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Copper: BME's proposal on how to understand and model global consumption, production, stocks and prices in a market where investors dominate price

By Peter Hollands, Managing Director of Bloomsbury Minerals Economics Ltd

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BME has a well recognised track record in price forecasting in industrial raw materials markets. We were the first to recognise and accurately model a world that had changed from 2002 when exchange rates began to seriously influence price, and again from 2005 when the impact of the fund investments in futures first began materially to be felt.

The next phase is now upon us, where an investment-dominated price itself has begun to work as a driver of what once used to be regarded as the market fundamentals, i.e. supply, demand and stocks. Also, looming on the horizon is a huge potential expansion of base metals ETFs, which will further change price behaviour.

We are well on the way to developing a model to define the relationships in this emerging world and thus define future trends, opportunities and risks in price and in the physical market in this emerging environment. Sponsorship of our model programme will allow you to get in at the start of this exciting new development in metals market forecasting.

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A presentation in five parts

- **Part I:** How investment drivers have achieved supremacy over physical market drivers in copper.

- **Part II:** exploring the potential impact of assumed steady-state investment-driven excess prices on consumption, production, market balance and cumulative stock build.

- **Part III:** forces which might prolong or curtail this price era.

- **Part IV:** exploring realistic dynamic (rather than assumed steady-state) systems in which investment / disinvestment drives price which drives the so-called fundamentals.

- **Part V:** benefitting from, and gaining access to, BME's price models and whole-industry models.

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PART I:
INVESTMENT DRIVERS HAVE ACHIEVED SUPREMACY OVER PHYSICAL DRIVERS IN COPPER

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The copper price "Super-Cycle": part Chinese demand, part supply constraint, part investment-driven bubble.

- Over 2000-2005, commodity market enthusiasts promoted one super-cycle theory for copper: that China would dramatically boost global consumption growth and that prices would soar.
- Combined with academic research which showed that historical yields from commodity investments were negatively correlated with other asset classes, vast amounts of pension fund (and other) money flowed into the relatively small copper market.
- Consumption growth in copper did not quicken as much as for other commodities, but falling supplies from old mines meant that Chinese demand was hard to satisfy. On top of these factors, investment in futures added some "bubble" to the brew.

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Investment in copper is further raising prices, suppressing usage, supporting secondary & primary production and keeping stocks on an upward trend

- Until 2004, copper was a simple and relatively well-behaved market, with a price cycle readily understood in terms of stocks ($R^2 = 0.62$), currency effects (US $ index: $R^2 = 0.59$) and global economic (industrial production) growth ($R^2 = 0.11$); or in terms of all three combined in a model ($R^2 = 0.82$).
- From 2005, this changed, and prices soared above the levels indicated by industrial-raw-material type price drivers.
- A new era had arrived: investment had boosted prices and set stocks on what seems to be a structural upward trend.

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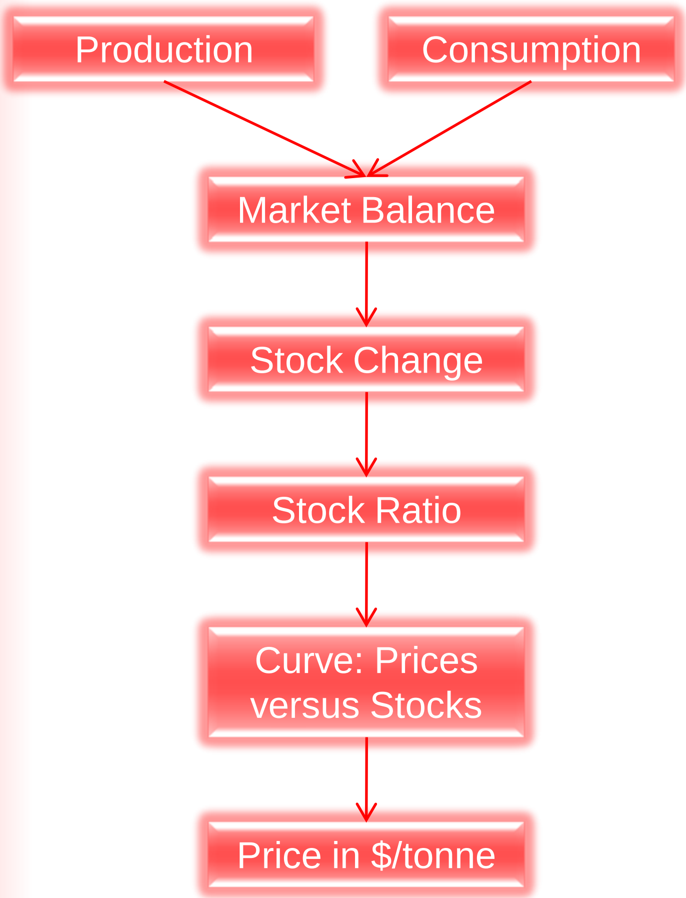
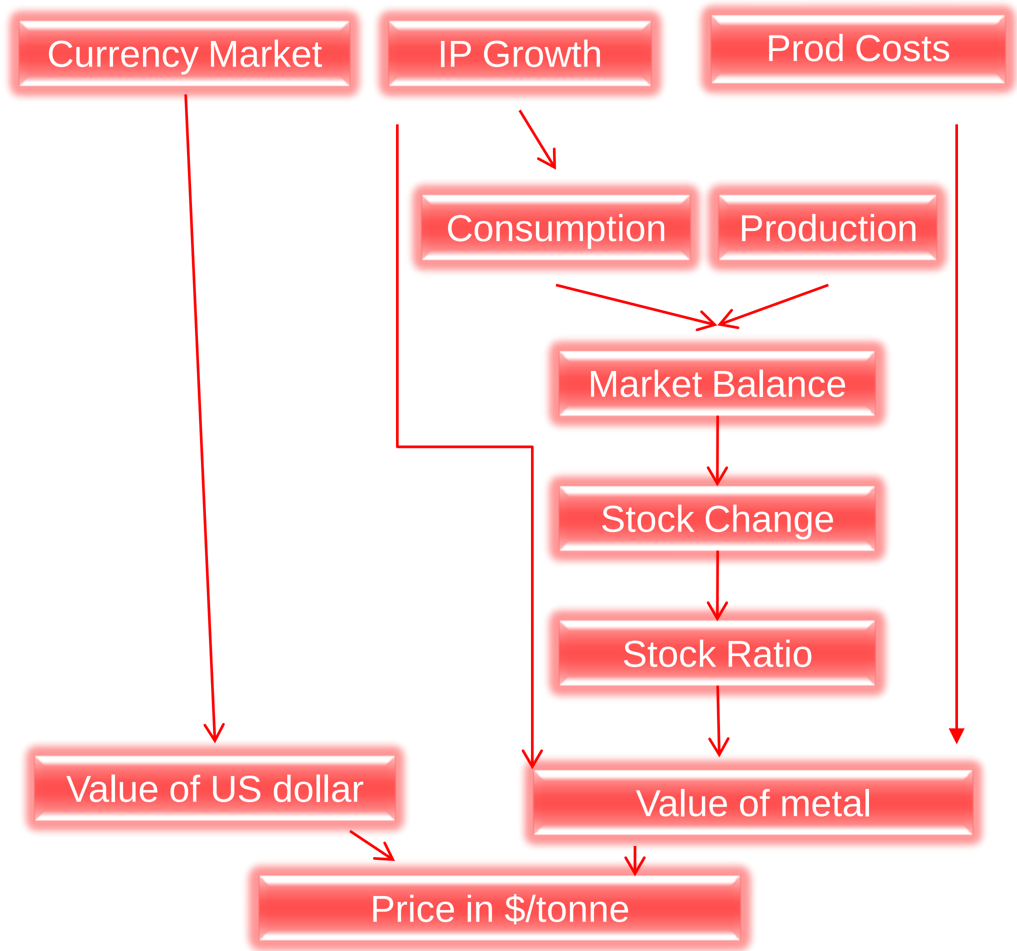
The starting point: prices in a traditional raw materials market – or how it used to be

Non-modeller's view



R^2=0.62

A modeller's view



R^2=0.82

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From 2005, prices soared above the levels indicated by the underlying physical market conditions

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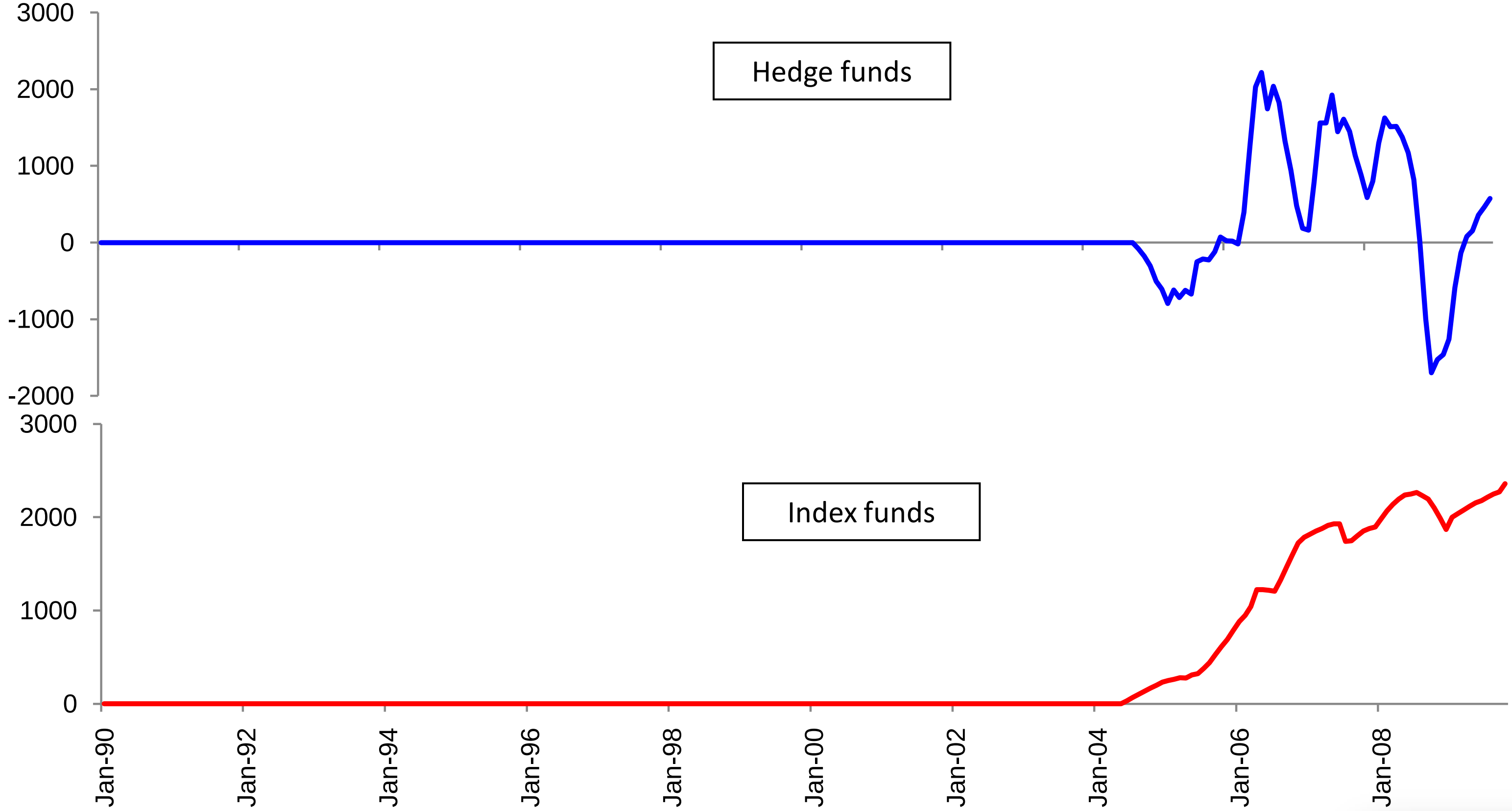
Splitting the net-long-investment price driver into quite smoothly growing positive only index funds and much more volatile long/short hedge funds



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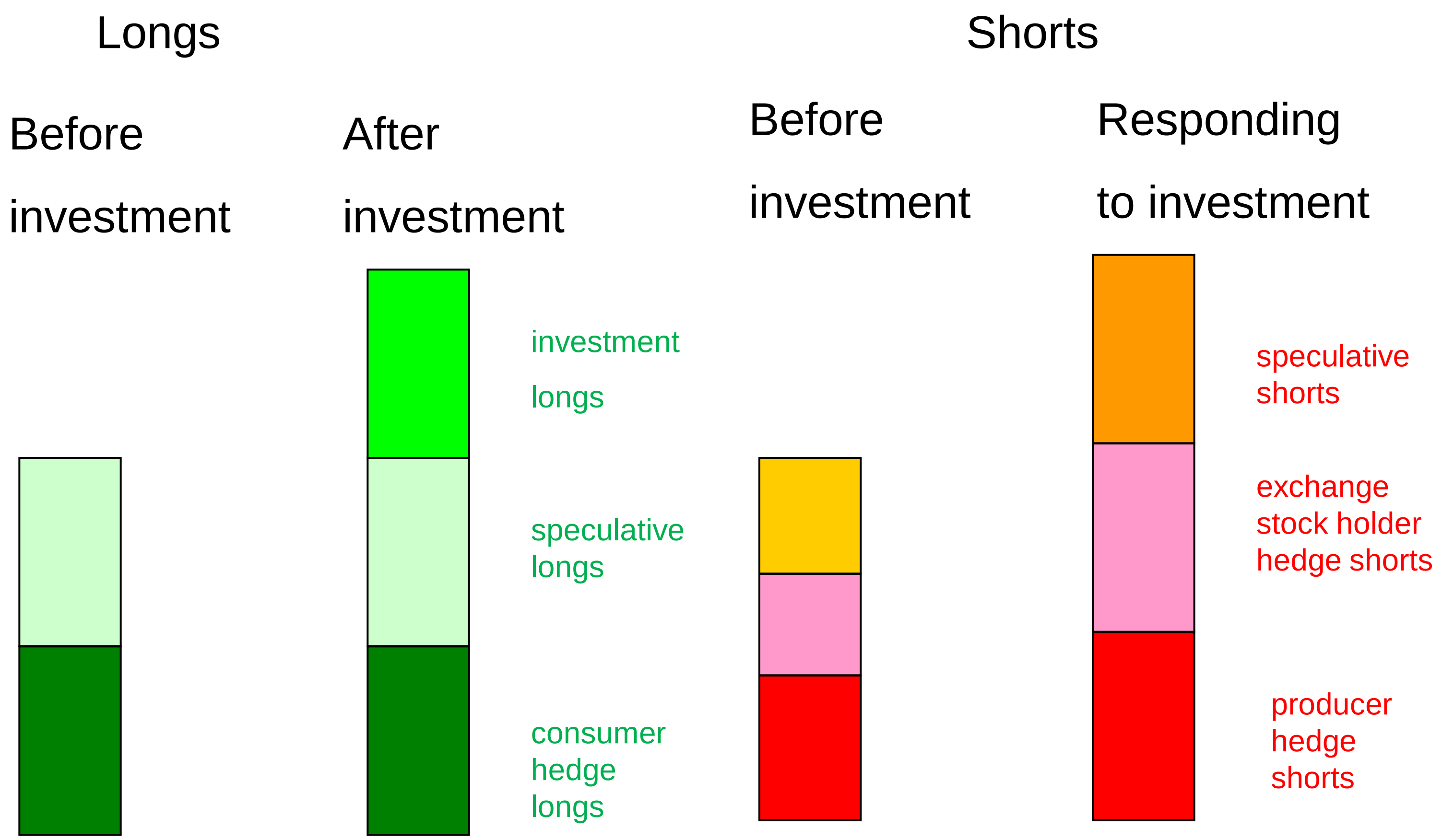
How price-insensitive index fund buying of futures changes the balance and raises stocks and prices (simplified!)



Conclusion: the system will *tolerate* higher stocks and *requires* higher prices to bring in the additional speculative shorts needed to offset investment longs

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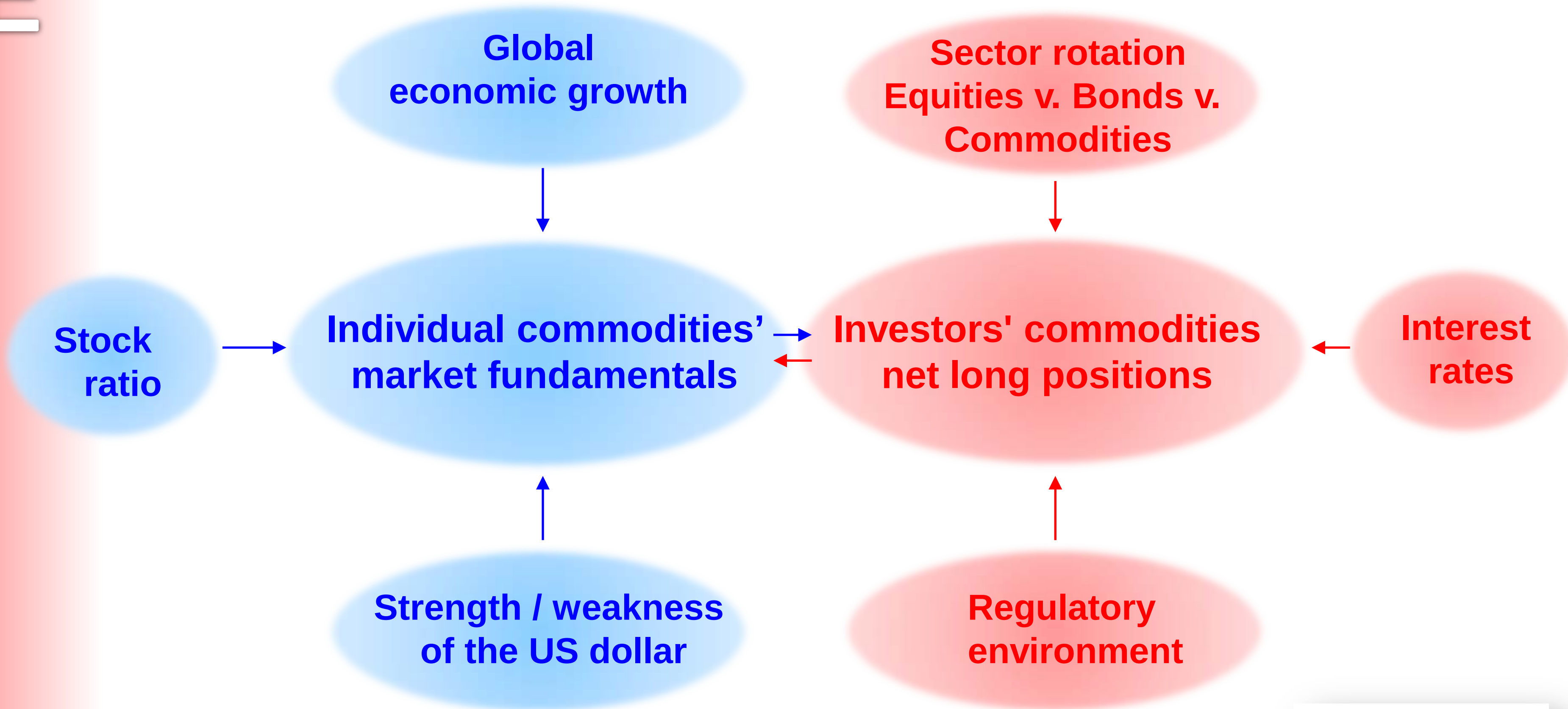
Understanding the interactions between the physical market and cycles and trends in investments in commodities futures



The old world shown in **blue**; the new world of commodities added in **red**

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PART II:

EXPLORING THE POTENTIAL IMPACT OF
ASSUMED STEADY-STATE INVESTMENT-DRIVEN EXCESS
PRICES ON CONSUMPTION, PRODUCTION,
MARKET BALANCE AND CUMULATIVE STOCK BUILD

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Exploring a world in which prices drive so called 'fundamentals' rather than vice versa

The next four slides will give a heroically simplified view of what different assumed steady-state investment/ disinvestment driven prices might do to:

- Consumption
- Production
- Annual market balance
- Cumulative stock change

Then we will go on to look at more complex and realistic *dynamic* systems

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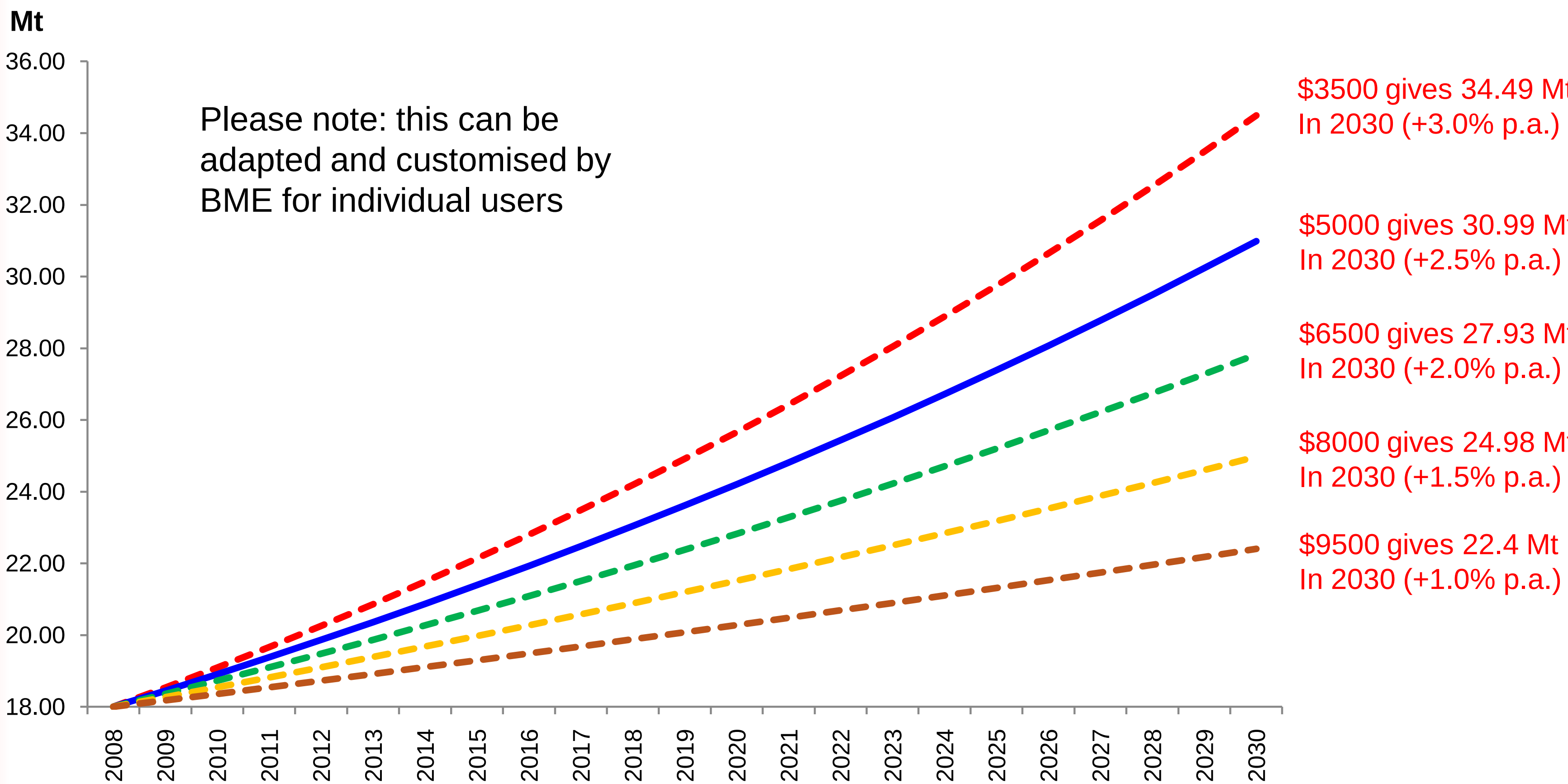
Copper consumption growth: how different assumed steady-state investment/disinvestment driven price levels might affect demand trends



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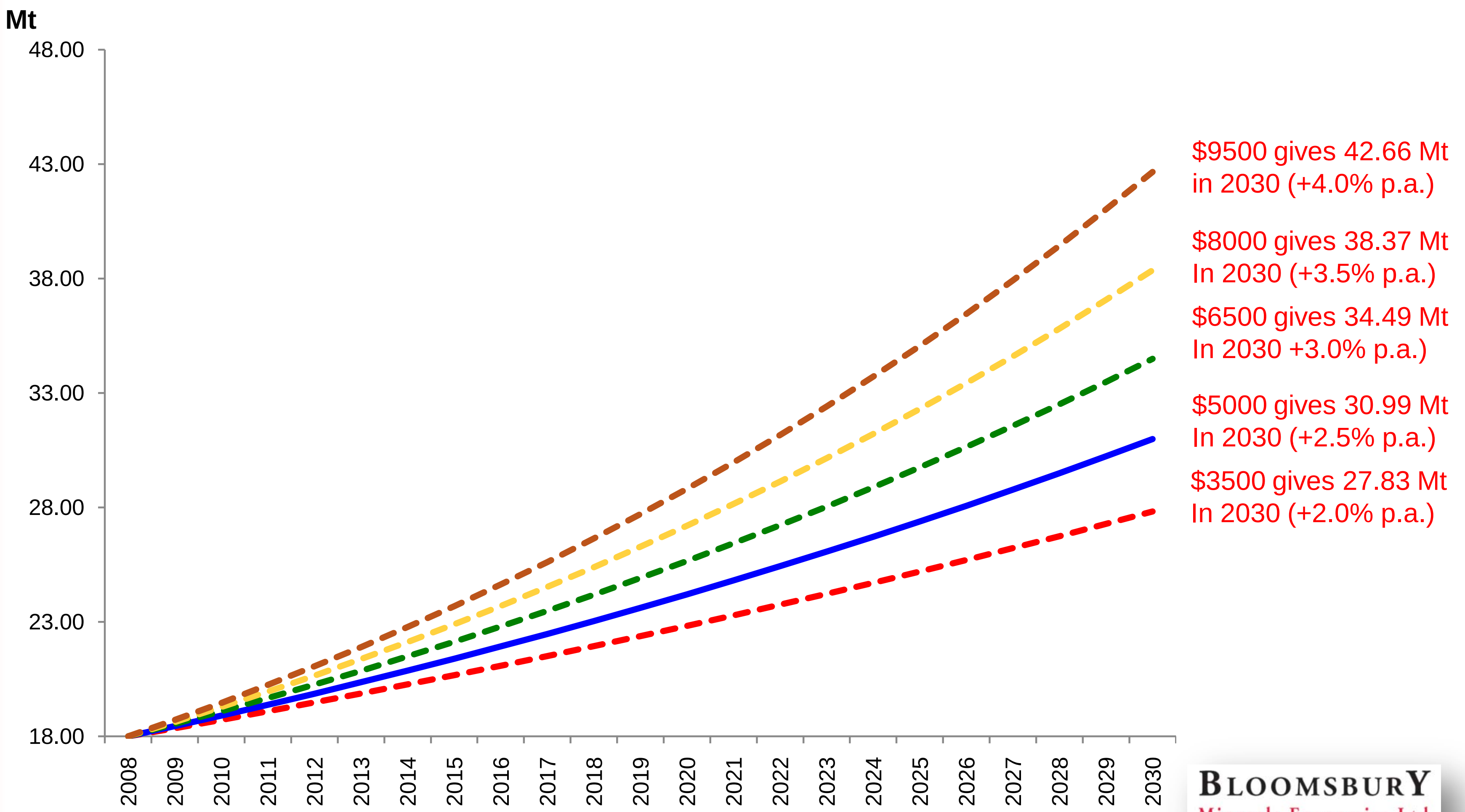
Copper production growth: how different assumed steady-state investment/disinvestment driven prices might affect the supply trend



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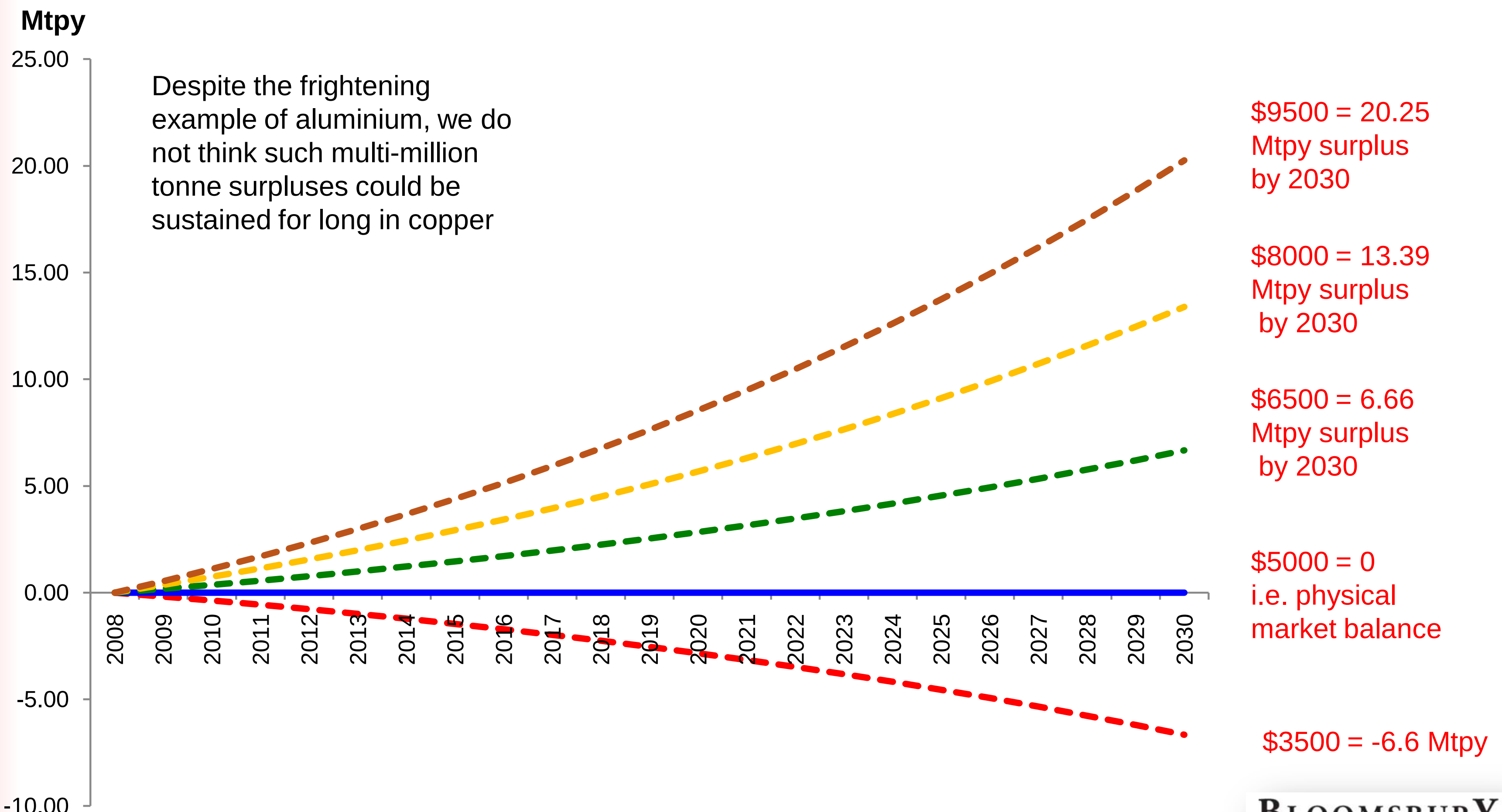
Annual market balance: how different assumed steady-state investment/disinvestment driven prices might affect trend annual surpluses (or deficits)



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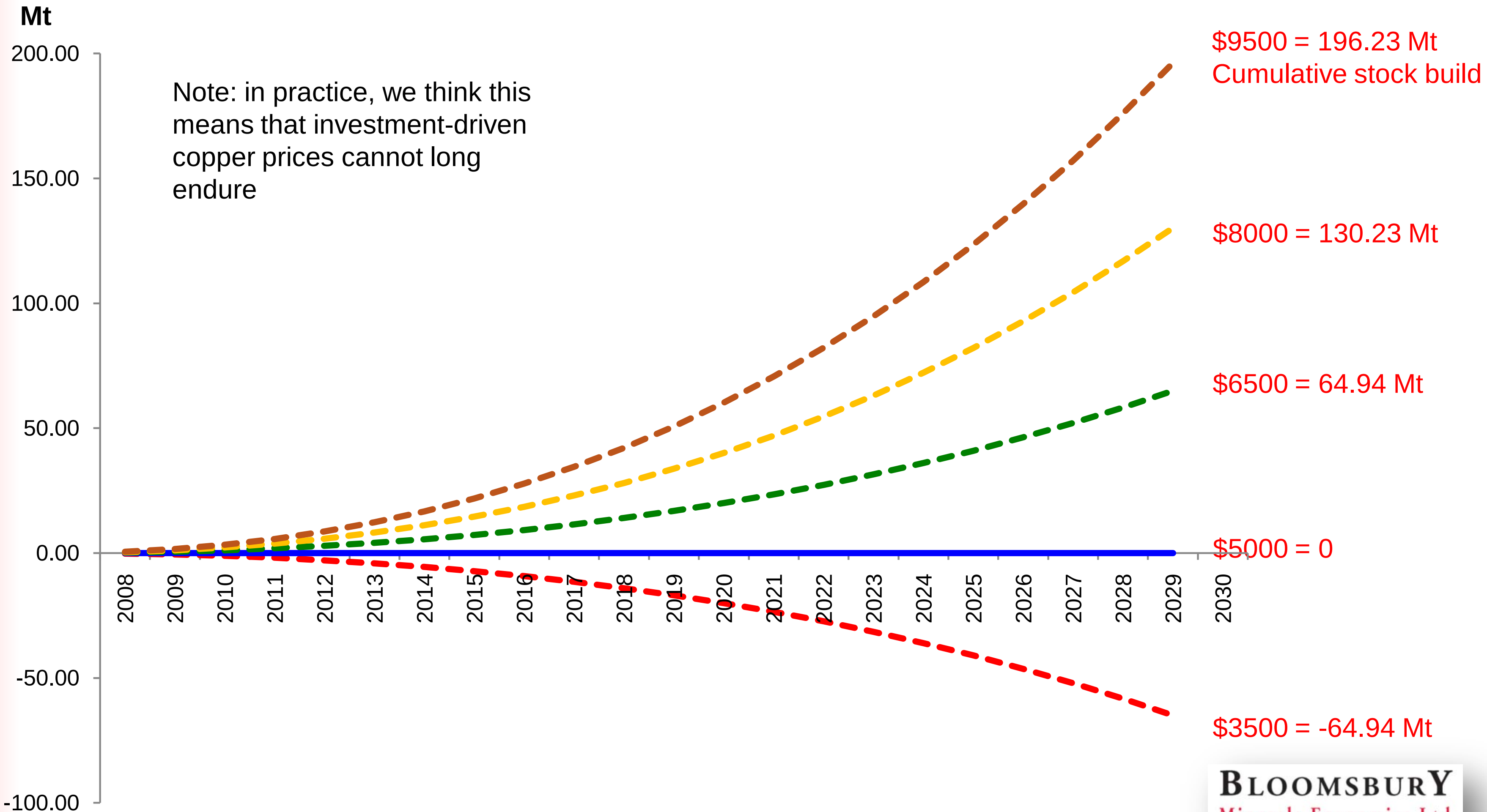
Cumulative copper stock build: how different assumed steady-state investment/disinvestment driven prices might result in extreme outcomes



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PART III:

FORCES WHICH MIGHT PROLONG OR CURTAIL SUCH INVESTMENT-DRIVEN EXCESS PRICES

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Factors which might prolong excess prices

- Base metals ETFs are being created and these seem likely to be able to absorb for some time the surpluses that are being created by index-fund-driven excess prices.
- Becoming more alert to the dangers of rising stocks, the mining majors might well ignore price signals and match the mine project pipeline closely to an assumed low (i.e. price suppressed) demand growth rate instead.
- Opportunities to invest directly in commodities might divert hot money that would otherwise have gone into equity investments in mining juniors. This diversion of funds would limit the juniors’ ability to finance new mines.

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Factors which might curtail investment-driven excess prices in copper

- Investment in commodities is being fuelled by very low nominal and real interest rates. Anticipation of rising interest rates might cause disinvestment in commodities.

- Commodity investments have served as a good hedge against dollar weakness. If the dollar were to begin a firm upward trend, investment in commodities could reverse.

- Negative correlation with other asset classes aroused pension fund interest in the first place. Positive correlation has been seen more recently and may reduce interest.

- Persistent contangos will give negative roll yield.

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Curtailing factors continued.........

- If very large-scale producer hedging were to emerge at very high prices, it might balance investment longs more fully.
- Extraordinarily high stock levels and a crisis in confidence in another base metal (most likely aluminium) might spread to become general disinvestment in all base metals.
- Financial vehicles which make investment in short-only commodity positions straightforward (short-only index funds and short ETFs) might proliferate at high prices.
- If investment-driven distortions occur in oil as well as copper, driving the price to say \$150 or \$200 / bbl, that might cause global recession and spark regulatory response.

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PART IV:

EXPLORING DYNAMIC (RATHER THAN STEADY-STATE) SYSTEMS IN WHICH INVESTMENT/DISINVESTMENT DRIVES PRICE WHICH DRIVES SO-CALLED FUNDAMENTALS

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Modelling dynamic demand growth cycles in an "investment drives price drives fundamentals" world

- In BME's dynamic model, demand analysis will begin with global industrial production growth forecasts.
- Superimposed on this will be price driven changes in intensity of use per unit of economic activity.
- Time lags will be added to the BME model to accommodate the delays which take place in the real world while substitution and re-engineering of products takes place.
- We will eventually also add a supply chain inventory cycle and interaction with the direct melt scrap cycle for further refinement of the dynamic model.

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Modelling copper production growth dynamics in an "investment drives price drives fundamentals" world

- For the short term, a directly known capacity growth forecast will be used, but further ahead we would pass into a partly modelled then wholly modelled (based on lagged prices) series.
- In the BME whole-industry model, price would then affect mine capacity utilisation rates (%) and mine production.
- Price would also both concurrently and with a time lag affect modelled secondary refined production.
- As a later refinement, we would add a price and growth driven stock change along the process chain (concentrates and blister).

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Modelling price to stock relationships in an investment-affected commodities market

- Until large-scale investment in futures began, price to exchange stock relationships had been stable for decades.
- Prices are driven by the futures market's balance, which traditionally was between producer hedge shorts, LME stock holders' contango-earning hedge shorts, speculative shorts, consumer hedge longs and speculative longs.
- From around 2005, a previously insignificant part of the balance – investment longs – offset more and more LME stock-holders' hedge shorts, and require more and more speculative shorts to be drawn into the market at any given stock level, which required higher and higher prices. *These changes are already being modelled by BME.*

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PART V:

BENEFITTING FROM AND GAINING ACCESS TO BME'S PRICE MODELS AND WHOLE-INDUSTRY MODELS

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What the new models of an investment driven copper industry have to offer mining majors

- The most fundamental benefit would be in quantifying better the effect that different investment patterns would have in raising the price and thus slowing demand growth trends, hence affecting optimum project pipeline timings.

- Very nearly equally important would be providing the basis for scenario analysis regarding different rates of project development, for instance if Chinese companies were to buy a less politically sensitive mining major and radically accelerate project development to reduce metal prices.

- Issues of diversification could be addressed in a much more informed way. Asset values for proposed purchases or sales could be better established.

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What a model of an investment driven industry has to offer governments of copper dependent countries

- The new model will allow governments of copper export dependent countries to anticipate successive price eras: phases first of excess prices, then very likely abnormally low prices during disinvestment and while elimination of global excess stocks occurs, then a new price equilibrium.

- That sequence will allow appropriate inflation and exchange rate strategies to be explored, to mitigate the likely damaging effects on other industries in the country.

- Understanding of the same price era sequencing would assist in optimisation of taxation and royalty structures, and price stabilisation or buffer stock schemes.

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What a model of an investment-driven market has to offer the financial institutions involved in metals

- The major financial institutions concerned will have to deal with their own potentially conflicting interests: mine financing – where higher prices are desired, proprietary trading – volatility desired, LME stock financing - contango desired, index funds - backwardation desired. Indexes bring with them a liability to create surpluses, which in turn may 'feed' the stock requirements of ETFs.
- BME's new model will allow those financial institutions which have advance knowledge of the investment pipeline to understand and anticipate interactions between physical markets, index funds, ETFs and LME financing of stocks.

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What a model of an investment driven commodity market has to offer merchants

- The models will assist merchants to understand a world which has become much more complex, with subtle interactions between physical markets, index funds and – now – a looming ETF industry.
- The models will stimulate new thinking on the sources of knowledge advantage in this market. It is no longer knowledge derived from physical order books that offers advantage, it is now knowledge of the current rate of investment and of the future pipeline of investments. New alliances with financial institutions need to be explored.
- More prosaically but very important, old value at risk models could be re-assessed using BME models.

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Understanding commodities prices: a moving target

- **Analysis of simple industrial raw material markets**
- ***BME was the 'thought leader' over 2002 - 2005***
  - Stock ratios
  - Rate of demand growth
  - Strength / weakness of the dollar
- **Analysis of hybrid raw material / investment vehicle market**
- ***BME the first to incorporate investment effects from late 2005***
  - Add effect of commodity index fund longs
  - Add / subtract effect of hedge fund longs / shorts
- **Next stage is to model better the level of investments/disinvestments in commodities**
- ***BME will again be leading the way in 2010***
  - Investment sector rotation: equities, bonds, commodities
  - Feedback loop: investment/disinvestment driving stocks
  - Regulatory influences

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The next step: gaining access to BME's price models and whole-industry models

- BME's current standard multi-user price models run with monthly data through 2010. They model prices, not entire industries. They are currently being extended to 2030.
- These standard multi-user models are available for copper, aluminium, nickel, zinc and lead. Annual licenses cost £10,000 for one metal, £16,000 for two metals, £20,000 for three, £23,000 for four and £25,000 for five.
- Similar models could be set up for other commodities.
- BME is now moving on from price models to whole-industry models as described in this presentation.
- *Companies wishing to sponsor development of these whole-industry models on a single-user basis are invited to contact BME to discuss.*

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