

Ferrochrome Market Overview 2017

Presented by:

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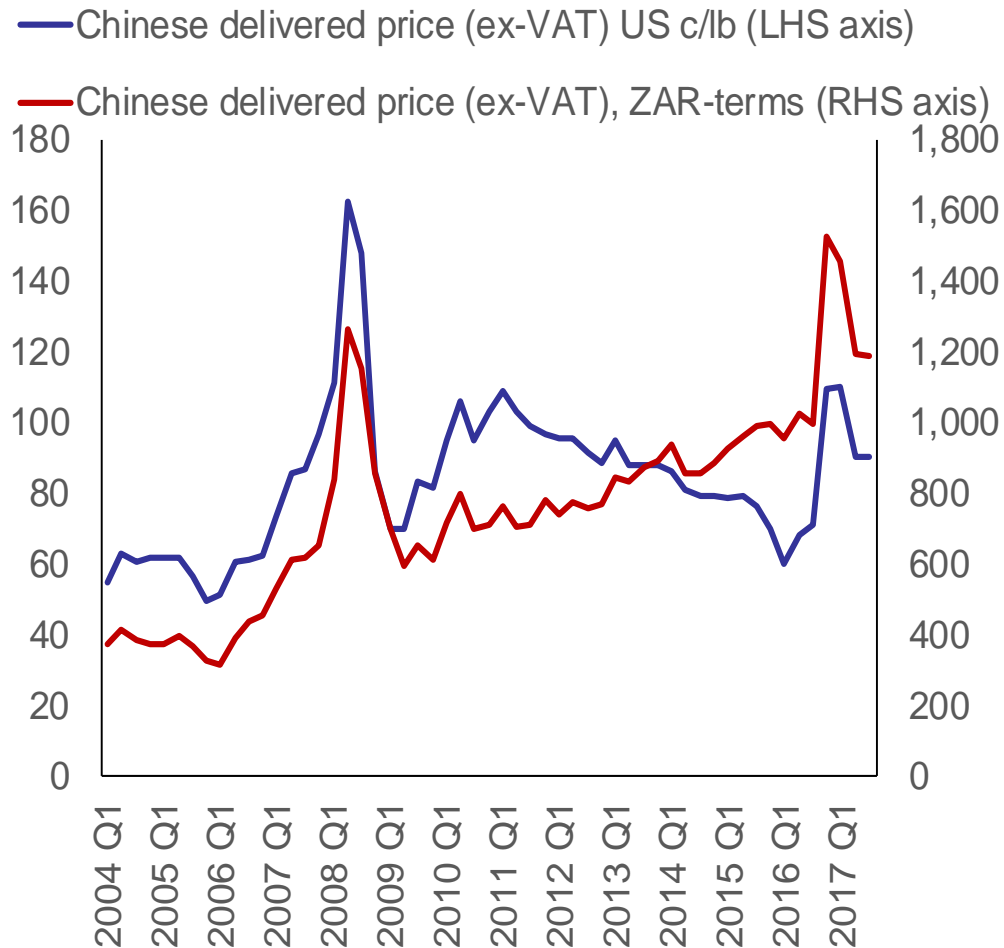
Principal Consultant

CRU Nickel, Chrome, Stainless Steel Group

Key Themes

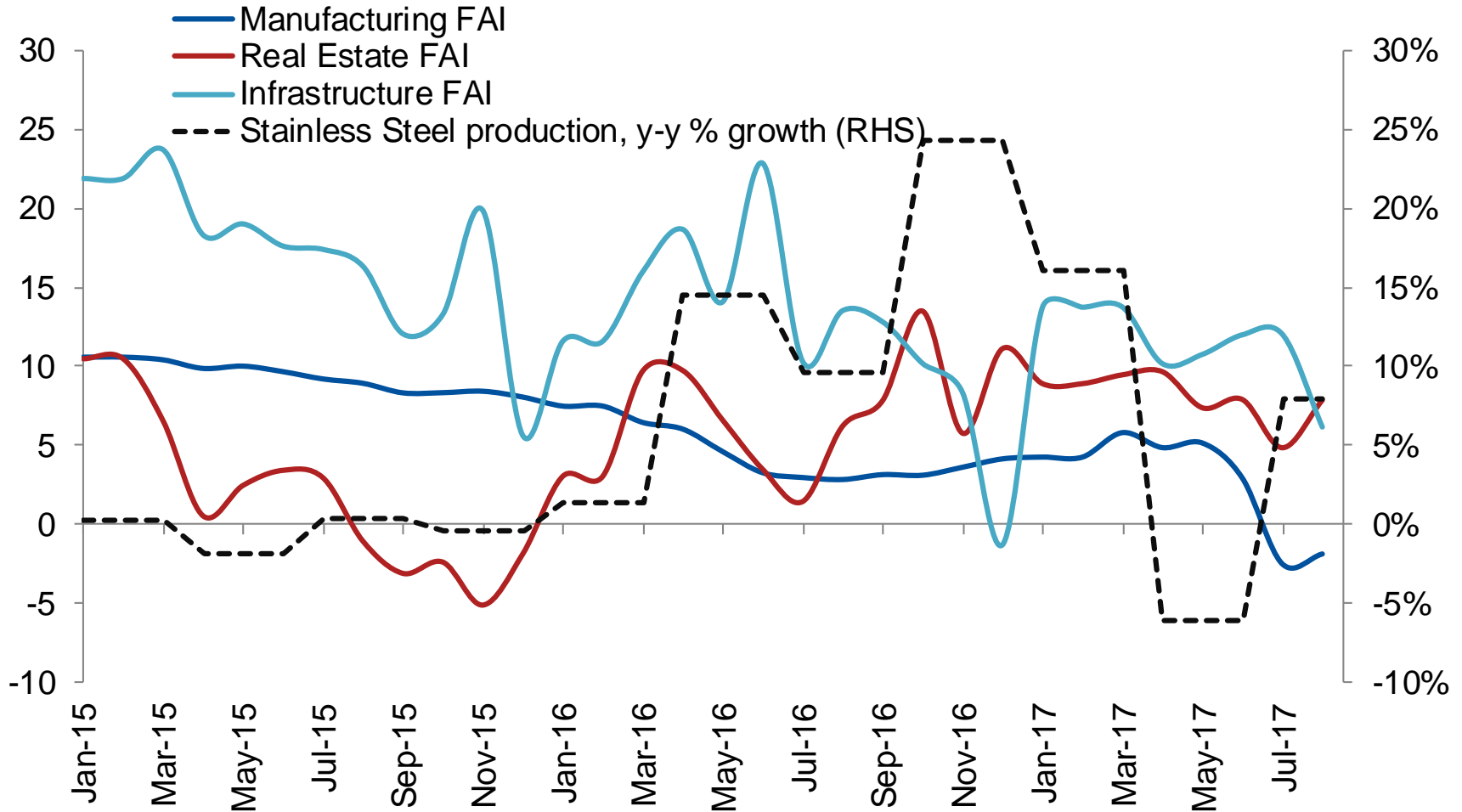
- Which factors define the chrome market?
 1. Chinese demand and the stainless steel cycle
 - Chinese credit creation
 - Inventory levels
 - Trade
 - Real demand
 2. Chinese Production costs
 3. South African Cr ore supply and price
- Explaining recent events
- Outlook global demand and supply
- Conclusions

Recent History



- 2017 looks like a high-side outlier in terms of pricing
- Too much ore stock in China, but otherwise current market fundamentals fairly neutral
- Market defined by Chinese FeCr production costs over the long term. Chinese production costs dependent on chrome ore price
- Risks to ore supply likely to grow—but barrier to entry into chrome mining fairly low

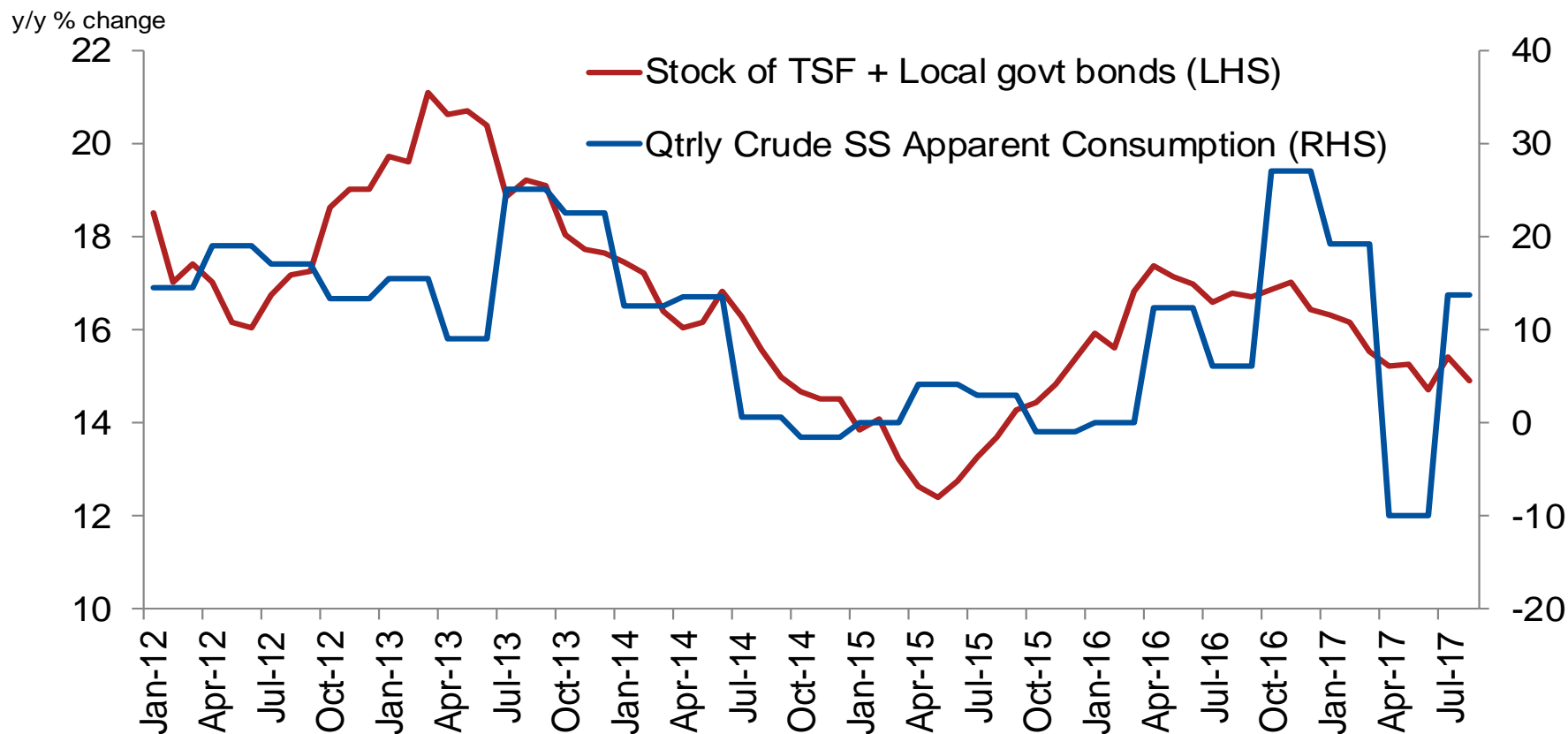
Understanding China: Real demand, apparent demand and production



Data: CRU, NBS

Chinese apparent stainless steel demand and the credit cycle

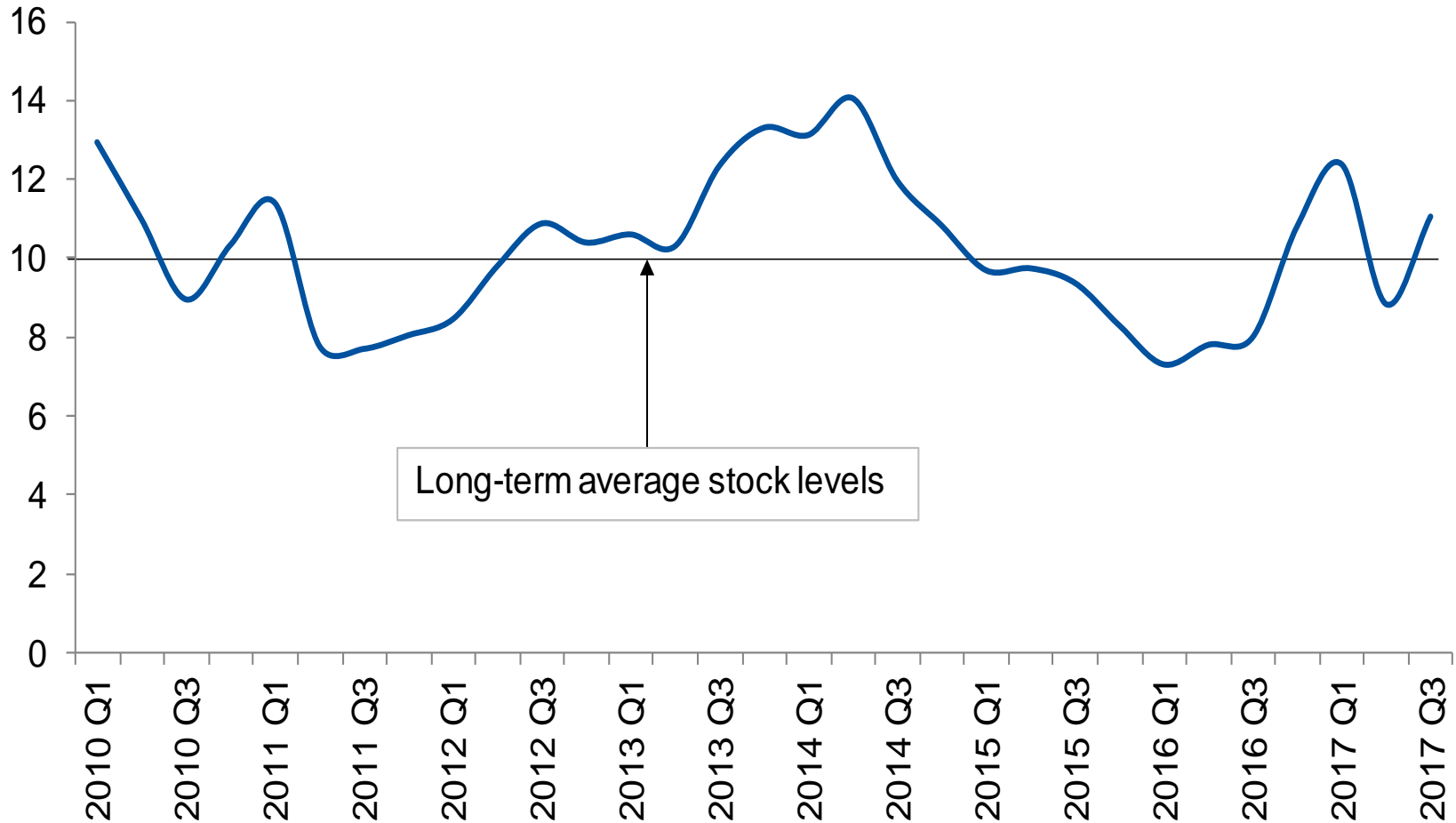
Allowing for some lag, there is correlation between credit creation growth and apparent consumption of stainless steel in China



Understanding China: real vs. apparent demand

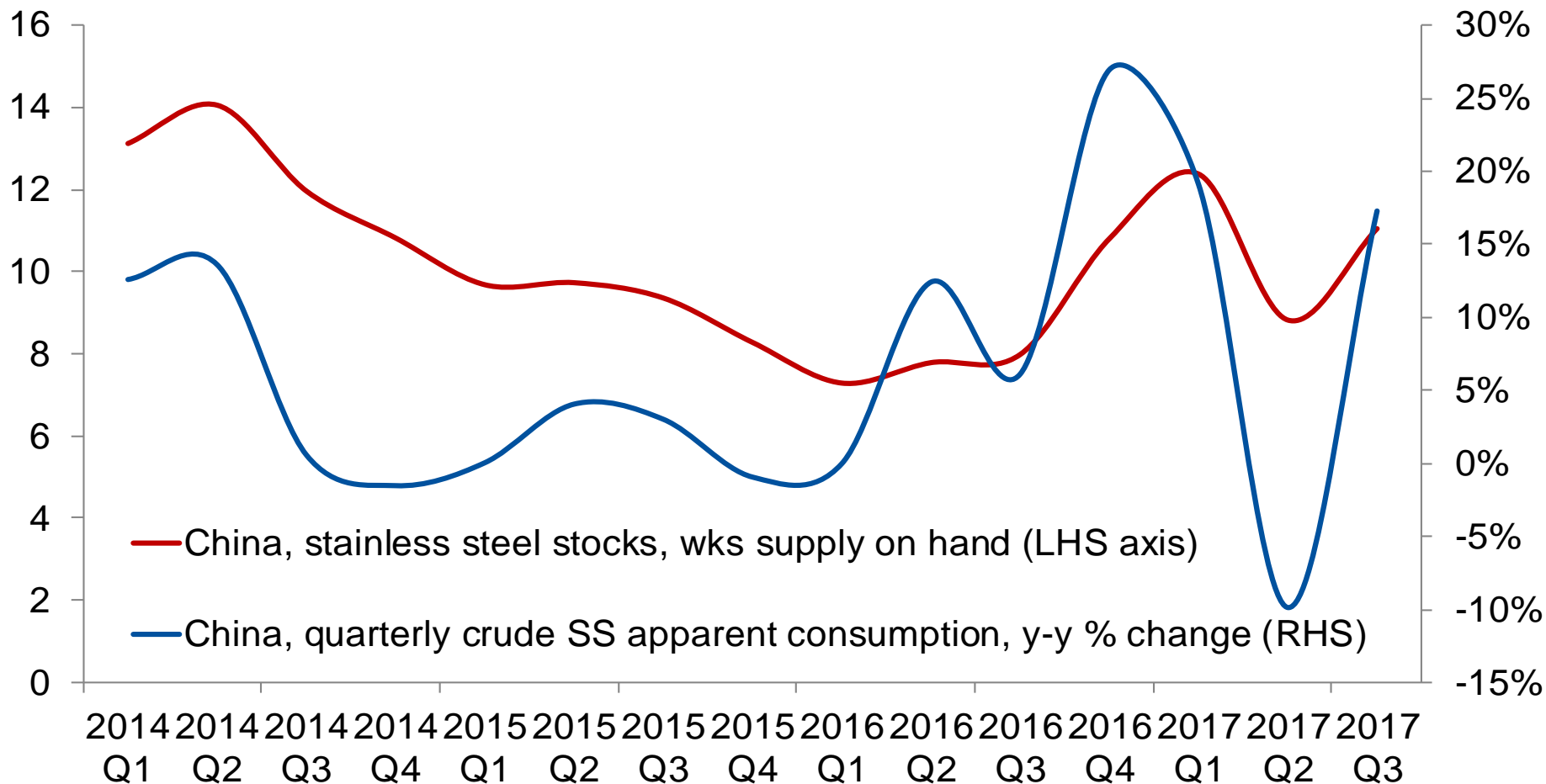
China's stainless steel inventory cycle—not yet carrying excessively high stock

Stainless steel stocks, crude steel basis, week's supply in hand



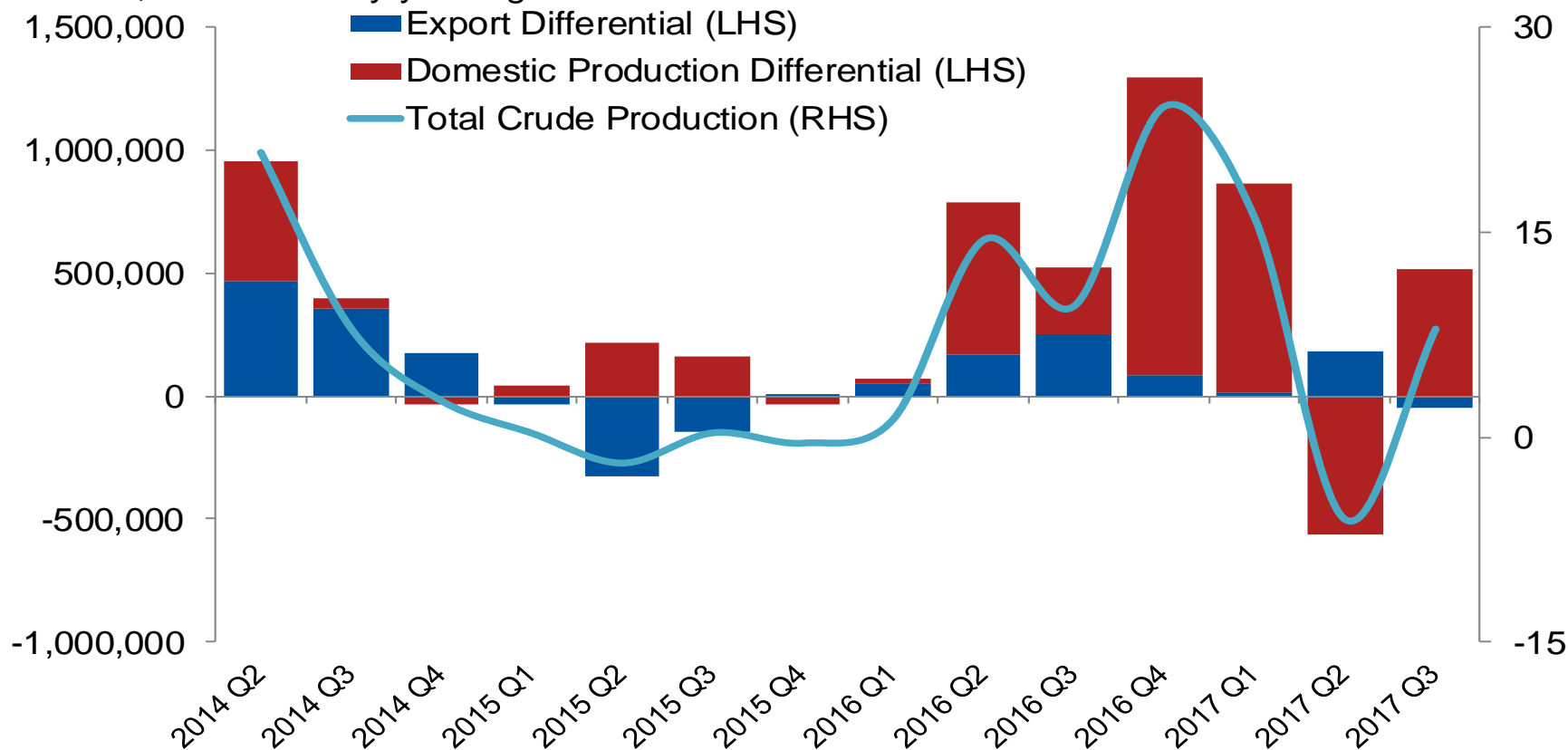
Understanding China: stainless steel production and the stocking cycle

Q-Q volatility in Chinese stainless steel production well reflected in the changing stock levels

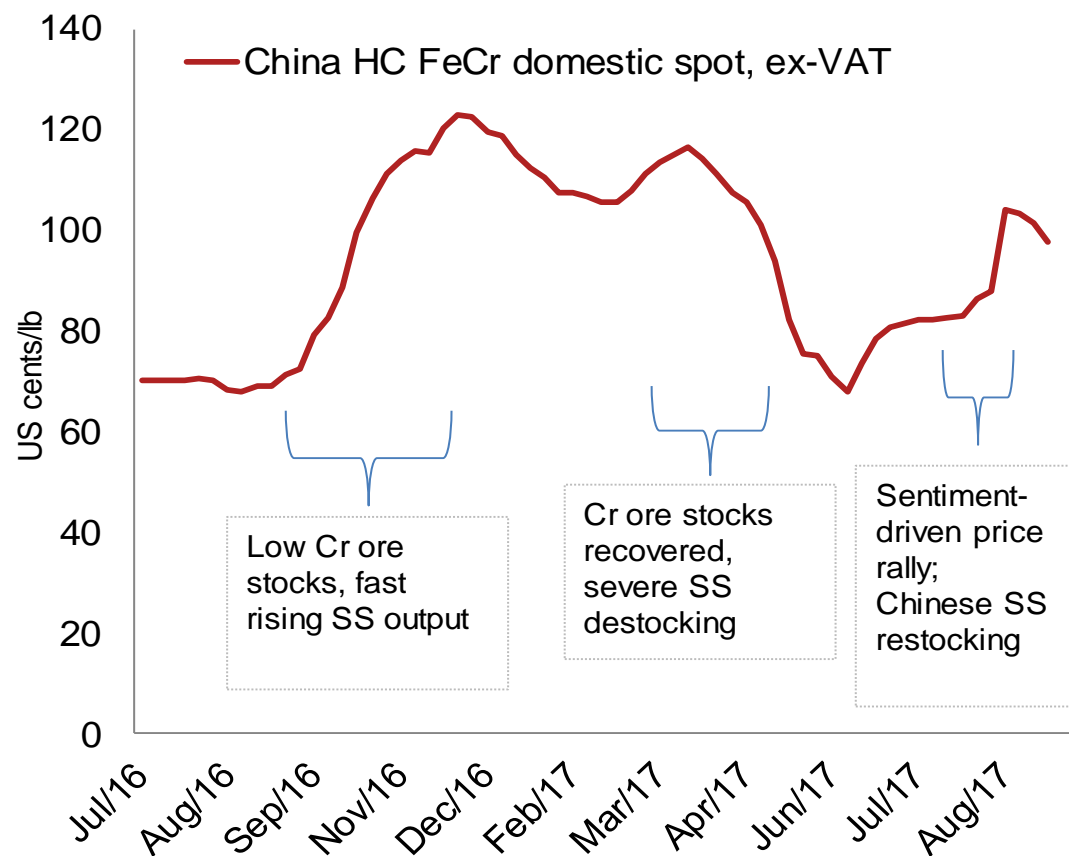


Chinese stainless steel production less dependent on exports...and that's before Indonesia starts up

LHS axis: y-y change in global stainless steel production, tonnes, split by export/domestic market; RHS axis: % y-y change



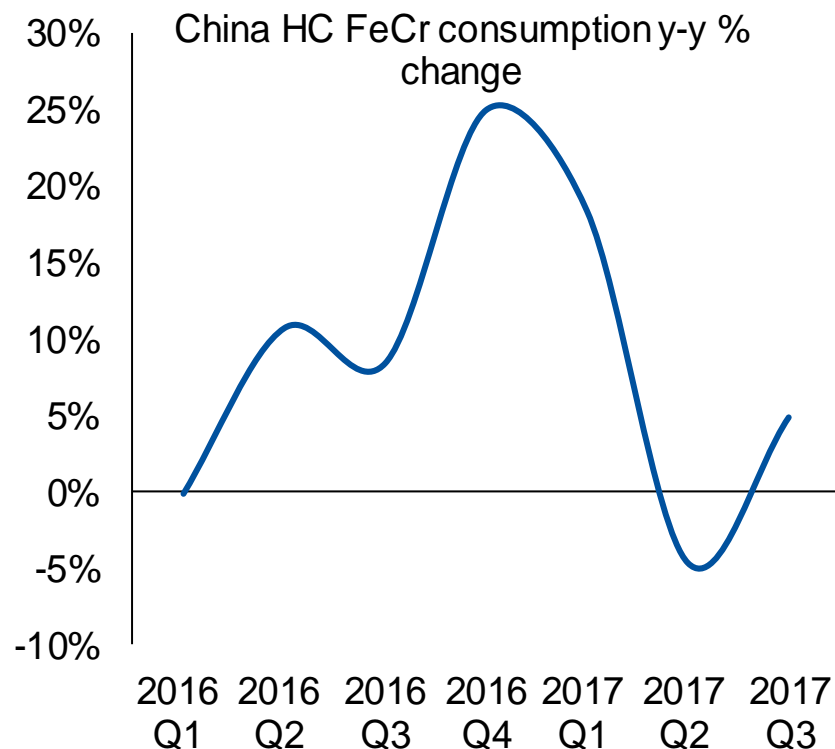
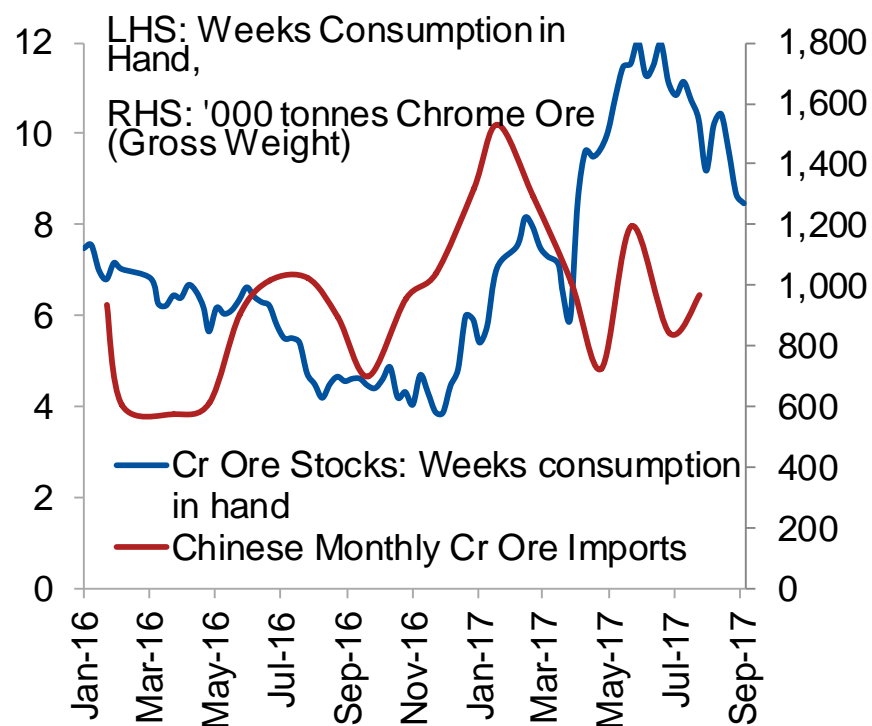
Explaining recent events in the chrome market



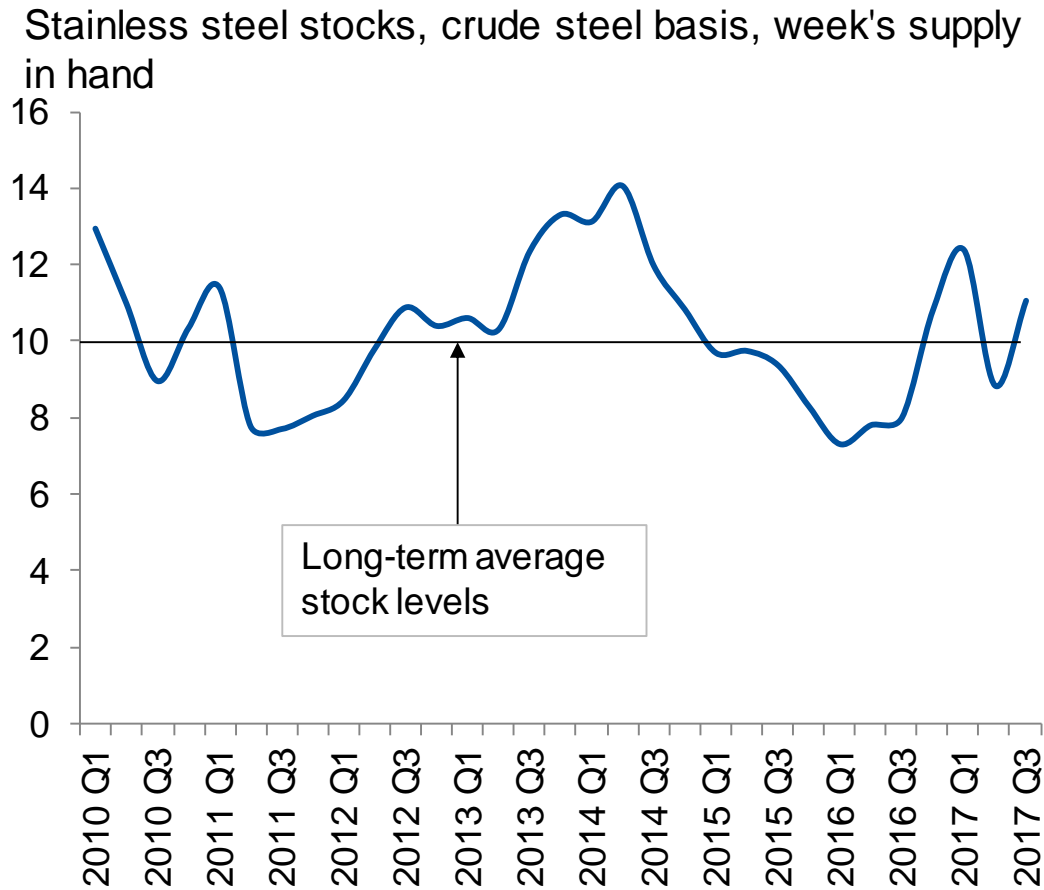
- Market fundamentals played an important role in the price volatility of late-2016 and mid-2017
- Latest price rally harder to justify in terms of market fundamentals
- A deeper look at recent price volatility suggests circumstances of 2016/17 were exceptional

Explaining recent events: Chrome ore stocks

- Late 2016/early 2017 prices defined by critically-low ore stocks in China and surge in demand (liquidity-driven)
- Pull back in prices in Q2 2017 coincided with collapse in demand, credit creation slowdown



Explaining recent events: Stainless steel stocks

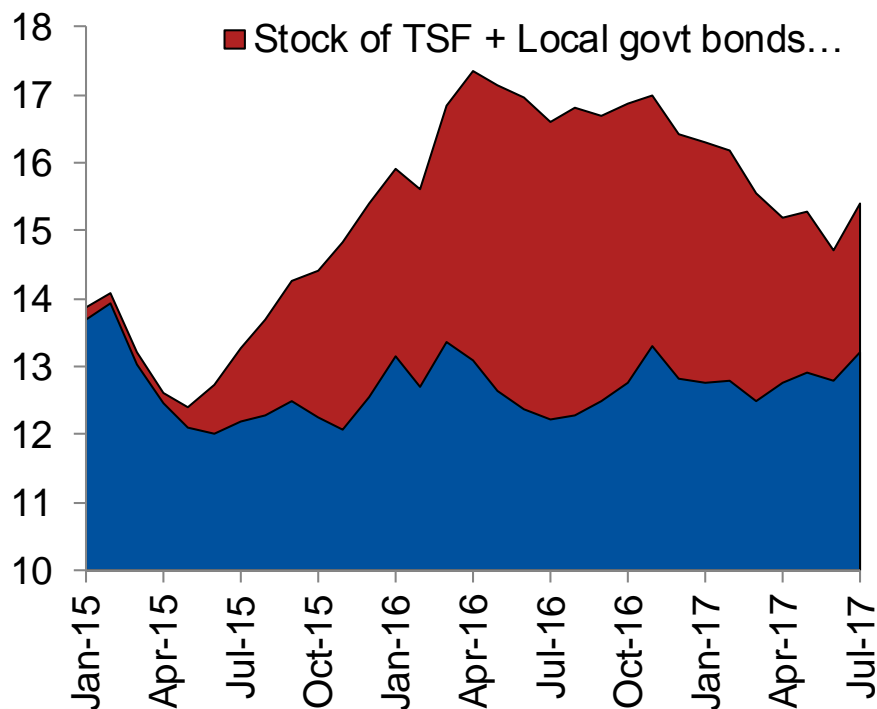


- China's stainless steel inventories also had a role to play—they grew rapidly in Q4 2016/Q1 2017; then fell in Q2 2017
- CRU doesn't believe that stocks are currently close to problematic levels—even with large SS output in Q3, stainless steel stock only slightly higher than the long-term average

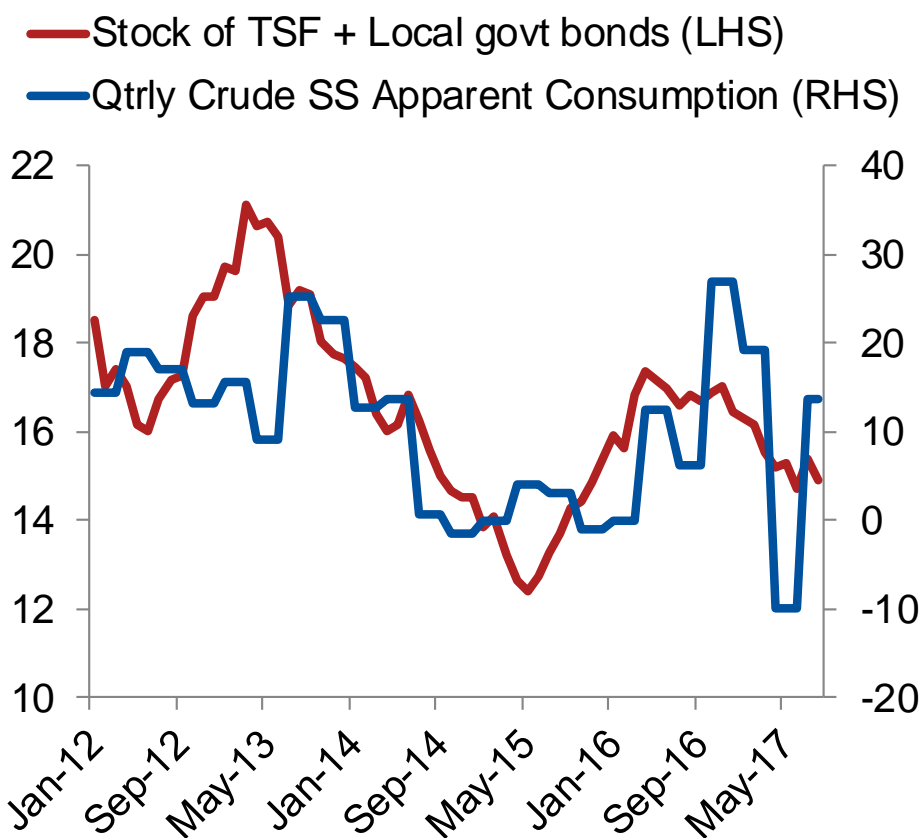
Explaining recent events: China's credit cycle

- Recent price rally influenced by sentiment—credit creation eased in July 2017
- Positive sentiment on raw material prices, supplemented favourable inventory position

y/y % change, wide indicator of credit creation in China (TSF=Total Social Finance)

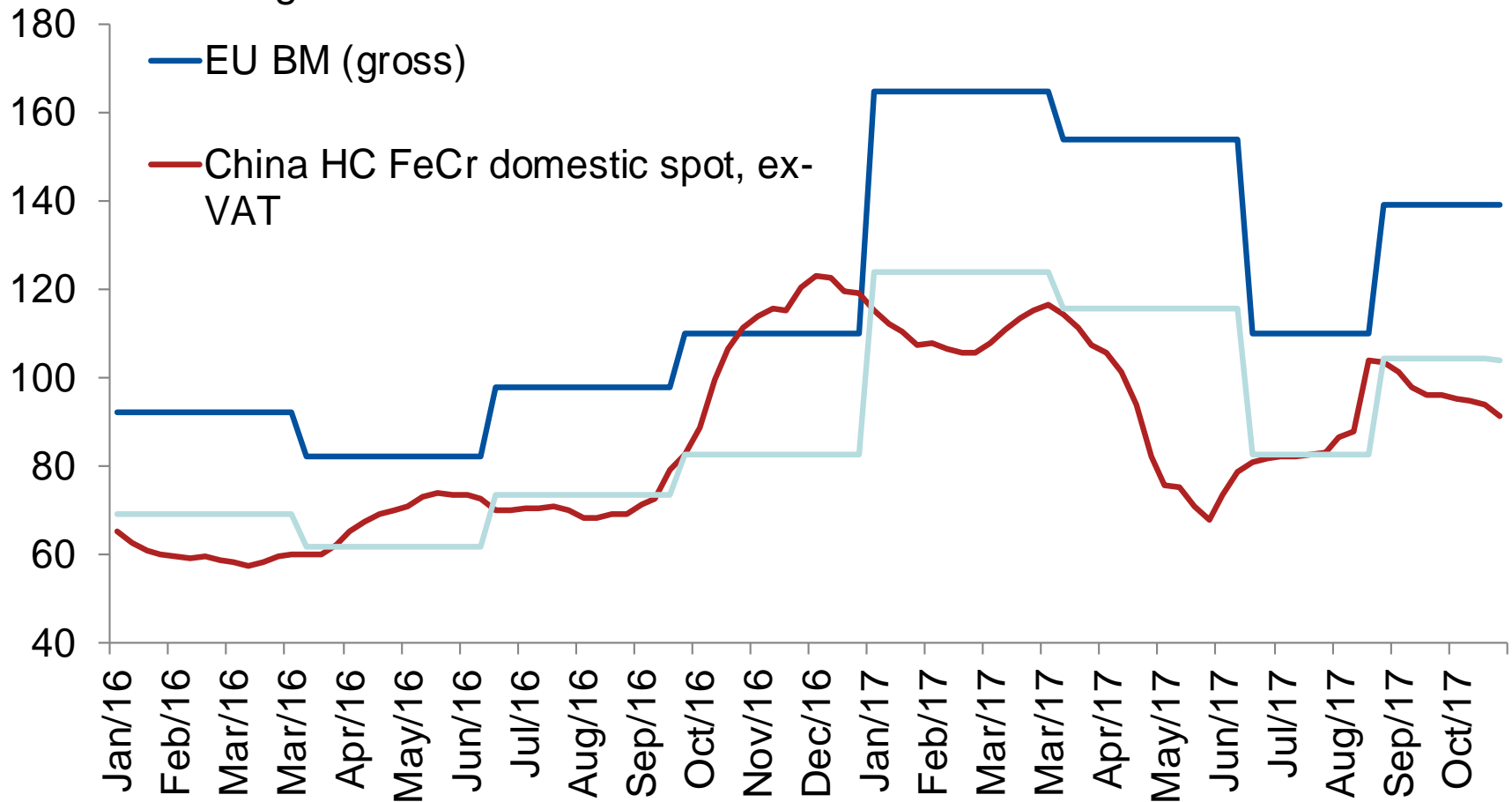


y/y % change



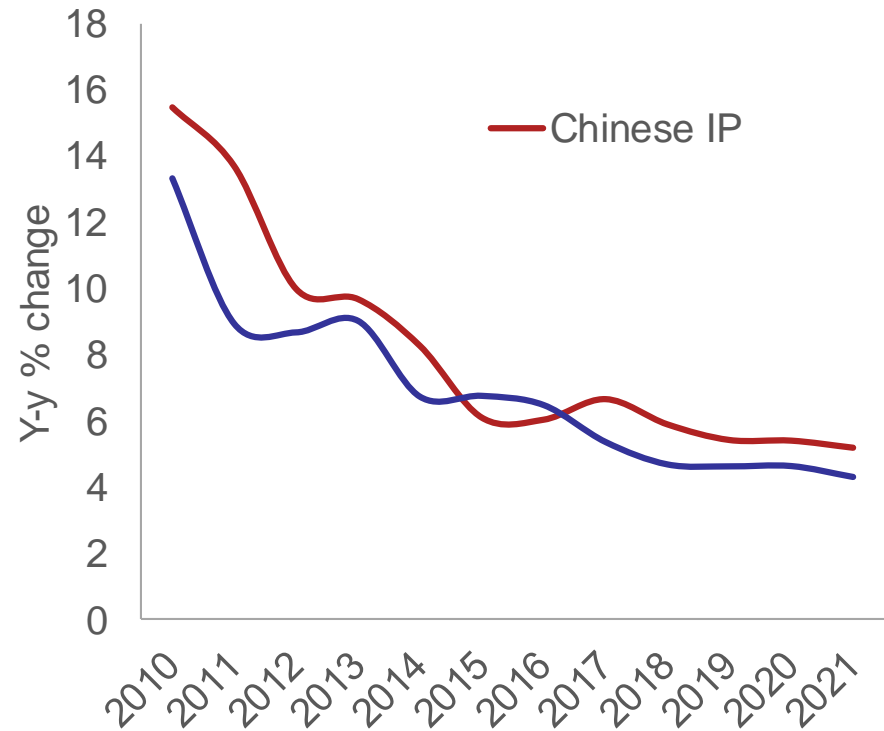
Explaining recent events: BM price moves

EU charge chrome benchmark has stuck to established trend



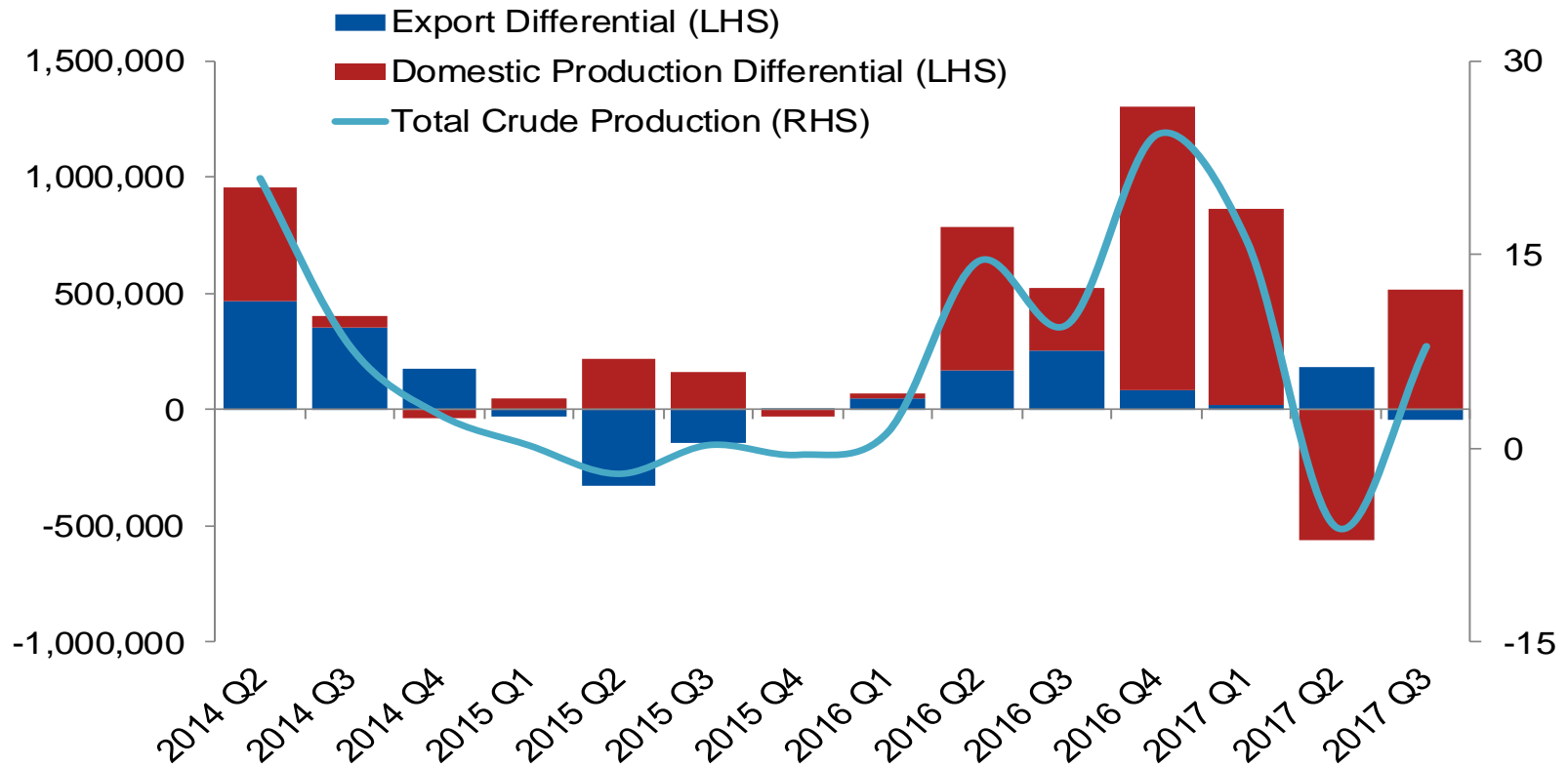
Outlook on FeCr demand: China

- Credit tightening, FAI slowdown contribute to slowing stainless steel demand growth
- Output growth to move in range between 3-5% y-y, 2018-21



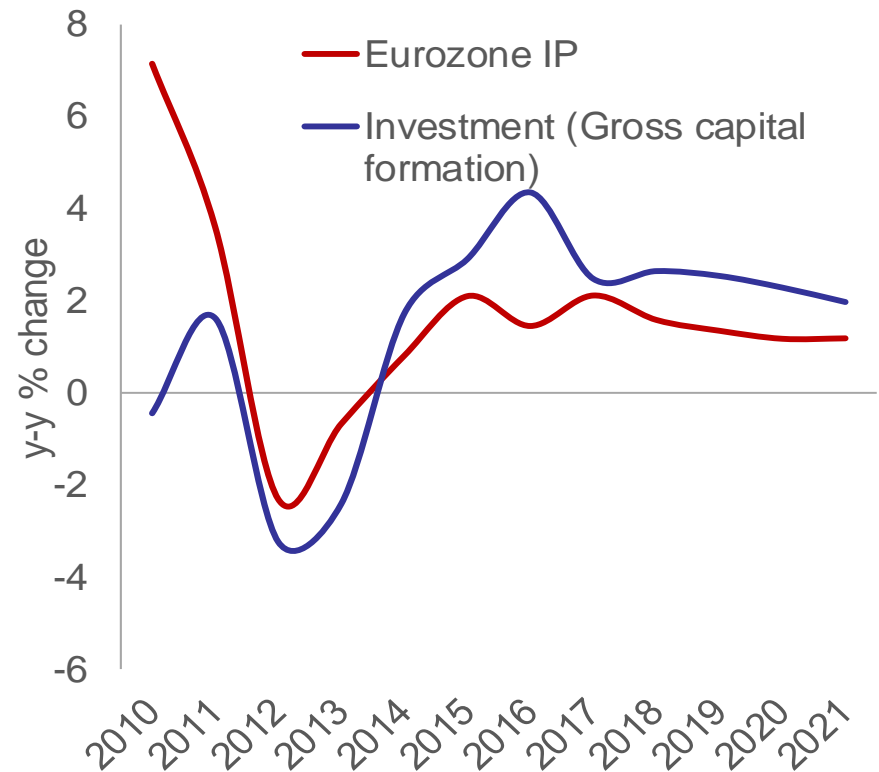
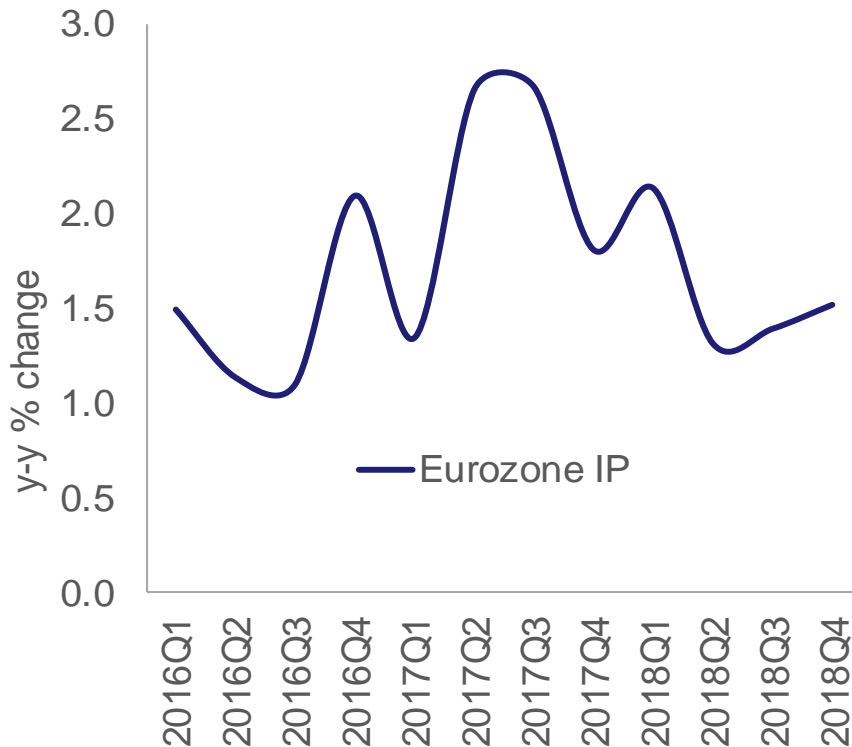
Outlook on FeCr demand: China's trade

LHS axis: y-y change in global stainless steel production, tonnes, split by export/domestic market; RHS axis: % y-y change



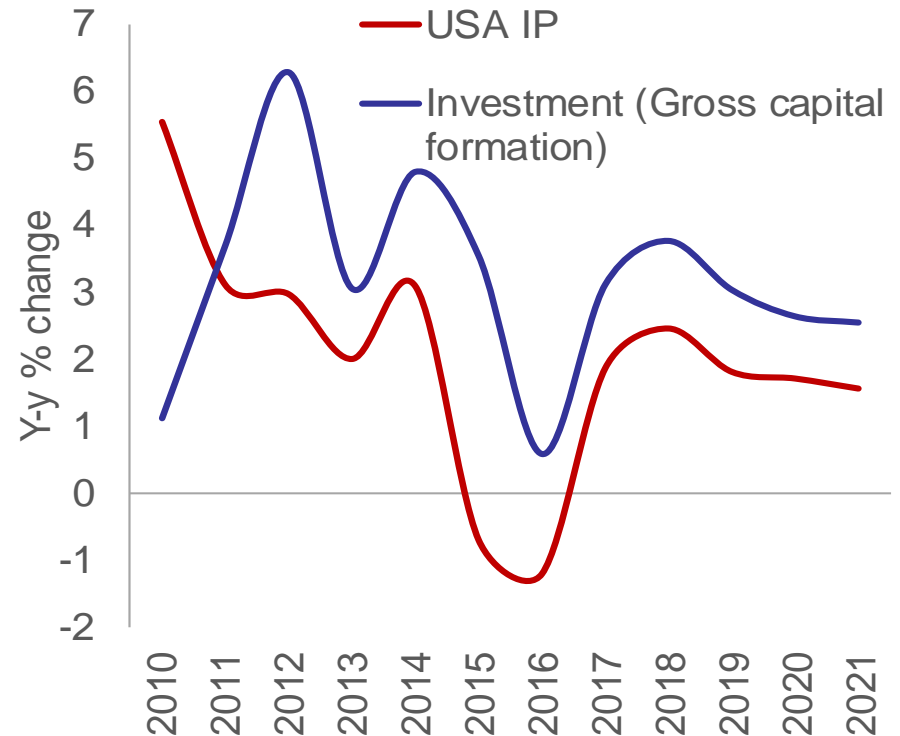
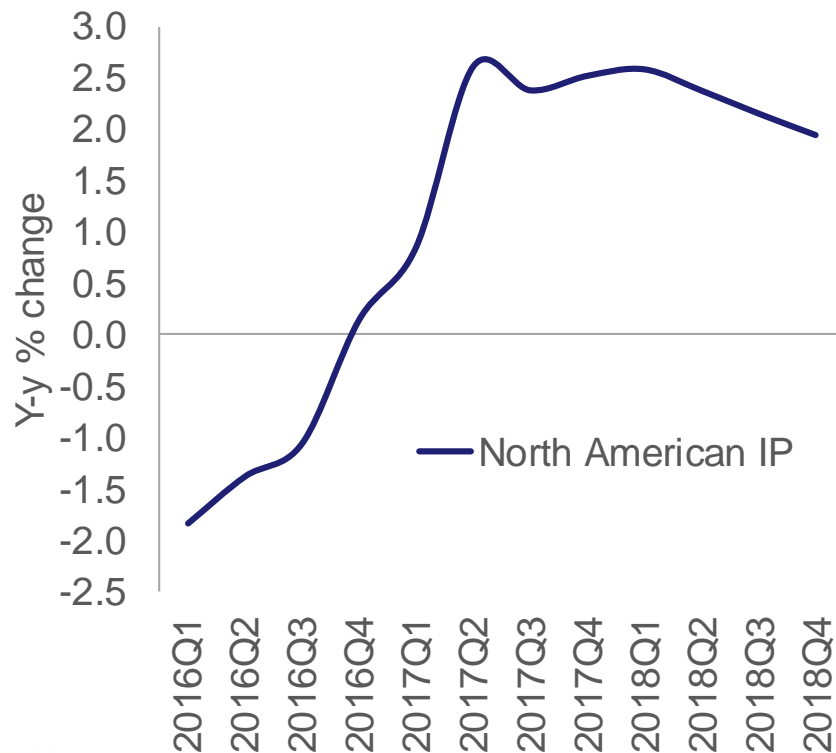
Outlook on FeCr demand: Eurozone

- Steady growth forecast: investment growth to trend up in short-term, IP down
- Stainless steel output growth projected to be flat 2018-21—import competition to intensify



Outlook on FeCr demand: USA

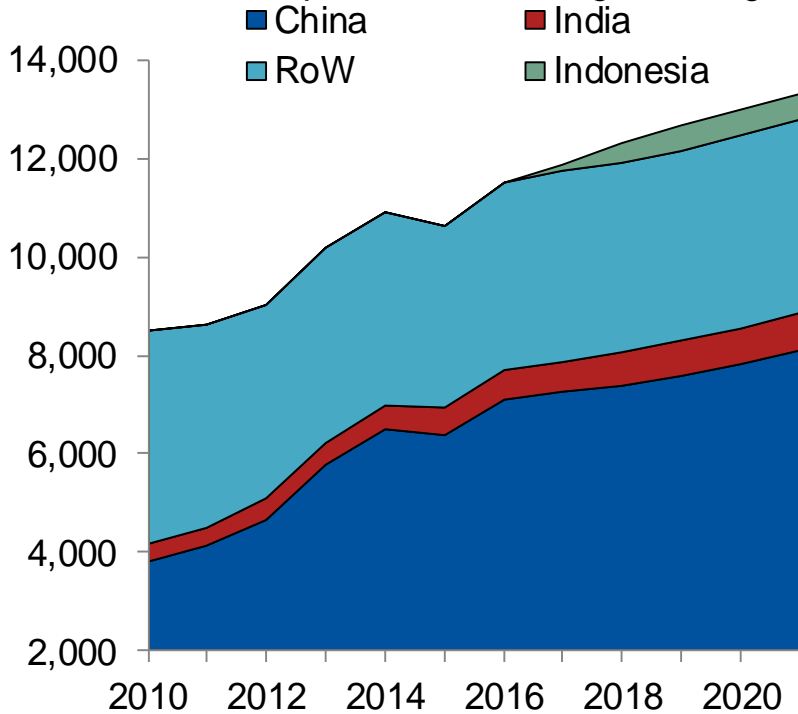
- IP, investment growth forecast to increase in 2018; decline thereafter
- Stainless steel production growth range forecast at 1-1.7% y-y 2018-21—running up against effective capacity limitations



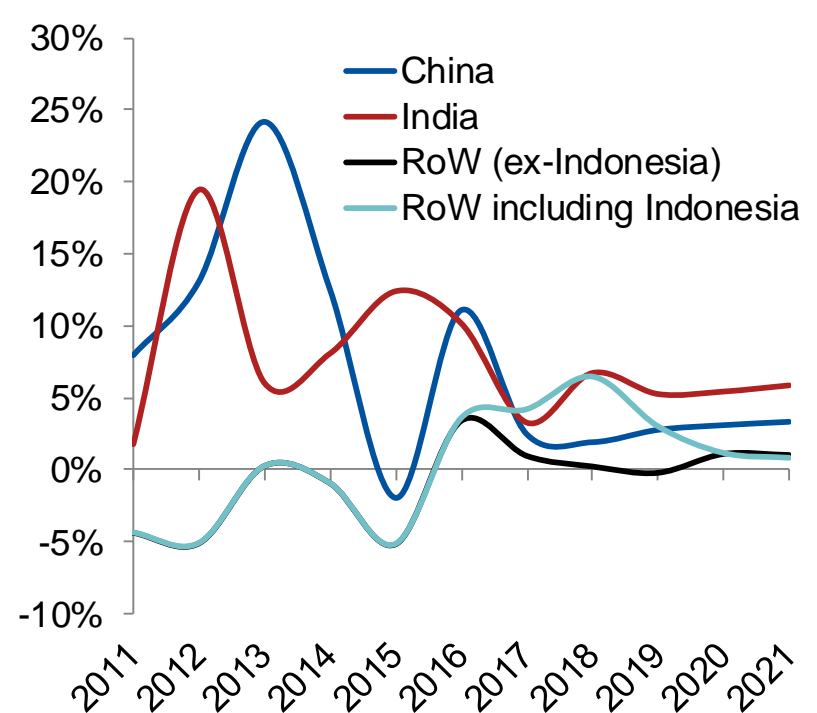
Outlook on Global HC FeCr demand

- The combination of Chinese, Indonesian and Indian demand will define HC FeCr market in coming years
- HC FeCr demand growth forecast to be relatively flat over forecast period

HC FeCr consumption, '000 tonnes gross weight

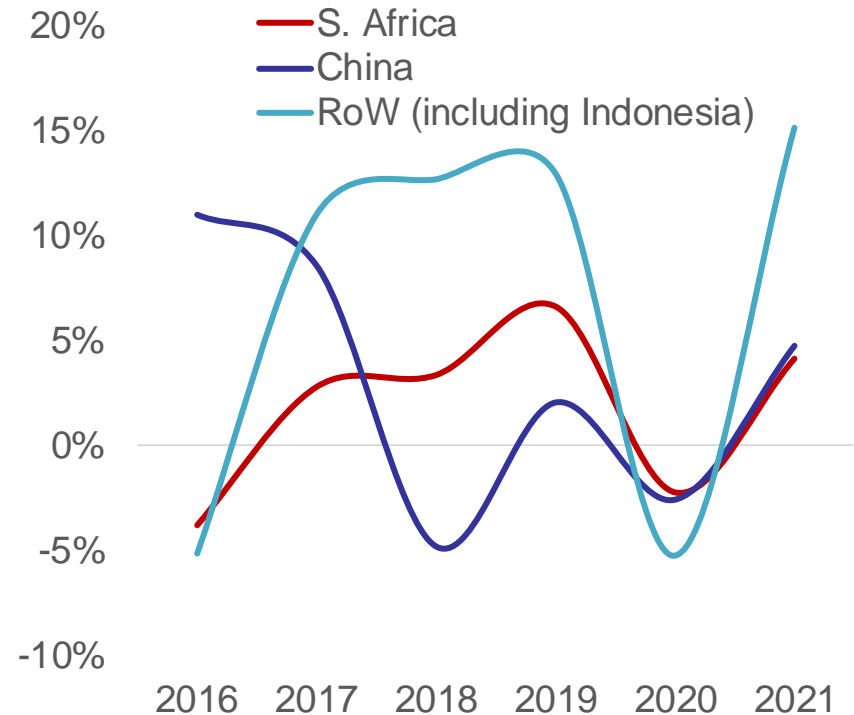
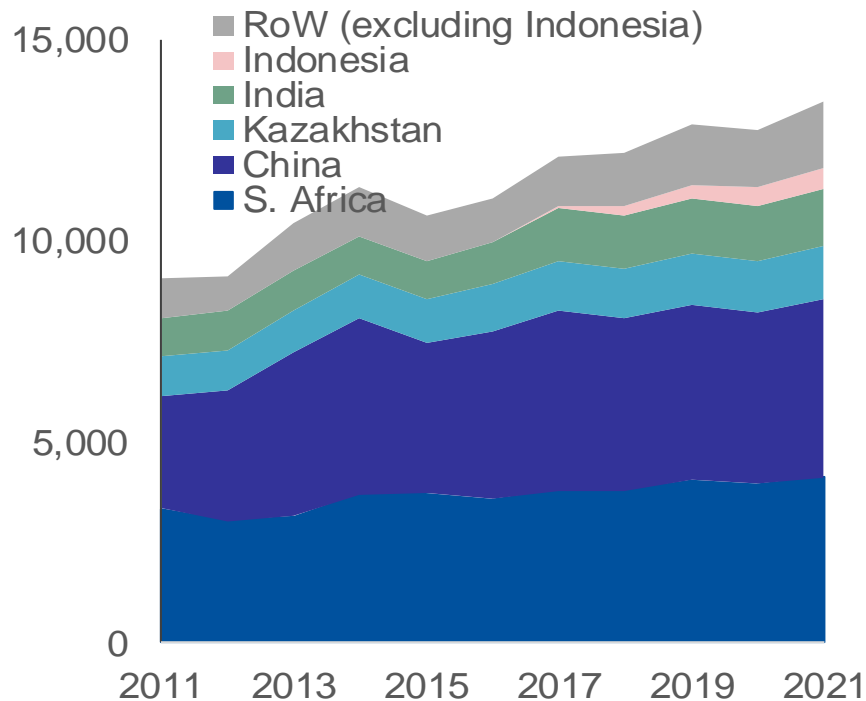


HC FeCr consumption, y-y % change

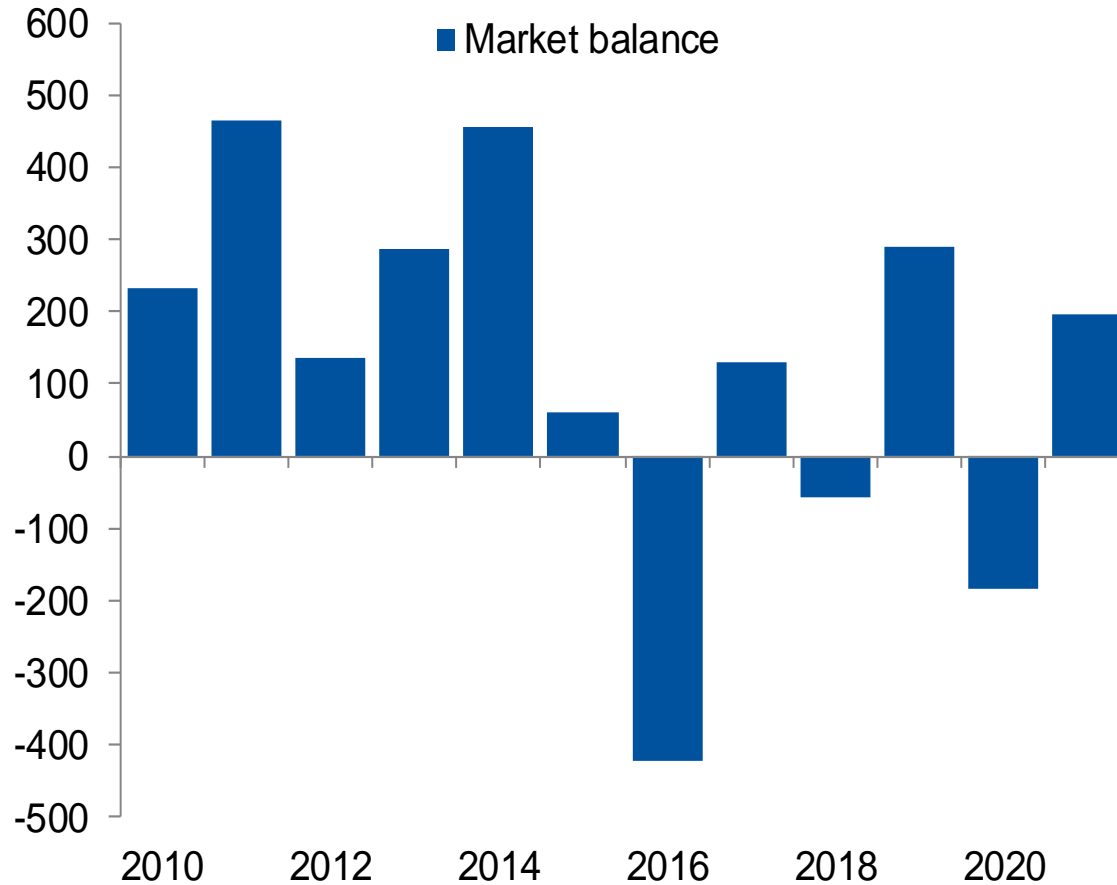


Outlook on Global FeCr supply

- Our forecasts expects supply growth from South Africa, Indonesia and India
- Chinese supply will swing into the market in response to pricing signals



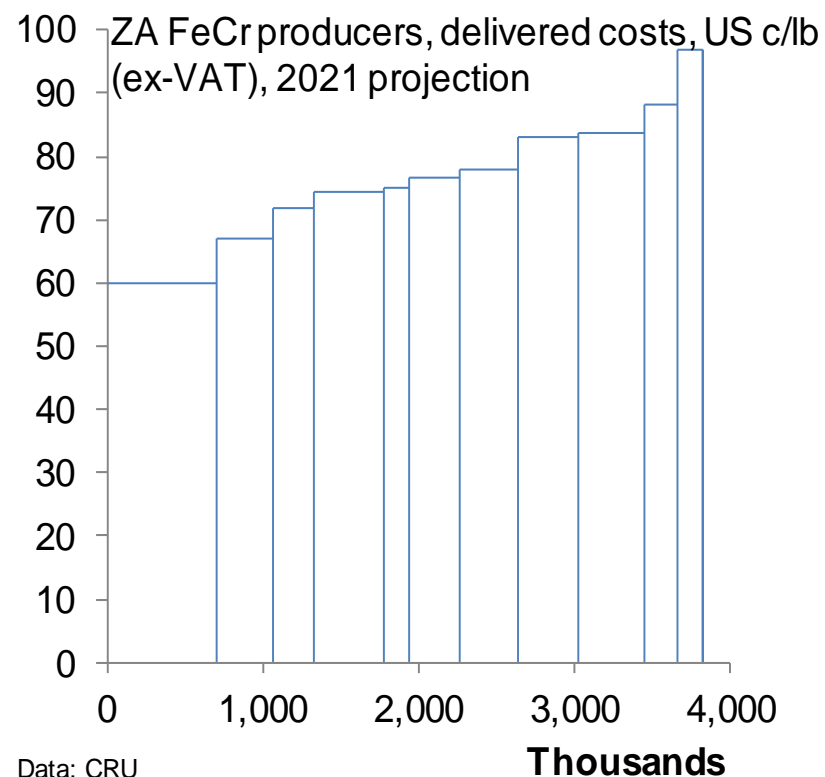
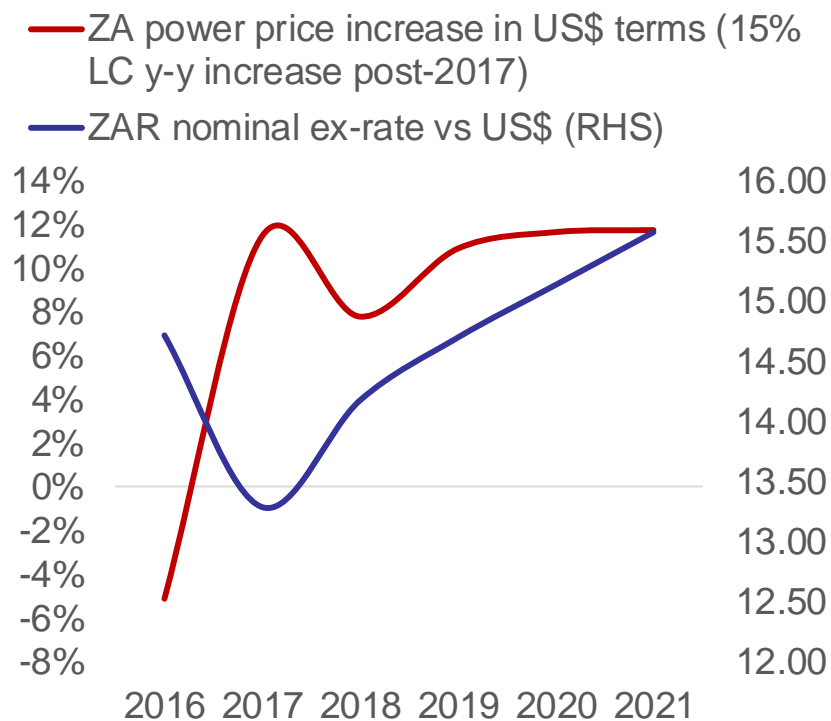
Global HC FeCr supply/demand balance



- Global HC FeCr will tend towards oversupply over the forecast period
- However, deficits will be required in order to prevent excessive stock accumulation
- Chinese supply will swing in and out of the market depending on pricing signals

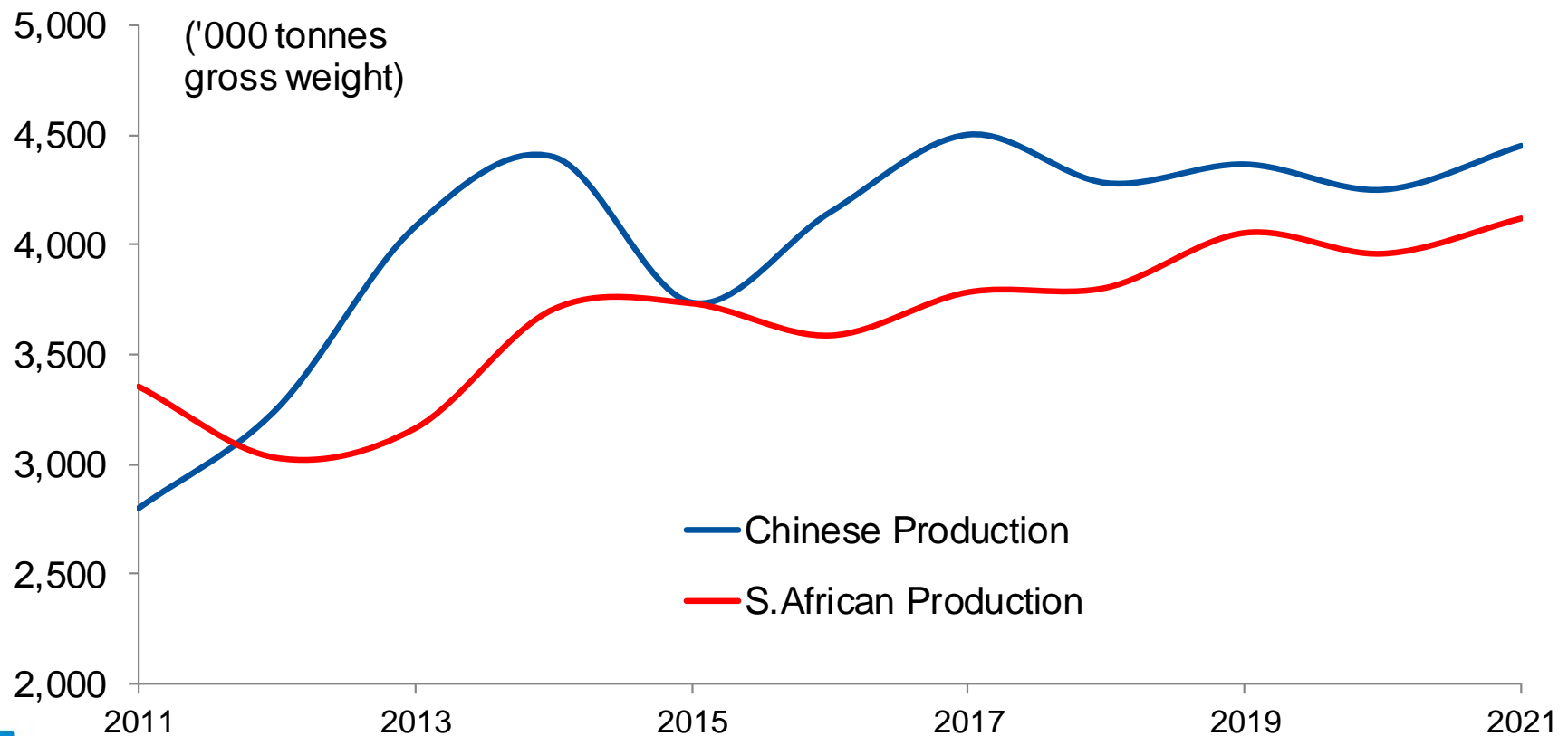
Production costs

- Rising power costs in South Africa (ZAR-terms) will push up production costs; effect will be offset by depreciating currency
- But South African marginal production costs will not be as important for global prices as Chinese production costs



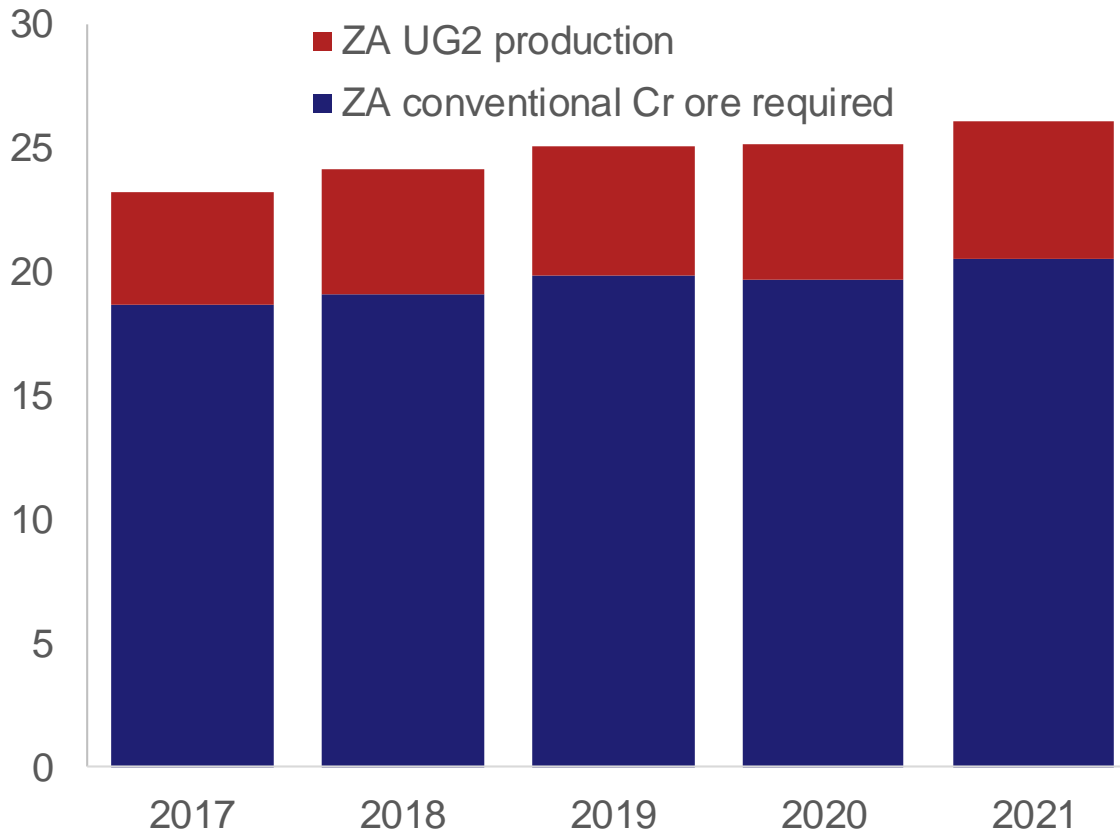
Chinese production costs and ore

- Chinese supply will balance the HC FeCr market in the long term; cost of production is vital—and is largely defined by price of South African chrome ore



China's dependence on ZA ore supply

m tonnes, ZA Cr ore production requirement



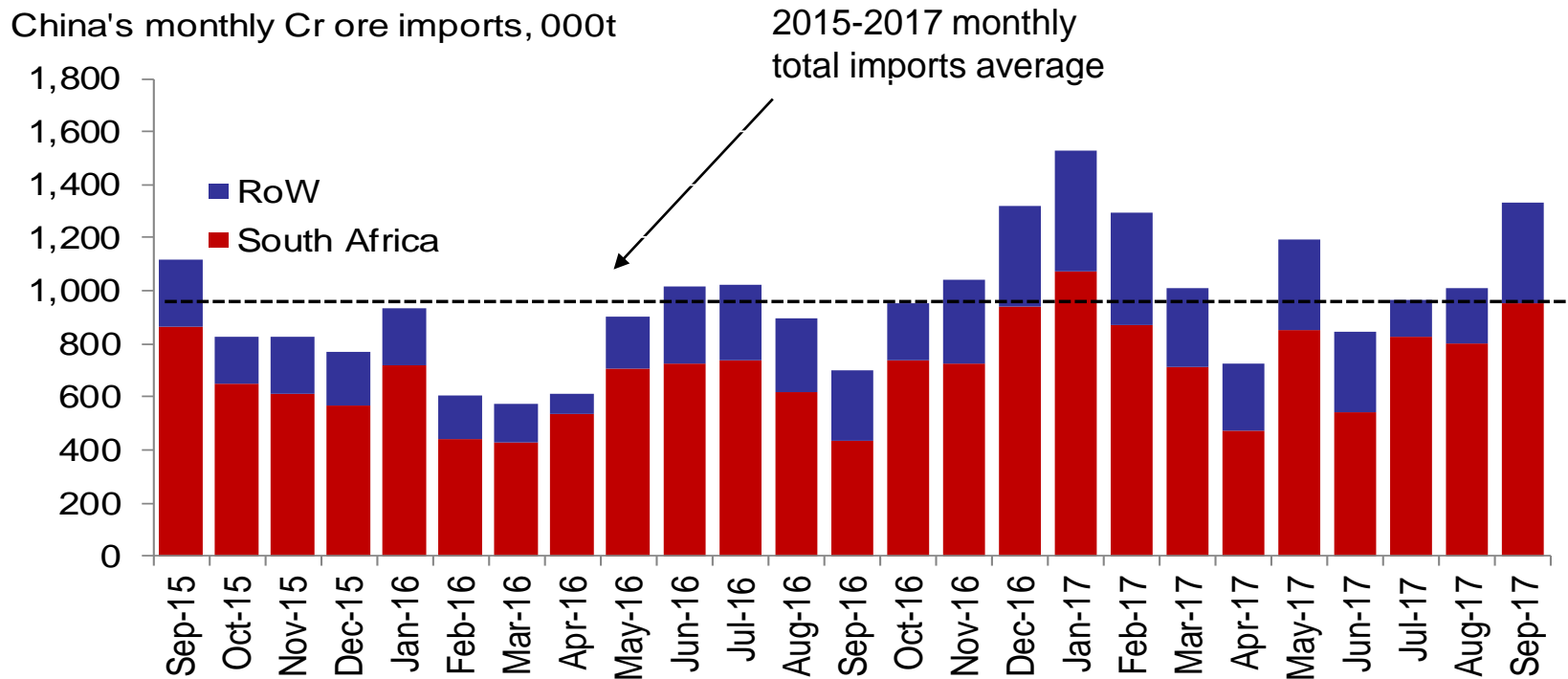
- South African ore production projected to need to rise by about 2.5mtpy by 2021

- Outlook for PGM prices is not particularly positive—yet more UG2 concentrate is needed, or else expansion will have to be entirely conventional ore

- Costs will rise, but barriers to entry are low

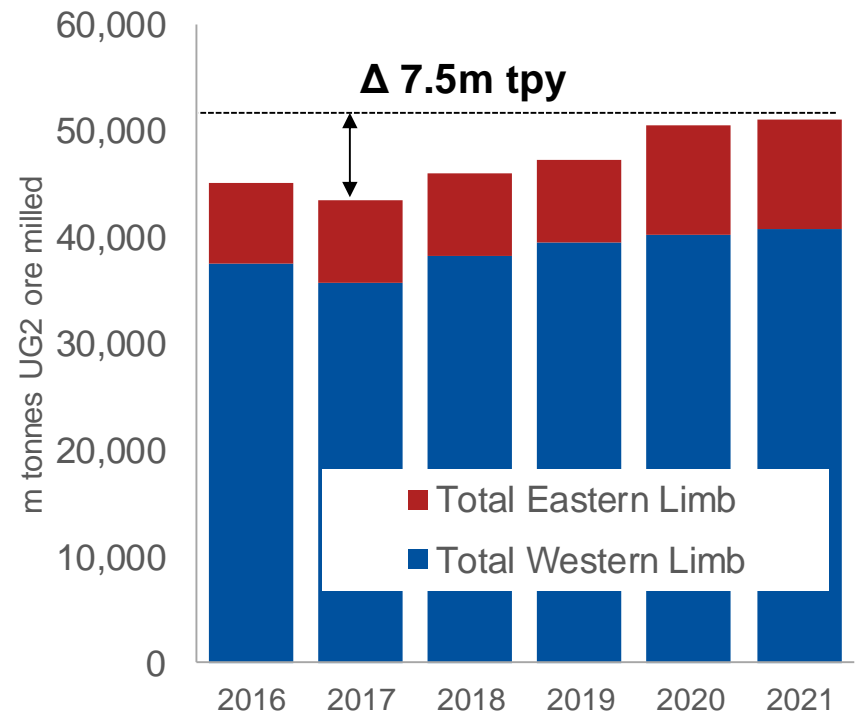
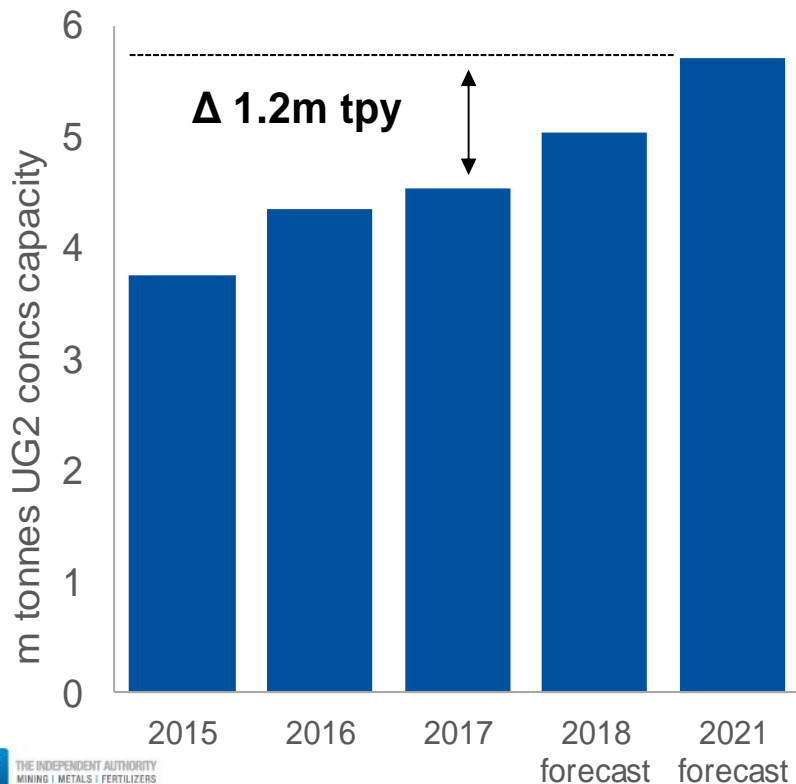
China's dependence on ZA ore supply

- ZA chrome ore exports responded quickly to the acute shortage of material in late 2016
- RoW supply also shows signs of being reasonably elastic



China's dependence on ZA ore supply

- South African ore production projected to need to rise by about 2.5mtpy by 2021
- CRU's outlook for PGM prices is bearish; risks to supply are acute



Conclusions:

- Short-term outlook dominated by chrome ore stocks in China
- Chinese stainless steel stock levels not overly worrying at the moment—but there is the twin threat posed by bullish nickel market and Indonesian imports
- Long-term trend towards lower global stainless steel production growth, but it retains late-cycle commodity characteristics
- Chinese stainless steel cycle will determine when domestic Chinese HC FeCr production is required to swing into the market.
- HC FeCr production cost in China will be key—and that will be determined by ore availability and price
- South African chrome ore is the key variable in the Chinese production cost calculation