

# Copper mine monopoly

(or why building a copper mine is like buying a house)



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**Mining Journal Base Metals Seminar**  
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**CRU | ANALYSIS**

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# Copper mine monopoly

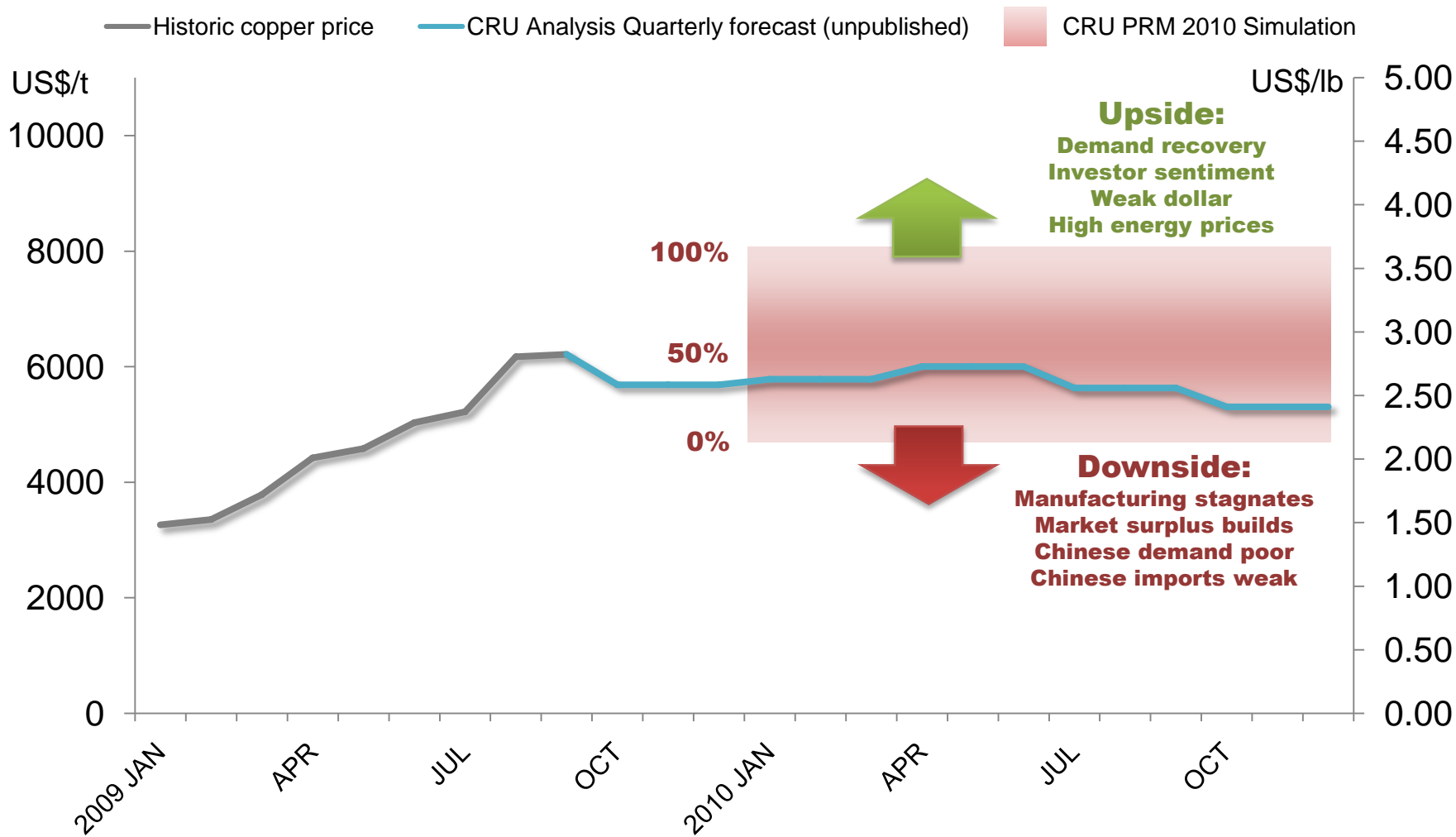
## Rules of the game

- Why play the game?
  - Whilst uncertainty remains in the short term...
  - The worst is over...
  - And there will be fundamentally higher long term prices
- How to play the game – picking your copper project
  - Choose your:
    - Region
    - Budget
    - Risk
    - By-products
    - Timeframe
  - Now select your copper project (if you can)
- How to win the game
  - Or how building a copper mine is like buying a house



# Short term copper prices in context

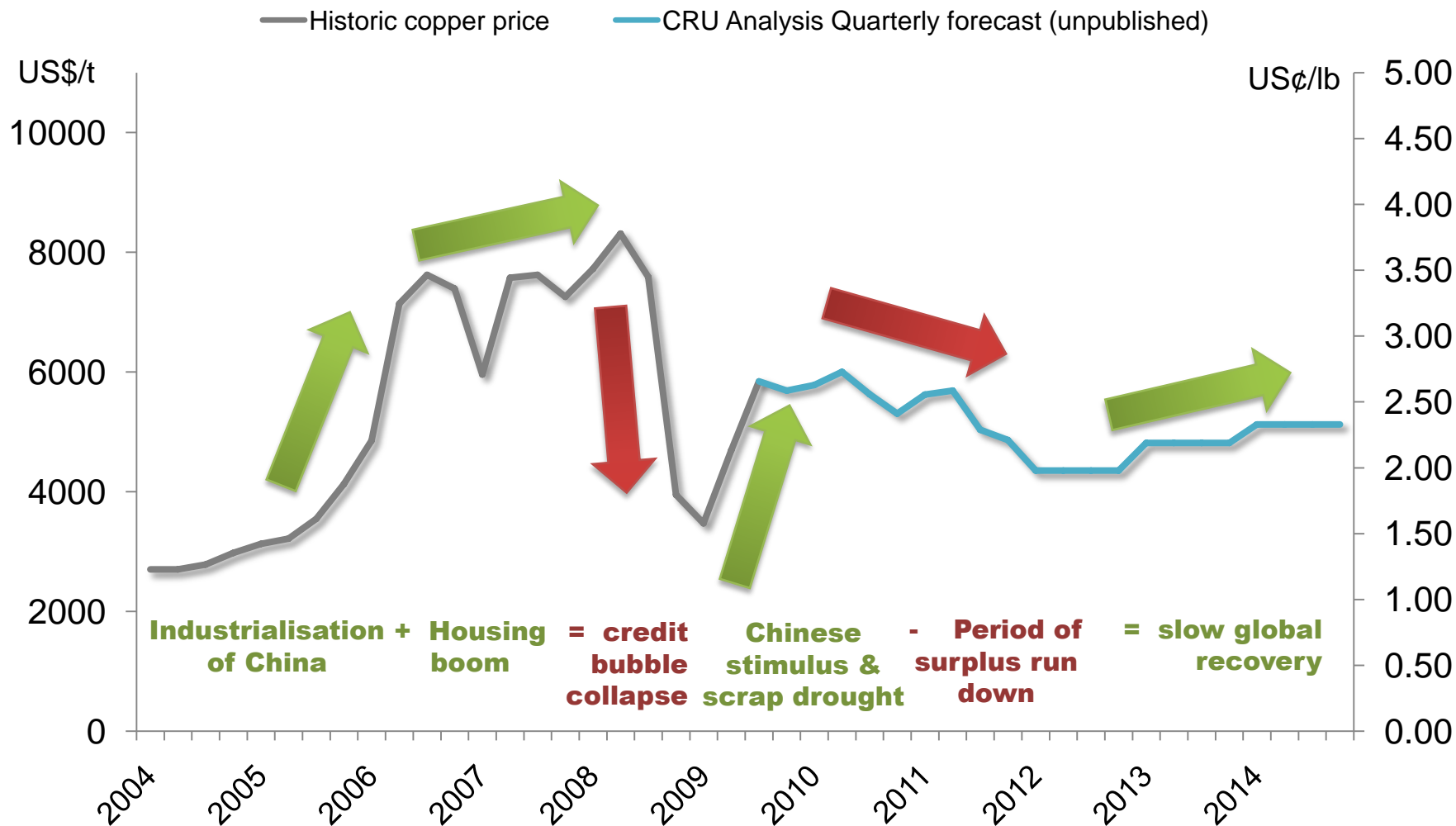
Uncertainty remains in the short term...



# Medium term copper prices in context



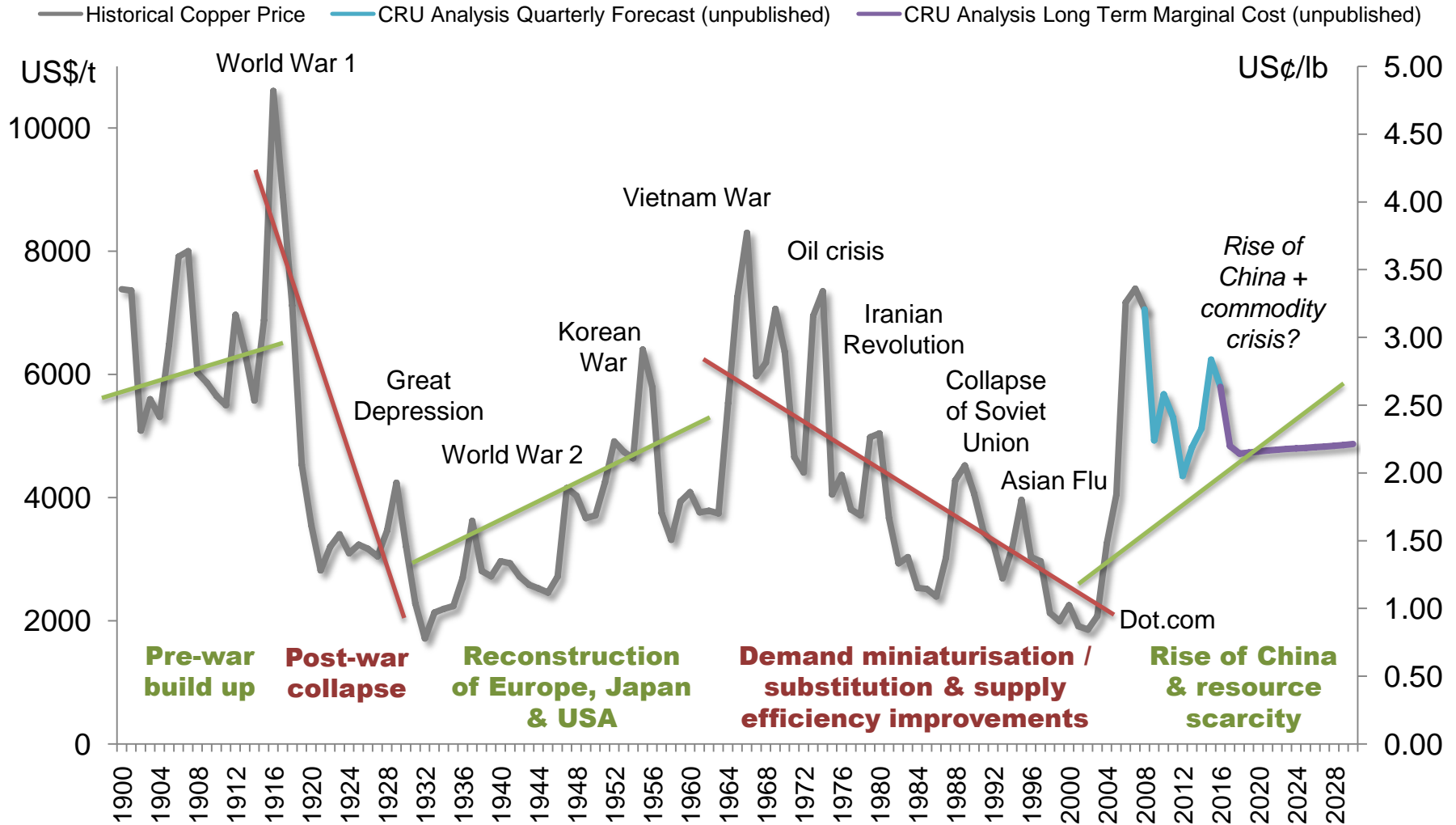
The worst is over... (fingers crossed)



# Long term copper prices in context

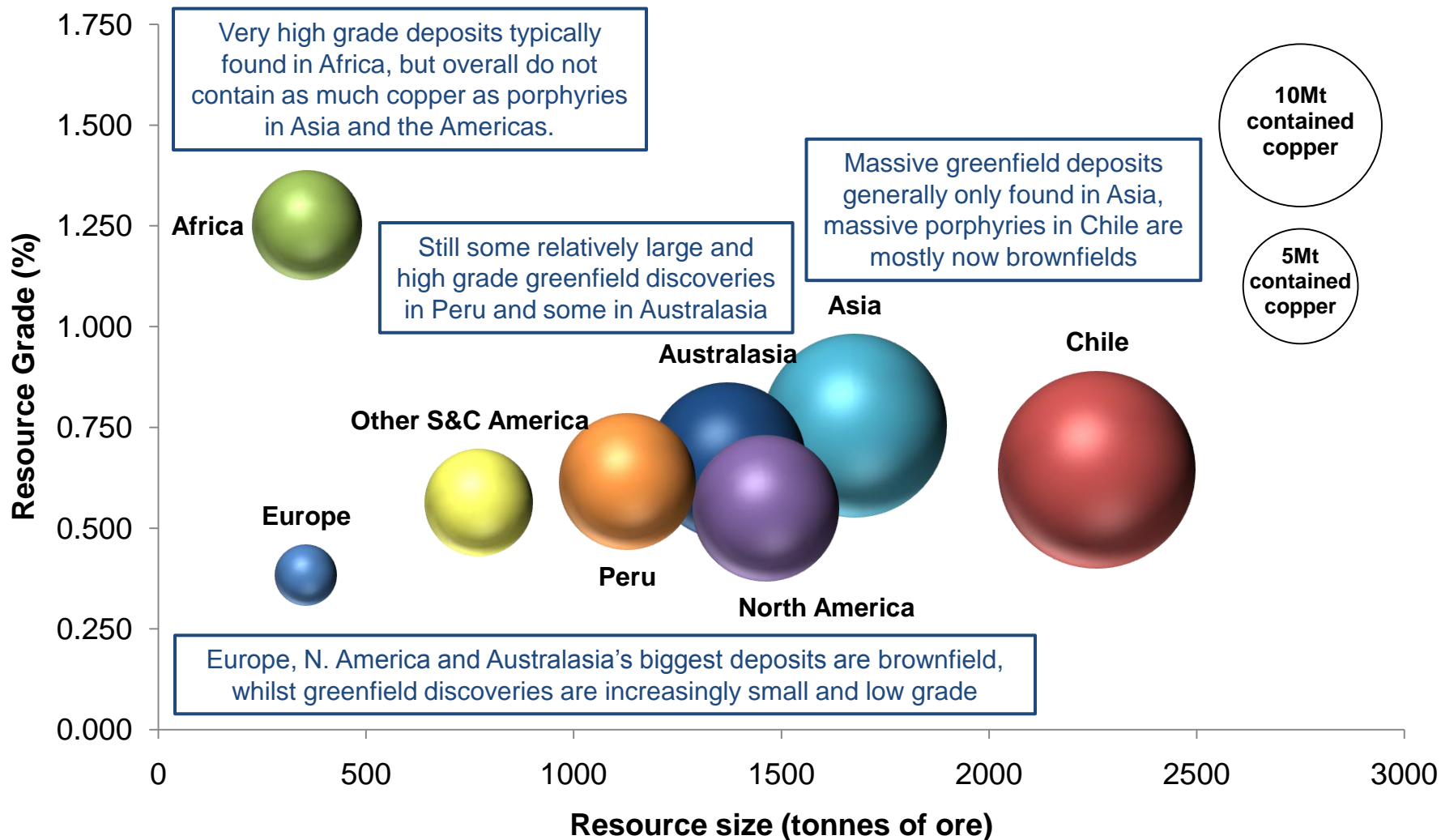


## Fundamentally higher long term prices



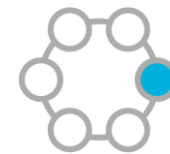
# Biggest deposits in Chile and Asia

Average project resource size vs resource grade vs contained copper



# Asia & Peru will be increasingly important

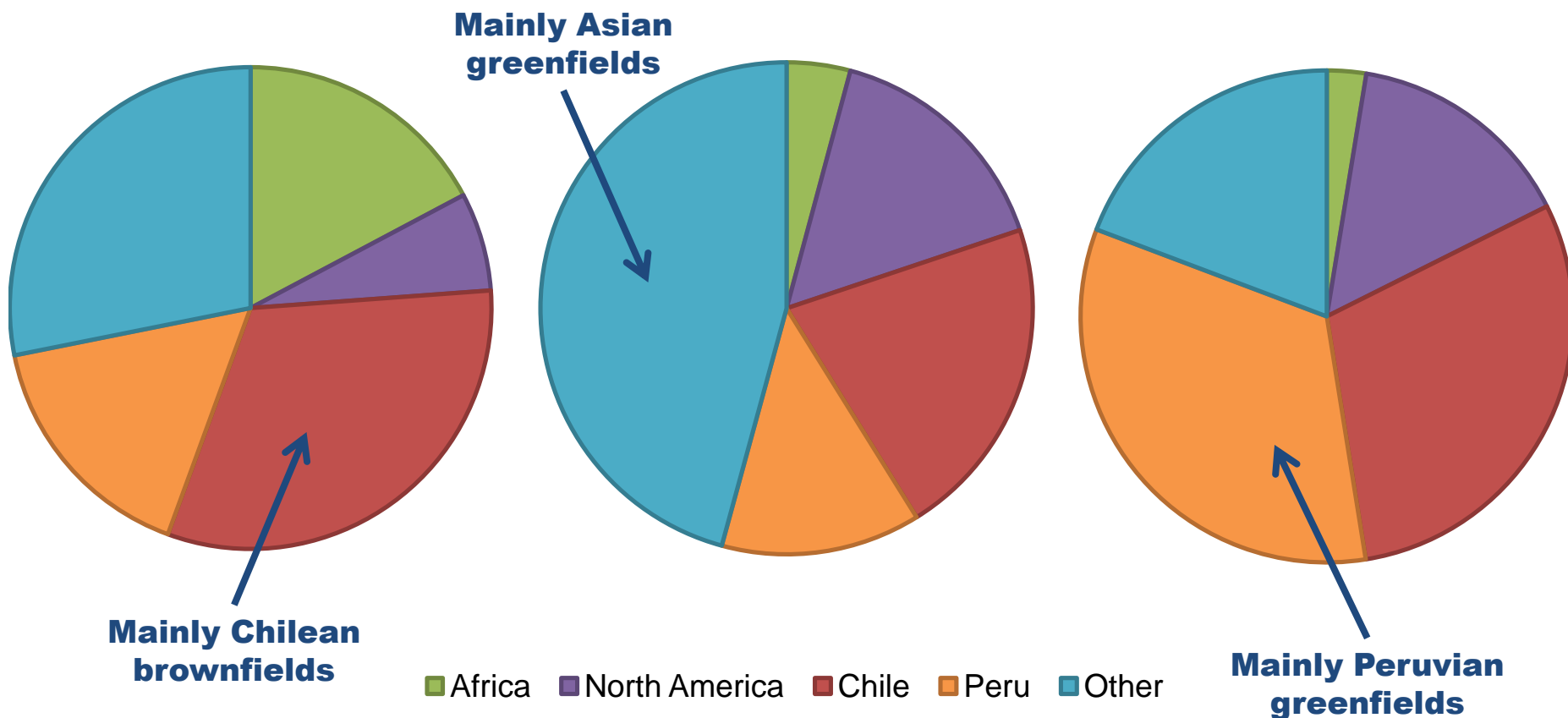
Location of new production from 98 key projects during each period



2009-12 (Economic Recovery)

2013-16 (Back to boom?)

2017+ (Into the future...)



# Mines going deeper underground...

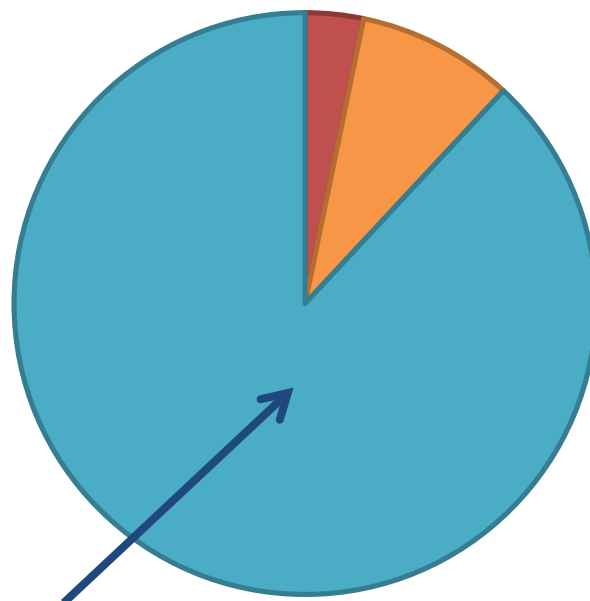
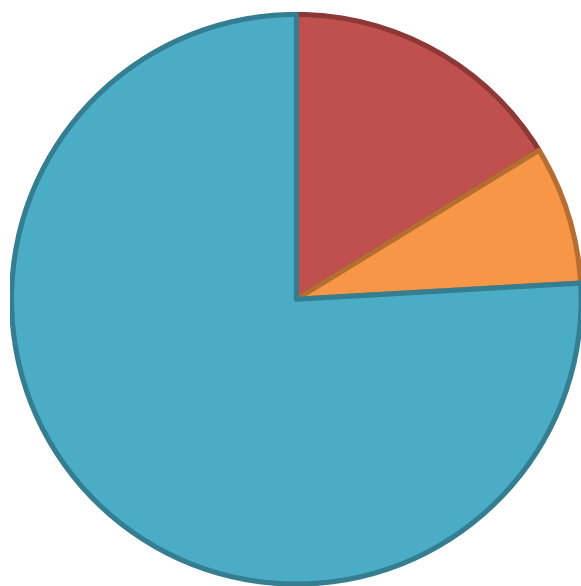
Type of new production from 98 key projects during each period



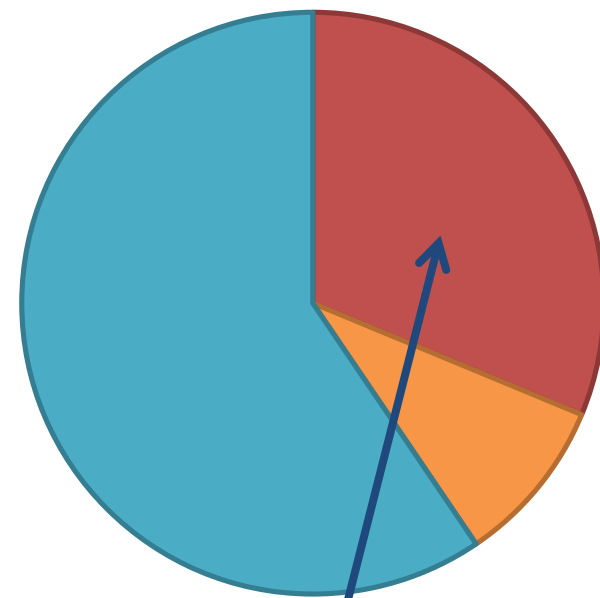
2009-12 (Economic Recovery)

2013-16 (Back to boom?)

2017+ (Into the future...)



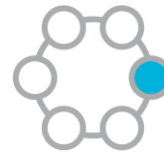
**Backlog of large open pits to develop**



**Increasing scarcity of good surface deposits**

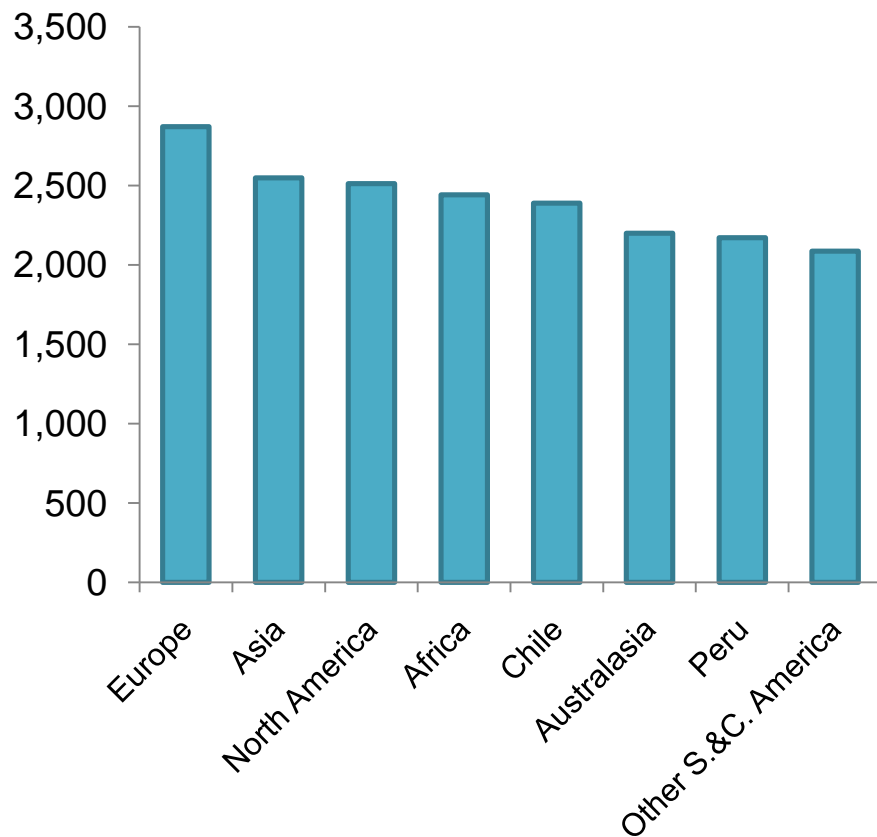
■ Underground ■ Combined ■ Open Pit

# Low capital cost versus low operating cost

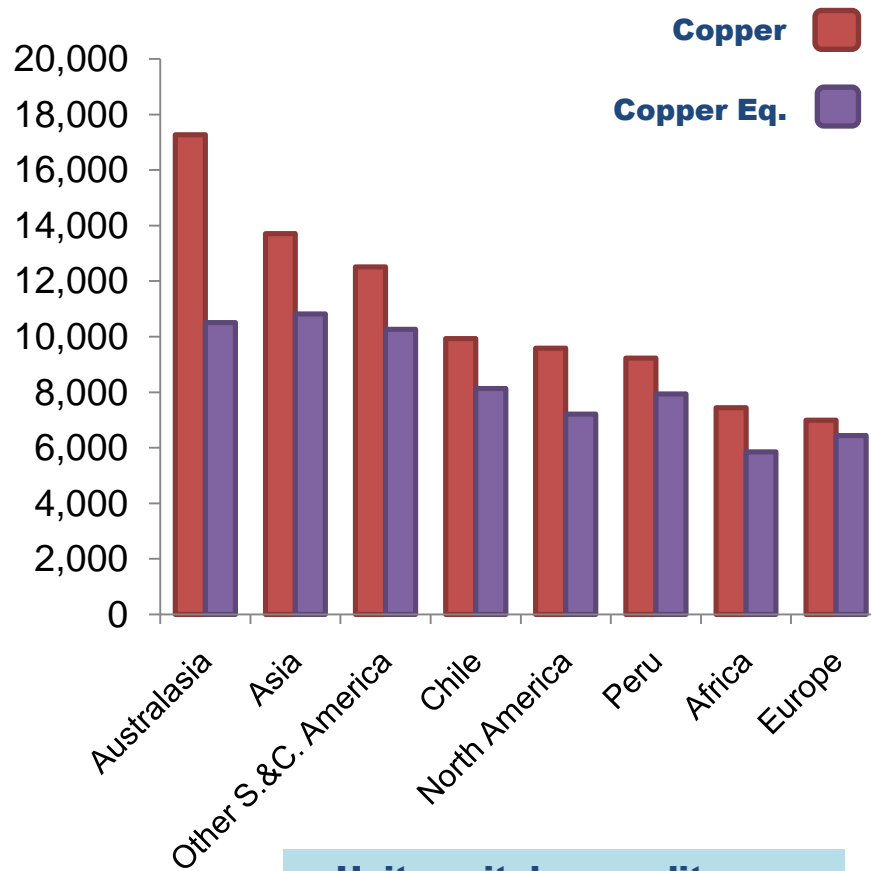


## Regional comparison of relative financial advantages

### Business Operating Cost (US\$/t/y)



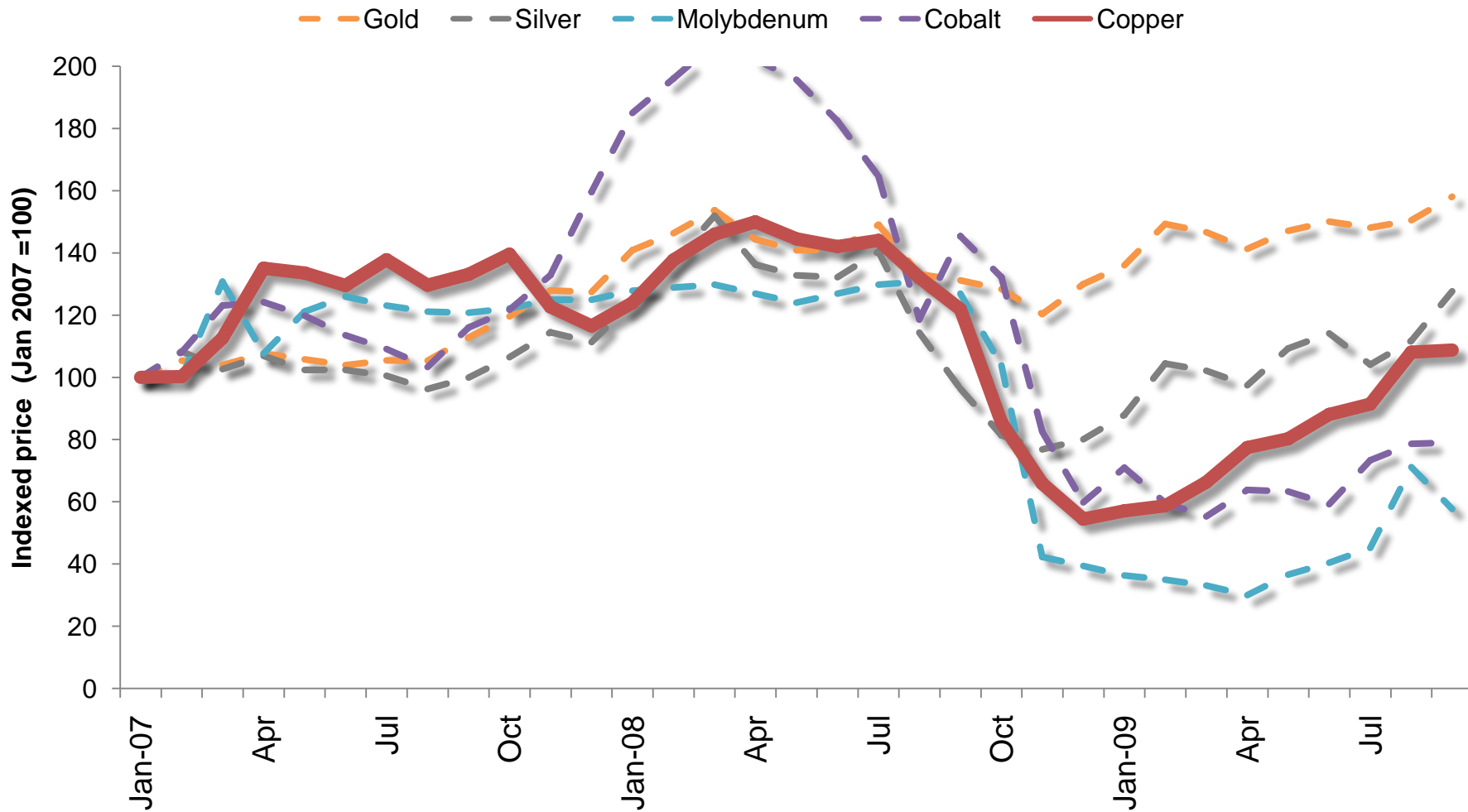
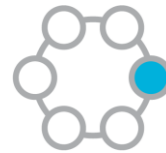
### Unit Capital Expenditure (US\$/t/y)



**Unit capital expenditure =  
total capital expenditure /  
average annual production**

# Performance of key copper by-products

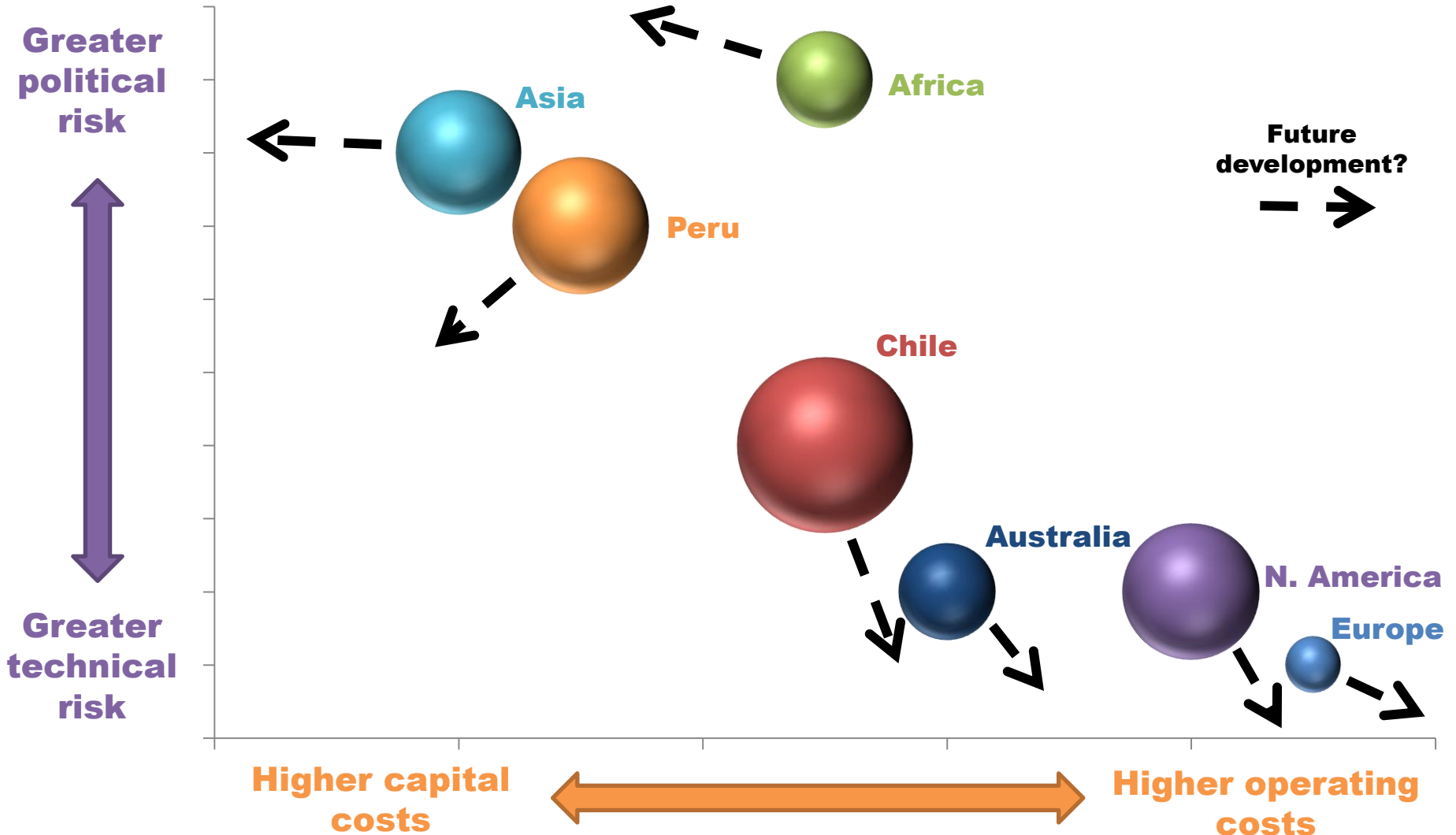
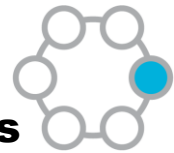
By-products move in different cycles



copper price = LME 3mth; gold & silver price = LBMA; cobalt price = Metal Bulletin; molybdenum price = CRU

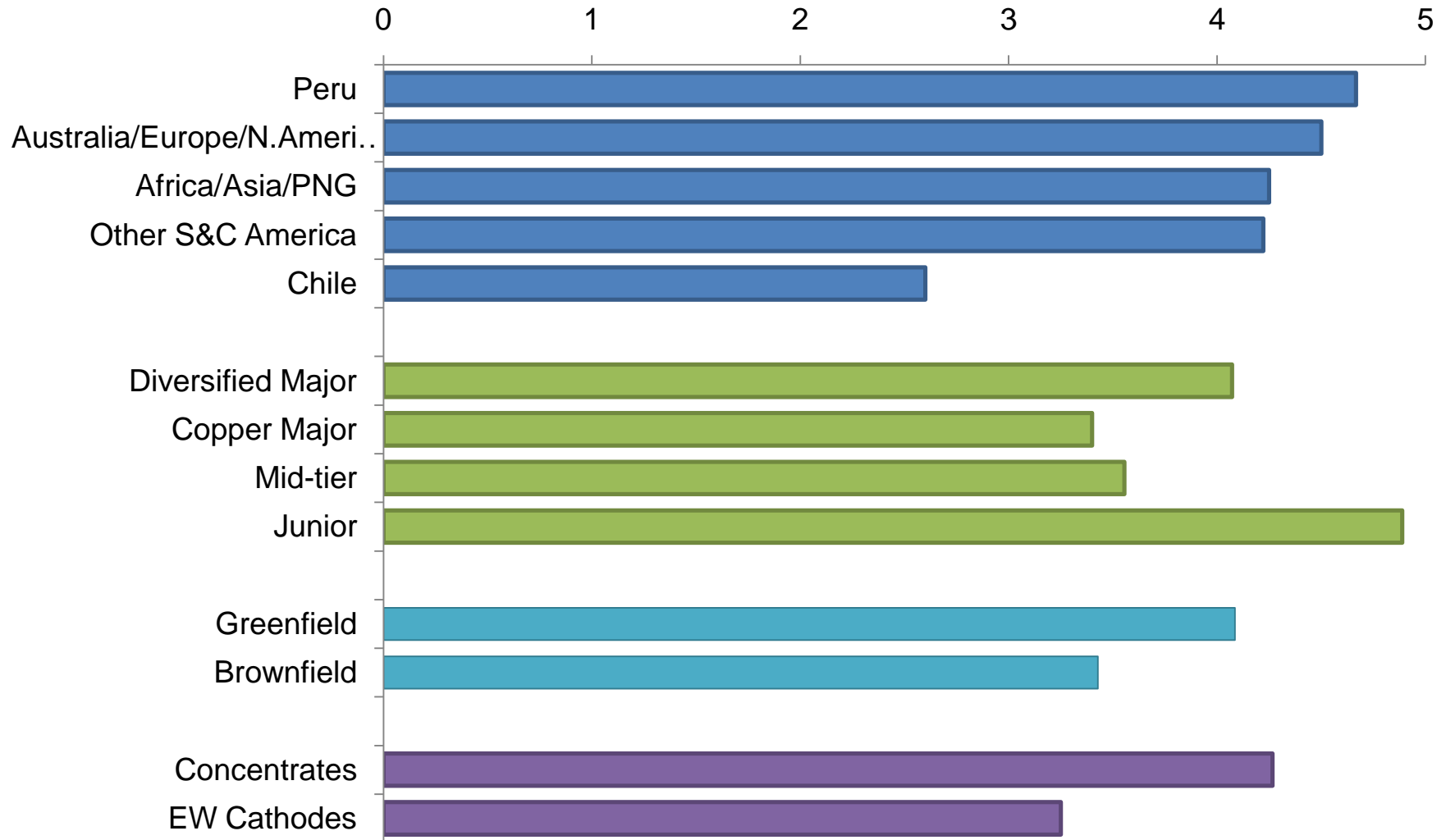
# Key copper regions offer differing risk profiles

Indication of risk balance of copper mine project development regions



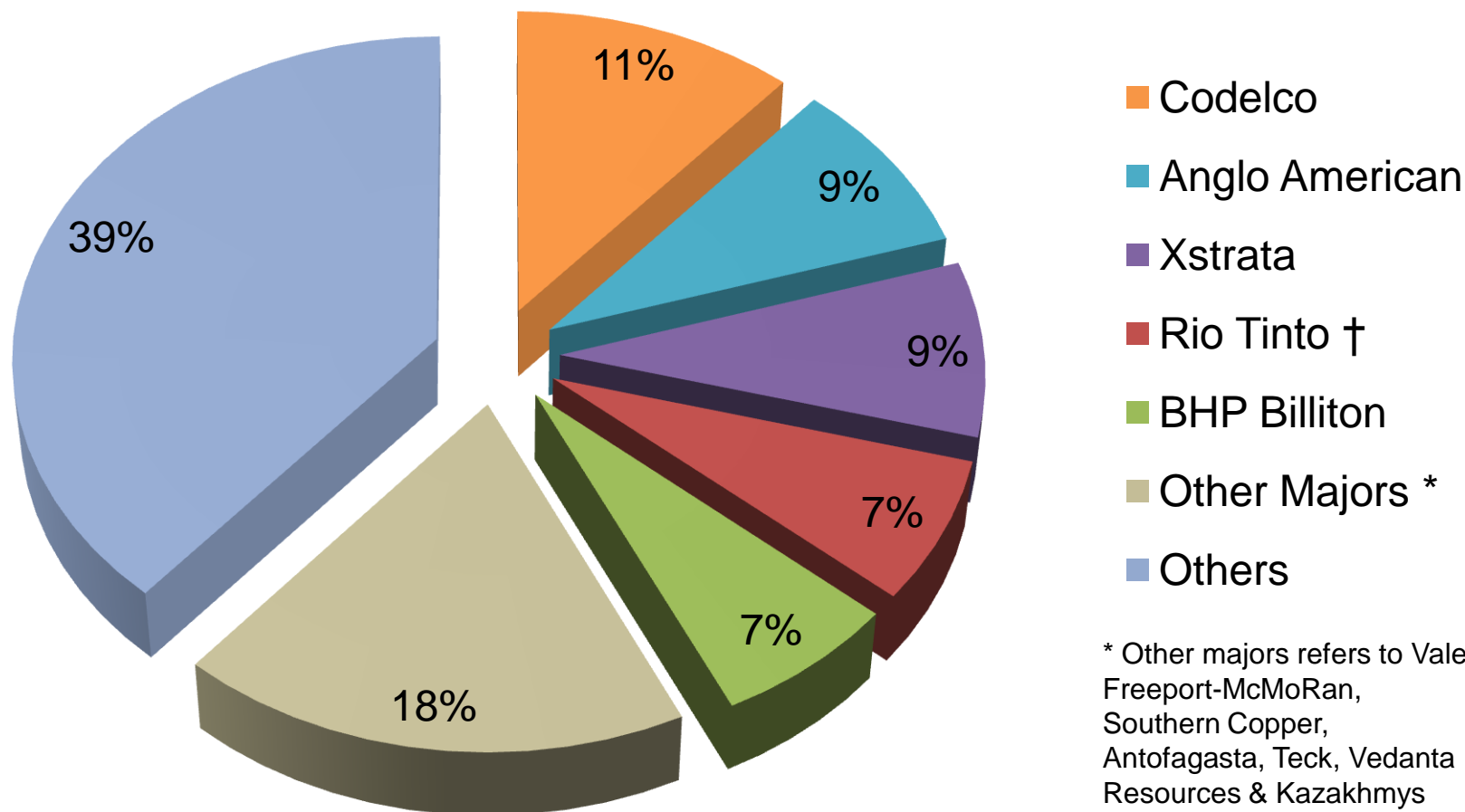
# Junior-owned projects the most affected

Average cumulative delay to projects over 2005-2009 (in years)



# Future production dominated by majors

## Share of production of 98 key copper mine projects



|  |                 |   |   |                   |  |   |   |   |   |   |
|--|-----------------|---|---|-------------------|--|---|---|---|---|---|
|     | <b>Antamina</b> |   | <b>Toromocho</b>  | <b>Quellaveco</b> |     | <b>Cananea</b>  | <b>Morenci</b>  |     | <b>Pebble</b>   |     |
|  | <b>\$30 B</b>   |   | <b>\$2.5B</b>   | <b>\$3.0B</b>     | <b>\$100M</b>  | <b>\$40 B</b>   | <b>\$50 B</b>   | <b>\$250M</b>   | <b>\$5.0B</b>   |   |
| <b>Olympic Dam</b>   | <b>\$25 B</b>   |  |   |                   |  |    |  |   |   | <b>\$5.0 B</b>  |
| <b>Mount Isa</b>   | <b>\$15B</b>    |  |   |                   |  |   |   |   |   | <b>\$5.0 B</b>  |
|    | Community Chest |   |   |                   |  |   |   |   |   | Community Chest   |
| <b>Cloncurry</b>   | <b>\$1.5B</b>   |   |   |                   |  |   |   |   |    | <b>\$75 B</b>   |
|    | <b>\$100M</b>   |   |   |                   |  |   |   |   |   | <b>\$100M</b>   |
| <b>Vale Copper</b>   | <b>\$10 B</b>   |   |   |                   |  |   |   |   |   |    |
| <b>Colombia</b>  | <b>\$1.0B</b>   |   |   |                   |  |   |   |   |    | <b>\$90 B</b>   |
|  | <b>\$500M</b>   |   |   |                   |  |   |   |   |   | Super Tax   |
| <b>Bolivia</b>   | <b>\$750M</b>   |   |   |                   |  |  |   |  |  | <b>\$100 B</b>  |
|  | <b>\$500M</b>   | <b>\$250M</b>   |  | <b>\$5.0B</b>     | <b>\$100M</b>  | Income Tax  | <b>\$5.0B</b>   |  | <b>\$2.5B</b>   |  |
| <b>Zambia</b>  |                 | <b>DR Congo</b>   |   | <b>Lumwana</b>    |  |   | <b>KGHM</b>   |   | <b>Boliden</b>  |  |

Community Chest

**CRU Copper Mine**

**MONOPOLY**

Monopoly image courtesy of Hasbro

Chance

# Potential tactics in copper mine monopoly



(or how building a copper mine is like buying a house)

## Rich hostages

- Get the prime properties, charge enormous rent
- Near impossible to be bought out of this position
- *Can lead to high internal standards becoming an obstacle to investment*

## Poor man's row

- Buy the cheap properties and aggressively develop them
- One of the few ways of successfully entering the industry
- *Quite high risk for potentially not great returns*

## Medium is the message

- Buy the “middle” properties and seek to add value
- Can offer greater returns for lower risk
- *Can also offer lower returns for greater risk*

## The middle man

- Buy the utilities and transport infrastructure to get a competitive advantage
- Security of supply and logistics reduces project risk
- *Can be expensive and not add the same value as investing in mine development*

## Scattergun

- Buy a bit of everything
- Stops industry consolidation and makes you a strategic key
- *Can be expensive, unwieldy and not provide sufficient value*

## “They’re not making it anymore”

- Borrow heavily, but whatever becomes available
- There’s only a limited supply of mines so value in the long term is always upwards
- *Very high risk...*

# ...but remember when choosing your strategy



## Conclusions

- *World class copper deposits are increasingly rare*
- *New greenfield resources are not as good as the older brownfield resources*
- *There is an increasing trade off between political and geological risk*
- *There is also an increasing trade off between capital costs and operating costs*
- *By-product revenues are becoming increasingly important to project planning*
- *The difficulties in developing projects mean increasing delays and longer development timeframes*
- *The industry is potentially organically consolidating*

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# Thank you for listening

Today's information source:  
*CRU Copper Mine Project Profiles*  
(2009 Edition)

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