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Aspects of Copper Price Volatility

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Trafigura

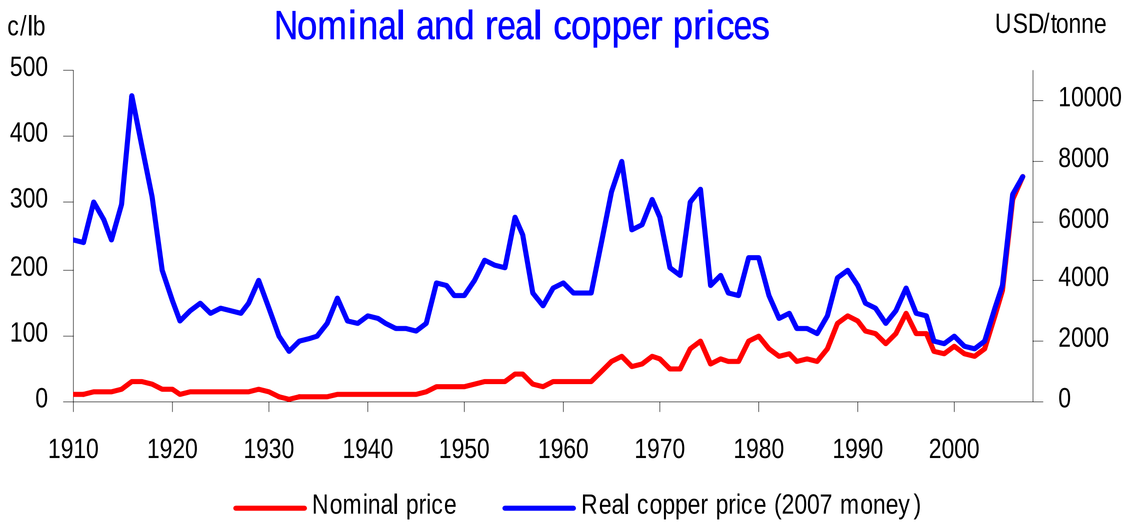
- Trafigura is a USD50Bn a year commodity trader
  - Second largest independent non-ferrous metals trader
  - Third largest independent oil trader
  - 50 offices in over 35 countries
- Galena Asset Management
  - Subsidiary of Trafigura
  - Leveraging off group information
  - Proprietary research into supply and demand
  - 3 Main Funds, cUSD600m under management

Structure of presentation

- Recent price history
- Who are the funds involved in the commodity markets?
- How do we track what the funds are doing?
- What is the impact of fund activity on metals prices and volatility?
- Other factors affecting prices and volatility
  - The US dollar
  - Arbitrage between the LME and other exchanges
  - The role of non-visible stocks
- Summary and conclusions

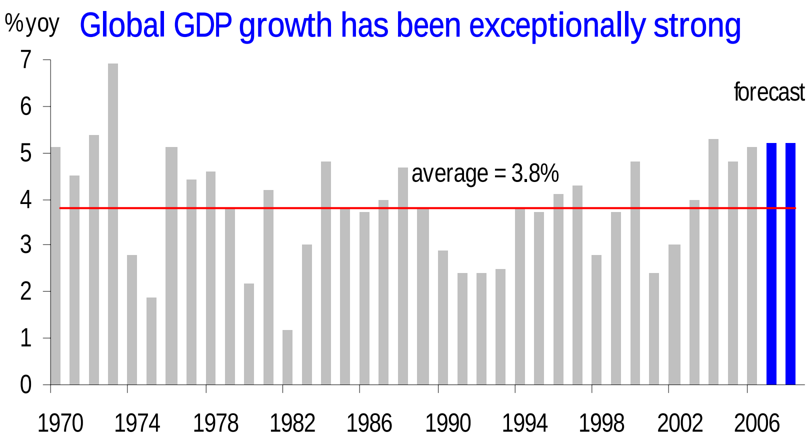
Long run trends in copper prices

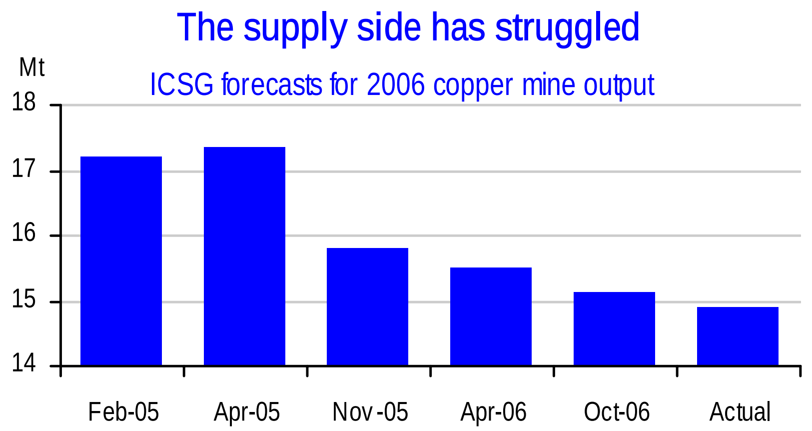
- In nominal terms current copper prices are unprecedented
- …but in real terms we have been here before
- The surge in prices 2002-07 has been unusual (outside war)

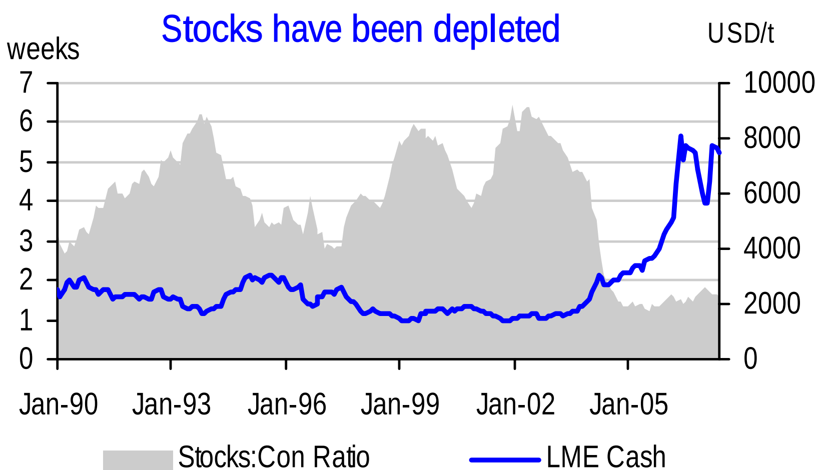


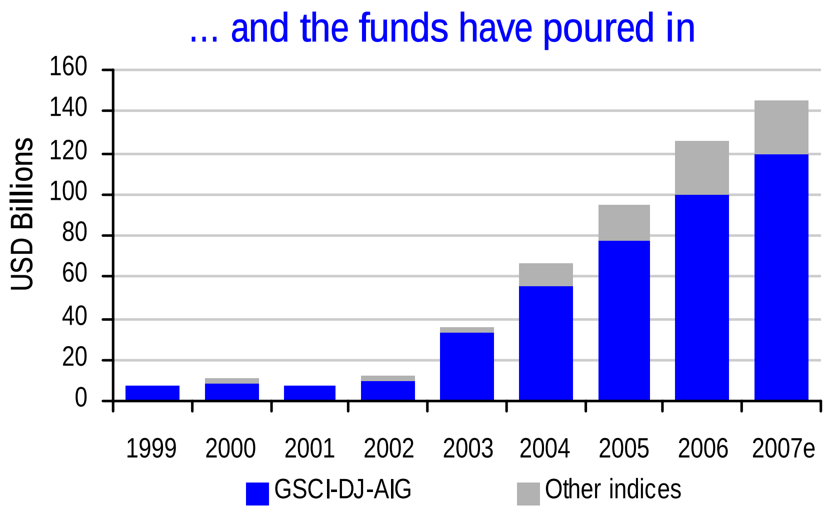
Source: CRU, Trafigura

Why have prices surged so dramatically?







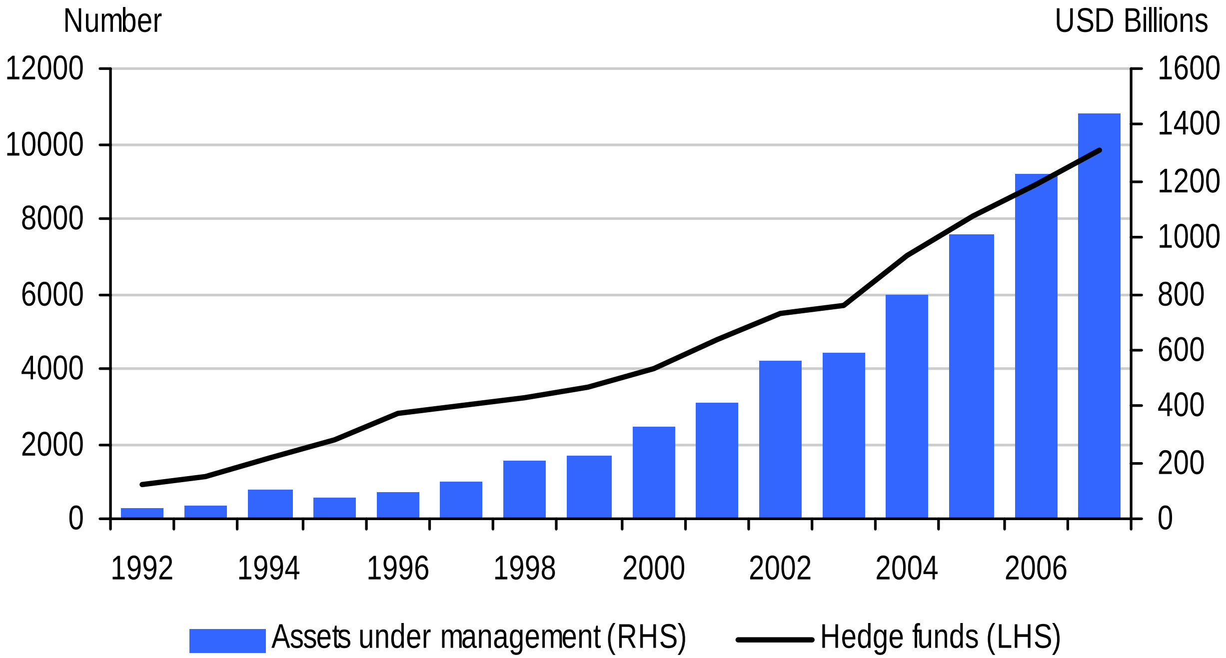


Types of funds involved in the metals markets

- Hedge funds
  - Over 10,000 active funds (more than the 8,600 US mutual funds)
  - Current assets around USD1,500Bn (US mutual funds cUSD9,200Bn)
  - Have a variety of investment styles, across asset classes
  - Can be long or short
- Commodity Trading Advisors
  - Current assets cUSD180Bn
  - Are largely driven by technical factors (charts, momentum)
  - Can be long or short
- Pension funds
  - Traditionally were purely index investors (GSCI, for example)
  - Not particularly price sensitive
  - Almost always long
- Other (arbitrageurs, specialists, Chinese general public)

Growth in hedge funds has been enormous

- Hedge fund business has increased 10x in recent years
- Over 10,000 hedge funds with cUSD1,500Bn under management
- Main sources of funding are high net worth individuals and ‘Fund of Funds’



Hedge fund strategies

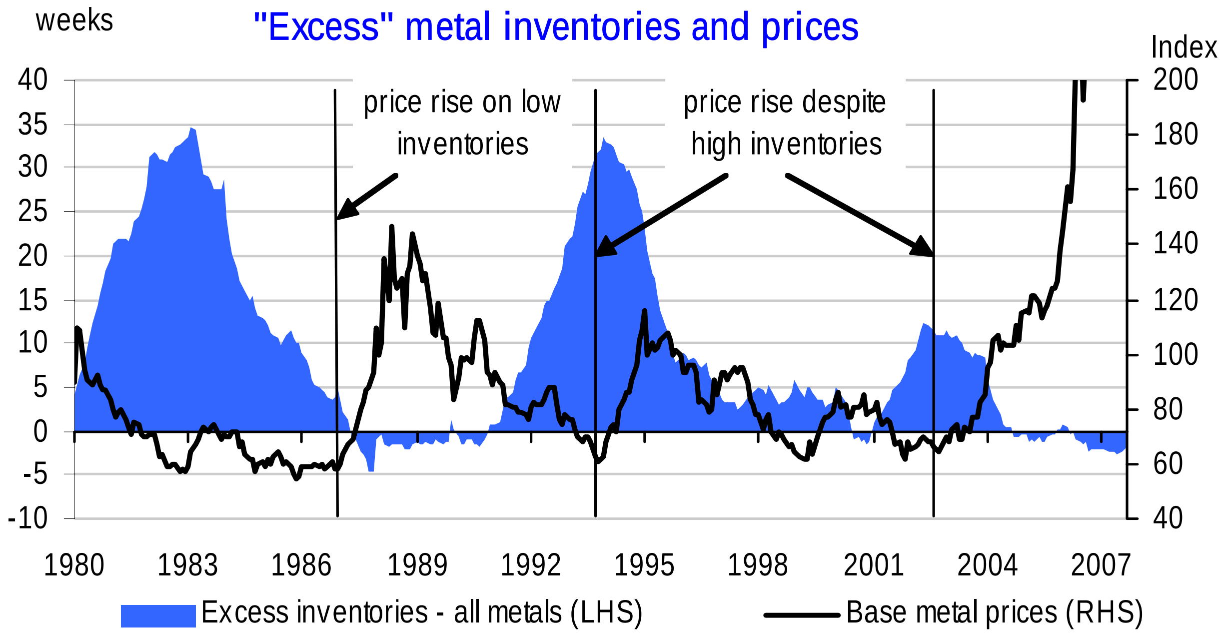
- Arbitrage – seek to aim from asset ‘mis-pricing’
  - Convertible arbitrage – between bonds and equities
  - Fixed income arbitrage – between bonds of different maturities, grades etc
  - Risk arbitrage – where different assets are pricing in different risk probabilities
  - Derivative arbitrage – between a derivative and the underlying asset
- Emerging markets - buy equity/debt in emerging markets
- Event driven
  - Distressed securities - buy debt/equities at discount
  - Merger arbitrage – between acquiring company and target company
- Global macro – aim to profit from changes in global economy
- Fund of funds - mixes and matches hedge funds
- Income - primary focus is yield
- Long/short equity - low volatility by offsetting positions across markets
- Market timing - attempts to pre-empt changes in market/economic conditions
- Multi-strategy - mixes and matches different hedge fund strategies

Characteristics of ‘macro’ hedge funds

- Aim to benefit from changing global economy
- Can take positions across asset classes, but often specialise
- Use derivatives to gain leverage and maximise gains
- Are very well researched
- Look for various investment opportunities
  - Cyclical play (near the top or bottom of a cycle)
  - Changing fundamentals / end-use applications
  - Look for value in commodity / equity trades
- Can run positions / trades for very long, or very short time periods

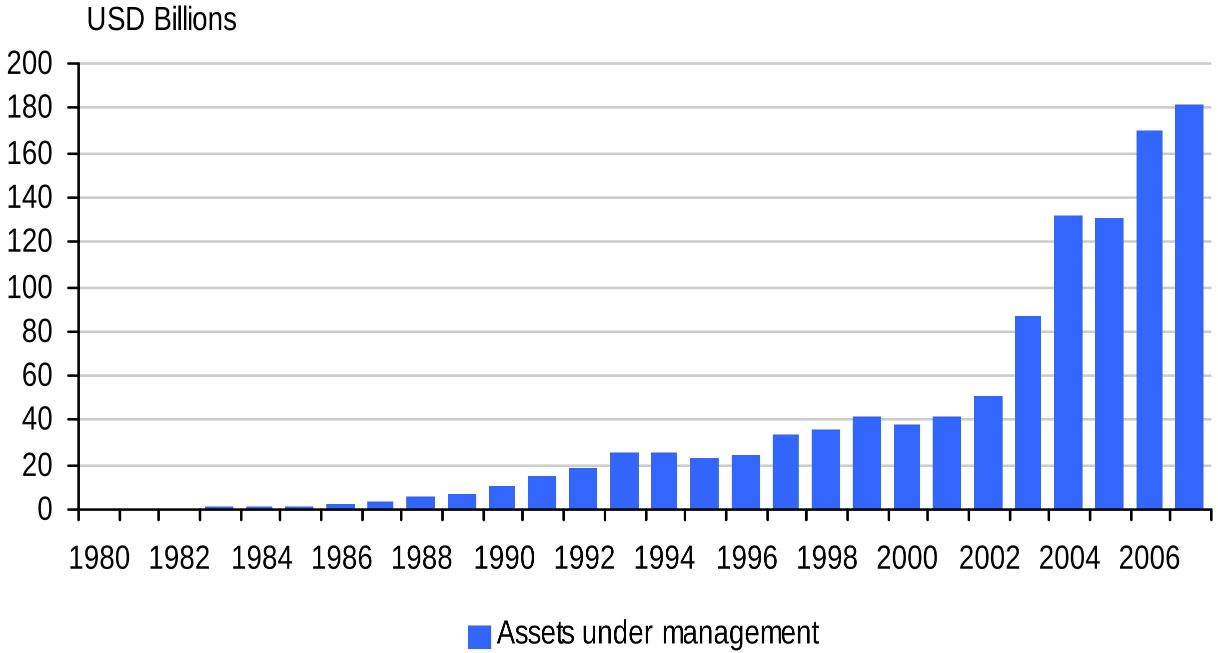
Macro funds can shorten bear markets

- In traditional cycles (the 1980s) inventories needed to fall to critical levels before prices would take off
- This changed in the 1990s as funds moved to anticipate the fundamentals
- This ensured the bear market ended sooner than it otherwise would have done
- Risk/reward means this is more noticeable in bear markets than bull markets



Commodity Trading Advisors (aka Managed Futures)

- Like hedge funds the growth in CTA business has been tremendous
- Long term average returns of CTAs have been 13.6%pa
- Little correlation with equities or bonds

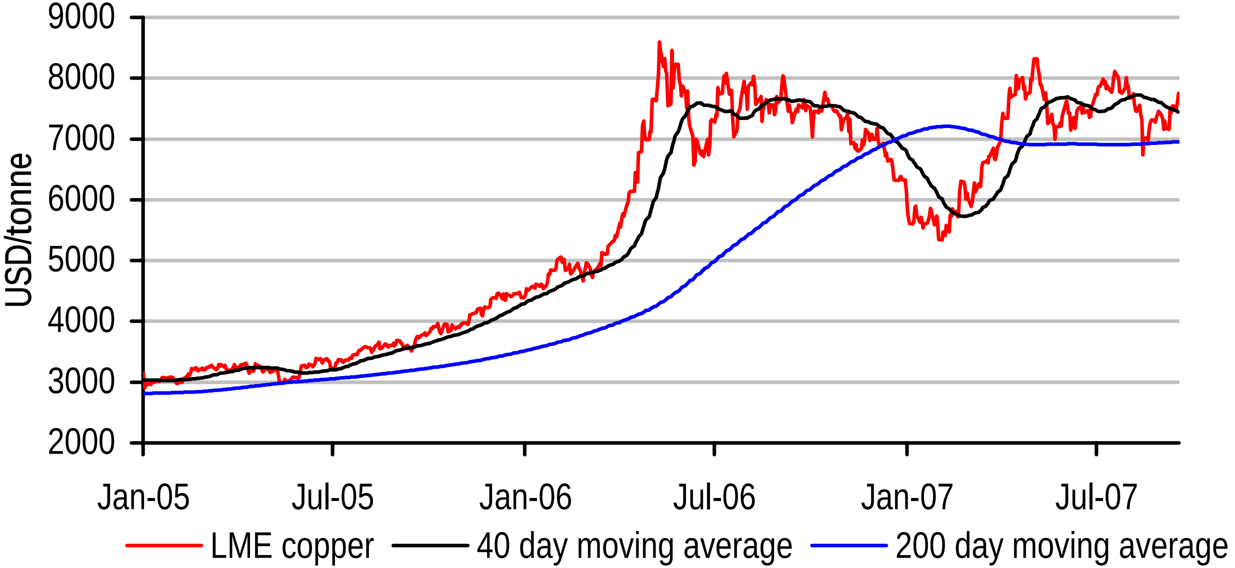


Characteristics of ‘CTAs’

- Can be technically driven or discretionary
  - 90% technically driven (charts, momentum)
  - 10% discretionary
- Allocate across asset classes
  - Foreign exchange 40%
  - Financials 30%
  - Softs 14%
  - Metals 9%
  - Energy 7%
- Allocation across LME metals
  - Al 41%, Cu 27%, Zn 15%, Ni 10%, Pb 4%, Sn 3%
- Account for 15-20% LME turnover

CTAs in the copper market??

- 2005 to May 2006 CTAs long as prices supported by 40 day moving average
- Momentum wanes in summer 2006 and CTAs switch to short positions
- Early 2007 momentum turns higher and CTAs switch back to long positions
- Currently still long

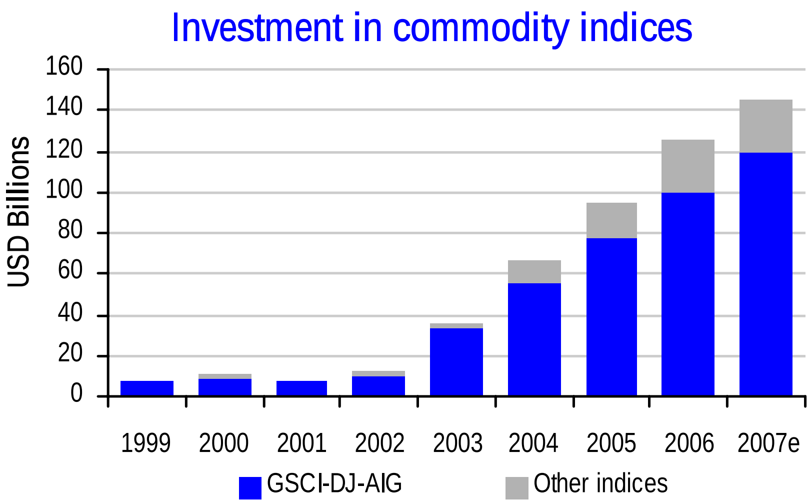


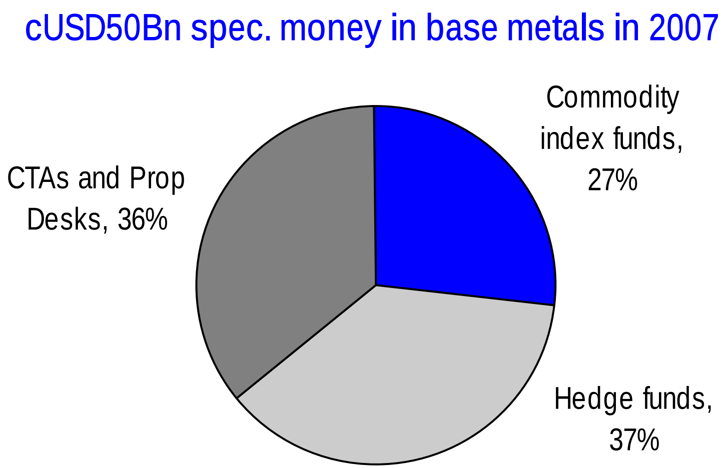
Pension fund interest in commodities

- Few pension funds have explicit mandates to invest in commodities, but this is growing
  - Dutch pension fund PGGM in 2000, now 4% of USD76Bn funds
  - Stichting Pensioenfunds in 2001, now 2.5% of USD190Bn funds
  - Ontario Teachers, Missouri State, Harvard University, Novartis have followed
- Investment decisions are based principally on asset class allocation considerations not supply/demand
  - Long run rates of return equal to or greater than other assets
  - Low correlation with equities and / or bonds
  - Returns/investment decision can be influenced by what happens in energy
- Are generally passive investors: historically have invested in index products or fund of funds
  - Increasingly looking to enhance returns

How much is invested in the commodity sector?

- Fund interest has boosted commodity prices and increased volatility
- Best estimates suggest USD145Bn in index products, USD40-50Bn in base metals
- No immediate sign of investor appetite for metal exposure waning as a result of US sub-prime worries
- Continues trend to more active management

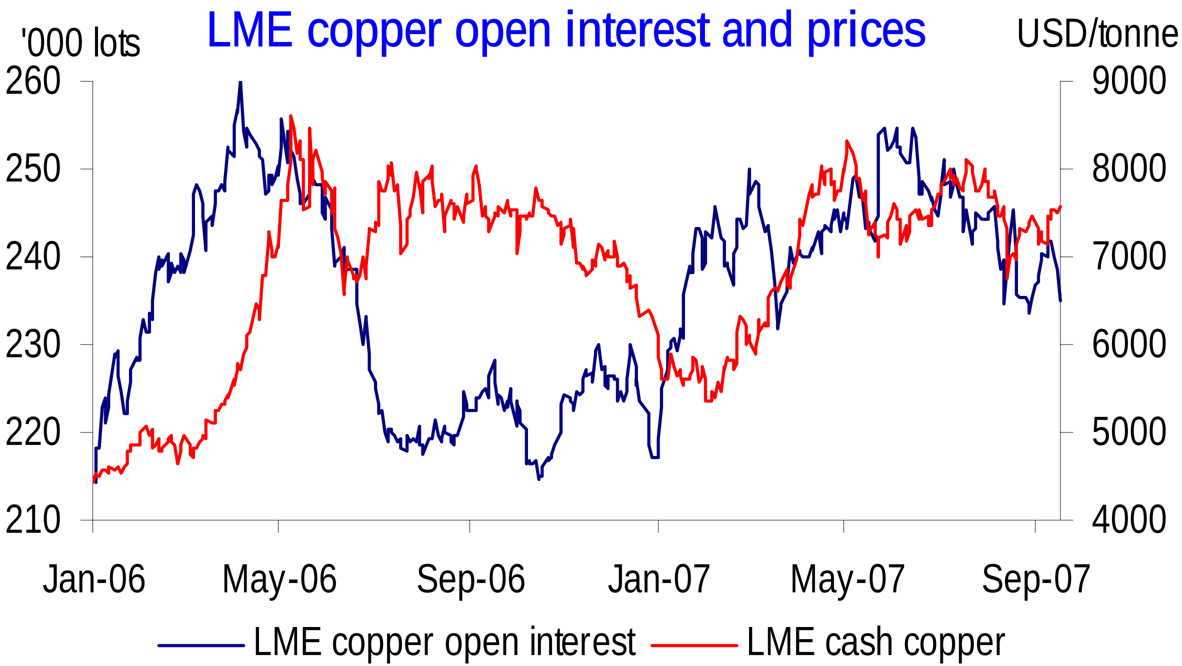




How do we track ‘fund activity’?

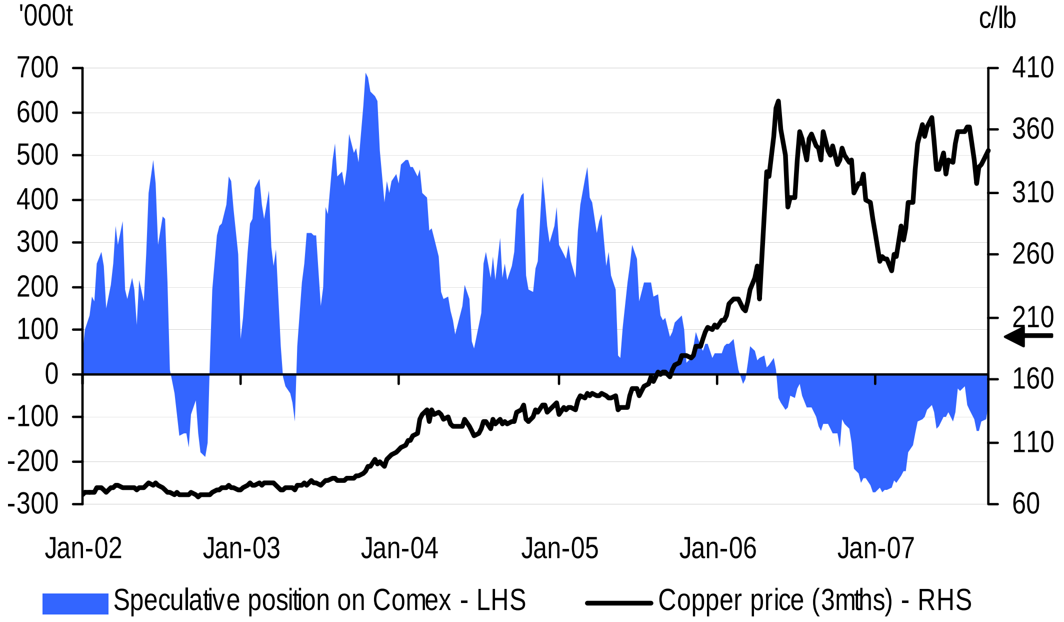
- Very little hard data available
- LME open interest
  - Rising open interest and rising prices = fund long position building
  - Falling open interest and falling prices = fund long liquidation
  - Rising open interest and falling prices = fund short position building
  - Falling open interest and rising prices = fund short covering
  - But other factors (producers/consumers) also impact the open interest data
- CFTC Commitments of Traders reports
  - Comex copper, aluminium, gold and silver
  - Nymex platinum and palladium
- Anecdotal evidence “the funds are buying …. the funds are selling…”
- Replicate the funds – run simple technical models

LME copper open interest and prices



CFTC Commitments of Traders data

- Most analysts follow the CFTC CoTs data
- The “non-commercial” + “non-reportable” positions are considered a proxy for speculative involvement in the markets
- But there are huge problems with the data that make it difficult to read, particularly for copper



Influence of funds on prices

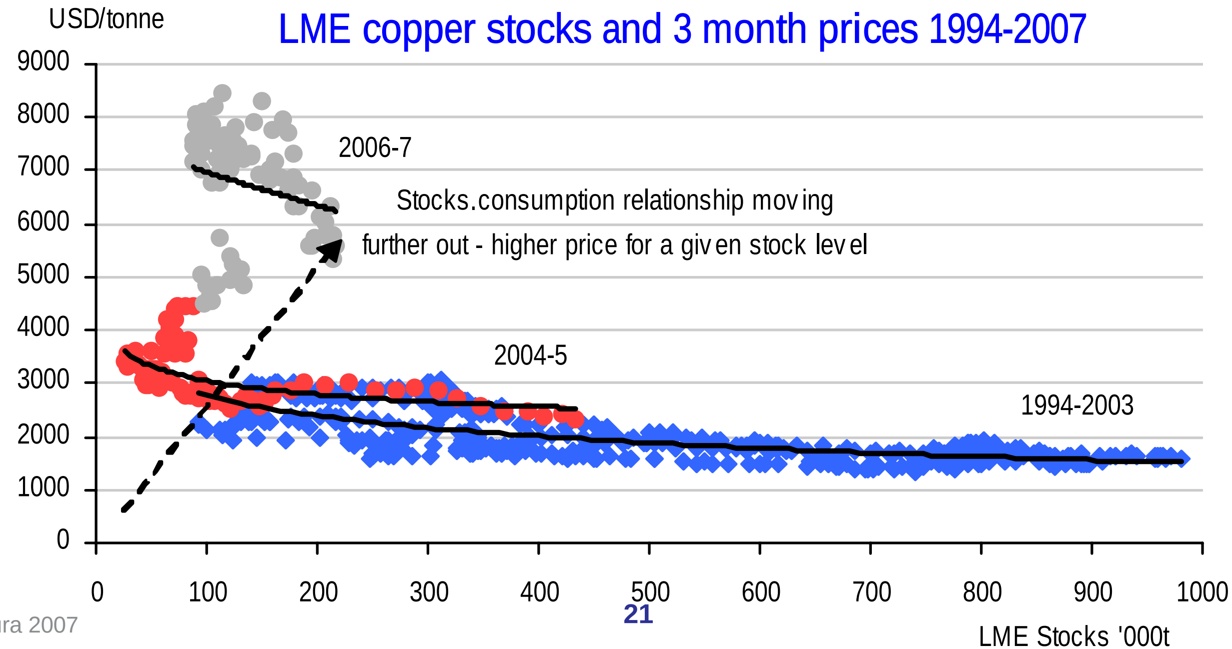
- Macro hedge fund
  - Can be long or short (and sometimes long and short at the same time)
  - Positions often counter-cyclical (picking turning points)
  - Effect is to dampen/shorten the cycle (particularly bear markets)
  - No long term impact on prices
- CTAs
  - Can be long or short
  - Positions tend to follow market trends
  - Effect is to exacerbate/lengthen the cycle
  - No long term impact on prices
- Pension Funds and other index investors
  - Almost always structurally long
  - Effect is to raise long term prices
  - Also has a significant impact on short term spreads as positions are rolled

Index fund investment

- S&P GSCI has cUSD80Bn invested in commodities
  - Currently copper has a 3.98% weighting
  - = USD3.18Bn = c400,000t copper
- DJ-AIG index has cUS40Bn invested in commodities
  - Currently copper has a 6.19% weighting
  - = USD2.48Bn = 310,000t copper
- Other indices have cUSD25Bn invested in commodities
  - CRB has a 5.88% weighting in copper
  - S&P Index has a 3.39% weighting in copper
  - Rogers International Commodity Index has a 4.00% weighting in copper
  - Deutsche Bank LCI has a 0% weighting in copper
  - = USD660Mn = 85,000t copper
- Total index fund investment = USD6.32Bn = 795,000t copper

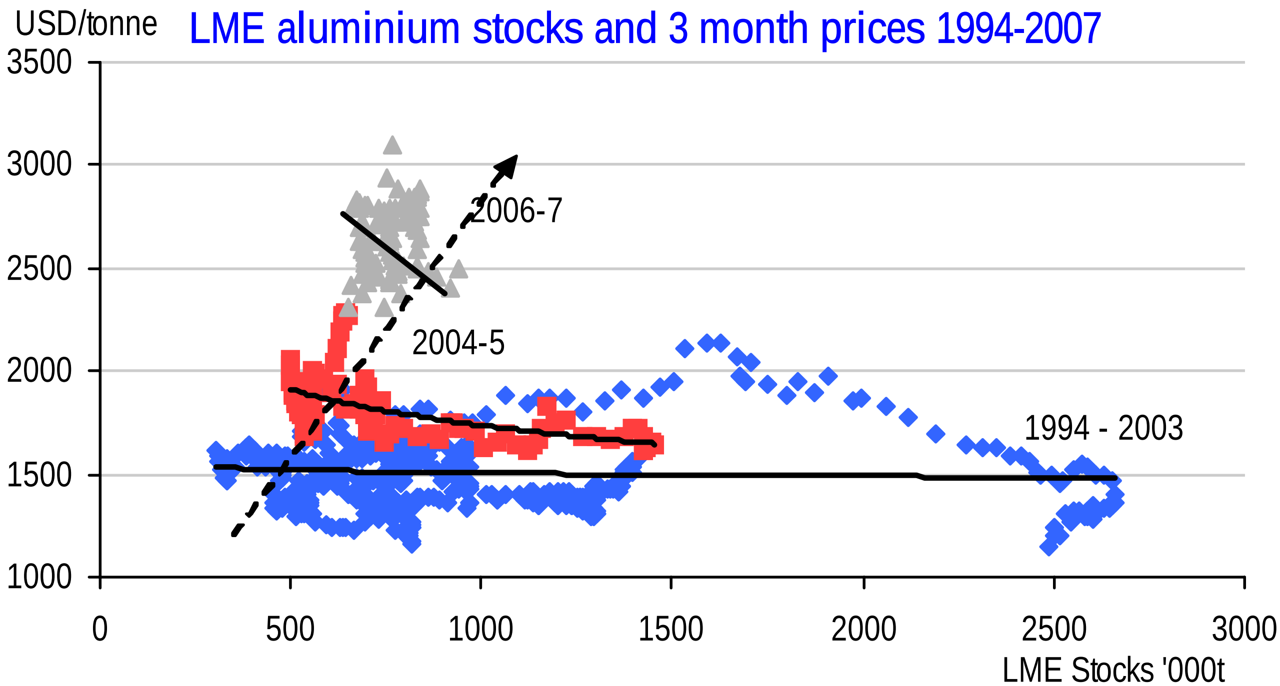
Influence of index fund investment in copper

- 800,000t of long position building has undoubtedly boosted copper prices
- Quantifying the impact is difficult given other influences – the level of stocks, strength of demand, other speculative interest in the market, the US dollar etc
- But clearly while index funds remain long, copper prices will be higher, for longer, than in previous cycles



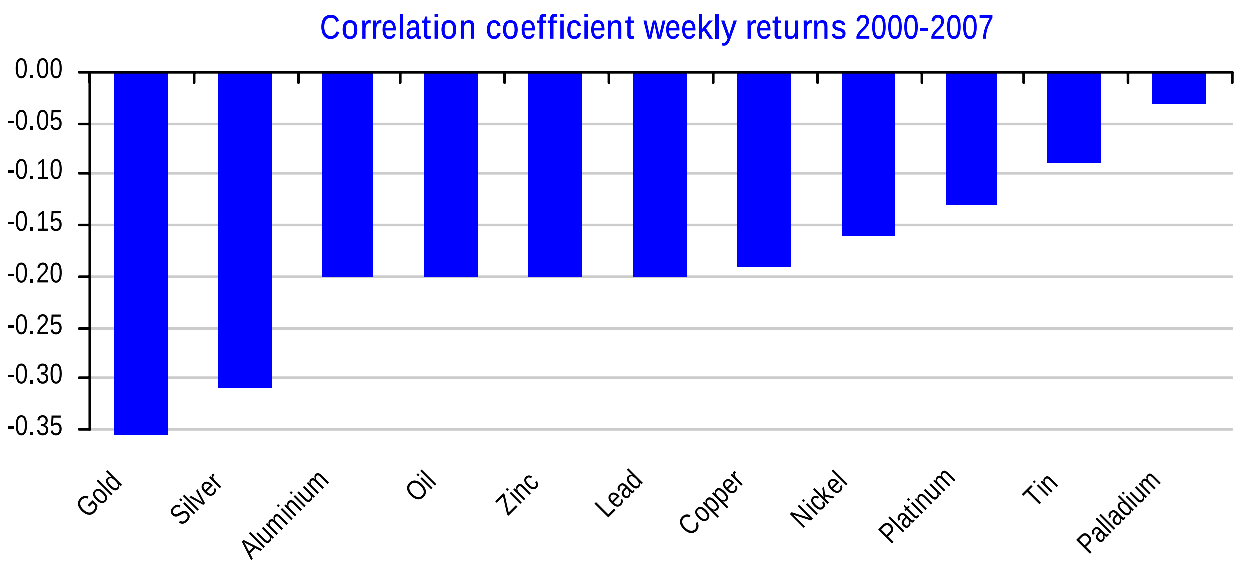
… ditto aluminium

- This structural shift higher in stocks/price relationships is common to all metals



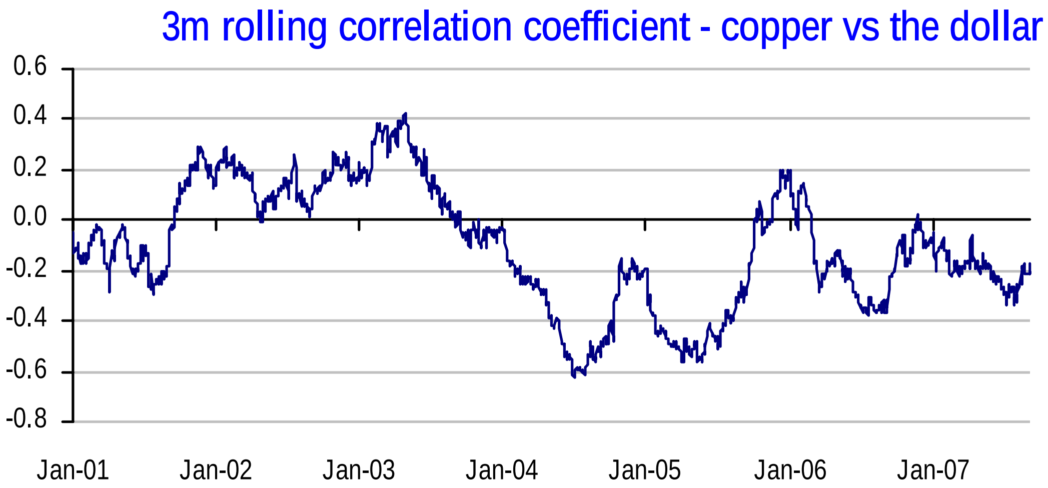
A weak dollar is good for copper! Discuss

- Conventional wisdom has it that a weak dollar is good for commodities
- This should be through marginal changes in supply and demand
  - A falling dollar lowers non-US prices, stimulating marginal demand, cutting production
  - Lower supply and higher demand = rising US dollar denominated prices
  - The impact should be higher with prices close to costs of production
- The funds knowing of this relationship will buy in advance
- This relationship is particularly important for gold



The role of the dollar in determining copper prices

- The view that the dollar drives copper prices is unfounded empirically
- In 2002-3 copper and the dollar were *positively* correlated
- Since 2004 there has generally been a negative correlation, but is this causal or coincidental?
- If the copper market moves into oversupply expect copper to fall irrespective of what the dollar does

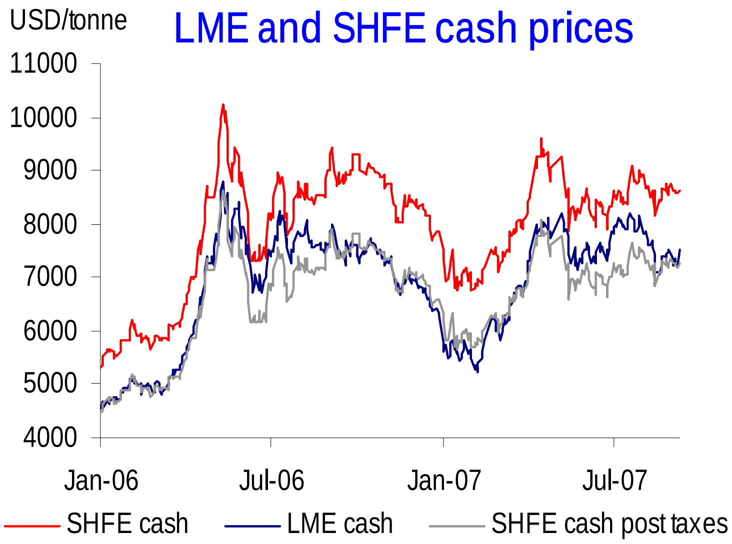


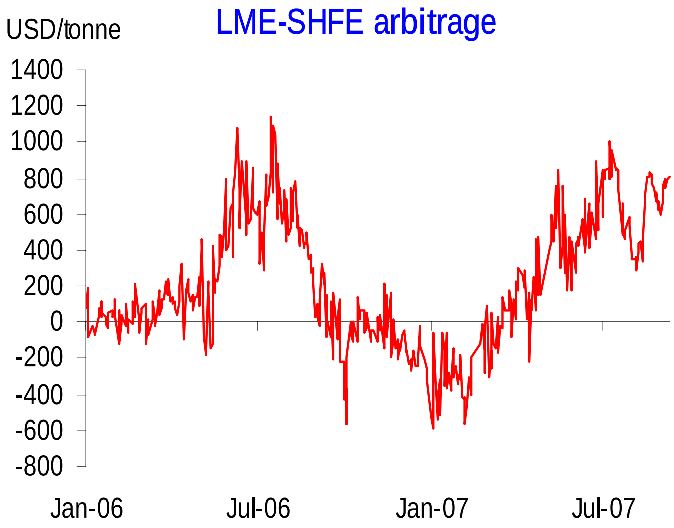
The influence of multiple exchanges on price volatility

- For many years the only copper arbitrage was between LME and Comex
  - Arbitrage difference was narrow as both contracts were liquid and nearby warehousing facilities ensures that metal could easily be moved to settle contracts
  - Activity has declined as increased volatility has seen risk/reward deteriorate…
  - … as has the decline in US copper consumption and production
- This has now been surpassed by the LME-Shanghai Futures Exchange arbitrage
  - Wide arbitrage reflecting lack of close warehousing facilities (higher freight costs) …
  - … exacerbated by Chinese import/export restrictions and taxes
  - Making prices volatile due to a lack of clarity on why metal is flowing to China

LME-SFE arbitrage

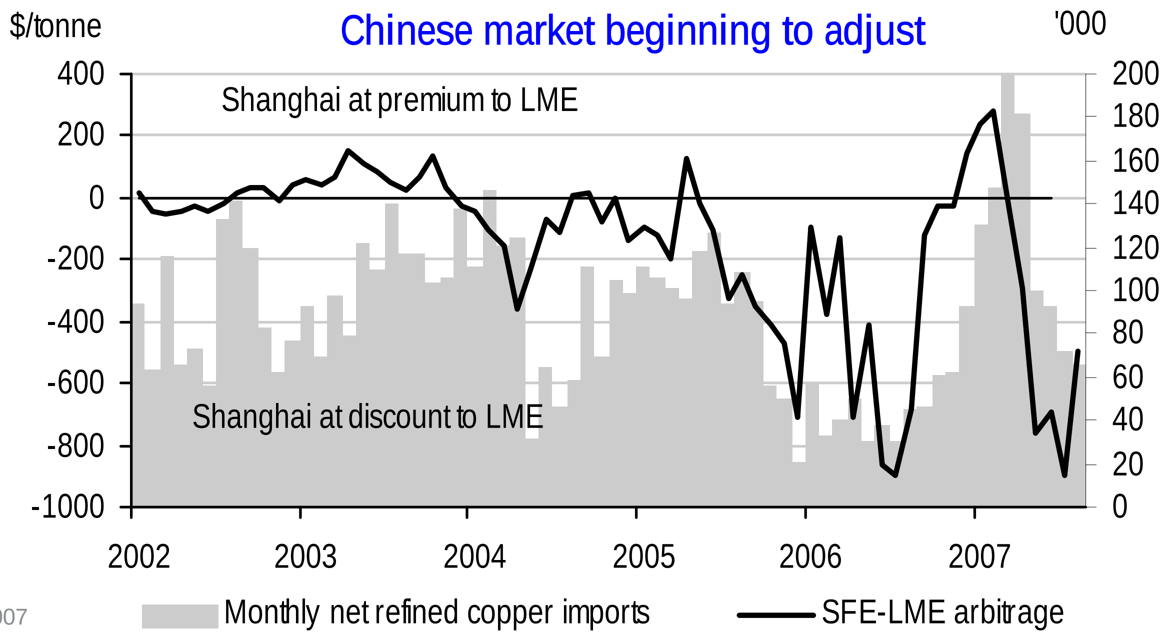
- Shanghai prices are a function of LME prices, local supply and demand for physical metals, and local speculative activity
- This can be further affected by raw material prices and the forward structure on both exchanges
- Huge differences in LME and SHFE prices can develop that require physical shipment to correct





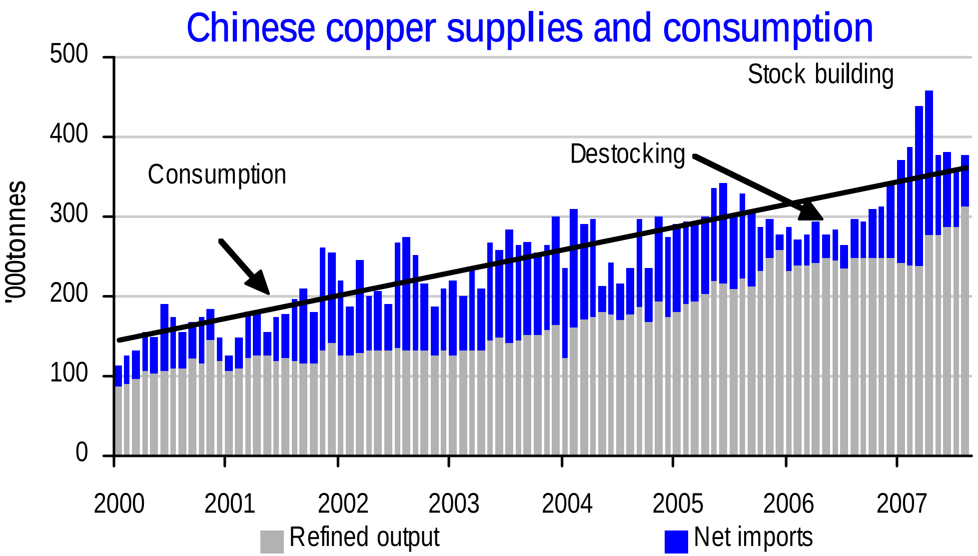
Chinese imports and SFE-LME arbitrage

- Early 2006 arbitrage was against imports – weak demand and stock overhang
- Stocks were run down through H1 2006, causing the local market to tighten
- By late 2007 Shanghai was trading at a significant premium to LME
- Traders began shipping copper to China in record quantities
- Eventually pushing the market into oversupply, arbitrage disappeared
- Excess stocks now being worked off / exported / accumulated by SRB



2006-07 – movements in Chinese 'unreported stocks'

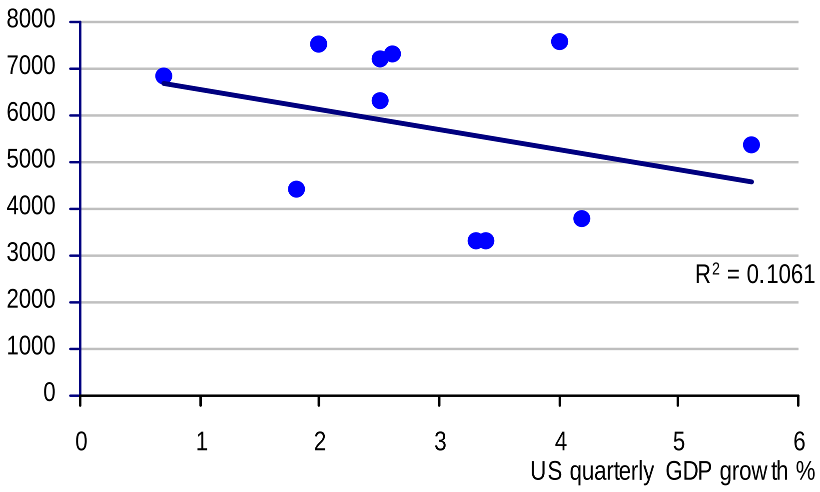
- 2006 Chinese imports fell sharply despite ongoing increase in real demand
  - Chinese supplies of 3.58Mt and consumption of 3.95Mt implies stock drawdown of 370kt
  - Market perceived lower imports to be bearish, erroneously believing demand to be weak
- 2007 Chinese imports rose sharply as favorable arbitrage encouraged shipment
  - 2007 supplies of 4.75Mt and consumption of 4.50Mt implies stock build of 250kt
  - Market perceived rising imports as bullish, erroneously believing demand to be stronger



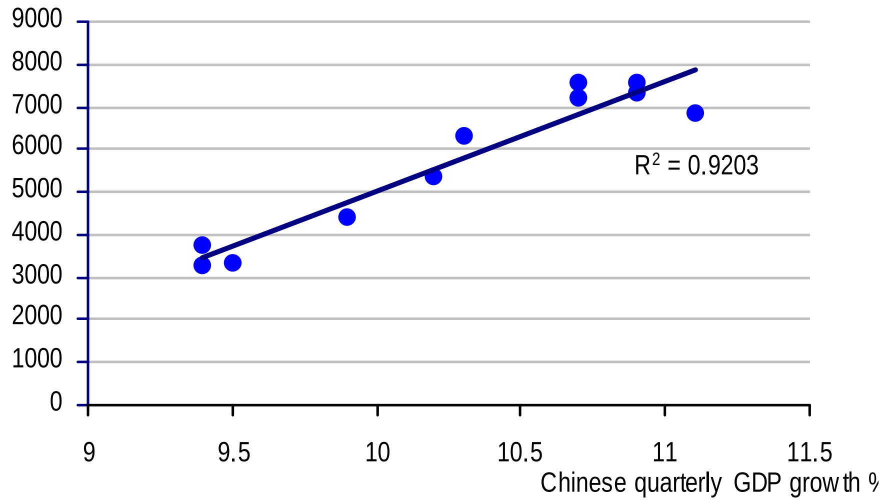
(Remember China is the key driver to copper prices)

- For much of the last 3 years the markets have been sanguine about US growth, correctly being more interested in China
- This changed in August, the markets fixating on US debt problems
- This created some good buying opportunities, particularly in equities
- If US debt worries ease, expect attention to go back to China

US GDP growth and copper prices 2005-Q3 07

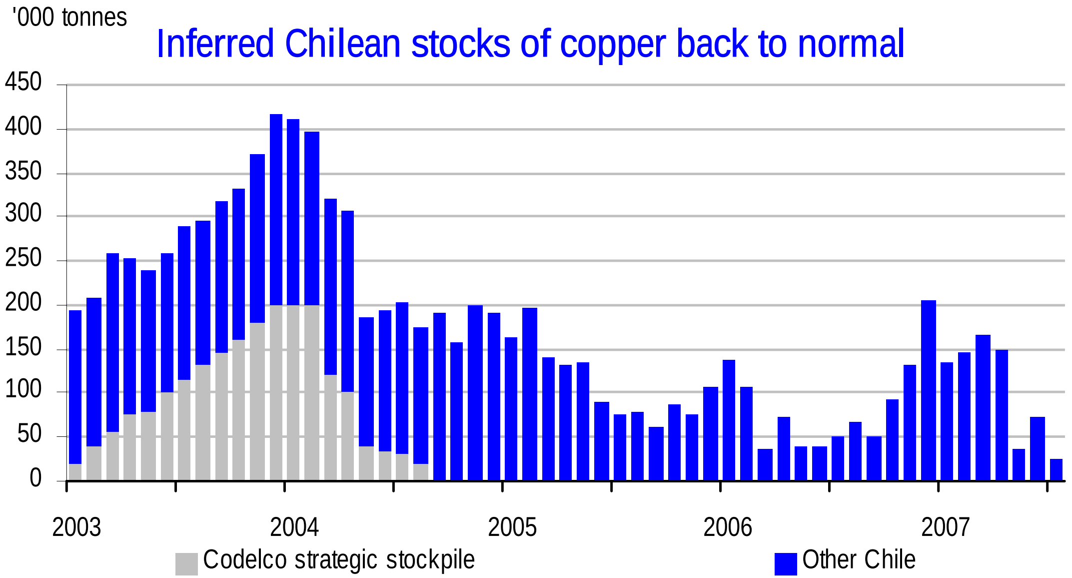


Chinese GDP growth and copper prices 2005-Q3 07



2007 Chinese stocks up, Chilean stocks down

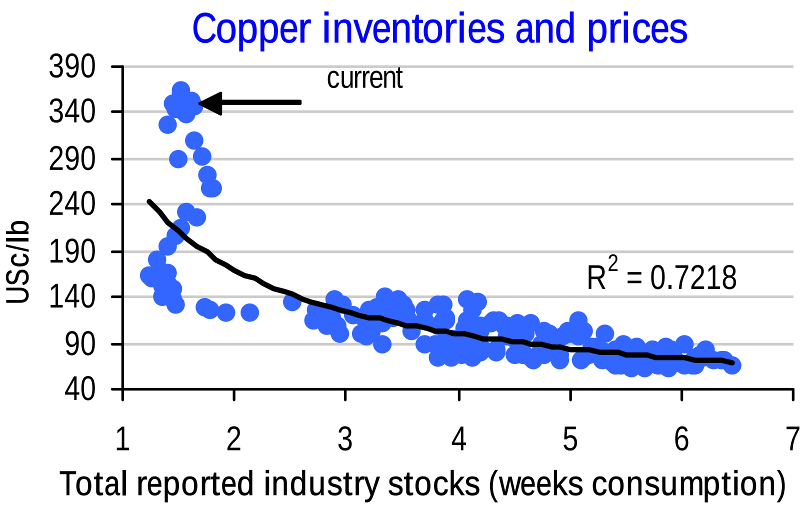
- H2 2006 collapse in US demand led to an unexpected rise in Chilean copper stock
- Much of this was then exported in H1 2007, most to China
- Markets took this as bullish (lower surplus in H2 2006 and higher deficit in H1 2007
- But should be market neutral as it is merely relocation of existing inventory

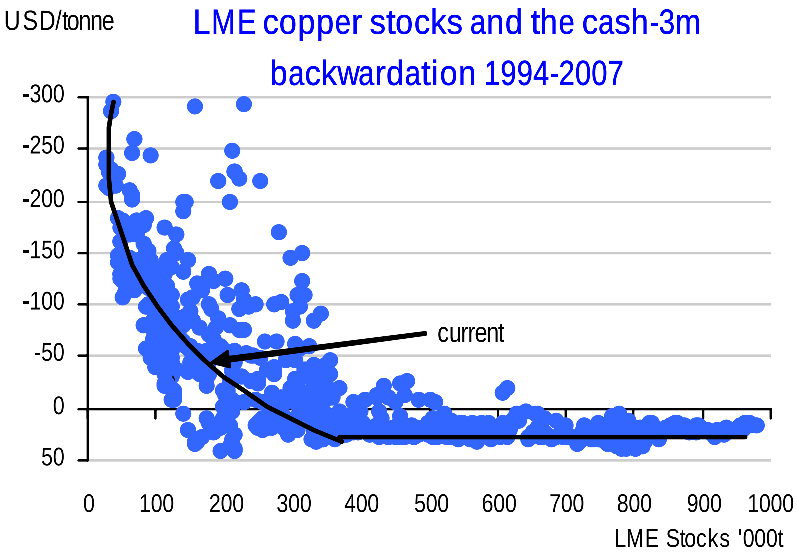


Stock change calculated as production less exports less consumption

The role of stocks in determining copper prices

- Basic economic theory has it that stocks influence prices
- But in reality information flows lag and it is difficult to know the true stock situation





But movements in unreported stocks can dwarf movements in reported stocks

Movements in copper stocks, 000t 2006 and 2007

	H1 06	H2 06	H1 07	H2 07e
Exchange stocks	5	86	-21	20
Other reported stocks	-16	34	-21	0
Total reported stocks	-11	120	-42	20
Chinese stocks	-210	-170	250	0
Chilean port stocks	-69	168	-134	40
Other unreported stocks	-100	100	-50	40
Total other stocks	-379	98	66	80
Total stocks	-390	218	24	100
Market balance	Deficit	Surplus	Balanced	Surplus
Prices	Up	Dow n	Up	Dow n

Summary and conclusions

- Copper prices have surged higher as the fundamentals have been incredibly tight
- ‘The funds’ have had and will continue to have a huge impact on commodities
- But we need to differentiate between ‘the funds’ – macro funds, CTAs and long only index investors
- Macro and CTA influence is transient, long only investors should keep prices higher for longer
- The impact of the dollar in driving copper prices is overstated
- The China factor – production, consumption, stock movements, speculative activity and arbitrage – is exacerbating copper price uncertainty and volatility

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