: Chinese commodity financing deals are likely to have a greater impact on the physical market than on the futures/paper market owing to relative market size
KT; visible inventory as % of exchange open interests



Source: Bloomberg, Goldman Sachs Global Investment Research.

What happens to prices and spreads in a deficit?
In a deficit market copper inventories may be needed for consumption. Assuming the interest rate gap between CNY and USD is positive, and CCFD participants fully hedge their FX risk through NDF market, the cash/3m LME spread would need to tighten to at least $100-200/t in order to start breaking CCFDs to make the copper available for consumers. In order for the curve to get this backwardated physical prices may need to rise sharply.

Are there invisible inventories in the system that are used for CCFDs?
- This is highly likely, since it can be cheaper to store copper off LME than on LME.

Can CCFDs offset the downside in copper prices if Chinese interest rates rise resulting in slower Chinese copper consumption?
- While CCFDs can offset some of the unexpected physical demand weakness they are not the dominant price driver. A copper surplus resulting from higher Chinese interest rates and economic slowdown would result in downward pressure on copper prices (via incremental futures selling).

Will CCFD continue for the foreseeable future?
- Unlikely as the Chinese government's recent movement to bring in more FX volatilities into the CNYUSD market will gradually increase CCFD's FX hedging cost, which would offset the gains from interest rate differentials.

How have CCFDs changed over the past six months?
- The CCFD market is even less transparent as market players are more concentrated post the SAFE regulations
- The number of circulations which is key to CCFD profits has been forced lower such that more metal is potentially used, resulting in the larger scale of CCFDs.

- The market structure has become more complicated as metal from more locations is accepted by banks. In the past CCFD copper was mainly from China bonded warehouses, now LME warehouses and other off-exchange warehouses also become available choices.

How much copper might be being used in CCFDs?

- We ballpark it at c.480kt-1000kt.

Are there 'invisible' (non-LME, bonded, or comex) inventories that are used for CCFDs?

This is highly likely owing to the following factors:

- The adjustment of LME warehouse rules reduces the LME warehouses' ability to compete with off-exchange operators for available cargoes. So naturally LME sees relatively smaller load-in than load-out from some warehouse locations.
- Onshore banks prefer offshore copper warrants sitting in LME and other recognized off-exchange warehouses post SAFE regulations.
- The existing "visible inventory" may not support the scale of hot money inflow over the course of last four months.

What do the revenues and costs of CCFDs look like?

Below we model the revenues and costs of holding copper to participate in CCFDs. By identifying the key components that affect the revenues and/or costs, we can better understand why LME spreads are tighter than in earlier years and under which circumstances the metal will move into the physical markets. More specifically, the CCFD revenue and cost equations can be written as:

$$R = Dinterest * Cash * n$$
$$C = Rolling + Storage + FX$$
$$P = R - C$$

Of which,

$$R: CCFD\ revenues$$
$$C: CCFD\ costs$$
$$P: CCFD\ profits$$
$$Dinterest: risk\ free\ interest\ rates\ differences\ between\ CNY\ and\ USD = onshore\ 6m\ discounting\ bills'yield - (6m\ libor + 150bp), annualized$$
$$Cash: LME\ cash\ price$$
$$n: number\ of\ circulations$$
$$Rolling: LME\ rolling\ cost = LME\ cash - 3m, annualized$$
$$Storage: storage\ cost = average\ daily\ rental\ fees * 365$$
$$FX: FX\ hedging\ cost = \frac{CNY}{USD}\ cash - 12m\ as\ \%\ of\ CNY\ cash * LME\ Cash * n$$

What are the factors that impact CCFDs?

In line with the above model, the components that affect the CCFD profits can be split into three sub-sectors: macro based, policy affected and copper market specific. As presented in Exhibit 30, of all five key variables that affect CCFD profits, only LME spreads and rental fees are considered as 'copper market specific', others are all somehow affected by macro environment or policies.

Exhibit 30: Most variables that affect CCFD profits are macro based or policy impacted and the linkages between these macro variables and the copper market are LME spreads

	Risk free rate differences	Number of circulations	FX hedging cost	LME spreads	Rental fees
Macro based	Yes	Yes	Yes	No	No
Policy affected	Yes	Yes	Yes	No	No
Copper market specific	No	No	No	Yes	Yes

Source: Goldman Sachs Global Investment Research.

Will CCFDs continue and what does the future hold?

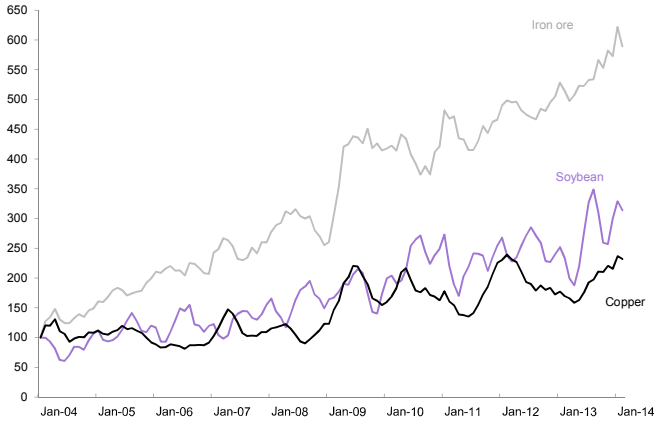
Gradual unwinding of Chinese commodity financing deals is our base case

Domestic commercial banks have been more conservative in issuing LCs to those CCFD trades, after SAFE changed the regulations last May/June. The regulations aimed to help SAFE control FX inflows associated with commodity financing, particularly copper. As a result, the arbitrageurs turned to other commodities to enable commodity financed FX inflows (Exhibits 31 and 32). Iron ore, gold, soybean, natural rubber, palm oil and potentially aluminum, zinc and nickel are all suitable candidates for Chinese commodity financing deals, since:

- These commodities also have relatively high value-to-density ratio, which means they incur relatively lower storage and transportation costs; or
- China is highly dependent on seaborne markets, for most of these commodities, so there is less liquidity issue if these stockpiles need to find real buyers.

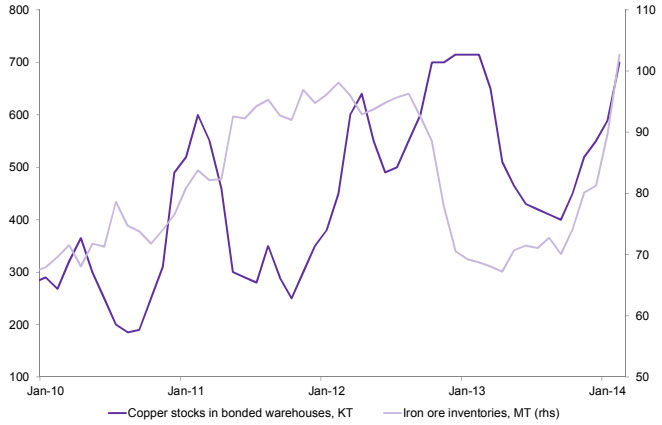
More importantly, the Chinese government's recent move to raise FX volatility will likely result in an increase in FX hedging and thus gradually increase CCFD's FX hedging cost, which over time is likely to fully offset the gains from the interest rate differential.

Exhibit 31: China's imports of iron ore, soybeans and copper have been rising strongly…
Index



Source: CEIC, Goldman Sachs Global Investment Research.

Exhibit 32: …while inventories are also building up at bonded warehouses, potentially reflecting financing deals' prevalence in these commodities
kt; mt



Source: Bloomberg, Goldman Sachs Global Investment Research.

How do CCFDs work and how have they changed?

What has changed post SAFEs June 2013 regulations?

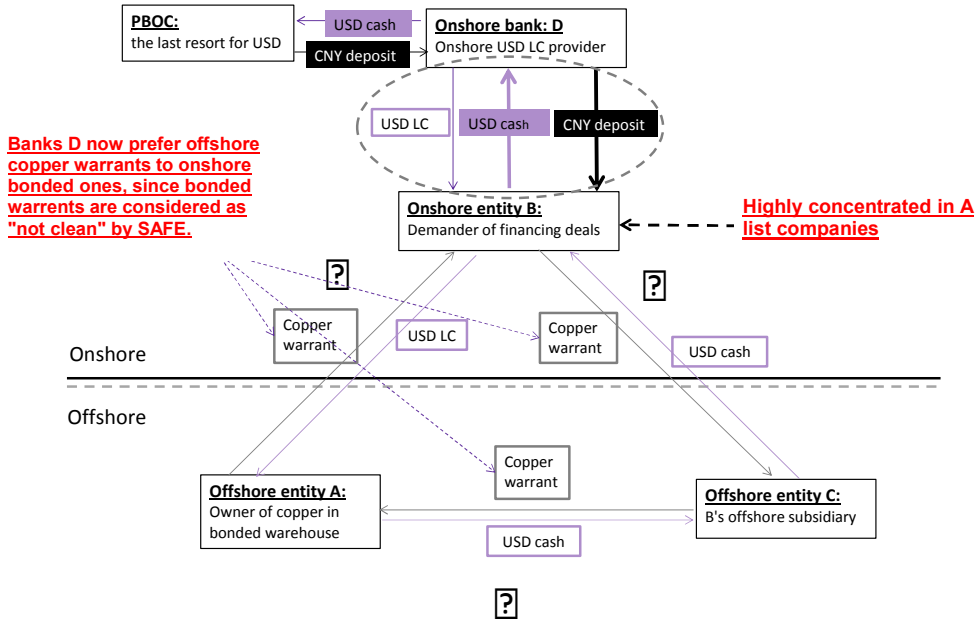
Below we discuss the main factors that have changed since SAFE's June 2013 'crackdown' on CCFDs.

1) Higher concentration of A list companies doing CCFDs

The categorization of trading houses into A, B and C lists helped SAFE more effectively supervise FX inflows. For example, the trading records of any enterprises included in the B or C list are likely to be monitored on a monthly basis and trading activities that involve circulating the same warrants multiple times between onshore and offshore entities are likely to be closely investigated. Severe punishment would be expected to follow if rehypothecation was identified. In theory, these measures could have eliminated CCFD driven FX inflow, but in hindsight they did not.

A list companies appear to be exempt so these companies are still able to participate in CCFDs. Given how lucrative Chinese commodity financing deals are, we suspect that the A list companies may function as "trustworthy" channels for FX inflow, and CCFDs would be more concentrated in the hands of A list companies[10] since mid-2013.

Exhibit 33: CCFDs work in a similar way after SAFE regulations changed last June except that: 1) entity B is mainly A list companies now; and 2) offshore copper warrants are more preferred than they were, relative to bonded copper



Note: **Step-4** is a circulation of step 1-3.

Source: Goldman Sachs Global Investment Research.

[10] The government regrouped the onshore trading firms into A, B and C categories last May, based on the firms' historical trading records, potential involvement in the CCFDs and the business relevance to the commodity trading activities. Only A listed firms can still participate in the deals, subject to further investigations by the government, and B and C listed firms are banned from the deals. For further details, please refer to "Copper curve ball – Chinese copper financing deals likely to end", published May 23, 2013.

2) Reduced number of circulations of warrants

Another focal point of the June-2013 regulations by SAFE was to reduce the number of circulations, or reduce the funding raised per commodity unit (reduce the apparent leverage of Chinese commodity financing deals). Indeed, one key step SAFE made was to require commercial banks to execute detailed background checks of the warrants and refrain from issuing more LCs if any LC issuance had been backed up by the same warrants.

It is extremely difficult to estimate the exact number of circulations allowed by SAFE post their June-2013 regulations, but we believe the number has fallen sharply. Our best guess is that 3-5 leverage, or circulations, or funding raised per unit of commodity, per annum is a conservative estimate of what is currently allowed.

Importantly, reducing the number of circulations of warrants means more commodity is needed to raise the same amount of domestic finance.

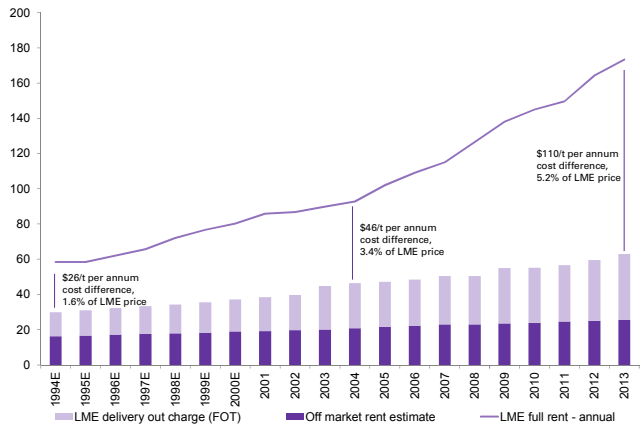
3) Increased availability of offshore copper warrants for CCFDs

Our understanding is that since mid-2013 banks tend to prefer offshore copper warrants to bonded ones for LC issuance. **The offshore copper may be stored in either LME warehouses or off-exchange warehouses, which are owned by the top four warehouse operators or China SOE warehouses' offshore entities. The non-LME inventory tends not to be visible and is not included in the Chinese bonded statistics.**

The reason why banks may hesitate to accept bonded warrants is that bonded stocks are considered by SAFE as "not clean" (i.e., the metal sitting there is presumed to have been participating in CCFDs (Exhibit 33).

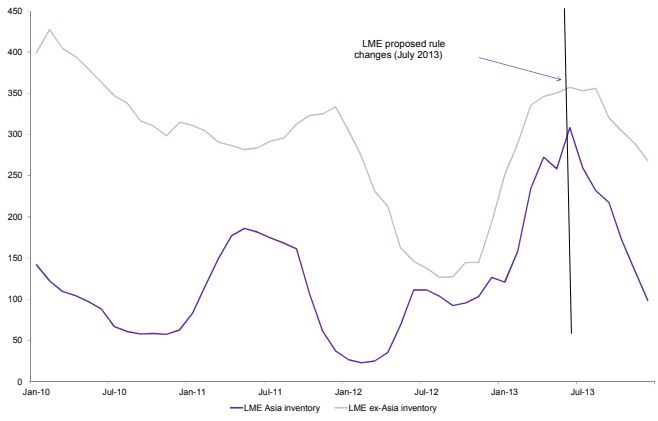
CCFD participants have generally been incentivized to withdraw inventories from LME warehouses and store them in off-exchange warehouses owing to lower storage fees and a reduction in LME warehouse ability to compete with off market storage post the LME rule changes (for detailed analysis on this, please refer to our commodity research titled "*The economic role of a warehouse exchange*", published October 31, 2013). Partly as a result, LME inventories have been drawing rapidly, shifting off market, rather than being consumed (Exhibits 34 and 35).

Exhibit 34: The gap between maximum LME and off-exchange storage fees continues to widen…
$/t per annum.



Source: LME, CRU, Wood Mackenzie, Goldman Sachs Global Investment Research.

Exhibit 35: …as a result, the metal has been flowing out of LME warehouses quickly after the consultation to reduce the queue length was announced
kt;



Source: Bloomberg, Goldman Sachs Global Investment Research.

Price actions, volatilities and forecasts

	Prices and monthly changes[1]			Volatilities (%) and monthly changes[2]				Historical Prices						Price Forecasts[3]		
	units	17 Mar	Change	Implied[2]	Change	Realized[2]	Change	3Q 12	4Q 12	1Q 13	2Q 13	3Q 13	4Q 13	3m	6m	12m
Energy																
WTI Crude Oil	$/bbl	98.08	-2.22	17.9	-0.76	18.6	4.2	92.20	88.23	94.36	94.17	105.81	97.61	**96.00**	**95.00**	**90.00**
Brent Crude Oil	$/bbl	106.24	-2.84	16.4	-0.77	15.8	2.8	109.42	110.13	112.64	103.35	109.65	109.35	**105.00**	**105.00**	**100.00**
RBOB Gasoline	$/gal	2.88	0.08	18.1	-0.17	32.4	14.6	2.95	2.73	2.99	2.83	2.91	2.66	**2.70**	**2.60**	**2.60**
NYMEX Heating Oil	$/gal	2.89	-0.19	17.6	-0.53	18.6	-17.8	3.00	3.05	3.04	2.89	3.05	2.99	**3.00**	**3.00**	**2.90**
NYMEX Nat. Gas	$/mmBtu	4.54	-0.68	30.8	-3.62	81.9	-6.5	2.89	3.54	3.48	4.02	3.56	3.85	**4.50**	**4.50**	**4.00**
UK NBP Nat. Gas	p/th	58.17	-0.29	15.1	3.95	44.7	24.1	56.92	66.12	67.58	65.08	65.45	70.16	**70.60**	**72.00**	**77.60**
Industrial Metals[4]																
LME Aluminum	$/mt	1,725	-21	16.2	0.79	17.8	3.4	1,950	2,018	2,041	1,871	1,828	1,815	**1,700**	**1,700**	**1,750**
LME Copper	$/mt	6,480	-670	15.4	0.85	19.0	9.6	7,721	7,924	7,958	7,190	7,098	7,169	**7,000**	**6,600**	**6,200**
LME Nickel	$/mt	15,880	1630	21.7	-0.77	15.1	-3.5	16,396	17,025	17,375	15,035	14,019	13,978	**14,500**	**15,000**	**16,000**
LME Zinc	$/mt	1,966	-76	15.9	-0.42	15.9	2.8	1,905	1,978	2,054	1,876	1,897	1,932	**2,000**	**2,050**	**2,100**
LME Lead	$/mt	2,058	54	16.2	0.85	15.3	2.3	1,989	2,200	2,308	2,065	2,115	2,136	**2,050**	**2,150**	**2,300**
Precious Metals																
COMEX Gold	$/troy oz	1,373	54	15.1	-0.69	13.8	-0.5	1,654	1,719	1,631	1,417	1,328	1,274	**1,215**	**1,150**	**1,050**
COMEX Silver	$/troy oz	21.2	-0.2	26.7	-0.32	28.4	4.1	29.9	32.6	30.1	23.2	21.4	20.8	**20.3**	**19.2**	**17.5**
Agriculture																
CBOT Wheat	cent/bu	687	89	26.0	2.66	30.9	8.7	871	846	739	695	650	655	**610**	**560**	**575**
CBOT Soybean	cent/bu	1,375	68	18.3	2.09	16.0	2.1	1,677	1,484	1,450	1,468	1,407	1,304	**1,400**	**1,050**	**1,050**
CBOT Corn	cent/bu	479	34	25.9	5.30	21.9	10.7	783	737	716	661	514	430	**450**	**400**	**400**
ICE Cotton	cent/lb	92	3	18.6	-1.51	19.4	0.7	73	73	83	86	86	81	**75**	**75**	**75**
ICE Coffee	cent/lb	190	50	45.3	18.34	68.4	24.6	172	152	143	132	118	110	**130**	**130**	**130**
ICE Cocoa	$/mt	3,030	96	23.8	0.58	14.8	-5.0	2,438	2,421	2,175	2,278	2,420	2,734	**2,700**	**2,700**	**2,700**
ICE Sugar	cent/lb	17.1	1.4	22.8	3.60	44.5	19.2	21	20	18	17	17	18	**16.5**	**17.5**	**17.5**
CME Live Cattle	cent/lb	145.0	2.4	8.5	0.28	13.5	2.8	122	127	128	122	124	132	**138.0**	**133.0**	**135.0**
CME Lean Hog	cent/lb	121.7	35.2	16.1	1.09	41.7	30.2	83	82	84	92	94	87	**90.0**	**100.0**	**80.0**

[1] Monthly change is difference of close on last business day and close a month ago.

[2] Monthly volatility change is difference of average volatility over the past month and that of the prior month (3-mo ATM implied, 1-mo realized).

[3] Price forecasts refer to prompt contract price forecasts in 3-, 6-, and 12-months time.

[4] Based on LME three month prices.

Source: Goldman Sachs Global Investment Research.

Disclosure Appendix

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We, Roger Yuan, Max Layton, Jeffrey Currie, Damien Courvalin and Amber Cai, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

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