Course Content

- Introduction to hedging – why do companies hedge?

- Case study 1: a metal producer hedge with futures

- Case study 2: a car manufacturer hedge with LMEswaps

- Case study 3: a drinks company hedge with futures

- Case study 4: a zinc smelter hedge with options

- Fundamental analysis of metal prices – what drives prices and why is the price important?

- Emerging economies

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What is risk?

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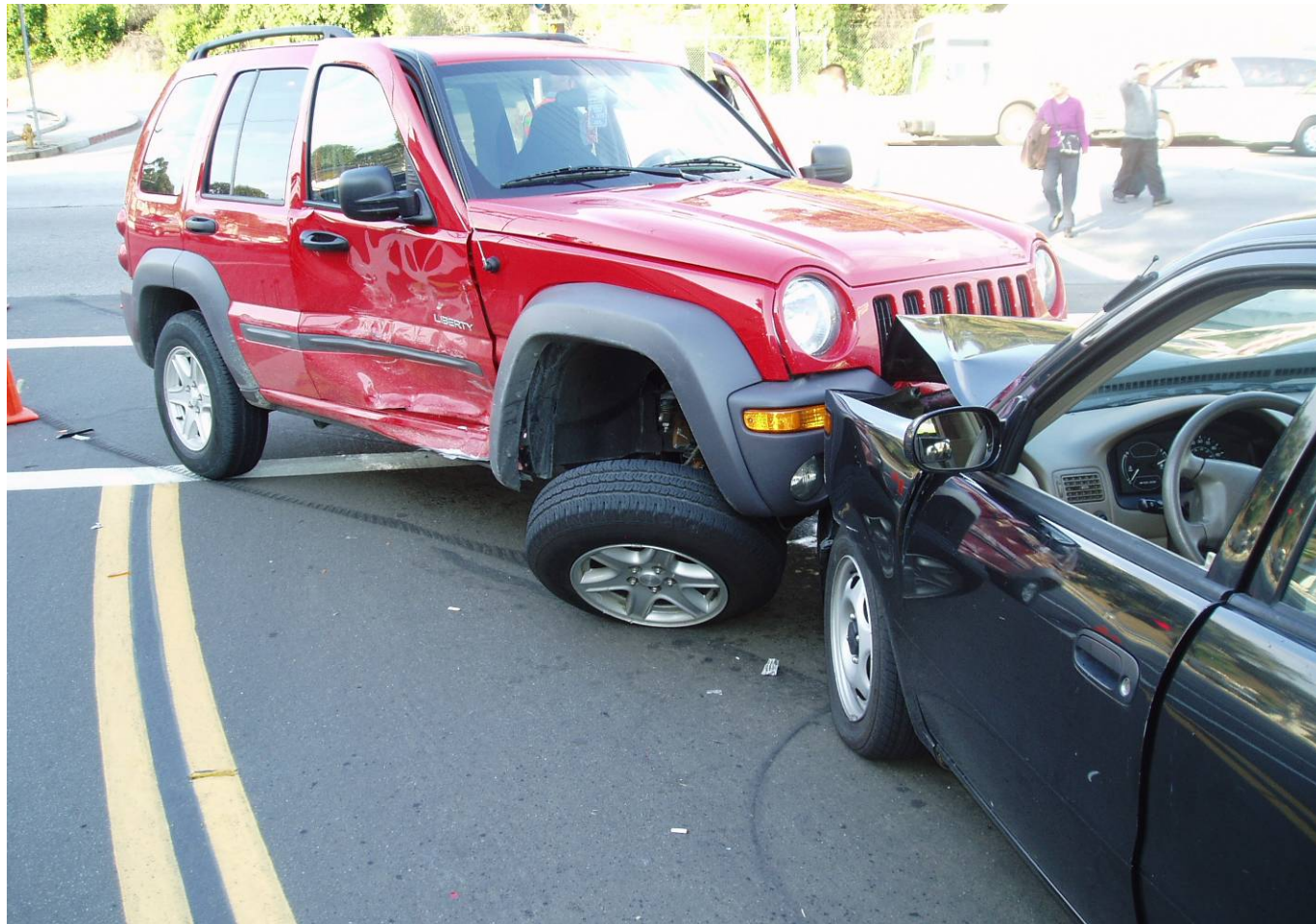
What is risk?

RISK = (PROBABILITY OF AN EVENT OCCURING) X

(IMPACT OF EVENT OCCURING)

Risk management

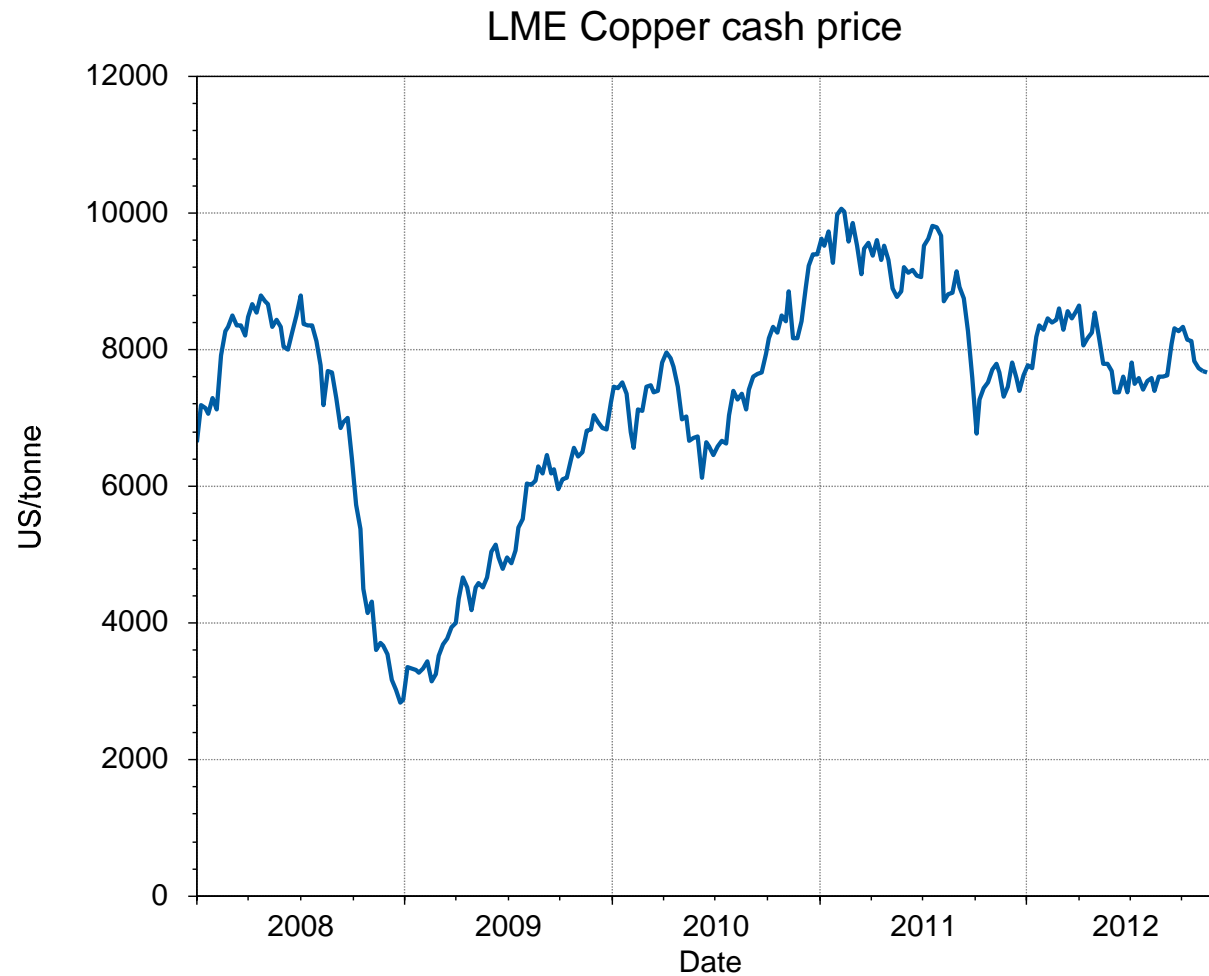> **Risks:** Identify, assess, prioritise

Apply resources to:

> **Minimise, monitor, control events that may impact:**
> - **Price**
> - **Maximise opportunities**

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When did you price your LME Copper?
LME Copper cash sellers price January 2008– July 2012

LME Copper cash price

Source: Thomson Reuters Datastream

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When did you price your LME Nickel?

LME Nickel cash sellers price January 2006 – July 2012

LME Nickel cash price

Source: Thomson Reuters Datastream

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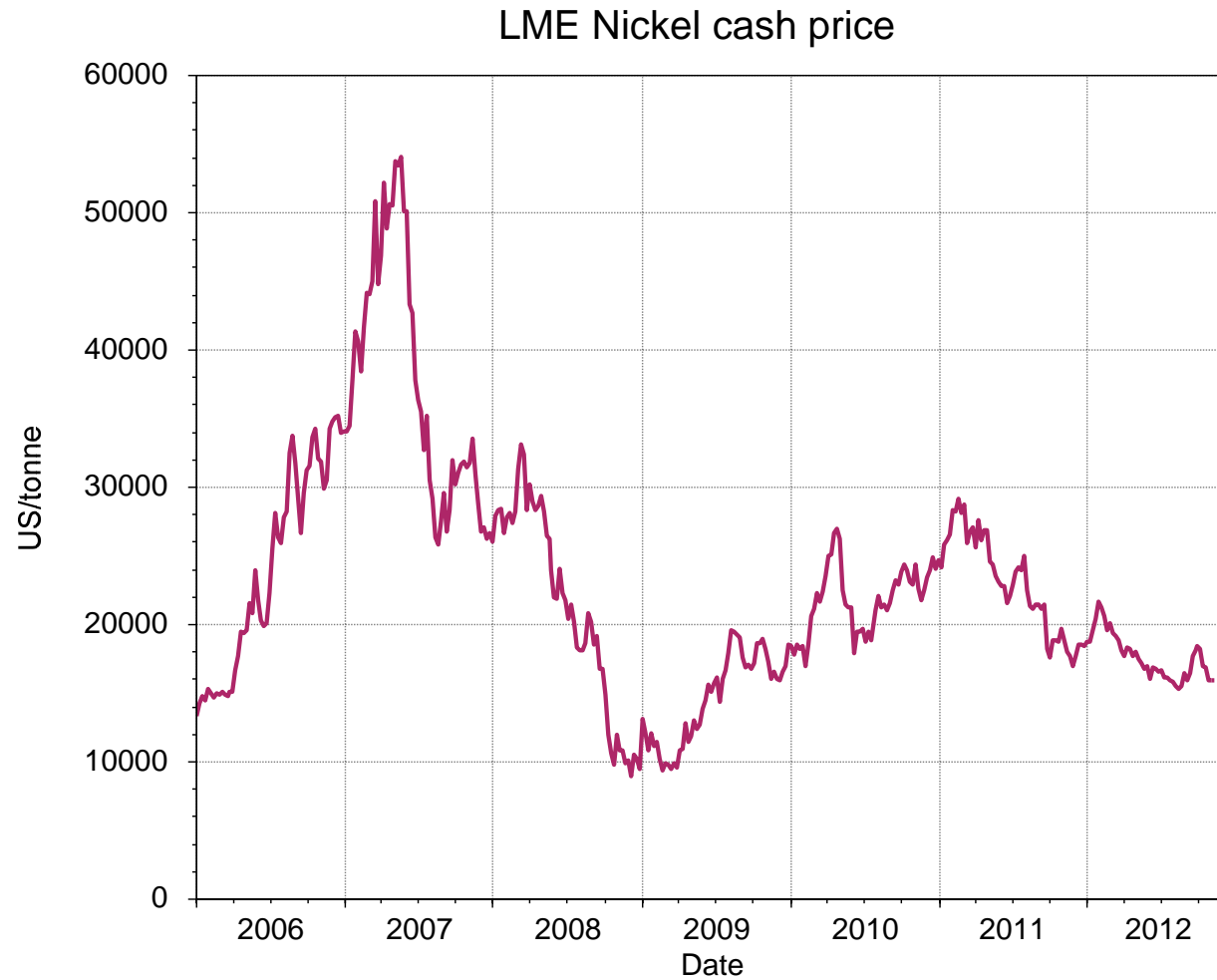
Origins of commodity price volatility

Production steps

Consumer Demand
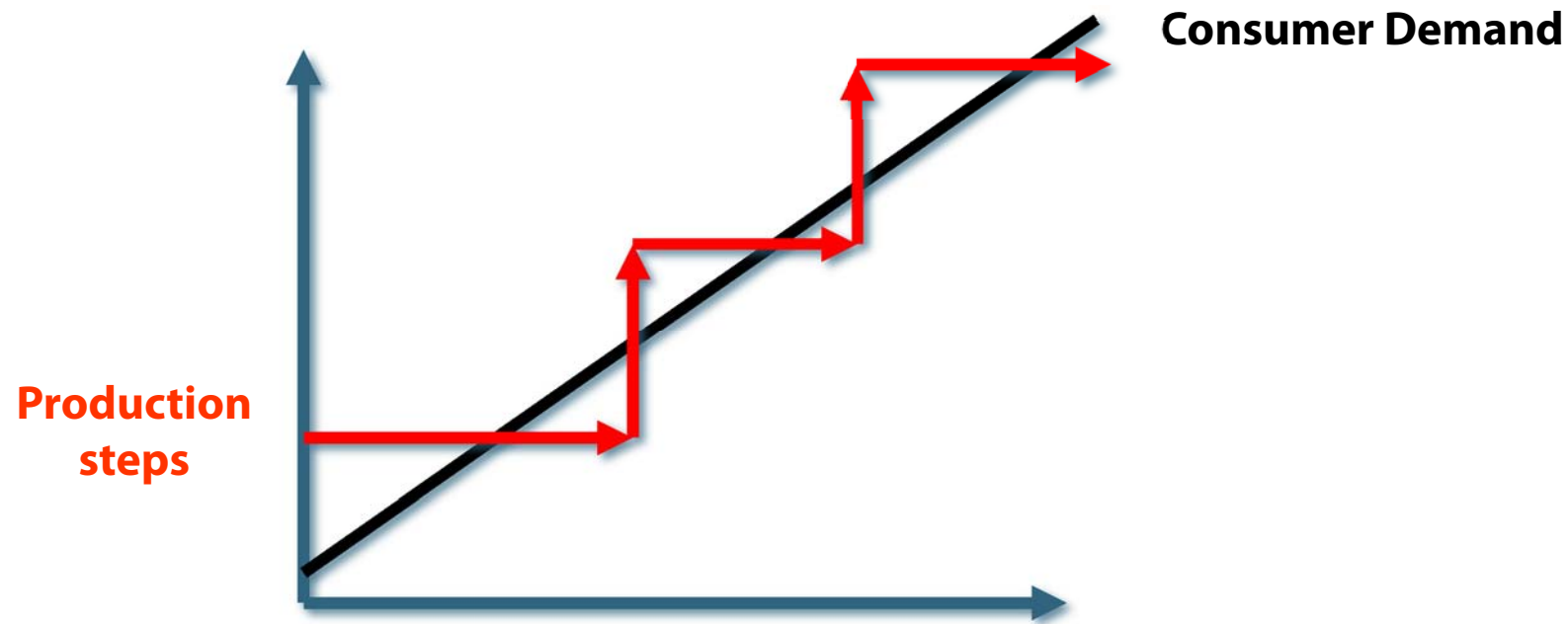
Volatility is inherent in commodity markets.

Stems from lack of responsiveness of both demand and supply in short term

Volatility is inherent in commodity markets

Inflexibility of supply:
- Economies of scale
- High fixed costs
- Development lead times

Inflexibility of demand:
- Lack of substitutes
- Sensitive to business cycle

Large price swings needed to force capacity offline during a surplus, and bring it back online during a shortage
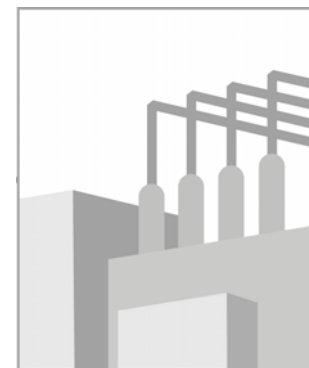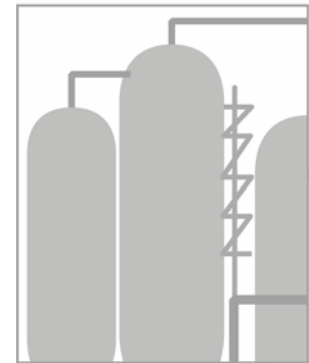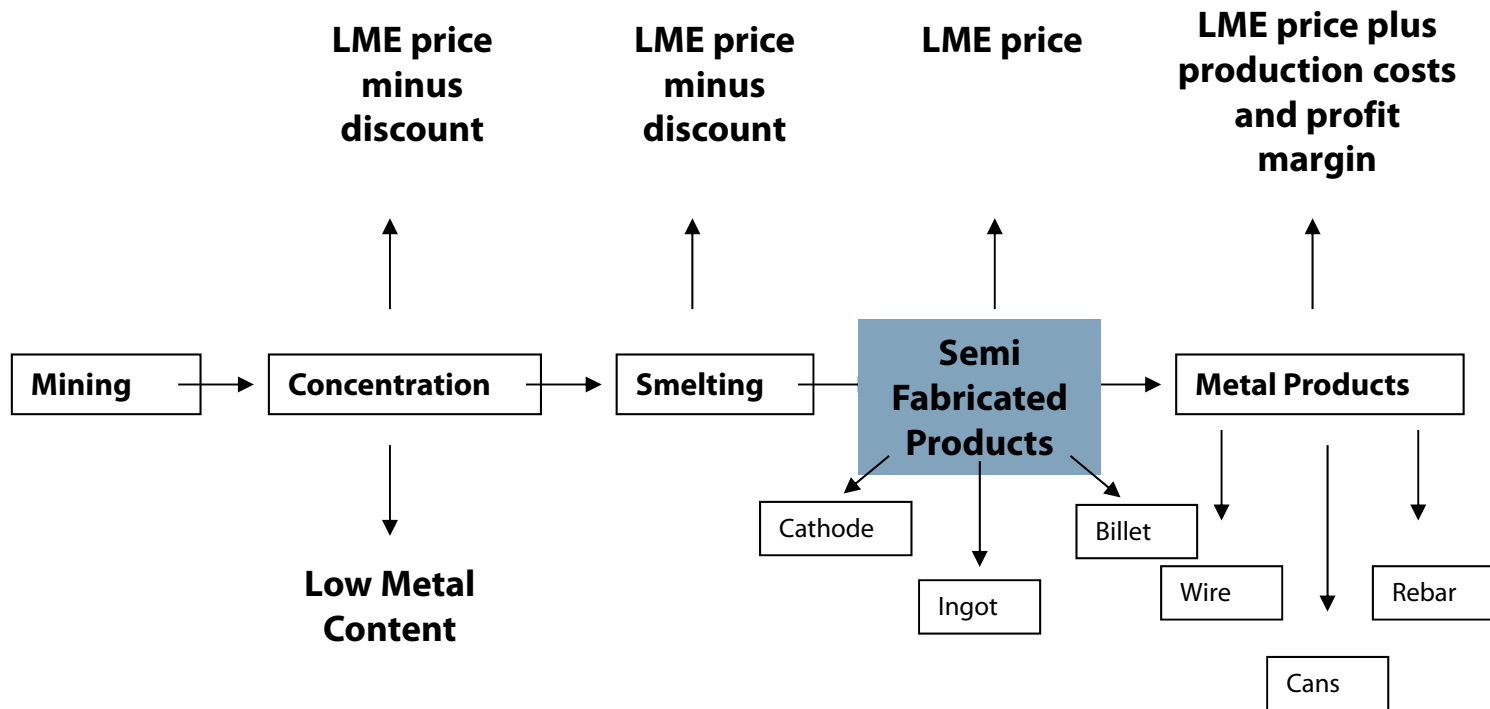
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What is hedging?

Hedging

Establishing a position in a commodity futures market (LME) which is equal and opposite to a risk on a physical market.

- Protects against adverse price movements
- Locks in an agreed profit margin
- Protects inventory value

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The metals value chain

How to use an LME price

LME price minus discount

LME price minus discount

LME price

LME price plus production costs and profit margin

Mining	→	Concentration	→	Smelting	→	Semi Fabricated Products	→	Metal Products

Low Metal Content

Cathode

Ingot

Billet

Wire

Cans

Rebar

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Exercise – you tell me!

Producer

Long   ↑   Buy

Short   ↓   Sell

Consumer

Long   ↑   Buy

Short   ↓   Sell

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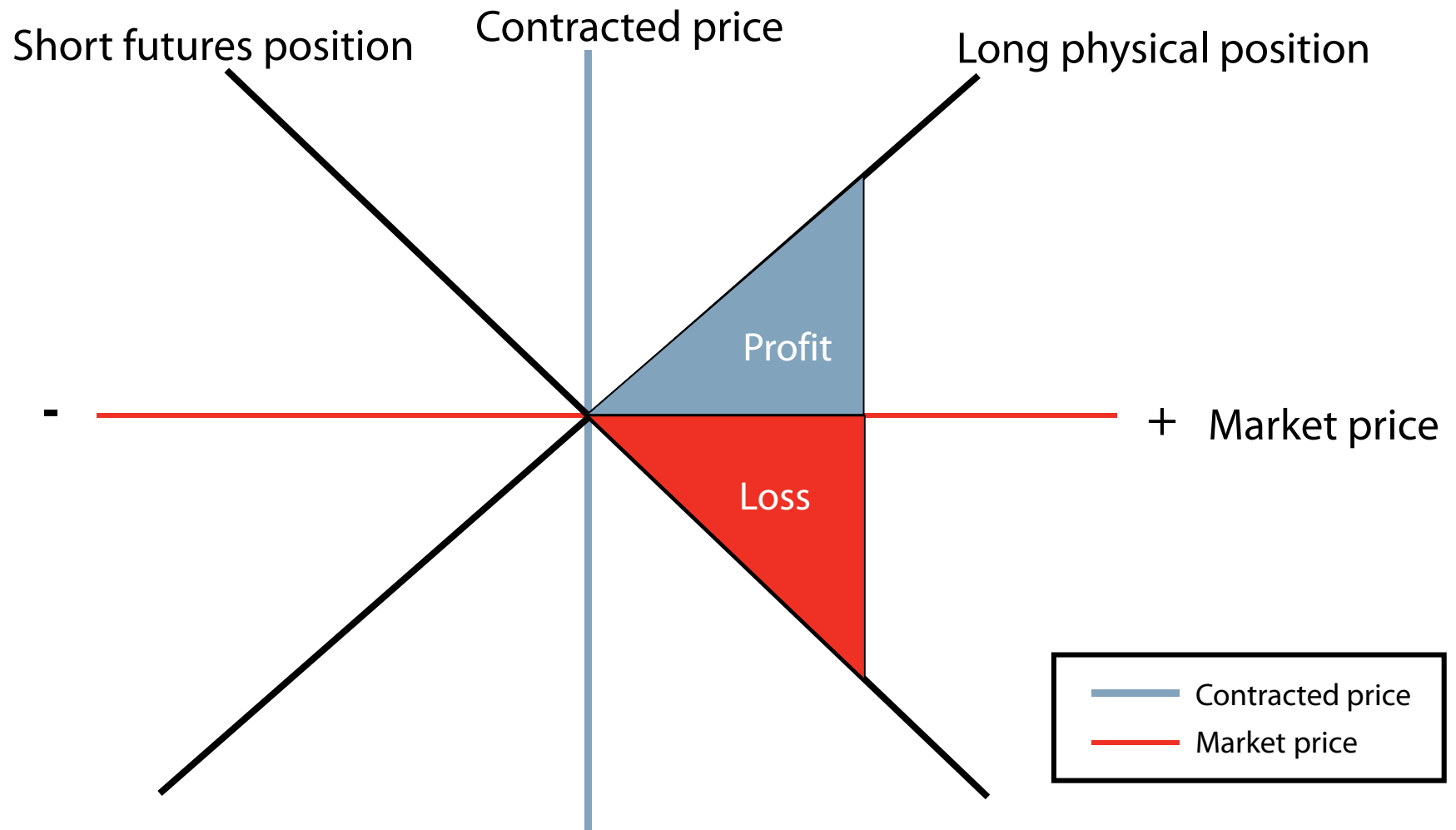
Hedger vs speculator

- *A **hedger** starts **with** a price exposure, buys or sells futures contracts, and therefore offsets the price exposure.*

- *A **speculator** starts **without** price exposure, buys or sells futures contracts, and takes on price exposure*

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Short hedge
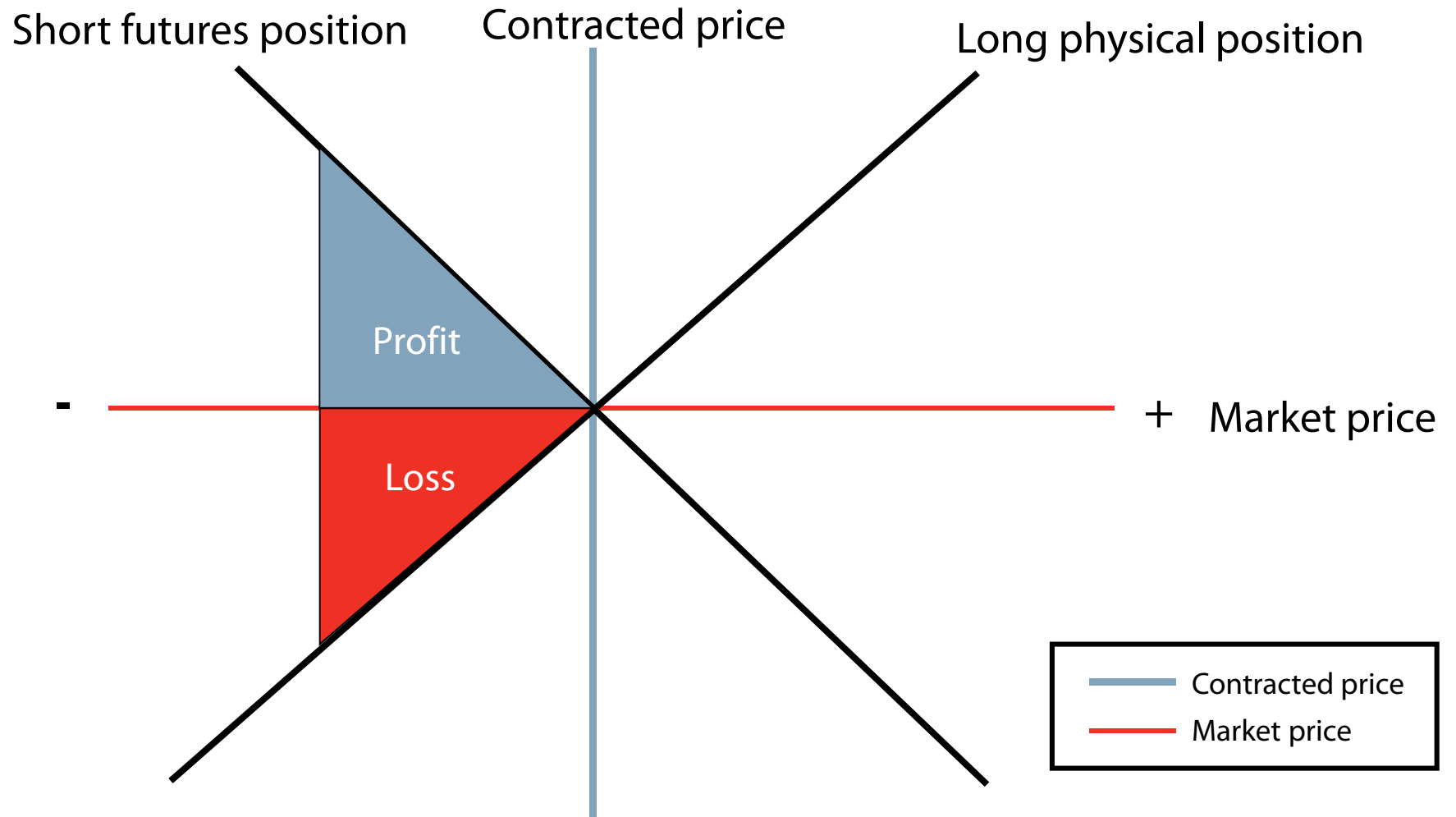
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Short hedge

- Used to protect inventory value or sale at an unknown price

- A decline in prices generates profits in the futures market, which are offset by depreciation in the value of the physical inventory

- The opposite happens when prices rise

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Short hedge – rising price

Short futures position

Contracted price

Long physical position

Profit

Loss

−   +   Market price

Contracted price

Market price

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Short hedge – falling price

Short futures position

Contracted price

Long physical position

Profit

Loss

− + Market price

Contracted price
Market price

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Strategic short hedge

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Case study 1: a nickel producer

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Strategic short hedge example

- **Strategic hedge** taking advantage of favourable prices

- Producers can sell forward production and lock in known price when prices are historically high e.g. nickel 2007

- Consumers can lock in raw material costs when prices are historically low e.g. copper early 2009

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Strategic short hedge example
ABC nickel producer Ltd

LME Nickel

Max 15M on 7 May 2007 = $42,125
7 Aug 2008 Cash price = $18,730

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Strategic short hedge example
ABC nickel producer Ltd

It is 7th May 2007 and the producer receives a purchase order for metal to be delivered in fifteen months

Quantity	600 tonnes
Delivery date	7th Aug 2008
Sales pricing basis	Unknown LME settlement price (day of delivery)
Current (known) 7th August price	$42,100– 42,150 per tonne
ABC's risk?	Aims and Action?

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Strategic short hedge example

LME	Physical
7th May 2007	**Produce metal = long physical**
Sell 100 lots LME Nickel futures prompt 7th Aug 2008 @ $42,100mt	Sell 600mt Ni @ Unknown Sett priced basis and delivery in 15 months (7th Aug 2008)

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Price fix hedge example

ABC nickel producer Ltd

5th August 2008 – Scenario 1 (falling market price)

LME settlement price $18,730 per tonne

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Price fix hedge example

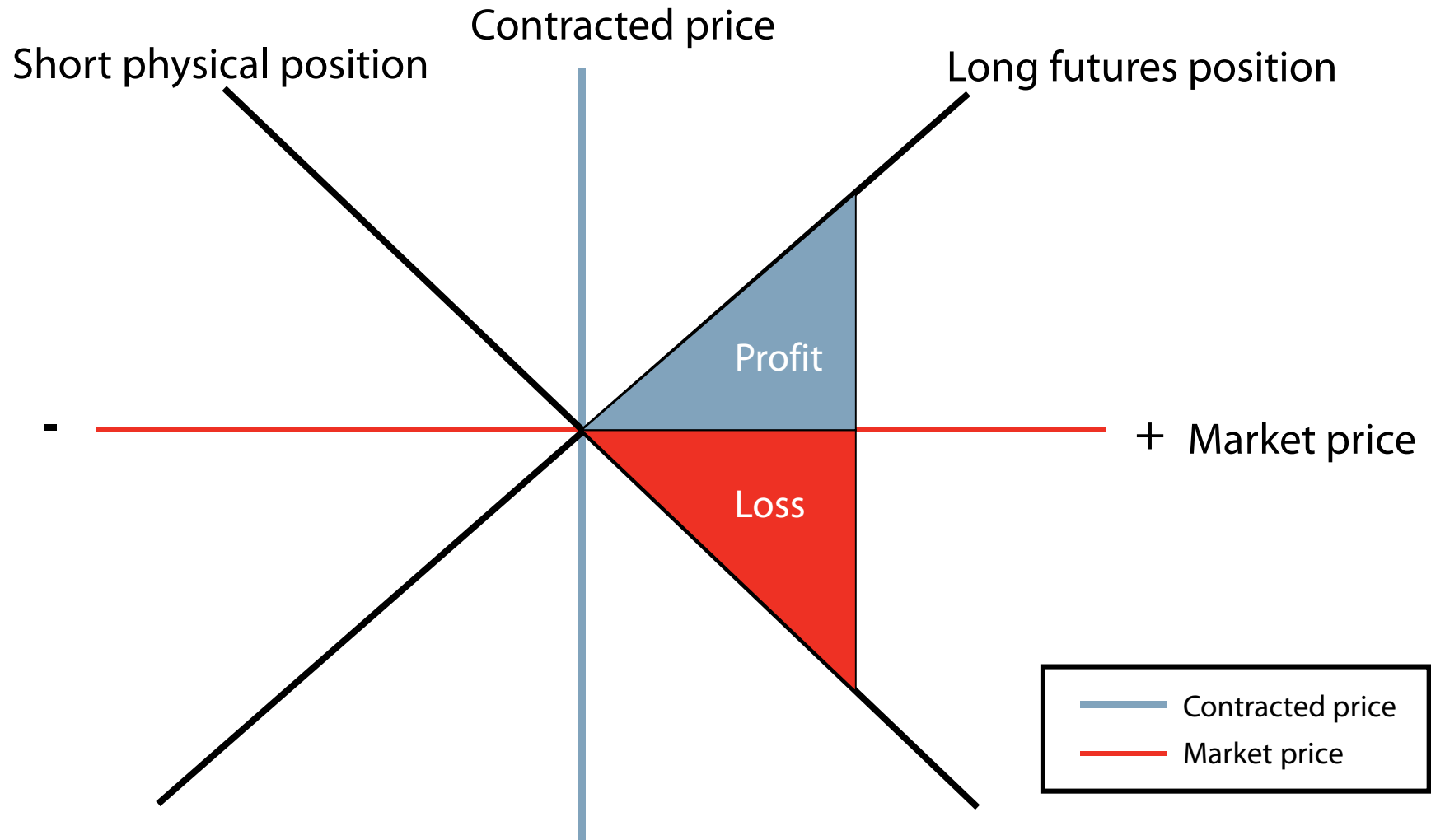| LME	Physical
7th May 2007	**Produce Metal = Long Physical**
Sell 100 lots LME Nickel futures prompt 7th Aug 2008 @ $42,100mt	
5th Aug 2008	
Buy back 100 lots Close 2nd Ring Cash LME Nickel @ $18,730mt	
7th Aug 2008	**7th Aug 2008**
LME contracts settle Realized LME profit = **$23,370mt**	Sell 600mt Nickel to converter @ $18,730mt Total revenue from sale = $18,730 + $23,370 = **$42,100mt**

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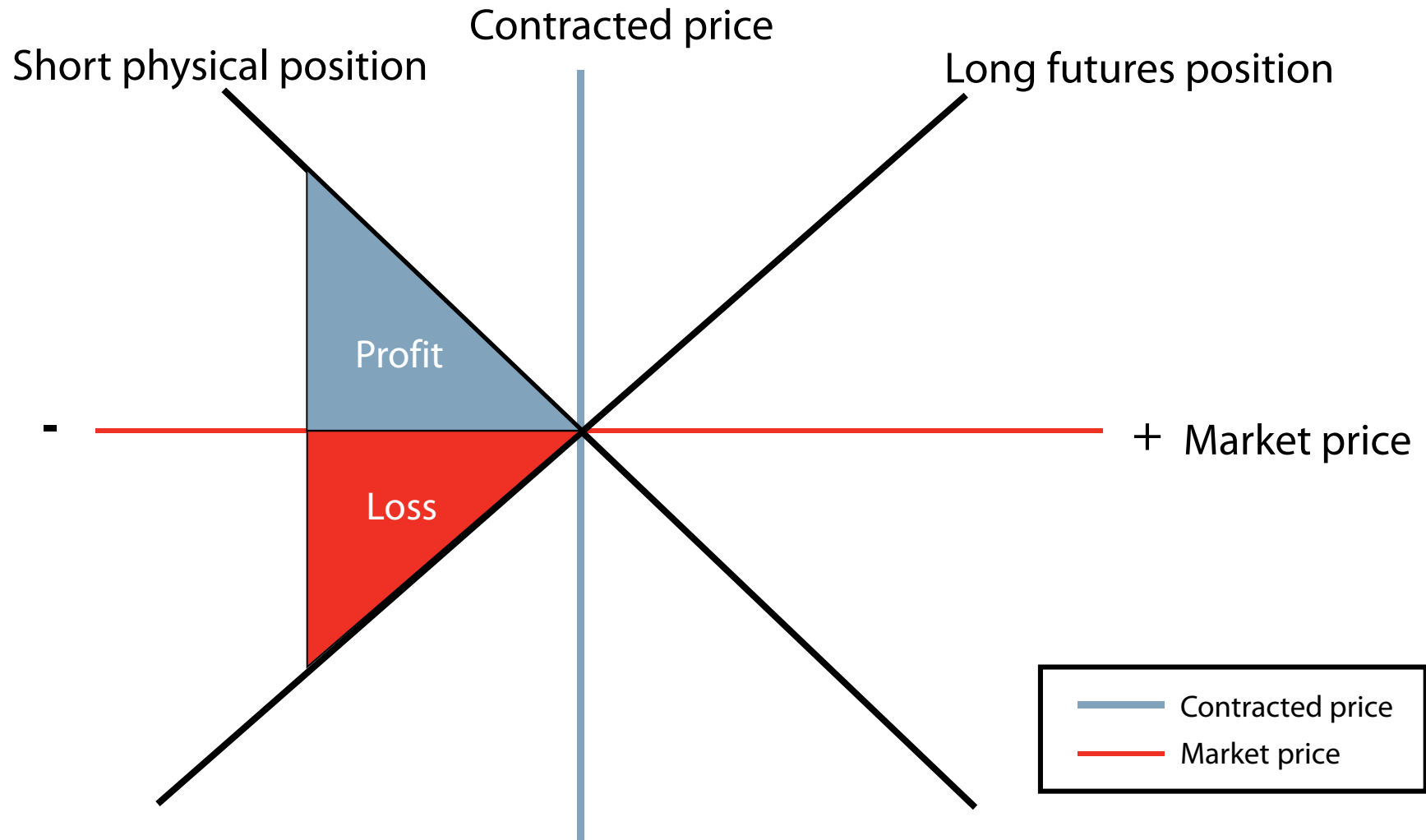
Long hedge

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Long hedge

Purchase of futures contracts by a firm worried about rising prices

- Used to protect against price increases in the future

- Offers the chance to lock in profits (if income from operations can be maintained)

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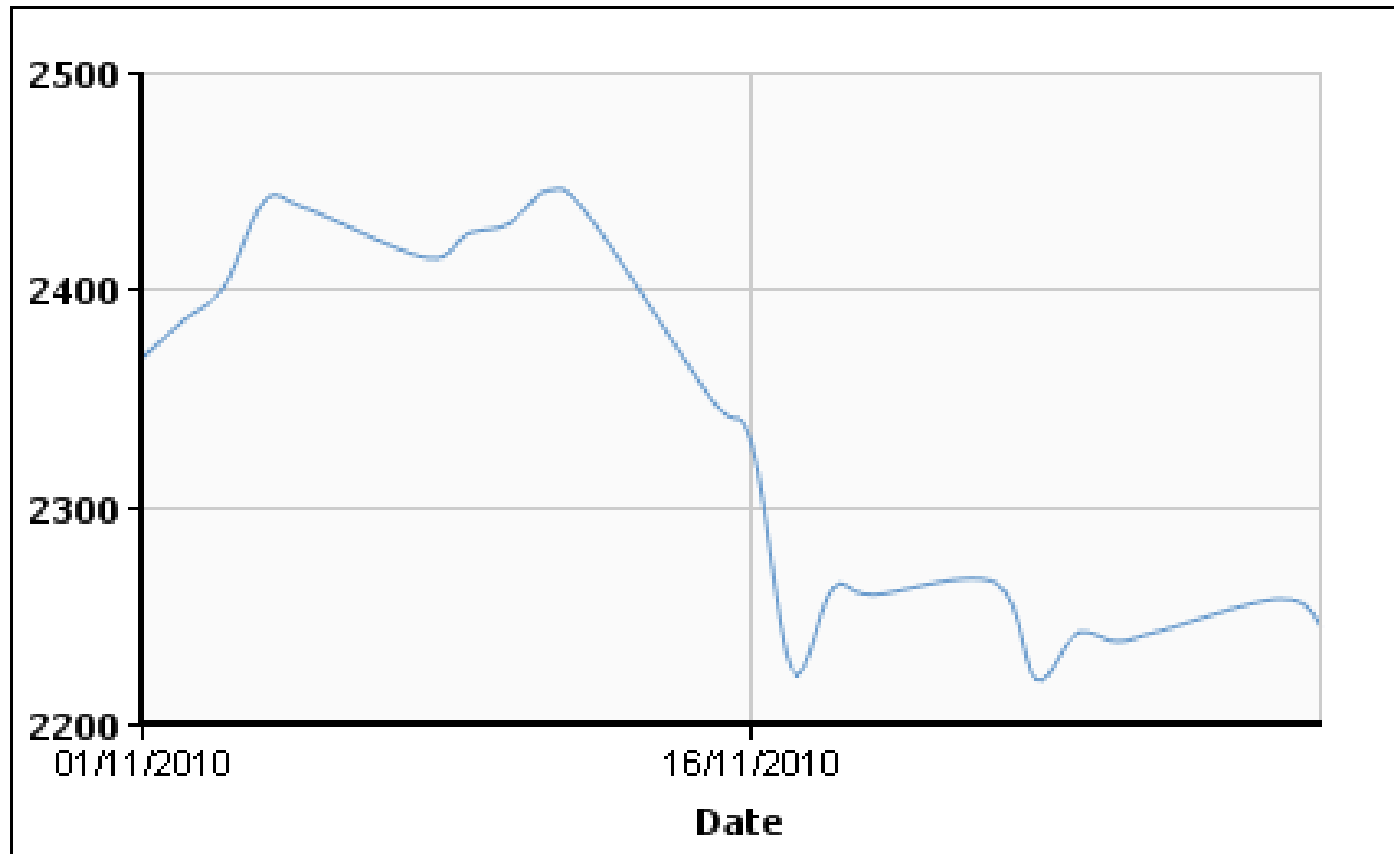# Long hedge – rising price

Short physical position   Contracted price   Long futures position

Profit

−   + Market price

Loss

| Contracted price |
| Market price |

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Long hedge - falling price

Short physical position — Contracted price — Long futures position

Profit

Loss

− + Market price

Legend:
- Contracted price
- Market price

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Hedging with LMEswaps

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Average Pricing

LME Aluminium settlement price Nov 2010

November average $2333.07

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Hedging with LMEswaps

Typical pricing formula:

M–1   (pricing month before month of shipment)

M   (pricing month of shipment)

M+1   (pricing month after month of shipment)

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LMEswaps

- Financially settled two-part futures contract

- Buy/sell fixed price for floating price

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LMEswaps

- Buyer of LMEswap fixes the purchase price and closes this purchase at the MASP. Cash difference is paid the second business day of the next month

- Seller fixes the sale price and closes this sale at the MASP. Cash difference is paid the second business day of the next month

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Case study 2: a car manufacturer hedge with LMEswaps

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Average price hedging
Scenario – BAT automobile company

November

An automobile manufacturer has published the sales price for a car. It has not been able to negotiate a fixed price for that period for the monthly purchases of aluminium alloy parts for that car; the contract will be priced on the unknown January MASP (monthly average settlement price).

BAT's budget is based on the *current* market price of LME Aluminium Alloy and it needs to ensure that the volatile price of raw material does not impact on its profit and loss for the period.

What action does the company have to take?

Quantity   300 tonnes of LME Aluminium Alloy (AA)
Period   January
Current Jan price $2010 per tonne

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Hedge using LMEswaps

- Aluminium alloy (AA) LMEswap quote for January is $2000 - $2010 per tonne

- BAT agrees to buy at the fixed price of $2010 per tonne and settle this financially at the Monthly Average Settlement Price (MASP) on the last business day of January

- If the price settles higher than $2010, BAT receives the difference. If the price settles lower than $2010 BAT pays the difference.

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Car manufacturer
BAT automobile co.

LME	Physical
Nov Buy 10 lots January AA LMEswap @ $2010mt	
	31 Jan Buy 250mt March AA requirement basis $2100mt
31 Jan Settlement for difference between fixed price $2010mt and floating MASP $2100mt	
	Total purchase price = $2100 - $90 = **$2,010mt**
2 Feb Receive cash settlement **$90mt**	

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Case study 3: a drinks company hedge with futures

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Case study 3: a drinks company

February

- It is February. A consumer of aluminium cans has agreed to buy material with an aluminium coil content of 250mt basis LME settlement price for 18 November.
  The consumer wishes to eliminate risk from any movement in price.
  The current 18 Nov forward price is:

Current LME prices	LME Aluminium
18 November Buyer	2215
18 November Seller	2225

If the price of the cans rises, they cannot pass any increase on.

Drinks company
Answer

LME	Physical
<u>Feb</u> Buy 10 lots (250 tonnes) Al 18 Nov @ $2225mt	

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Drinks company
Answer

16 November LME settlement price

	Aluminium
November Buyer	**3,300**
November Seller	**3,310**

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Drinks company
Answer

LME	Physical

Feb
Buy 10 lots (250 tonnes) Al 18 Nov @
$2,225mt

16 Nov
Sell 10 lots Al Cash at $3,310mt

16 Nov
Buy 250mt material basis LME Al
Settlement price of $3,310mt

Total buy price =
Nominal LME profit =   **$1,085mt**
$3,310- $1,085 =   **$2,225mt**

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Drinks company

Answer

16 November LME settlement price

	Aluminium
November Buyer	**1,300**
November Seller	**1,310**

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Drinks company
Answer

LME	Physical
<u>Feb</u> Buy 10 lots (250 tonnes) Al 18 Nov @ $2,225mt	
<u>16 Nov</u> Sell 10 lots Al Cash at $1,310mt	**<u>16 Nov</u>** Buy 250mt material basis LME Al Settlement price of $1,310mt
Nominal LME loss = **$915mt**	Total buy price = $1,310 + $915 = **$2,225mt**

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Case study 4: a zinc smelter hedge with options

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Case study 4: a smelter hedge using options

December 2012

- The forward price for zinc is $1800 for 2013. A zinc smelter has agreed to sell zinc at the unknown LME price for 2013

- Prices are low but the smelter does not want to risk selling at an even lower price

- Buying a put is one solution

Current 2013 put prices	LME Zinc
Strike 1800	120
Strike 1750	95

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Selling an option

Another major reason for selling options, is to reduce the cost of buying other options, assuming that this option purchase is the primary hedge objective

The MinMax

Maybe suitable for both hedge buyers and sellers

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The MinMax strategy
(risk reversal, collar, fence)

The consumer MinMax

Buys calls and sells puts

Setting a maximum price that can be paid but limiting any downside
   participation

The producer MinMax

Buys puts and sells calls

Setting a minimum hedge sale price but limiting any upside price
   participation

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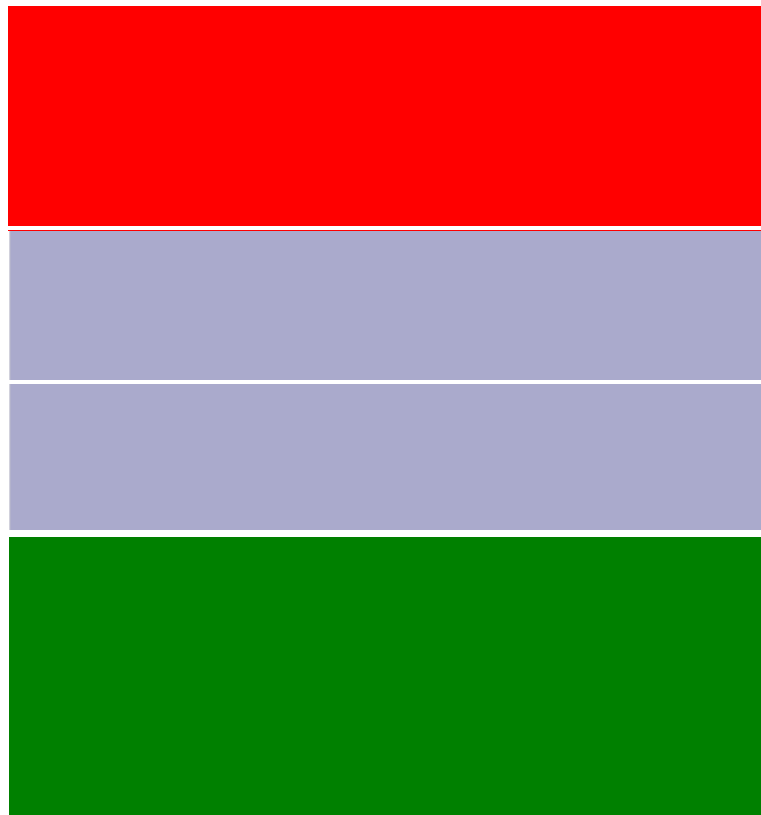
Producer MinMax

The MAX. Producer sells **out-of-the-money** call at $1900

They will sell at market within this band

The MIN. Producer buys **out-of-the-money** puts at $1700

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MinMax

Variations and variables

Zero-cost is the norm but not essential

Ratio does not have to be 1 : 1

Return for zinc smelter is no lower than $1700 and no higher than $1900

Fundamental analysis of the industrial metals

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Introduction

Define a metal

- How are they made?

- Where are they from?

- Where are they used?

- Why is the price important?

Metals reserve map

Canada exports large quantities of materials to US both ores and semi-finished.

A key trading route is Russia – EU allowing Europe to easily consume Russian metals

Fe
Cu
Ni
Al
Zn
Sn
Pb

Zambian copper ore shipped to China and refined metal to Europe.

Australia exports ores to China for further processing

Chile exports copper ores/metal to China

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PEST analysis

PEST - Political, Economic, Social & Technological factors of the macro-environment.

POLITICAL ANALYSIS	ECONOMIC ANALYSIS
• Trade restrictions and tariffs (arbitrage). • Political stability (Middle East, Nigeria) • Anti-trust laws • Environmental regulations • Employment laws (cheap labour) • Tax policy	• Economic growth rate • Exchange rates, Inflation rate, Interest rates etc • Business cycle stage (prosperity, recession, recovery) • Labour costs • Government intervention in the free market
SOCIAL ANALYSIS	TECHNOLOGICAL ANALYSIS
• Demographics • Population growth rate • Class structure • Education • Emphasis on environment, safety & health.	• Research & Development Activity • Rate of technological change • Impact of technology on products • Impact on cost structure • Impact on value chain structure

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Aluminium industry overview

• Export restrictions and tariffs
• Resources/ technology

Bauxite/ alumina
Freight of raw materials
Electricity

• Refinery expensive to start and run
• Distribution of producers
• **energy intensive**

Refined Aluminium
(ingots)

Economic growth (GDP)
Industrial production (IP)

Aluminium products
Eg. Sheet, cable, foil

• Key driver for consumption growth

Transport
Construction
Packaging

• Environmental regulation/ emissions
• Substitutes e.g. plastics in transport/ packaging and copper cables

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Collating raw data

Key Economic Data

- GDP/IP including sector IPs (construction, engineering, auto, transport)

- Government & private sector spending e.g. fixed asset investment

- Purchasing Managers Index (PMI)

- Unemployment & household disposable incomes

- Inflation rates, interest rates and exchange rates

- Other e.g. money supply, fiscal policy, economic stimulus packages

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Historical copper prices trend

Real Copper price (2012 USD)

USGS, LME

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Demand Forecasting

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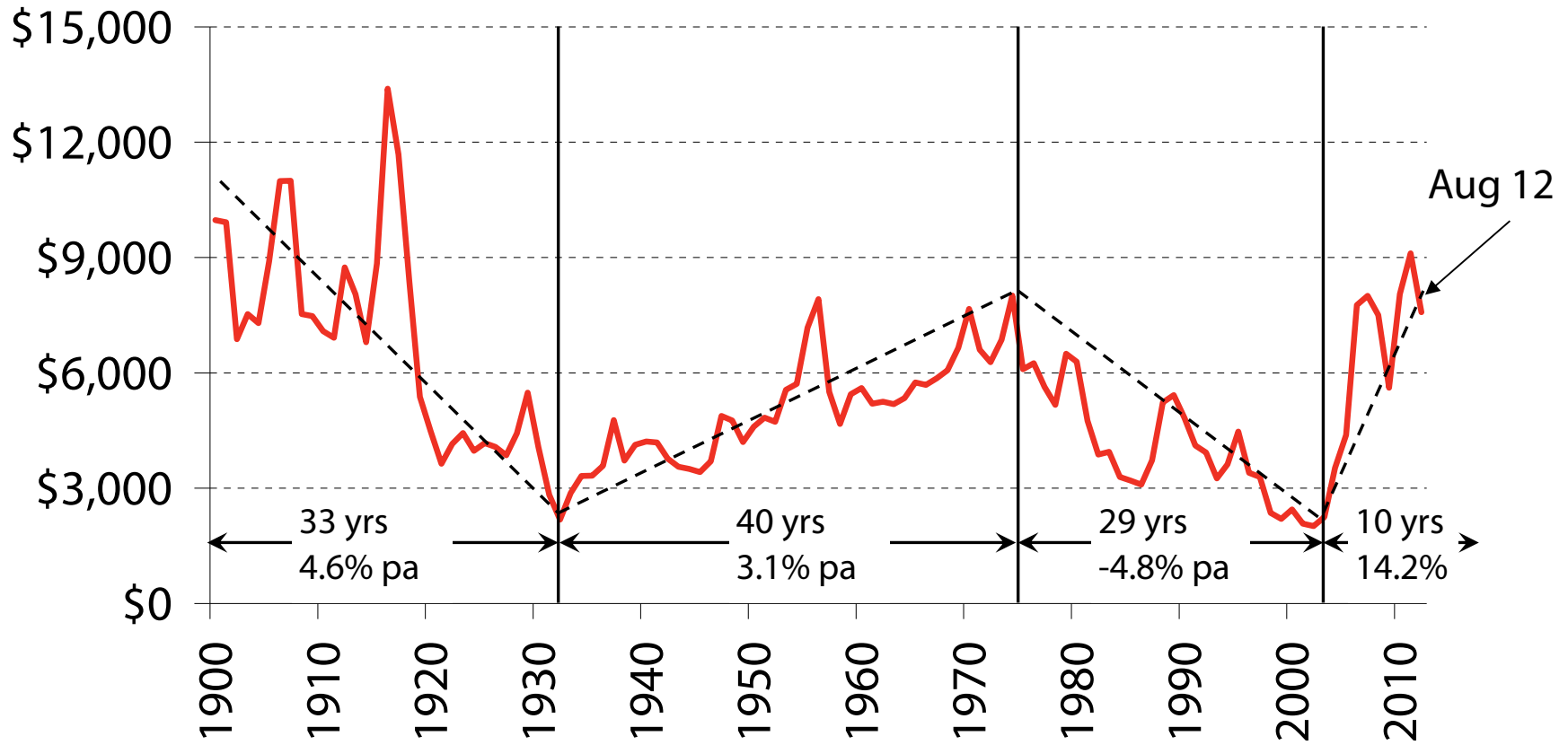
Market modelling - forecasting

- Econometrics and quantitative techniques such as correlations and regressions

- Analyst's gut instinct & knowledge of industry trends through experience and new information assimilated may lead to different forecasts

- Analyst will also consider current market forces at play in Porter's Analysis and/or relevant 'PEST' issues.

- A forecast is not a mere prediction!

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Top down approach - macroeconomics

- **Effect of IP/GDP growth on demand**

- **Consumption by end use sector**

  – Vehicle production

  – Housing

- **Effect of inventory changes**

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US, Europe and China GDP

2012 forecasts: China 8.1% growth, US 2.1% growth, EU 0.5% decline

Y-o-Y percentage change in quarterly GDP
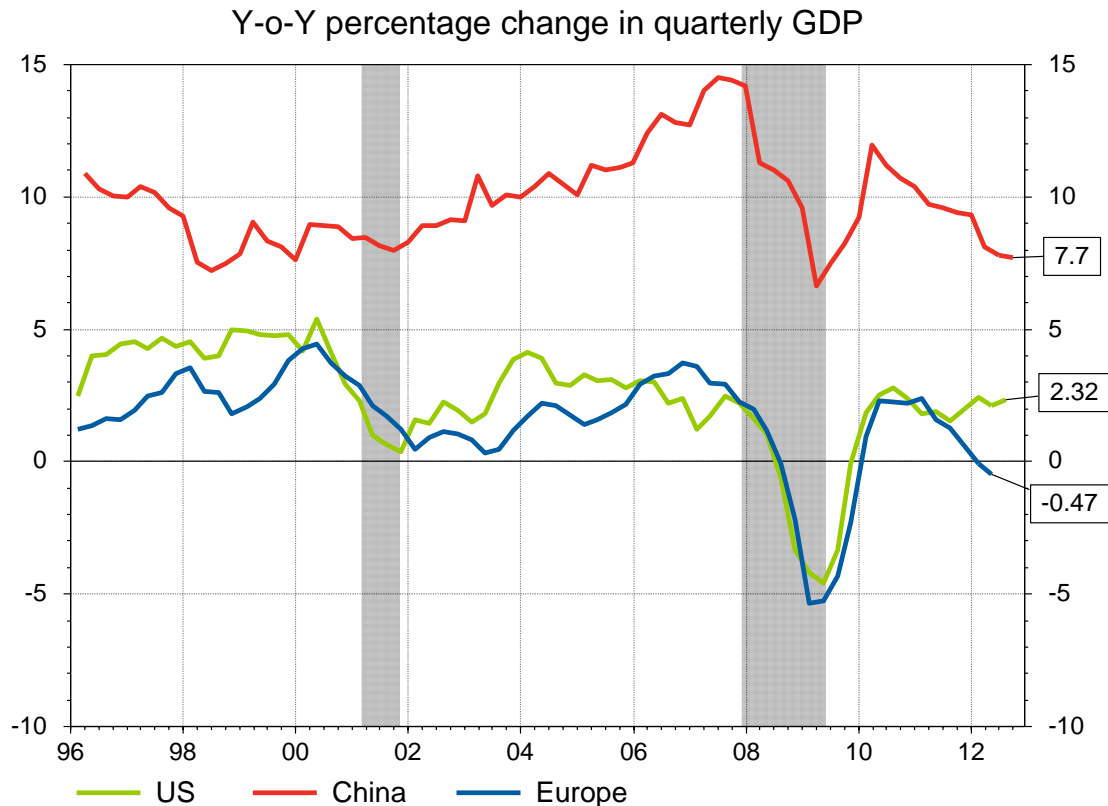
Q2 2012
Chinese GDP growth slowing

7.7

US growth stable

2.32

-0.47

EU heading for recession?

US   China   Europe

Source: Thomson Reuters Datastream

Source: National Sources, The Economist

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Metals end-use consumption by sector

Copper

- 31% Electrical/Electronic
- 25% Construction
- 17% Consumer & General
- 12% Transport
- 10% Industrial Machinery
- 5% Other

Legend:
- Electrical/Electronic
- Construction
- Consumer & General
- Transport
- Industrial Machinery
- Other

Aluminium

- 24% Transport
- 25% Construction
- 17% Packaging
- 12% Electrical
- 6% Consumer durables
- 10% Machinery & equipment
- 6% Other

Legend:
- Transport
- Construction
- Packaging
- Electrical
- Consumer durables
- Machinery & equipment
- Other

Source: CRU

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US auto production & construction
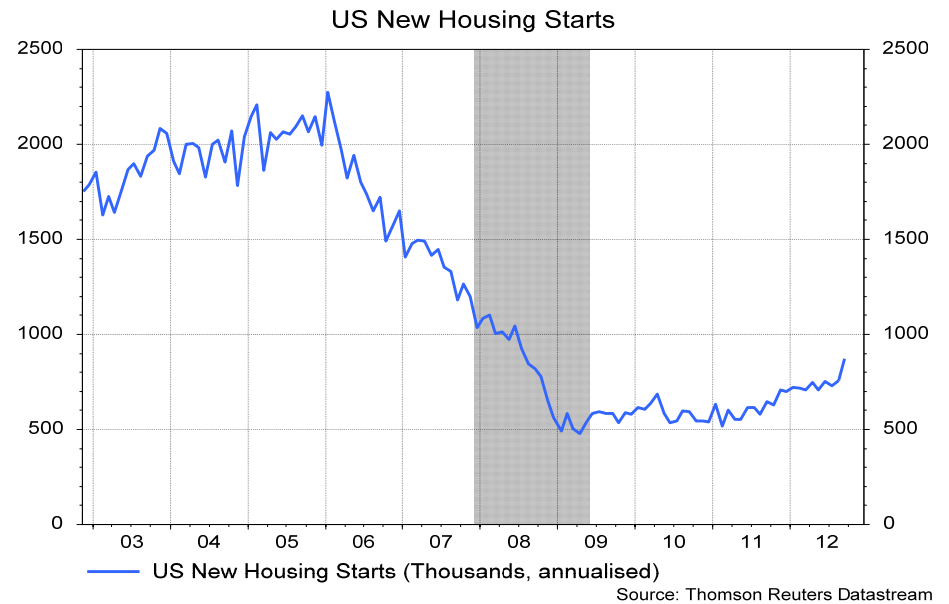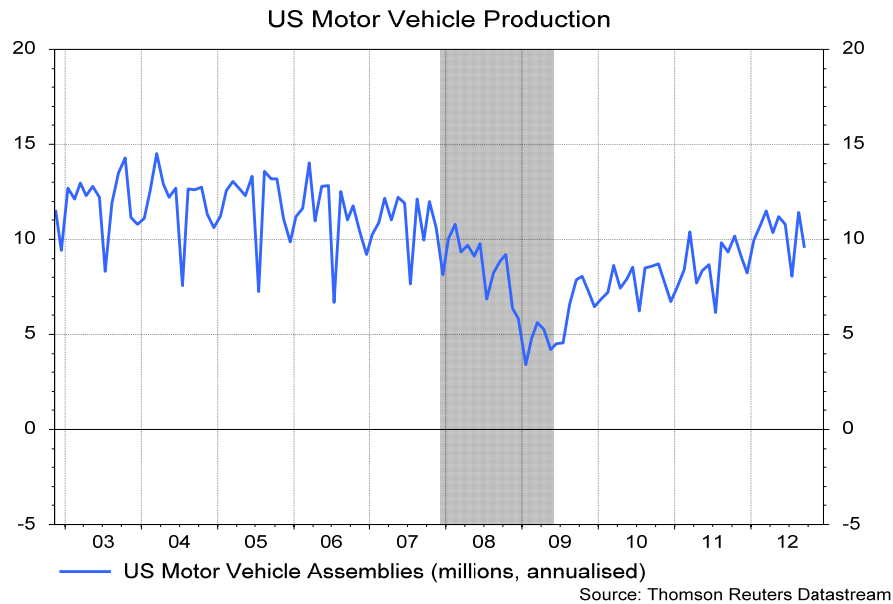
US recessions highlighted in grey

- Vehicle production decreased approximately 50% through 2008, but has seen improvement in recent months
- US Housing starts have stabilised through 2009.

Source: Federal Reserve

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Demand forecasting – bottom up approach

- Production data for the end-uses of the product will be summed up to find the total demand for the product.

- **Example 1:** Demand for semi-finished product

  = Production of finished products/ Product yield

- **Example 2:** Steel plate demand from shipbuilding

  = Number of ships X Steel plate used per ship

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Interpretation of stocks data

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Examples: interpretation of stocks data

- LME stocks + LME cancelled stocks

- Other exchanges' stocks e.g. Shanghai, Comex

- Producer, country, commercial stocks

- Unreported stocks

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Metal copper stocks
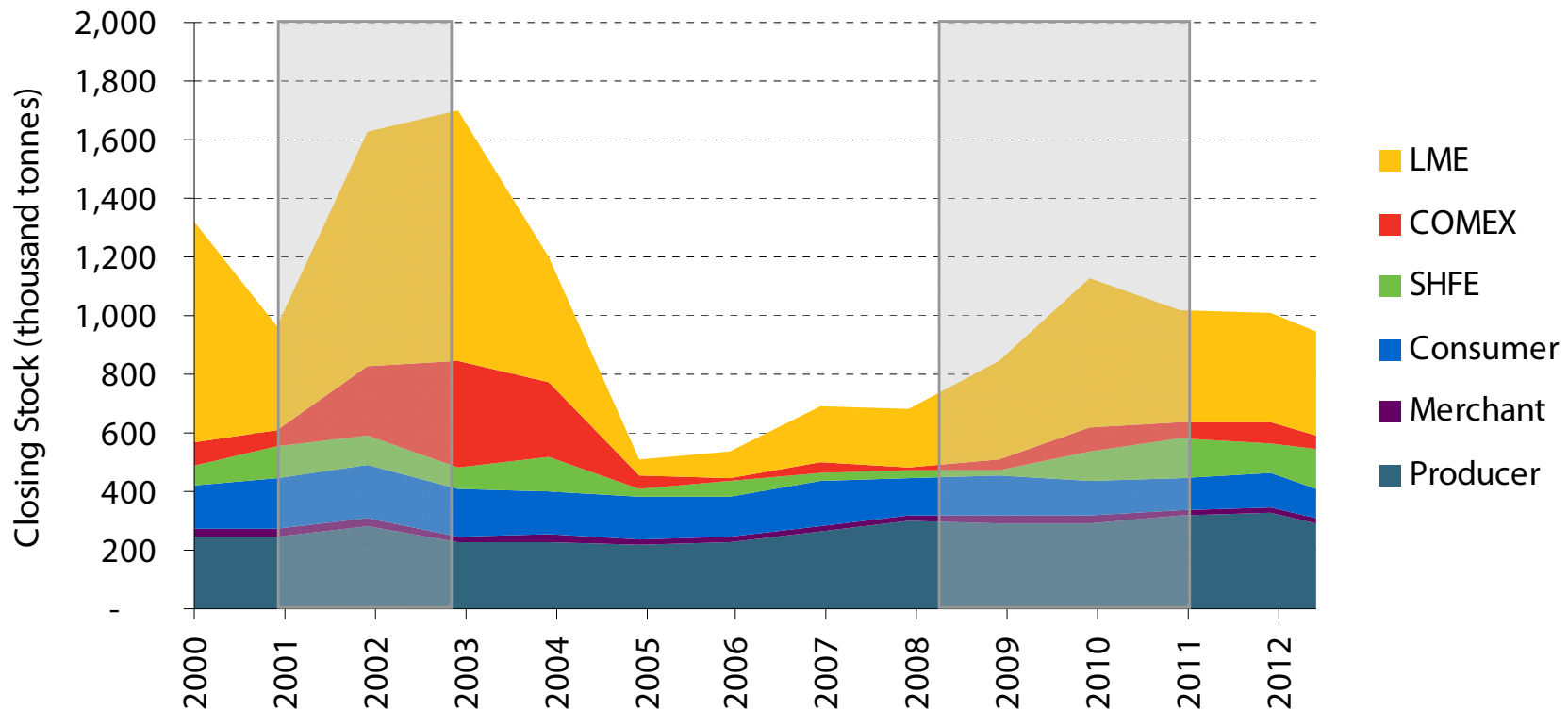
- Recession band highlighted in grey (US recessions, NBER).
- Demand in recession decreases hence stocks increase.

Source: WBMS

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Nickel stocks and price trend

Nickel price (cash) and warehouse stock

Record Max
Date: 16 May 2007
Price: $54,200

Record minimum
Date: 5 Feb 2007
Stock: 2,982 tonnes

— LME Cash Price (U$/MT)
Warehouse stock (Thousand tonnes)
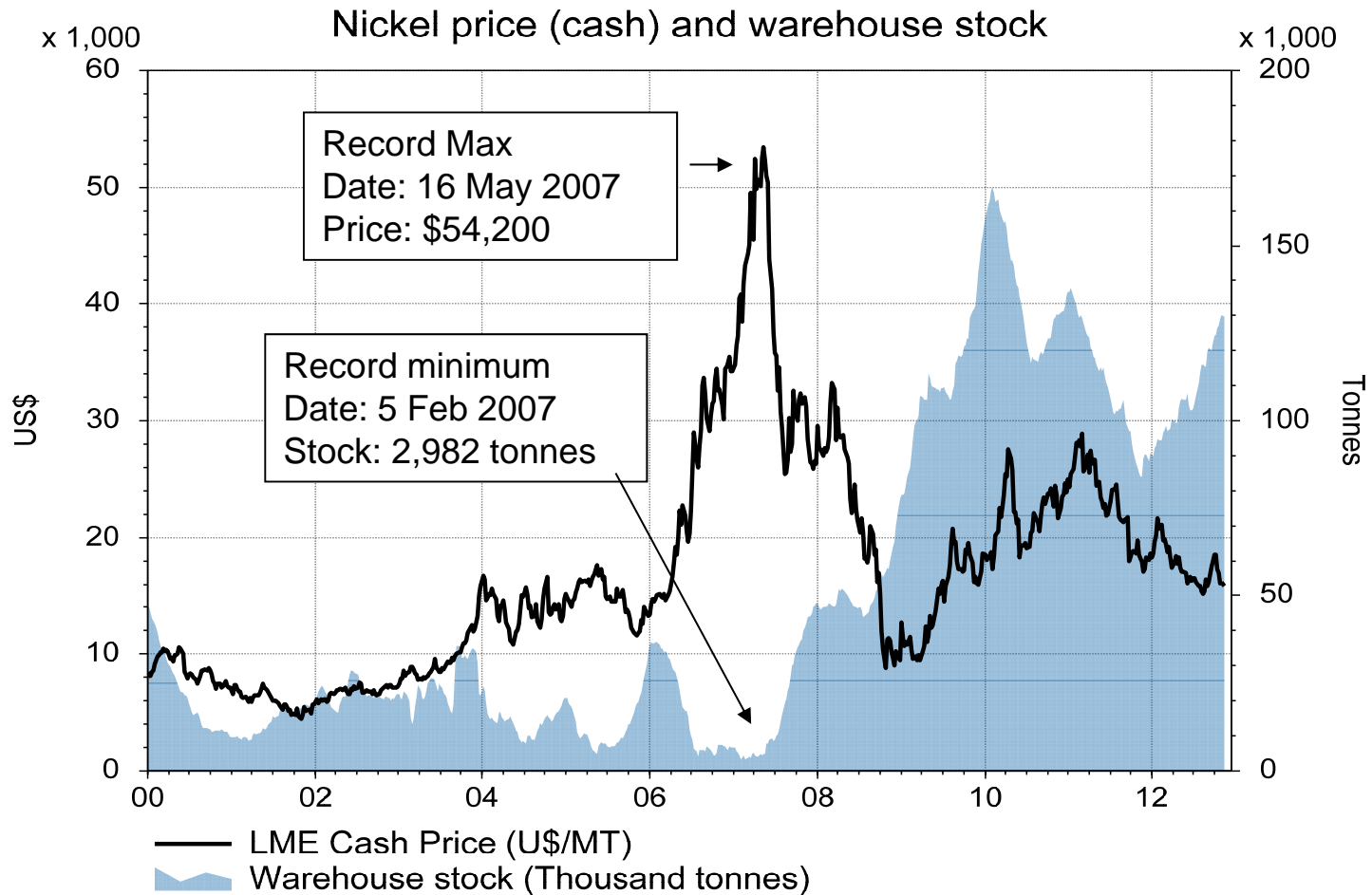
Source: Thomson Reuters Datastream

Source: LME

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Other prices drivers

- Freight

- Regulation

- Stimulus packages

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Production forecasting

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Market modelling – production forecasting

- Following factors must be considered:

    - New capacity

    - Unplanned stoppages e.g. strikes, breakdowns, raw material shortages, disasters, wars etc

    - Supply cutbacks as a result of lacklustre demand

    - The cost curve i.e. is the cost of production below the sale price?

    - Any capacity closures

- Production forecasts will also be influenced by the implied net trade balance i.e. whether the analyst thinks the country will be a net importer or net exporter.

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Forecasting prices

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Market modelling – forecasting prices

- **So what determines the price?**

- **Simply put, it's the ability of the market to satisfy demand:**

  - If demand rises faster than production, prices are likely to increase.

  - If production rises faster than demand prices are likely to fall.

  - When both demand and production are falling, the one that is falling faster is likely to determine the direction of the prices.

- **When forecasting prices analysts will follow the changes in supply/demand while considering the cost curve.**

- **Seasonal patterns are also factored into the forecasts.**

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Emerging economies

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Emerging economies

Overview

- What is an emerging economy / BRICS countries?

- BRICS background

- How can GDP data give us an insight into the past, present and future of developing economies?

- Consumerism and infrastructure

- Case study: Aluminium

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Emerging economies

BRIC

Brazil

Russia

India

China

+ **South Africa** = **BRICS**

- developing countries
- large populations/ land mass
- key consumers/ producers
- drivers of commodity prices

• **BRICS countries are KEY consumers and/or producers of industrial metals**

Source: Black Coffee Project

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BRICS GDP

BRIC: annual GDP (at PPP) - US$ trillions

EU GDP (PPP) = US$14.3 trillion (2011)
US GDP (PPP) = US$15.0 trillion (2011)

Brazil
Russia
India
China
South Africa

Source: Thomson Reuters Datastream

BRIC: %age change in annual GDP (at PPP)

Brazil
Russia
India
China
South Africa

Source: Thomson Reuters Datastream
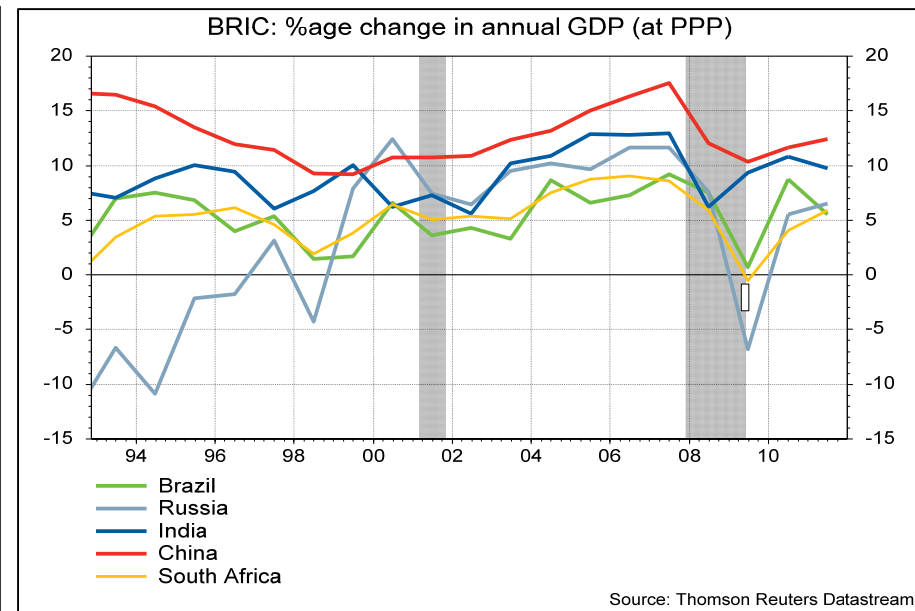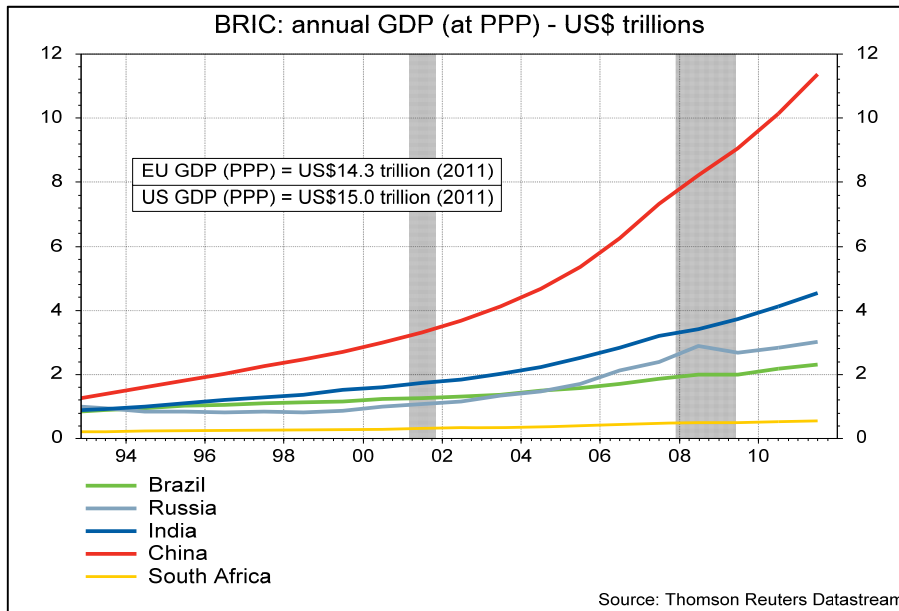
- China has the second largest GDP (PPP) after the US; since 2002 increase in GDP has been between 10% and 17.4% y-o-y

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BRICS GDP

BRIC: GDP per capita (PPP) - US$
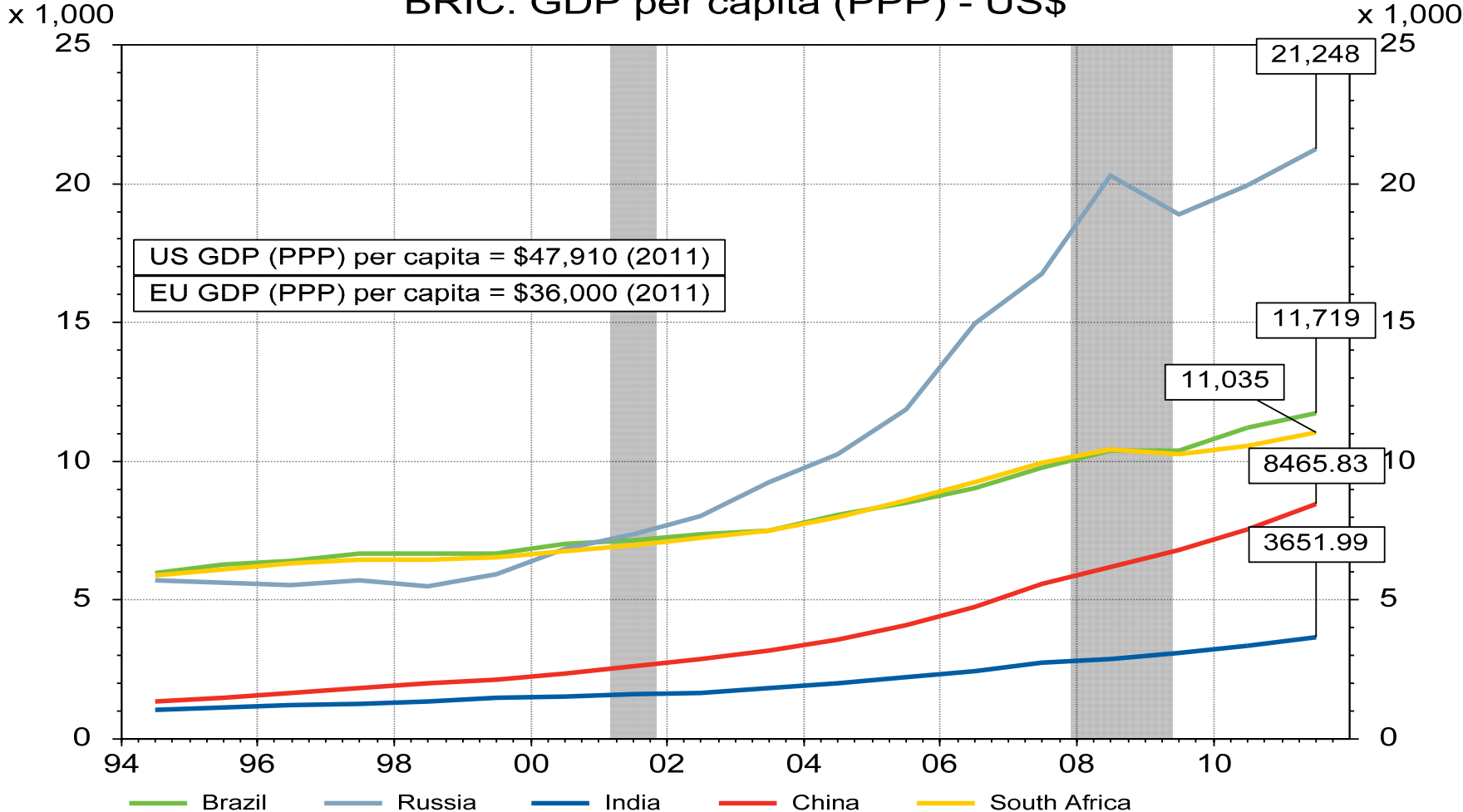
US GDP (PPP) per capita = $47,910 (2011)
EU GDP (PPP) per capita = $36,000 (2011)

21,248
11,719
11,035
8465.83
3651.99

Brazil | Russia | India | China | South Africa

Source: Thomson Reuters Datastream

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BRICS GDP – slowing growth in China

- Quarterly change in Chinese GDP

China- Quarterly %age GDP growth

Q2 2012 = 7.6%

China

Source: Thomson Reuters Datastream

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BRICS GDP –Slowing growth overall

- Quarterly change in GDP
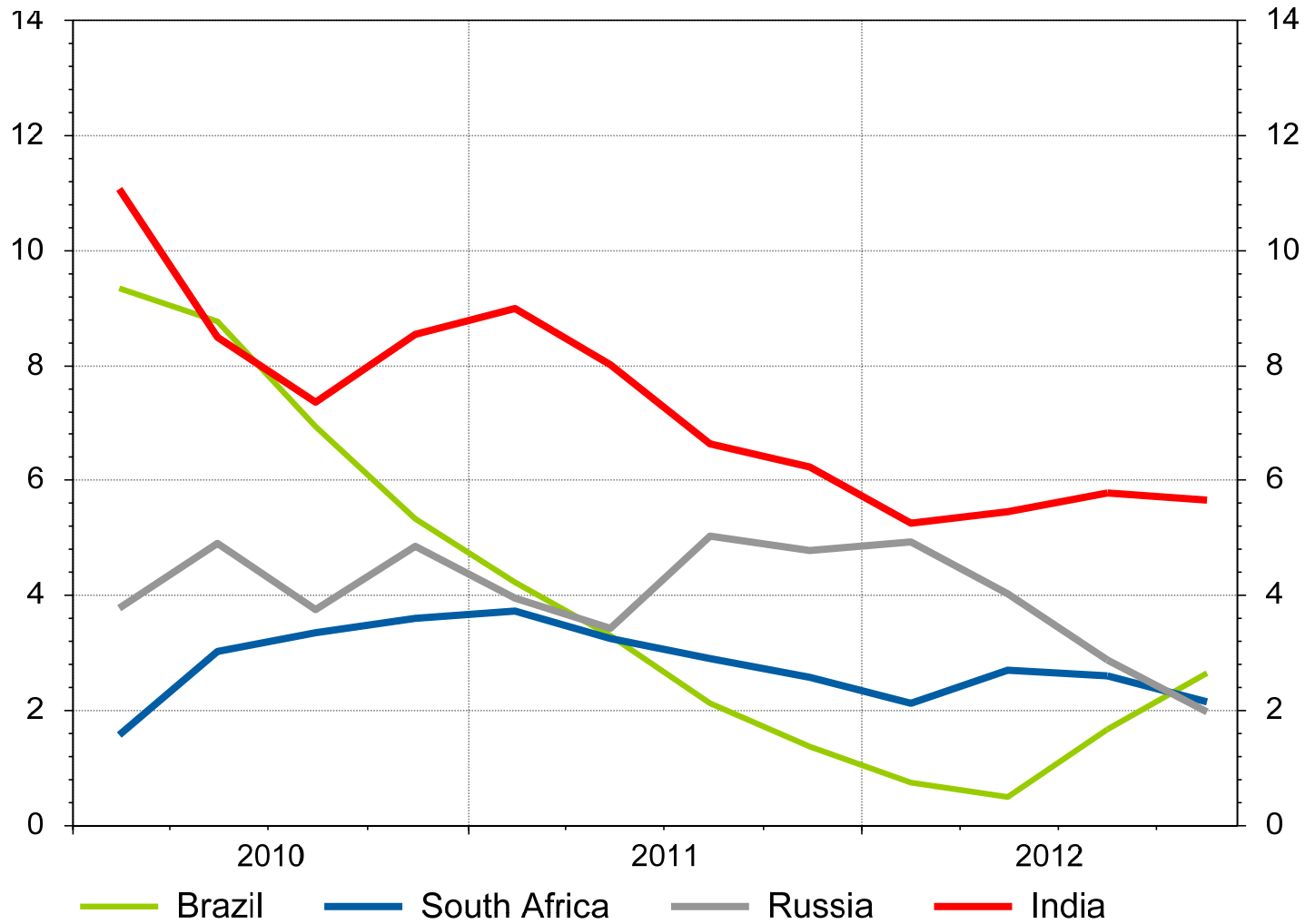
Source: Thomson Reuters Datastream

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Consumerism & infrastructure

METALS Demand

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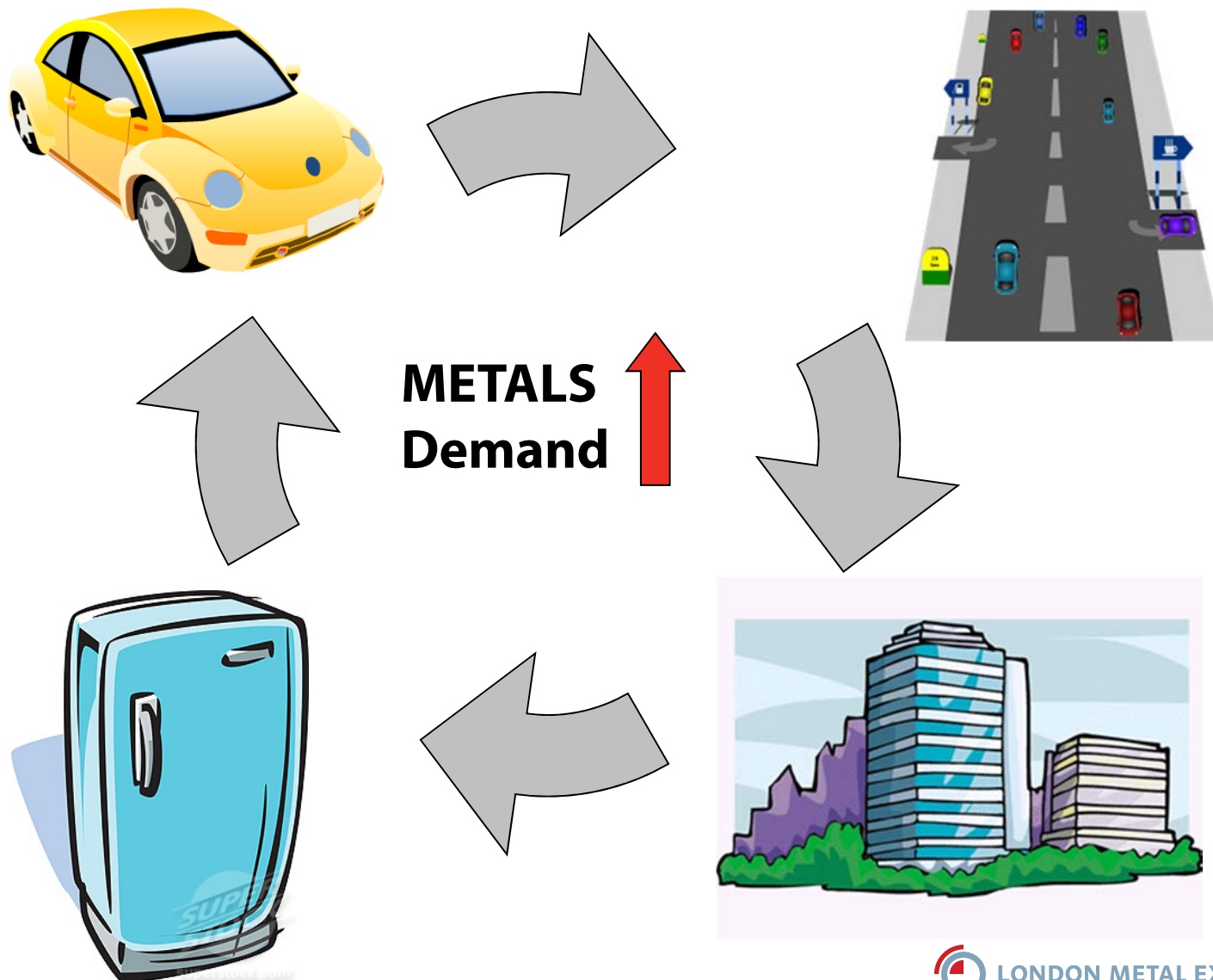
Consumerism & infrastructure

Chinese car sales

Thousands

Legend:
- US (black)
- China (red)
- Brazil (green)
- India (blue)
- South Africa (yellow)
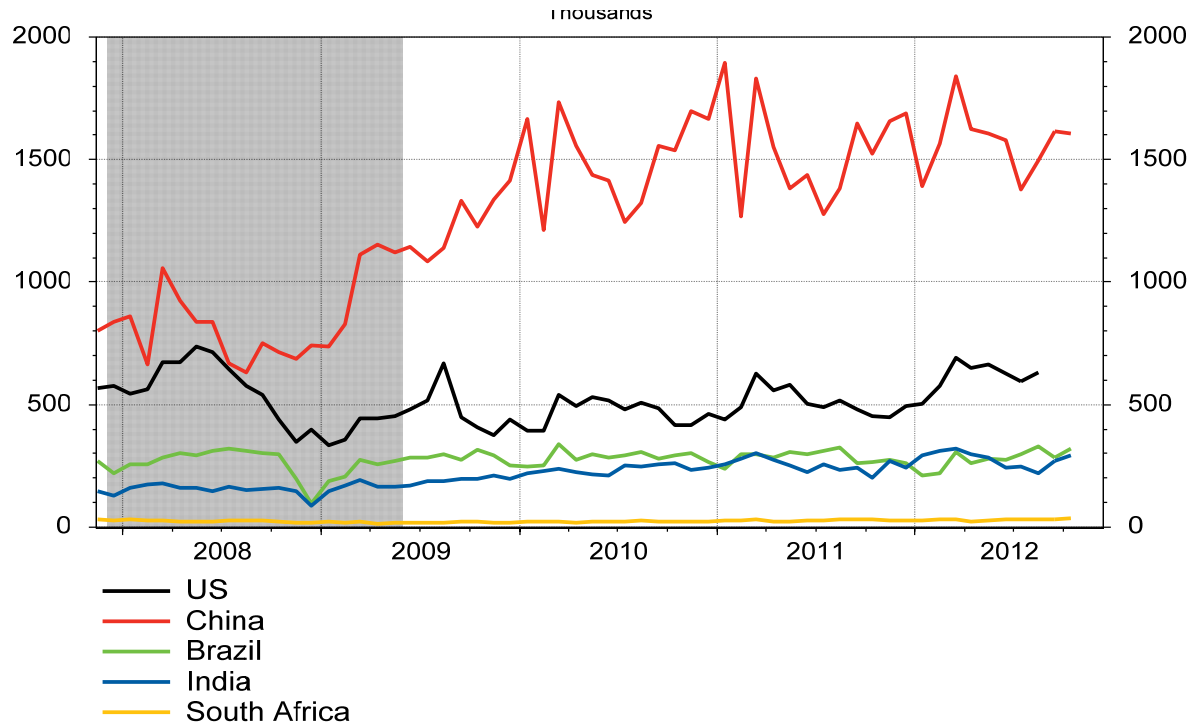
Source: Thomson Reuters Datastream

Chinese lead demand nearly double since 2007

- Don't forget the e-bikes! - estimates of 120 million in 2010, with 40 million annual production

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Consumerism & infrastructure

- Chinese high-ways doubled in length in 5 years

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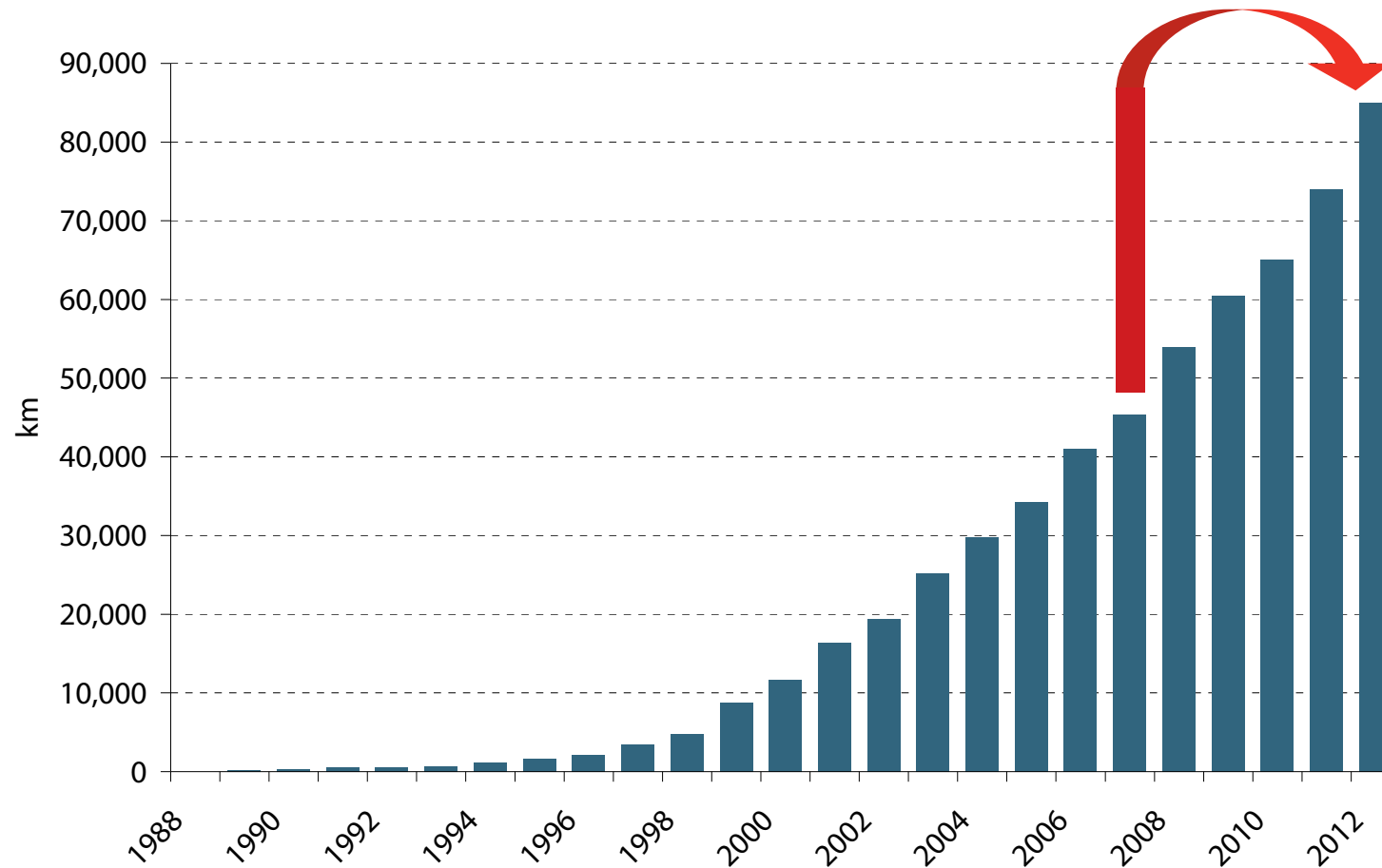
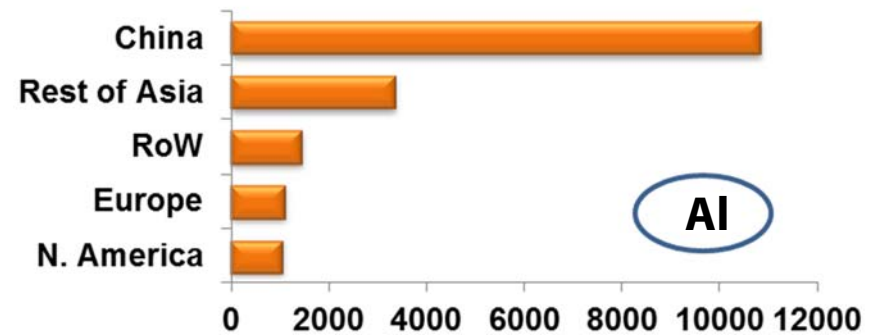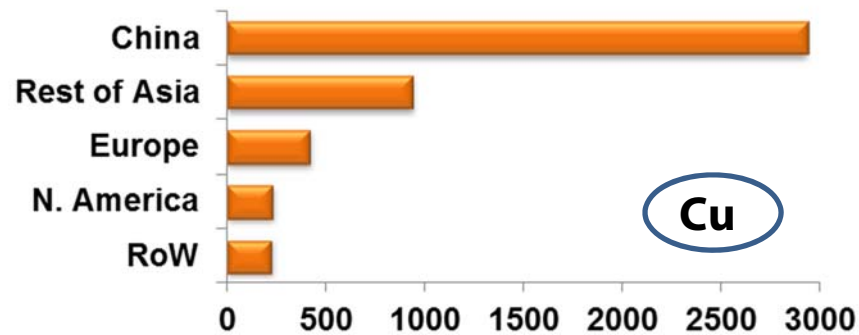# Consumerism & infrastructure

- China and the BRICS can still expand
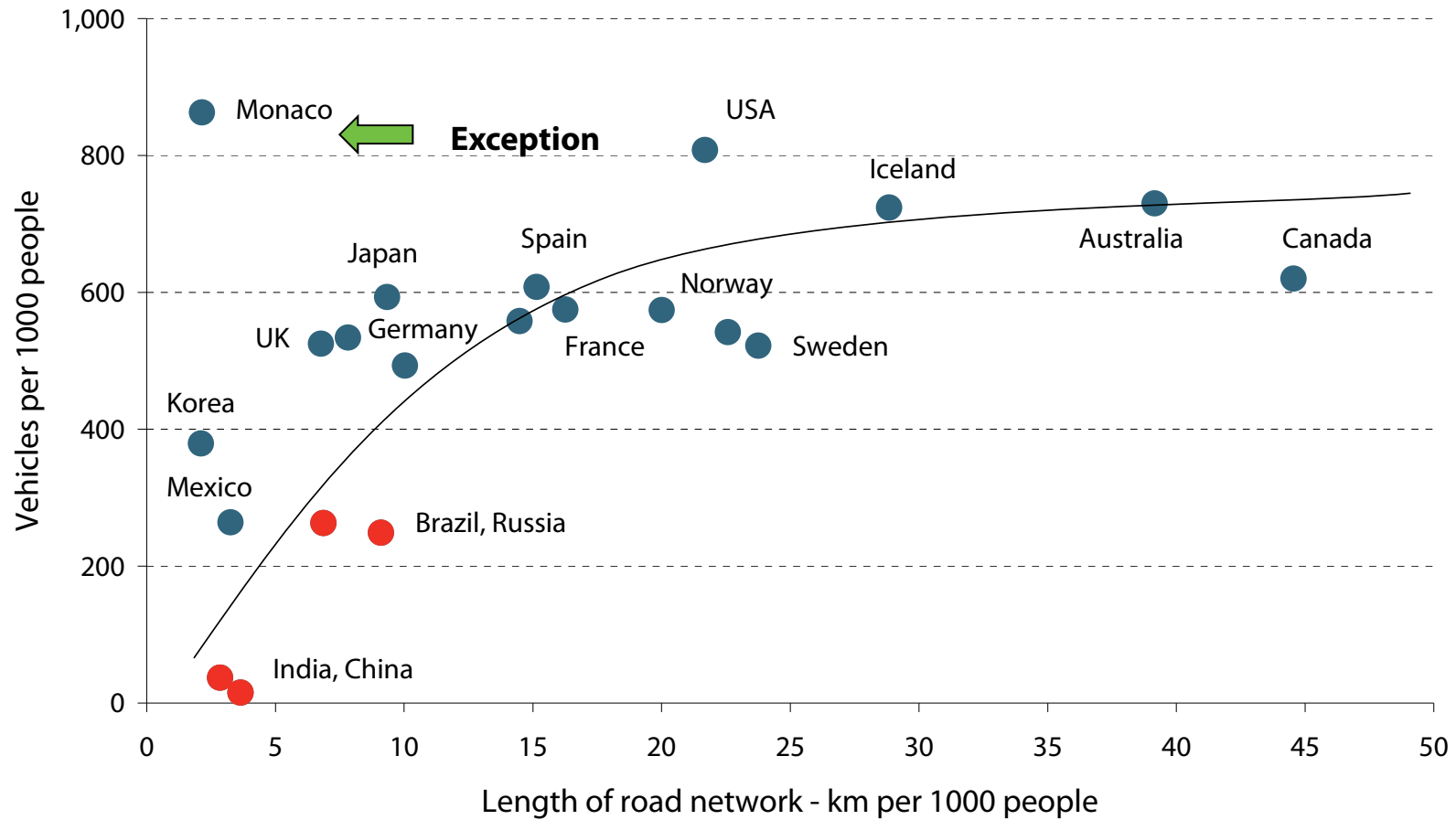
China completely dominates consumption...

Regional refined metals consumption growth, 2007-12 '000 tonnes Source CRU

LONDON METAL EXCHANGE
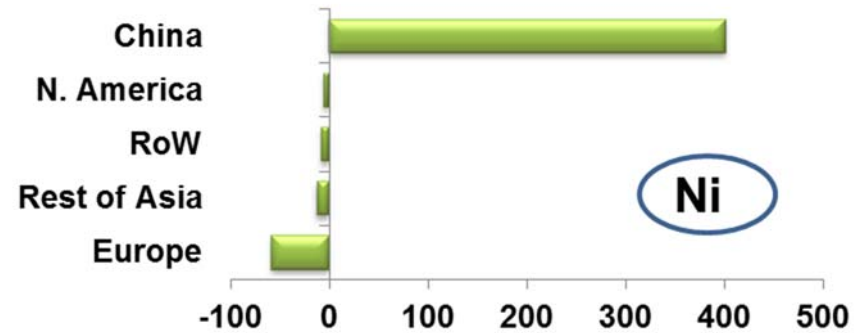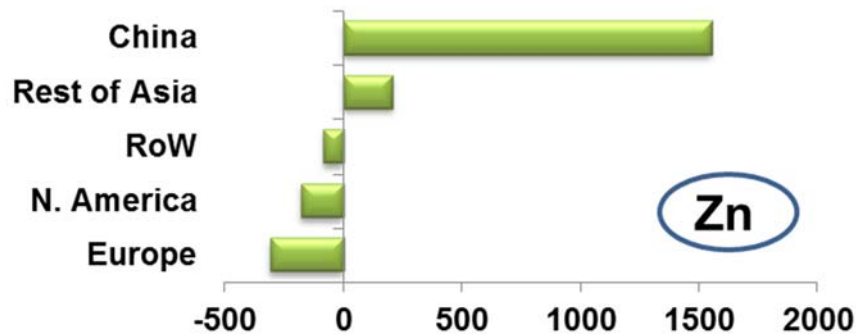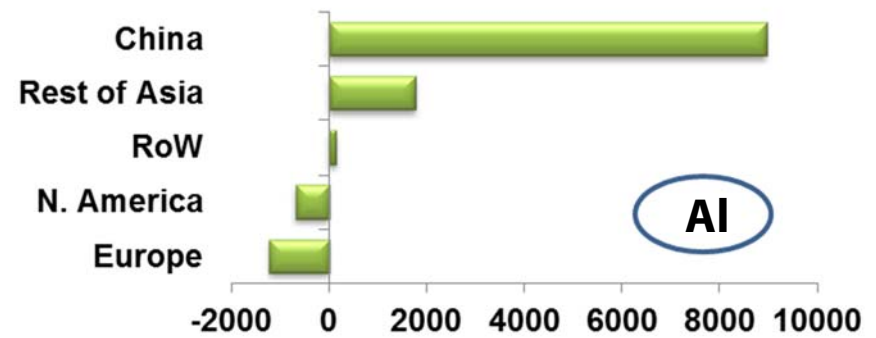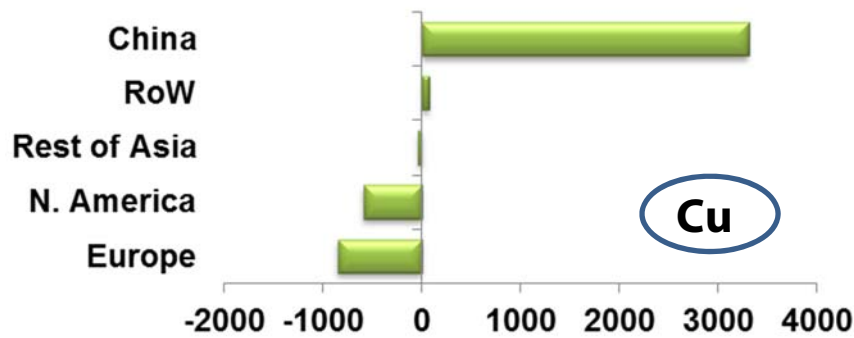
...and is expected to continue to do so

Regional refined metals consumption growth, 2012-17 '000 tonnes Source: CRU

LONDON METAL EXCHANGE
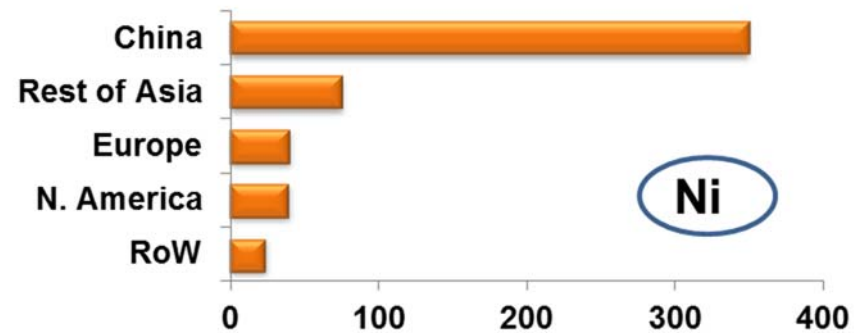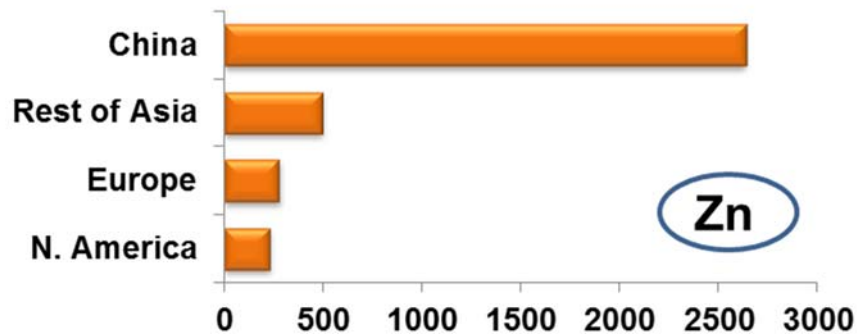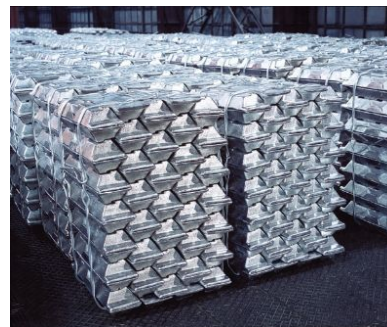
Case study: China and aluminium

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Bauxite to aluminium

Bauxite
Ore

Alumina

Aluminium chassis
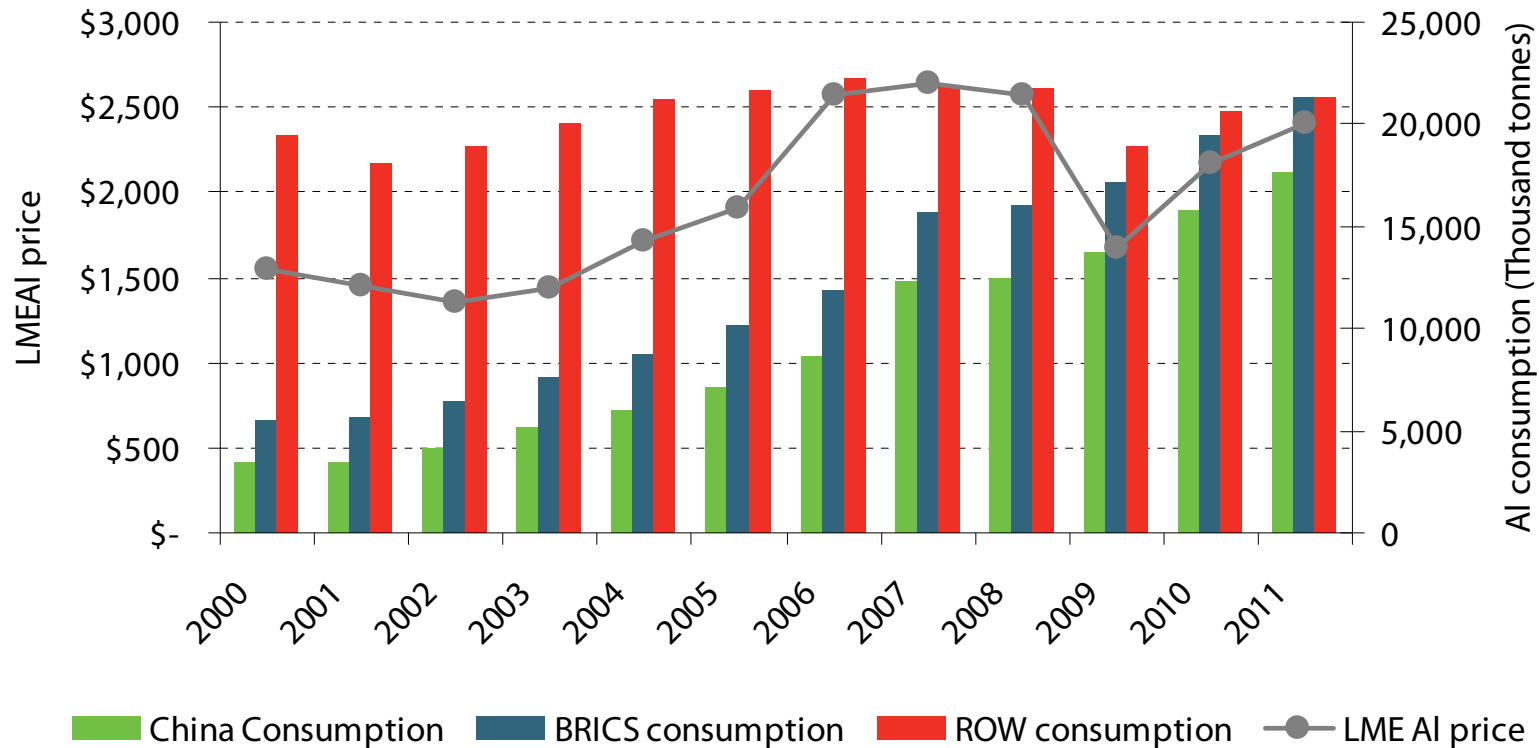

RUSAL aluminium smelter

89

Aluminium ingot

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Aluminium Consumption

-In 2011 BRICS consumptions = ROW consumption

-Chinese consumption =   14% in 2000

    41% in 2011

China Consumption   BRICS consumption   ROW consumption   LME Al price

*WBMS

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Bauxite reserves

Bauxite base reserves vs reserves (2009)

Source: USGS

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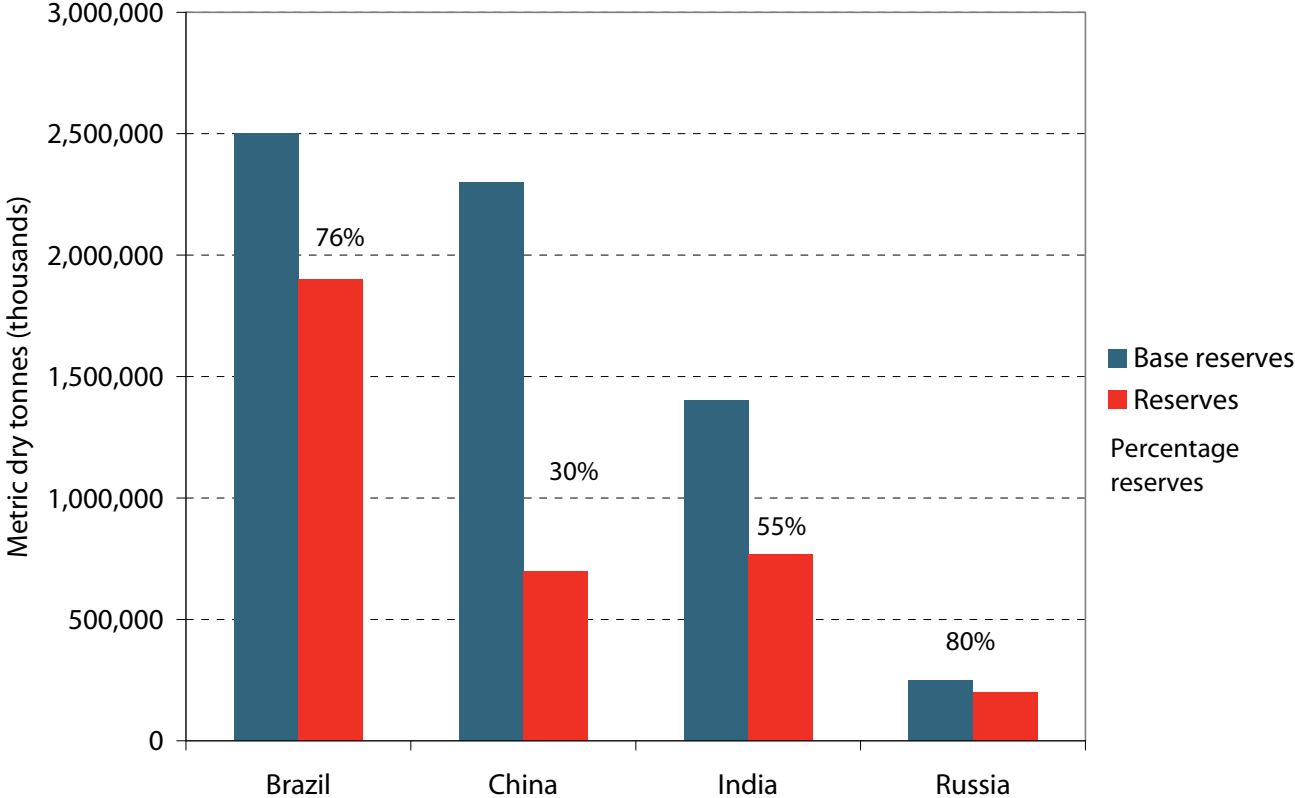
BRICS: trade

Bauxite

Aluminium

0.6 mil tonnes

1.0 mil tonnes
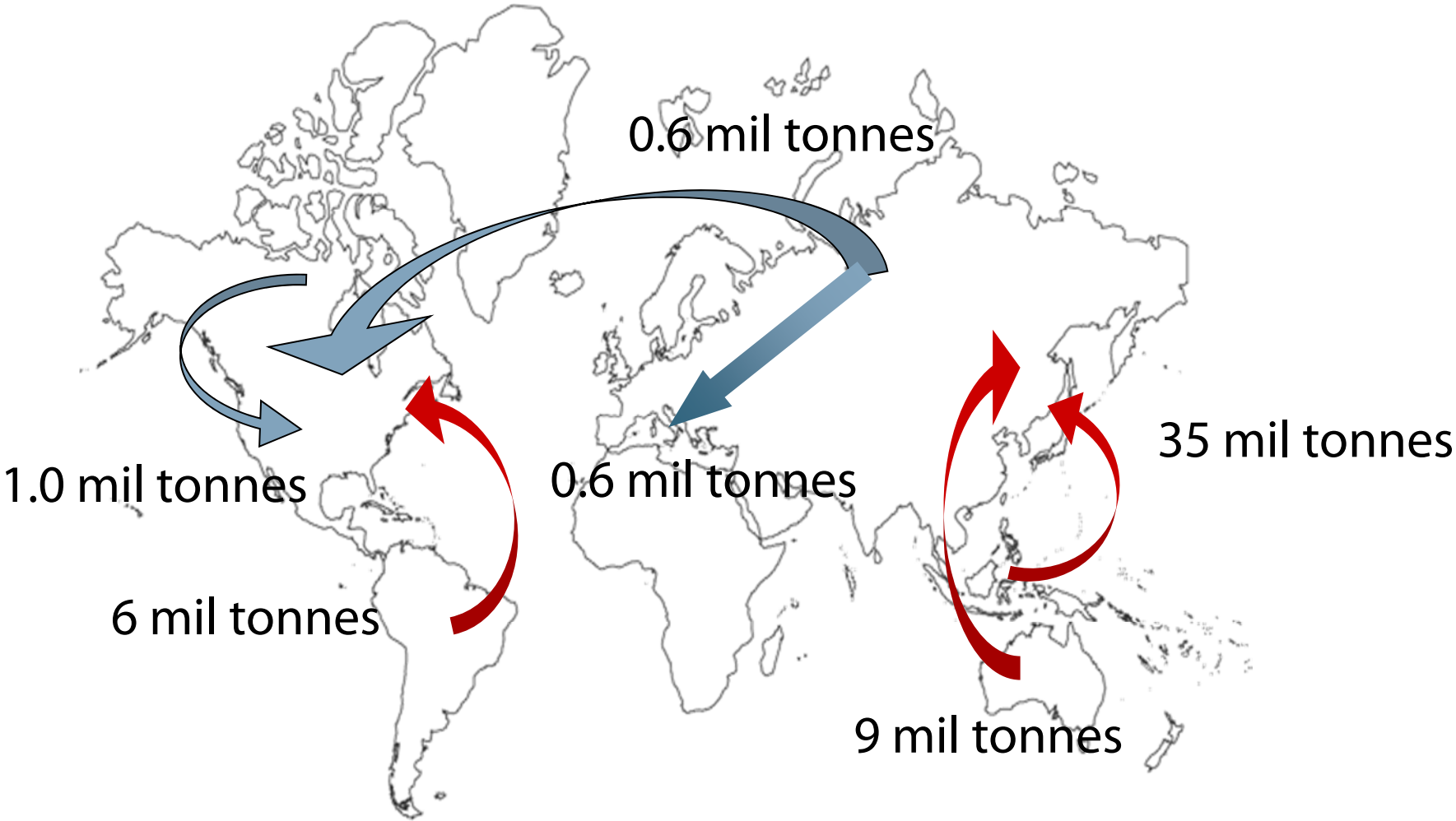
0.6 mil tonnes

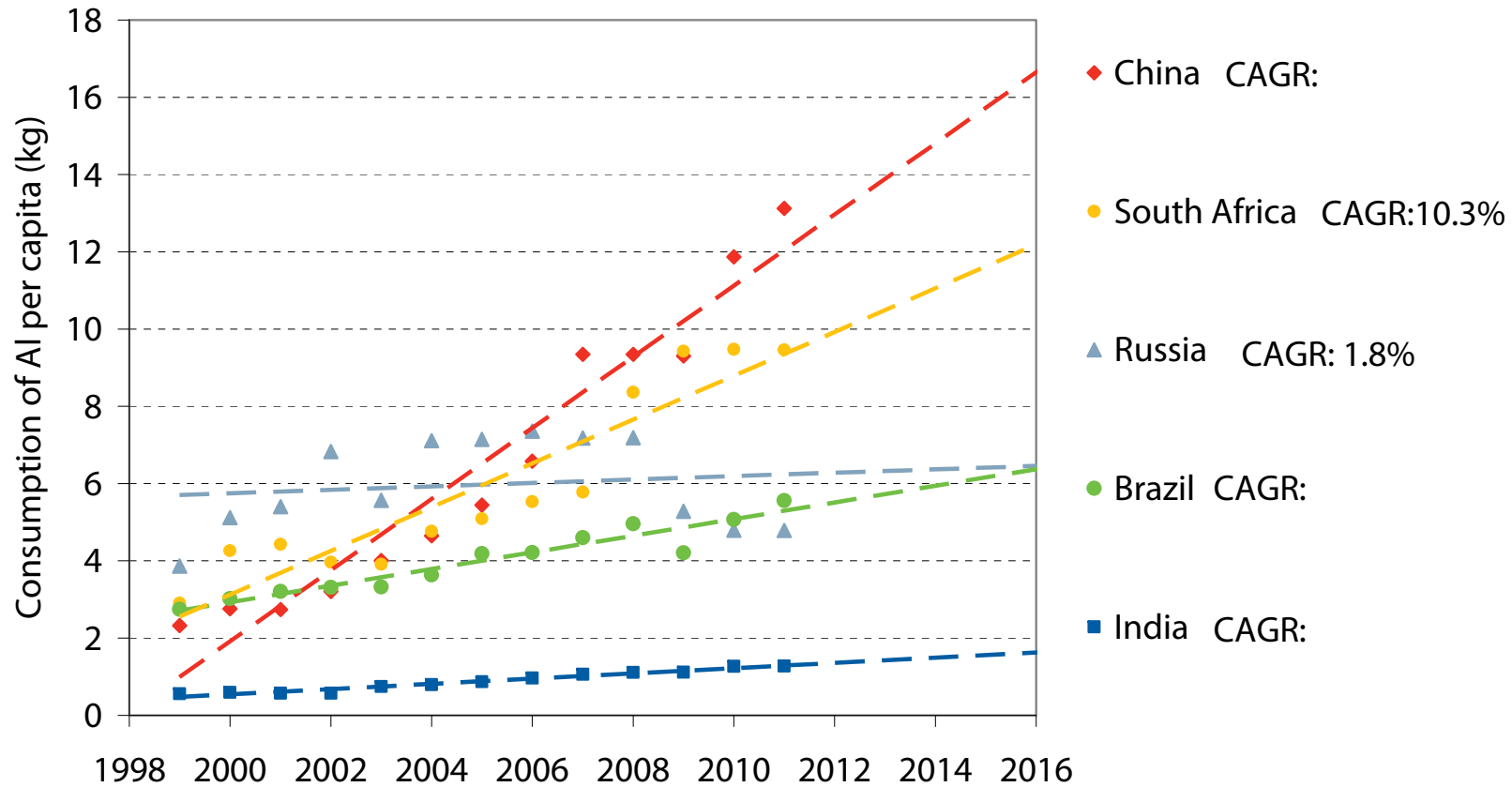35 mil tonnes

6 mil tonnes

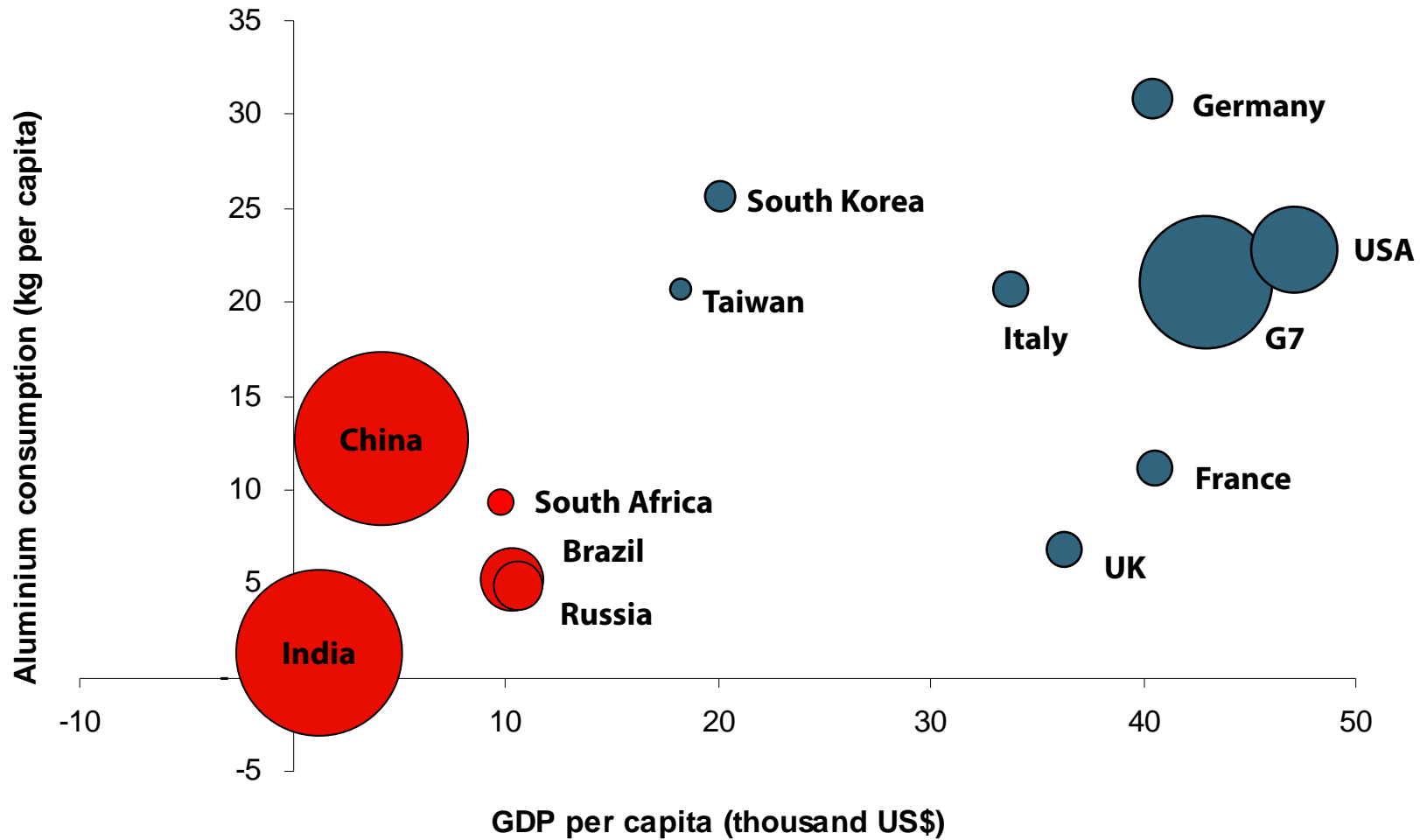9 mil tonnes

92

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BRICS aluminium consumption: THE FUTURE

2011 = 20.8 mil tonnes;   2016e = 26.9 mil tonnes
Next 5 years an extra **6 mil tonnes** of metal required

◆ China   CAGR:

● South Africa   CAGR:10.3%

▲ Russia   CAGR: 1.8%

● Brazil CAGR:

■ India   CAGR:

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Where next……

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Conclusions

- BRICS countries have all shown unprecedented increases in GDP over the last 10 yrs

- Demand for industrial metals due to growth in middle classes and large-scale construction and consumerism - but with room to grow.

- How much can we rely on China and the emerging economies? Is china slowing? Can it secure its raw materials and energy?

- What other factors should be considered and why? Eg. inflation, currencies, rising food prices….

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Disclaimer

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