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Global Drivers of Commodity Prices

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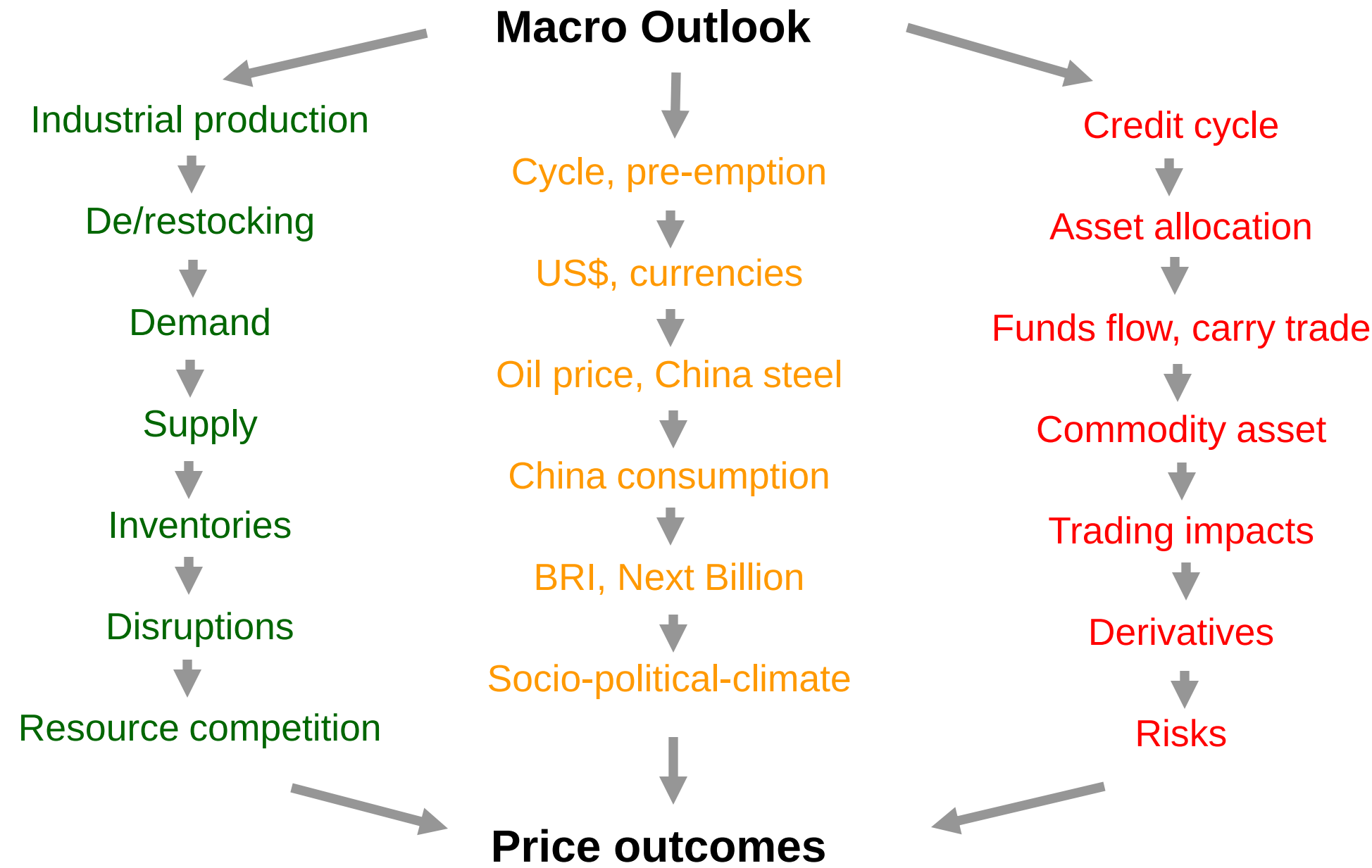
What drives commodity prices – complex, iterative, systemic dimensions



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Source: UBS

Global macro – the starting point for all commodity dimensions

- End of QE2; treasury monthly net US$75bn purchases to end in June ending rally in risk assets since Aug10, driven by portfolio adjustments
- Cyclical soft-patch or double dip; US manufacturing, housing, employment matters globally; US to start tightening in Q112
- Greater volatility in currencies and commodities as short US$ positions unwind; Asian central banks may shift out of commodity currencies?
- Eurozone now like ‘Europe in the early 1990s’ with Germany booming but can’t set interest rates for all the currency union
- Chinese and EM inflation continuing to worry; China tightening to impact developed world demand
- Higher oil price lowers demand in coming months; Japanese disruption to global manufacturing; weather impacts in US, China, Europe

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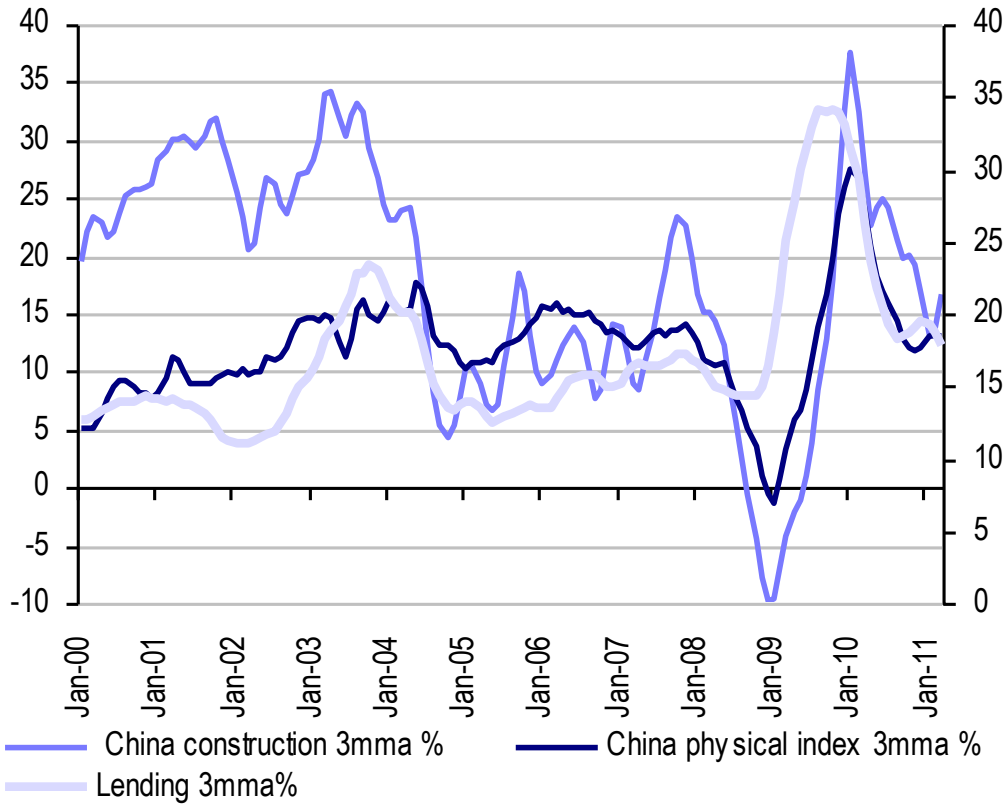
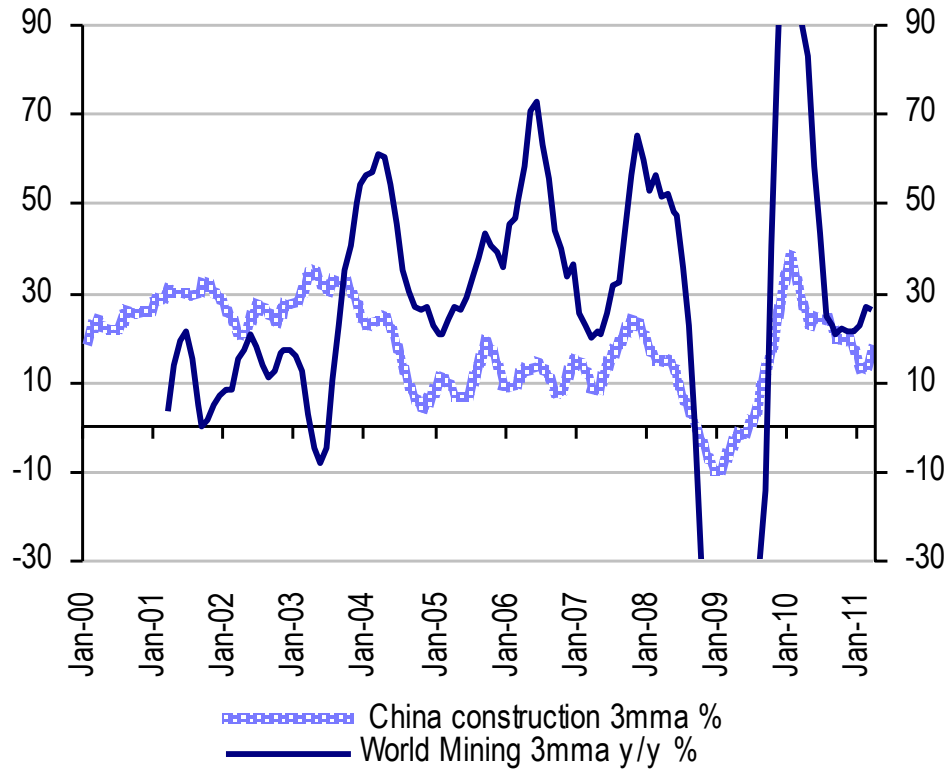
Source: UBS

China macro indicators also key – normalising at healthy levels

Construction, lending, physical



Construction, world mining



- Physical index stabilising, soft landing expected
- China construction drives global mining equities and commodities

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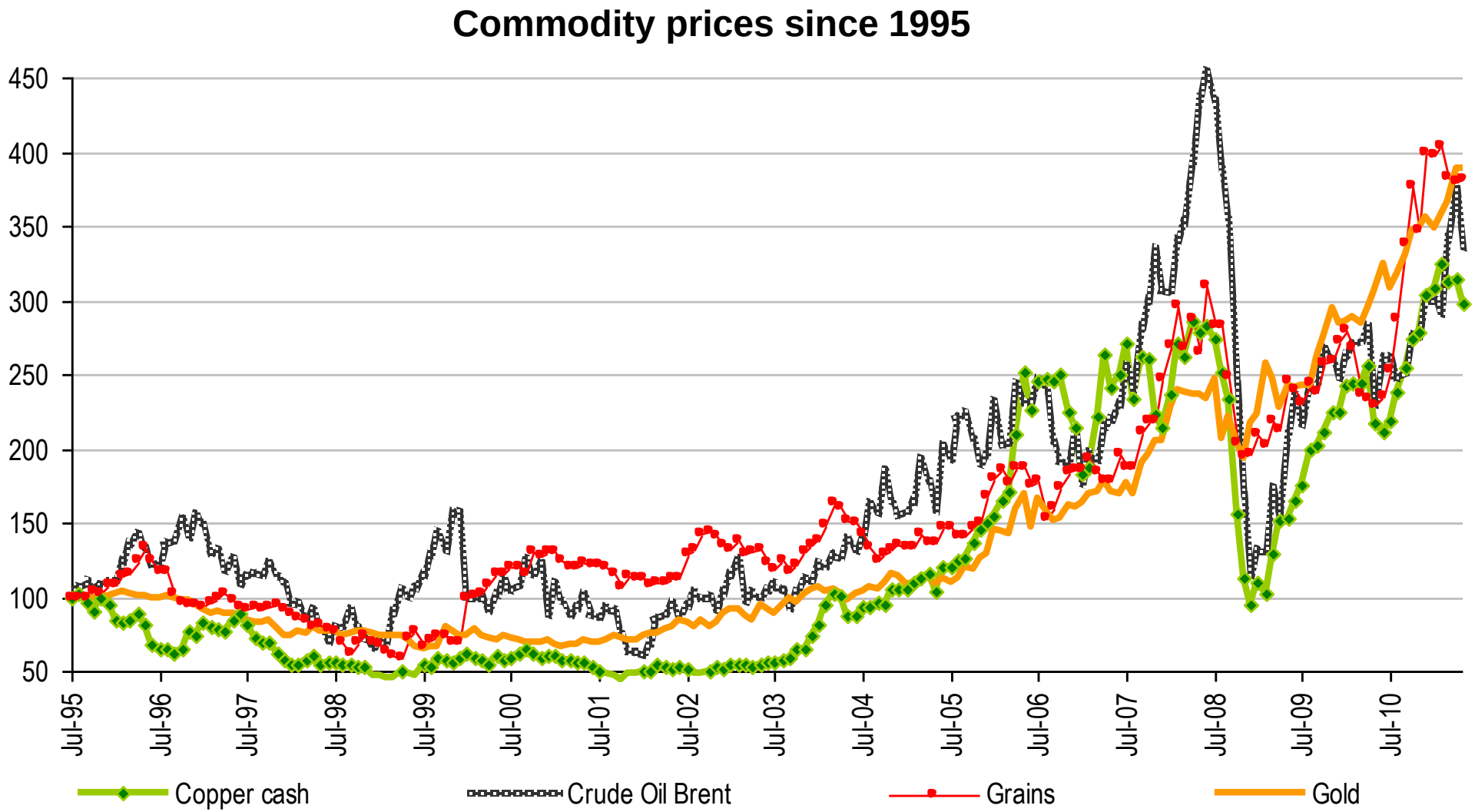
Source: China Customs Stats, UBS

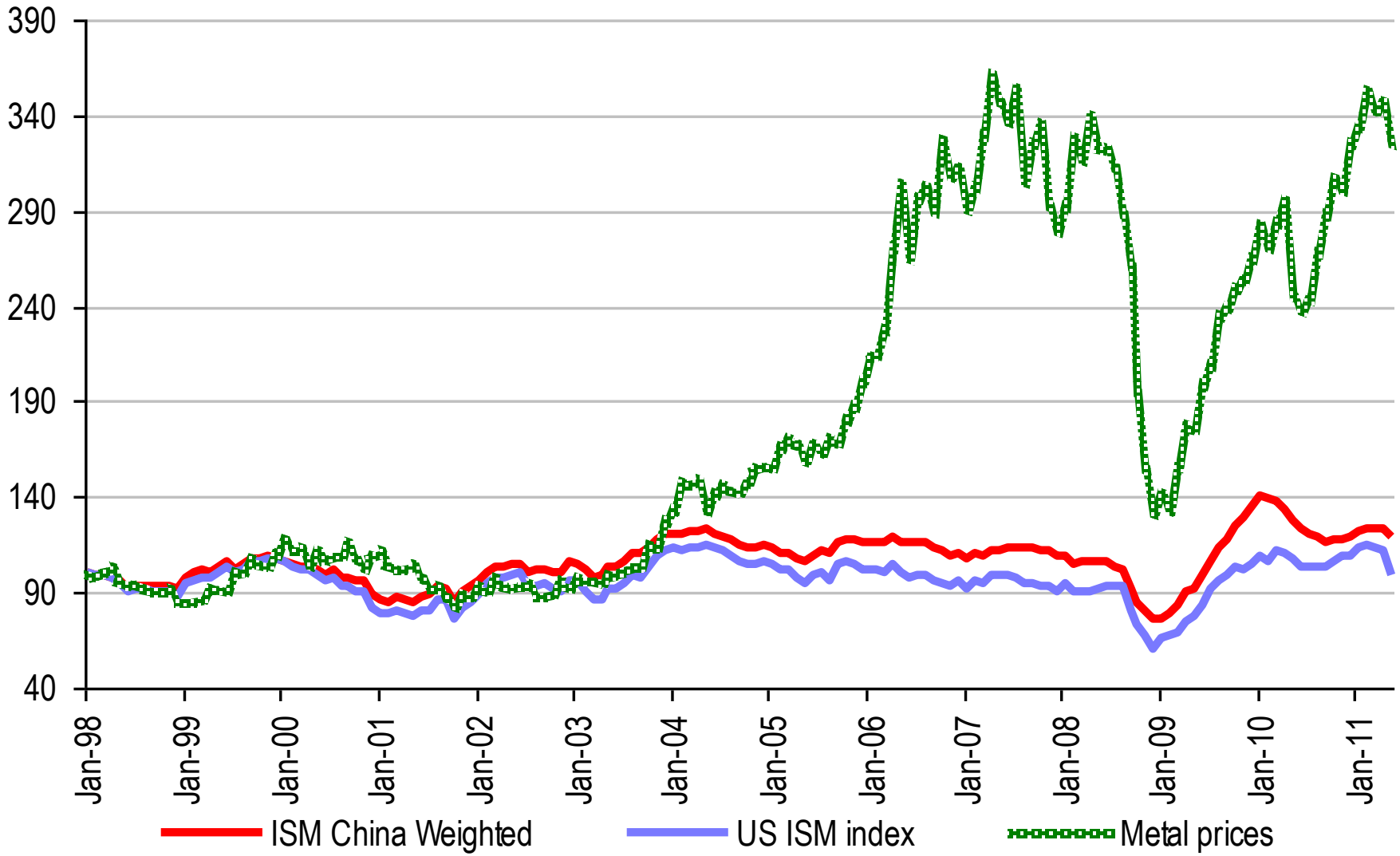
Prices – upwardly volatile since 2003, after years of 'stability'



Source: Thomson Financial, UBS

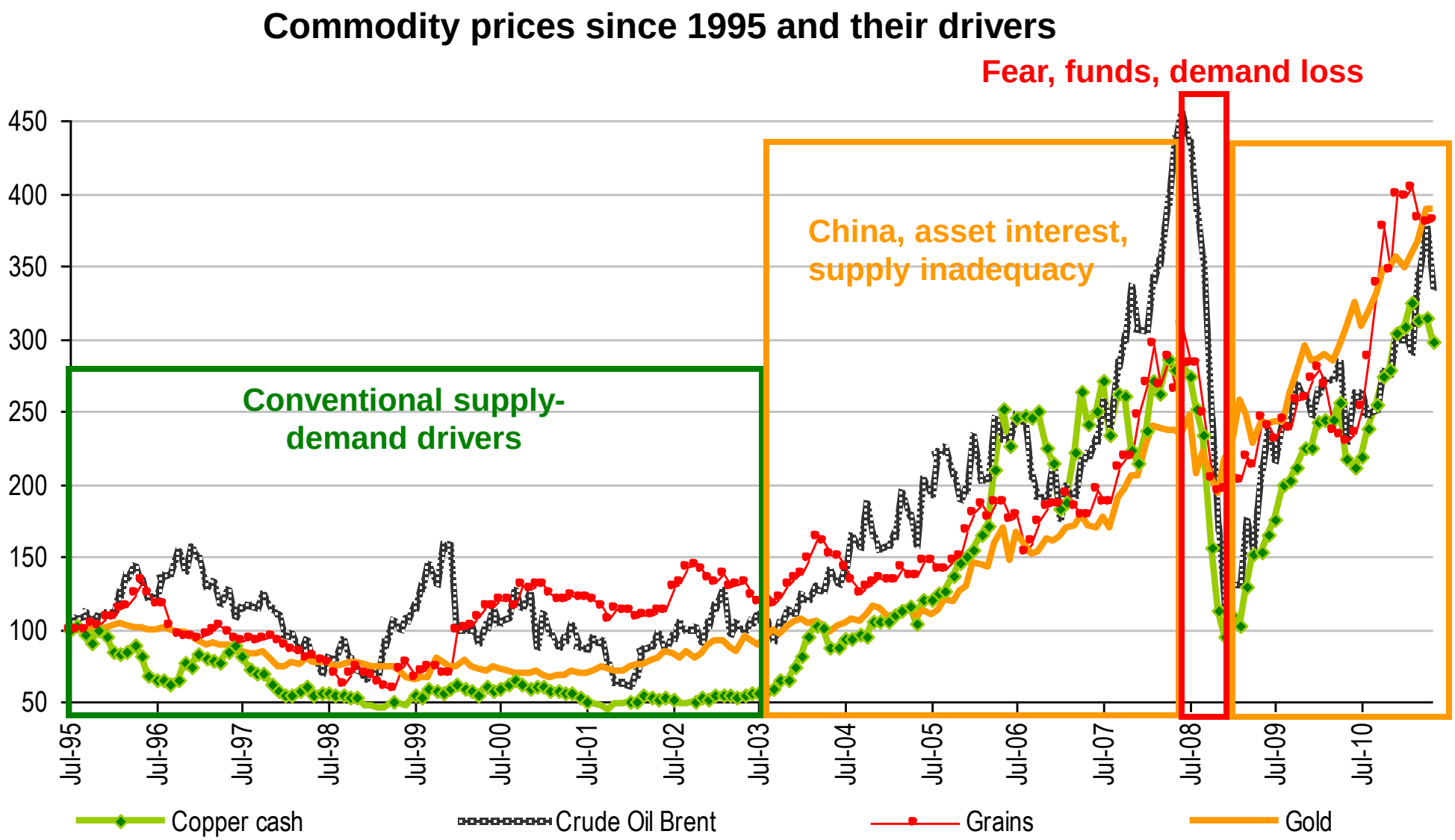
Traditional cyclical indicators losing their powers of 'prediction'

US ISM manufacturing index, modified for China, and metal prices



Source: Thomson Financial, UBS

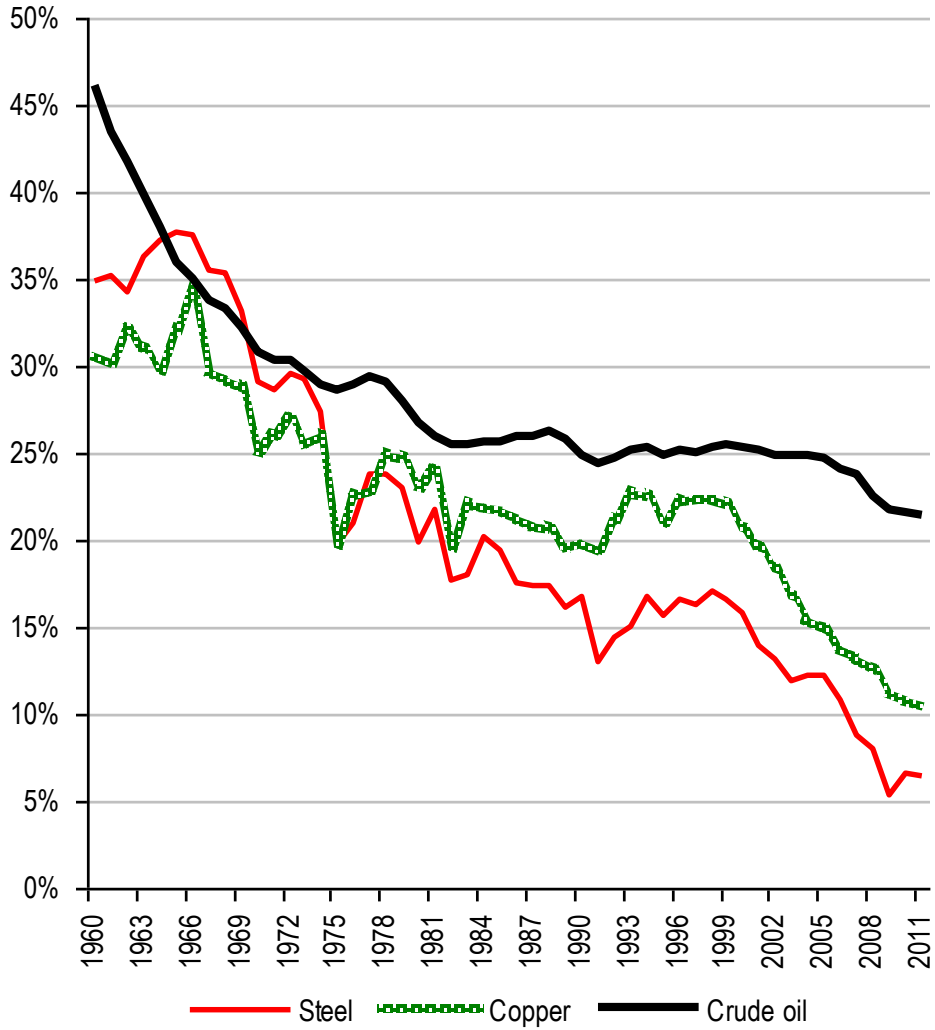
Moving forward – all three dimensions will impact on future prices



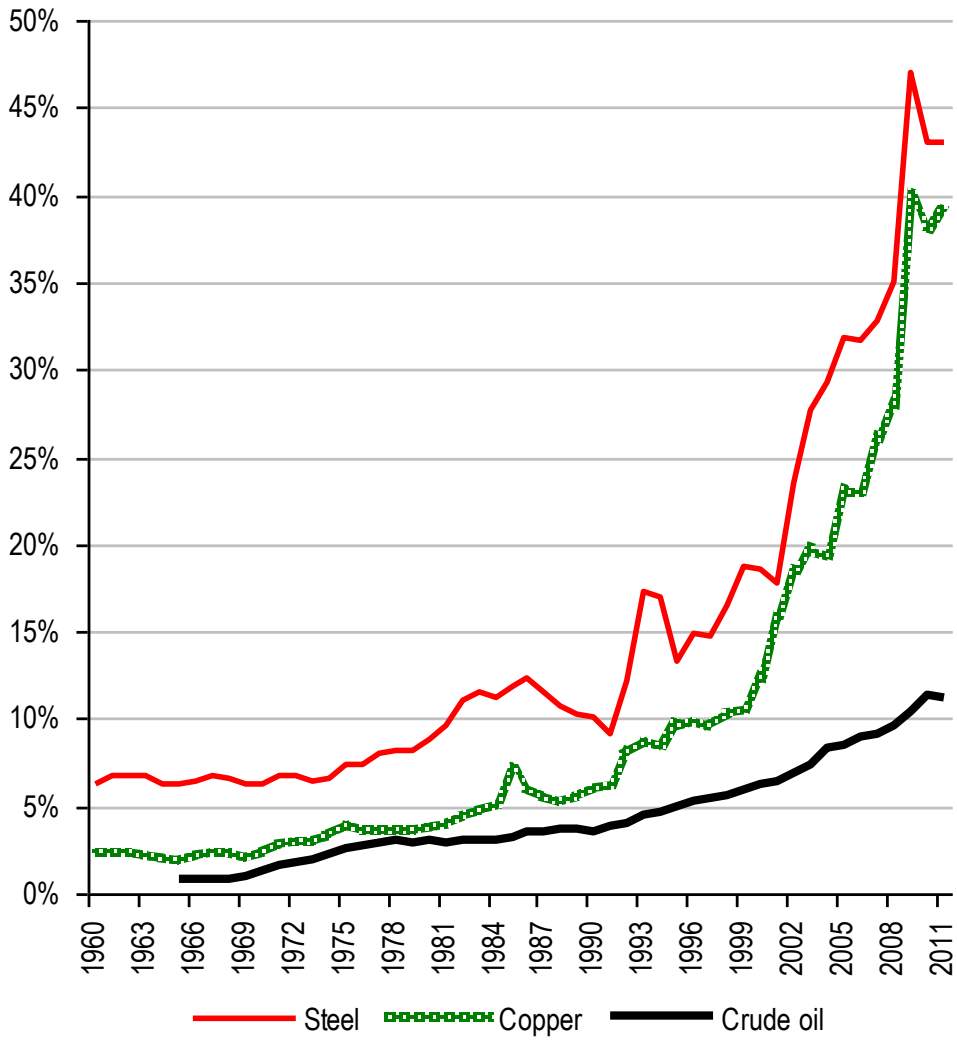
Source: Thomson Financial, UBS

The rise of China – marked the new era for commodity pricing

US share of global consumption

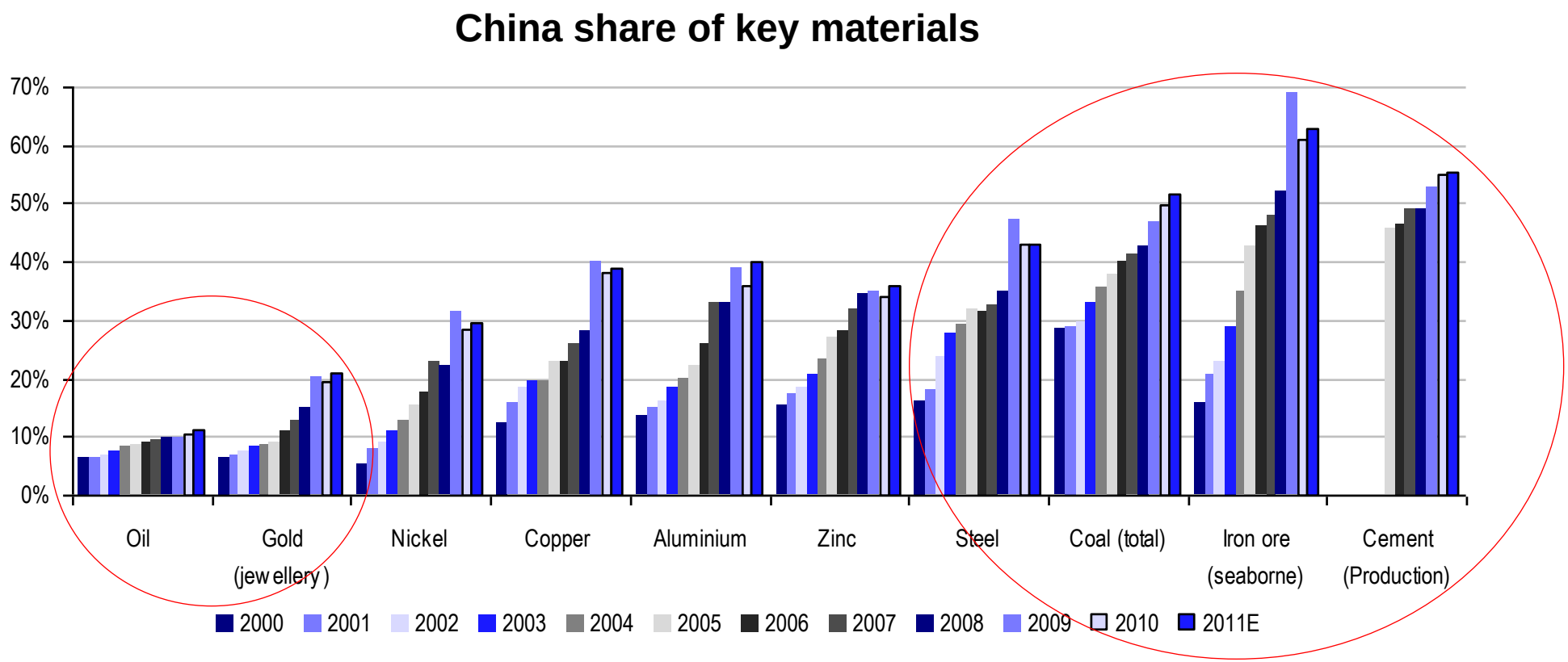


China share of global consumption



Source: Thomson Financial, UBS

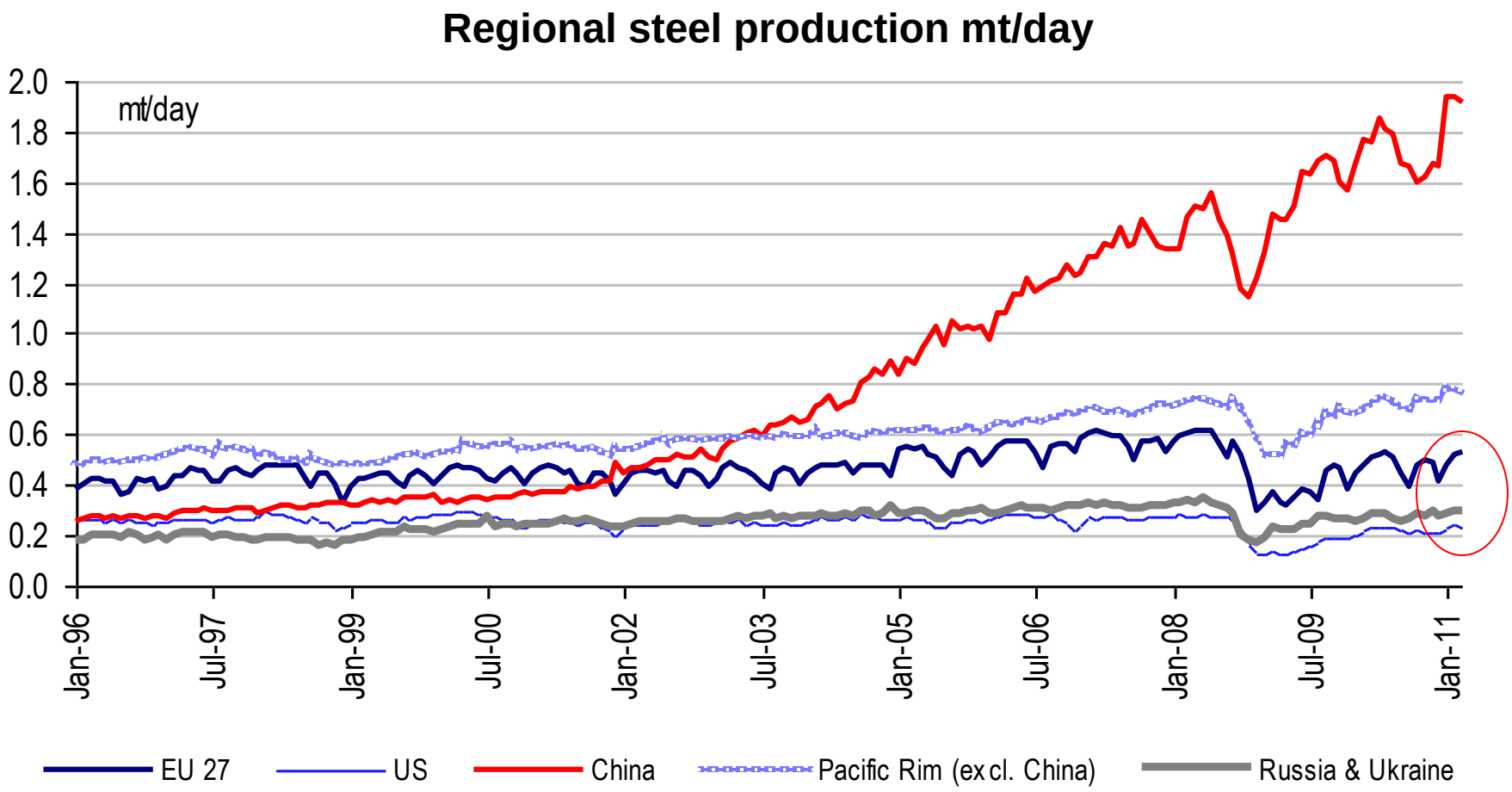
China's share of global commodity consumption is up dramatically



- China dominates key bulk materials consumption
- But significant in industrial metals, over 30%
- Oil and gold market share expected to rise

Source: Thomson Financial, Bloomberg, UBS

Steel dramatises China's global commodity challenge

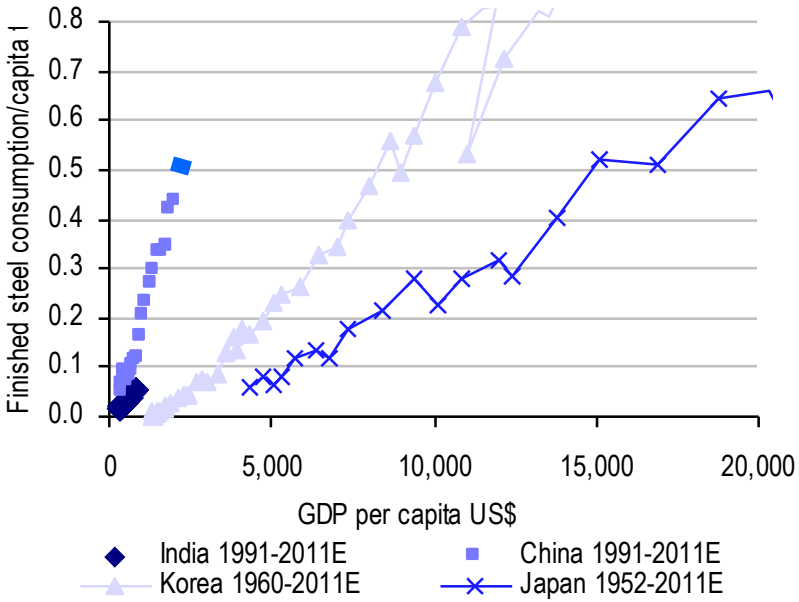


- China steel production 2011 at 700+mt/y
- Apart from Asia, rest of world is still below pre-GFC levels

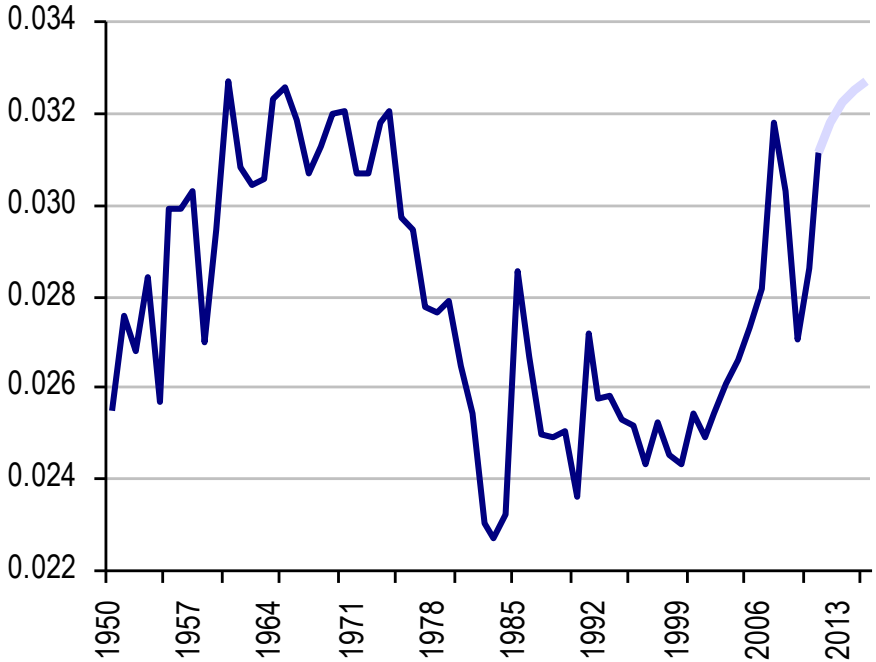
Source: WSA, UBS

China's steel IoU maps future growth - uncertain for all commodities?

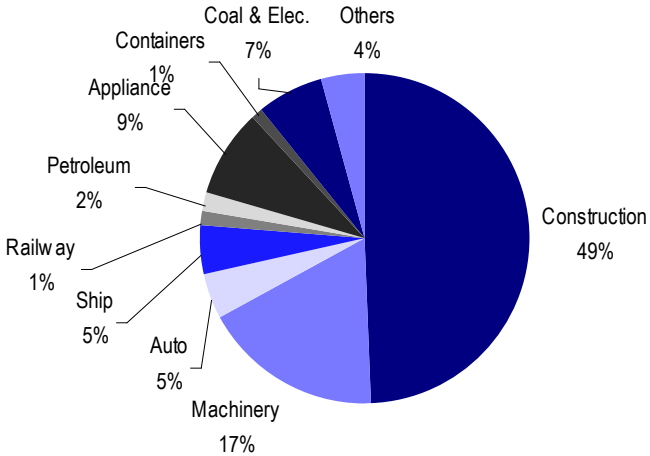
Asian Steel IoU



Global steel IoU



China steel use



Steel intensity in China buildings

Building Height in storeys	8	12	18	32	50	100
Steel IoU kg/m2 low end	5	40	50	60	80	110
Steel IoU kg/m2 high end	40	50	70	100	120	220

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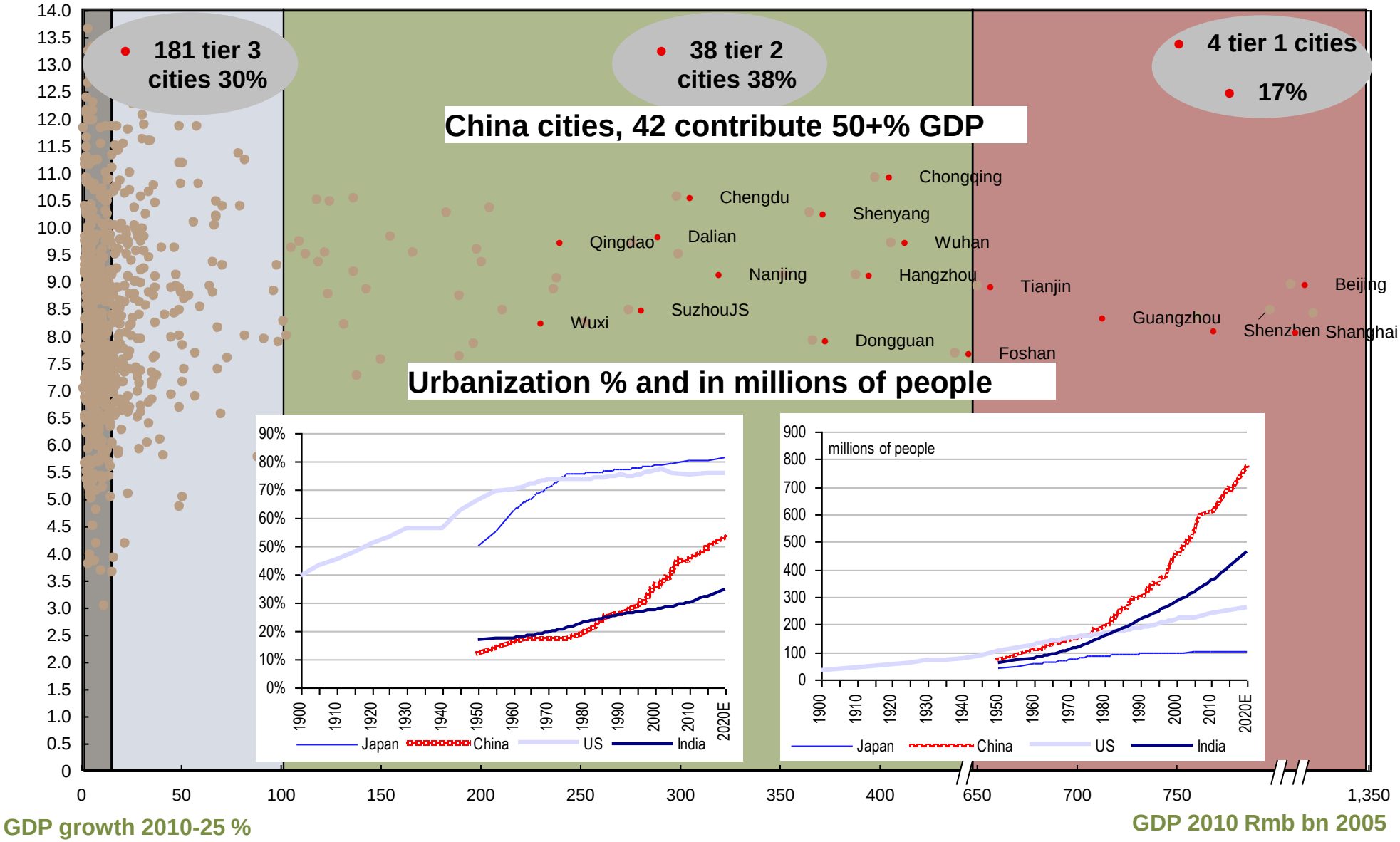
Source: Rio Tinto, UBS

China urbanization the driver – scale and duration underpin demand



Source: McKinsey Insights China – Macroeconomic model update (Mar11), UN , UBS

China's growth underpinned by urbanization – but constraints question

- Urbanisation and 'exploding middle class' still unstoppable drivers of growth that will continue to exceed government expectations
- Inflation and sustainability the big questions; China central govt further raise rates and intervening on costs and raw material prices
- China natural resources strategic imbalances; rising imports in coal, copper, grains; domestic mine output poor quality and rising costs
- China's energy is coal dependent; while output growth is strong, data quality and transparency questioned
- China's changing cost base is likely to push these higher costs on to the world see an exporting of inflation
- China's economic transition yet to happen, needs sharp contraction in investment growth; debt and 'addiction to construction' continues

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Source: UBS

China's 5 year plan – a map to transition and lower commodity growth?

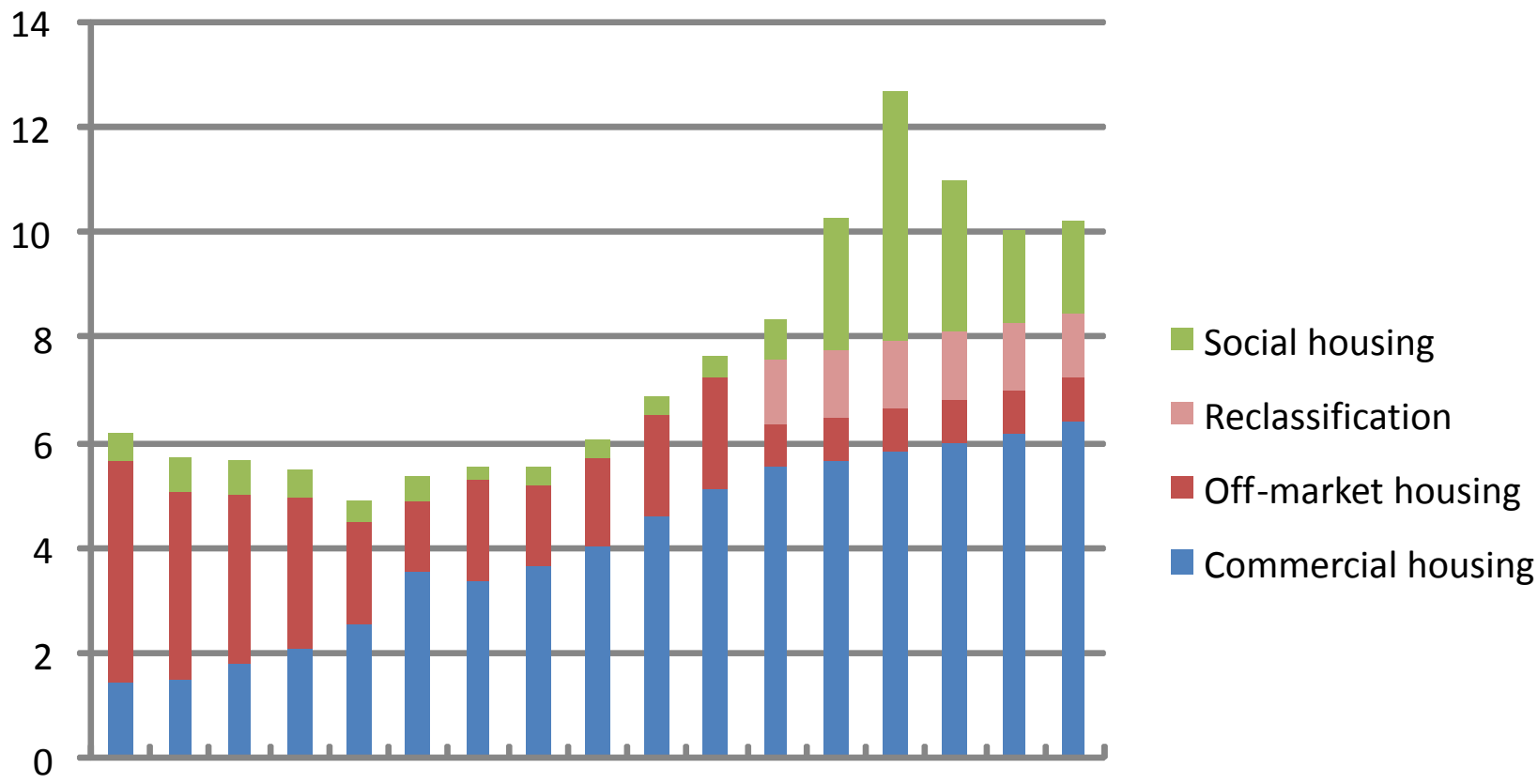
	11th 5YP		12th 5YP	
	Targets	Outcomes	Targets	Reference
GDP growth	7.5%	11.2%	7%	8% (2011)
Service industry (as share of GDP)	43%	43%	47%	na
Urbanization rate	47.0%	47.5%*	51.5%*	65% (2030)
Registered urban unemployment rate	na	na	<5%	4.6% (2011)
Urban disposable income growth rate	5.0%	9.7%	>7% p.a.	na
Rural net income growth rate	5.0%	8.9%	>7% p.a.	na
Job creation in urban areas	45m	57.7m	>45m	9m (2011)
R&D expenditure (as share of GDP)	>2%	1.8%	2.20%	n.a.
CO2 emission per GDP			cut by 17%	New target
Energy consumption per unit GDP			cut by 16%	20% for 11th FYP
Non-fossil energy (as share of primary energy consumption)			11%	Currently 8.3%
Forest coverage rate			21.7%	Currently 20.4%
Proportion of kids to attend all the 9 years of basic education			93%	Currently 89.7%
Subsidized housing			36m	New target
Water usage per unit IP value-added			down by 30%	Currently -36.7%

- Start of the 12th 5YP prompted pre-emptive stocking, now destocking
- Economic and environmental transition key but questioned

Source: CEIC, Rio Tinto, UBS

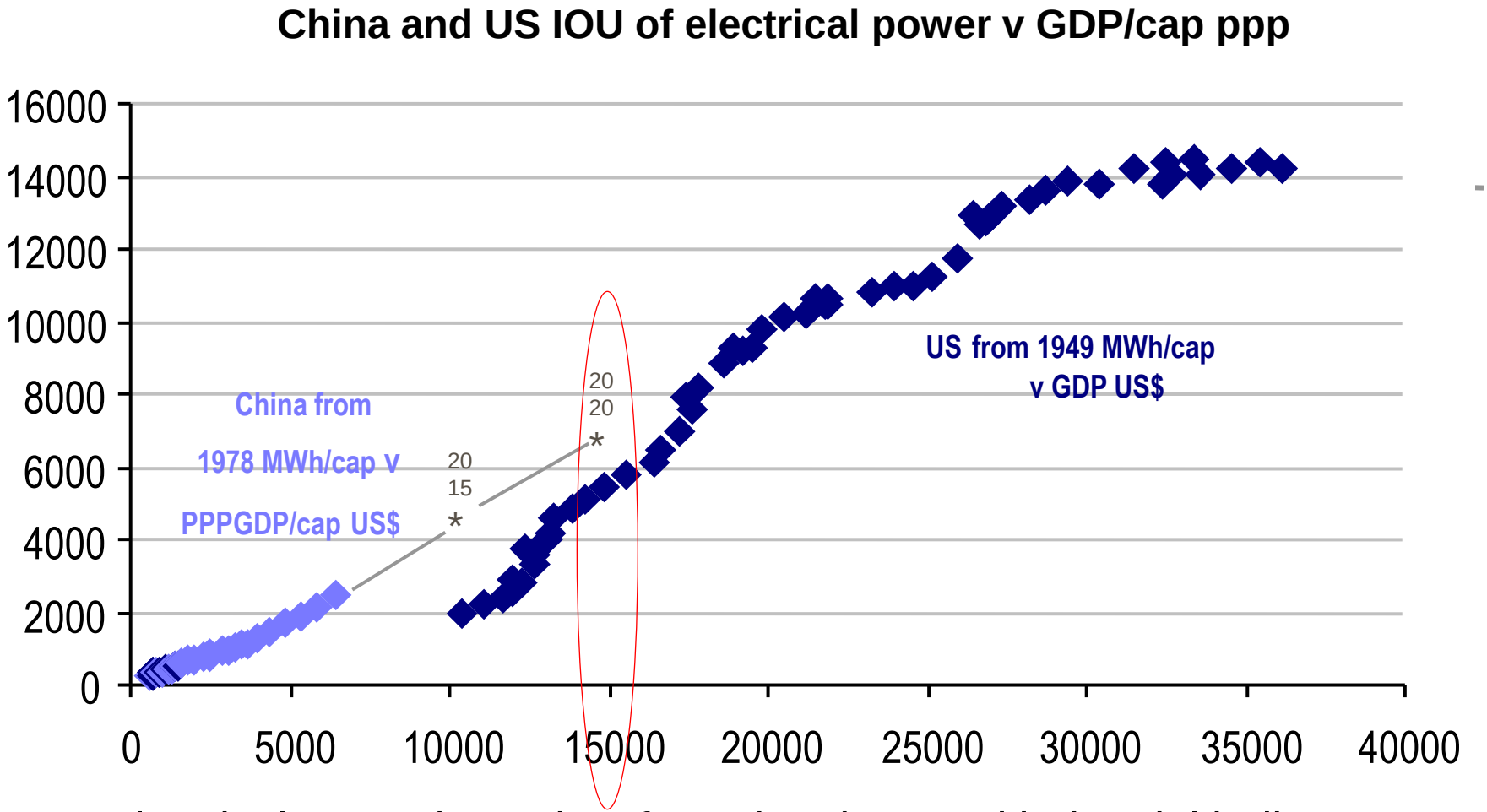
China 'business as usual' until 2013 – social housing front loaded in 5YP

China housing, including social housing in m units, 12th 5 year plan



Source: CEIC, Dragonomics, UBS estimates

China's energy growth - implies more upside compared to the US

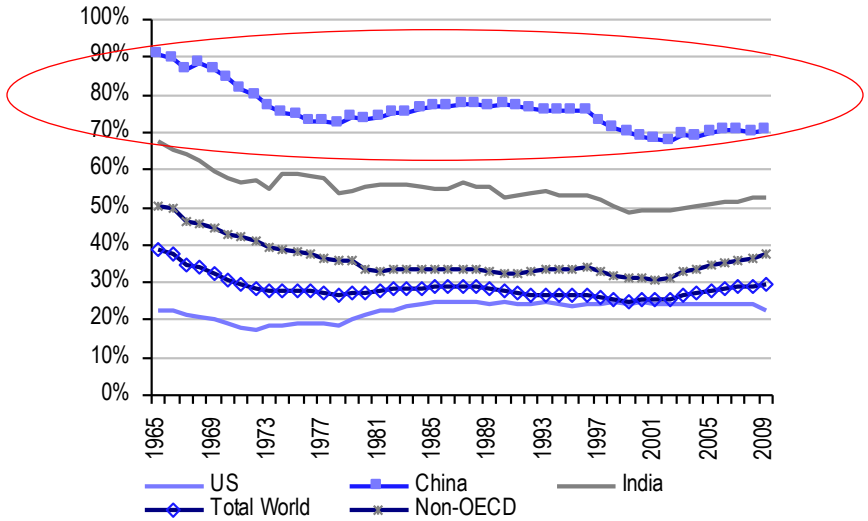


- Electrical power intensity of use (IOU) a good industrial indicator
- China in 2020 6600MWh/cap (US$15.2k/cap ppp GDP) < half current US
- Questions about constraints from resources, costs, environment arising

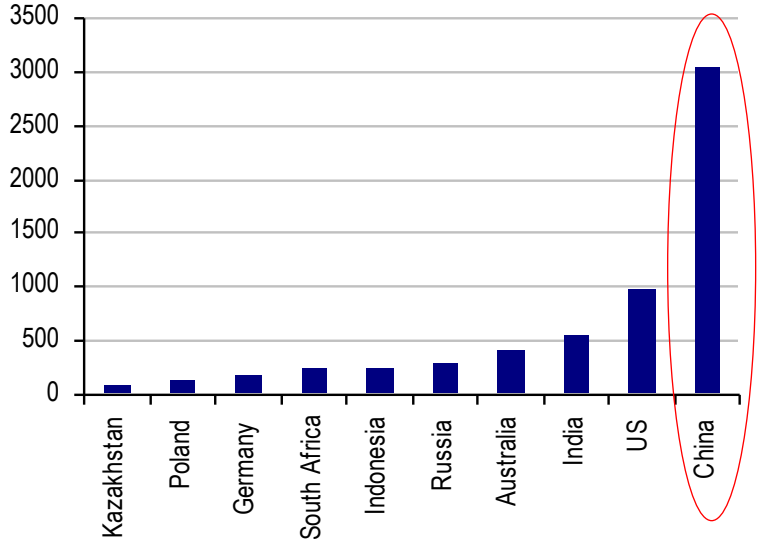
Source: UN, World Bank, BP

China's strategic dependence on coal for energy - underpins demand

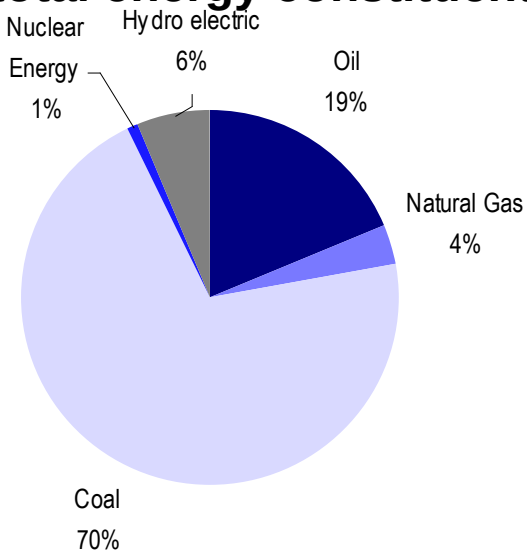
Coal % of total energy



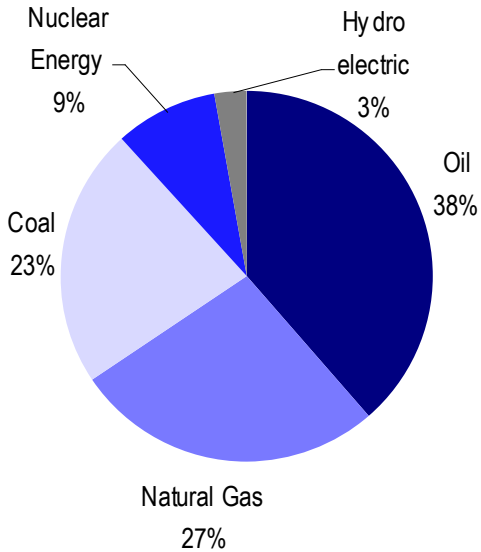
Raw coal production mt



China total energy constituents

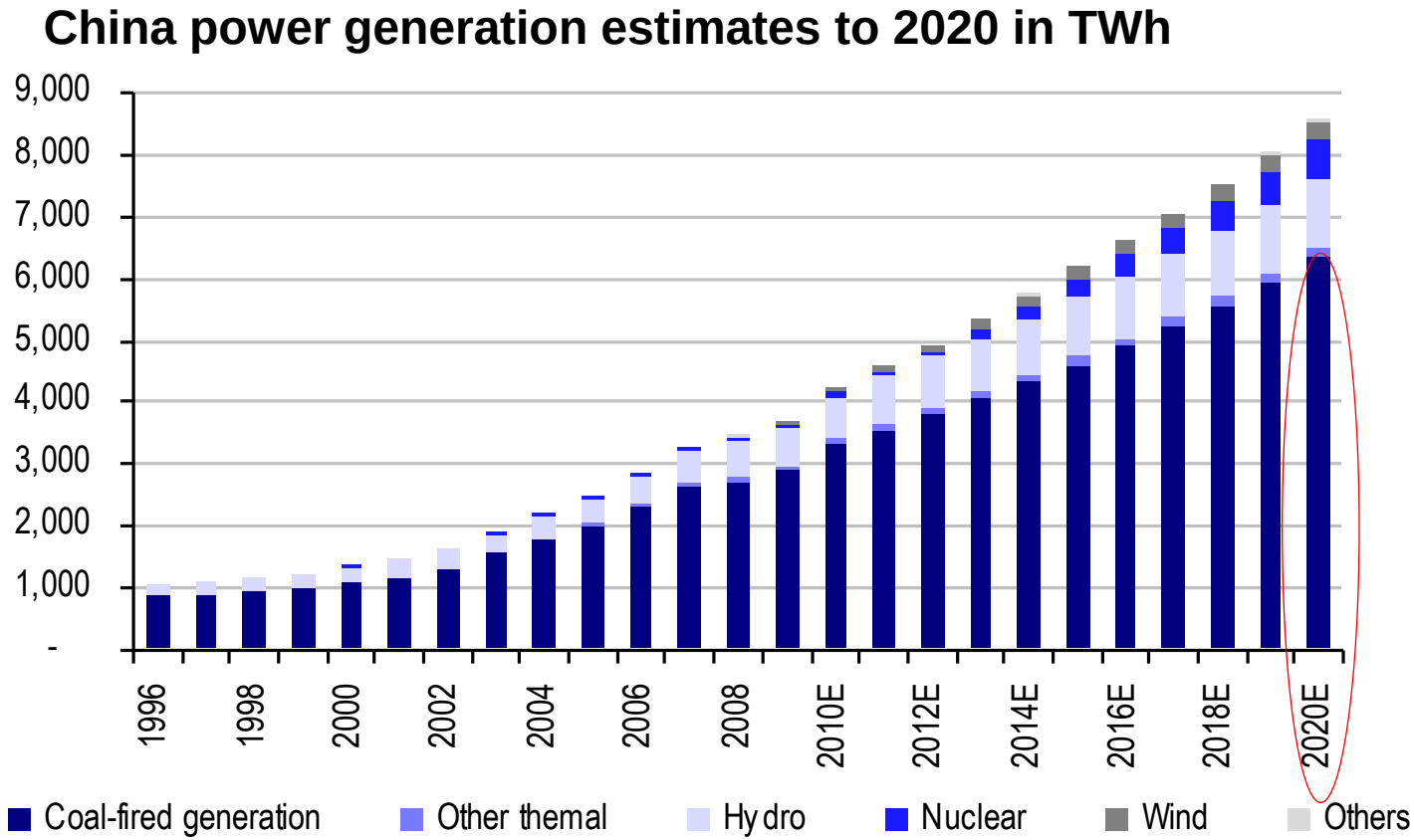


US total energy constituents



Source: BP 2010 Statistics, UBS

China's coal dependency fixed - despite nuclear and wind efforts



- Nuclear + 25% pa, 10GW per year…but might slow with Japan crisis
- Gas to grow by 8%...but could increase as an alternative to nuclear
- Despite the above…coal will still be 74% of power mix by 2020E

Source: BP 2010 Statistics, UBS utilities research

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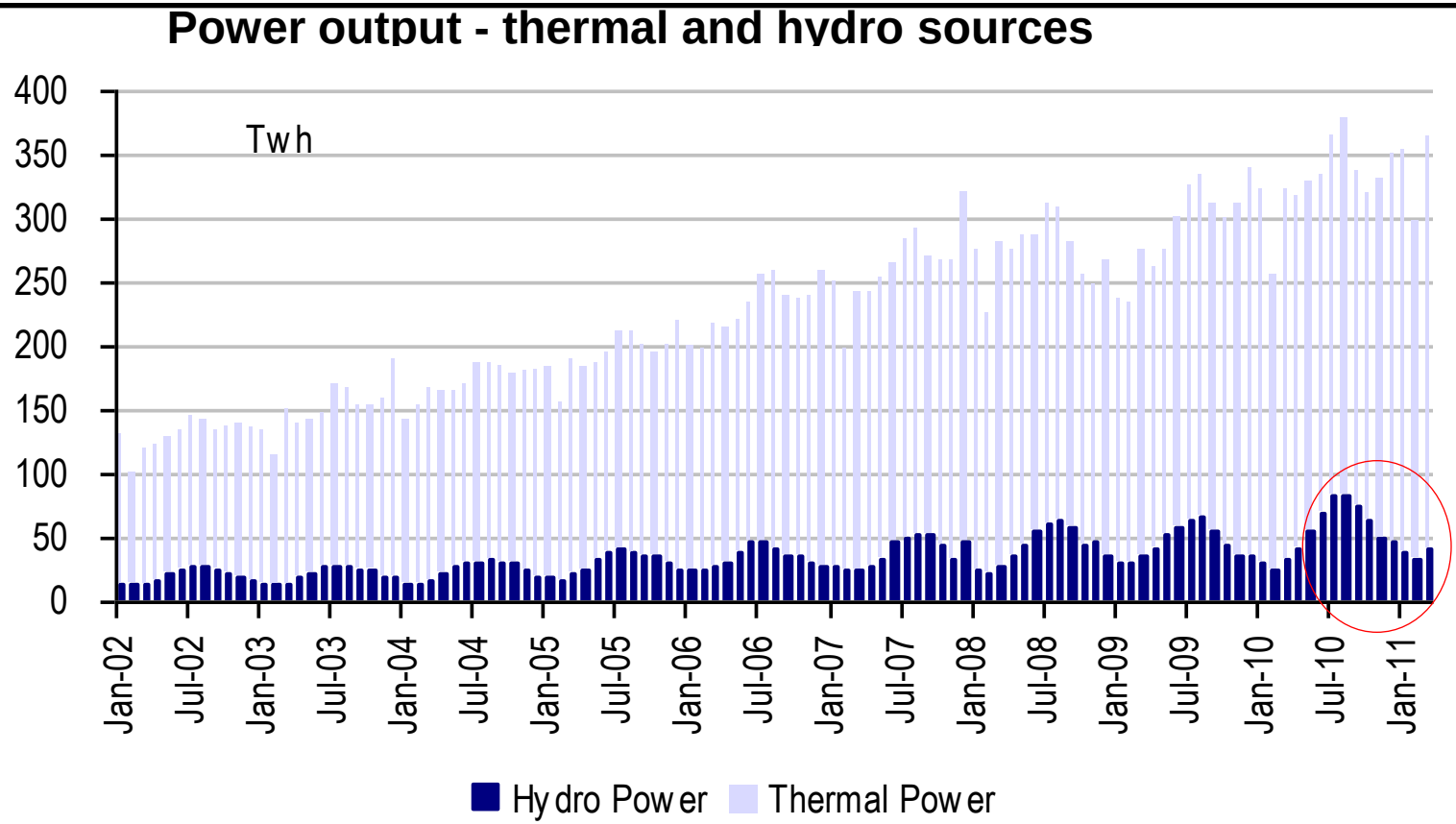
China's power output – also increasingly seasonal and constrained



- Increasing deeper seasonality in hydro power adds to overall coal demand; peak to trough in hydro power now 9% of yearly hydro output
- Drought conditions cap hydro power this summer leading to shortages
- Wind installations (45GW in 2010) need back up power during low wind

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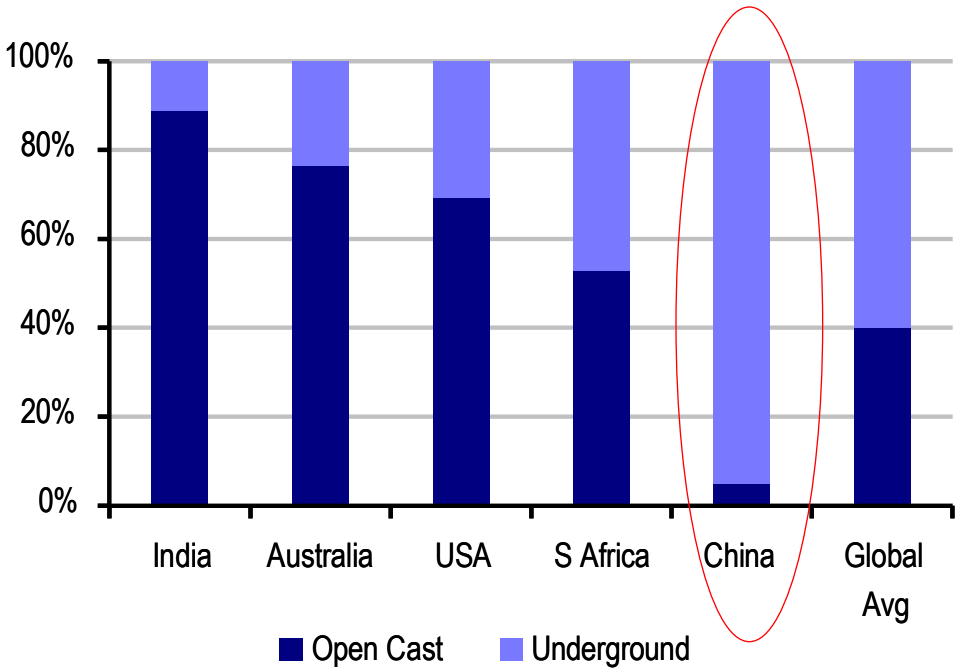
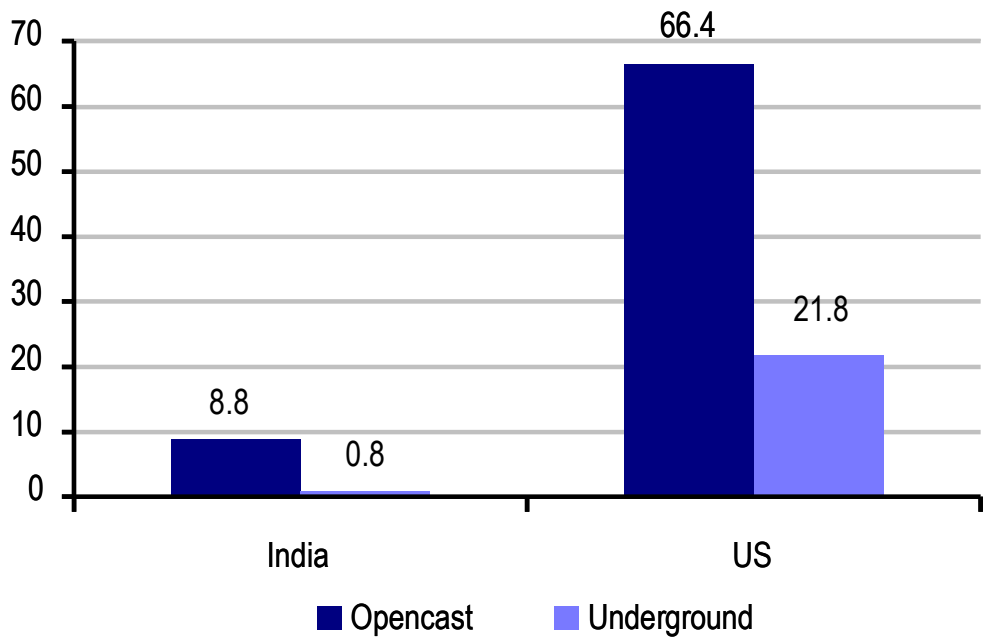
Source: China National Bureau of Statistics, UBS

Costs and productivity spreads widening – China marginal producer





- Global coal is the biggest bulk materials handling activity in the world
- China's coal >90% reliant on underground, getting deeper and longer
- China the marginal producer with rising costs, labour, energy, transport
- India's coal 90% open pit, providing cost and security advantages
- Productivity varies; water, reclamation, carbon costs not accounted

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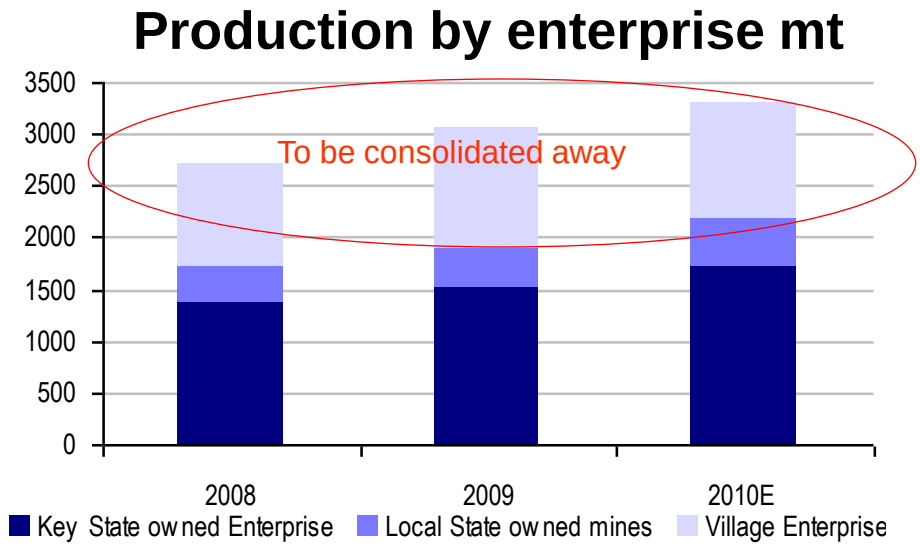
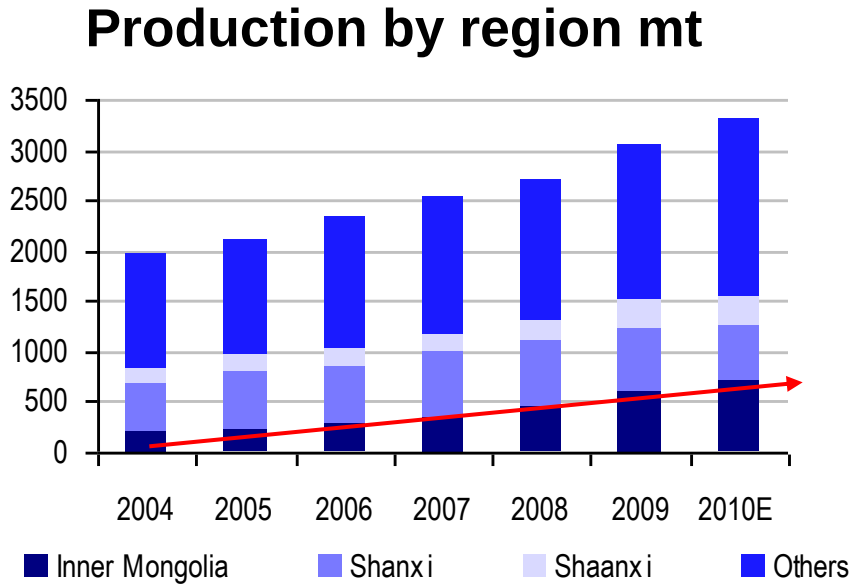
Source: EIA, World Coal Institute,UBS

Big structural challenges for future Chinese coal mining growth

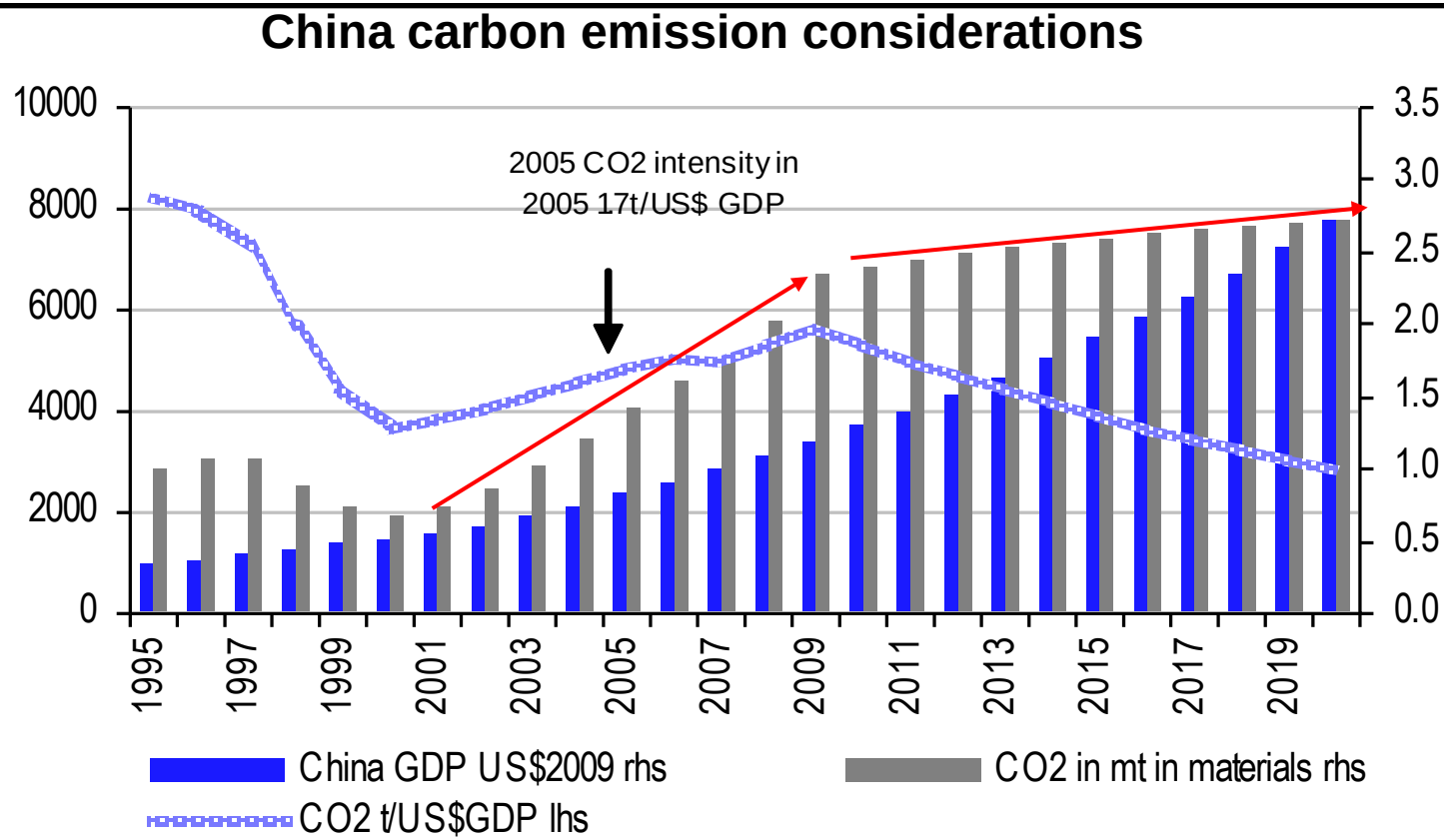




- Uncertainty about reserve definition, drill spacing too wide? reserve sterilisation from poor resource extraction rates hidden
- Mines getting deeper, longer haulage distances, safety constraints; costs rising – labour, energy, royalty, water and transport
- Loss of working faces with industry consolidation to constrain production; calorific values falling, ash-sulphur levels rising
- Rising capital costs sees diminishing effectiveness of FAI

Source: China National Statistics, UBS

12th 5 Year Plan – carbon commitments typify transition?



- China committed to lower carbon emissions per GDP by 40% rel to 2005
- If these carbon commitments were met we estimate coal consumption would fall by 25% relative to our 2020 estimates
- Widespread scepticism about implementation among provinces; but the 12th Five Year Plan reiterated the commitments

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Source: UBS

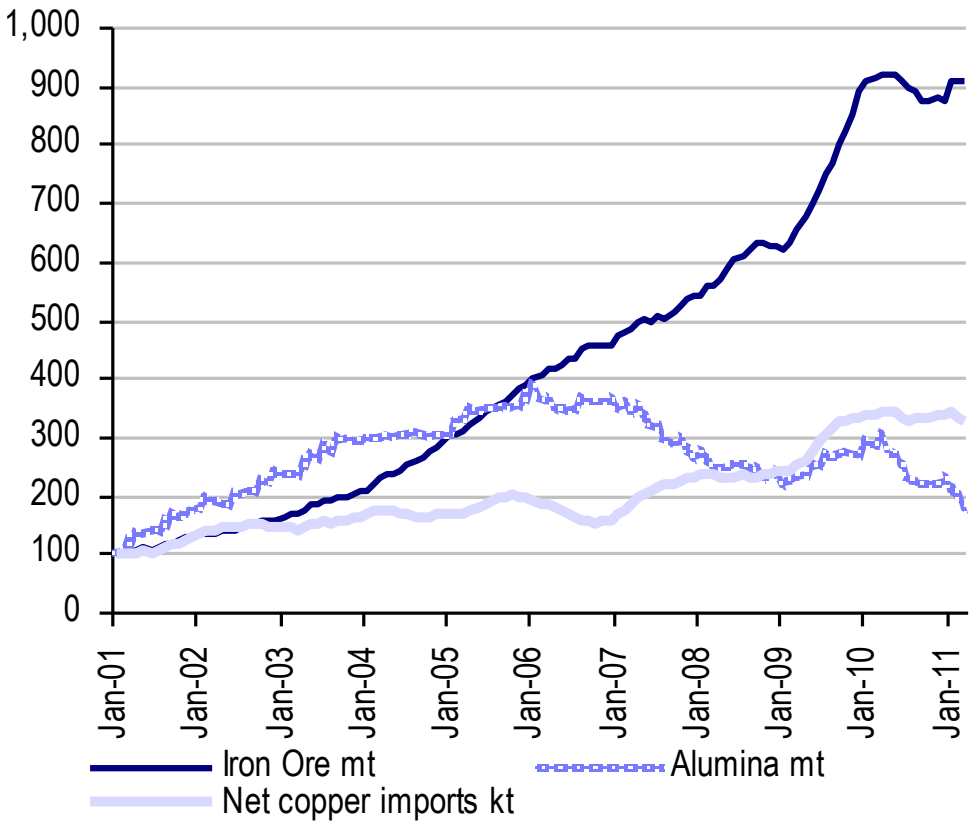
Water challenges in China – daunting and to curtail growth sometime

- 20% of world's population; 7% water resources but uses 4x as much water per $GDP than G20 peers; 20% lost in leakage; low tariffs
- 66% China's 660 cities suffer from water shortages; 110 severe, 700m people drink contaminated water (human/ animal waste)
- 90% groundwater, 75% rivers and lakes polluted, 30% river water is unfit for agriculture or industrial use; 2.3 sewerage untreated
- Agriculture uses 65% of total water but inefficiently; Northern Plain, includes Hebei, half of grain production
- China worst drought in 50 years; Jan-Apr Yangtze basin 40% less rainfall 50 yr avge; river levels fell to 2.6m from 8.8m y/y at Jiangxi
- Traditional approach has been to expand supply e.g. South to North diversion scheme, deeper wells; 3tr Rmb in 12 5YP
- First comprehensive document on water resources in Jan11 proposed 670bn m3 cap on annual water consumption
- 5YP calls for 30% lower water per unit of GDP by 2015

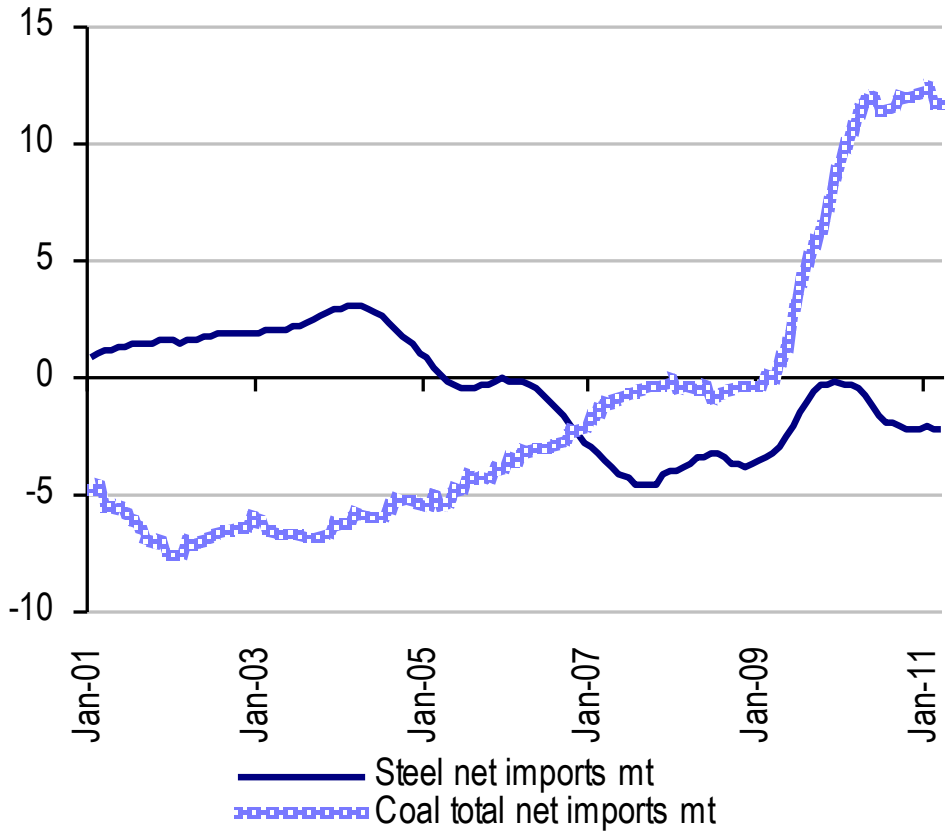
Source: Bloomberg, Reuters, CEIC, UBS

China trade a big commodity driver – differential outcomes to be watched

Iron ore, alumina, copper net imports



Steel and coal net imports



- Iron ore imports the story of the decade – strong case for continuity
- China coal imports surged but future direction critical for global balances
- Copper, soybean, corn, silver, pulp, oil China imports move markets

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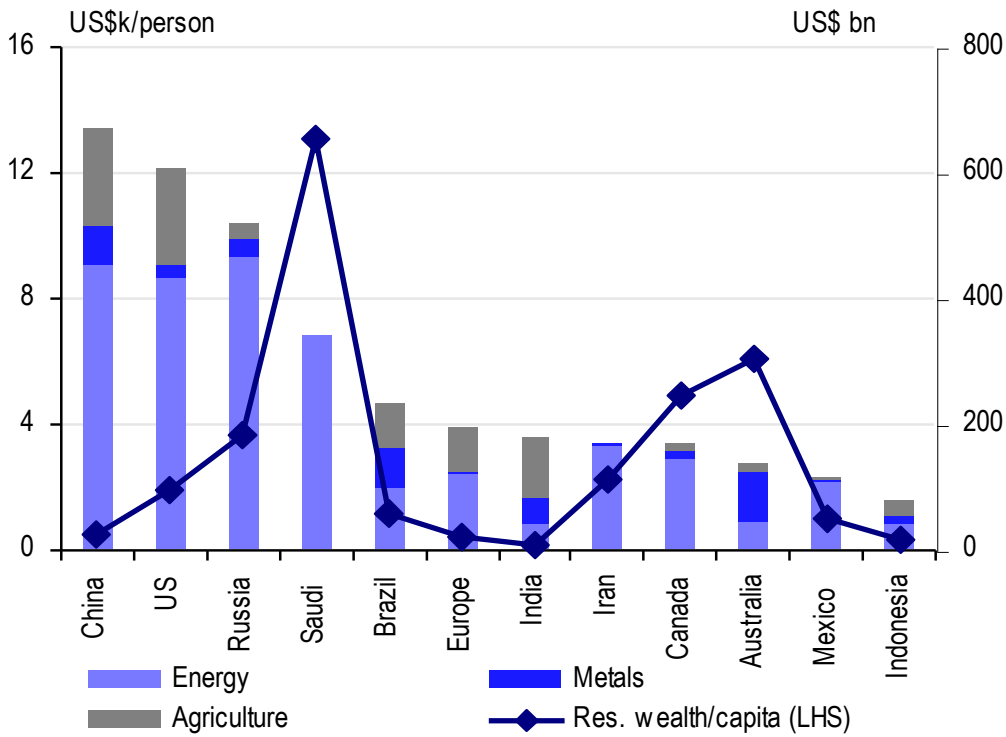
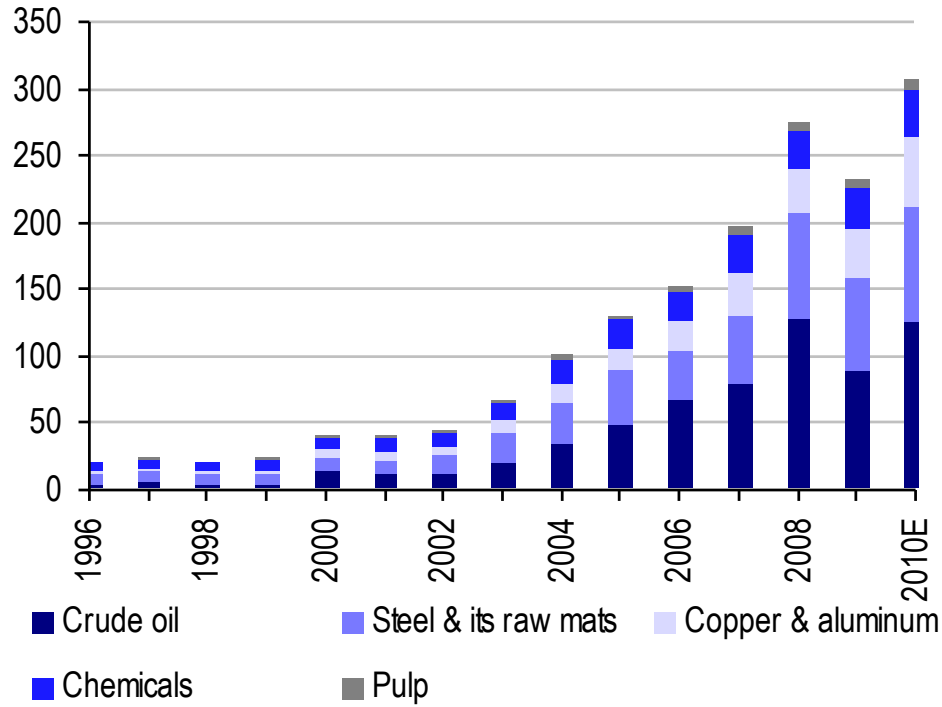
Source: China Customs Stats, UBS

Resources competition to increase – China coal rich but oil poor

Global resources wealth



China raw material imports US$bn



- Energy resource - oil, gas, coal 2009 output at Q111 prices
- Agriculture – all grains, sugar, rice 2010 output at Q111 prices
- Differentiation by resource per capita

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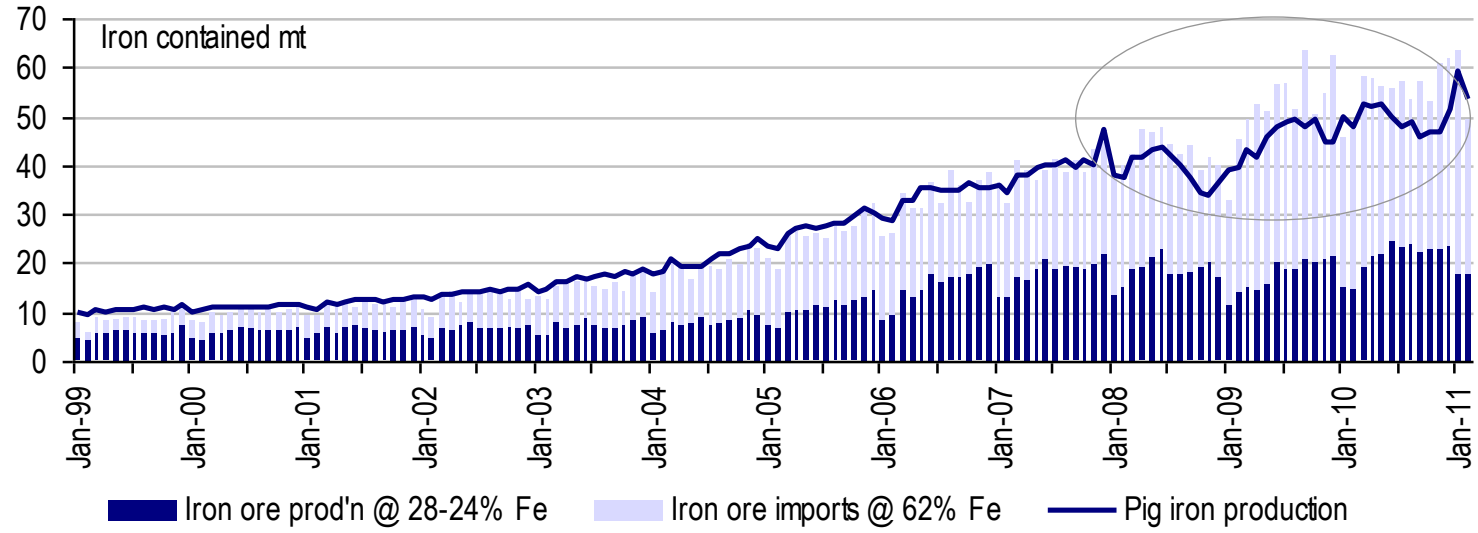
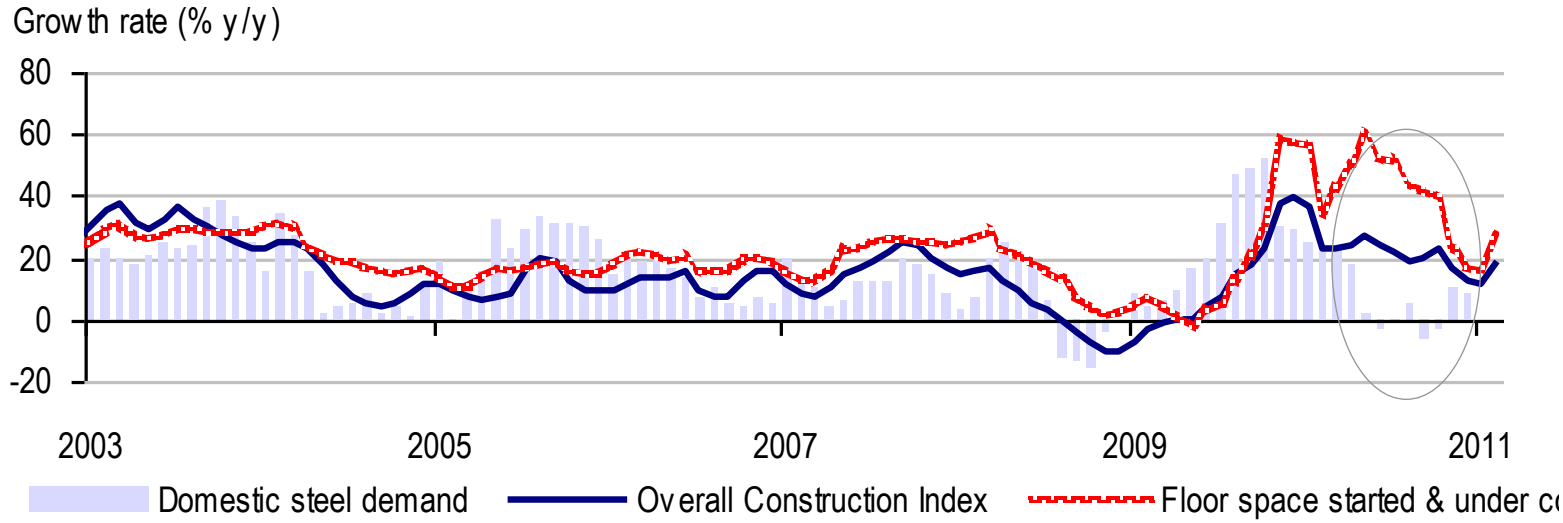
Source: Thomson Financial, UBS

China data challenges conclusions – steel understated by 45mt in 2010?

China iron inputs and pig iron output



China steel demand and construction end use



Source: MEPS, Bloomberg, CEIC, Chinese Customs, UBS

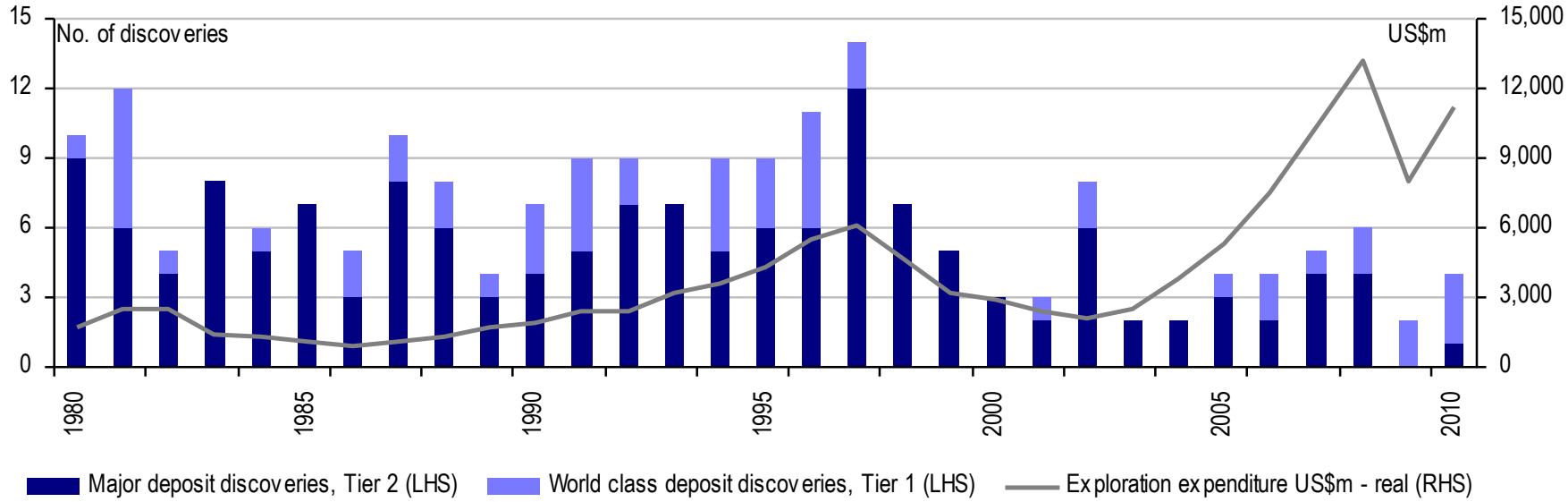
Political risk and supply struggles will underpin prices and M&A

- **Resource access increasingly constrained**
  - India, Congo, Philippines, Peru recent examples
  - Lease security challenged, DRC, Guinea, South Africa
  - Environmental/social constraints, Vedanta in India (aluminium, iron ore)
  - 'Peak production' with falling grades and deeper orebodies
  - 9 out of 10 publically traded oil companies passed peak production
- **Extraction costs are rising**
  - Cost of energy drives all costs up
  - Loss of skills with ageing workforce
  - Over stretched project management resources
- **Politicisation adds to investment uncertainty**
  - Asian State competition for resource access in Africa and elsewhere
  - Shift from Capitalist to State-ownership/companies development models
  - Volatile fiscal/tax/sovereign risk environments will not help development
  - Australian super profits tax and others example of capricious change
  - Geopolitical concerns with China's resource needs, Mongolia, Russia
  - Regulatory intervention, US Frank-Dodds, EU

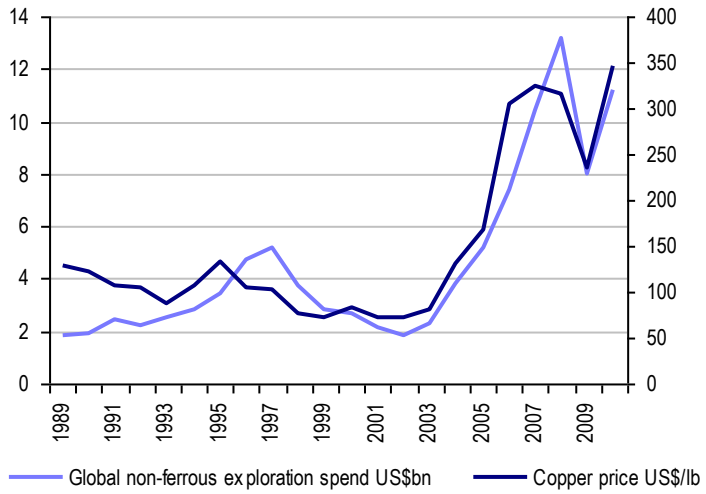
Source: UBS

Global supply responds – politically constrained but funding is back

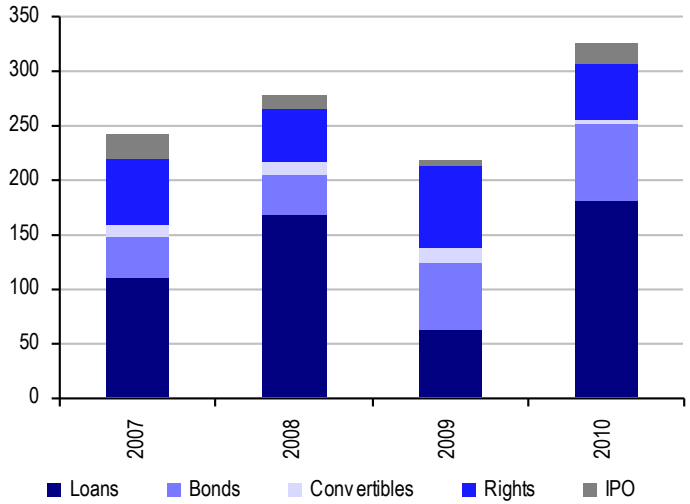
Global exploration spend and success



Spend and metal prices



Global mining funding



Source: BHP Billiton, Ernst&Young, Company sources, UBS

Global costs and shortages are rising – delays to supply lifts nearby prices

Global mining cost heat map

	Australia	Brazil	Sth Africa	Chile	Canada	US	Indonesia	China	Kazakhstan	Russia
Aluminium		15%	15%		10%	6%		3%		8%
Copper	18%			20%		15%			15%	12%
Nickel	18%				25%					12%
Zinc	18%				20%			15%		
Coal	18%		30%		20%	7%	15%	15%		10%
Iron ore	20-25%	20%	30%			10%				10%
Platinum/palladium			30%			10%				13%
ferrochrome			30%						7%	

	30%	Red hot cost rises		20%	hot cost rises		10%	moderate cost rises
	25%	very hot cost rises		15%	warm cost rises		<10%	contained costs

Exchange rate impacts on costs

	Japan	Europe	Australia	Brazil	Canada	Chile	China	India	Indonesia	Russia	Sth Africa
2008	13%	7%	3%	8%	3%	1%	9%	-4%	-5%	3%	-13%
2009	13%	-5%	-9%	-12%	-9%	-9%	2%	-11%	-8%	-23%	-4%
2010	8%	-4%	16%	15%	10%	10%	1%	5%	13%	4%	13%
2011E	10%	4%	14%	8%	6%	9%	4%	2%	3%	4%	7%

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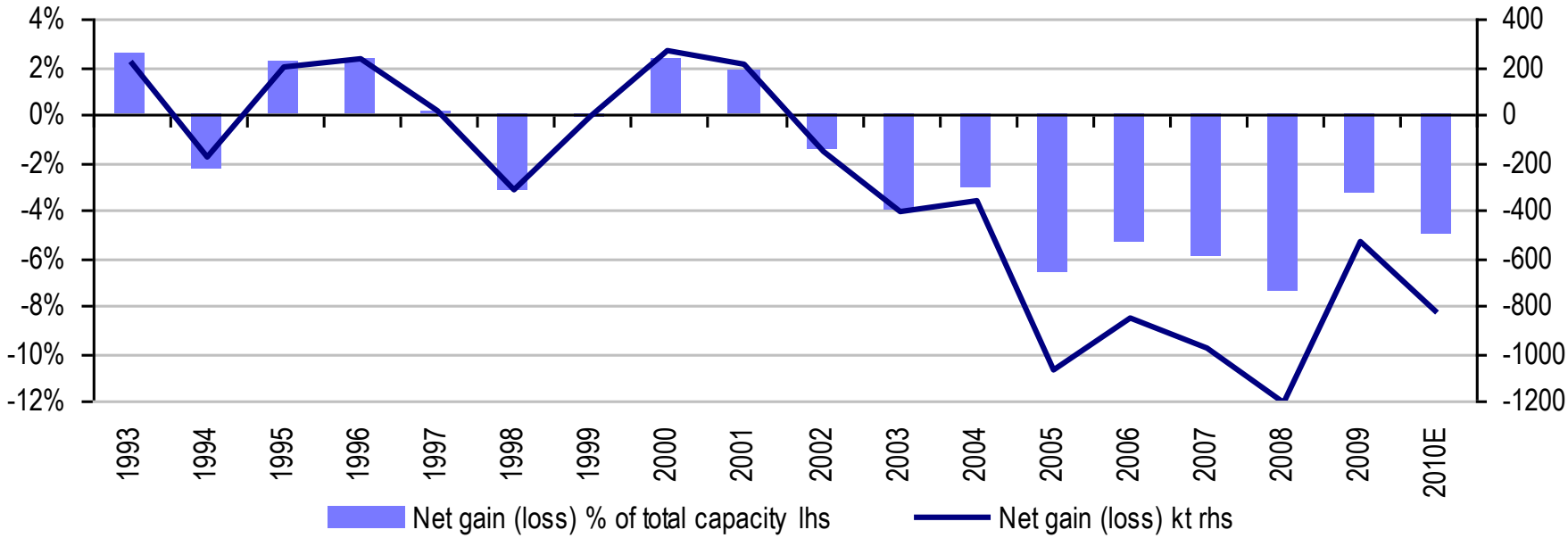
Source: Bloomberg, UBS estimates

Copper – illustrates systemically troubled and constrained supply

Global copper production reconciliation, kt and % of total



- ICSG forecast 8.5% growth in copper in 2010; copper supply missed forecasts by >1mt for 4 years straight
- Ramp-ups in the Copper Belt at risk; strikes ongoing; not sufficient capex or maintenance; grades declining
- Water constraints in Latam; environmental concerns in APAC

Source: Brook Hunt, UBS

Infrastructure and weather – growing challenges in supply

Infrastructure limits everywhere

- Indonesia production consistently underperforms forecasts - take 2-3 years to work out bottlenecks; new reclamation and license reform key
- Australia building ports and rails slowly but may not keep up with the potential demand in the next 5 years from China-India
- China rail system is increasingly stretched as mining moves west – 'west to east' expansion in 2014-15 but again below forecasted demand growth
- Mongolia decision to export through Russia delay development; integrated Mongolian-Far East Siberian rail system has big potential but capex is huge
- Indian rail seen as the biggest constraint in Coal India achieving its targets
- Mozambique infrastructure costs and governance are challenging

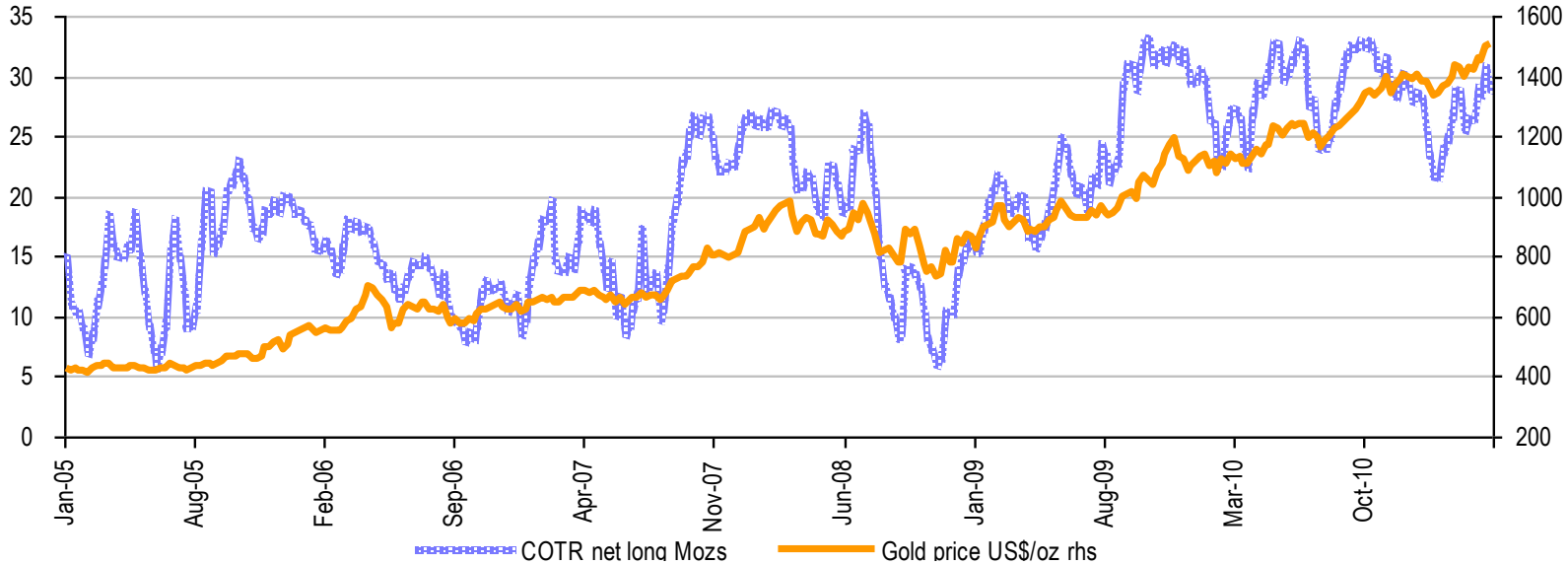
Erratic weather and floods causing havoc

- Australasia 2x '100 year events' in 3 years – time to de-rate future supply?
- China coal production in the north increasingly water stressed
- Australia, Indonesia, China, Sth Africa, Colombia impacted by La Nina

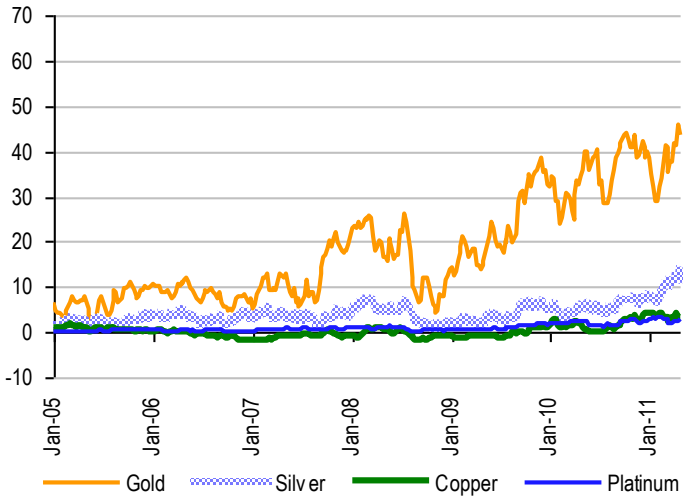
Source: EIA, World Coal Institute,UBS

Speculative support for prices – real but hard to quantify

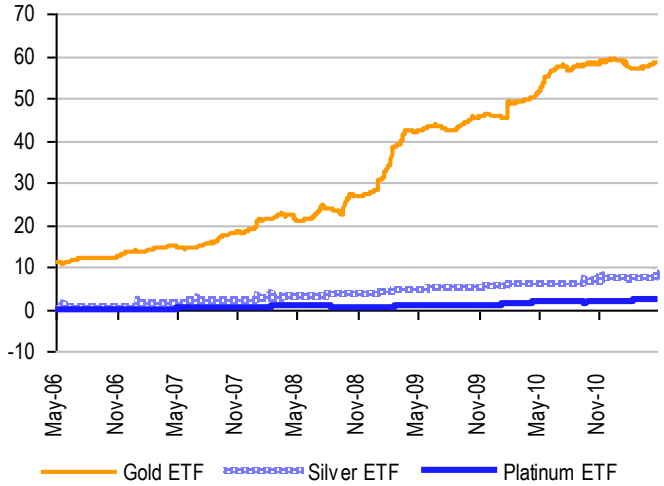
Gold COTR mozs and Gold price US$/oz



COTR positions in US$bn



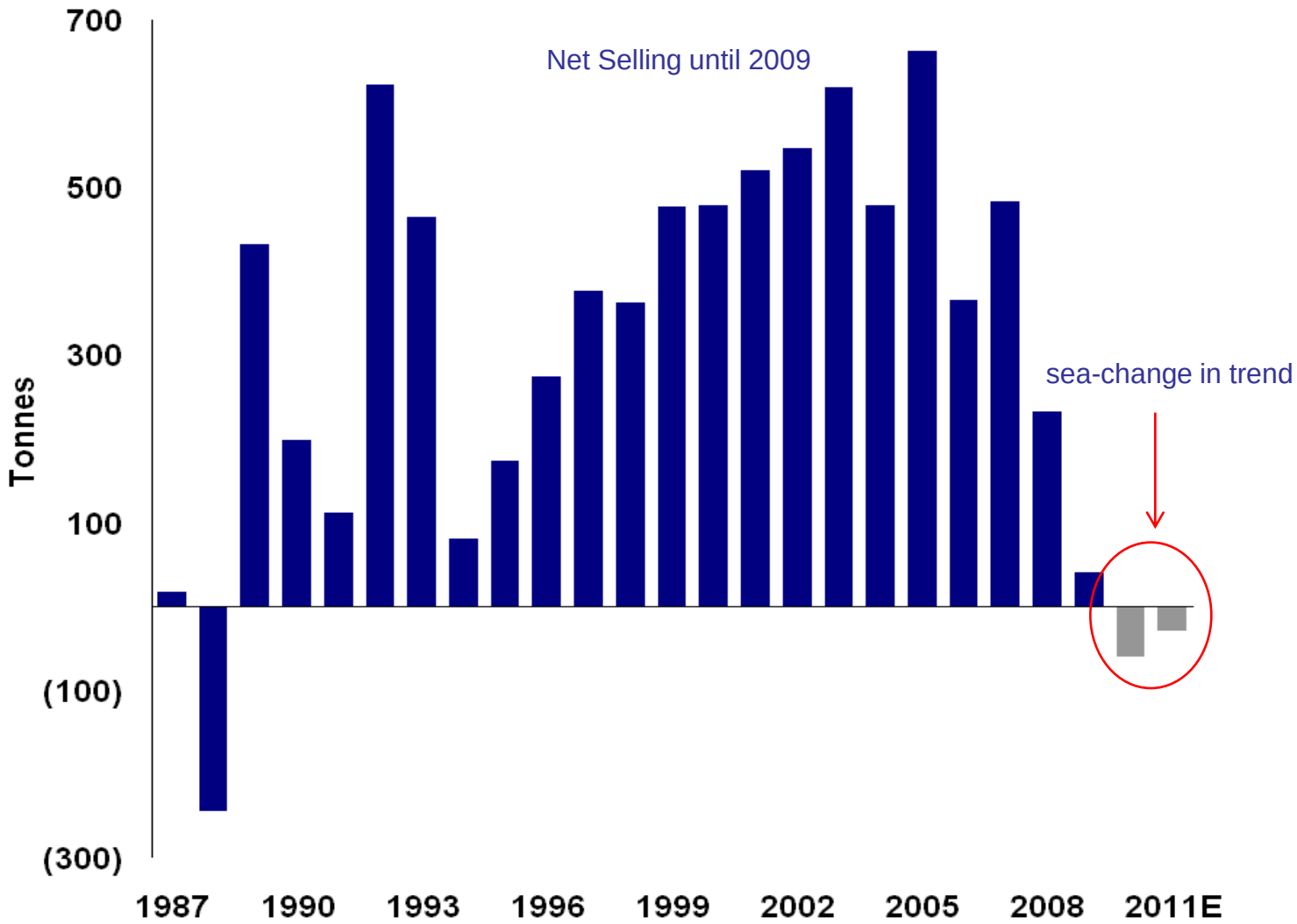
ETF positions in US$bn



Source: Bloomberg, Nymex, UBS

Policy shifts change balances - Central Banks are buying gold

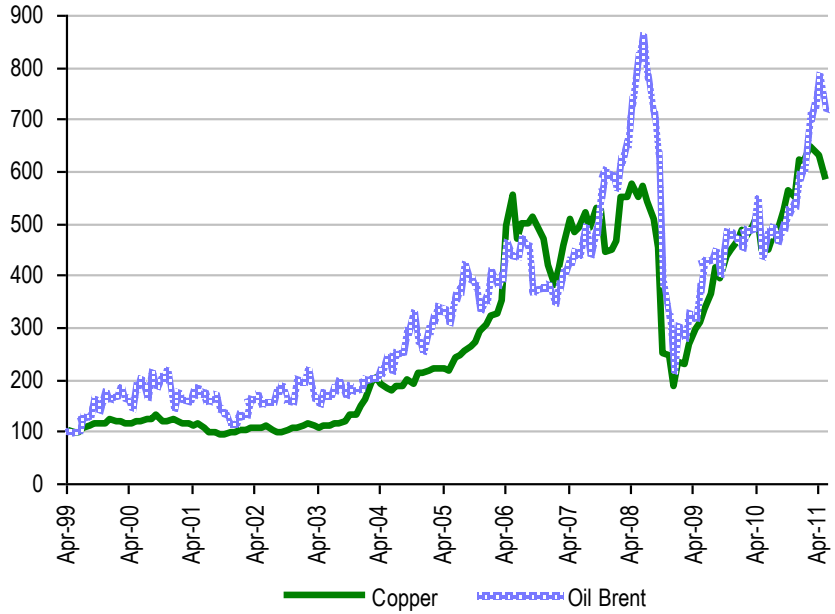
Central banks selling/buying gold



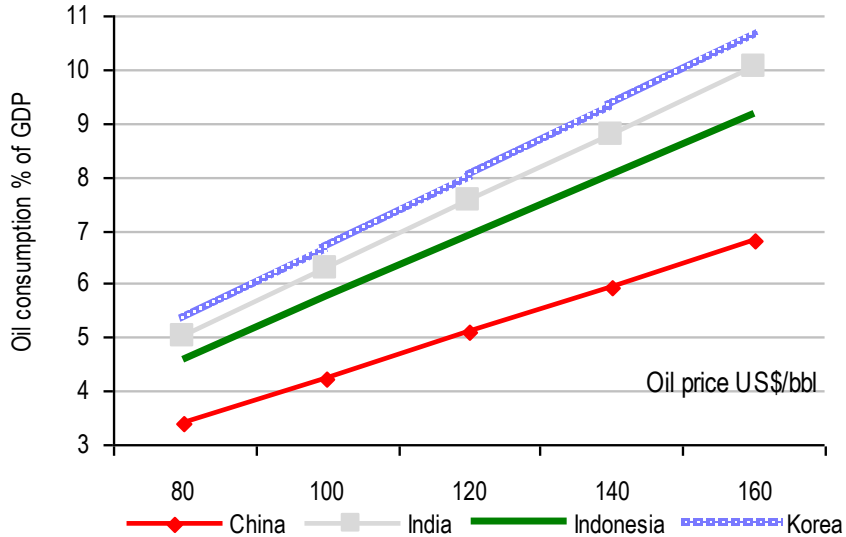
Source: GFMS, WGC, UBS

Oil markets dominate other commodities – supply and risk vs elasticity

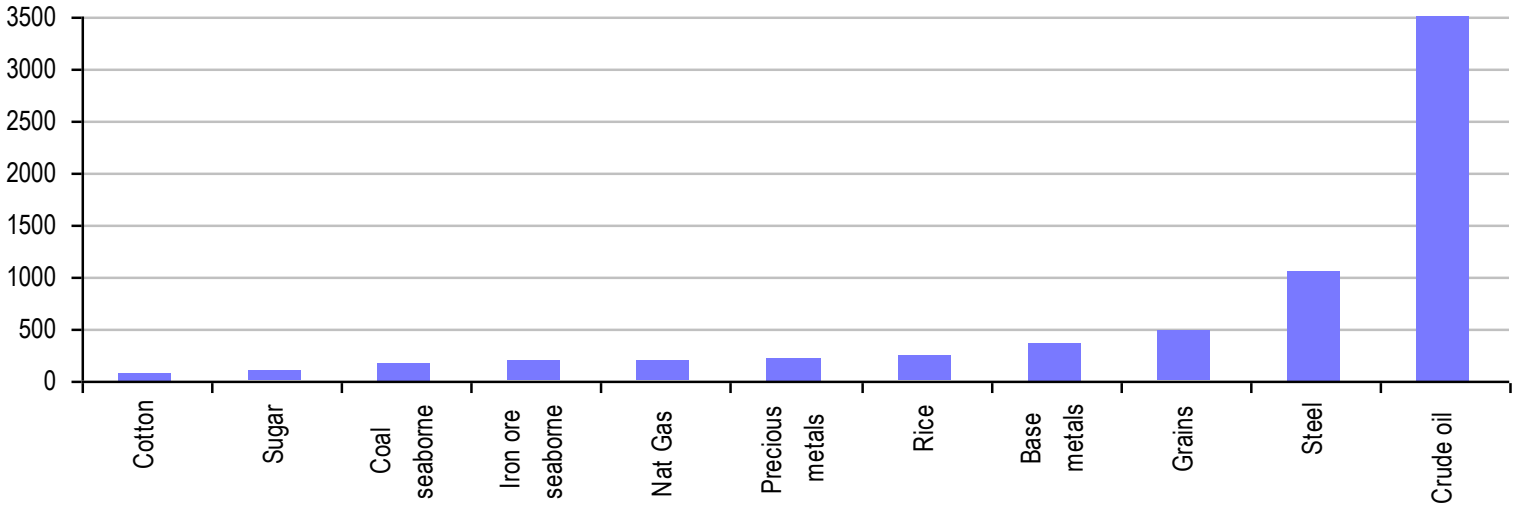
Oil and copper price



Oil and Asian GDP



Value of commodity markets in US$bn



Source: Bloomberg, UBS modelling

‘Ag-flation’ another new driver – supply-demand drivers and constraints

Supply

- Soft commodity inventories low; vulnerable to shocks
- Adverse volatile weather (La Nina) still impacting; rain in Australasia,; drought in China, Argentina
- Land supply pressures (China; India)
- Biofuels undercutting food supply; 40% of US corn to ethanol
- Structural changes needed to further yield gains
- Rapid rising cost of production (fertilizers, pesticides, fuel)
- Water supply constraints (LT issue; China mainly but global)

Demand

- Rising global population with rising caloric intake/intensity
- Portfolio diversification via commodity markets

Commodity analogies across sectors - common drivers

- **Supply constraint**
- **China/India short**
- **Japan impact**
- **Energy links to commodity**
- **Stock levels**
- **Political/Data shocks**
- **Weather/climate impact**
- **Market size, Investor flows**
- **Regulatory risks**
- **Technical direction**

	Supply constra	China/India sh	Japan impact	Energy cost lin	All Stock levels	Political shocks	Climate/weath	Investor flows	Regulatory risk	Prices/Technica	Total Rating
Crude oil	5	4	5	4	3	5	2	4	3	4	39
Platinum	5	5	3	4	4	5	4	4	3	2	39
Phosphate	4	4	4	4	4	5	4	3	3	3	38
Lead	4	2	5	3	3	4	4	4	4	4	37
Palladium	5	4	4	3	4	4	4	3	3	3	37
Potash	4	4	4	4	3	4	4	3	3	4	37
Silver	3	4	3	3	4	5	3	5	3	3	36
Soybeans	4	5	4	3	4	4	3	3	3	3	36
Euro NatGas	3	3	5	5	3	4	3	3	3	3	35
Zinc	4	3	5	4	2	3	4	3	4	3	35
Gold	4	4	3	3	3	5	2	4	3	4	35
Thermal coal	3	5	2	4	4	3	4	3	4	3	35
Corn	3	4	3	5	4	3	4	4	2	2	34
US NatGas	2	3	4	5	2	4	4	2	3	5	34
Urea	3	3	4	4	4	3	4	3	3	3	34
Iron ore	5	4	3	3	4	3	3	3	2	3	33
Met coal	5	4	3	3	4	3	3	3	3	2	33
Copper	4	5	3	4	3	3	3	3	3	2	33
Wheat	3	3	4	3	3	3	4	3	3	3	32
Sugar	3	3	3	4	4	3	4	3	2	3	32
Pulp	3	4	3	3	4	3	4	2	3	2	31
Cement	3	2	4	3	3	3	4	2	3	3	30
Nickel	3	3	3	4	3	3	3	3	2	2	29
Ethylene	3	3	4	4	2	3	2	2	3	3	29
Steel	3	2	4	3	2	3	2	2	3	3	27
Uranium	3	4	1	4	2	1	3	3	2	4	27
Aluminium	2	2	2	4	2	3	2	3	3	2	25

Source: UBS

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Buy	**Buy**	52%	41%
Neutral	**Hold/Neutral**	40%	37%
Sell	**Sell**	8%	20%
UBS Short-Term Rating	**Rating Category**	**Coverage[3]**	**IB Services[4]**
Buy	**Buy**	less than 1%	30%
Sell	**Sell**	less than 1%	17%

1:Percentage of companies under coverage globally within the 12-month rating category.
2:Percentage of companies within the 12-month rating category for which investment banking (IB) services were provided within the past 12 months.
3:Percentage of companies under coverage globally within the Short-Term rating category.
4:Percentage of companies within the Short-Term rating category for which investment banking (IB) services were provided within the past 12 months.

Source: UBS. Rating allocations are as of 31 March 2011.

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UBS 12-Month Rating	Definition
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Buy	Buy: Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event.
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