



Impact of price cycles on investment in the raw materials industry

A presentation by CRU for the World Materials Forum

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9 June 2016



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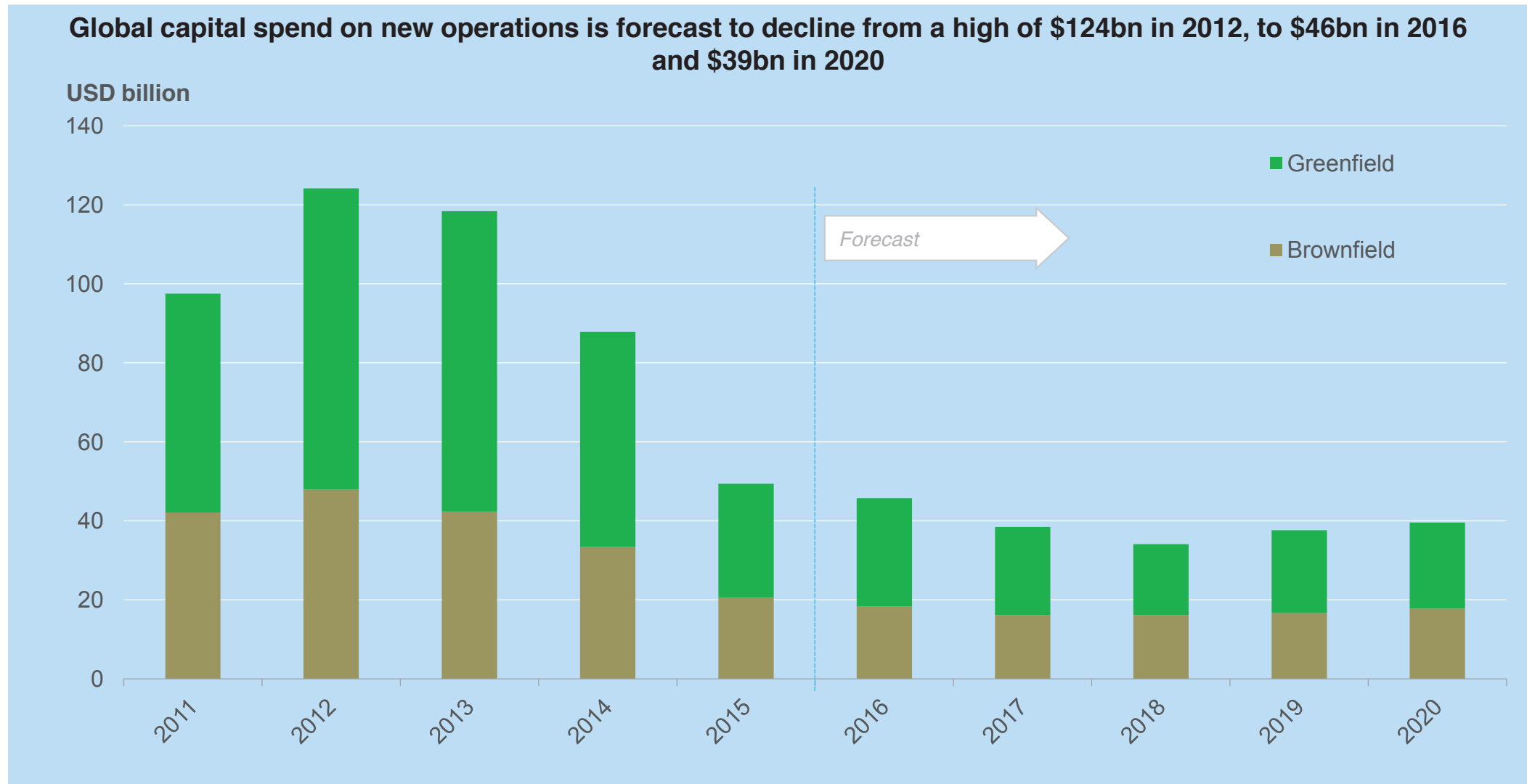
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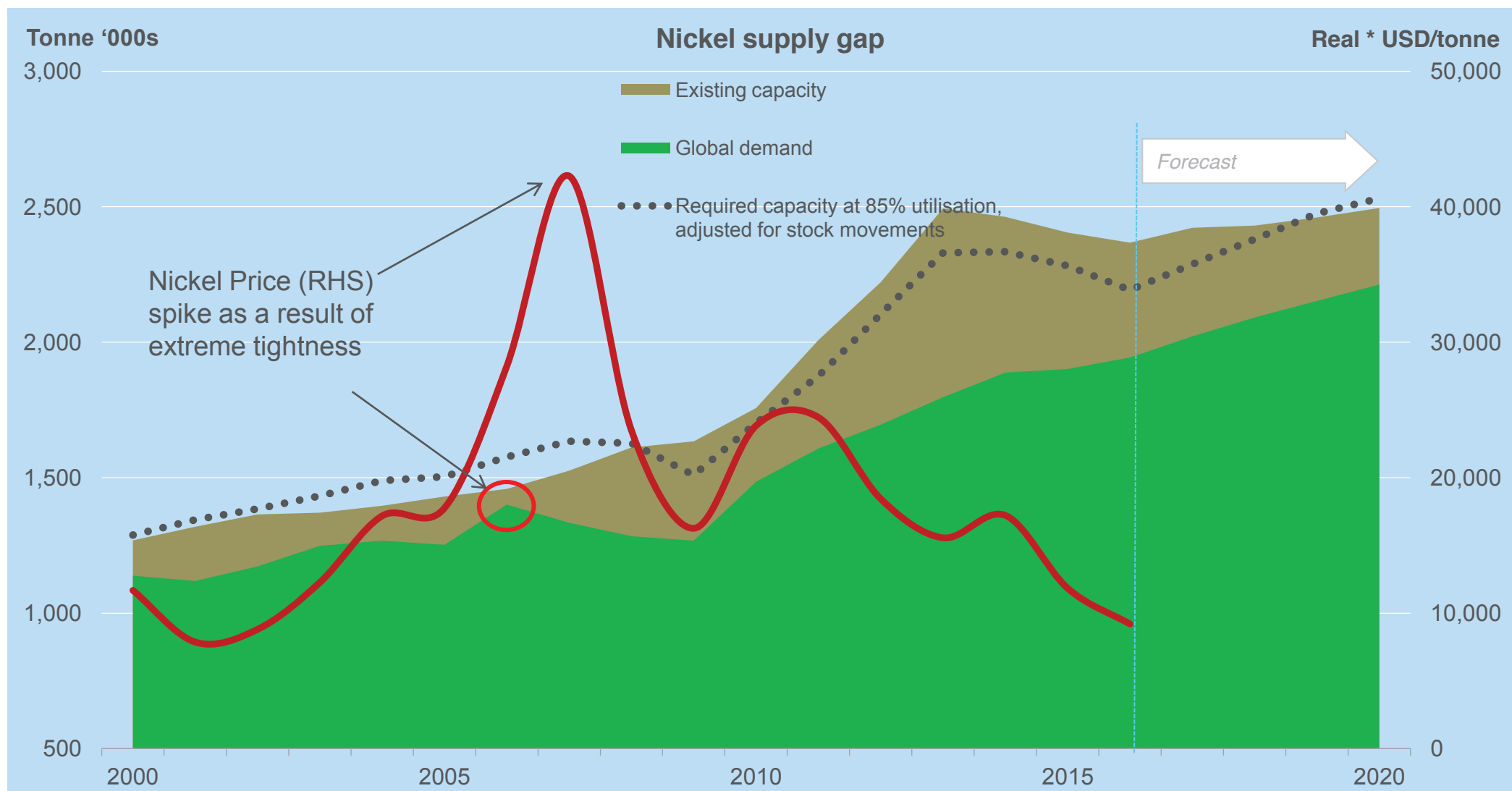
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Recent fall in capital investment is a reaction to previous over investment

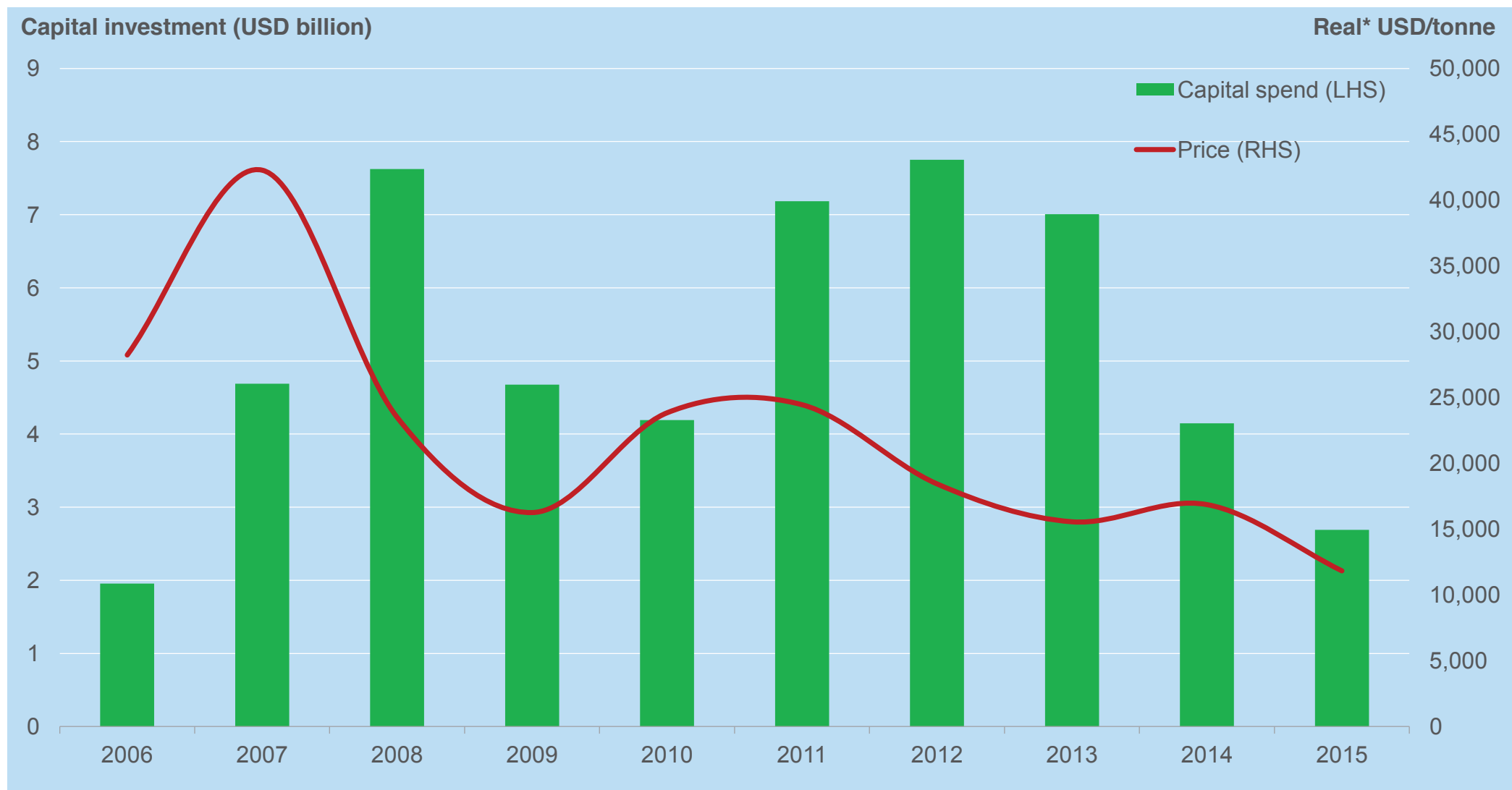


Nickel shows what can happen to a market after a price spike



* (2011/2014 average MUV deflator)

Nickel industry capital investment cycle lagging price changes

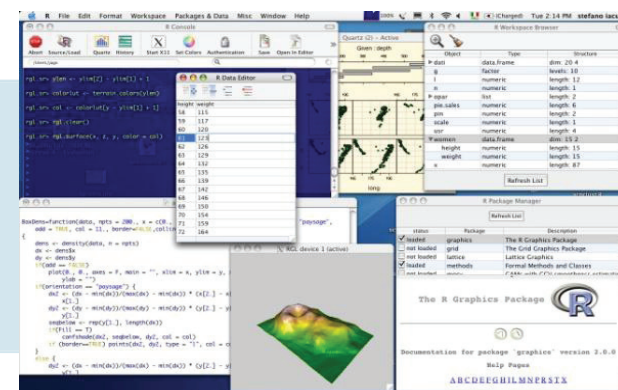


* (2011/2014 average MUV deflator)

CRU methodology to interpret historical commodity prices

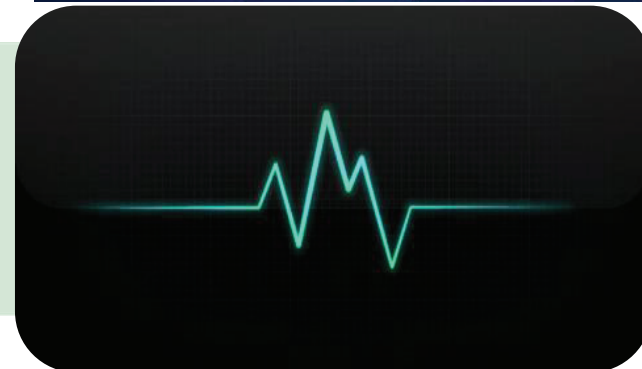
Data

- Annual price data 1900-2015
- Deflated to real 2015 \$ terms



Filter

- Band pass filter to separate different frequencies
- Use of the Asymmetric Christiano Fitzgerald (ACF) filter

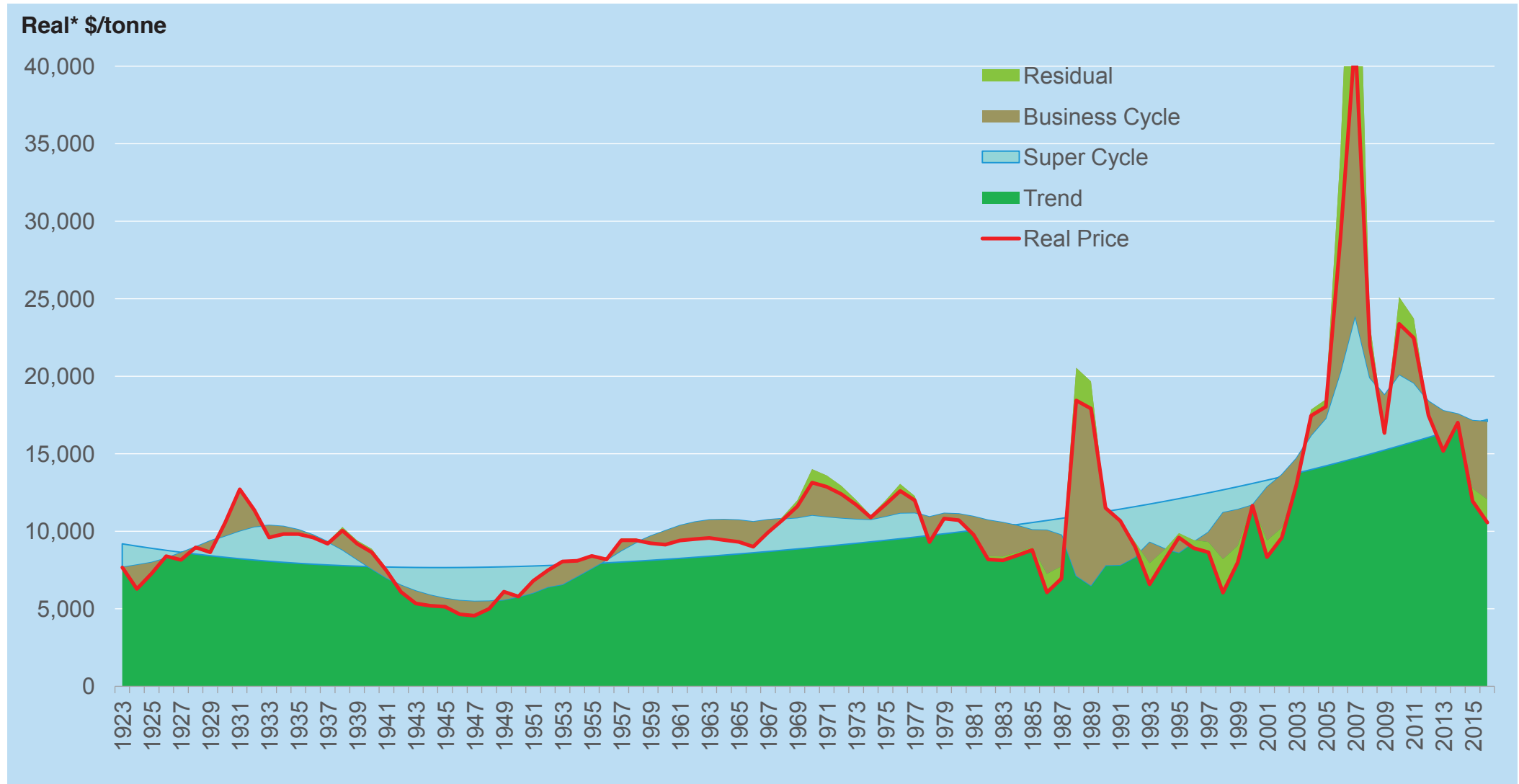


Interpret

- Trends (>70 years)
- Super Cycles (20 – 70 years)
- Business Cycles (2 – 20 years)

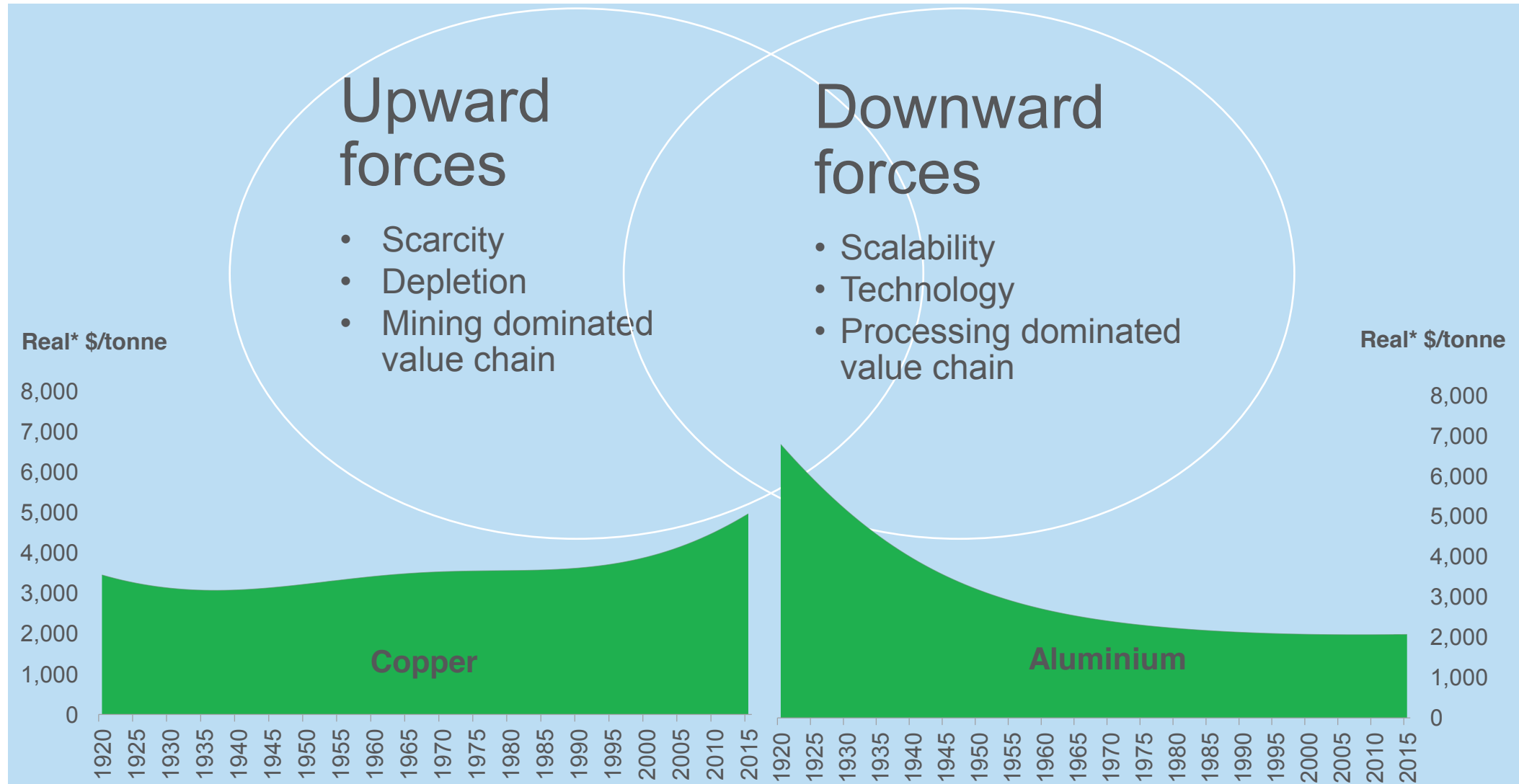


Deconstructed price of nickel



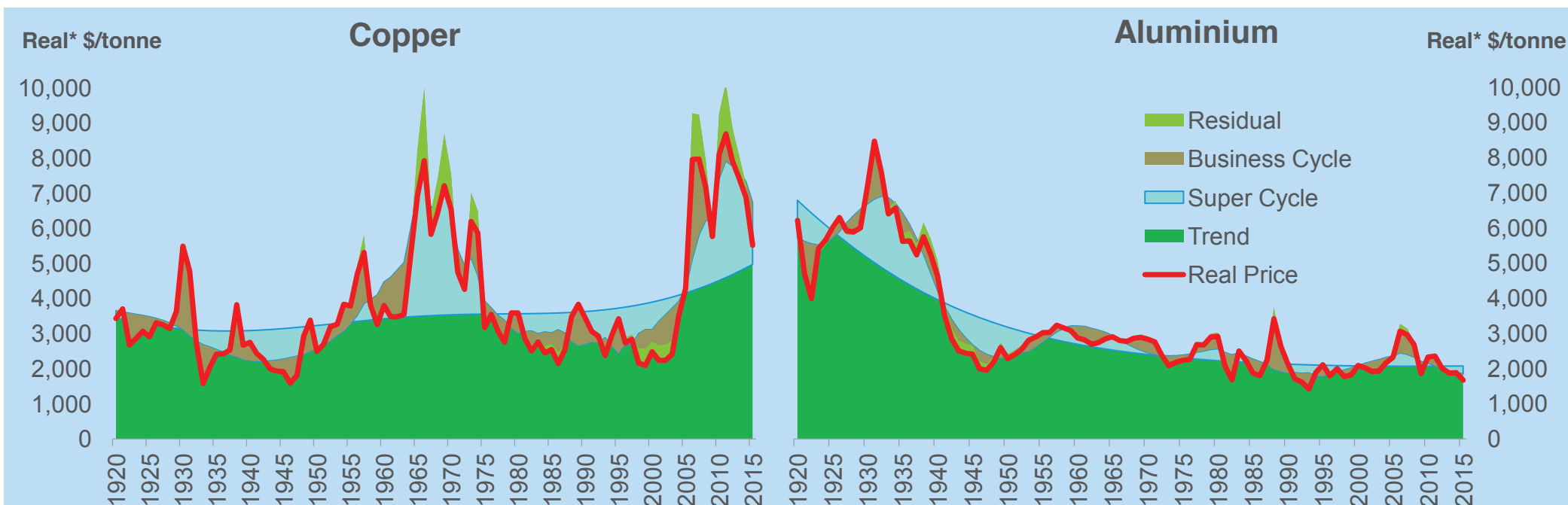
* (2011/2014 average MUV deflator)

Underlying industry fundamentals impact long term trends



* (2011/2014 average MUV deflator)

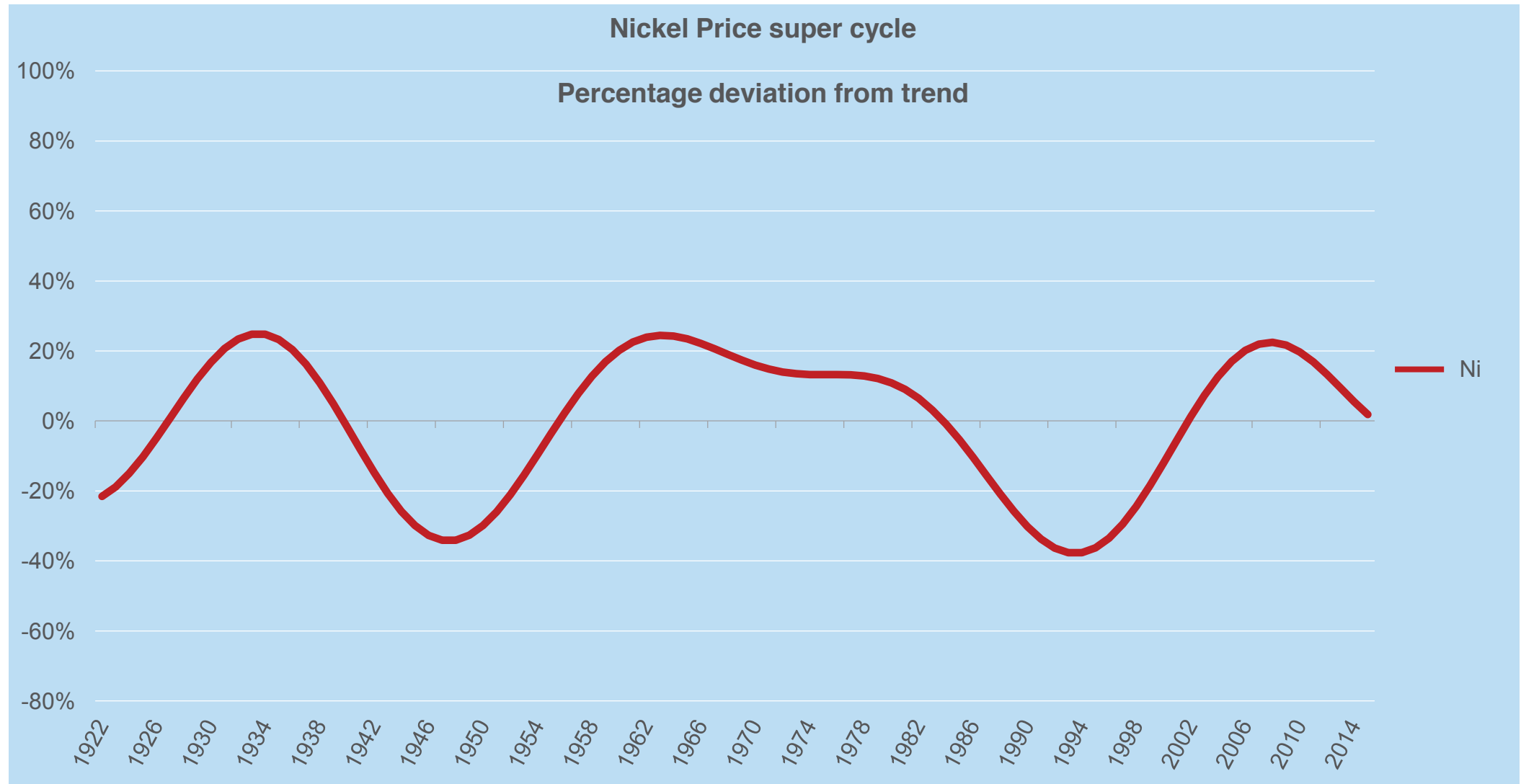
Super cycles reflect behaviour as well as fundamentals



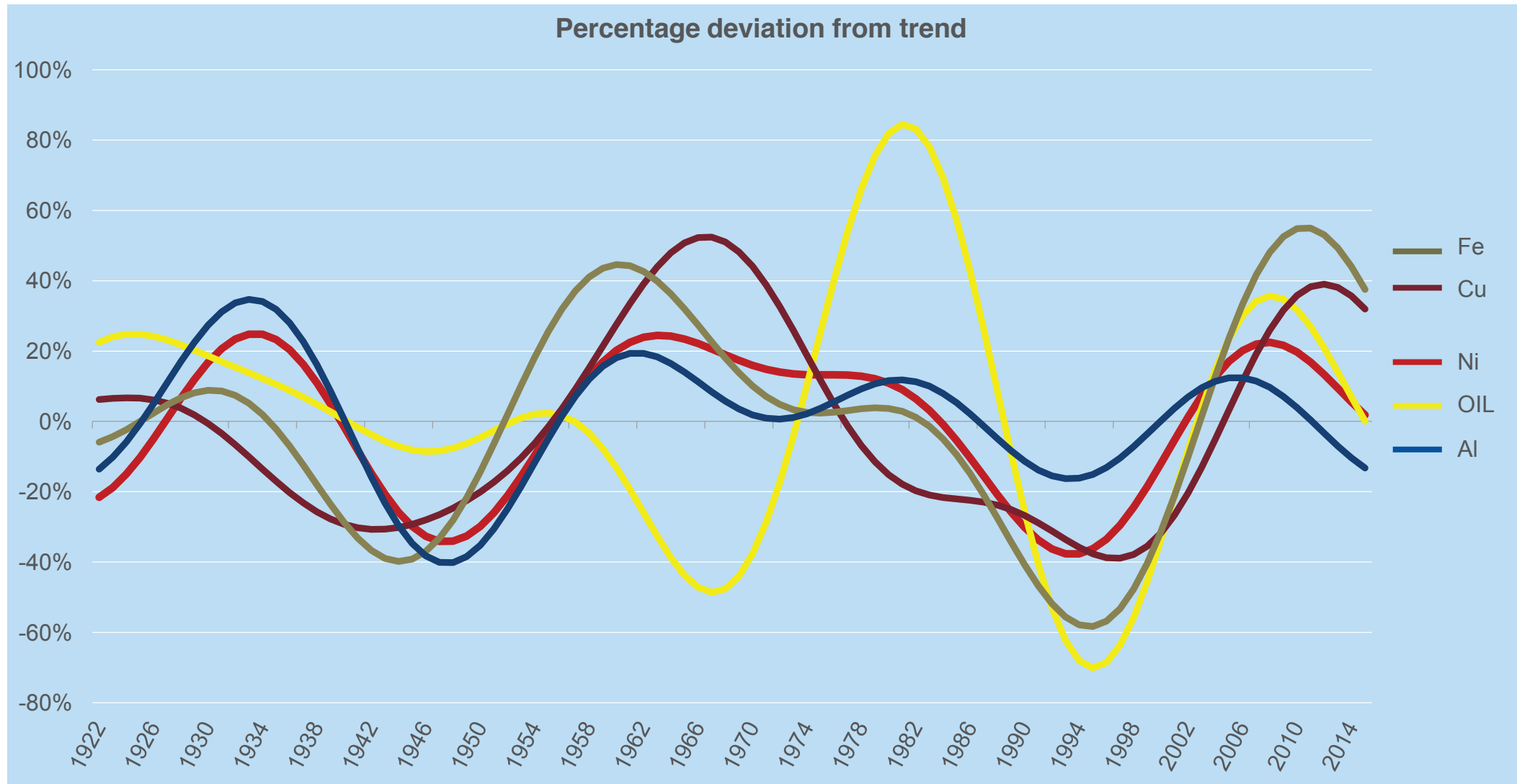
- Post war boom peaked in late 1960's and copper price declined relative to long term trend for the next 30 years

- Lower level of volatility once industry "established"

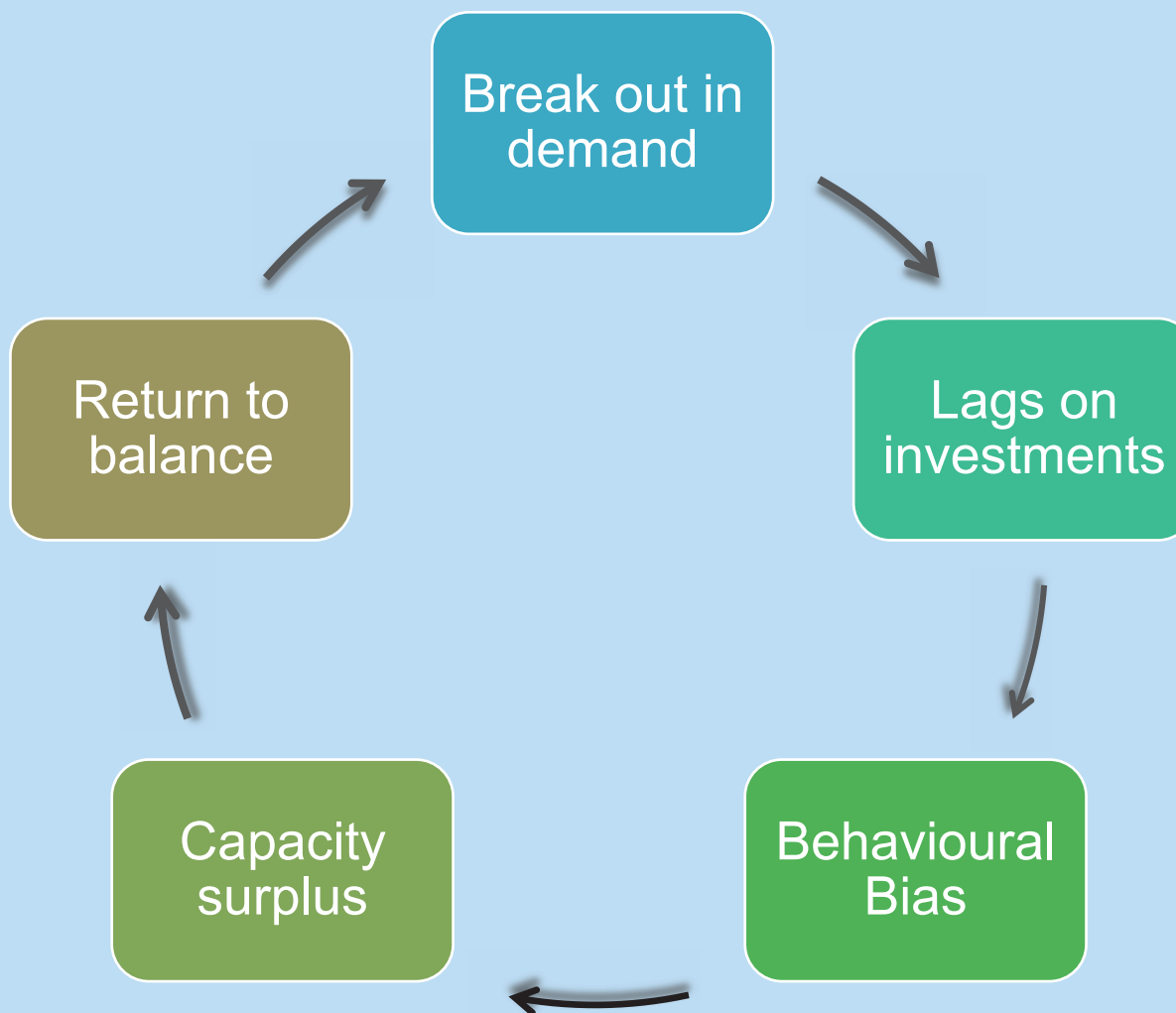
Representing super cycle as a deviation from long term trend



Super cycle phases not always synchronous



The super cycle is driven by imperfect reaction to break outs in demand



Conclusion

- Long term price trends are driven by factors that are hard to change
- Breaks in demand / positive demand shocks can trigger reactions which lead to over capacity and low prices
- Additional understanding is needed:
 - Where will break out demand level off?
 - What will competitors do in reaction to high prices?
- Price stability will lead to a less volatile investment environment and higher levels of availability of capital for necessary investments
- Breaks in demand are hard to predict but one can speculate that a combination of technological advances and encouragement through environment related legislation could lead to the next super cycle upswing
- The next commodity to show a break out in demand may be determined by public agencies decisions relating to sustainable development.

About CRU

CRU's reputation with customers across mining, metals and fertilizers is for integrity, reliability, independence and authority.

CRU's insights are built on a twin commitment to quality primary research and robust, transparent methodologies. You can rely on our work - our data, our views, our models - because we have built them ourselves, from the ground up, since our foundation in 1969.

The requirement for exclusive, first-hand knowledge has driven us to invest in a global team of analysts, the key to gaining a real understanding of critical, hard-to-reach markets such as China.

CRU's people - whether delivering market outlooks, price assessments, cost analysis or consulting - focus on helping customers to make important business decisions. Across a comprehensive range of commodities, we strive to provide customers with the best service and the closest contact - flexible, personal and responsive.

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Attending the World Materials Forum



David Trafford

CEO, CRU Consulting

David Trafford, CEO of CRU Consulting, has thirty years' experience in the mining, metals and fertilisers industry gained by working for international companies and a range of corporate and investment banking divisions within global financial institutions. He has worked on projects involving the exploration, development, production and marketing of base and precious metals, bulk commodities, fertilizer minerals and specialist metals. He has led transactions on every continent for investors, mining companies and governments advising on: strategy; financing options; acquisition and disposals. Prior to joining CRU, David was Global Head of Mining and Metals at Standard Chartered. He was head of Macquarie Bank's European Natural Resources advisory team and held natural resource related positions at BNP Paribas, Kleinwort Benson and Samuel Montagu. In addition, David spent four years in the Business Development Department of Outokumpu Metals and Resources. David holds a Bachelor of Science degree in Mining Geology from Imperial College.

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Rebecca joined CRU Consulting in 1995 and has worked on and managed many single client consultancy projects across a broad range of metals and subjects. From 2004 until 2007, Rebecca was Practice Area Leader for the Performance Improvement Practice and in particular developed this business in South America. Between 2007 and 2010, Rebecca spent time as Head of Business Development within CRU focusing on internal improvement projects including introducing an internal investment approvals process. In 2010, Rebecca returned to CRU Consulting and took charge of the group's Strategy Practice. More recently Rebecca runs the Technology Metals Desk with a focus on new commodities.

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