

**Scotia Capital Conference**  
**Toronto, January 13<sup>th</sup> 2009**

**The Collapse in Copper  
Consumption: How Long? How Deep? Will  
the Copper Industry Be Ready for the  
Recovery?**

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**BLOOMSBURY**  
Minerals Economics Ltd



## Summary

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- **The second half of 2008 in retrospect**
  - Economic downturn and collapse in copper consumption
  - Retreat of the hedge funds and collapse in copper prices
  - Strong supply response, but not enough to re-balance the market
- **Prospects for consumption and prices in 2009 and beyond**
  - Bottom of the economic cycle mid-2009. Real recovery in copper consumption somewhat later
  - Prices below \$3,000/tonne prices probable through most of 2009. Strong recovery in 2011 after slow improvement in 2010
- **Implications for copper miners**
  - 2009 will be a lean year, especially for new projects.
  - Production shortfall when consumption picks up in 2010



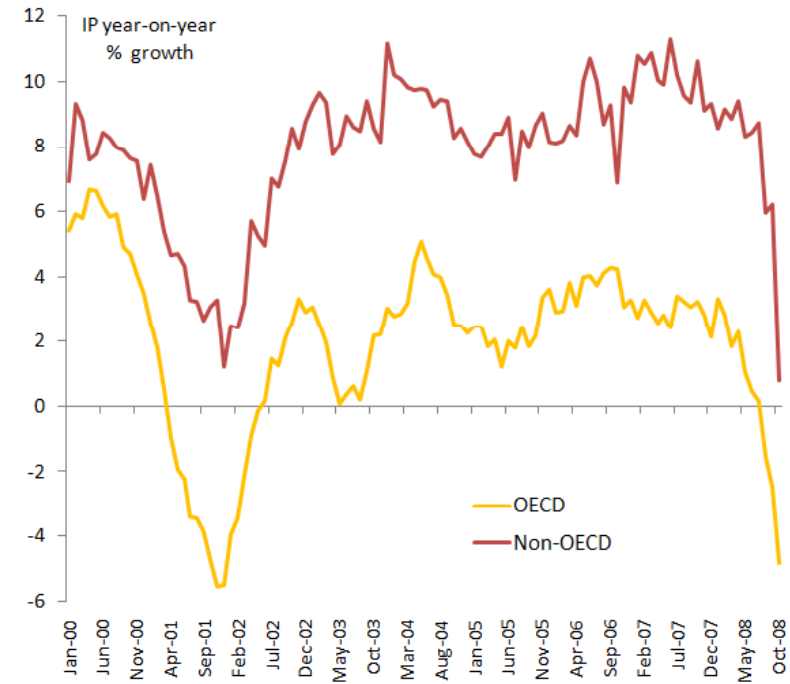
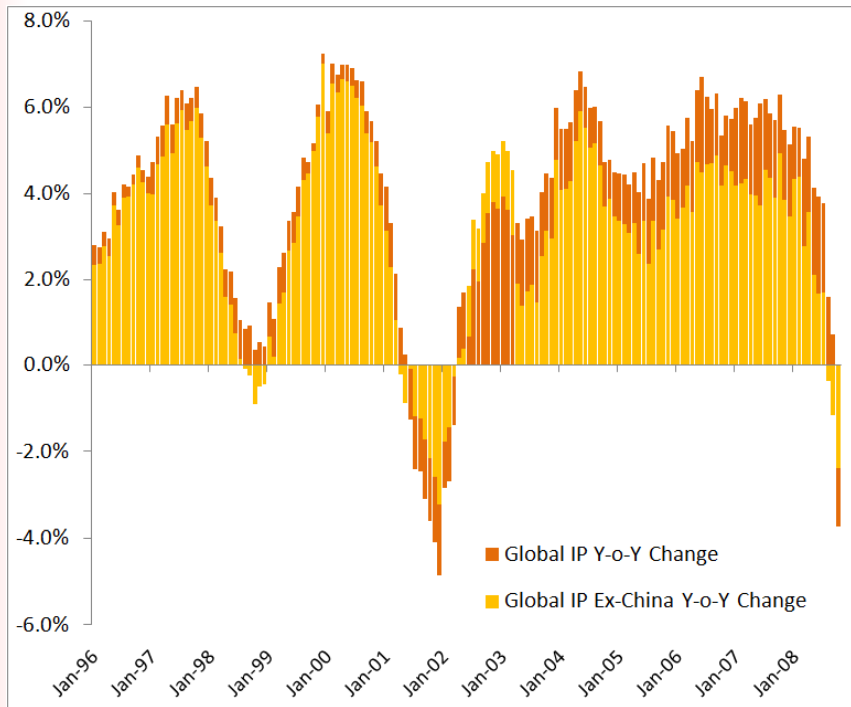
## The second half of 2008 in retrospect

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# 2008 in retrospect: *The Economy*

## The economic downturn



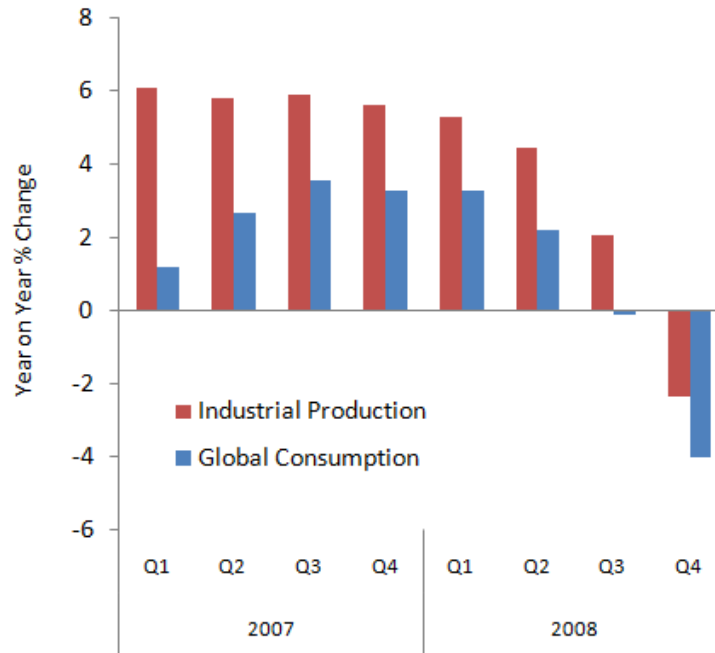
The downturn in the world economy is established fact. Global Industrial Production fell below that in the previous year in October. On a month-to-month basis, the negative figures had been evident much earlier. The most worrying aspects of the figures are the rate of deterioration, and clear indications that there is much worse to come



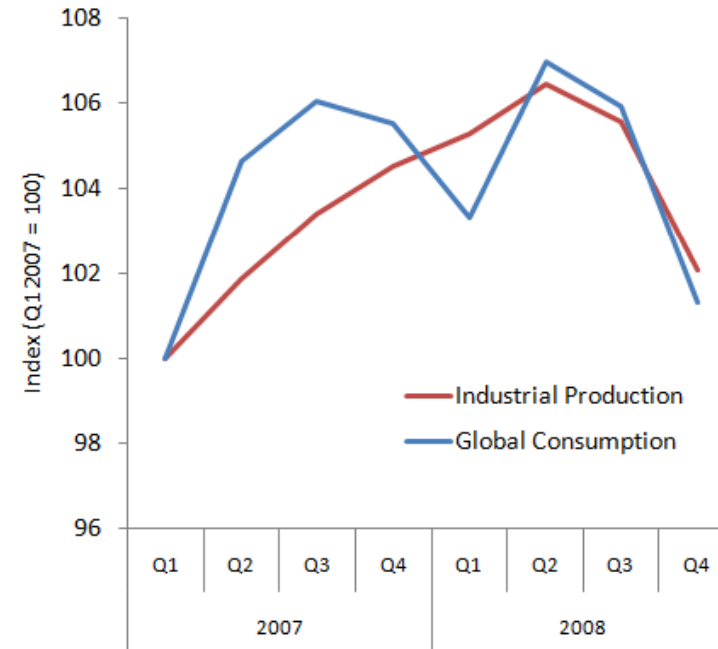
## 2008 in retrospect: *Consumption*

Copper consumption collapsed in the second half of 2008

### Year on Year Change



### Sequential Development



Refined copper consumption lagged IP growth before the recent economic downturn. When the downturn really began to bite in Q3 and especially Q4 2008, copper consumption responded sharply with a dramatic downturn



## 2008 in retrospect: *Supply*

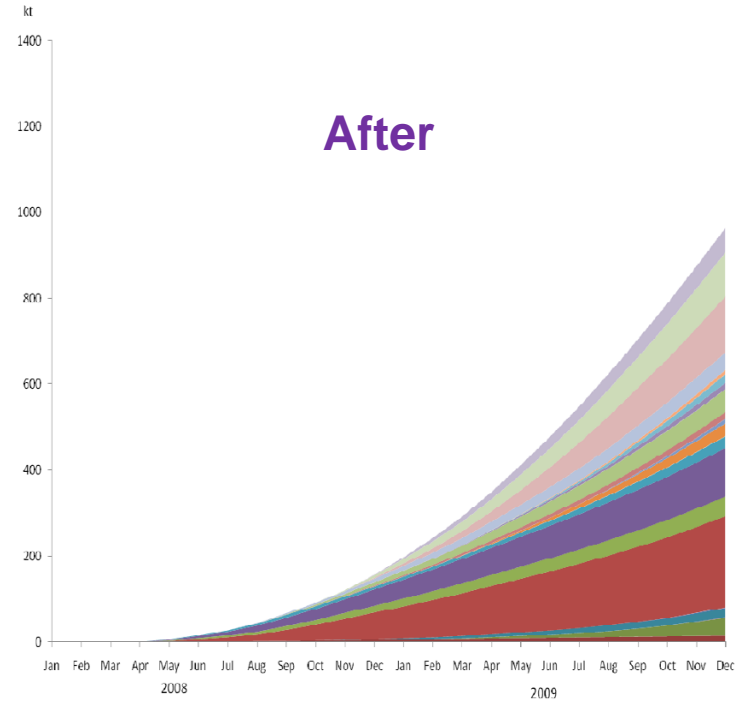
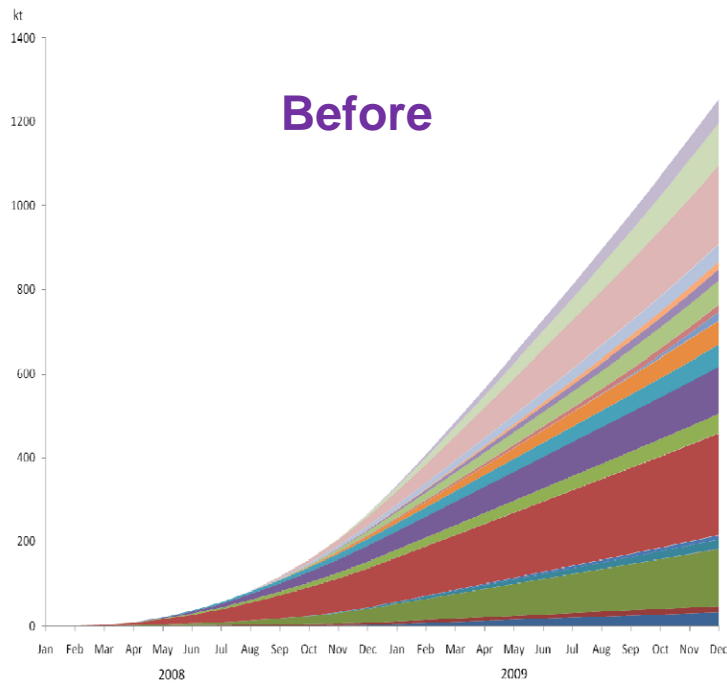
The mining industry responding by announcing major cuts to current and future production schedules

Country	Mine/Project	Owners	2008	2009	2010	2011	2012
Argentina	Alumbrera	Xstr., Goldcorp, NOE	-5	-25	-40	-35	-30
Argentina	Agua Rica /1	Northern Orion (NOE)	0	0	0	-10	-165
Australia	Northparkes	Rio Tinto, Sumitomo	-5	0	0	0	0
Australia	Prominent Hill	Oxiana	-17.5	-30	0	0	0
Australia	Tritton	Tritton Res.	0	0	-5	-20	-20
Australia	White Range	Matrix Metals	0	0	0	-15	-10
Australia	Other	Various/ 3	0.5	-15	3	10	10
Australia	Other	Various/4	0	5	5	5	5
Australia	Panorama	CBH Resources	0	-7.5	0	0	0
Australia	The Peak	Peak Gold	-3.5	-2.5	-2	-2	-2
Australia	Kanmantoo	Hillgrove	0	-9	-9	-12	-12
Brazil	Salobo	Vale	0	0	-25	-75	0
Brazil	Project 118	Vale, BNDES	0	0	-20	-35	-35
Canada	Afton u/g	New Gold	0	-5	-10	-5	-25
Canada	Minto	Sherwood Copper	0	0	-10	0	0
Canada	Mount Polley	Imperial, Sumit.	0	0	-5	-5	-5
Canada	Prosperity/Fish Lake	Taseko	0	0	0	-25	-40
Canada	Tulsequah Chief	Redfern	0	-5	-6	0	0
Canada	Wolverine	Yukon Zinc	0	-1	-5	-5	-5
Chile	Andina	Codelco	0	-10	0	-20	-15
Chile	Candelaria	Freeport, SMM, SC	-30	-25	-25	-20	-20
Chile	Codelco Norte	Codelco	-55	50	25	0	-200
Chile	Codelco Norte	Codelco	-25	5	5	0	-10
Chile	Collahuasi	Xstrata, Anglo, et al	75	125	125	0	-25
Chile	El Abra	Freeport, Codelco	0	-10	10	30	75
Chile	Esperanza	Antofagasta	-75	-125	-155	-35	-5
Chile	Los Bronces	Anglo American	0	0	0	-85	-185
Chile	Los Pelambres	Antofagasta, Mits, Nip	0	-10	15	50	40
Chile	Zaldivar	Barrick	0	-40	-40	-45	-45
D.R. Congo	Tenke Fung.	PD, Tenke M, Gec	0	-25	-70	0	0
D.R. Congo	Kamoto/Dima	Katanga Mining	0	-25	0	0	0
D.R. Congo	Kov	Nikanor	0	0	0	-20	-25

Country	Mine/Project	Owners	2008	2009	2010	2011	2012
D.R. Congo	Kolwezi Tails	First Quantum, Gec.	0	-30	-25	0	0
D.R. Congo	Luita	CAMEC	-20	-30	-35	0	0
Finland	Kylylahti	Vulcan Resources	0	-2.5	0	5	5
Indonesia	Grasberg et al	Freeport, Rio T.	-100	-150	-50	-275	-175
Indonesia	Batu Hijau	Newmont et al.	-125	-125	-50	-25	-25
Iran	Ali Abad	Nicico	0	0	0	-10	0
Iran	Chehel Korreh	Nicico	0	0	0	-5	0
Mexico	Terrazas	Constellation Copper	0	0	0	-10	-18
Mexico	Boleo	Baja Mining	0	0	-5	-40	-55
Mexico	La Balsa	Nexvu Capital	0	-10	-15	-15	-15
Mongolia	Turquoise Hill /1	Ivanhoe / Rio Tinto	0	0	0	-75	-175
Peru	Rio Blanco	Moterrico	0	0	0	-50	-175
Peru	Toromocho EW	Peru Copper	0	0	0	0	-60
Peru	Conga	Newmont et al.	0	0	-5	-40	-40
Peru	Justa	Chariot/Koreans	0	0	-5	-50	0
Philippines	Dinkidi (Didipio)	Oceana Gold	0	-7.5	-10	-5	5
Philippines	Atlas, Carmen	Atlas Mining	0	0	0	-25	-40
Philippines	Cantuan	TVI Pacific	-2.5	0	0	0	0
Philippines	Rapu Rapu	Lafayette, LG, Korea	-5	-5	0	2.5	2.5
Philippines	Tampakan	Xstrata, Indophil	0	0	0	0	-100
PNG	Ok Tedi	Govt, Inmet	-30	-25	-10	-10	-15
PNG	Solwara / 2	Nautilus	0	0	0	-5	-20
Spain	Las Cruces	Inmet, MK Gold	-5	5	0	0	0
Spain	Las Cruces	Inmet, MK Gold	-20	-42	0	0	0
Spain	Aguas Tenidas	Iberian Minerals	0	-5	-20	-15	0
Turkey	Cerattepe	Inmet	0	-5	0	0	0
USA	Florence	BHPB	0	0	0	-35	-35
USA	Lisbon Valley	Constellation Copper	0	0	-2.5	0	0
USA	Various SX-EW	Various	0	0	-2.5	-35	-35
Zambia	Muliashi	Int Min Resources	-5	-5	0	0	0
Ecuador	Ecuador	Corriente: Mirador	0	-30	-40	0	0

# 2008 in retrospect: *Supply*

Planned new mine capacity was slashed as well



- |                |                   |            |                   |                |
|----------------|-------------------|------------|-------------------|----------------|
| ■ Muliashi     | ■ Las Cruces      | ■ Kinsenda | ■ Tulsequah Chief | ■ Browns oxide |
| ■ Konkola Deep | ■ Cerro Corona    | ■ Ruashi   | ■ New Afton       | ■ Boddington   |
| ■ Lumwana      | ■ Phu Kham        | ■ Frontier | ■ Mowana (Dukwe)  |                |
| ■ Carlota      | ■ Cerro de Maimon | ■ Yulung   | ■ Panorama        |                |
| ■ Agua Tenidas | ■ Tenke           | ■ Gaby     | ■ Prominent Hill  |                |



## 2008 in retrospect: *Supply*

### The new capacity cutbacks and delays in detail

Country	Mine	Owners	2008				2009				Capacity (ktpy)	Product
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
Australia	Boddington	Newmont				Suspended					30	concentrate
Australia	Browns oxide	Compass				X					10	cathode
Australia	Prominent Hill	Oxiana				→	X				104	concentrate
Australia	Panorama	CBH Resources								X	20	concentrate
Botswana	Mowana (Dukwe)	African Copper				→	X				20	concentrate
Canada	New Afton	New Gold								X	34	concentrate
Canada	Tulsequah Chief	Redcorp Resources								→	10	concentrate
Chile	Gaby	Codelco	→	X							150	cathode
China	Yulong	Quinghai, Fujian Z		X							30	concentrate
D.R. Congo	Frontier	First Quantum		X							75	concentrate
D.R. Congo	Ruashi	Metorex								→	35	concentrate
D.R. Congo	Kinsenda	Copper Resources Corp								→	54	concentrate
D. R. Congo	Tenke	Freeport McMoRan								X	120 (initially)	concentrate
Dominican Rep	Cerro de Maimon	Globestar Resources				X					15	concentrate
Laos	Phu Kham	PanAustrian				X					50	concentrate
Peru	Cerro Corona	Gold Fields				X					25	concentrate
Spain	Las Cruces	Inmet, MK Gold								→	72	cathode
Spain	Agua Tenidas	Iberian Minerals				X					21	concentrate
USA	Carlota	Quadra				→	X				34	cathode
Zambia	Lumwana	Equinox				→	X				170	concentrate
Zambia	Konkola Deep	Konkola Copper				X					150	concentrate
Zambia	Muliashi	Luanshya Copper Mines				X					60	concentrate

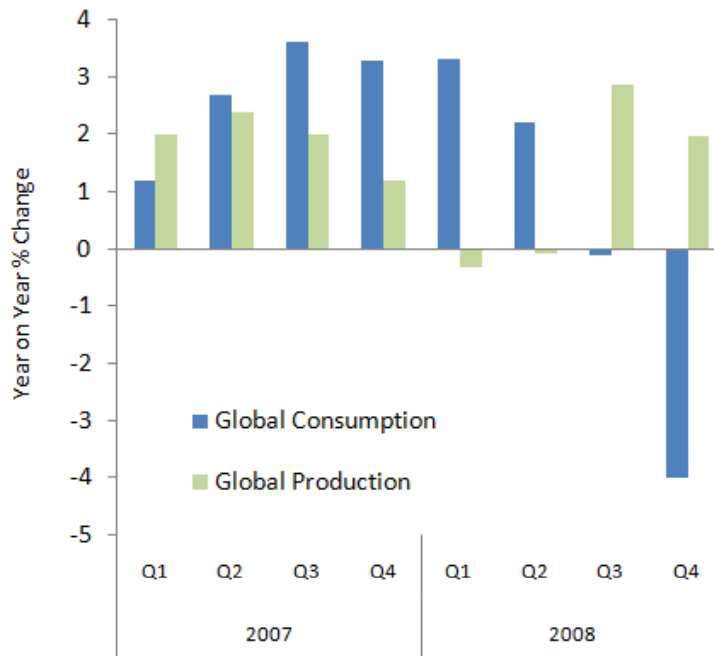


Indicates delay in start up since January 2008

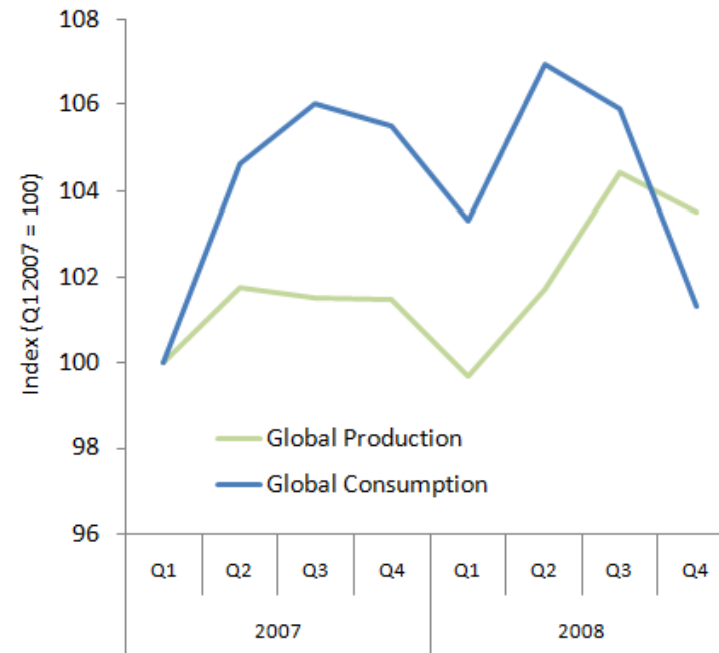
## 2008 in retrospect: *Supply*

Production cutbacks were nowhere near enough to balance consumption loss

### Year on Year Change



### Sequential Development

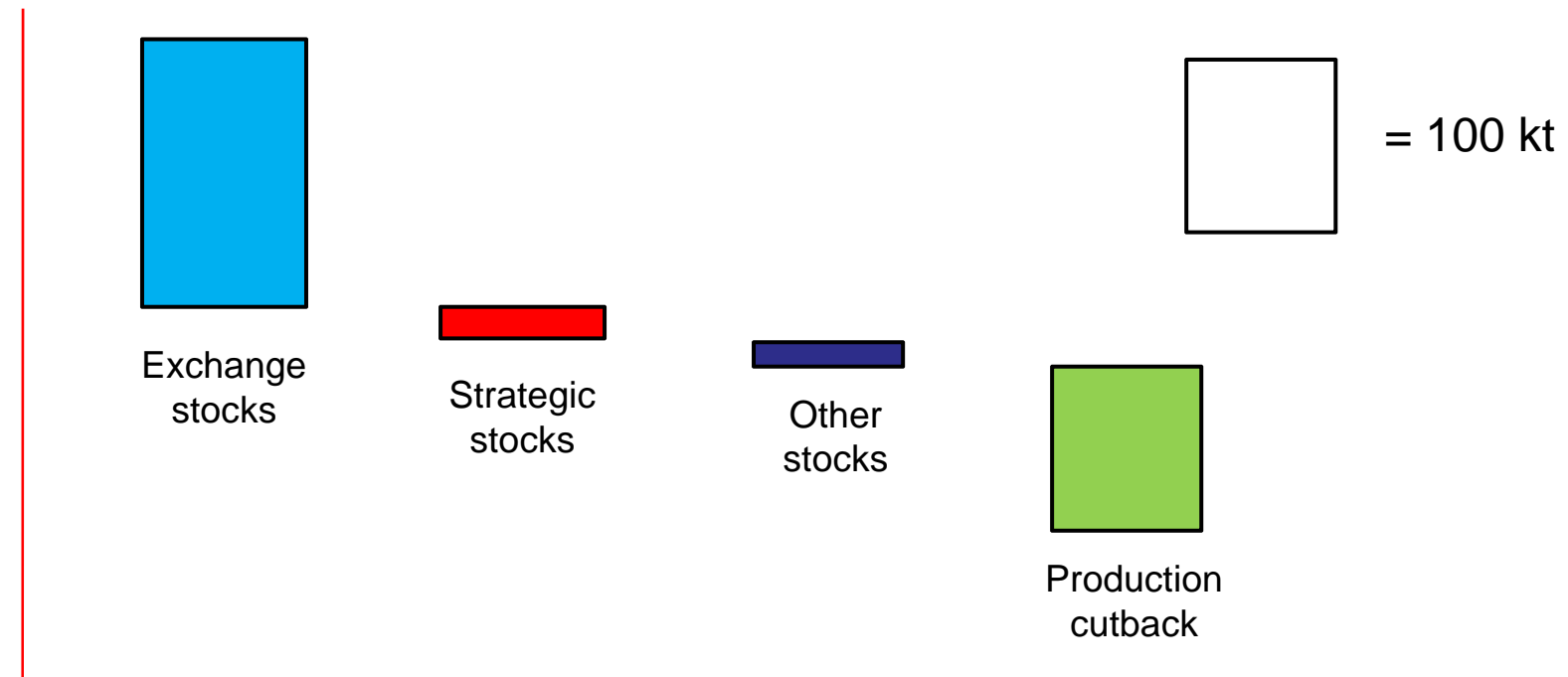


The end-year production cuts were against a backcloth of rising output. While refined production had failed to keep pace with consumption from mid-2007 to mid-2008, in the latter half of 2008 there was a sharp reversal, with production surging ahead of consumption



## 2008 in retrospect: *Market Balance*

With the arrival of surplus, exchange stocks rose. The chart below shows where the surplus went in Q4 2008

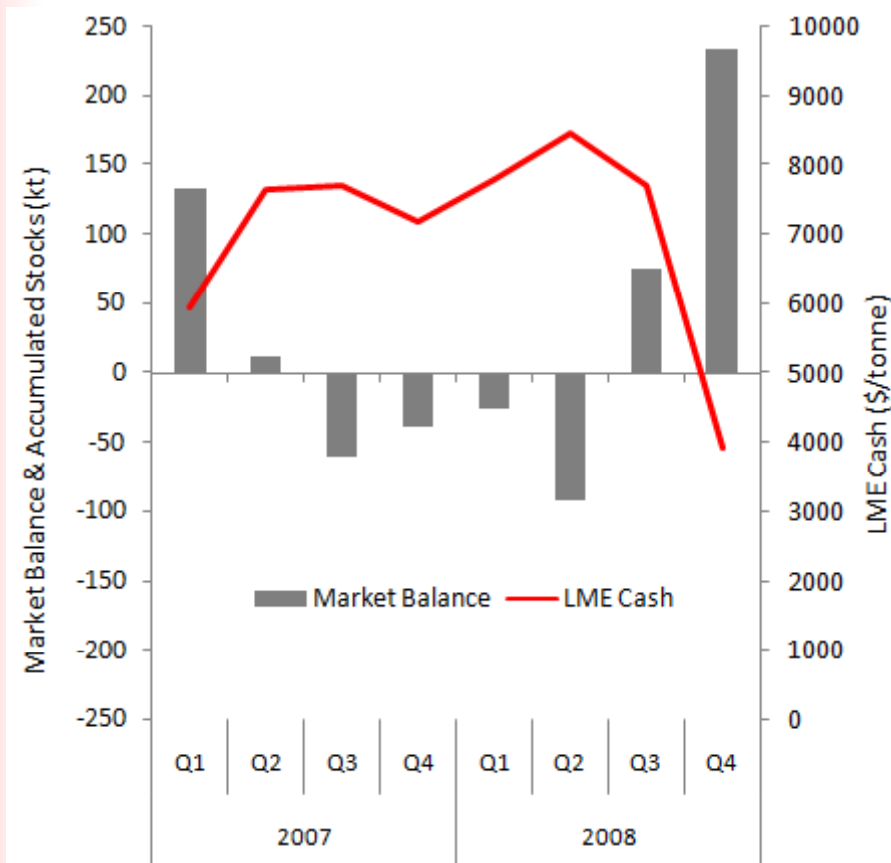


Production cuts were insufficient to fully offset the fall in consumption. Part of the reason for this was that cuts in mine output did not fully feed through to refined output. The net result was a large increase in exchange stocks. The increase would have been larger without off exchange stock building



## 2008 in retrospect: *Copper Price*

Prices tumbled in the latter half of 2008 as the market retreated into surplus



Of course, price is about an awful lot more than just the raw market balance. But, it is no coincidence that successive surpluses in Q3 and Q4 totalling 309kt and the halving of average quarterly prices occurred in tandem

Other issues that need to be taken into consideration are (a) exactly where the extra stock lands (the exchanges or elsewhere), (b) currency movements, (c) market sentiment, (d) the involvement of the funds

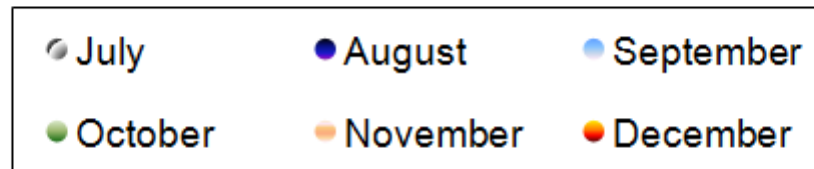
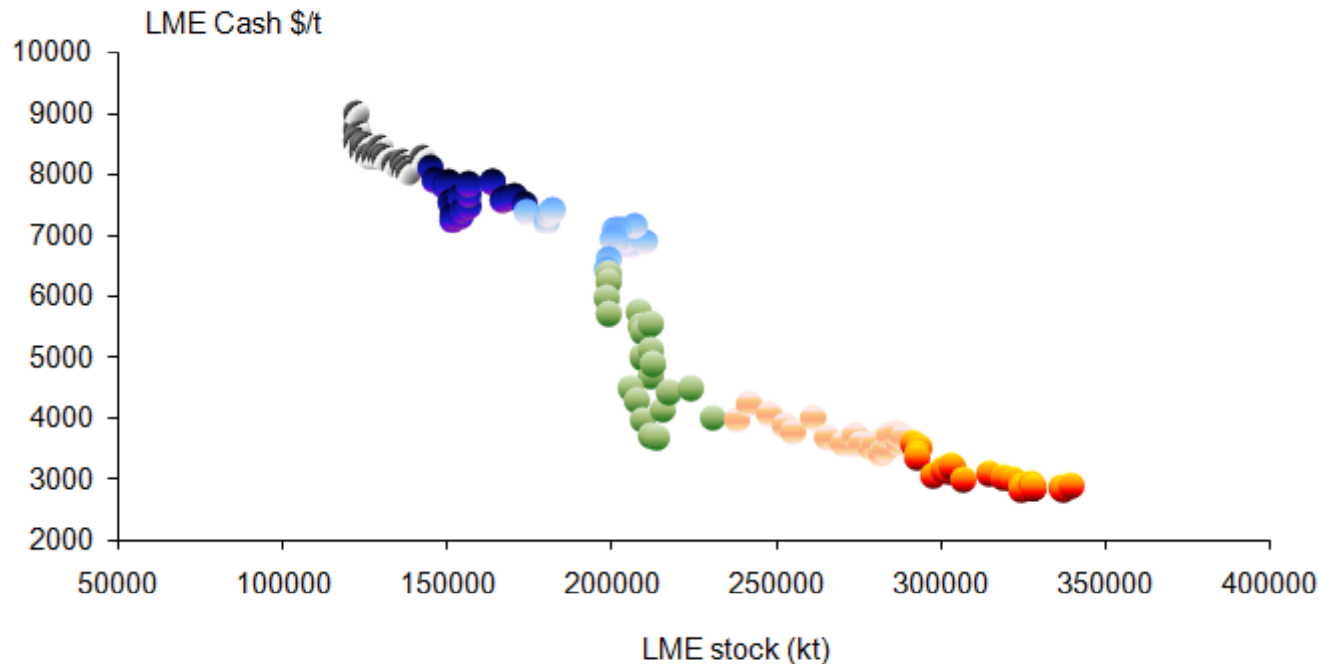
Prices demonstrated their precipitous fall mainly in October, the month in which economic sentiment really turned sour

The hedge fund retreat from copper occurred at much the same time, with a dramatic and immediate impact on price



## 2008 in retrospect: *Copper Price*

LME cash and LME stocks July to December 2008: Clear stocks / price relationship with step price fall in October as the funds retreated



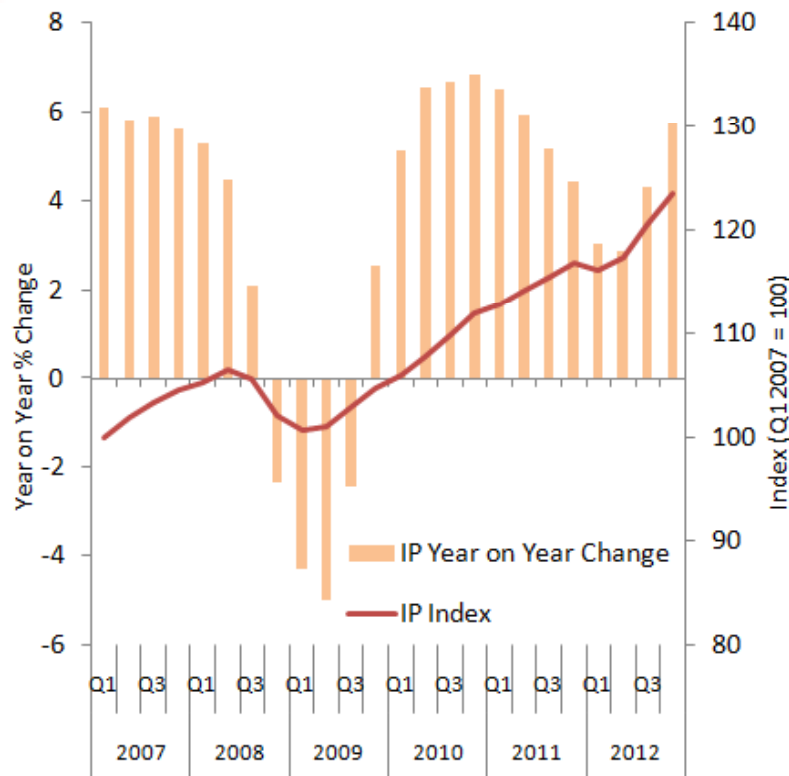
## Prospects for 2009 and beyond

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## Prospects for 2009 and beyond: *Economic Recovery*

Industrial production growth will remain negative through most of 2009, then recover strongly



### Country / Region Forecasts

	2009	2010	2011	2012
North America	-3.9%	3.3%	3.6%	2.4%
South America	1.2%	3.6%	4.8%	3.8%
Europe	-2.0%	4.0%	3.8%	2.0%
Japan	-4.4%	4.3%	3.0%	1.5%
China	2.6%	11.3%	8.8%	7.8%
Other Asia	1.0%	8.4%	7.3%	6.0%
Others	-2.7%	3.2%	4.0%	1.0%
OECD	-3.2%	4.1%	3.7%	2.1%
Non-OECD	1.9%	8.3%	7.4%	6.1%
World	-0.9%	8.0%	5.4%	4.0%

Macroeconomic forecasts provided by CHR, relating to our Base Case, show negative IP growth for 4 quarters starting Q4 2008, then a strong recovery led by China and other Asia outside Japan



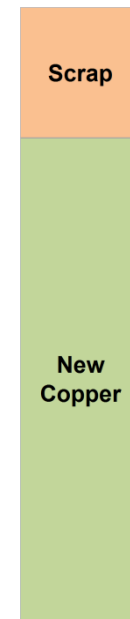
## Prospects for 2009 and beyond: *Consumption*

To understand consumption prospects, we need to look at where the copper products go

Prospects for copper use are best understood by looking at the individual products and applications, and their requirement for new copper versus scrap. The chart below illustrates the global market position. Individual countries vary substantially from this

	Share of Volume					
	Energy Cable	Information Cable	Winding Wire	Copper Mill Products	Alloy Mill Products	Total
<b>Infrastructure</b>	7.9%	3.7%	1.8%	1.0%	1.1%	15.5%
Telecom	0.2%	3.1%	0.0%	0.3%	0.5%	4.2%
Power	6.3%	0.2%	1.4%	0.4%	0.3%	8.6%
Other	1.4%	0.4%	0.3%	0.3%	0.3%	2.7%
<b>Building Construction</b>	17.4%	3.2%	0.5%	8.6%	5.4%	35.1%
Commercial & Industrial	10.8%	2.0%	0.2%	5.5%	2.9%	21.4%
Residential	6.6%	1.2%	0.2%	3.2%	2.5%	13.7%
<b>OEM &amp; General</b>	10.2%	0.7%	8.9%	14.2%	15.3%	49.4%
Transport	4.5%	0.2%	2.5%	2.1%	1.7%	11.0%
Industrial Equipment	1.5%	0.1%	2.4%	2.5%	5.0%	11.6%
Other Equipment	2.7%	0.3%	3.5%	9.0%	4.4%	19.8%
General Market	1.5%	0.1%	0.6%	0.6%	4.2%	7.0%
<b>Total</b>	<b>35.5%</b>	<b>7.7%</b>	<b>11.1%</b>	<b>23.9%</b>	<b>21.8%</b>	<b>100.0%</b>

Notes: The figures relate to total copper content, including scrap. All figures are BME estimates.



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## Prospects for 2009 and beyond: *Consumption*

% change in copper use in 2009 by segment: Growing infrastructure use will not compensate for loss elsewhere

	Base Case						Worst Case Scenario					
	Energy Cable	Information Cable	Winding Wire	Copper Mill Products	Alloy Mill Products	Total	Energy Cable	Information Cable	Winding Wire	Copper Mill Products	Alloy Mill Products	Total
<b>Infrastructure</b>												
Telecom	9.0%	-2.0%	7.5%	7.5%	7.0%	5.9%	9.0%	-2.0%	7.5%	7.5%	7.0%	5.9%
Power												
Other												
<b>Building Construction</b>												
Commercial & Industrial	-7.0%	-6.0%	-6.5%	-9.0%	-9.0%	-7.7%	-13.0%	-8.0%	-10.0%	-14.0%	-13.0%	-12.8%
Residential												
<b>OEM &amp; General</b>												
Transport												
Industrial Equipment	-7.5%	-5.0%	-9.5%	-8.5%	-7.0%	-8.0%	-12.5%	-8.5%	-12.5%	-12.0%	-9.0%	-11.2%
Other Equipment												
General Market												
<b>Total</b>	<b>-3.6%</b>	<b>-4.0%</b>	<b>-6.7%</b>	<b>-8.0%</b>	<b>-6.8%</b>	<b>-5.7%</b>	<b>-8.0%</b>	<b>-5.1%</b>	<b>-9.2%</b>	<b>-11.9%</b>	<b>-9.2%</b>	<b>-9.1%</b>

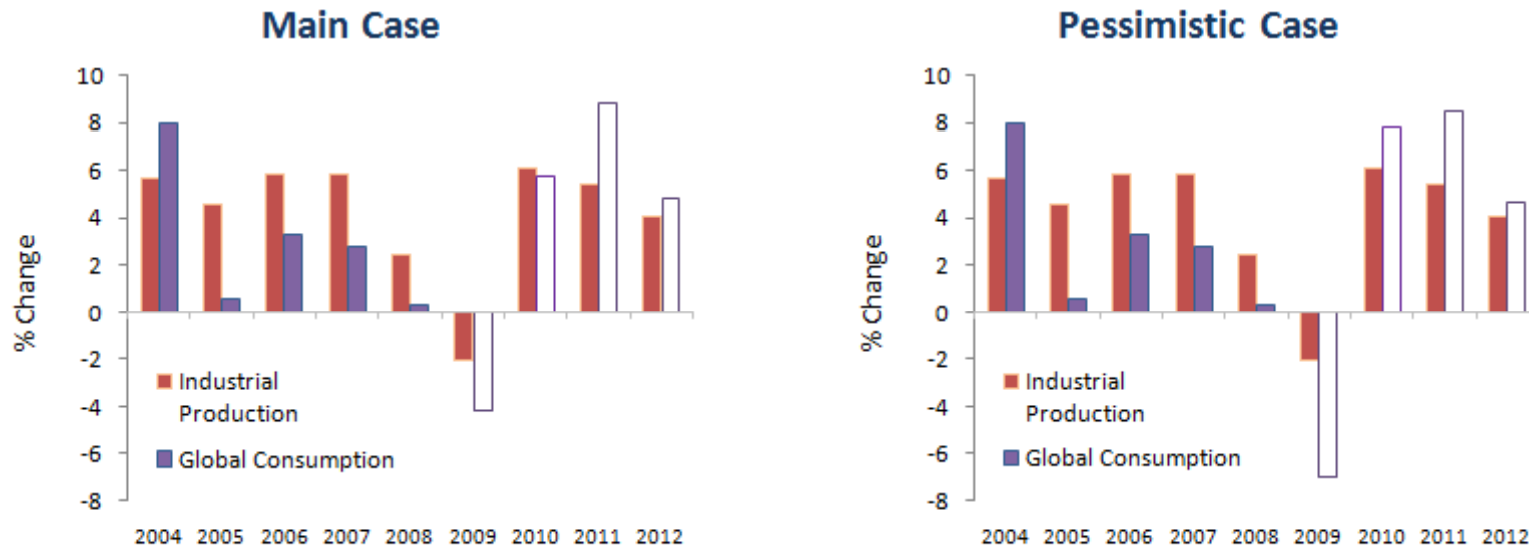
While spending on Building Construction and on Manufactures is set to show a dramatic downturn, government stimulus packages should ensure that spending and hence copper consumption in Infrastructure should increase

With direct melt scrap hit harder than cathode, the 5.7% fall in all copper use in our Base Case equates to a 4.1% fall in refined metal. The Pessimistic Case scenario is for a 9.1% fall in all copper, 6.9% in refined metal



## Prospects for 2009 and beyond: *Consumption*

As IP picks up from 2010 refined copper use will grow even faster, across all segments



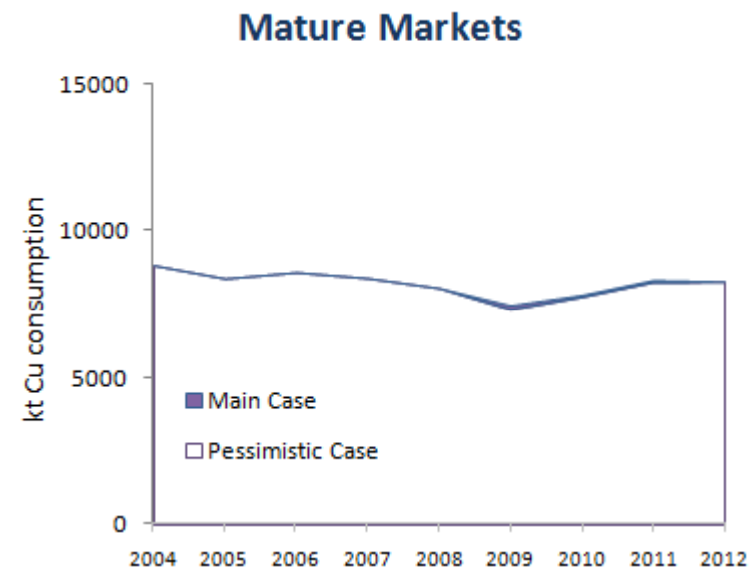
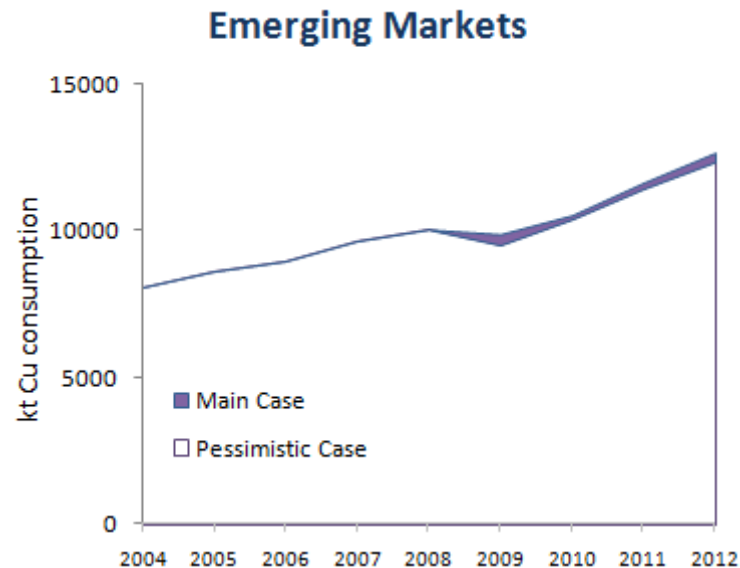
Following marginal growth in refined copper use in 2008, 2009 is set to be one of the worst years on record, even in our Main Case. The Pessimistic Case takes into account the possibility of deep and prolonged recession in Building Construction and OEM markets, leading to one of the sharpest falls in consumption in history

When the economic recovery comes, from late 2009 onwards, refined copper consumption should rise quicker than IP, first through inventory build then through a rapid increase in copper intensive economic activity



## Prospects for 2009 and beyond: *Consumption*

Emerging markets will continue to account for the lion's share of new consumption



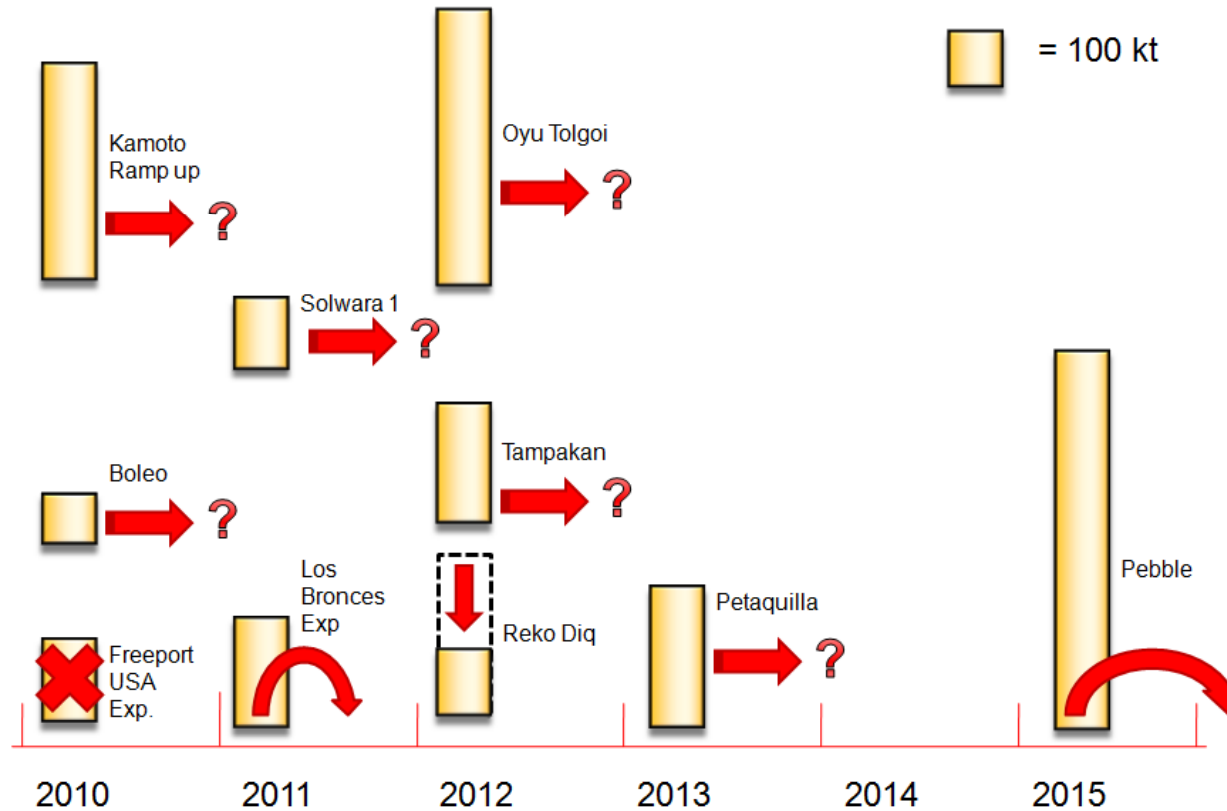
In the period of strong demand growth up to 2007, growth was focussed more or less entirely on Emerging Markets (especially China). Despite the healthy economy, the Mature Markets (W. Europe, N. America, Oceania, Japan, S. Korea, Taiwan) declined in total

The differential between Mature and Emerging Markets is expected to continue, but to narrow as the pace of the shift in global manufacturing eases. Our Pessimistic Case shows a narrower differential than the Main Case



## Prospects for 2009 and beyond: *Supply*

Major projects to be cut, downsized or delayed from 2010



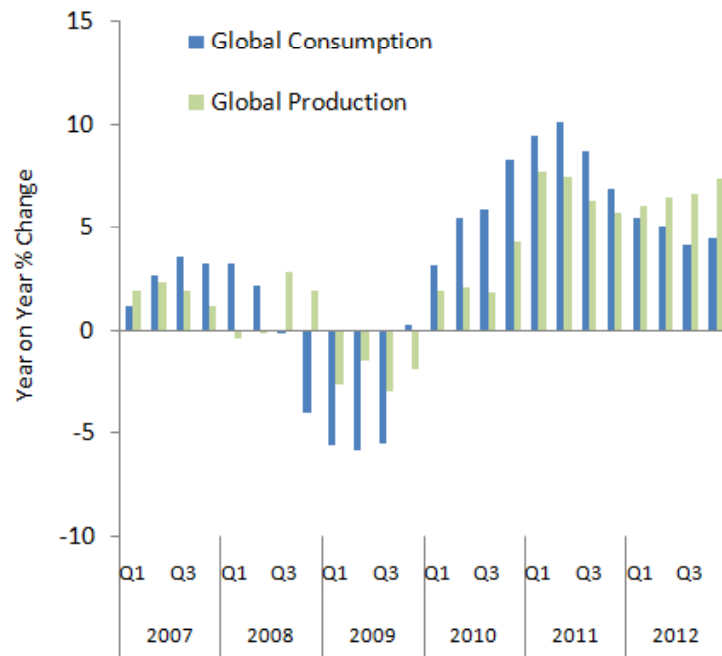
In previous slides we have shown how new mine project schedules and existing production was slashed late in 2008. The downturn has also affected projects further into the future, as shown on this slide. Together with production restraint from existing mines and at smelters this will have a major effect on future output of refined metal



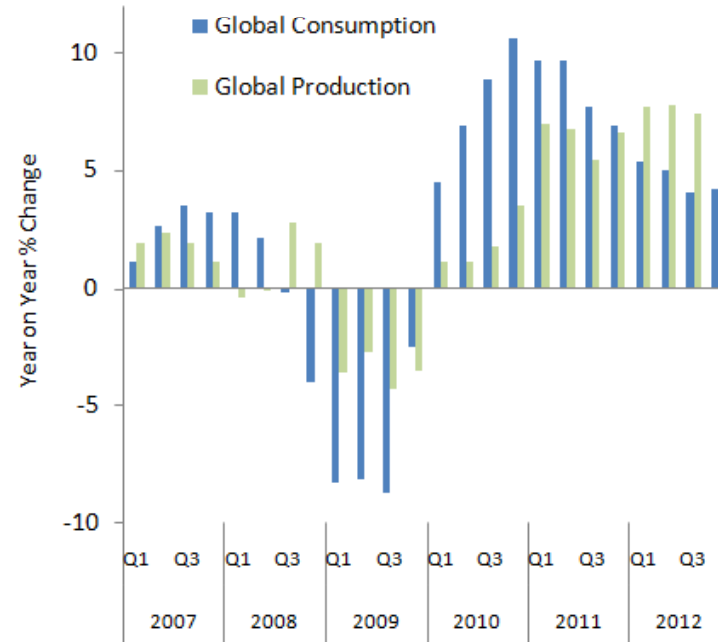
## Prospects for 2009 and beyond: *Supply*

When consumption starts to pick up again, we expect the supply response to be lagged

**Main Case**



**Pessimistic Case**



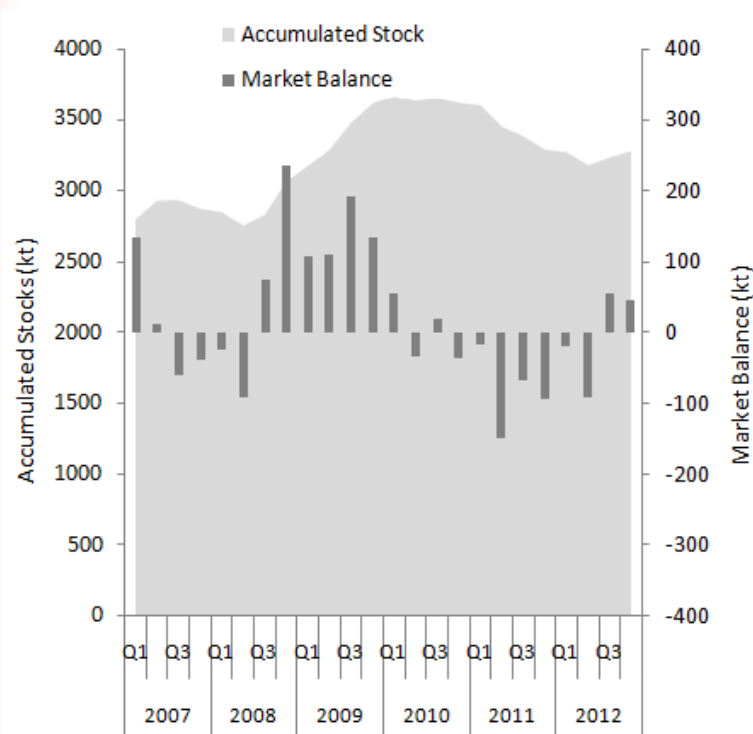
While both production and consumption growth is expected to turn positive in Q1 2010, year on year growth will be much greater in consumption, especially in the Pessimistic Case. Large production gains are expected to be delayed until late in 2010 or early 2011



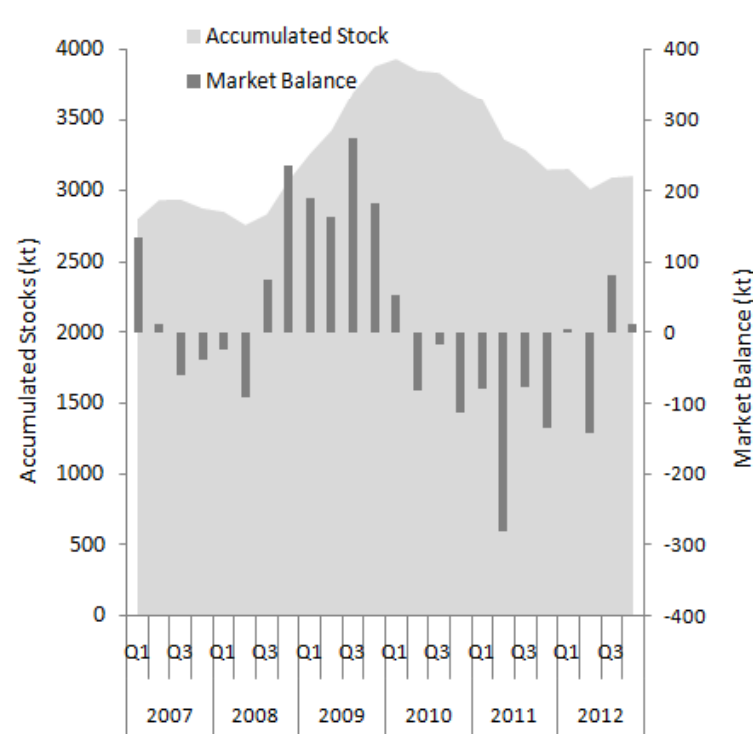
## Prospects for 2009 and beyond: *Market Balance*

Total accumulated stocks are set to rise by around 1 Mt by end-2009, thereafter to fall

**Main Case**



**Pessimistic Case**

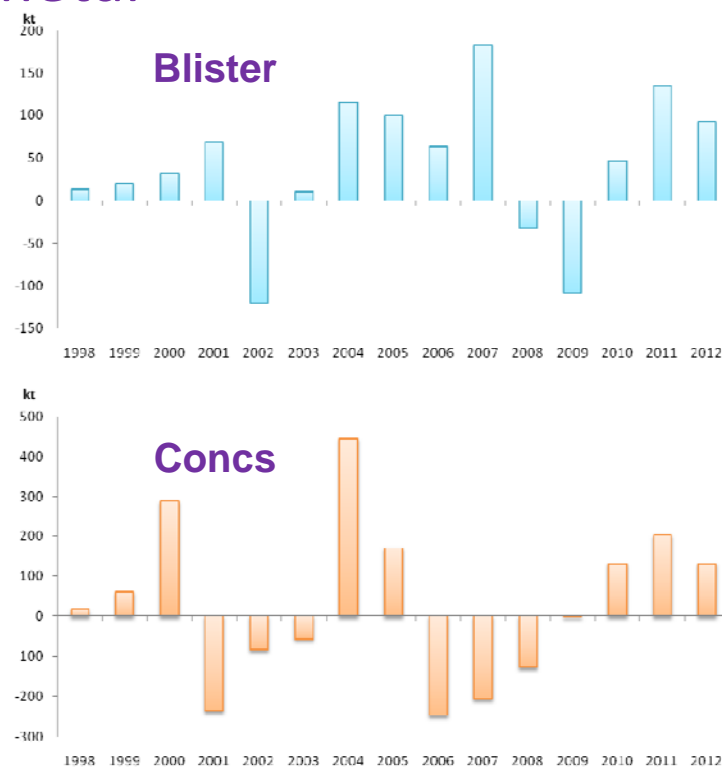
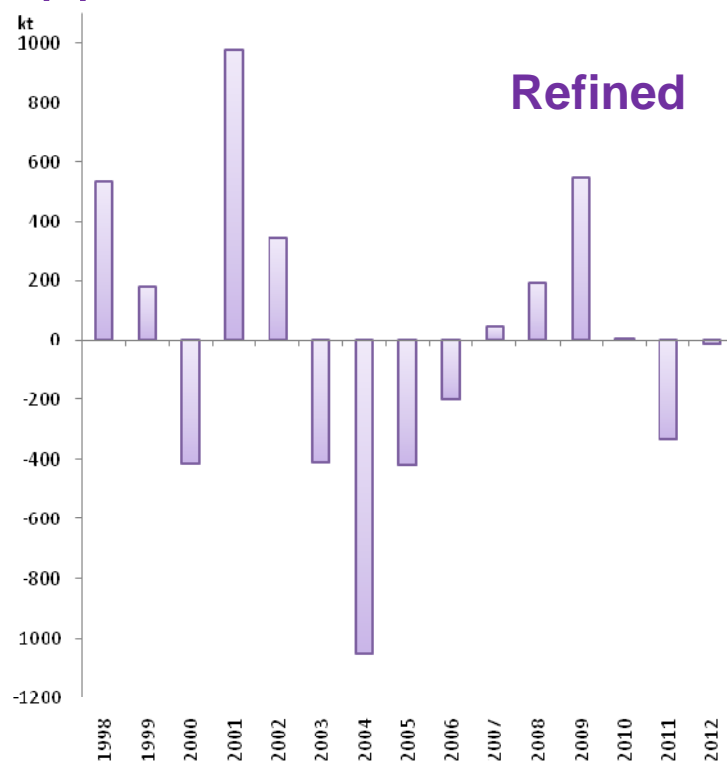


With repeated market surpluses between Q3 2008 and Q1 2010, total stocks are expected to grow massively – by 0.9 Mt in the Main Case, 1.2 Mt in the Pessimistic Case. With a sharper recovery and more muted supply response, the subsequent stock fall is expected to be greatest in the Pessimistic Case



## Prospects for 2009 and beyond: *Market Balance*

Blister and concentrates balances will move in the opposite direction to refined metal

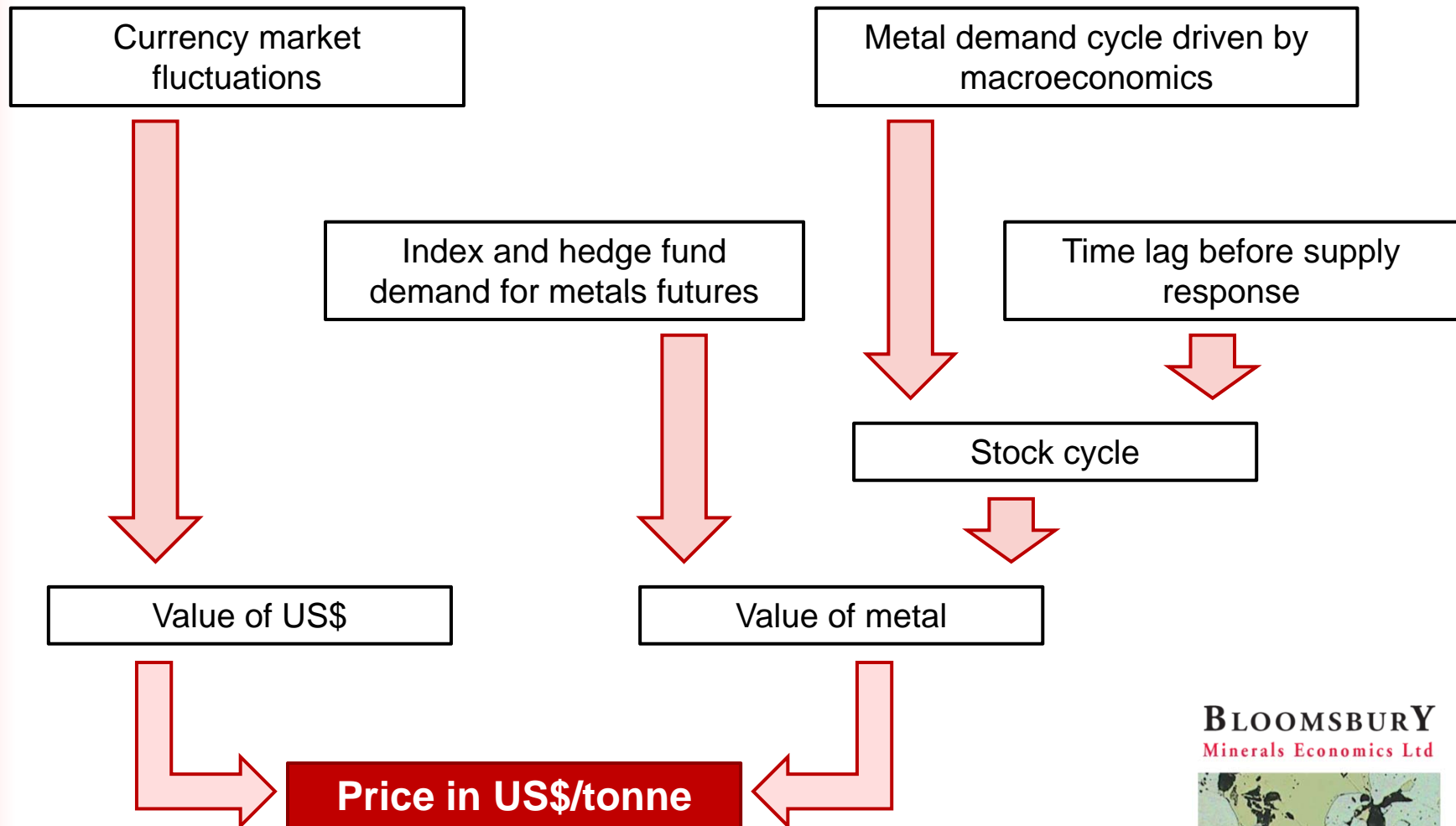


As cathode prices have collapsed, we have already seen a substantial rise in treatment and refining charges (TC/RCs) for concentrates and blister. This indicates a surplus of these process materials, as mine cutbacks run behind the ability or willingness of smelters to process. This will be a feature of the market throughout the period up to 2012 (Main Case)



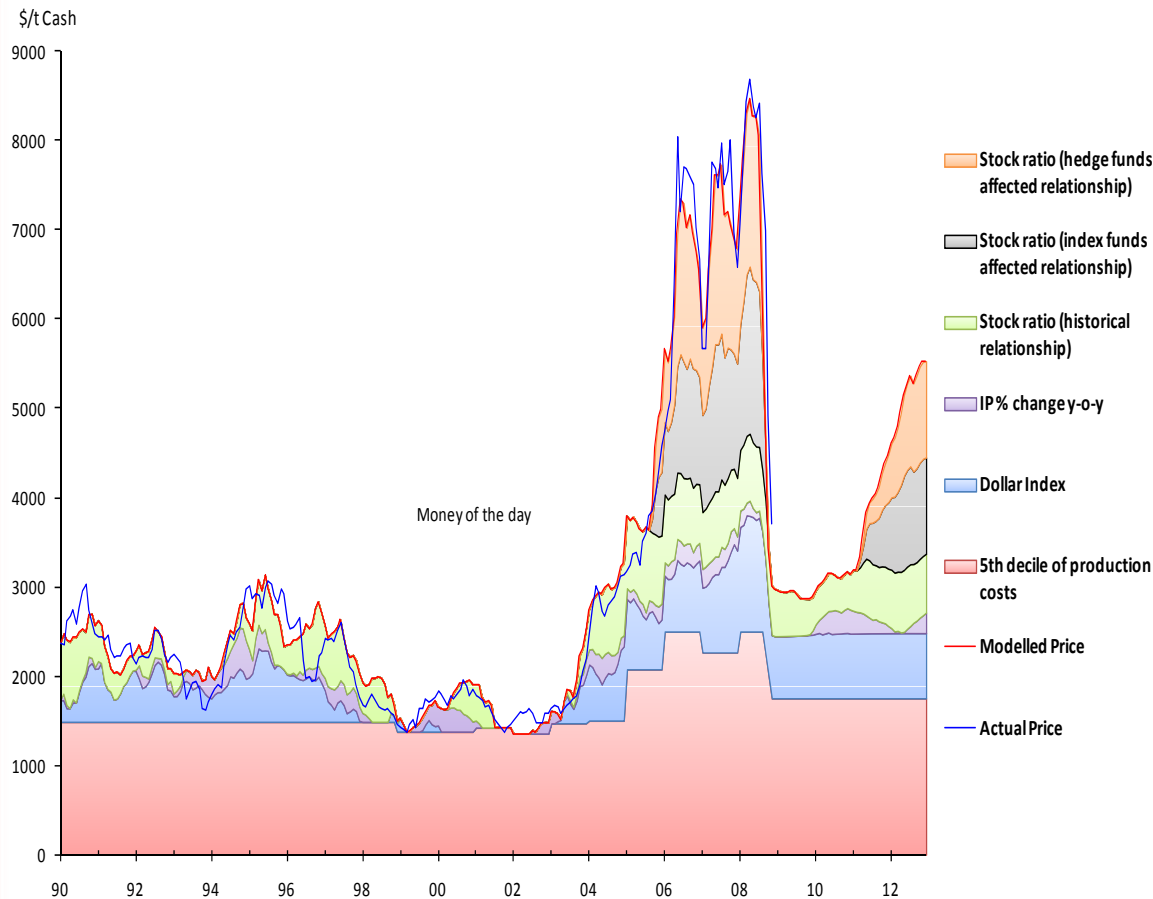
# Prospects for 2009 and beyond: *Copper Price*

## The BME Price Forecasting Model



# Prospects for 2009 and beyond: *Copper Price*

## A print out from the BME price model (Main Case)



The BME model takes into account the various elements that take prices above the cost-driven base line

This print out shows that the froth in the market resulted from the involvement of the funds, which enhanced the existing stocks to price relationship

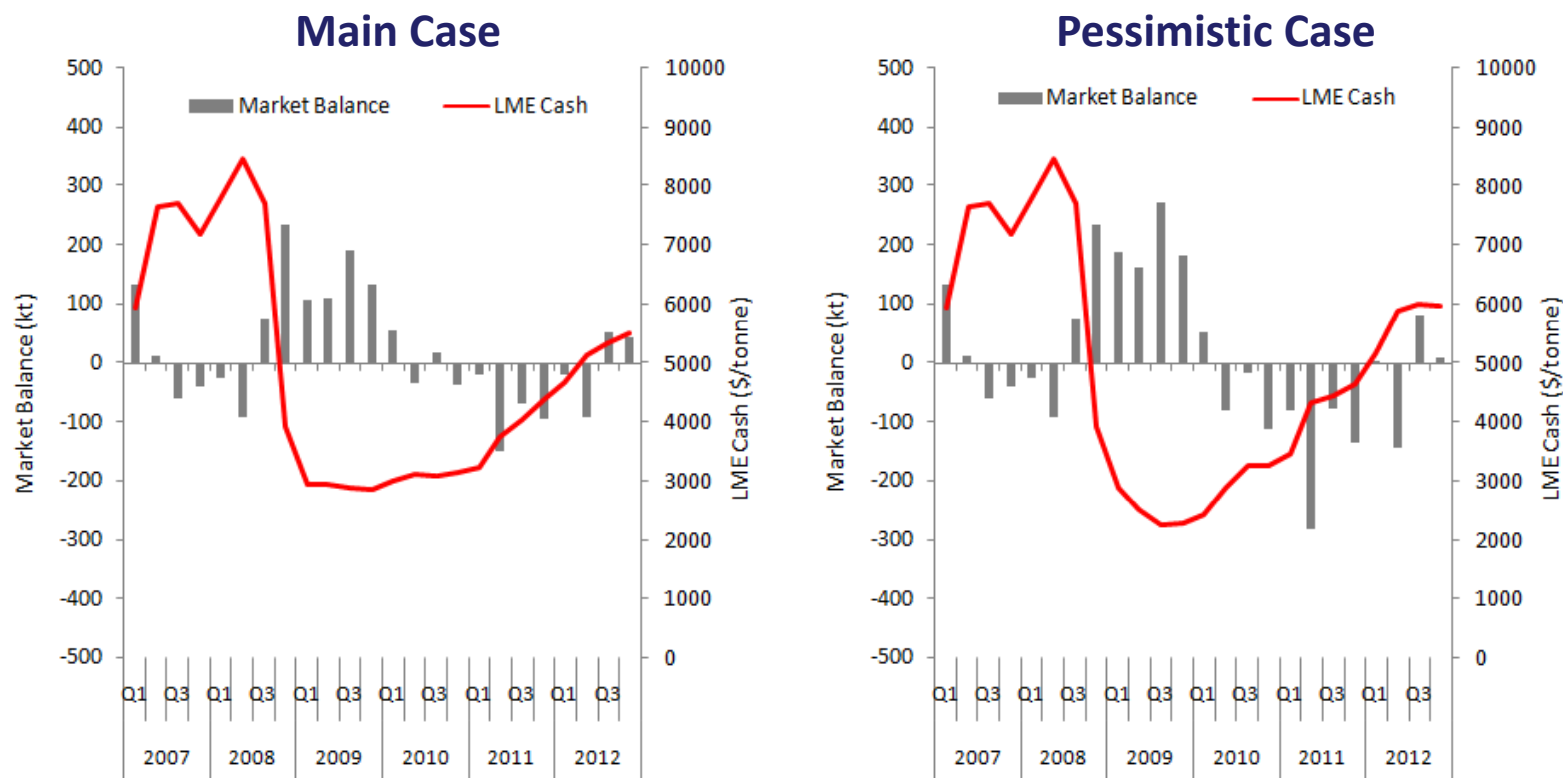
The fund influence on price is expected to be absent until well into 2010

Their return should herald a renewed period of strong prices in 2011 and 2012



## Prospects for 2009 and beyond: *Copper Price*

Our Pessimistic Case shows lower prices in 2009, but then prices higher than in the Main Case in 2010 and beyond



The pattern of prices in the Pessimistic Case is similar to that in the Main Case, but with important differences. a) the lows in H2 2009 are lower (at around \$1/lb), b) the recovery begins earlier in 2010 (though prices remain low), c) prices track higher in 2011 and 2012 (peaking at around \$6,000/t)



## Implications for copper miners

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## Implications for copper miners: *Conclusions*

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### What does all of this mean for the mining industry?

- While 2009 is set to be a pretty dismal year, prices *will* recover
- The strength of the recovery will depend on two things – first the strength of the consumption rebound, secondly supplier response
- With such a deep trough in consumption in 2009 as predicted, the rebound is likely to be strong. This is especially true in our Pessimistic Case
- Early indications are that while supplier response to the demand downturn will not be enough to prevent a large stock build, it will be much stronger than in past recessions. As a result, the stock build will be modest considering the background
- Less certain is the supplier response to the demand upturn when it occurs. It is clear that low investment now will put limits on the industry's ability to ramp up production quickly. More important, however, will be industry's unwillingness to invest until it is sure of a sound financial return
- With lower prices, costs of production will inevitably fall. If the strong recovery in prices predicted for 2011/2012 is to be achieved, suppliers will need to hold off from too early investment in new capacity



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- Conventional fundamental market analysis

For exchange traded metals

- Interactive fundamental/investment based price models

For anything that has an opening, close, high and low price

- Technical analysis expert systems working from intra-day to long-term (for individual markets and arbitrage)
- Sector rotation analysis
- Black box trading systems

For more information contact **Paul Dewison, Christopher Welch or Peter Hollands**

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