



UBS Investment Research

Latiza Conference 8 July Lima

Global Drivers of Commodity Prices

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8 July 2011

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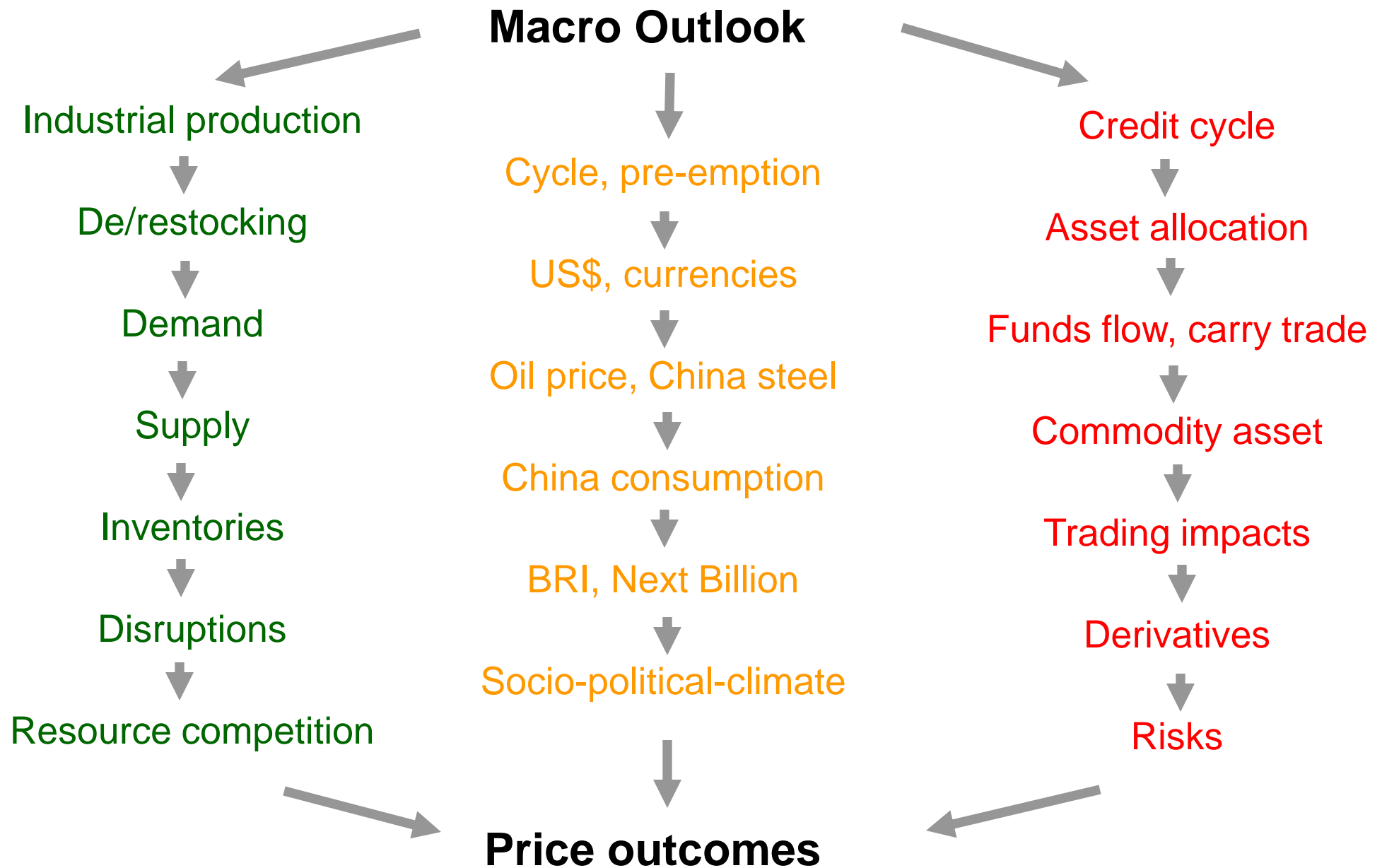
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What drives commodity prices – complex, iterative, systemic dimensions

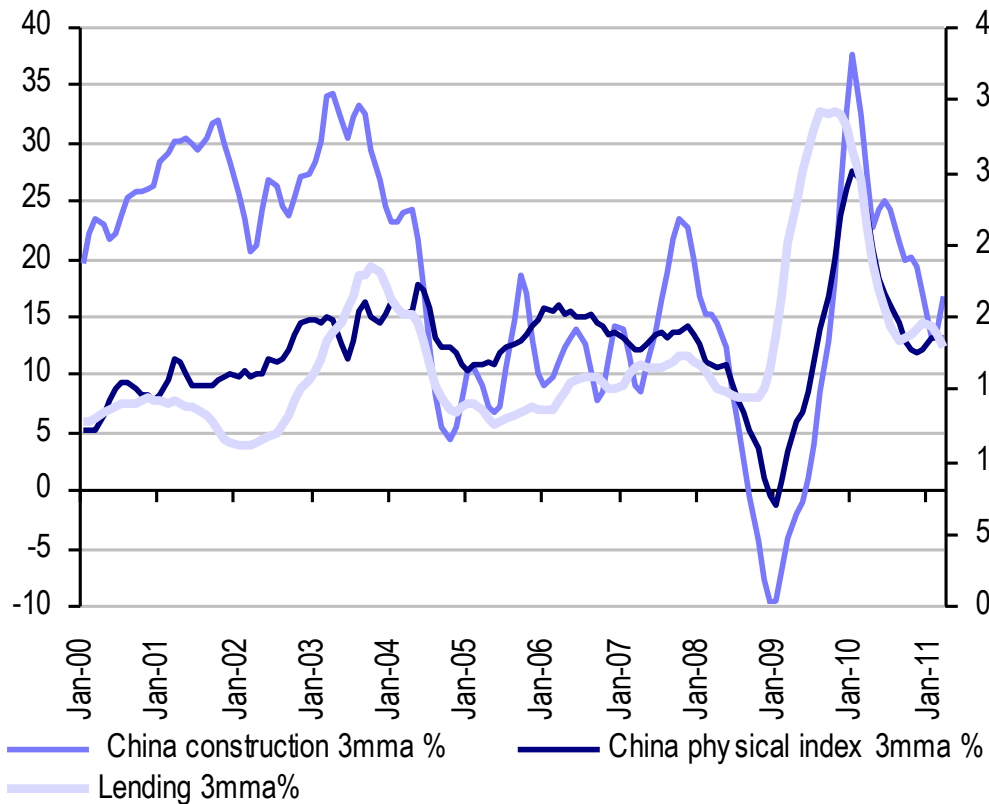


Global macro – the starting point for all commodity dimensions

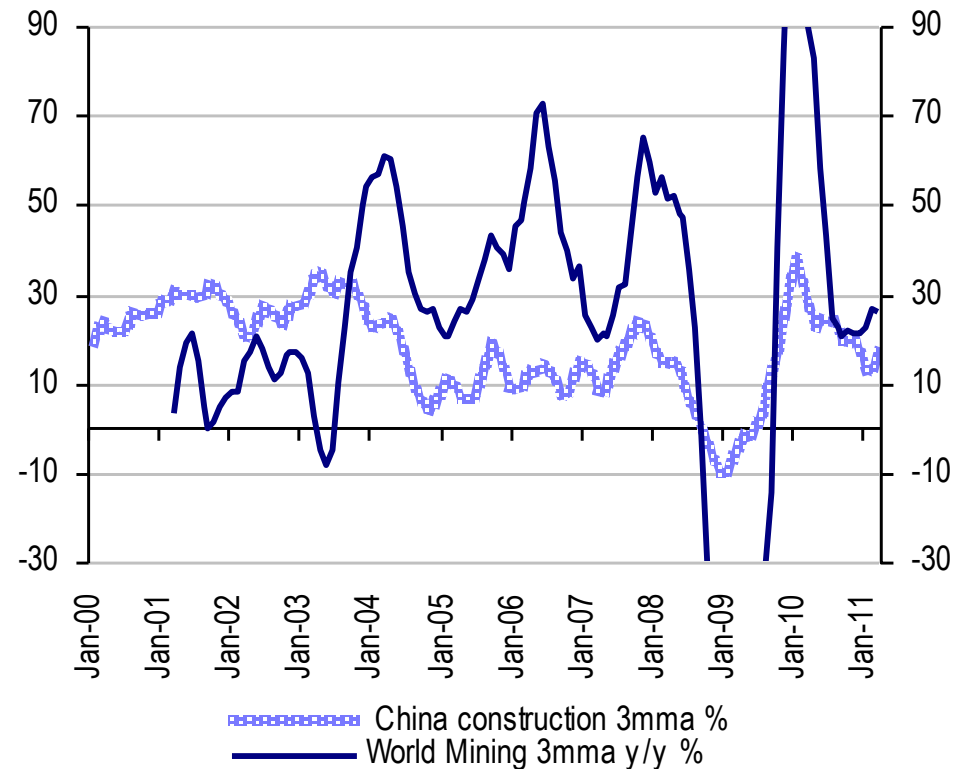
- End of QE2; treasury monthly net US\$75bn purchases to end in June ending rally in risk assets since Aug10, driven by portfolio adjustments
- Cyclical soft-patch or double dip; US manufacturing, housing, employment matters globally; US to start tightening in Q112
- Greater volatility in currencies 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

China macro indicators also key – normalising at healthy levels

Construction, lending, physical



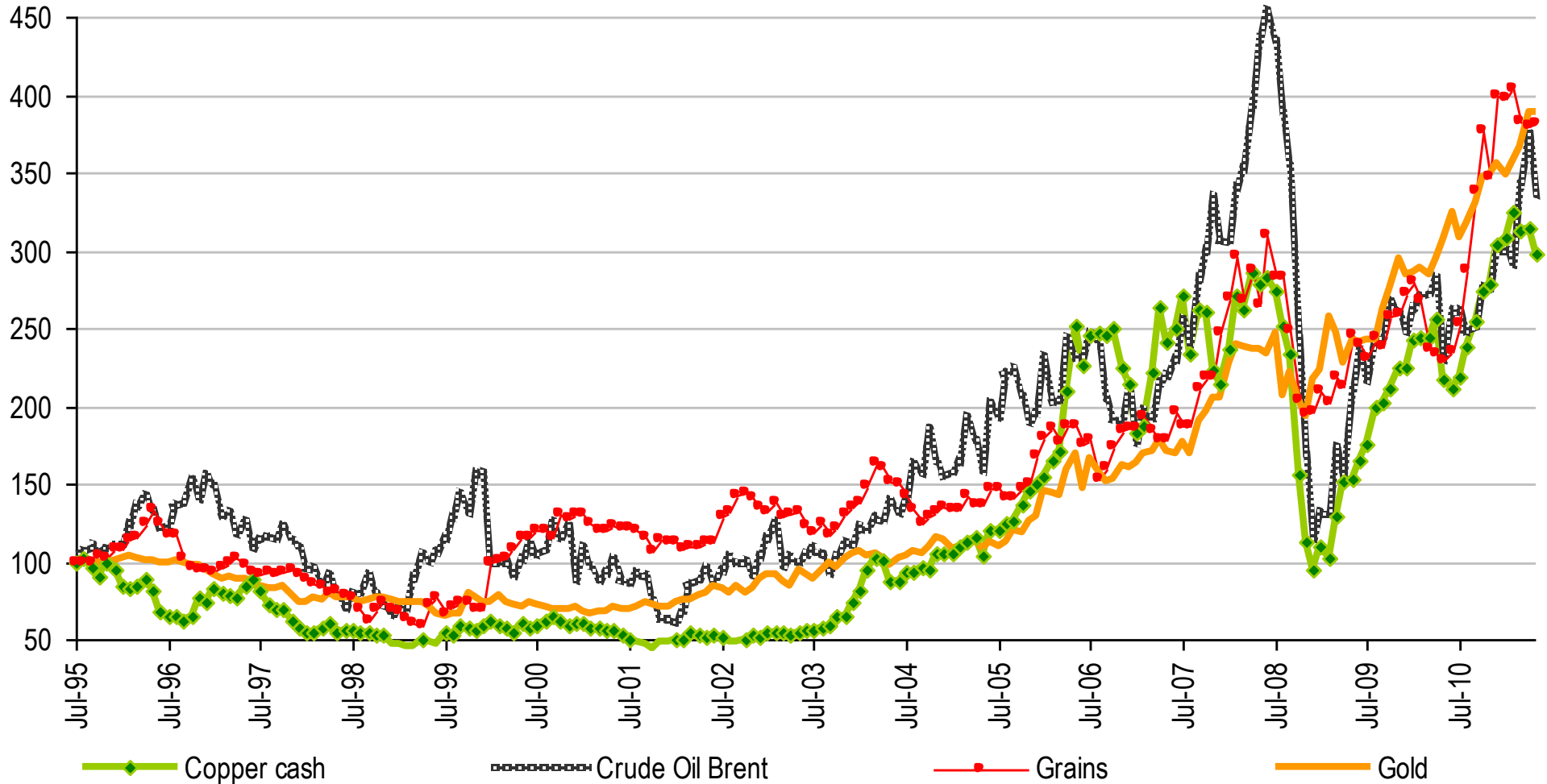
Construction, world mining



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

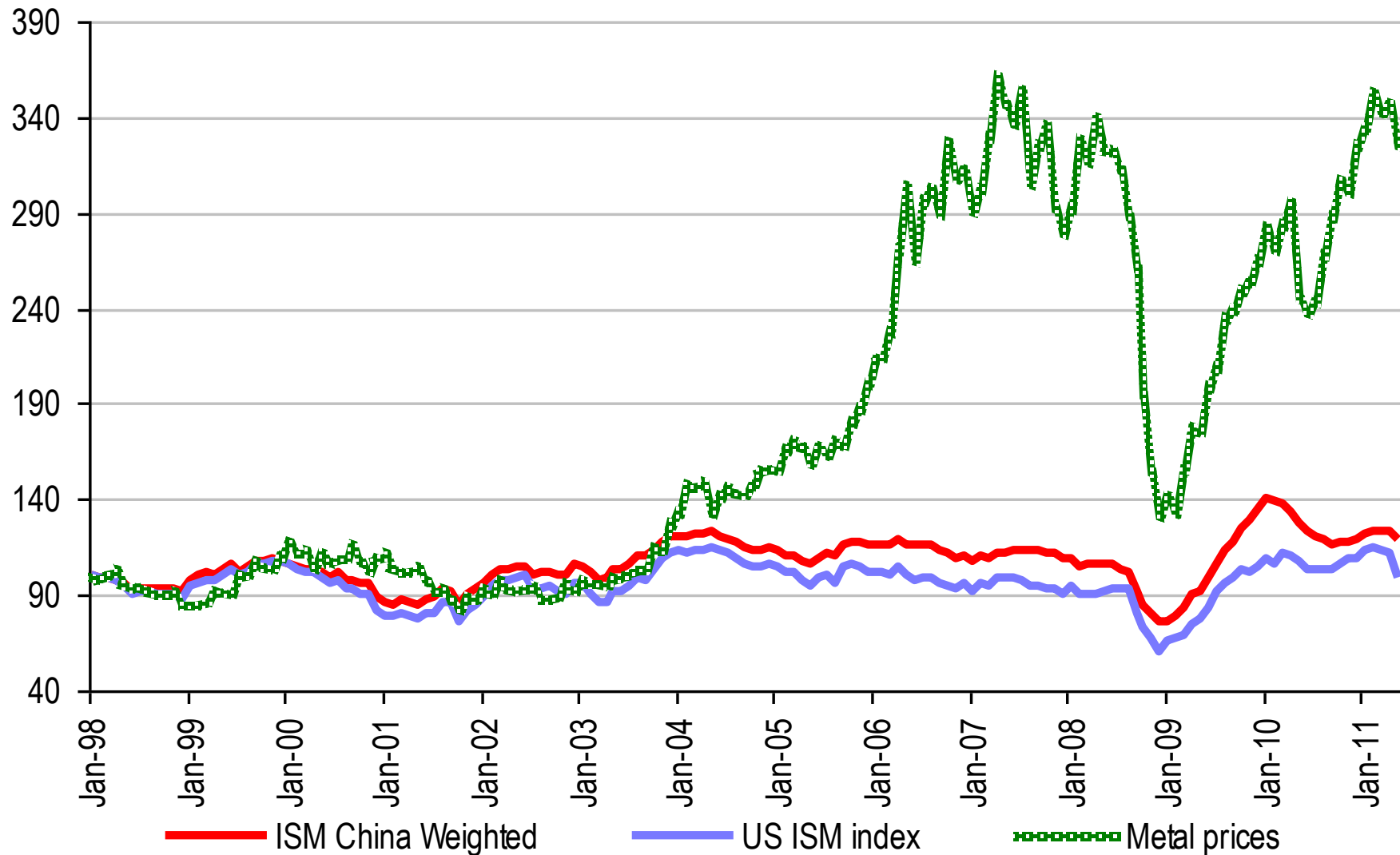
Prices – upwardly volatile since 2003, after years of ‘stability’

Commodity prices since 1995



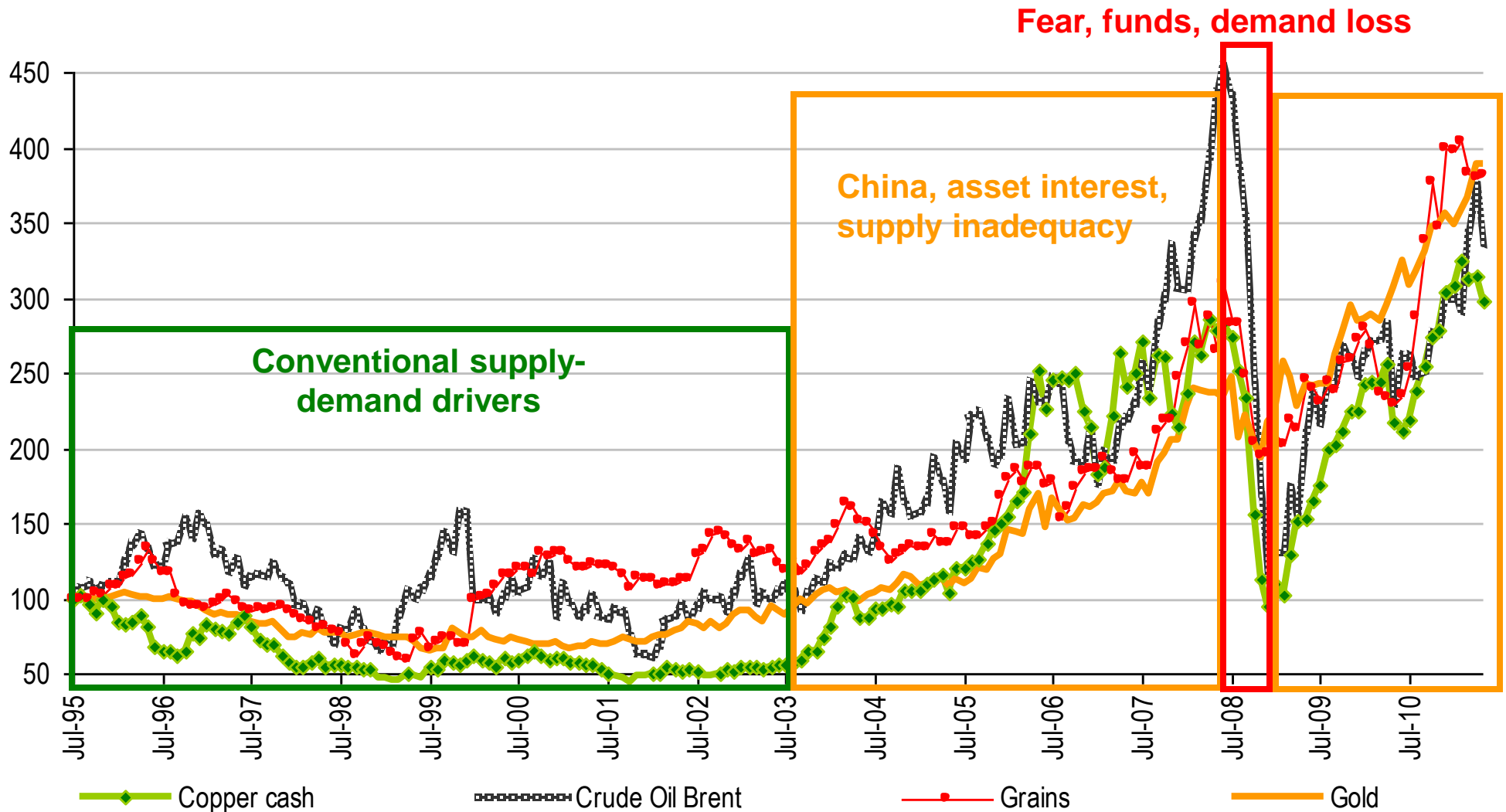
Traditional cyclical indicators losing their powers of 'prediction'

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



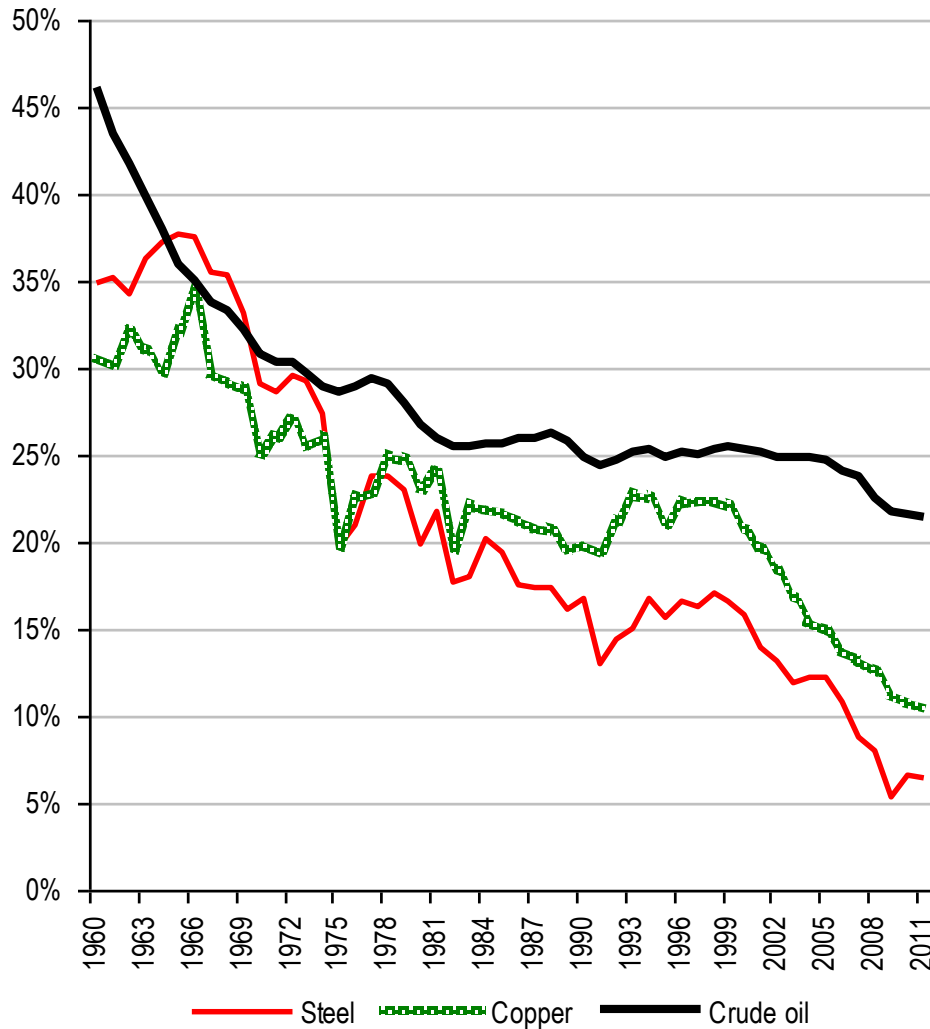
Moving forward – all three dimensions will impact on future prices

Commodity prices since 1995 and their drivers

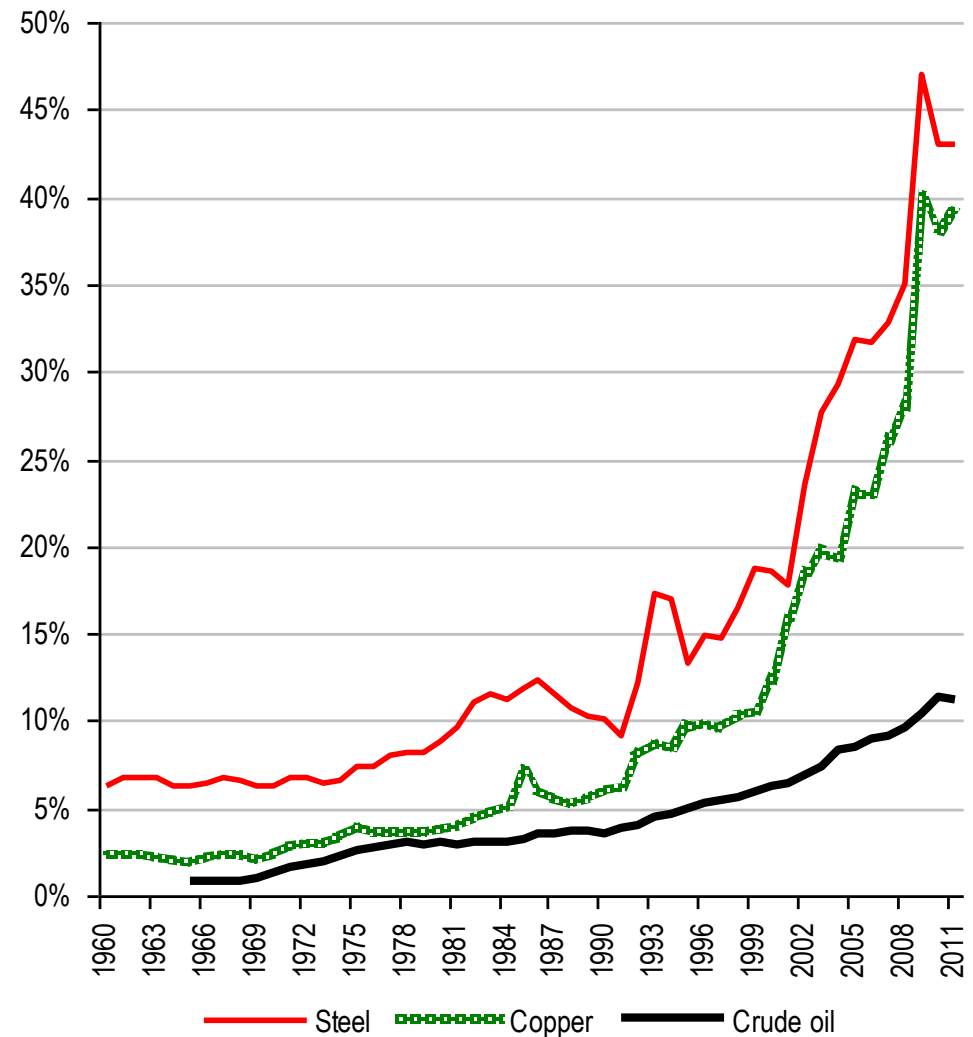


The rise of China – marked the new era for commodity pricing

US share of global consumption

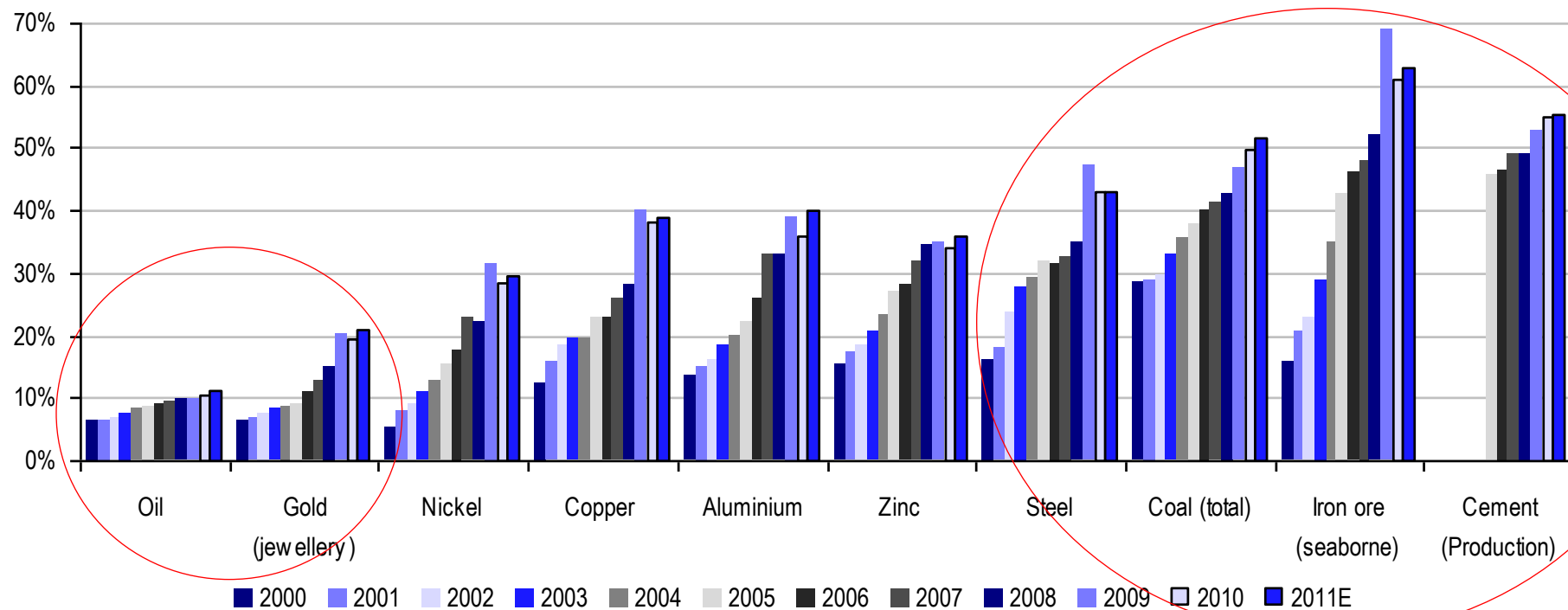


China share of global consumption



China's share of global commodity consumption is up dramatically

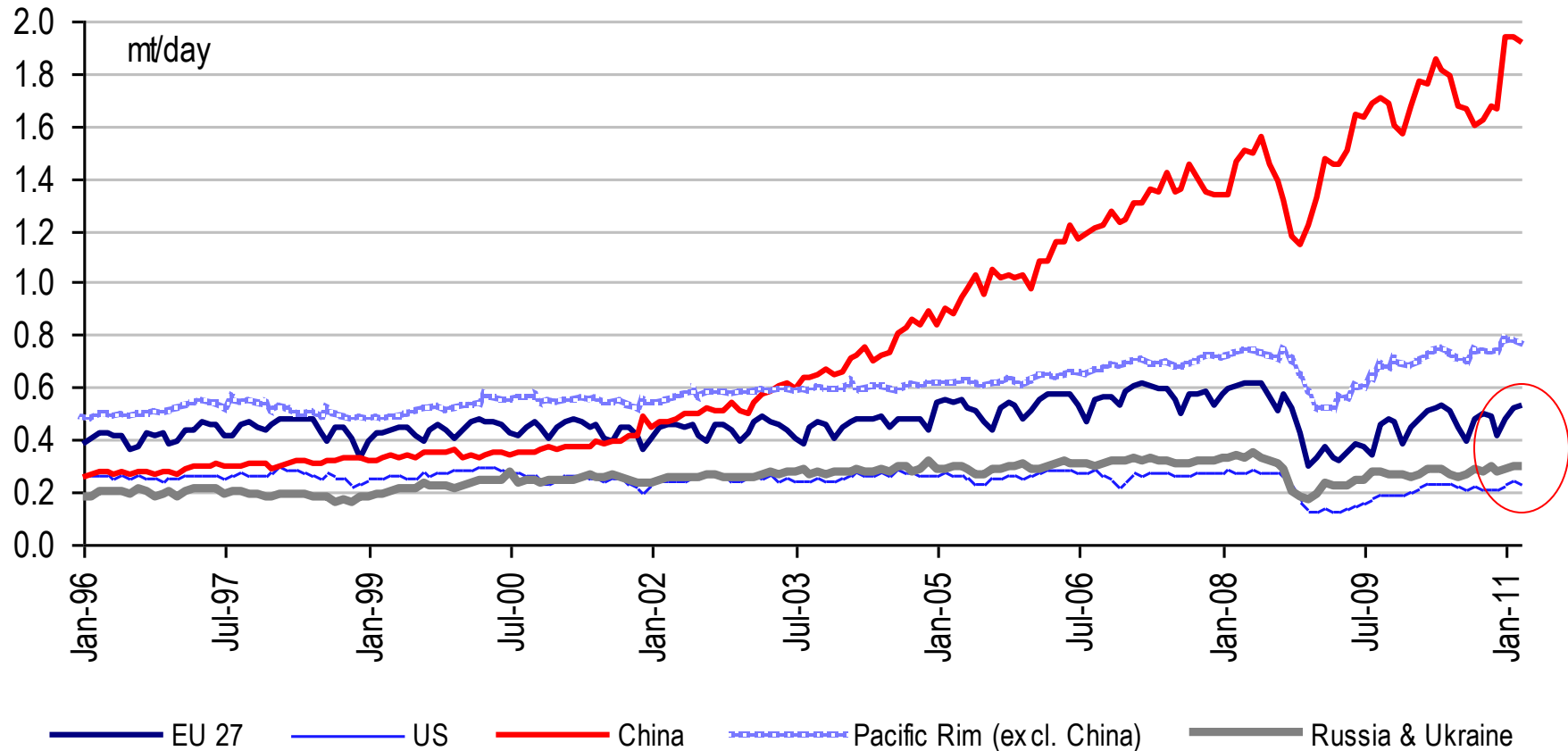
China share of key materials



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

Steel dramatises China's global commodity challenge

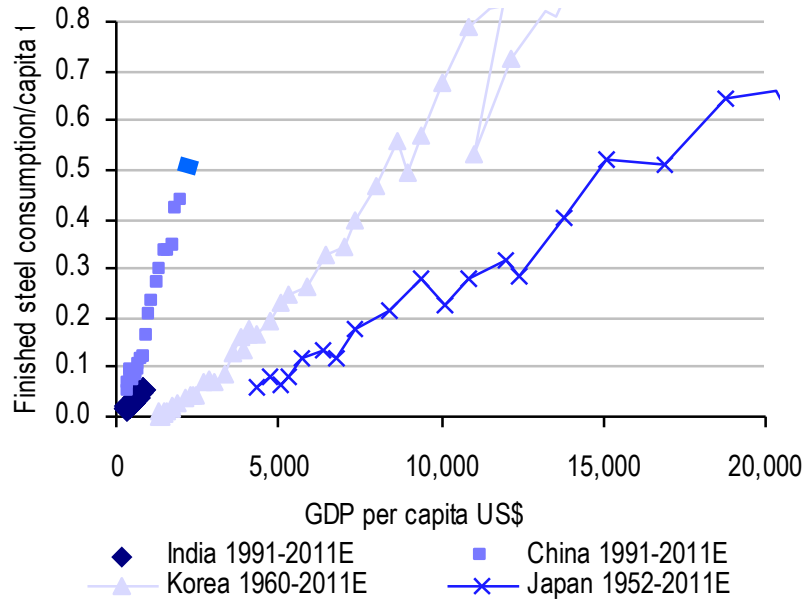
Regional steel production mt/day



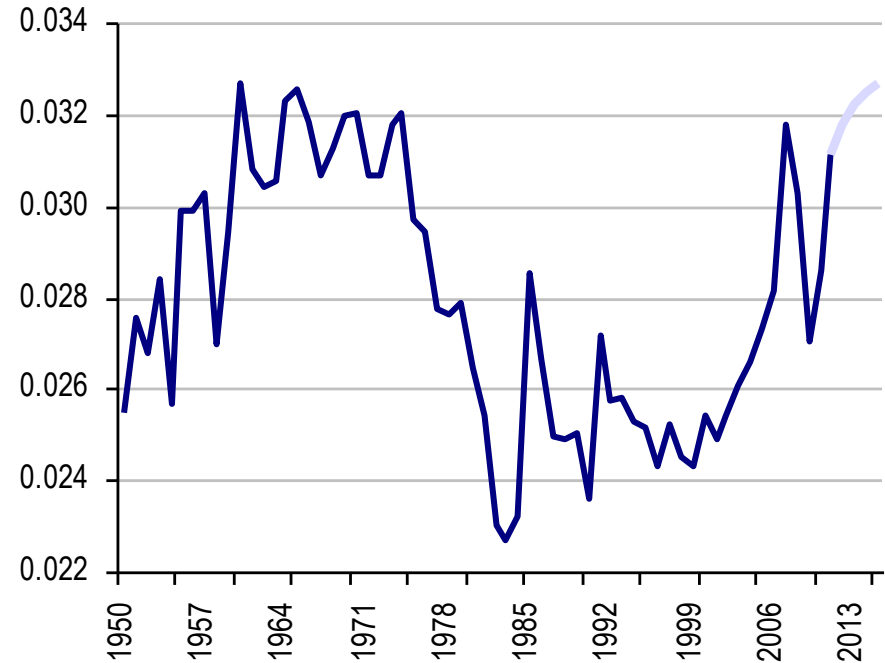
- China steel production 2011 at 700+mt/y
- Apart from Asia, rest of world is still below pre-GFC levels

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

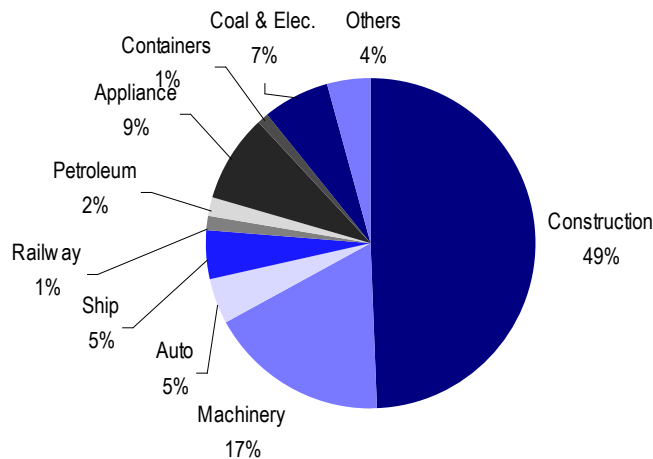
Asian Steel IoU



Global steel IoU



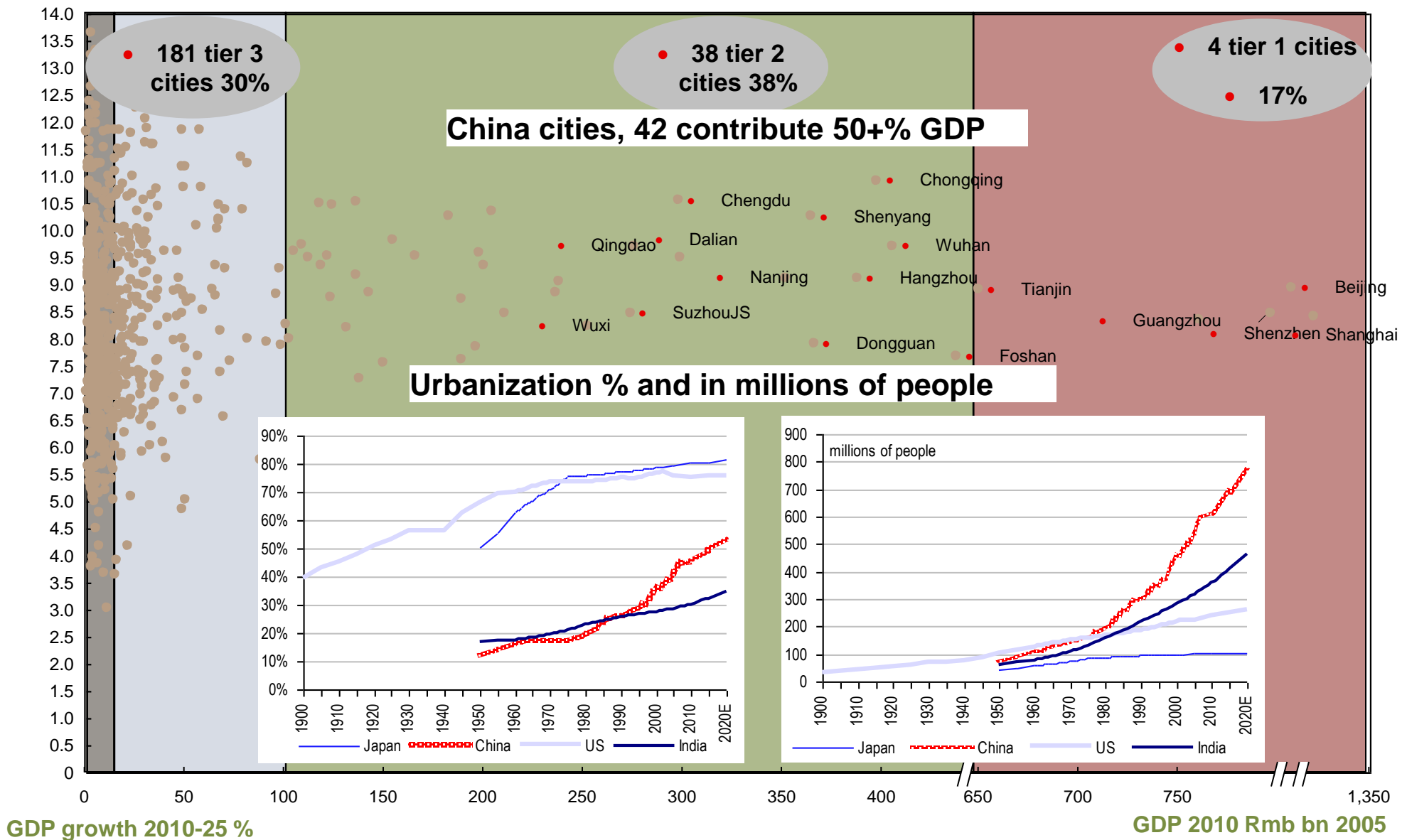
China steel use



Steel intensity in China buildings

Building Height in storeys	8	12	18	32	50	100
Steel IoU kg/m ² low end	5	40	50	60	80	110
Steel IoU kg/m ² high end	40	50	70	100	120	220

China urbanization the driver – scale and duration underpin demand



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

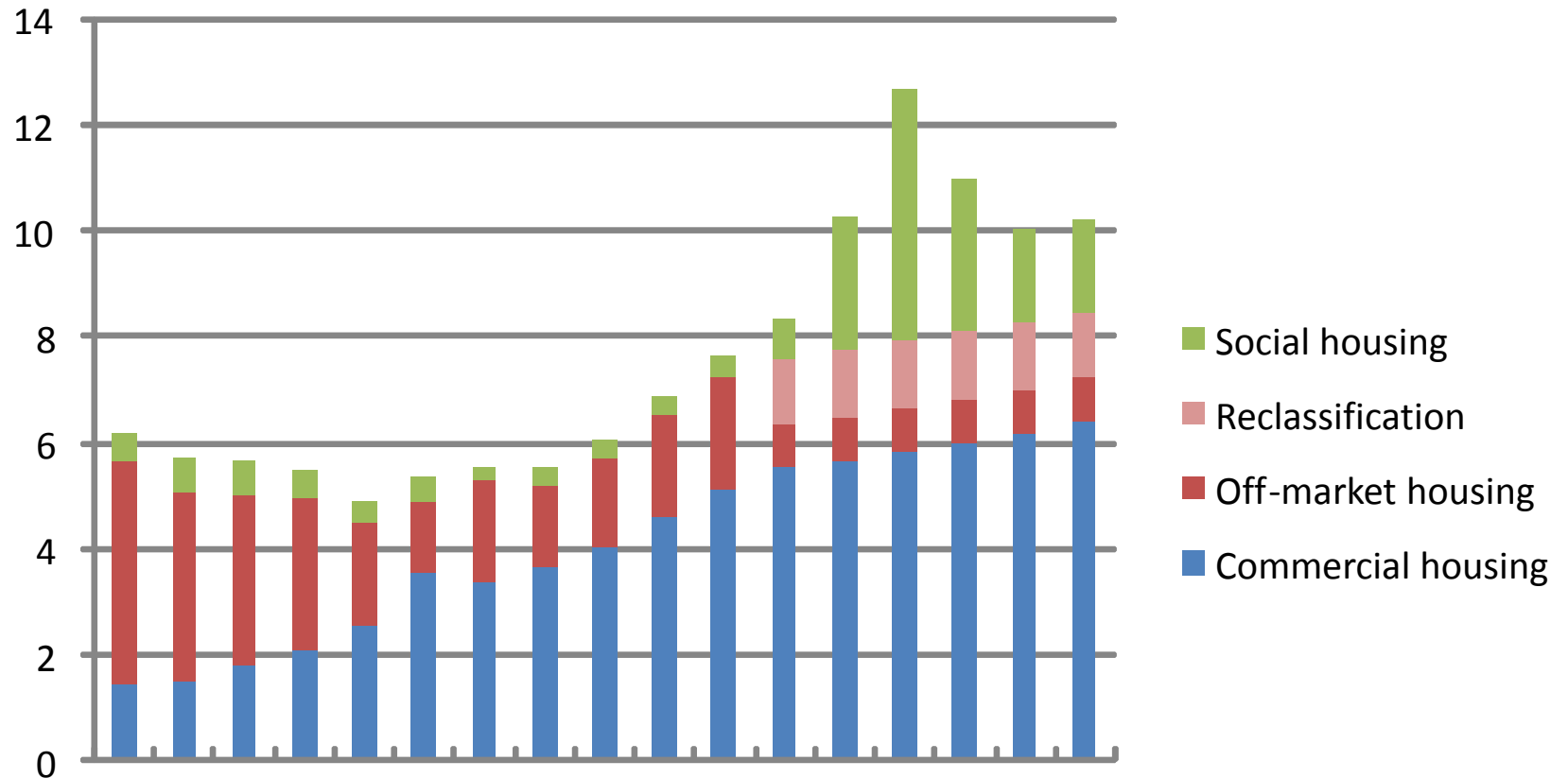
China's 5 year plan – a map to transition and lower commodity growth?

	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

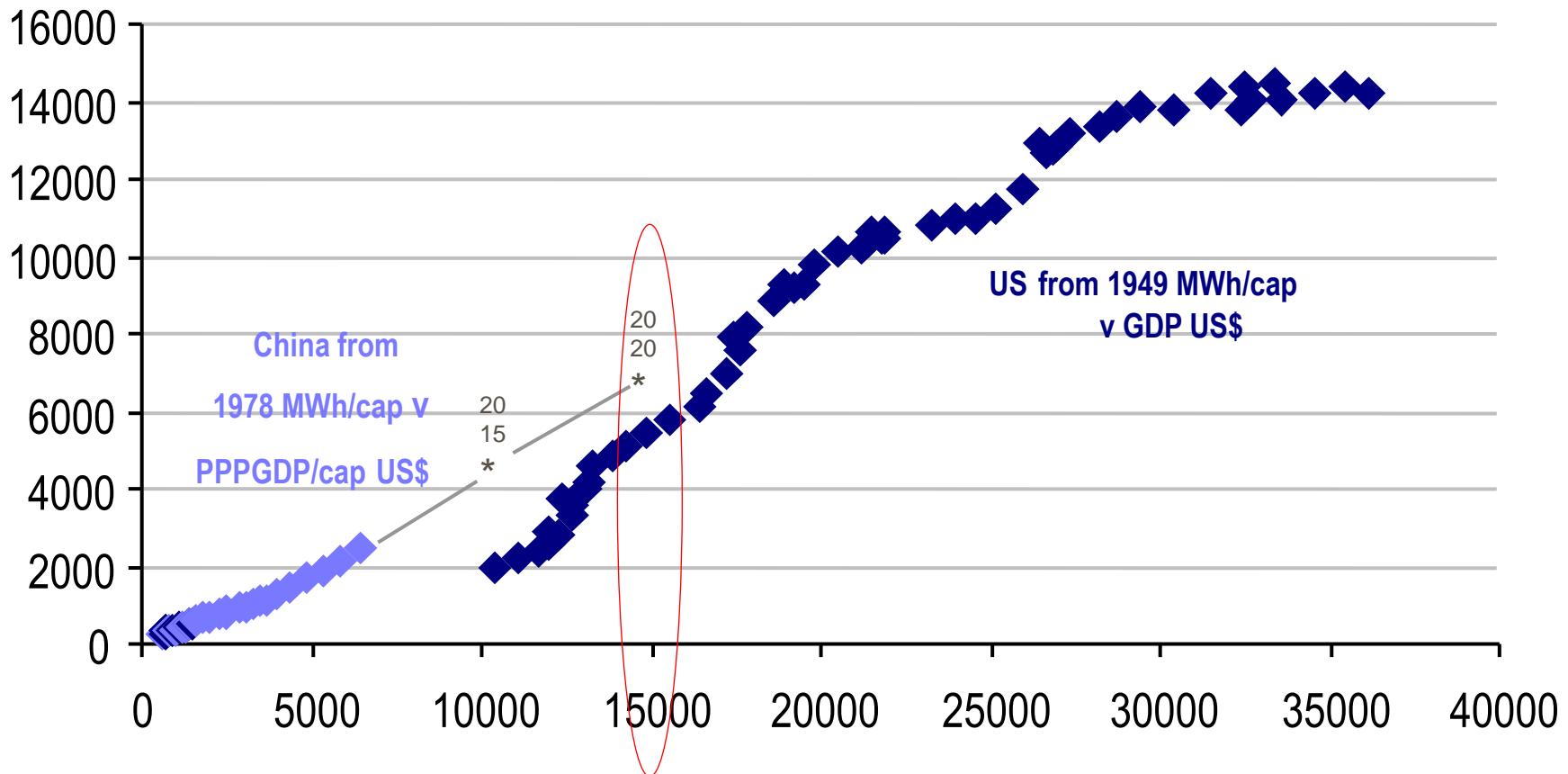
China 'business as usual' until 2013 – social housing front loaded in 5YP

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



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

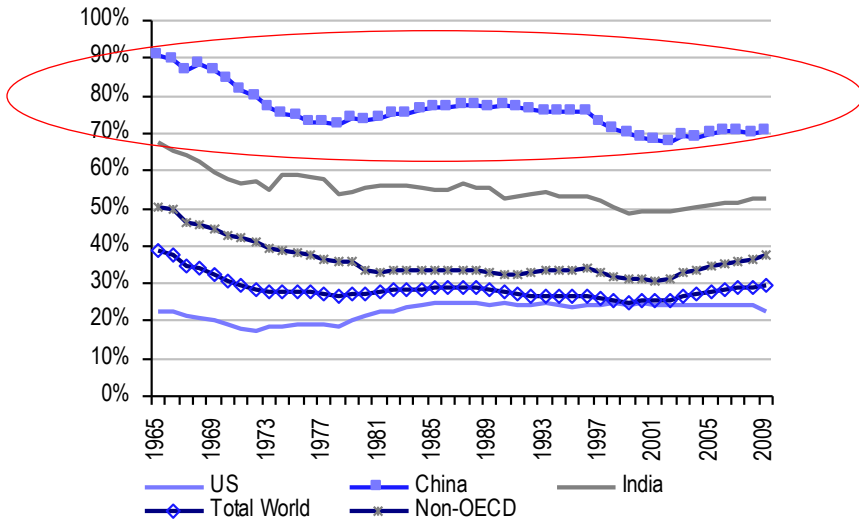
China and US IOU of electrical power v GDP/cap ppp



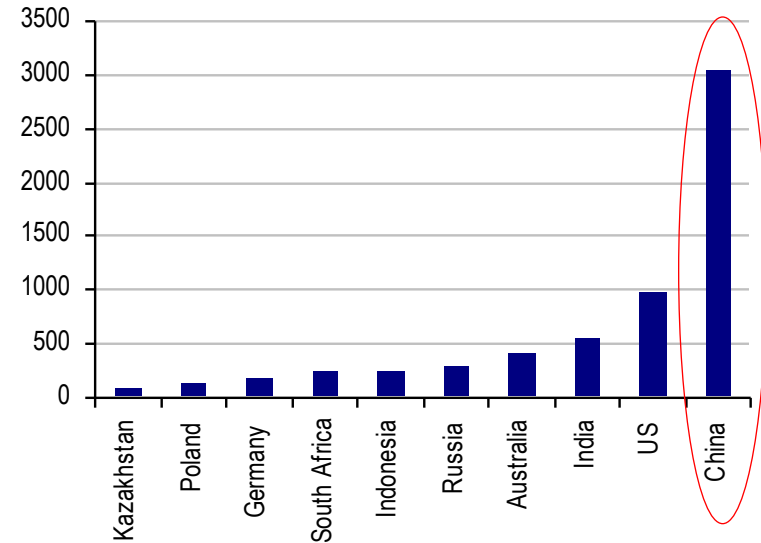
- Electrical power intensity of use (IOU) a good industrial indicator
- China in 2020 6600MWh/cap (US\$15.2k/cap ppp GDP) < half current US
- Questions about constraints from resources, costs, environment arising

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

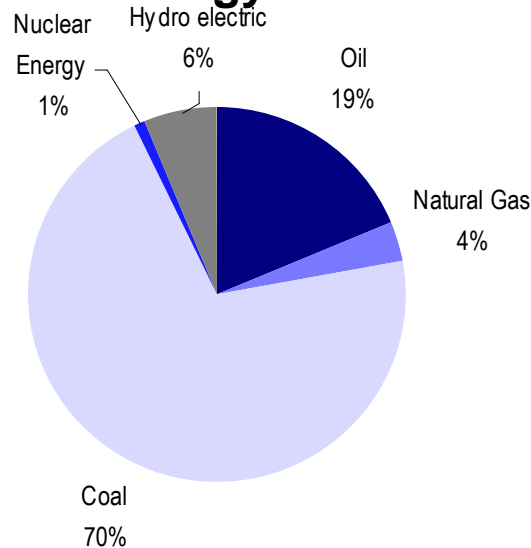
Coal % of total energy



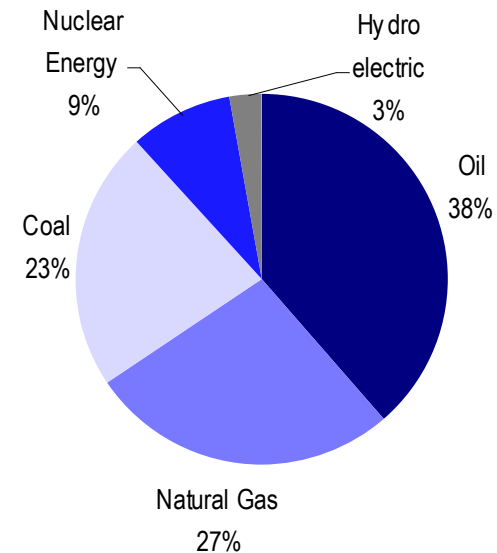
Raw coal production mt



China total energy constituents

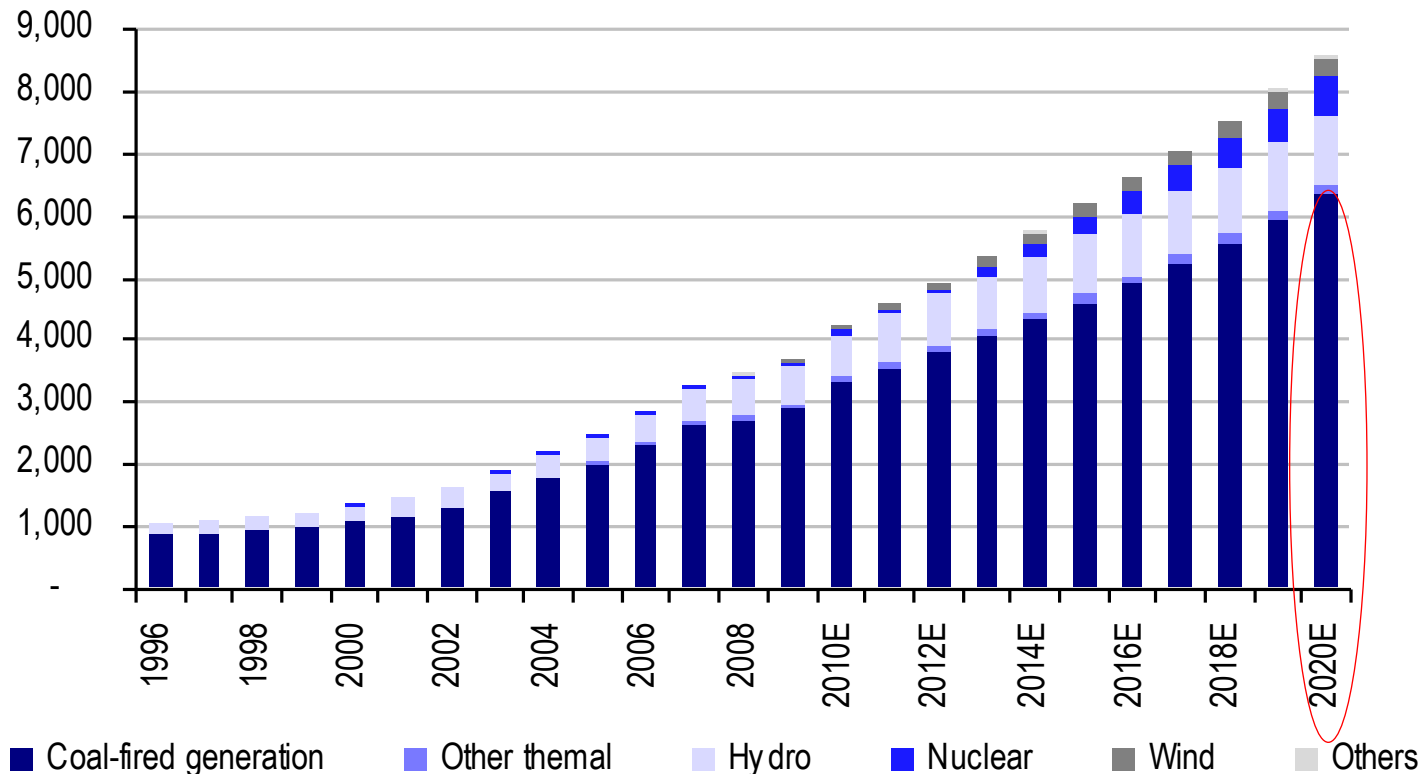


US total energy constituents



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

China power generation estimates to 2020 in TWh

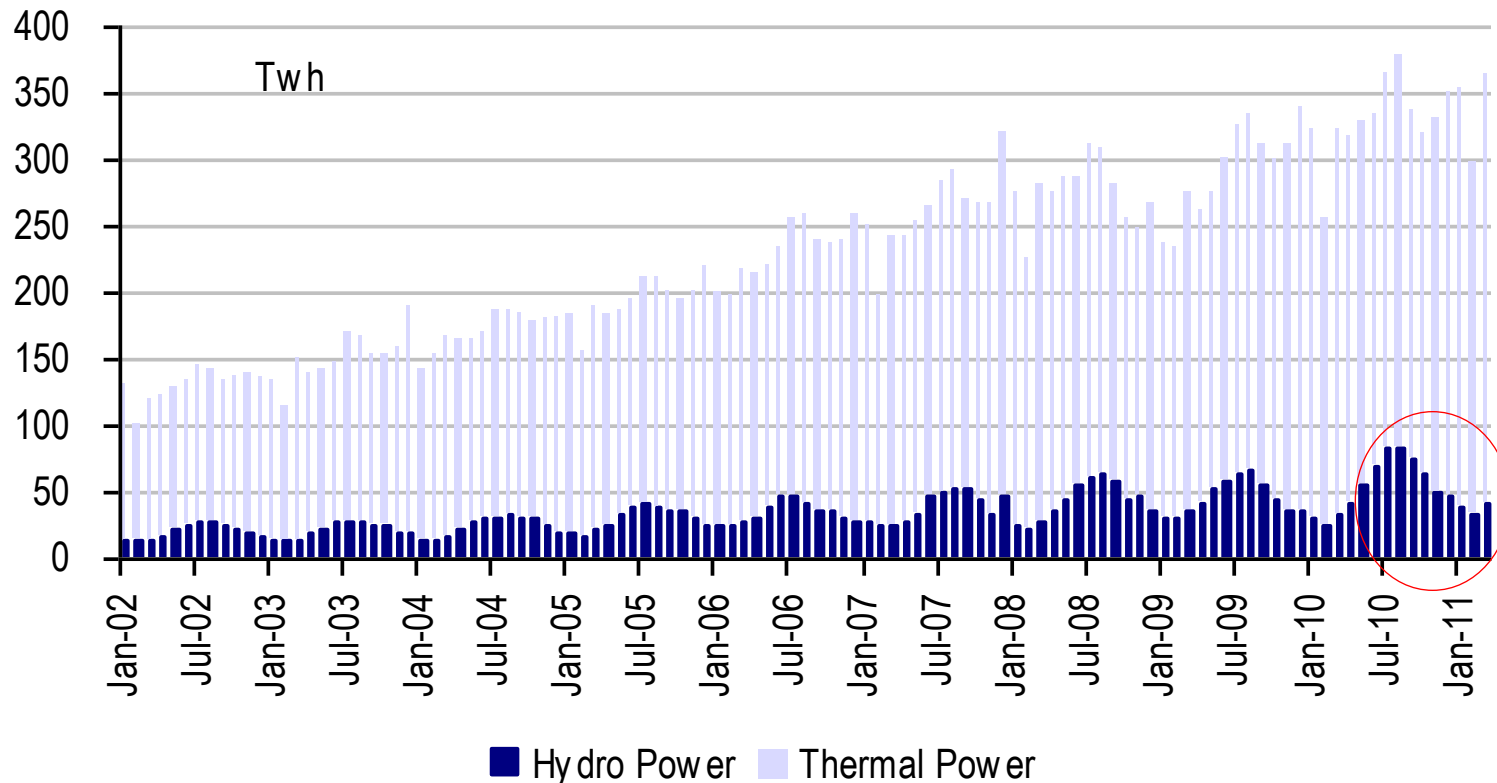


- Nuclear + 25% pa, 10GW per year...but might slow with Japan crisis
- Gas to grow by 8%...but could increase as an alternative to nuclear
- Despite the above...coal will still be 74% of power mix by 2020E

Source: BP 2010 Statistics, UBS utilities research

China's power output – also increasingly seasonal and constrained

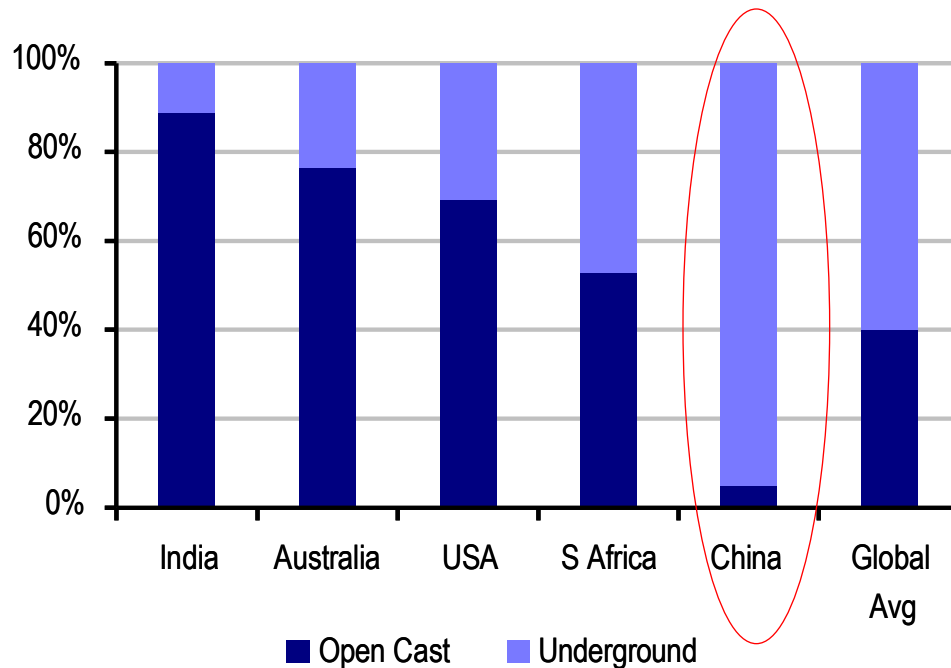
Power output - thermal and hydro sources



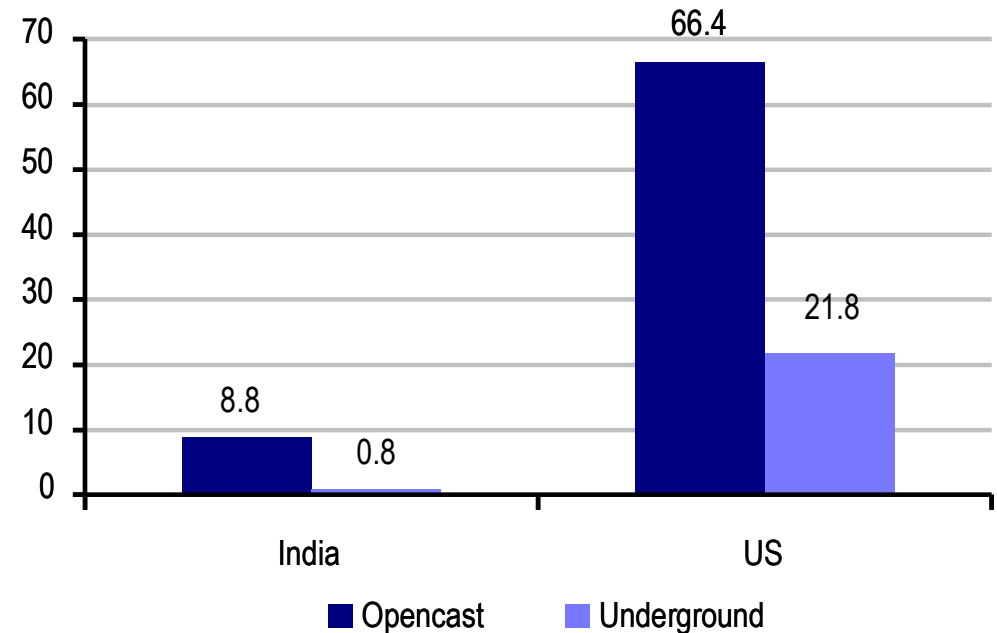
- Increasing deeper seasonality in hydro power adds to overall coal demand; peak to trough in hydro power now 9% of yearly hydro output
- Drought conditions cap hydro power this summer leading to shortages
- Wind installations (45GW in 2010) need back up power during low wind

Costs and productivity spreads widening – China marginal producer

Global mining methods



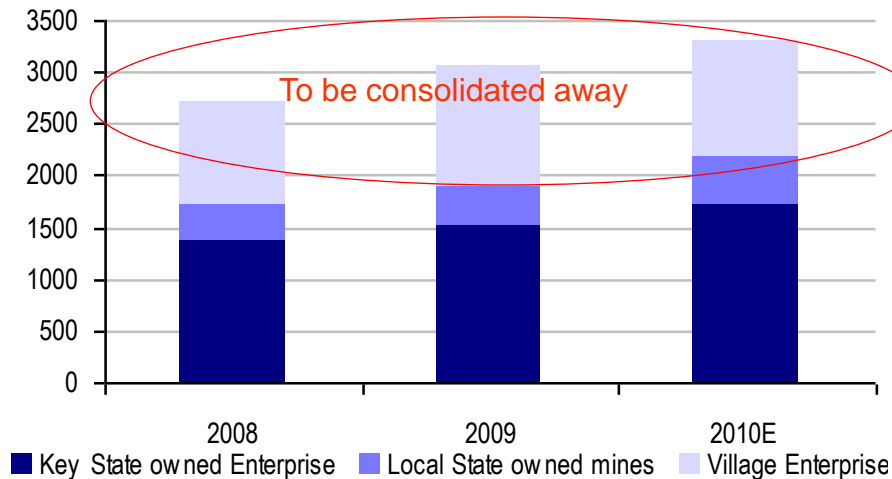
Productivity (t/shift) varies



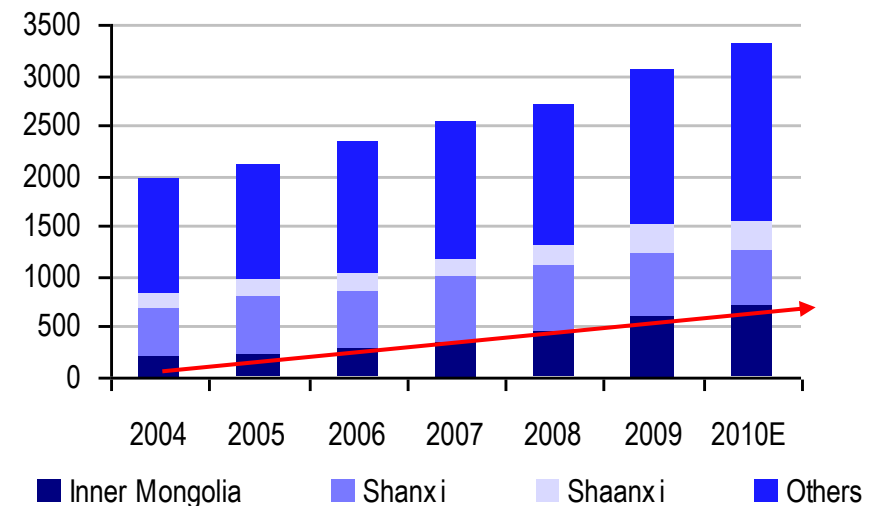
- Global coal is the biggest bulk materials handling activity in the world
- China's coal >90% reliant on underground, getting deeper and longer
- China the marginal producer with rising costs, labour, energy, transport
- India's coal 90% open pit, providing cost and security advantages
- Productivity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

Big structural challenges for future Chinese coal mining growth

Production by enterprise mt



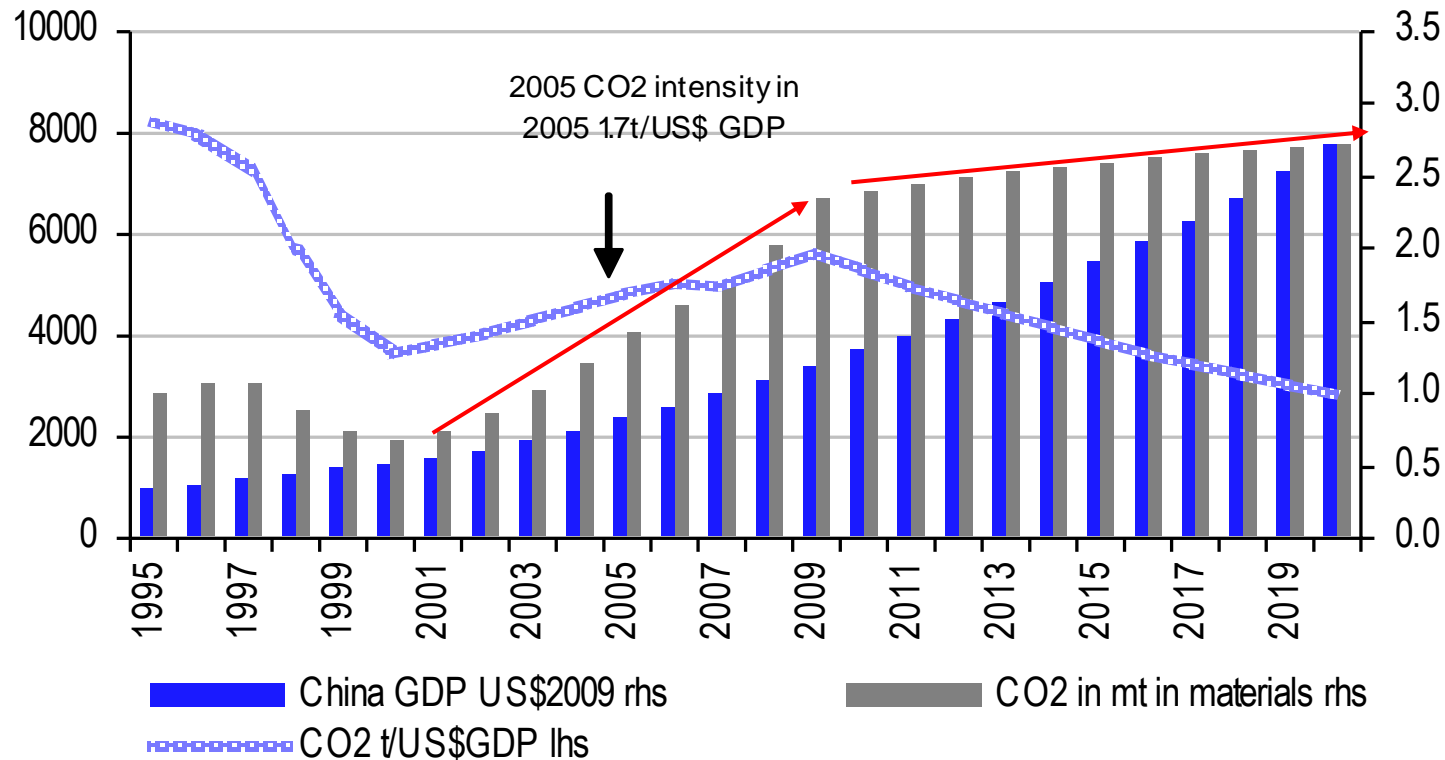
Production by region mt



- 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

12th 5 Year Plan – carbon commitments typify transition?

China carbon emission considerations



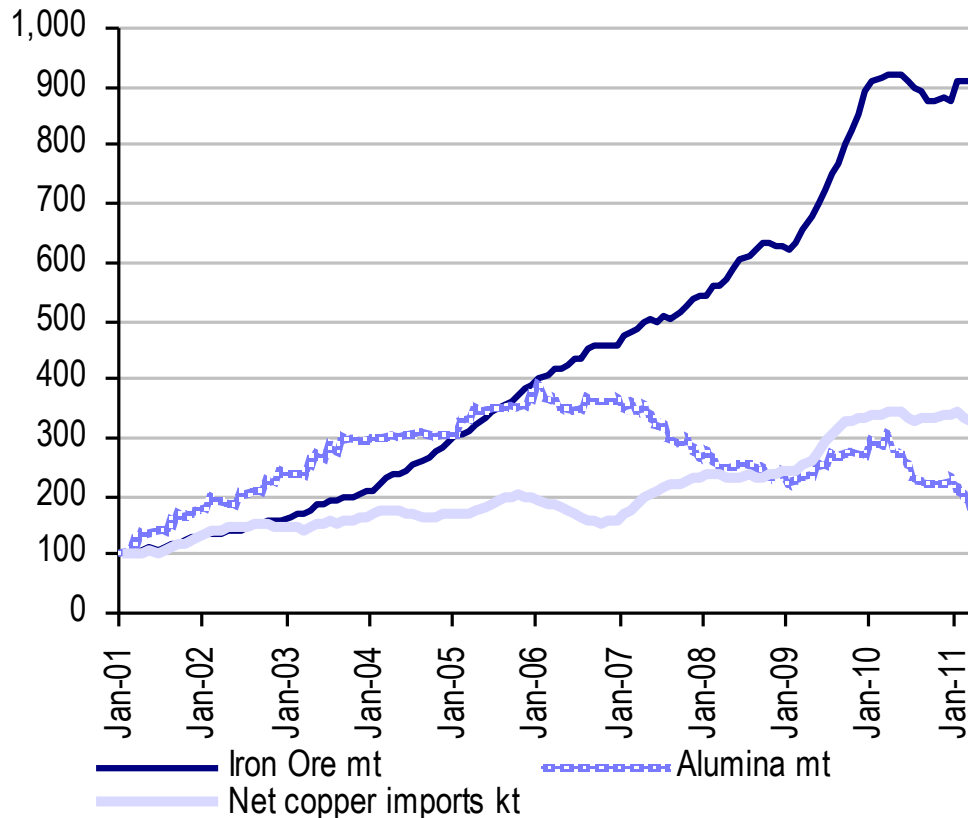
- China committed to lower carbon emissions per GDP by 40% rel to 2005
- If these carbon commitments were met we estimate coal consumption would fall by 25% relative to our 2020 estimates
- Widespread scepticism about implementation among provinces; but the 12th Five Year Plan reiterated the commitments

Water challenges in China – daunting and to curtail growth sometime

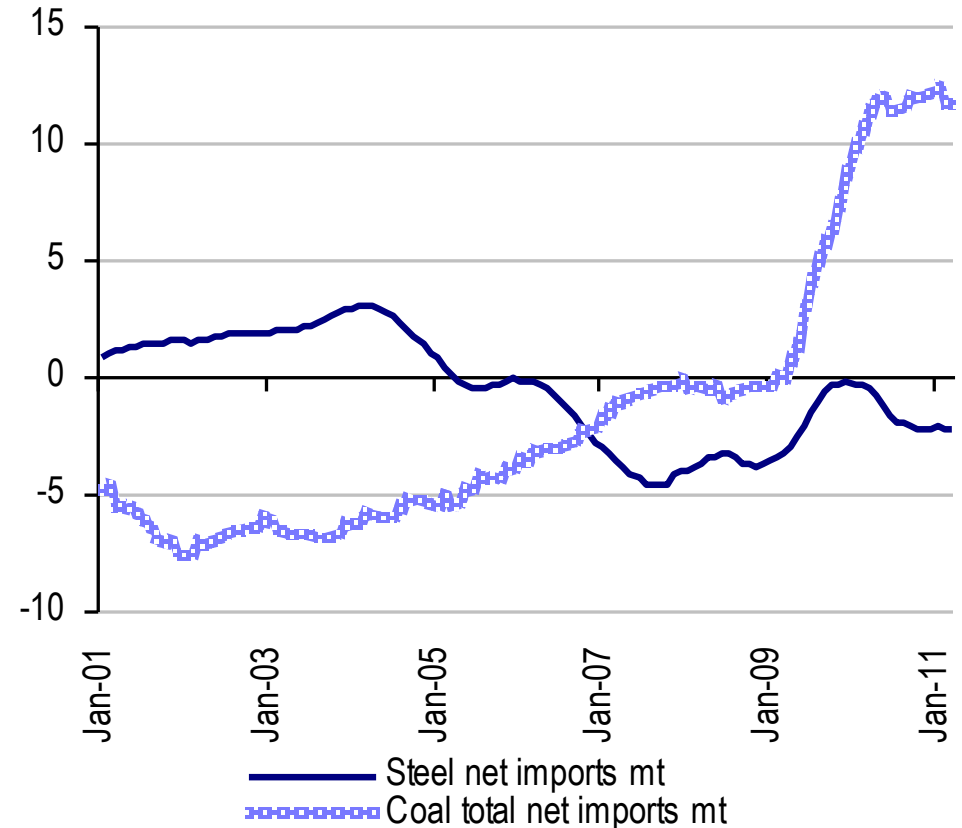
- 20% of world's population; 7% water resources but uses 4x as much water per \$GDP than G20 peers; 20% lost in leakage; low tariffs
- 66% China's 660 cities suffer from water shortages; 110 severe, 700m people drink contaminated water (human/ animal waste)
- 90% groundwater, 75% rivers and lakes polluted, 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

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

Iron ore, alumina, copper net imports



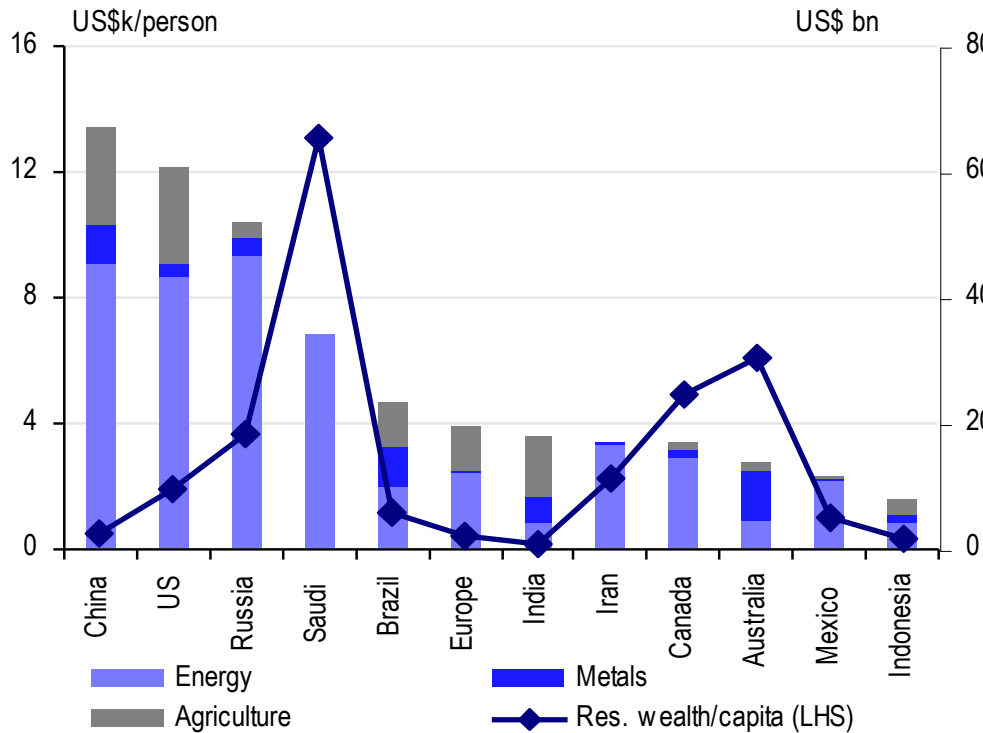
Steel and coal net imports



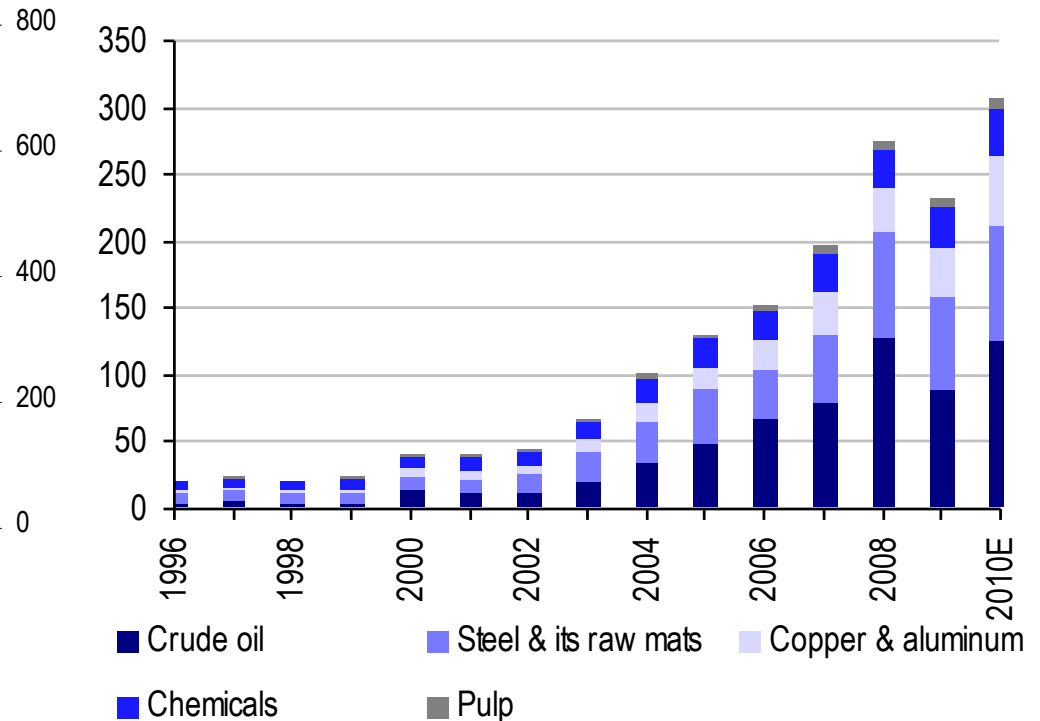
- Iron ore imports the story of the decade – strong case for continuity
- China coal imports surged but future direction critical for global balances
- Copper, soybean, corn, silver, pulp, oil China imports move markets

Resources competition to increase – China coal rich but oil poor

Global resources wealth



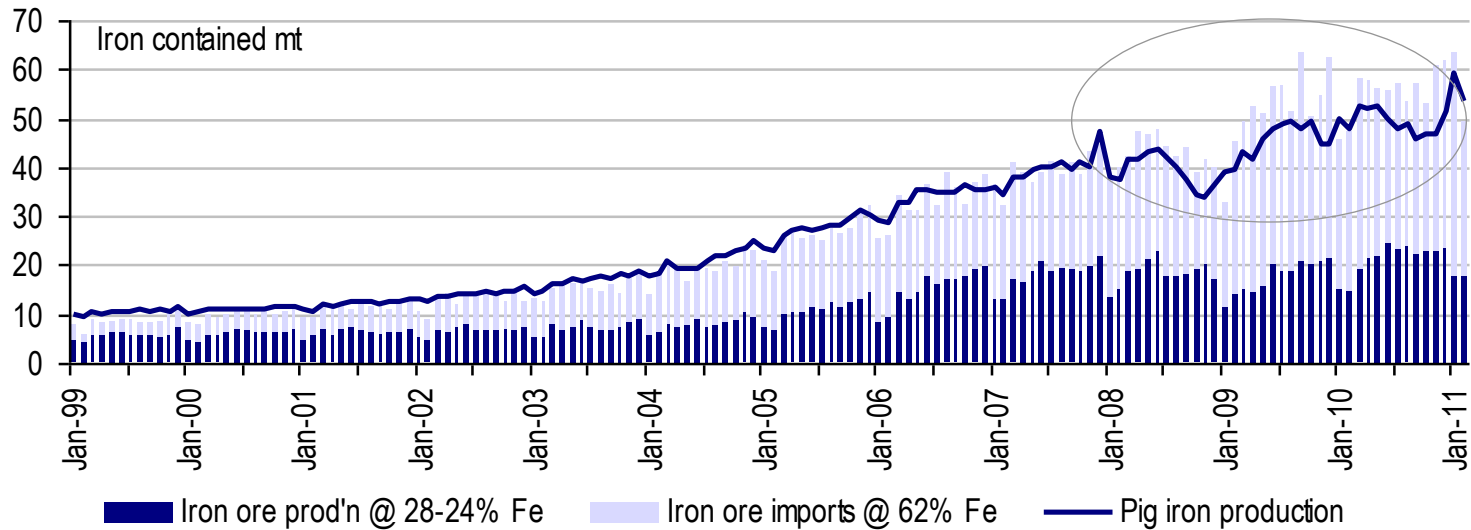
China raw material imports US\$bn



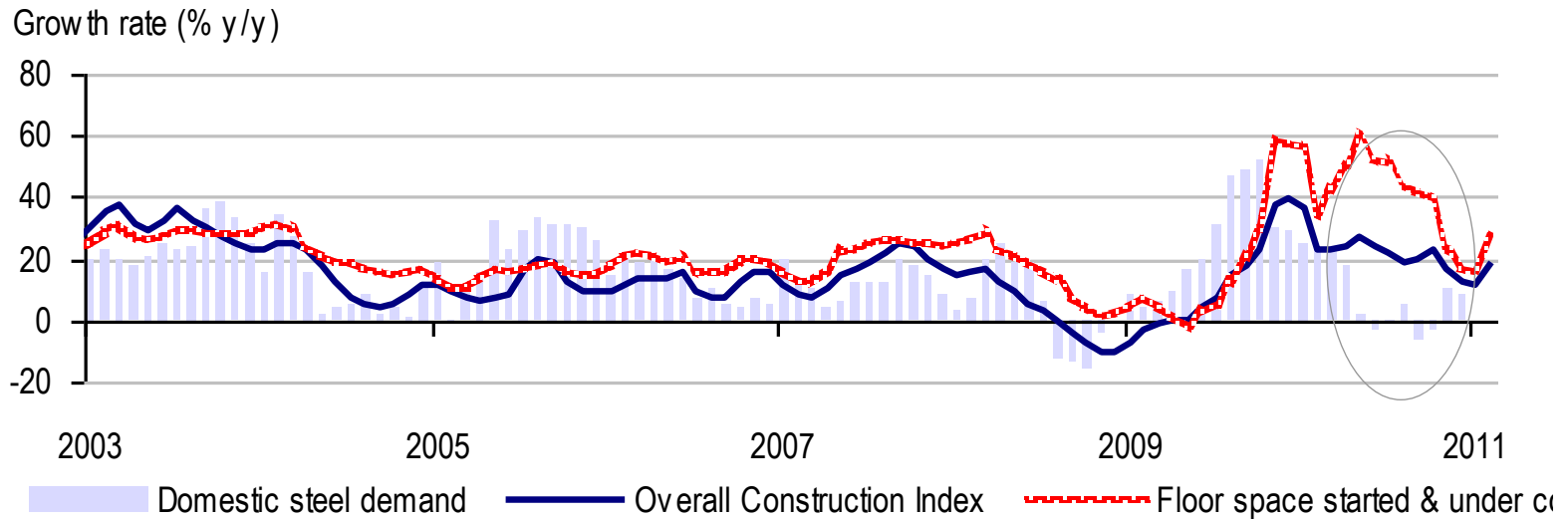
- Energy resource - oil, gas, coal 2009 output at Q111 prices
- Agriculture – all grains, sugar, rice 2010 output at Q111 prices
- Differentiation by resource per capita

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

China iron inputs and pig iron output



China steel demand and construction end use



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**

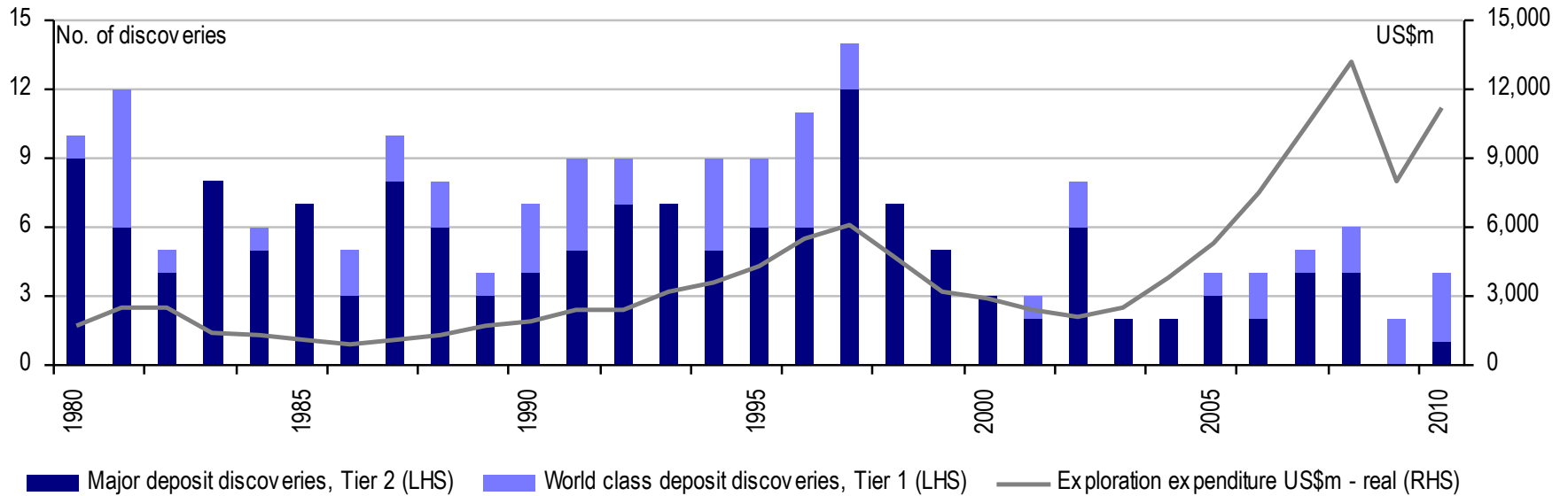
- Cost of energy drives all costs up
- Loss of skills with ageing workforce
- Over stretched project management resources

- **Politicisation adds to investment uncertainty**

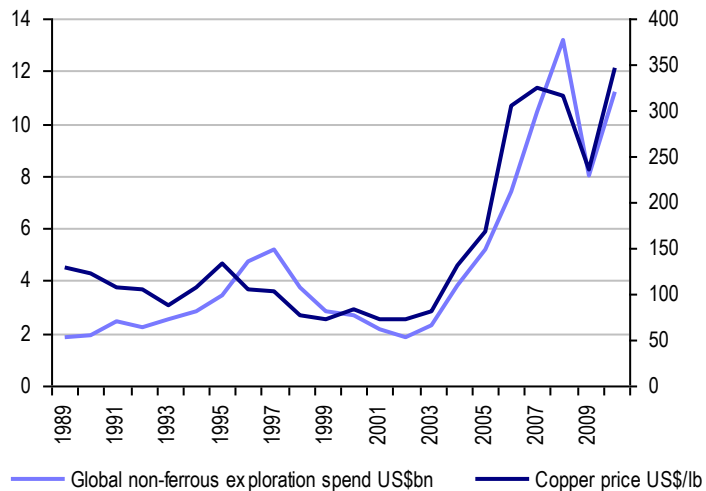
- Asian State competition for resource access in Africa and elsewhere
- Shift from Capitalist to State-ownership/companies development models
- Volatile fiscal/tax/sovereign risk environments will not help development
- Australian super profits tax and others example of capricious change
- Geopolitical concerns with China's resource needs, Mongolia, Russia
- Regulatory intervention, US Frank-Dodds, EU

Global supply responds – politically constrained but funding is back

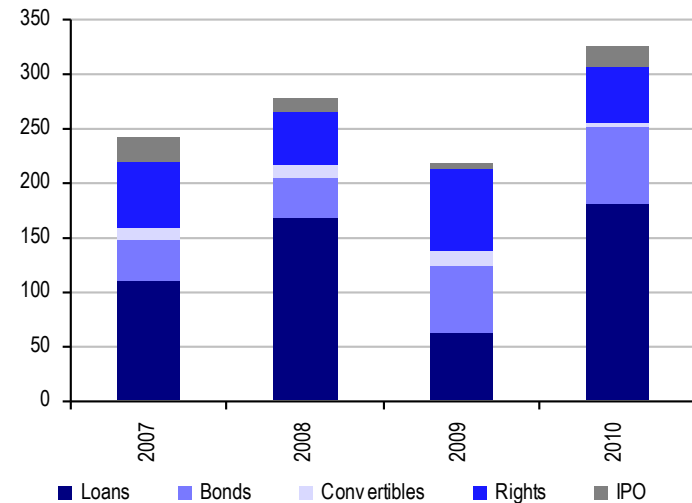
Global exploration spend and success



Spend and metal prices

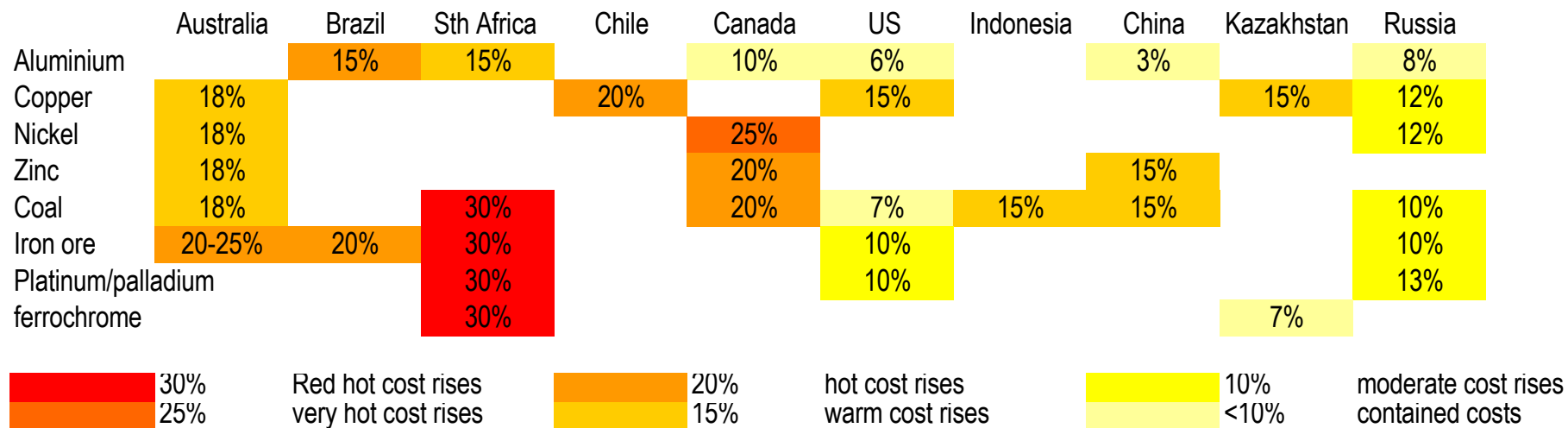


Global mining funding



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

Global mining cost heat map

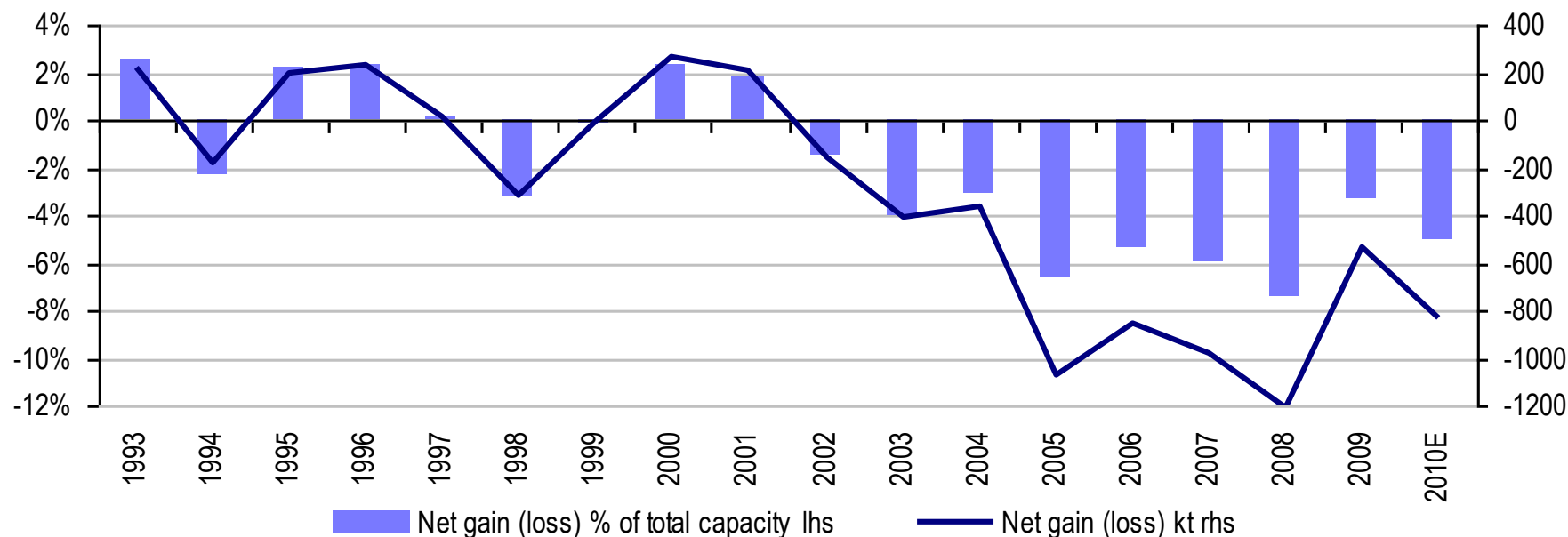


Exchange rate impacts on costs

	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%

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

Infrastructure and weather – growing challenges in supply

Infrastructure limits everywhere

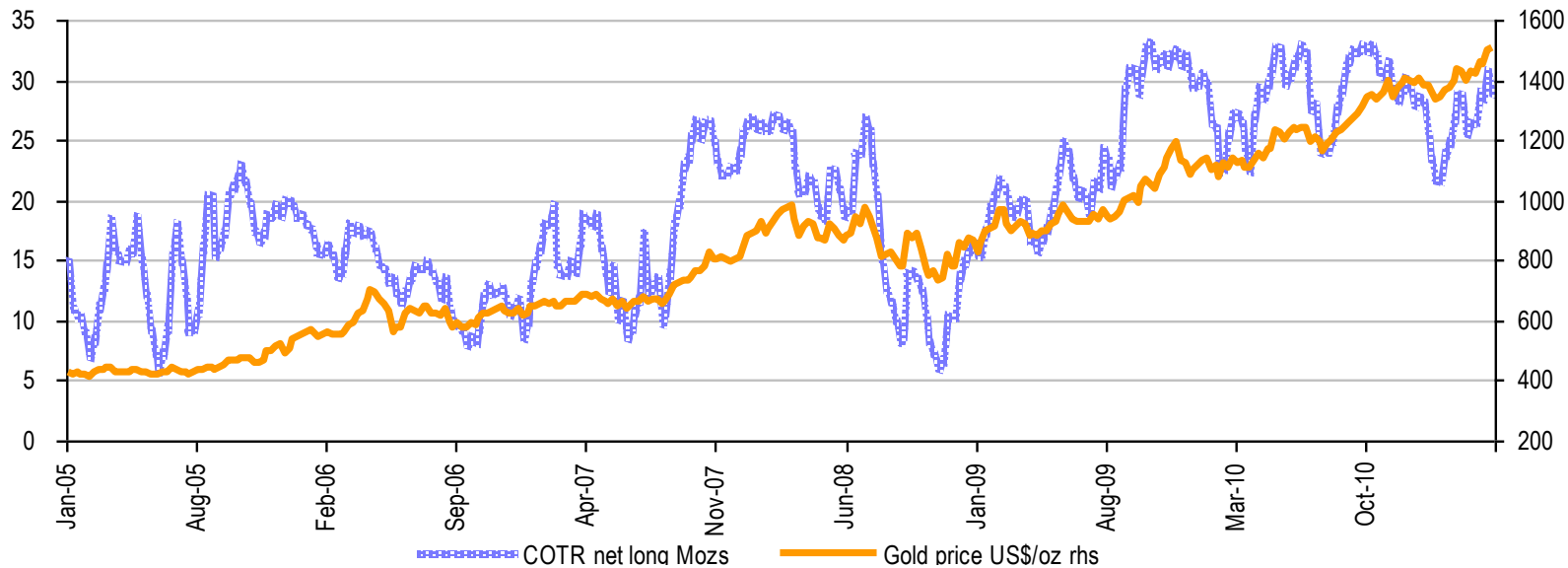
- Indonesia production consistently underperforms forecasts - take 2-3 years to work out bottlenecks; new reclamation and license reform key
- Australia building ports and rails slowly but may not keep up with the potential demand in the next 5 years from China-India
- China rail system is increasingly 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

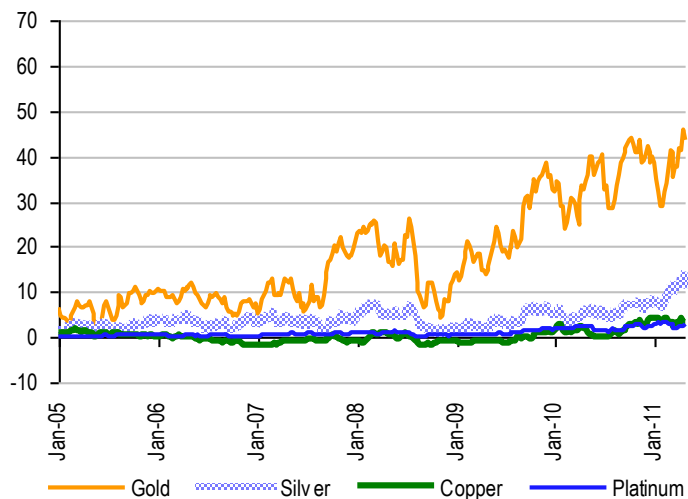
- Australasia 2x ‘100 year events’ in 3 years – time to de-rate future supply?
- China coal production in the north increasingly water stressed
- Australia, Indonesia, China, Sth Africa, Colombia impacted by La Nina

Speculative support for prices – real but hard to quantify

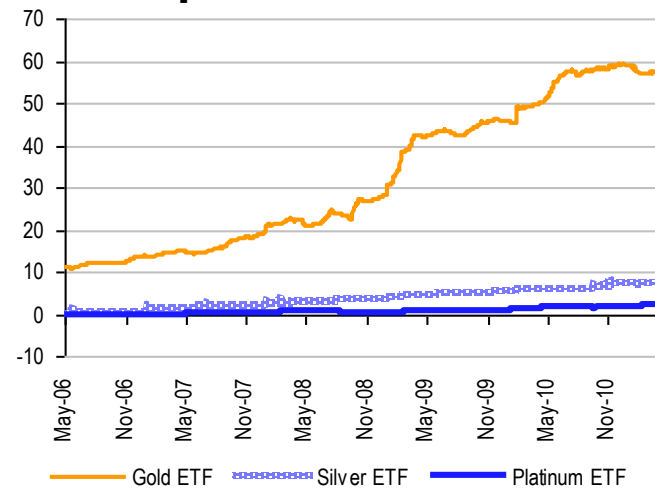
Gold COTR mozs and Gold price US\$/oz



COTR positions in US\$bn

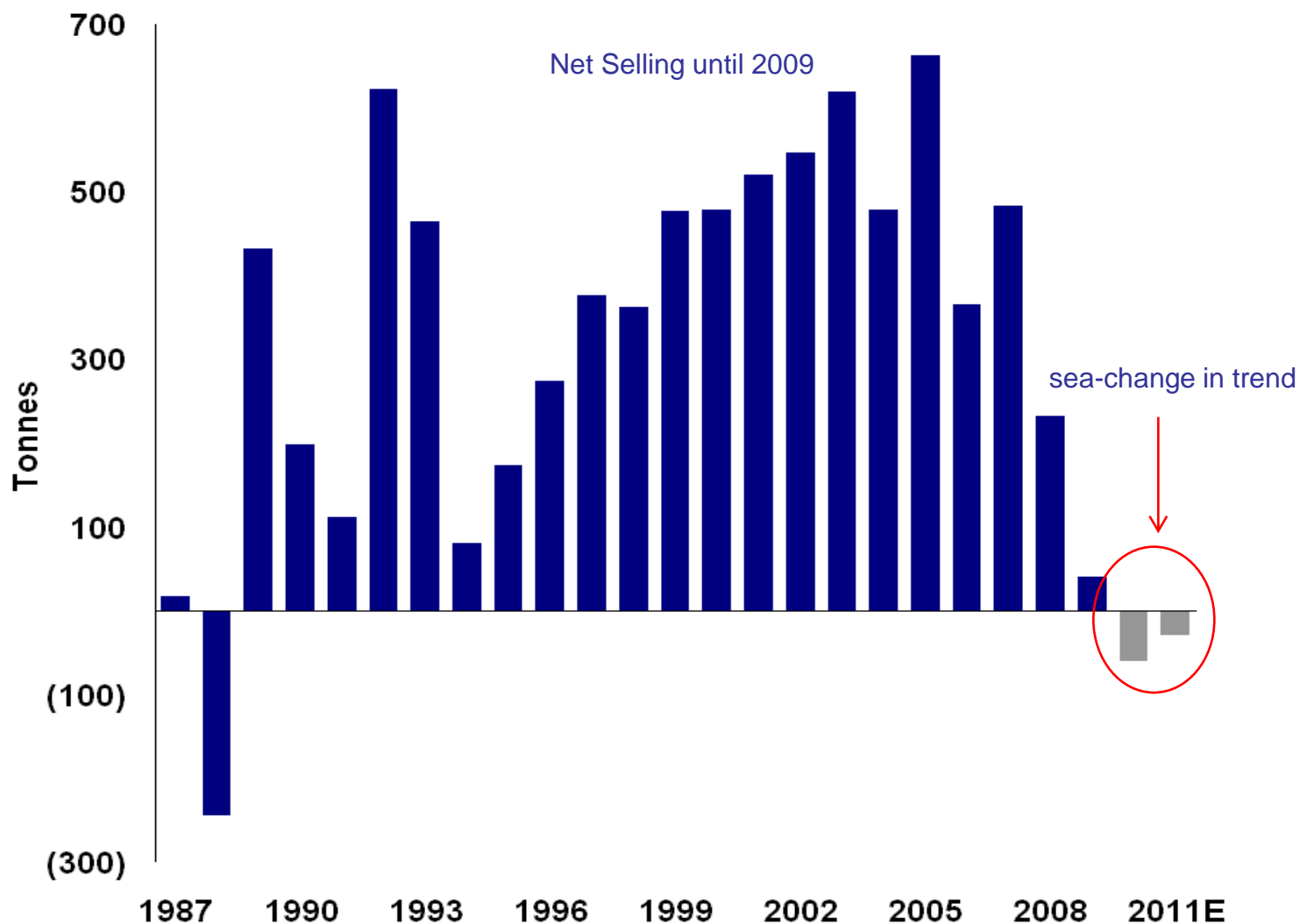


ETF positions in US\$bn



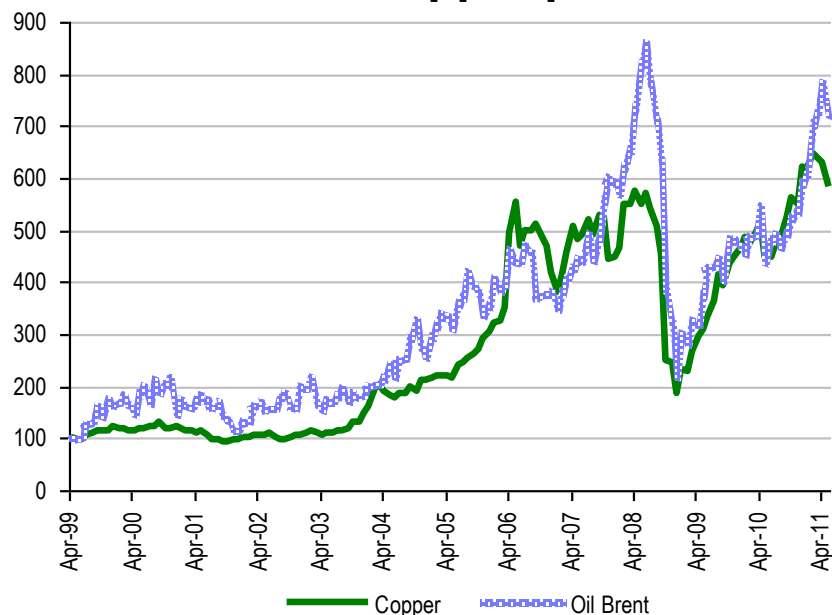
Policy shifts change balances - Central Banks are buying gold

Central banks selling/buying gold

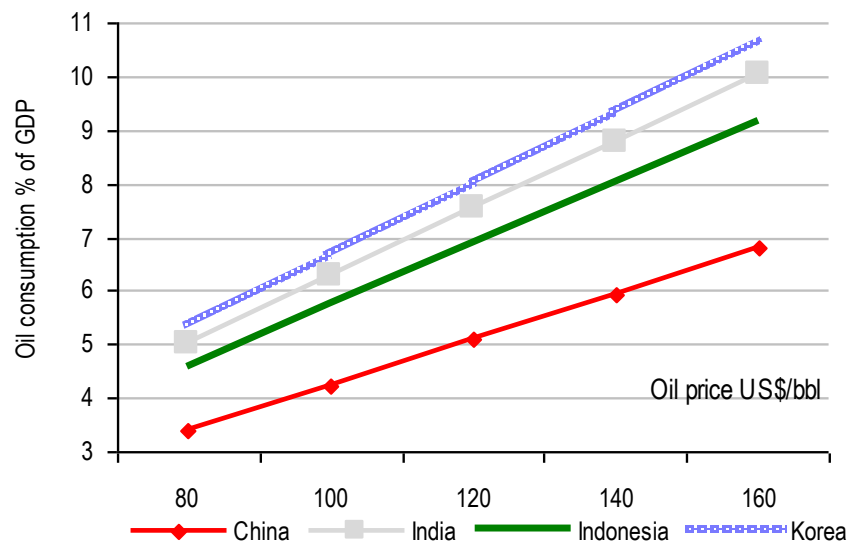


Oil markets dominate other commodities – supply and risk vs elasticity

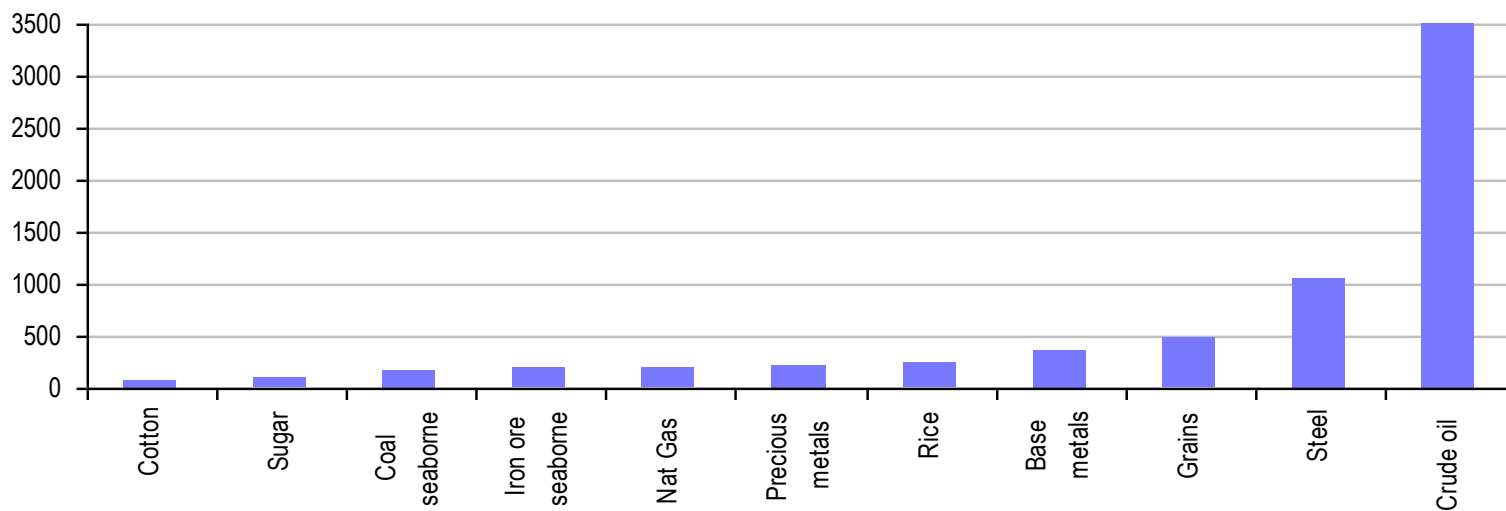
Oil and copper price



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/wearth	Investor flows	Regulatory risks	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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UBS 12-Month Rating	Rating Category	Coverage ¹	IB Services ²
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.

UBS Investment Research: Global Equity Rating Definitions

UBS 12-Month Rating	Definition
Buy	FSR is > 6% above the MRA.
Neutral	FSR is between -6% and 6% of the MRA.
Sell	FSR is > 6% below the MRA.
UBS Short-Term Rating	Definition
Buy	Buy: Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event.
Sell	Sell: Stock price expected to fall within three months from the time the rating was assigned because of a specific catalyst or event.

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Forecast Stock Return (FSR) is defined as expected percentage price appreciation plus gross dividend yield over the next 12 months.

Market Return Assumption (MRA) is defined as the one-year local market interest rate plus 5% (a proxy for, and not a forecast of, the equity risk premium).

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Short-Term Ratings reflect the expected near-term (up to three months) performance of the stock and do not reflect any change in the fundamental view or investment case.

Equity Price Targets have an investment horizon of 12 months.

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