

Market Trends in Metals Supply and Demand – Recent Rises in Metal Prices

2005 Mine Water Treatment Technology Conference
August 15-18, 2005
Pittsburgh, PA

by

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Acknowledgements

- Kenneth Beckman
- Lisa Corathers
- John Jorgenson
- Patricia Plunkert
- Pui-Kwan Tse

U.S. Geological Survey Minerals Information

Most up-to-date information on the USGS
minerals information Web page:

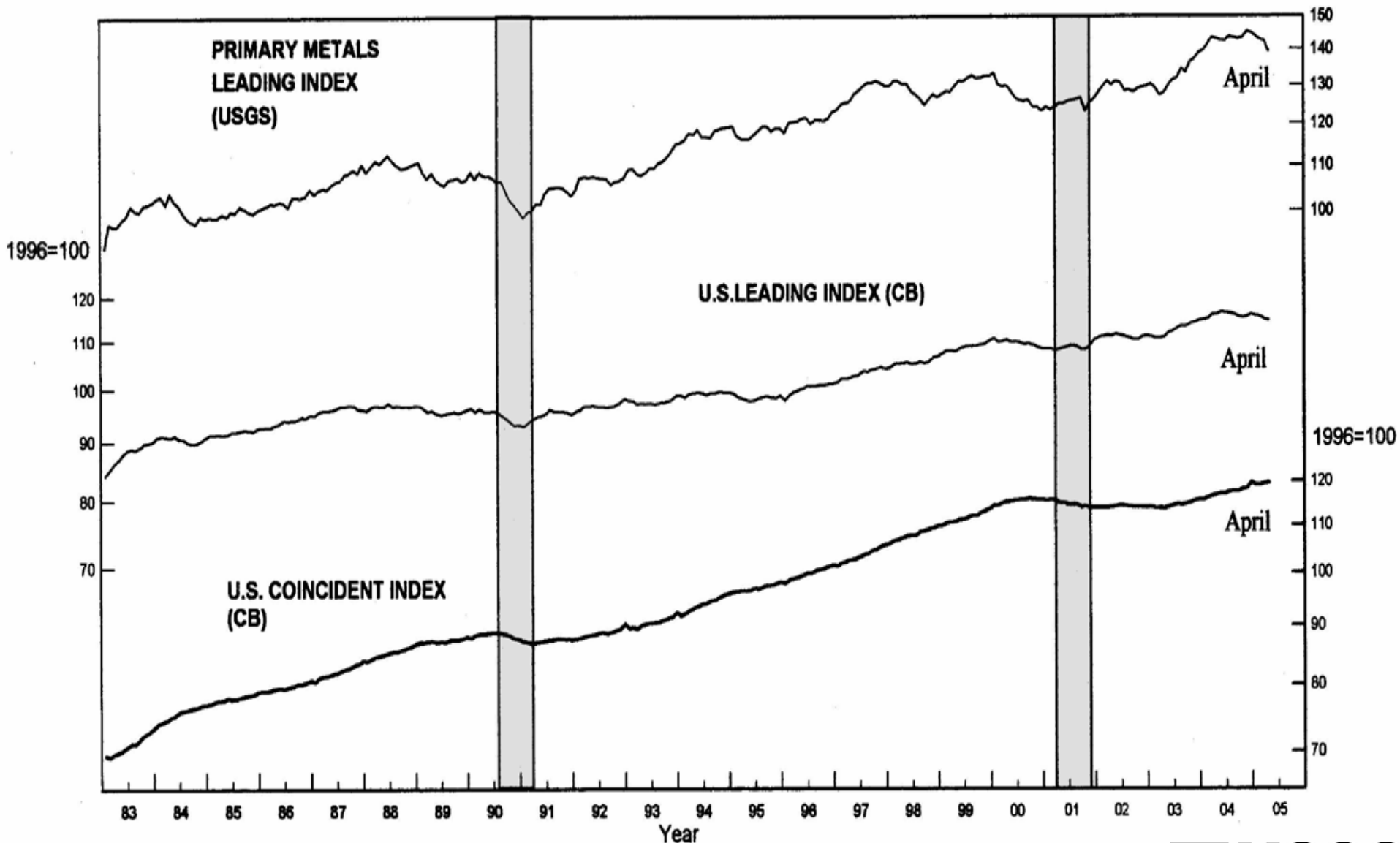
<http://minerals.usgs.gov/minerals>

Metal Industry Indicators

- Based on composite indexes of diverse economic activity.
- A coincident index, in this use, is a measure of current metal industry activity that is based on measurements of production, shipments, and total employee hours worked.
- A leading index is a measure of anticipations or new commitments to various economic activities that can affect the metal industries in the months ahead, such as new orders for metal products, permits issued for new housing, metals prices, and stock price indexes.
- Leading indexes turn several months in advance of major changes in a coincident index: 6 to 8 months for aluminum and 7 months for steel and copper.

PRIMARY METALS LEADING INDEX AND COMPOSITE INDEXES OF LEADING AND COINCIDENT INDICATORS FOR THE U.S. ECONOMY

1977=100



Shaded areas are business cycle recessions.

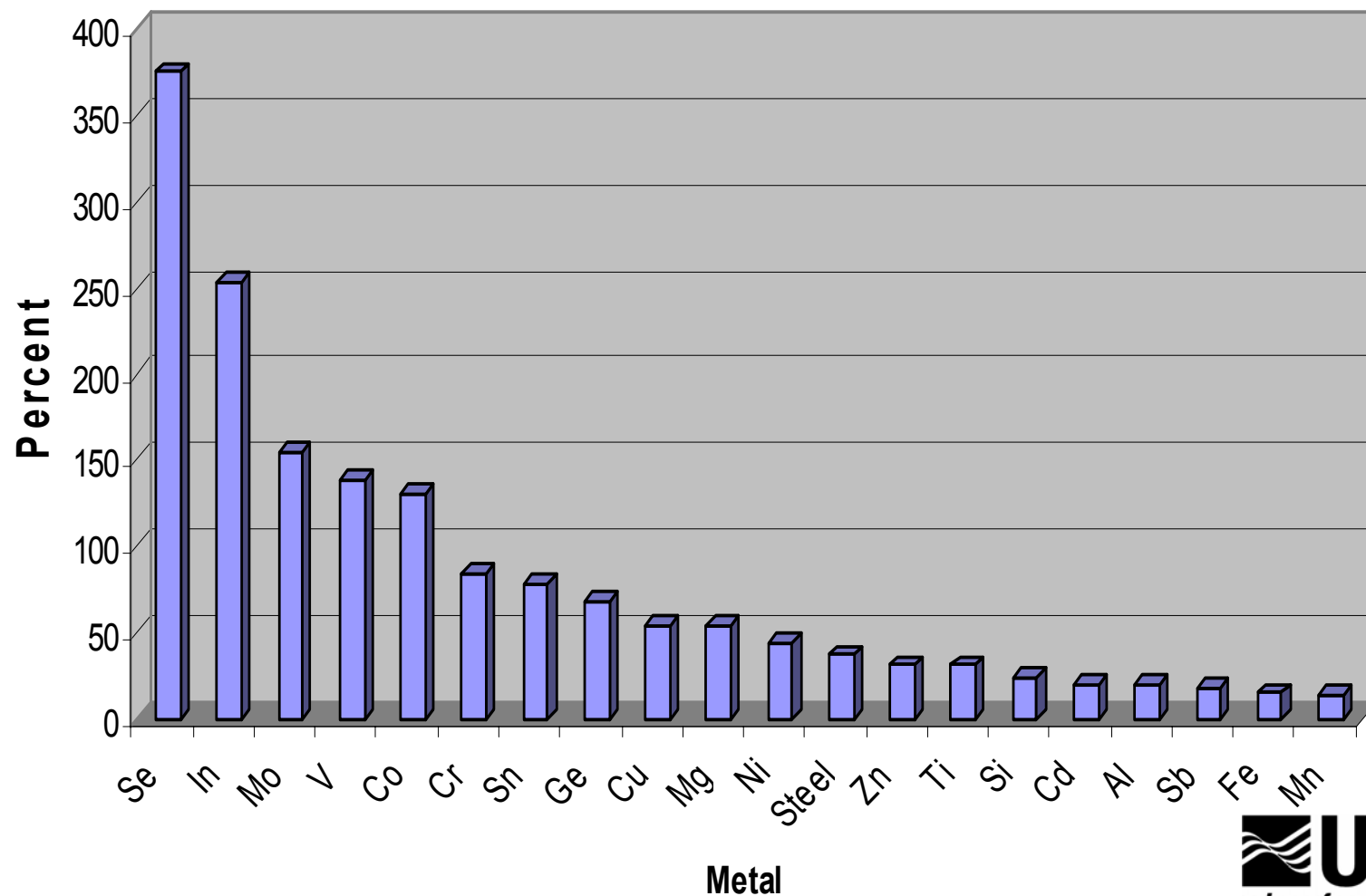
Sources: U.S. Geological Survey (USGS) and Conference Board (CB).

May 2005

Overview

- Price changes of selected metals.
- Possible causes.
- Supply drivers.
- Price history of selected metals.
- U.S. and world economy.
- Asian markets.
- Outlook.

Metal Price Increases (2003-2004)



Factors that May Contribute to or Characterize Price Rises

- Increased consumption (regional, worldwide):
 - New uses.
 - General economic strengthening.
 - Specialized economic strengthening.
- Shortage of supply (regional, worldwide):
 - Plant shutdowns for maintenance, weather, fire, strikes, etc.
 - Civil unrest.
 - Lack of transportation for raw materials or product.
 - Reduced energy availability.
 - Depletion of resources.
 - Concentration of supply (monopoly or oligopoly).
 - Drawdown of stocks.
 - Increased demand.
- Increased scrap recovery.
- Speculation.
- Currency exchange rate increases (weakening of the dollar).
- Tariffs, export tax.
- Increased cost of production:
 - Energy.
 - Labor.
 - Raw materials.
 - Equipment.
 - Capital (funds).

2003-2004 Exchange Rate Changes

Currency unit	1/2/04 Unit/\$	12/31/04 Unit/\$	Dollar strengthen (+)/ weaken (-)	Percent change 2003-2004
British Pound	0.558597	0.521921	Weaken	- 7
Euro	0.79384	0.738662	Weaken	- 7
Japanese Yen	106.95	102.68	Weaken	- 4
South African Rand	6.565	5.645	Weaken	-14
Chinese Yuan	8.2769	8.2765	Constant	None

Components of Supply

- Primary (principal and byproduct mined material).
- Secondary (recycled new and old scrap).

Primary Supply

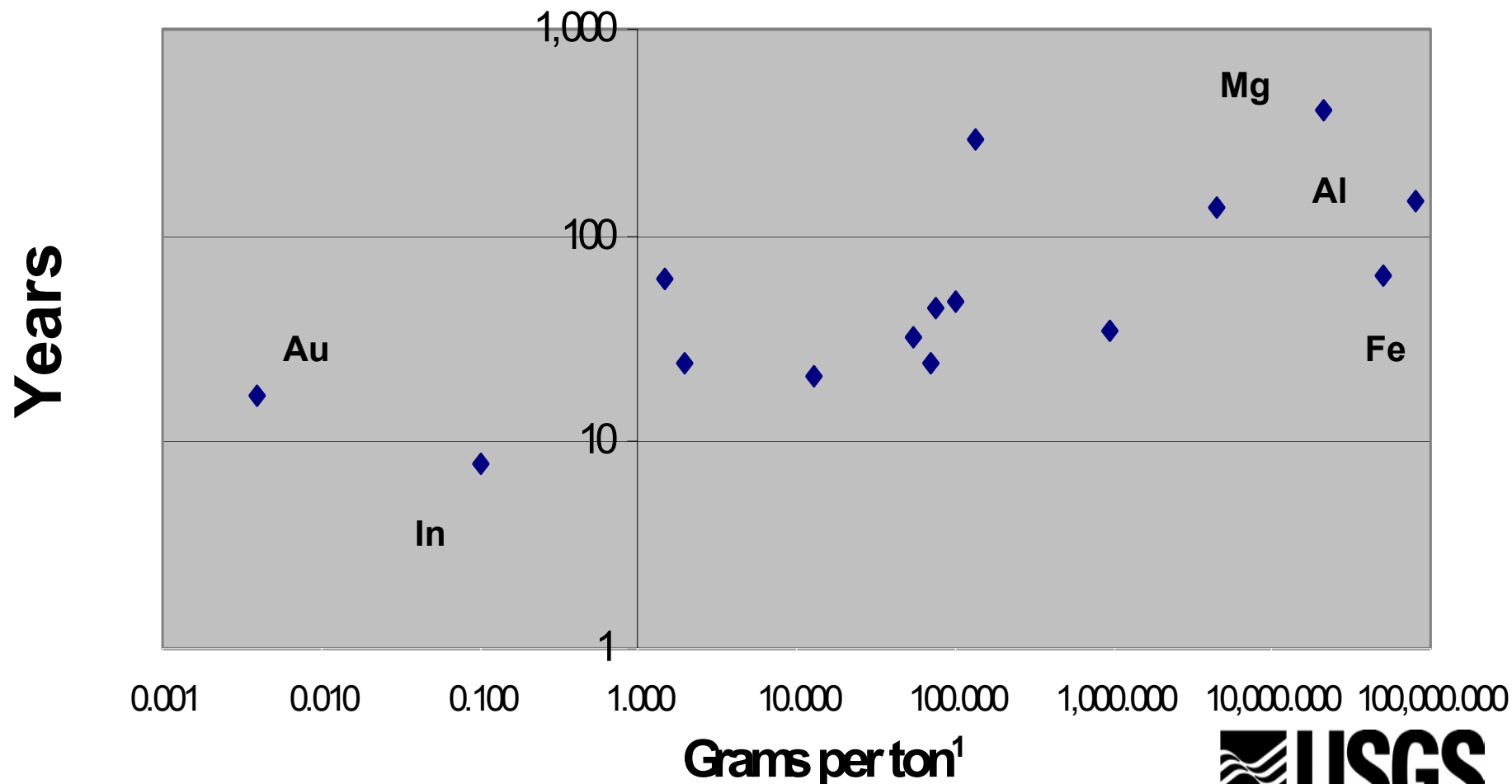
World Reserves

- Are reserves and resources generally significant enough and adequate?
- Grade of ore and tonnage are two determinants of economic recoverability.
- Economic (or cutoff) grade changes with costs of production and price of metal mined.

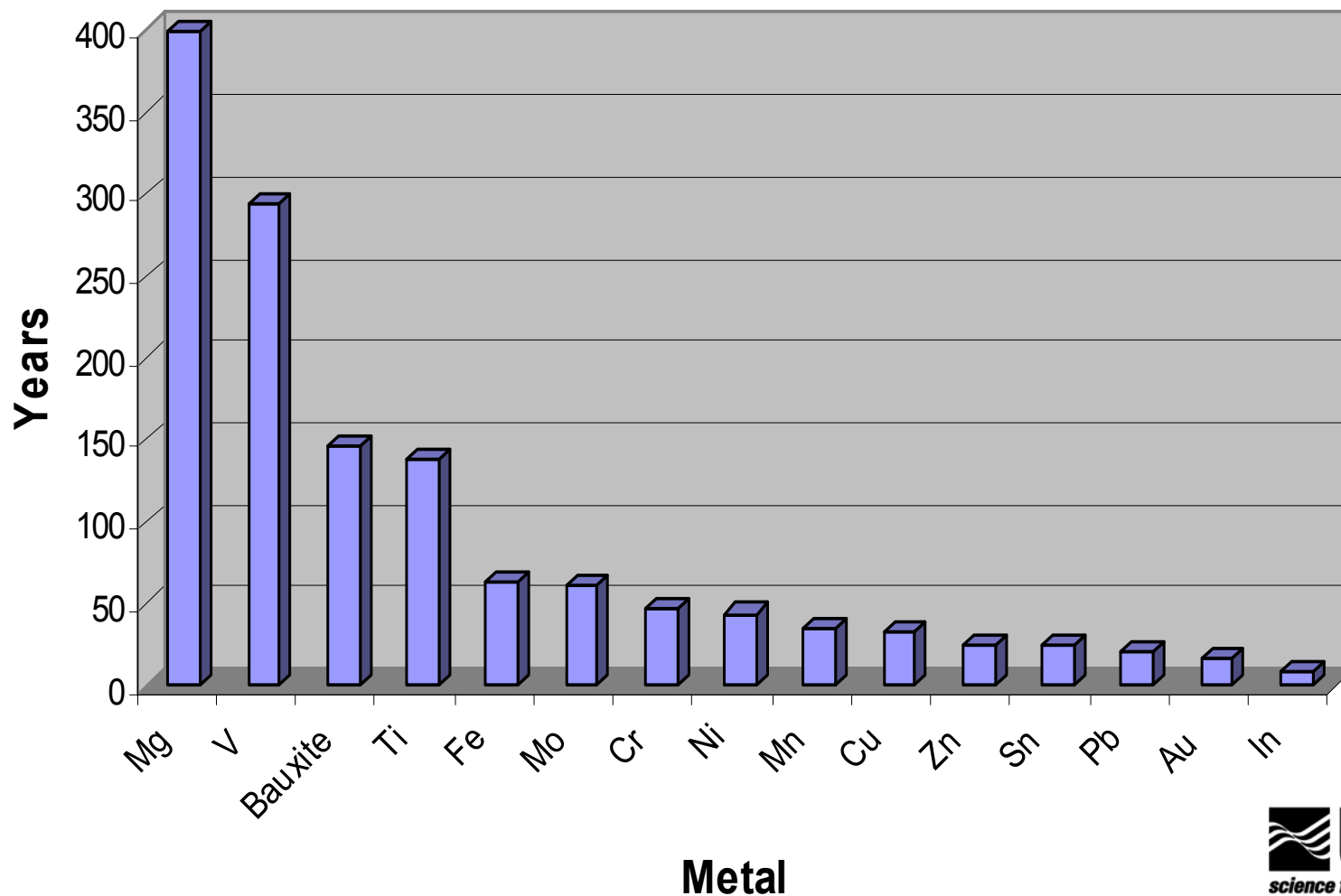
Long-Term Supply

- Reserves are dynamic, subject to change, with price, new discoveries, and production.
- Accuracy and precision of reserve data differ by country.
- Companies may minimize reserves.
- As reserves are drawn down, prices may rise, prompting further exploration and identification of new reserves.
- Long lead times to develop new capacity, resulting in possible short term supply deficits and price rises.
- Some researchers have compared different metals' reserves by comparing the ratios of world reserves to annual world production.
- No relation between price rises and reserve status.

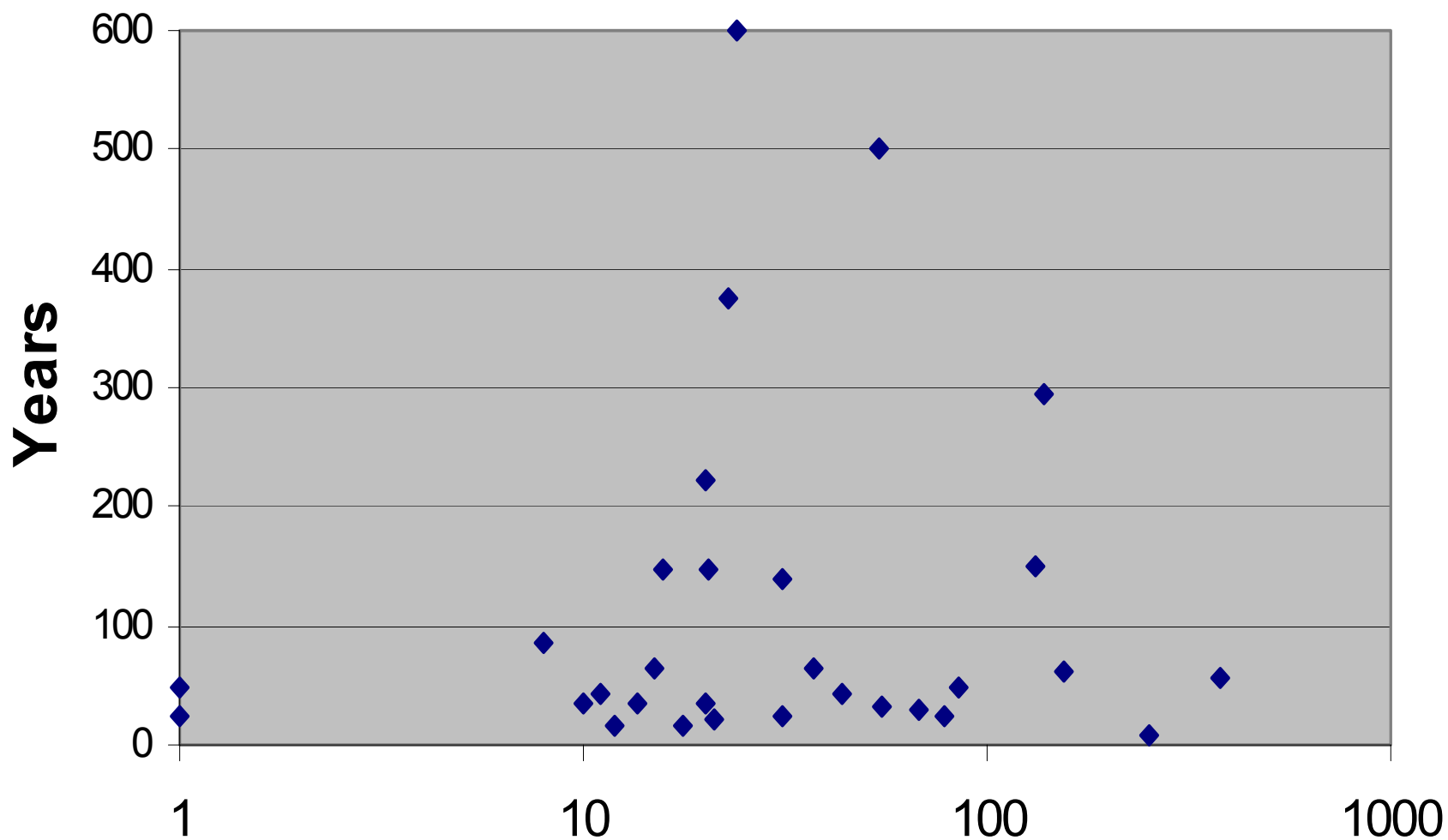
Average Crustal Abundance vs. Ratio of Reserves to Annual Production (2004)



Ratio of Stocks (Reserves) to Annual Production (2004)



Relation of Price Change to Long-term Supply

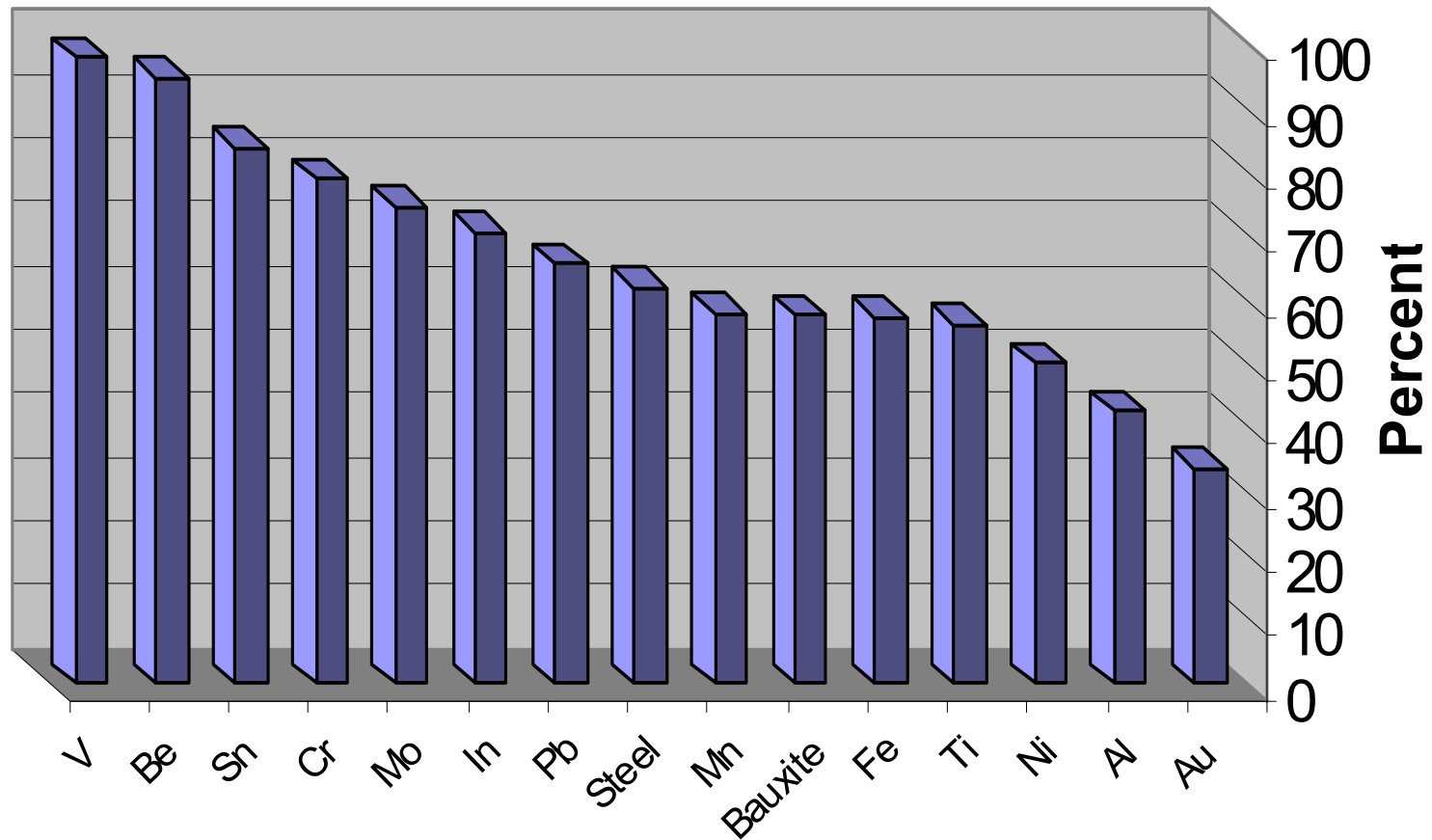


Supply Concentration

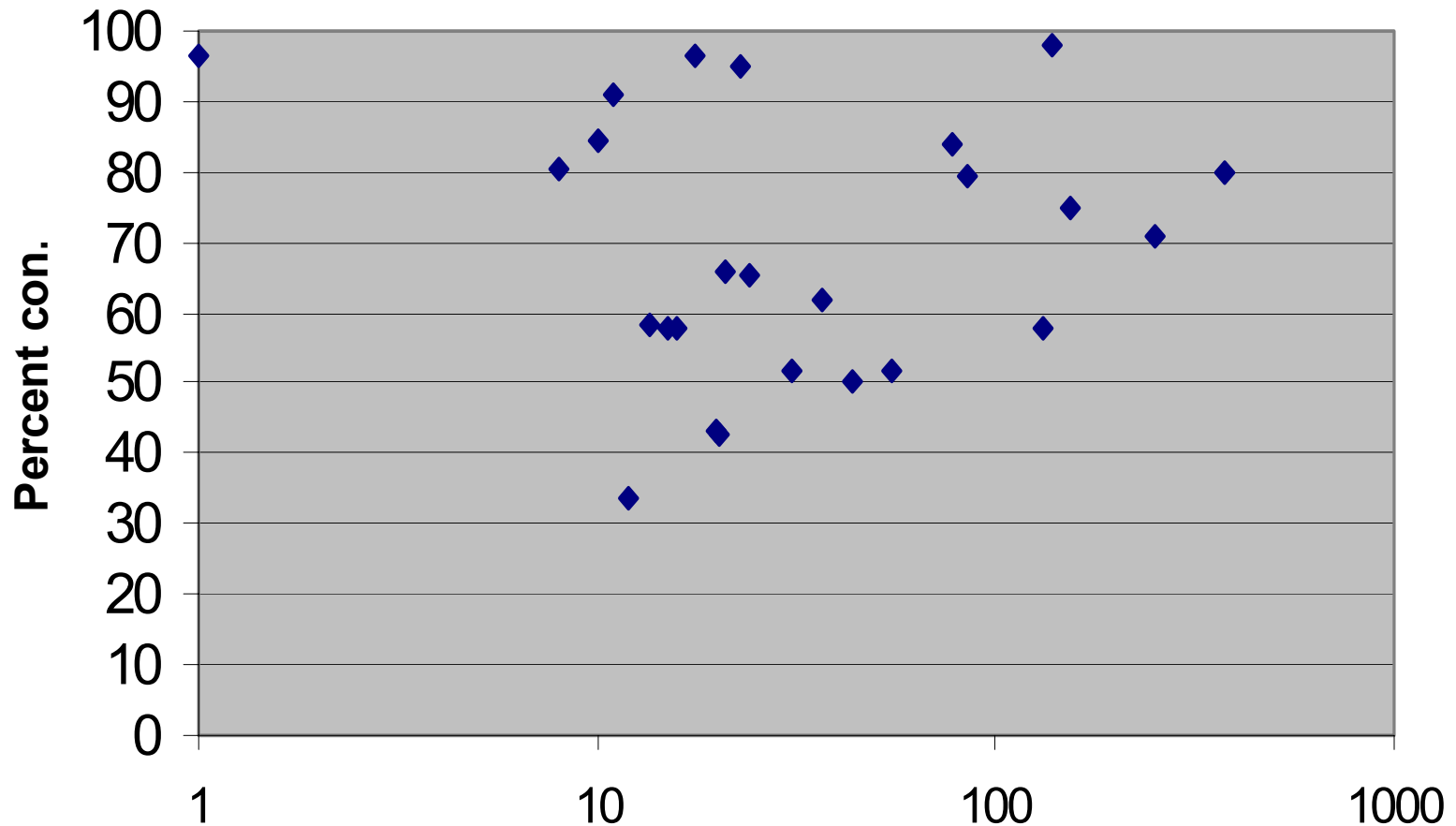
- For comparison purposes, supply concentration may be considered as the total of the percent of world production of the top three producing countries of a metal.
- For example, for iron ore, the supply concentration is 58% (China, 22%, Brazil, 18%, and Australia, 18%).
- Also a measure of the degree of vulnerability of supply to disruption, which could be from natural disaster, accident, political unrest, or other causes.

Metal Supply Concentration

(top 3 producing countries)



Relation of Price Change to Concentration of Supply



Metals price changes (%), 03-04

Secondary Supply

Recycled Material

- Recovery of material from obsolete scrap is significant.
- New scrap is also significant.
- Potential for increased recovery (efficiency).
- Recycling rates are relatively stable.

Recycling Status

Mineral Commodity	Recycling Rate	Recycling Efficiency	New to Old Scrap Ratio
Iron and Steel	41	52	34:66
Manganese	37	53	33:67
Aluminum	41	42	60:40

Recycling Rate Formula

$$\frac{\text{COS} + \text{CNS}}{\text{AS}}$$

Where, COS = Consumption of old scrap

CNS = Consumption of new scrap

AS = Apparent supply

Industries Supplying Materials for Recycling

- Automotive
- Alloy
- Chemical
- Computer
- Oil
- Plating

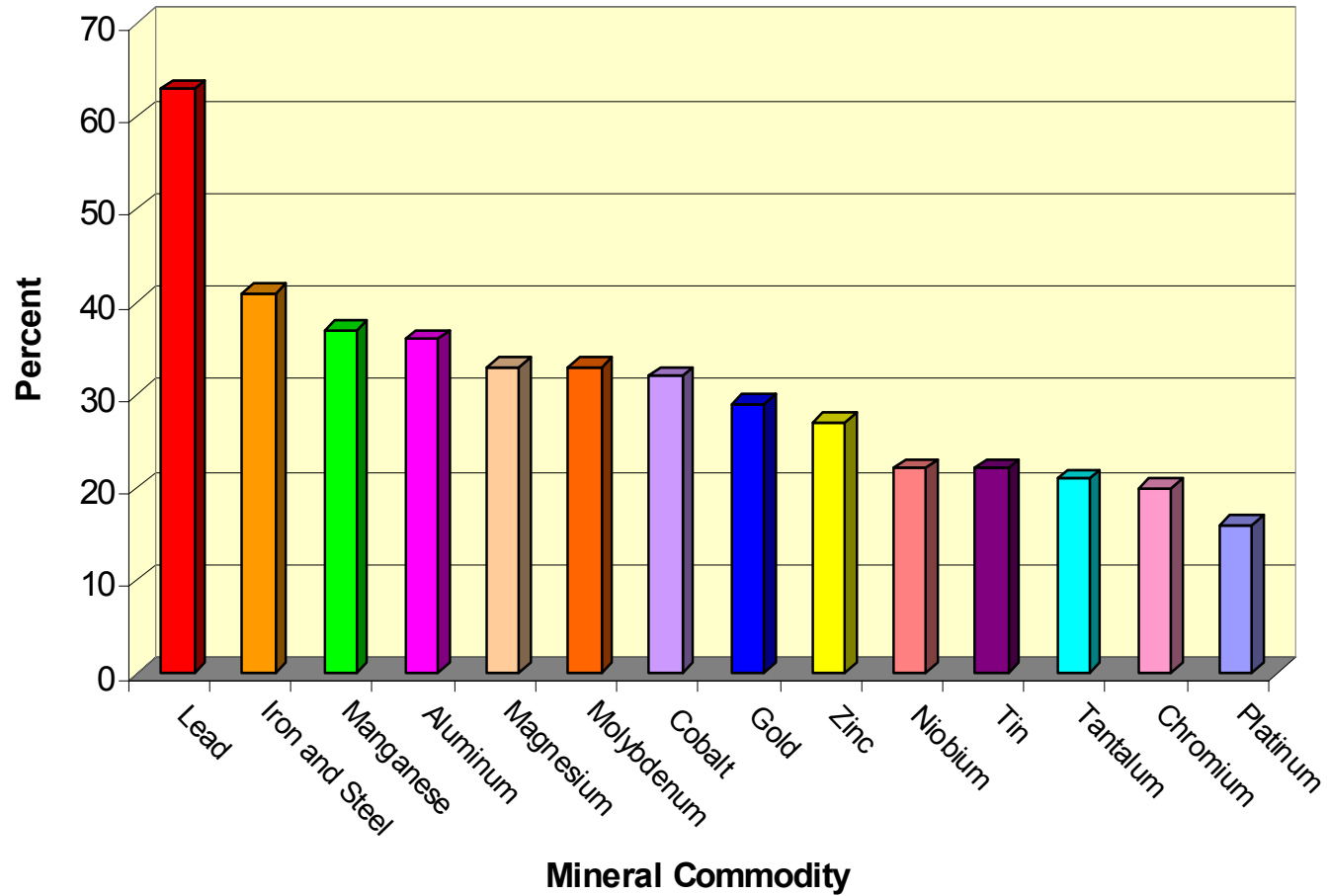
Materials

- Sludges
- Dusts
- Catalysts
- Solutions
- Grindings

Processors of Industrial Waste

- Alpha Omega Recycling, Longview, TX (Fe, Al)
- Amlon Metals, New York, NY (variety)
- Horsehead Resource Development (Palmerton, PA)
- INMETCO, Ellwood City, PA
- OMG Americas, Franklin, PA (produces organic based driers)
- Southern Water Treatment (SWT, Greenville, SC (produces sodium aluminate)
- World Resources, Pottsville, PA

Recycling Rates for Selected Metals

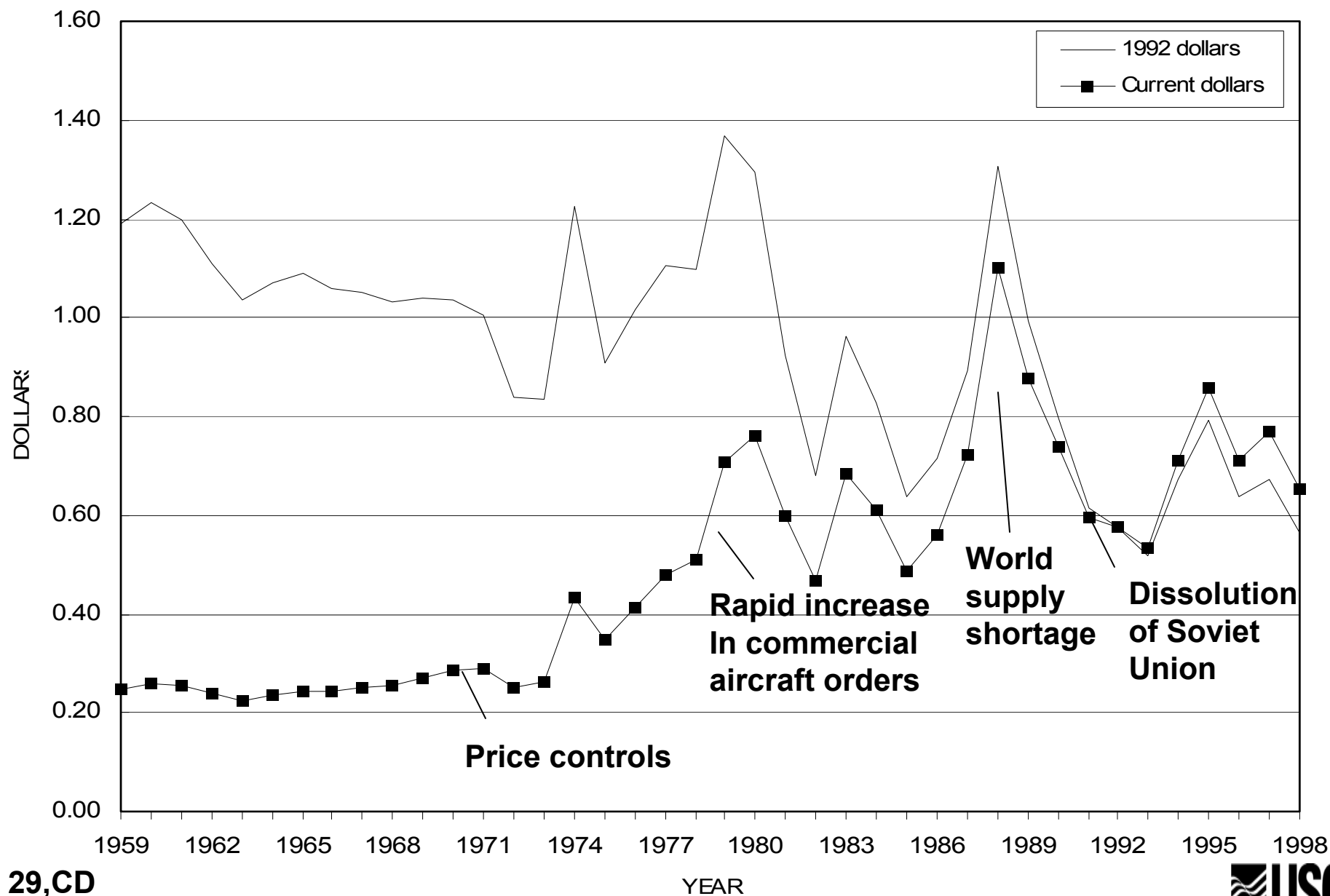


Price Trends over Time

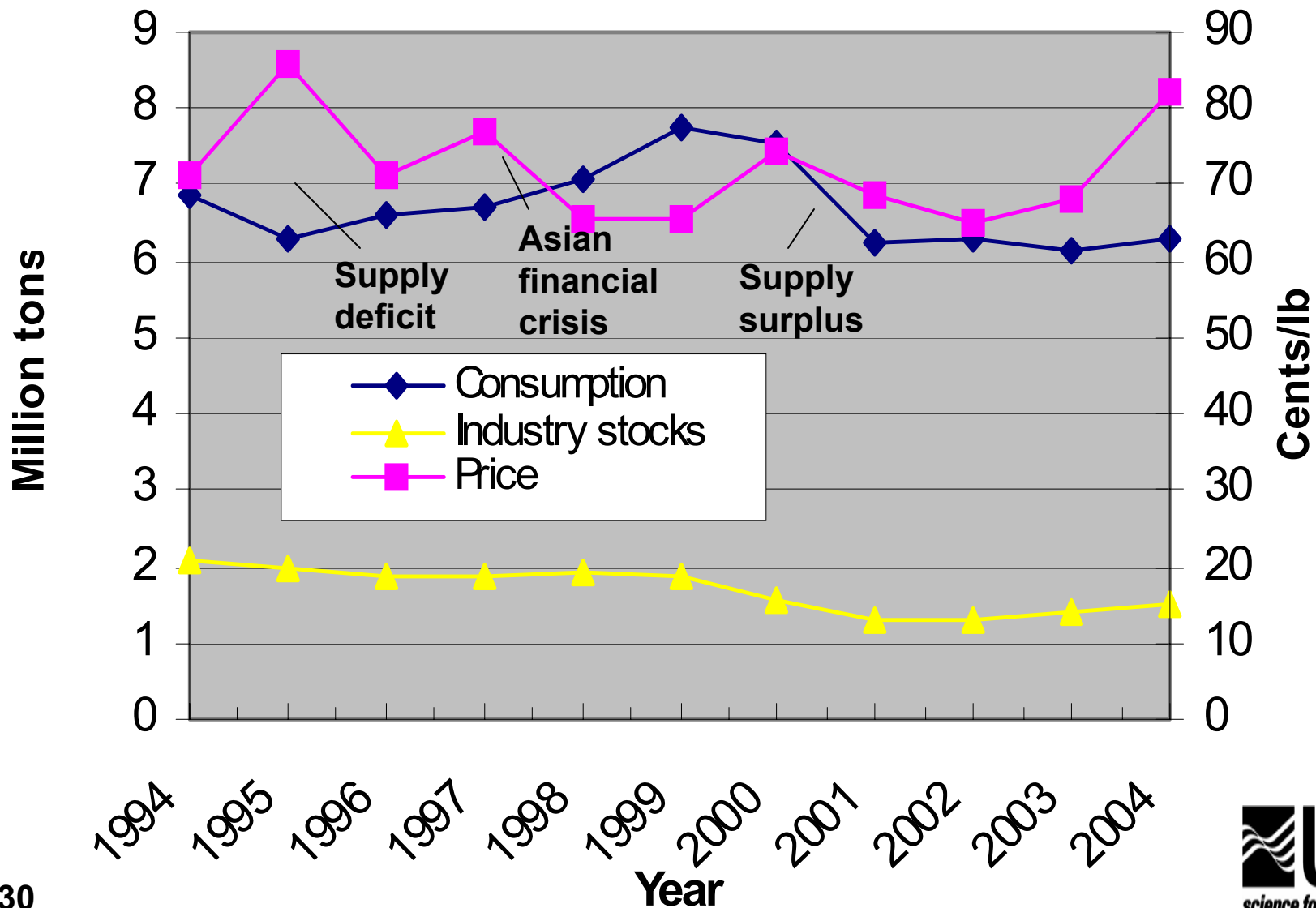
– Al, Mn, Fe

- Historical
- Recent

ANNUAL AVERAGE PRIMARY ALUMINUM PRICE
(Dollars per pound)



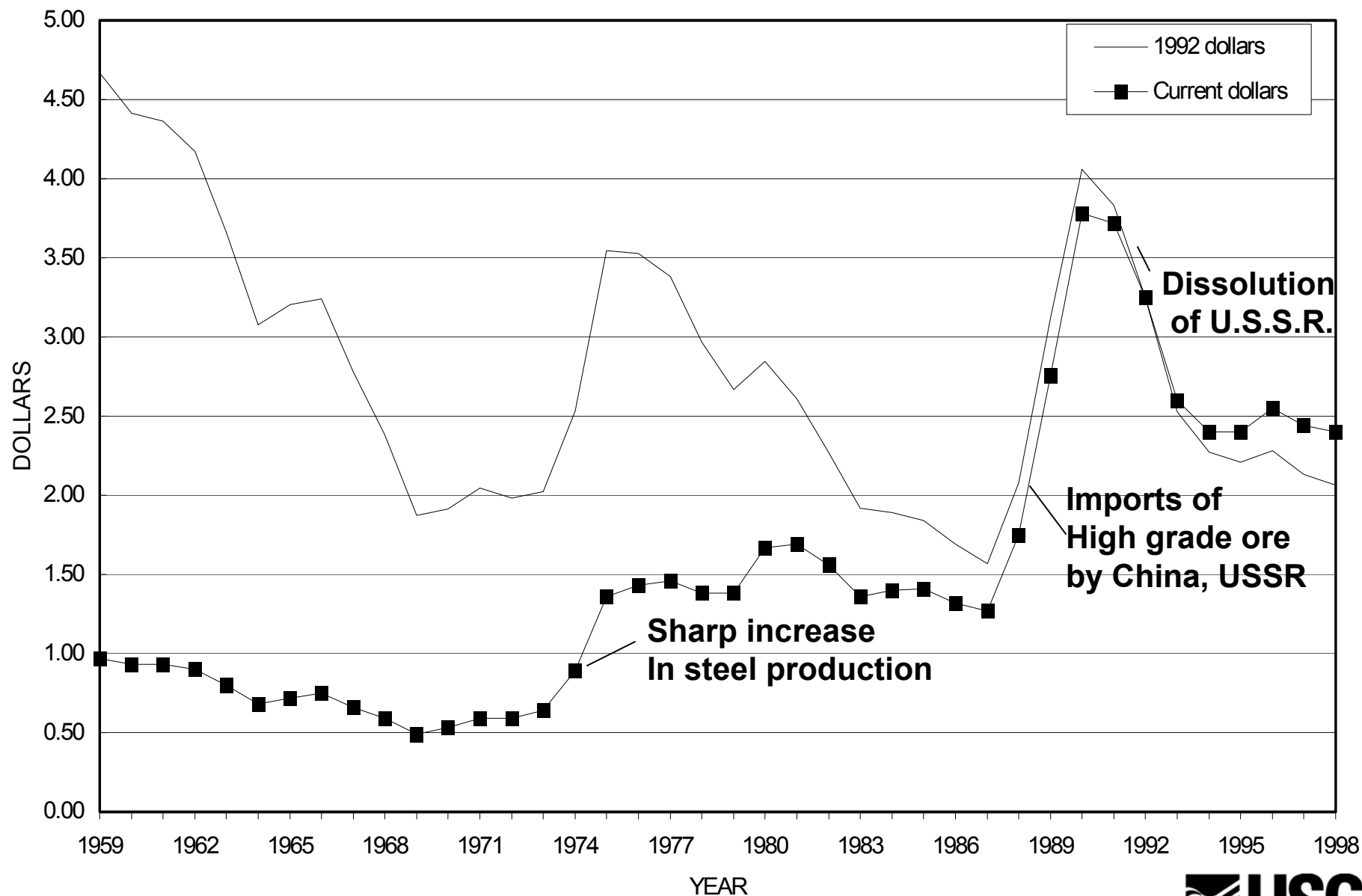
U.S. Aluminum Consumption, Stocks, and Price



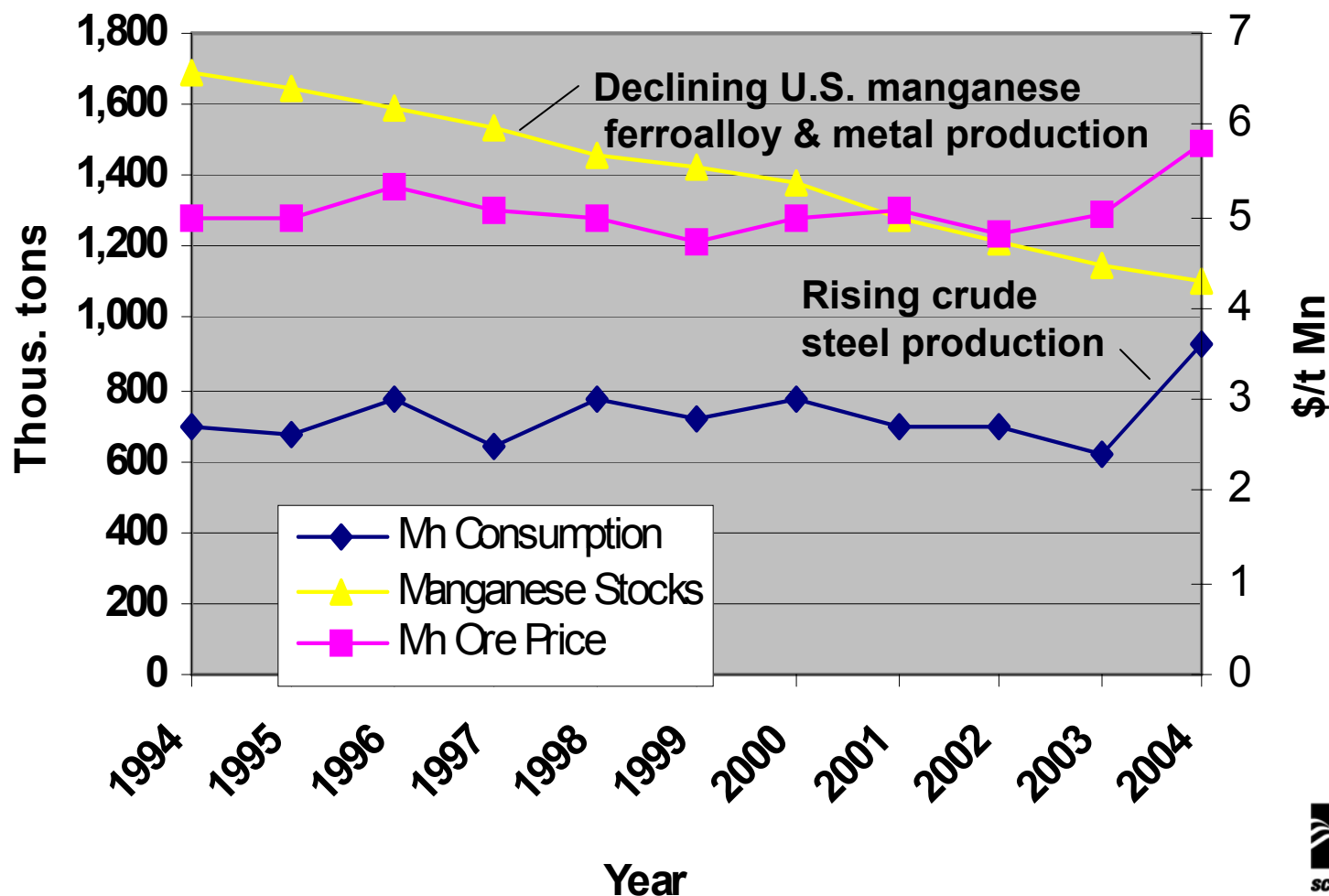
Sources of AI Price and Analysis

- LME
- Nymex
- Trade journals, such as Platts Metals Week, American Metal Market, Metal Bulletin.
- Price forecasters and analysts:
 - CRU International
 - Metal Bulletin Research
 - AME Mineral Economics
 - Brook Hunt Associates
 - Anthony Bird Associates
 - Commodity Metals Management Company

ANNUAL AVERAGE 48%-50% MANGANESE ORE PRICE
(Dollars per metric ton unit, c.i.f.)



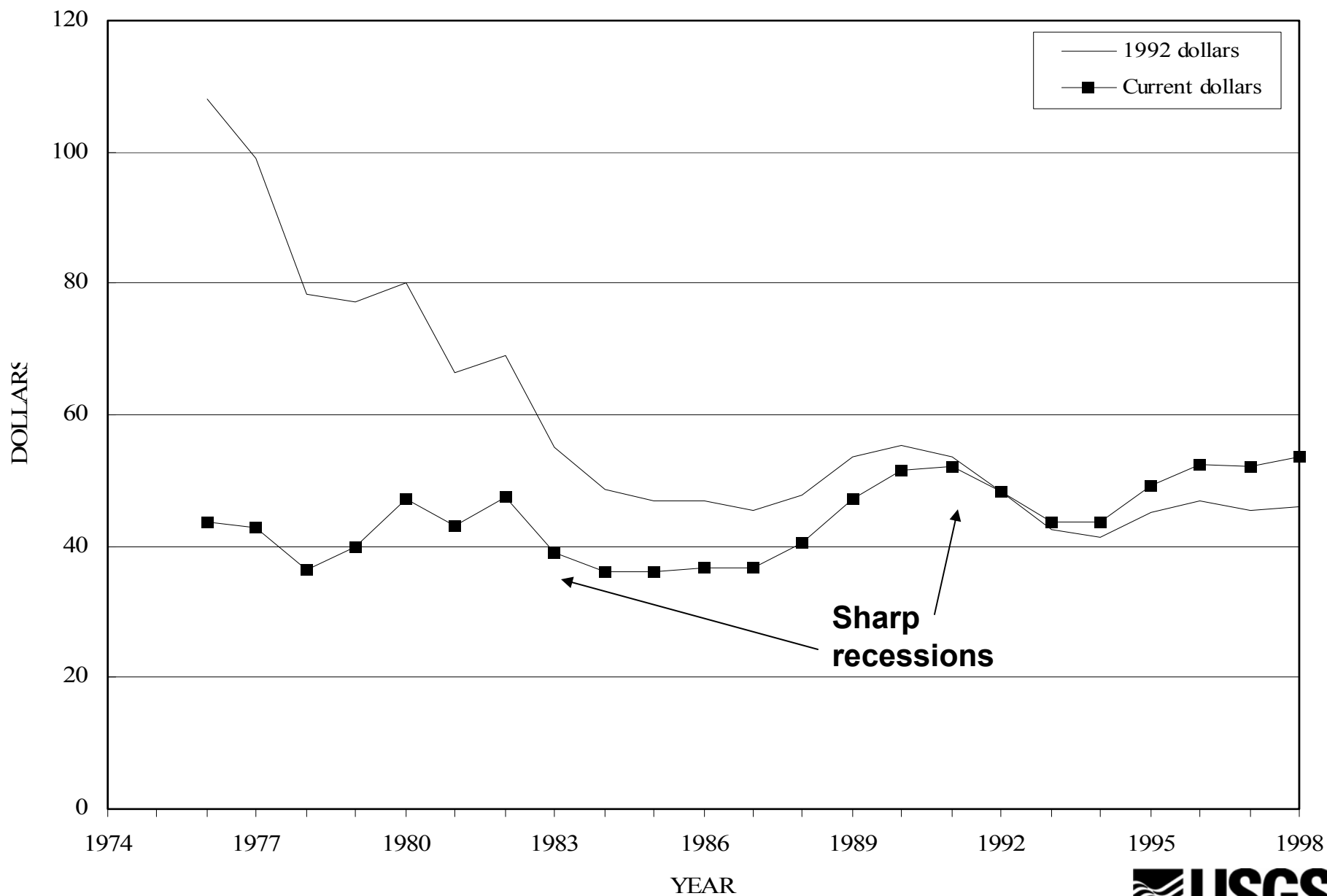
Manganese Apparent Consumption, Ore Stocks, and Ore Price



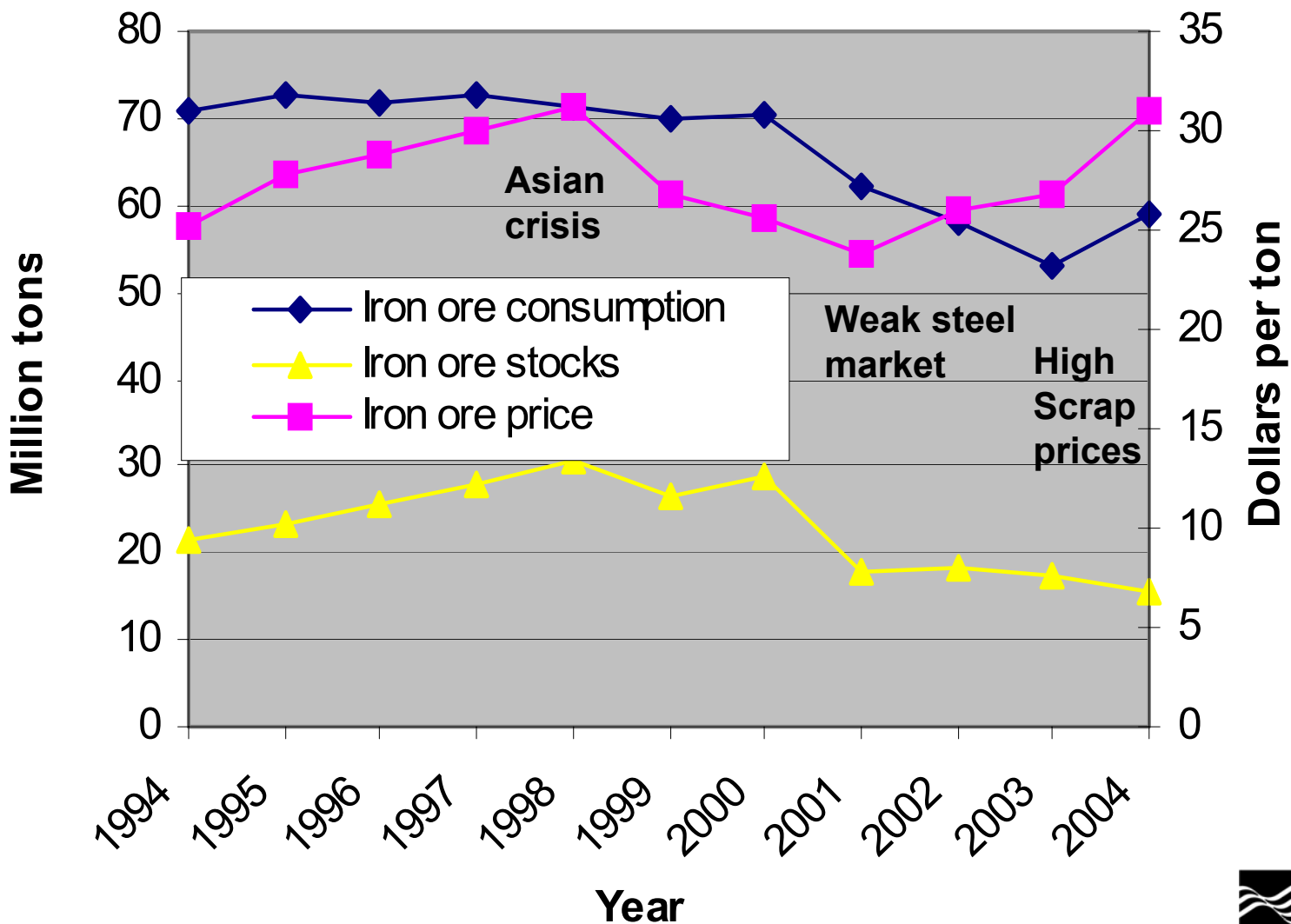
Sources of Mn Price Information

- Ryan's Notes.
- Platts Metals Week.
- Metal Bulletin Research.
- CRU International.
- American Metal Market.

ANNUAL BRAZILIAN IRON ORE PELLET PRICE
(U.S. dollars per metric ton contained iron)



U.S. Iron Ore Consumption, Stocks, and Price



Sources of Information on Iron Ore Prices

- USGS Web site.
- Roskill Information Services –
“The Economics of Iron Ore.”
- Skillings Mining Review (monthly).

U.S. Economic Performance in 2004

- New orders for durable goods (computers, autos, aircraft, machinery) increased 11%.
- New orders for nondefense aircraft and parts rose 37%.
- New orders for primary metals rose 27%.
- Nondefense capital goods new orders and shipments rose 12%.
- Industrial production index for primary metal manufacturing rose 6%.

2004 World Economic Performance

- IMF - Global output increased by 5.1%.
- Metal prices increased 10% on average.
- Greatest growth in China (9.3%), India, Indonesia, Thailand, Malaysia, the US, Russia, and the CIS.
- Growth in Japan and EU moderate.
- Growth dampened by higher fuel prices.

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China in 2005

- **Rapid economic growth for past 15 years.**
- **Growth “spreading” to other countries, such as India.**
- **Development primarily influenced by—**
 - **Infrastructure projects.**
 - **Demand for capital goods and consumer goods.**

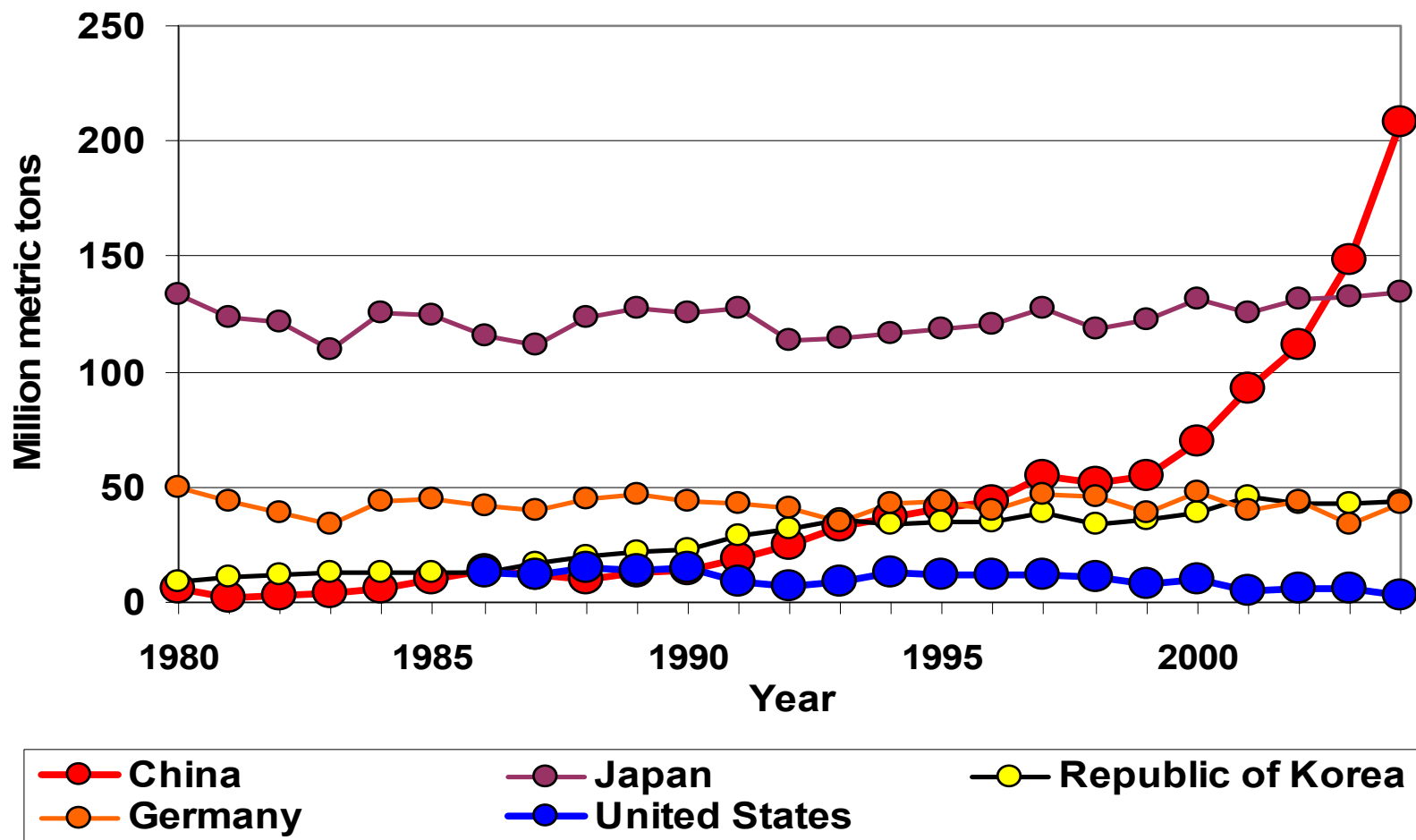
China's Share of World Mineral Production in 2003

Commodity	Percentage	Rank
Fuels:		
Coal	45	1
Oil	4.7	6
Industrial minerals:		
Cement	42	1
Fluorspar	55	1
Rare earths	85	1
Metals:		
Aluminum	18	1
Antimony	89	1
Copper	12	2
Gold	8	4
Lead	18	2
Magnesium	45	1
Molybdenum	24	3
Silver	12	3
Steel, crude	23	1
Tin	32	1
Tungsten	83	1
Zinc	22	1

China and the United States in 2004

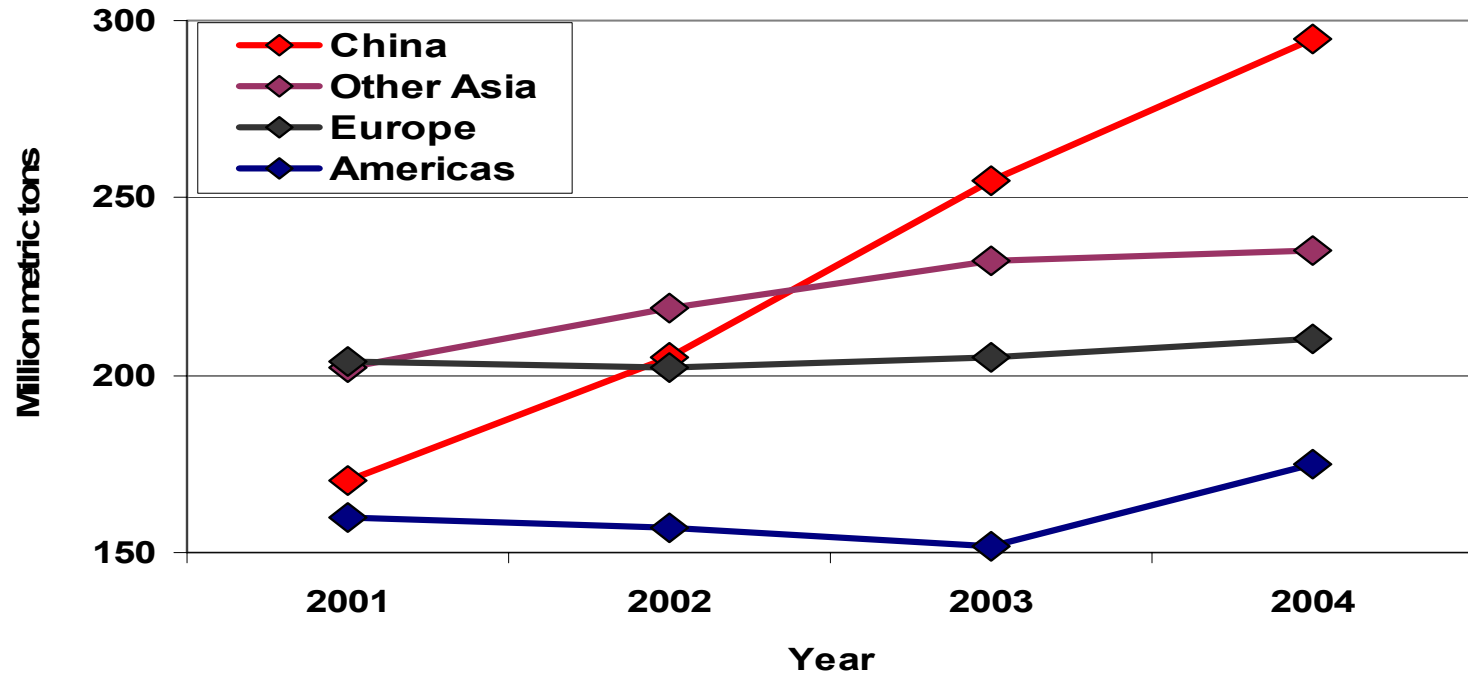
	China	United States
Area	9,596,960 km ²	9,629,091 km ²
Population	1.3 billion	295 million
Gross Domestic Product (GDP)	\$6.9 trillion	\$11.7 trillion
GDP/capita	\$5,300	\$39,700
Economic growth rate	9.5%	4.4%
Trade (total)	\$1.15 trillion	\$2.29 trillion
Exports	\$594 billion	\$819 billion
Imports	\$561 billion	\$1.47 trillion
Trade between China and the United States	\$170 billion	\$231 billion
Exports	\$125 billion (to U.S.)	\$35 billion (to China)
Imports	\$45 billion (from U.S.)	\$197 billion (from China)
Ownership of companies	Some state-owned	Private
Direct foreign investment	\$54 billion	\$30 billion

Leading Importers of Iron Ore 1980–2004



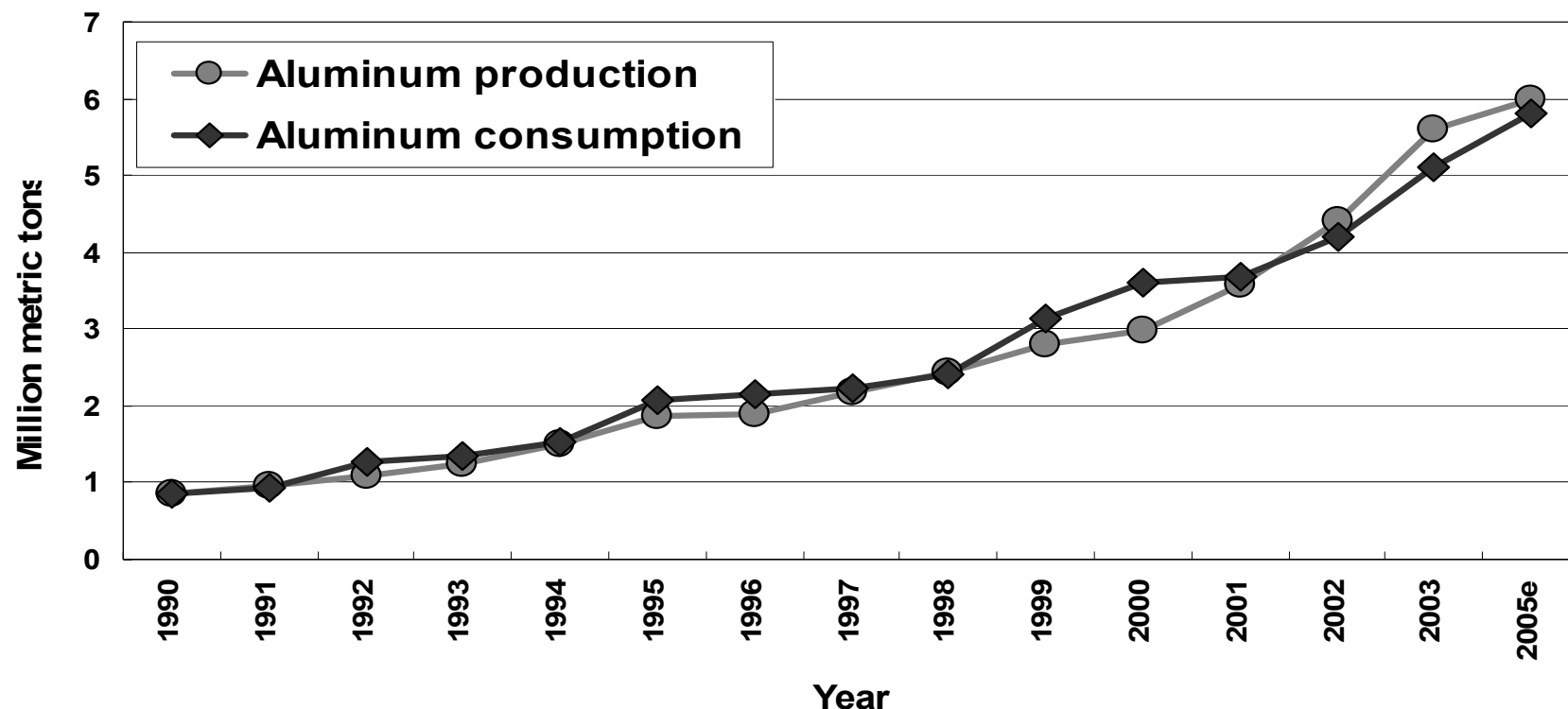
Sources: U.S. Geological Survey Minerals Yearbook; United Nations Conference on Trade and Development.

Trends in Consumption of Steel



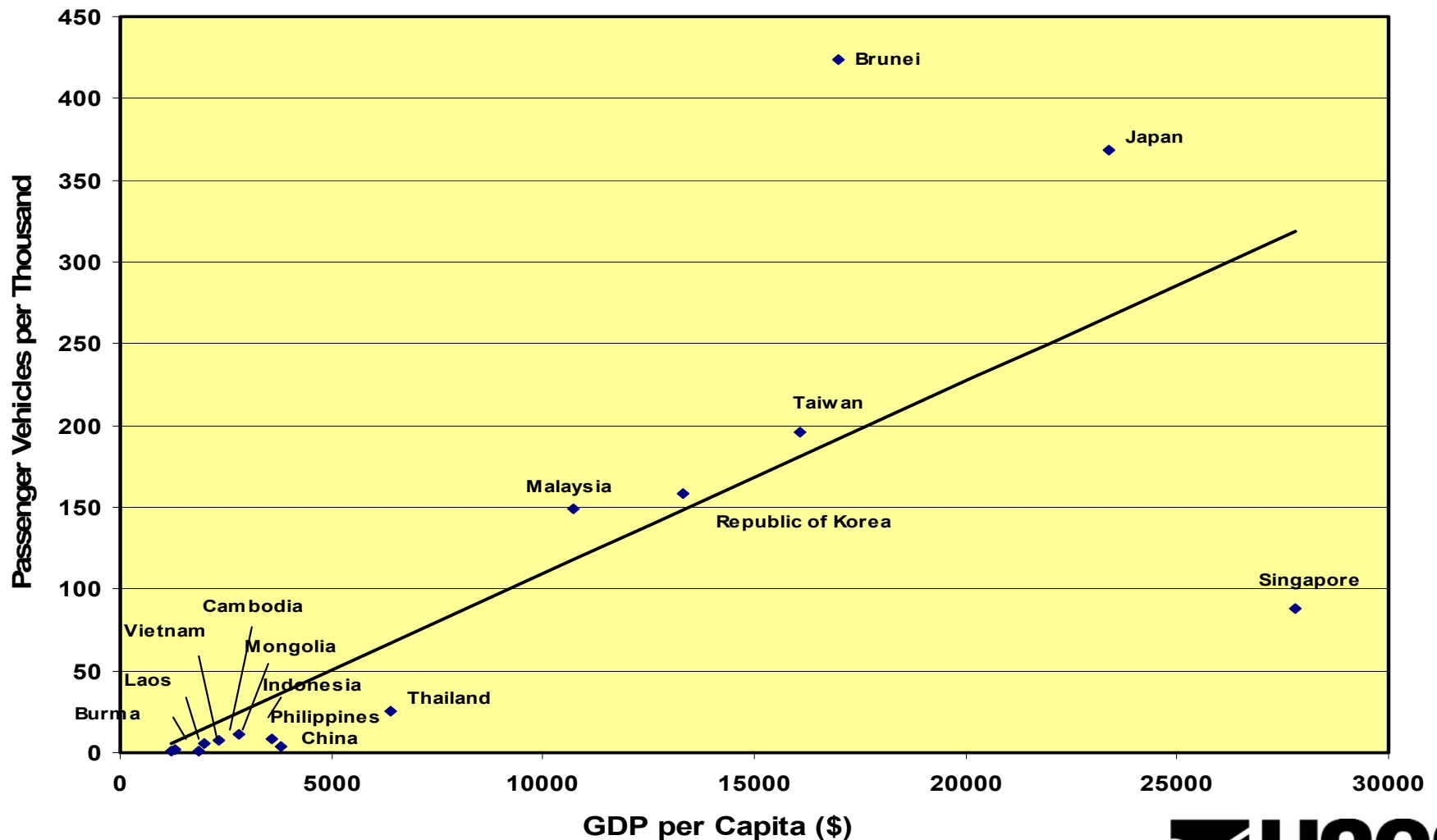
Source: International Iron and Steel Institute.

China Production and Consumption of Aluminum



Aluminum mainly produced
from imported bauxite and
alumina

GDP and Passenger Vehicles per Capita in East and Southeast Asia in 2002



Conclusions

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Implications of Growth in China

- **Increased consumption of metals, putting upward pressure on prices for an extended period.**
- **Continued price volatility.**
- **Increased competition for metals, with greater vertical integration.**
- **Continued trade disputes.**
- **Pressure on manufacturers in developed countries and need for new material strategies.**
- **Increased environmental residuals.**