Copper Super Cycle Impact on the Chilean Economy

By

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Outline

• Motivation
  • There was a Copper Price Super Cycle
  • How big was the impact on the Chilean Economy
Importance of Mining in Chile: Tax collection plus CODELCO profits

Copper Price Super Cycle

Importance of Mining in Chile: Exports

2015:
- Mining: 55%
- Copper: 49%

[Graph showing trends of mining exports and copper exports from 1985 to 2015.]
News from 2016

Economic context and mining investment

Latest news for mineral commodities

Oil Price Falls as Global Growth Anxiety Weighs on Markets

Mining Ready for M&A Revival, Producers Fight for Survival

Glencore seeks to refinance credit facility

THE WALL STREET JOURNAL
U.S. Industrial Production Dropped on Declines in Mining, Utilities

Oil Prices: What’s Behind the Drop? Simple Economics
Importance of Chile in Mining

Methodology

• How to measure the impact?
  • Leontief model from Miller and Blair (2009)

Leontief Quantity Model (Demand-pull)
[Prices fixed; quantities change]

Exogenous Variables

\[ f^1 = [f_i^1] \]
\[ \Delta f = [\Delta f_i] \]

Endogenous Variables

\[ x^1 = L^0 f^1 \]
\[ \Delta x = L^0 (\Delta f) \]

Variation in Exports
Did quantity change?

Chilean expected copper production

Source: COCHILCO.
Is copper price constant?
Methodology

• How to measure the impact?
  • Leontief model from Miller and Blair (2009)

Leontief Price Model
(Cost-push)
[Quantities fixed; prices change]

Exogenous Variables

Endogenous Variables

\[ v_c^1 = (\hat{x}^0)^{-1}v^1 = [v_j^1/x_j^0] \]

or

\[ \Delta v_c = (\hat{x}^0)^{-1}(\Delta v) = [\Delta v_j/x_j^0] \]

\[ \bar{p}^1 = (L^0)^{-1}v_c^1 \]

or

\[ \Delta \bar{p} = (L^0)^{-1}(\Delta v_c) \]

Variation in Price
Methodology

Using an IO table, the \( j \) column can be represented by:

\[
x_j = \sum_{i=1}^{n} z_{ij} + v_j
\]

In matrix form, summing columns of IO table:

\[
x' = i'Z + v'
\]
Methodology

By definition $Z = A\hat{x}$, therefore $x' = i'A\hat{x}$ and post-multiplying by $\hat{x}^{-1}$,

$$x'\hat{x}^{-1} = i'A\hat{x}\hat{x}^{-1} + v'\hat{x}^{-1}$$

$$i' = i'A + v'\hat{x}^{-1} = i'A + v'_{c}$$

According to Miller and Blair (2009), “this illustrates the unique measurement units in the base year table – amounts that can be purchased for $1.”
Methodology

Denoting base year index prices by \( \bar{p}_j \) so \( \bar{p}' = [\bar{p}_1, \ldots, \bar{p}_n] \), then the input–output price model is:

\[ \bar{p}' = \bar{p}'A + v'_c \]

Which lead to:

\[ \bar{p}' = v'_c(I - A)^{-1} = v'_cL \]

Transposing and expressing in column vector:

\[ \bar{p} = (I - A')^{-1}v_c = L'v_c \]

This is a mark-up price model, where the output price is determined by input prices plus the cost of labor per unit of output and the margin per unit.
Results

Price

\[ \bar{p} = (I - A')^{-1}v_c = L'^* [\text{wage profits}] \]

Where wage and profits are the share of wage and profits on the total buys by the sectors.
Wage and Profits in the Copper Sector
Results: wage and profits share participation on copper price
Next step

• Split the impact among domestic and foreign ownership

• Determine how those share are affected by the price cycle,
Conclusion
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