



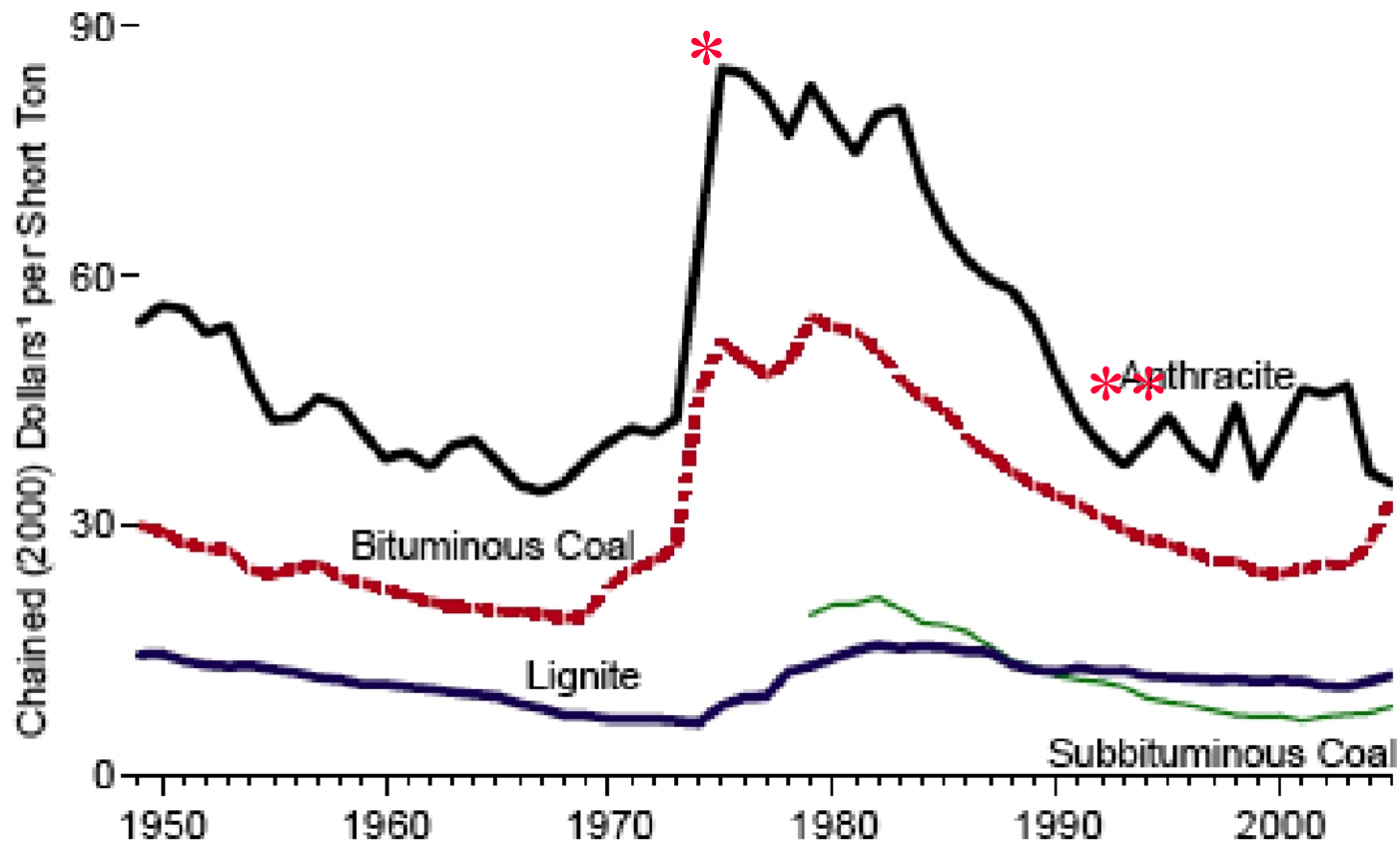
Malton Sheep Market, UK

www.nickhawkes.co.uk

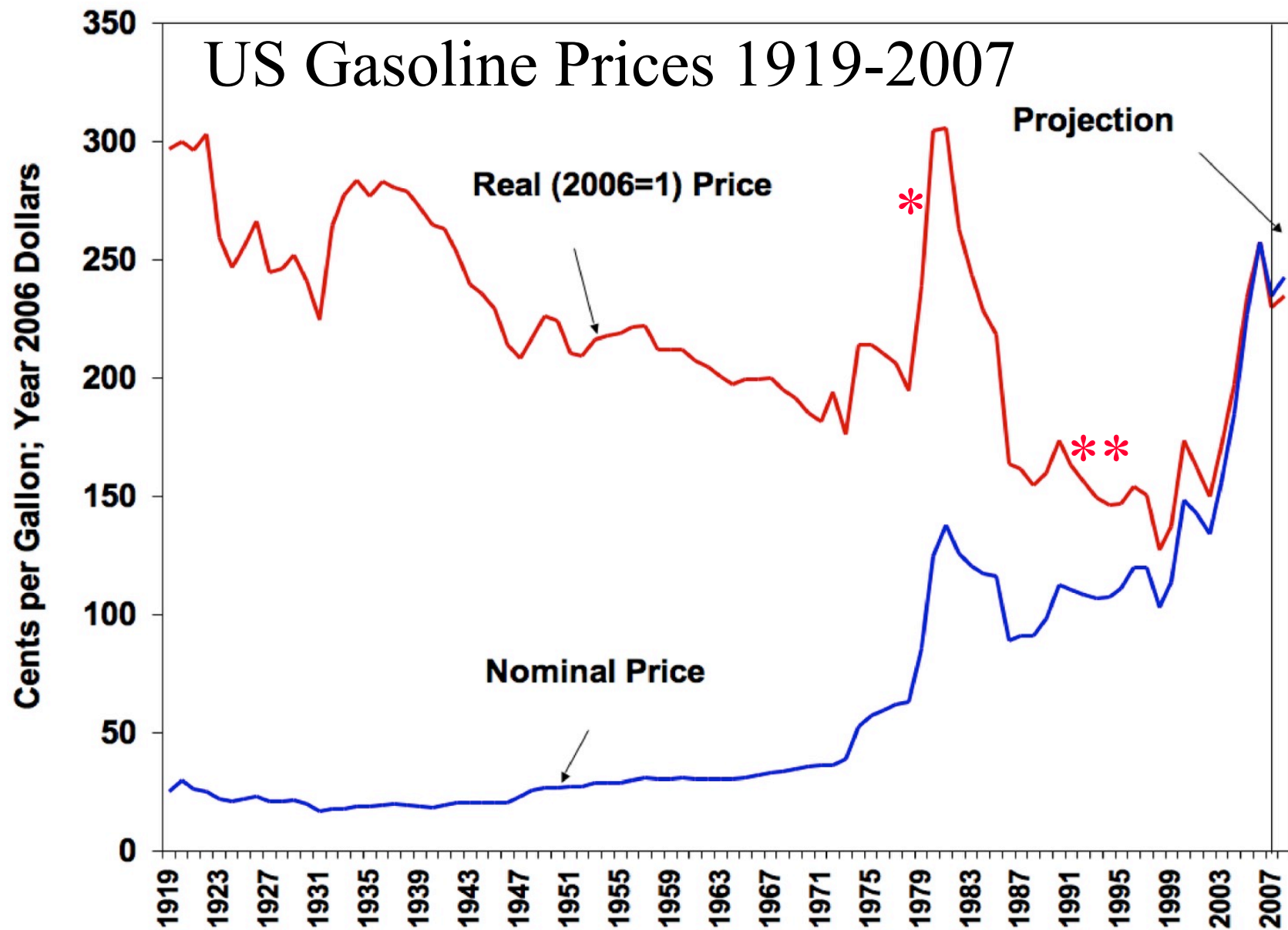
<http://www.flickr.com/photos/nickhawkes/2296154165/>

Supply and Demand in Minerals and Fuels

By Type, 1949-2005



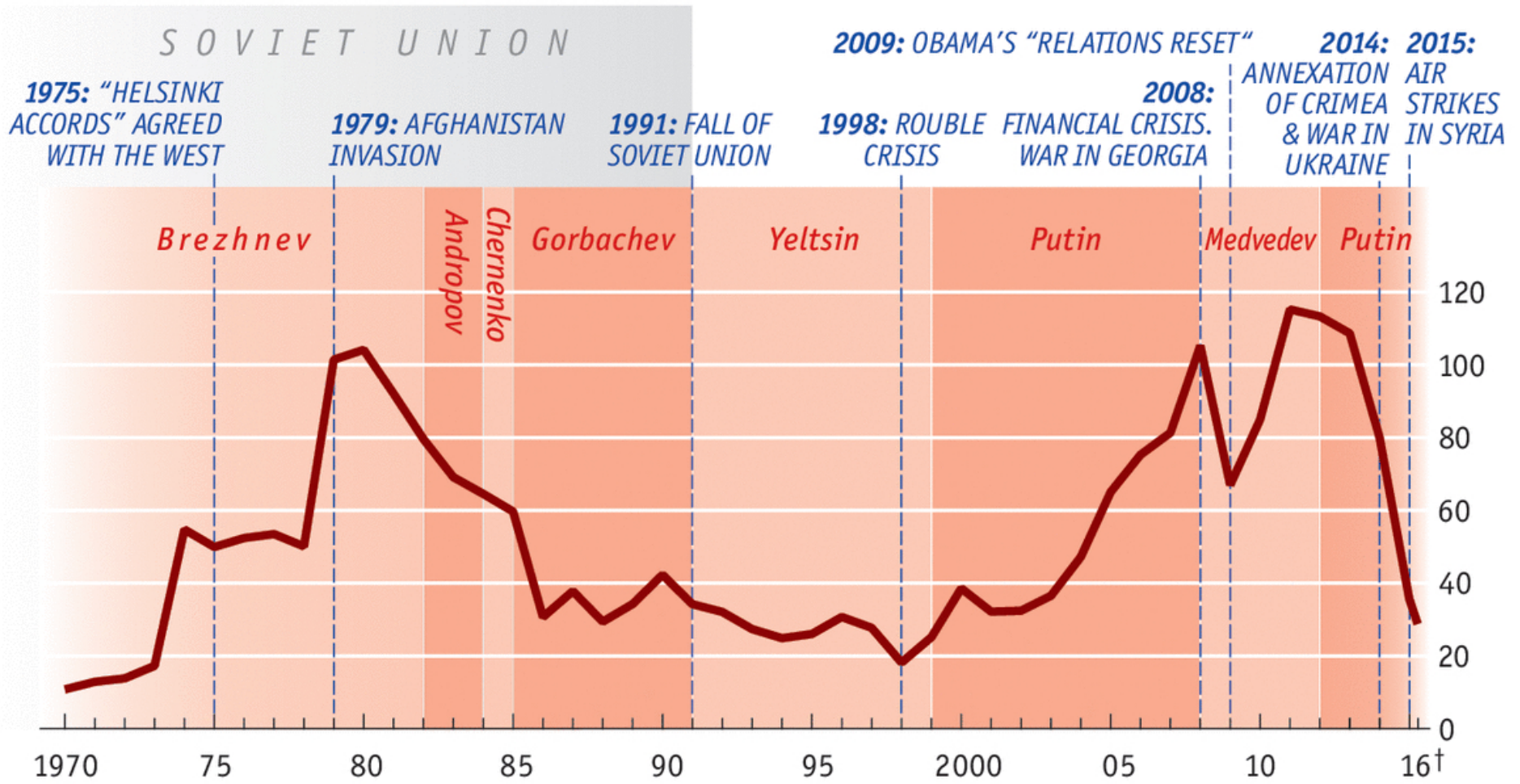
*first Arab oil embargo **End of USSR



*first Arab oil embargo **End of USSR

Soviet/Russian political history v oil price

Brent crude* oil price per barrel, \$, 2013

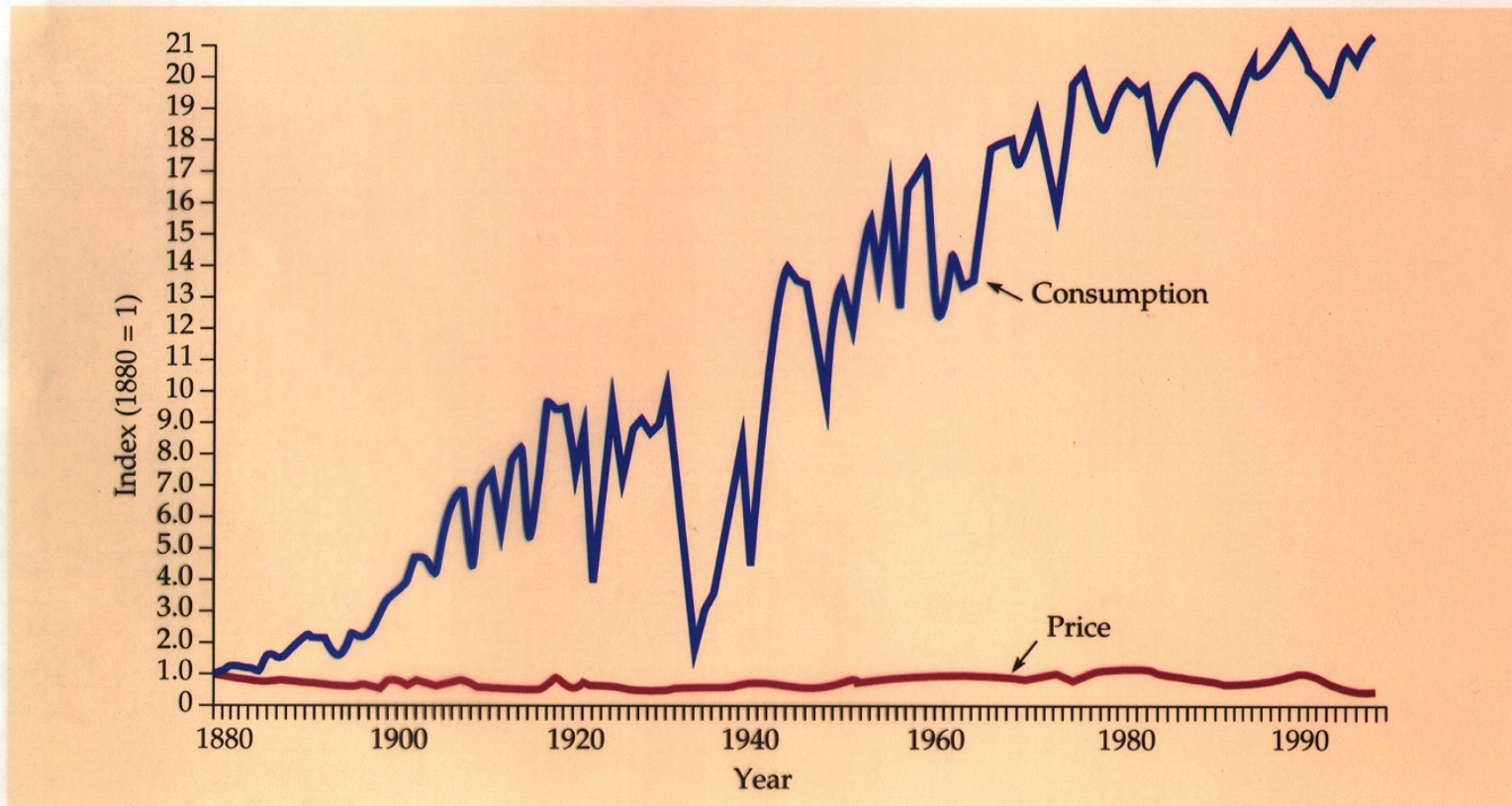


Sources: BP; Thomson Reuters

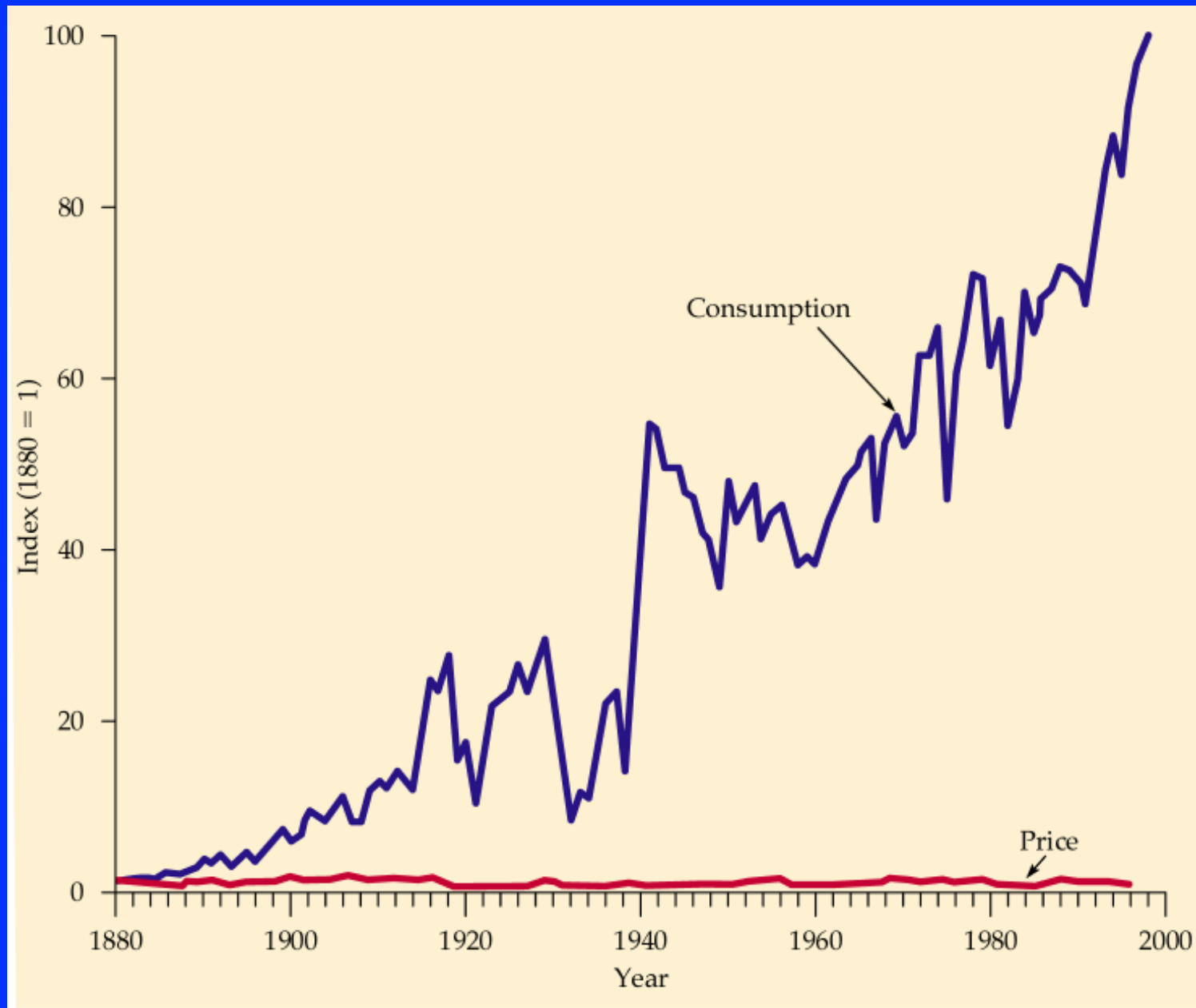
*Arabian light to 1983 †January 20th

Consumption & Price of Iron 1880-1998

Figure 2.8 Consumption and Price of Iron, 1880-1995



Consumption & Price of Copper 1880-1998



Price of Gold 1978-2013

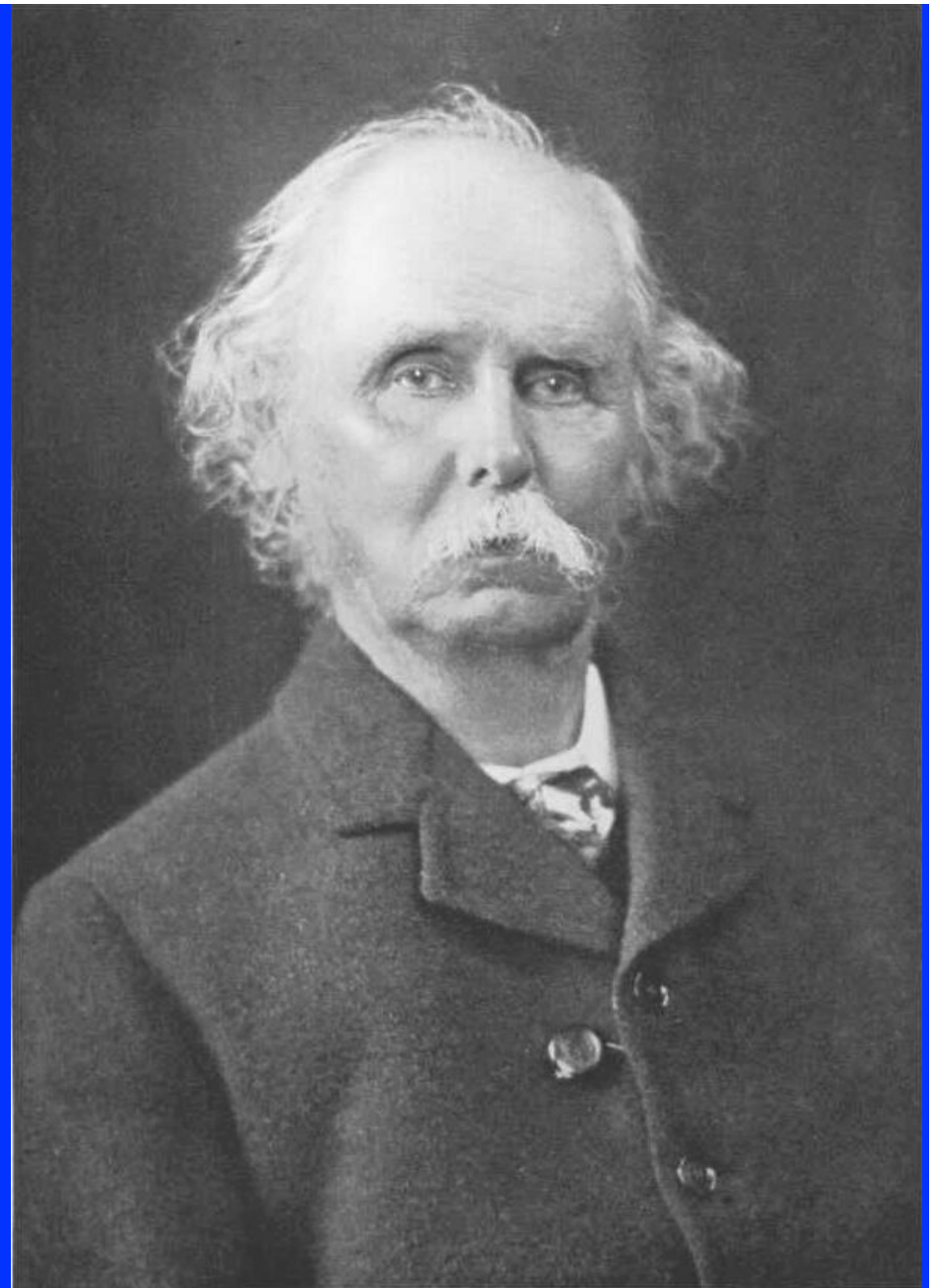


*first Arab oil embargo **End of USSR



The Author of the Wealth of Nations

Adam Smith



Alfred Marshall

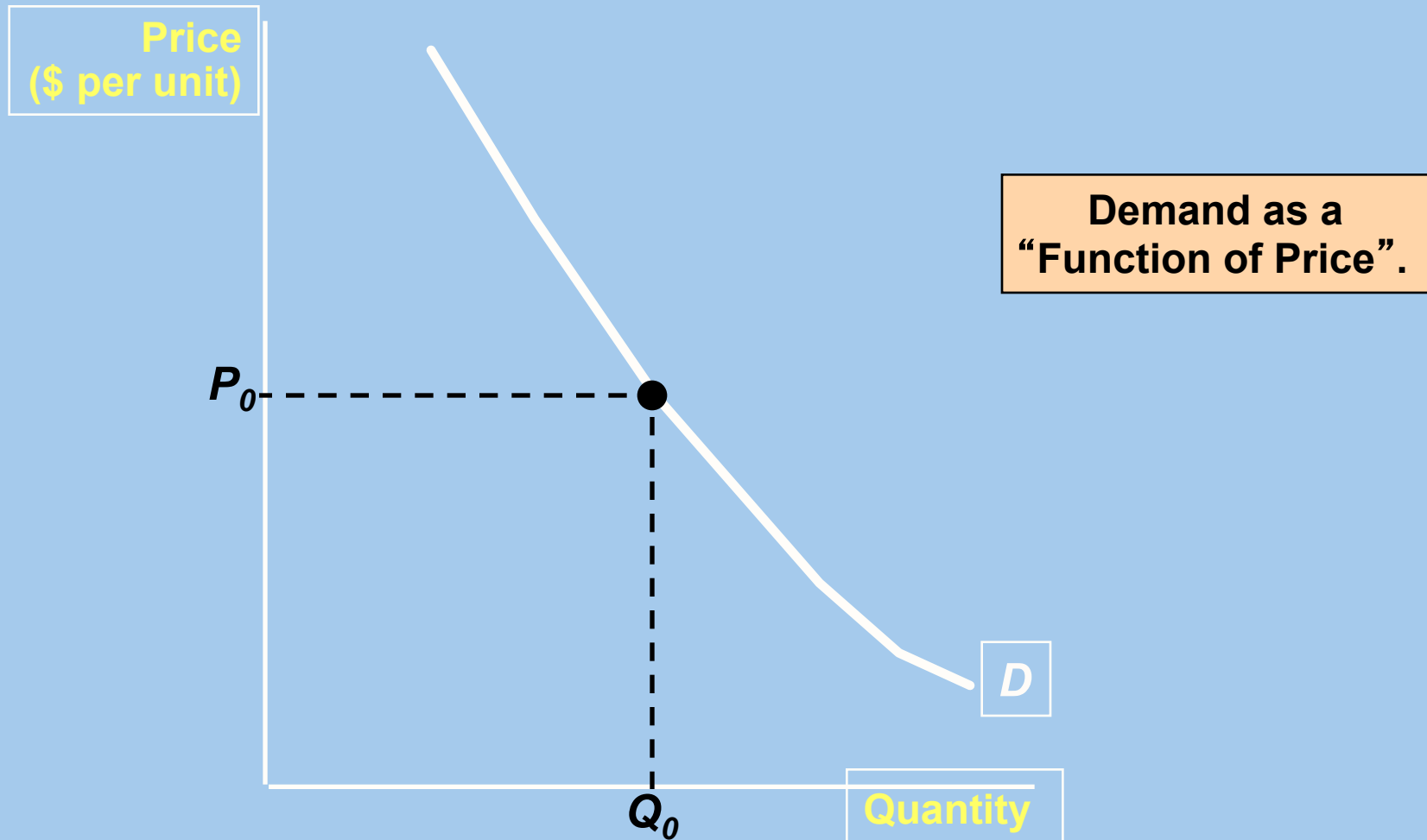
Demand Curve

Shows amount purchased as a function of price

Depends on:

- income
- tastes
- prices of competitive products
- prices of complementary products

The Market Mechanism



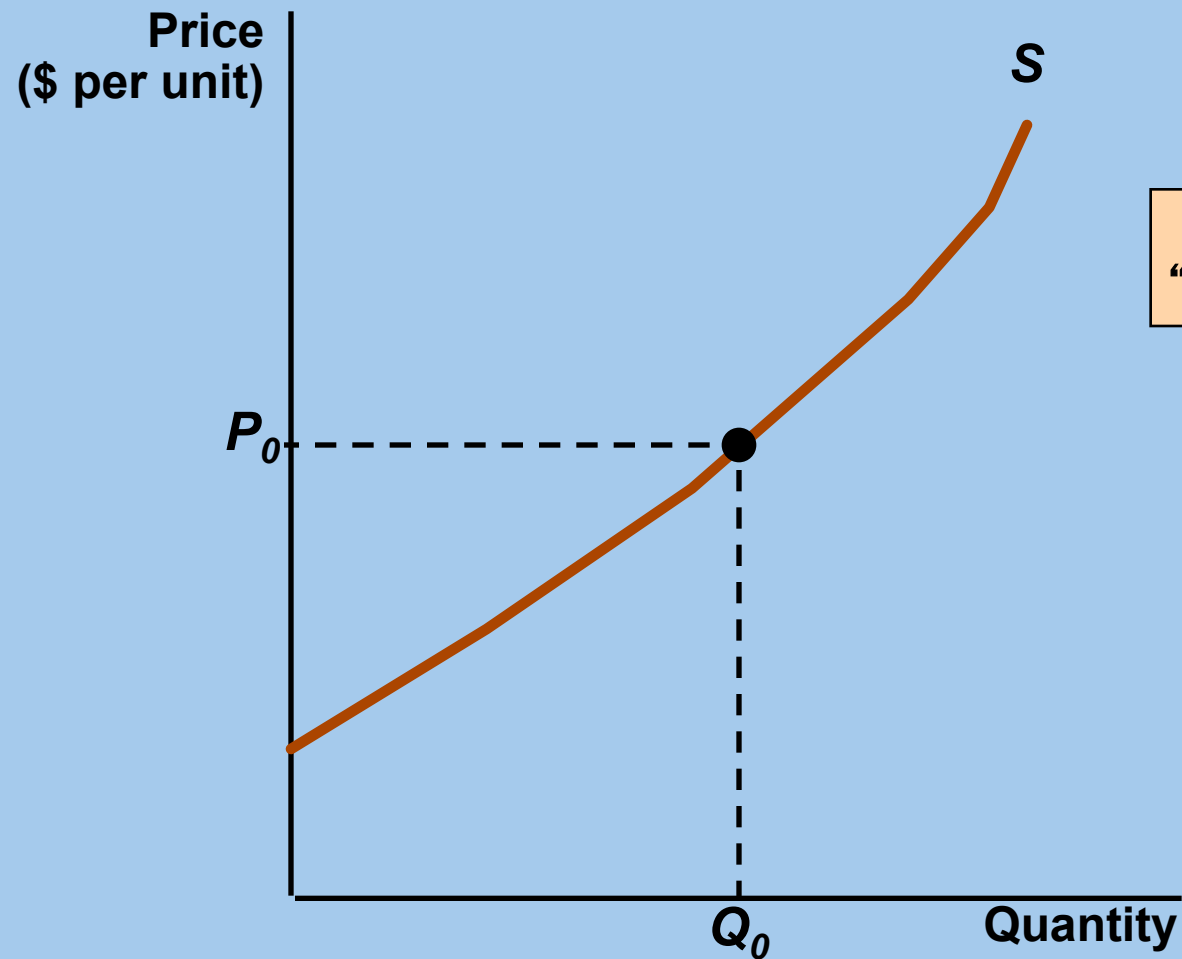
Supply Curve

Amount offered for sale as a function of price

Depends on costs of production, which in turn depend on

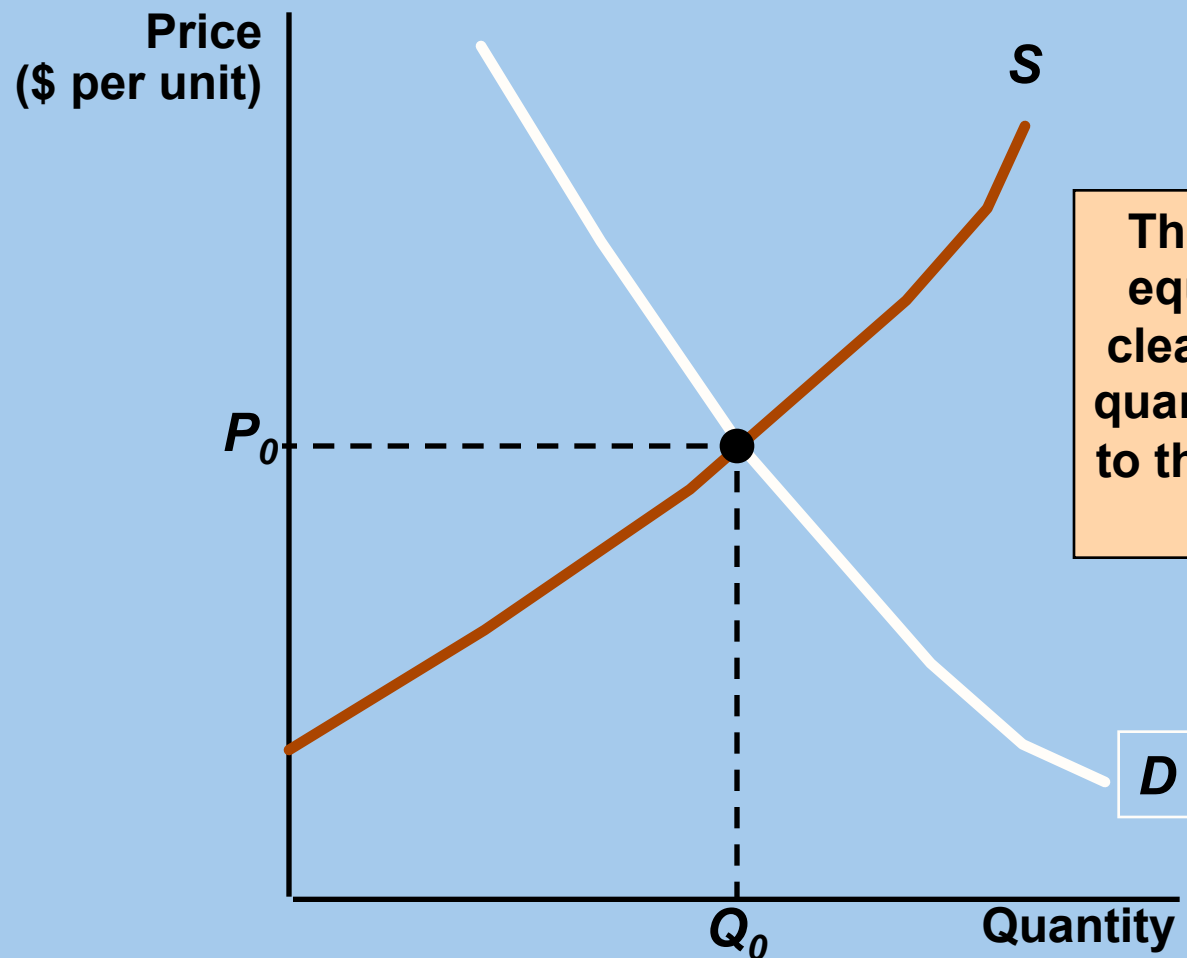
- costs of inputs
- technology

The Market Mechanism



Supply as a
“Function of Price”

The Market Mechanism

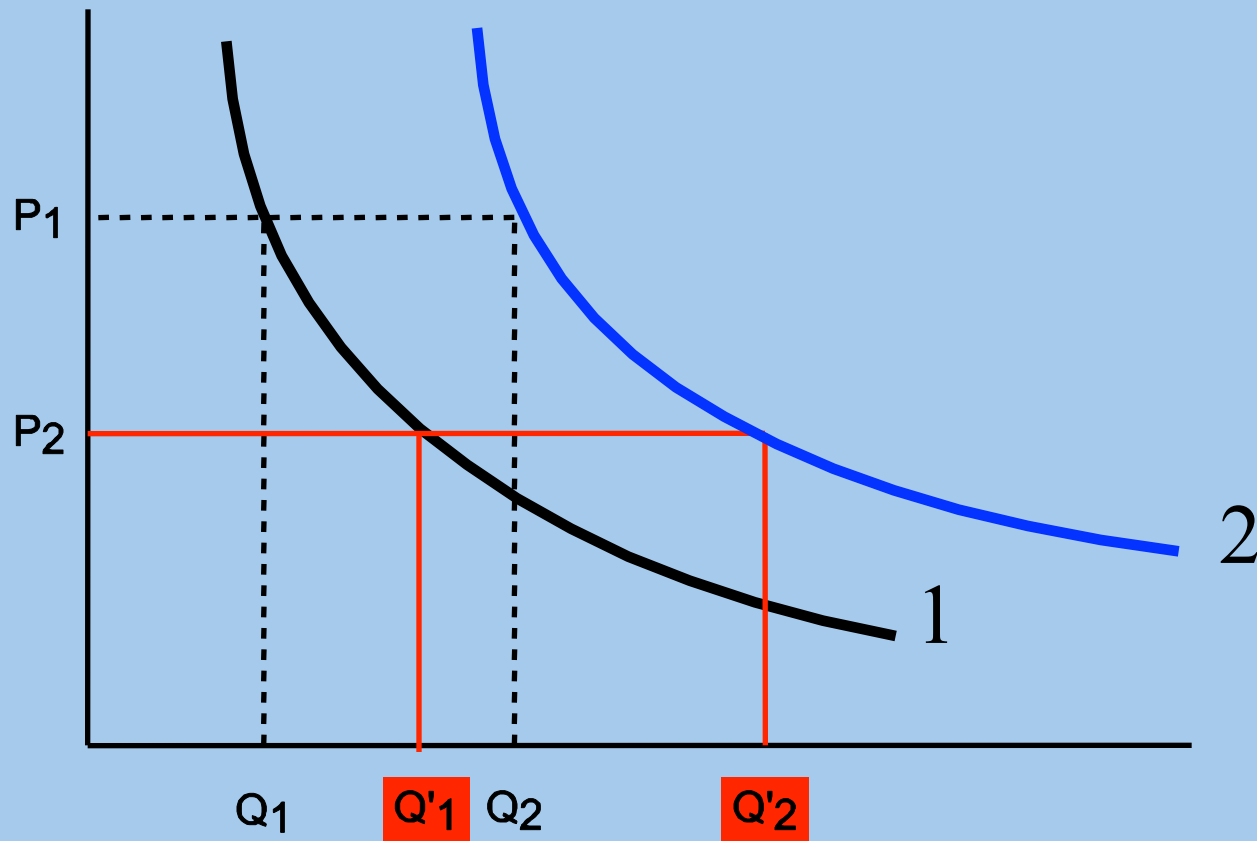


The curves intersect at equilibrium, or market-clearing, price. At P_0 the quantity supplied is equal to the quantity demanded at Q_0 .

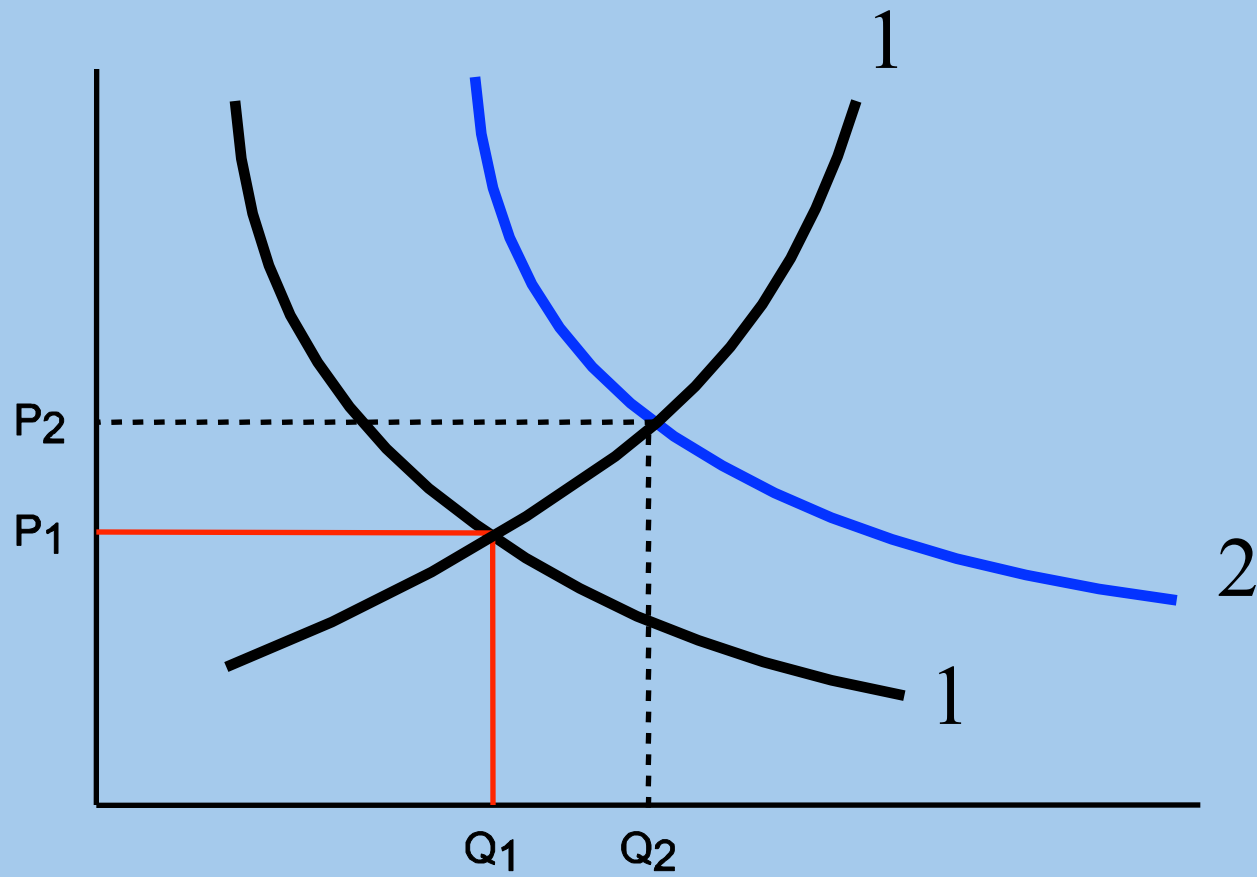
The Market Mechanism

- Characteristics of the equilibrium or market clearing price:
 - $Q_D = Q_S$
 - No shortage
 - No excess supply
 - No pressure on the price to change

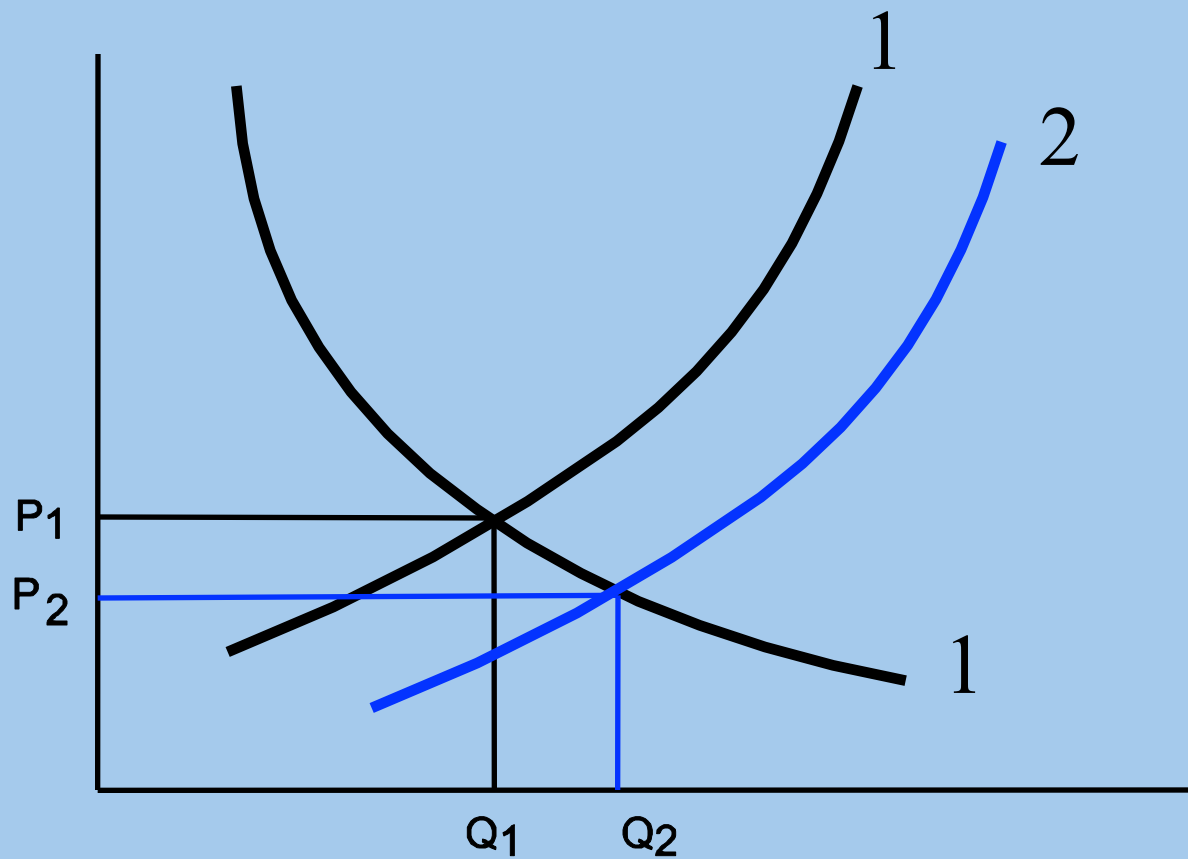
Demand Curve - Income or Population Rises



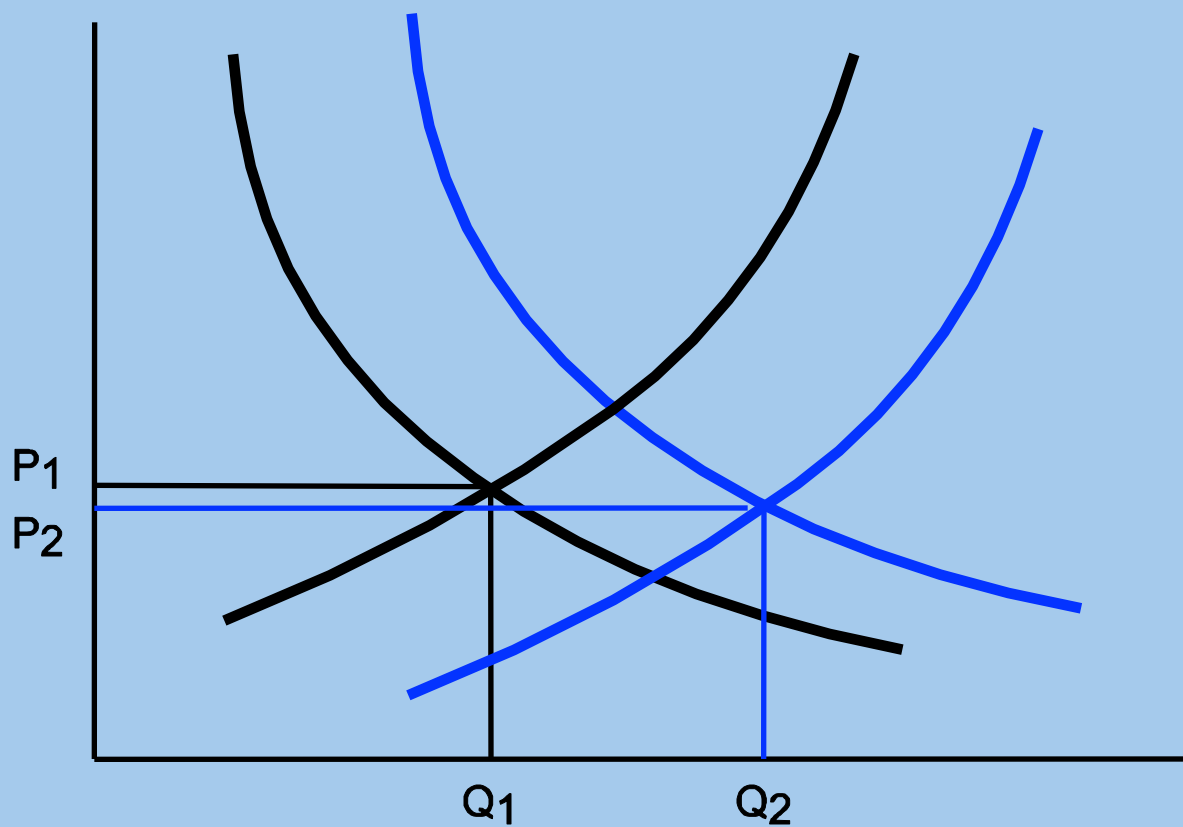
Demand Shifts



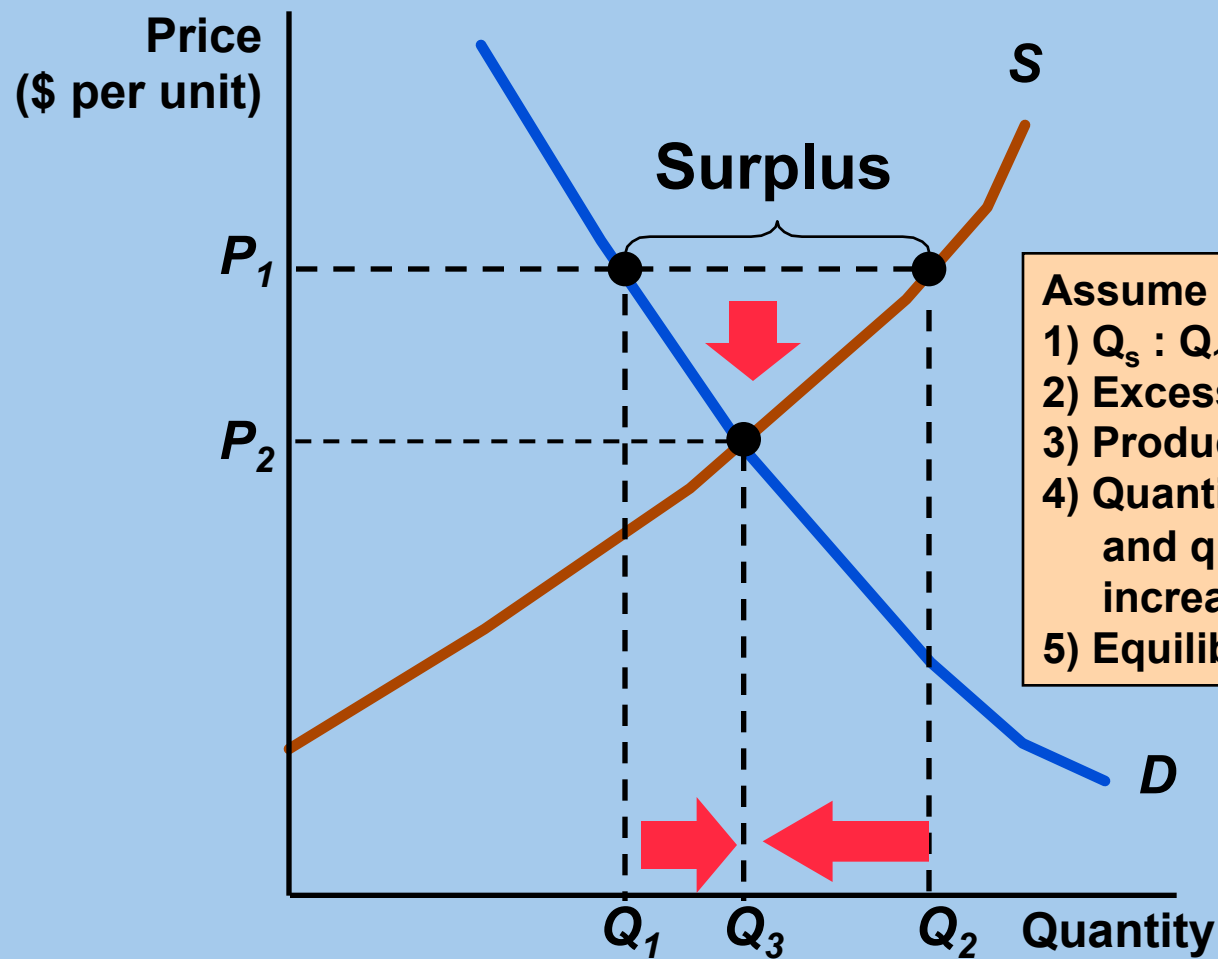
Supply shifts due to new mines . . .



Demand & Supply shift



The Market Mechanism



Assume the price is P_1 , then:

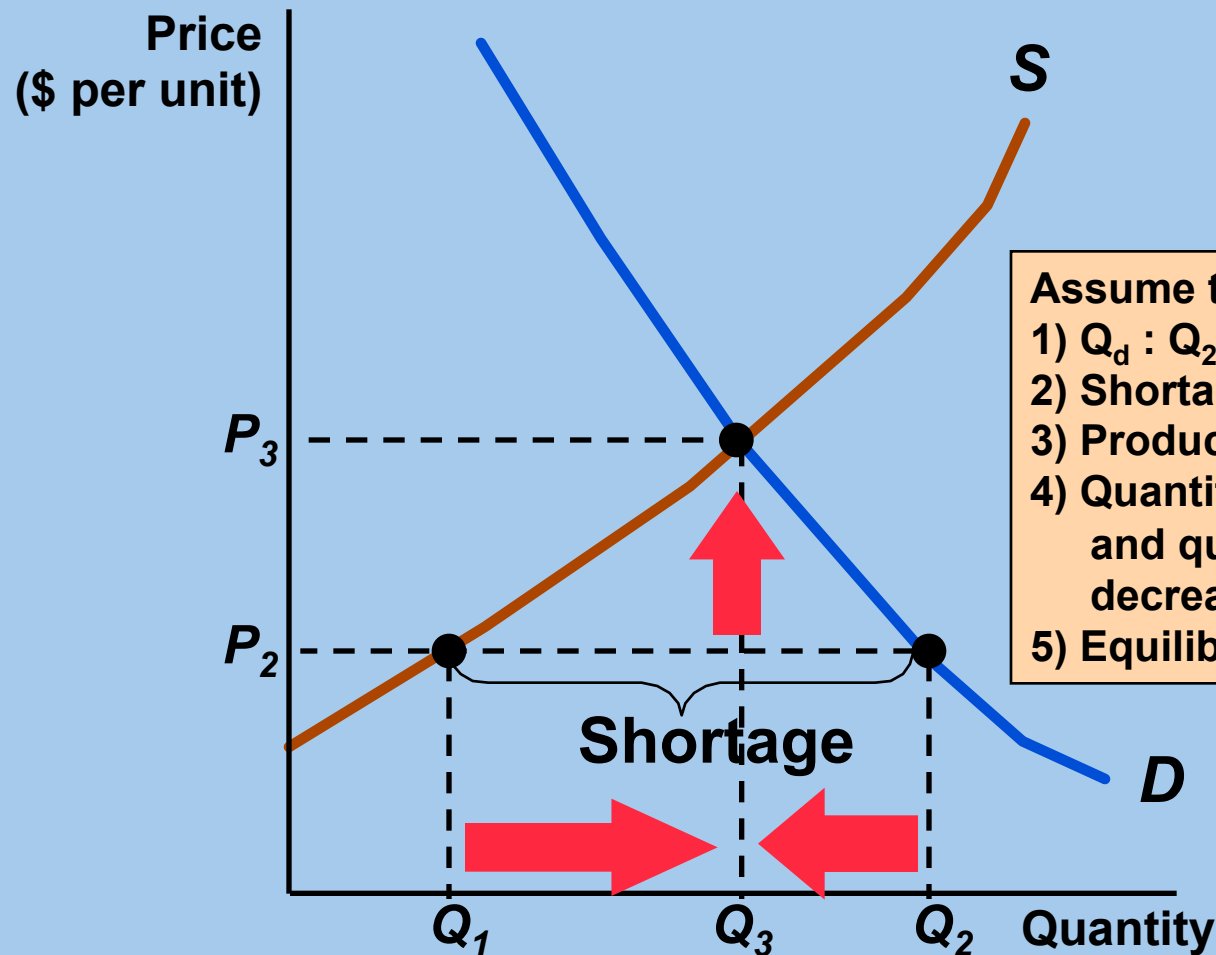
- 1) $Q_s : Q_1 > Q_d : Q_2$
- 2) Excess supply is $Q_1 : Q_2$.
- 3) Producers lower price.
- 4) Quantity supplied decreases and quantity demanded increases.
- 5) Equilibrium at $P_2 Q_3$

The Market Mechanism

A Surplus

- The market price is above equilibrium
 - There is excess supply
 - Producers reduce prices
 - Quantity demanded increases and quantity supplied decreases
 - The market continues to adjust until the equilibrium price is reached.

The Market Mechanism



- Assume the price is P_2 , then:
- 1) $Q_d : Q_2 > Q_s : Q_1$
 - 2) Shortage is $Q_1 : Q_2$.
 - 3) Producers raise price.
 - 4) Quantity supplied increases and quantity demanded decreases.
 - 5) Equilibrium at P_3, Q_3

The Market Mechanism

Shortage

- The market price is below equilibrium:
 - There is a shortage
 - Producers raise prices
 - Quantity demanded decreases and quantity supplied increases
 - The market continues to adjust until the new equilibrium price is reached.

The Market Mechanism

- Market Mechanism - Summary:
 - 1) Supply and demand interact to determine the market-clearing price.
 - 2) When not in equilibrium, the market will adjust to alleviate a shortage or surplus and return the market to equilibrium.
 - 3) Markets must be competitive for the mechanism to be efficient.

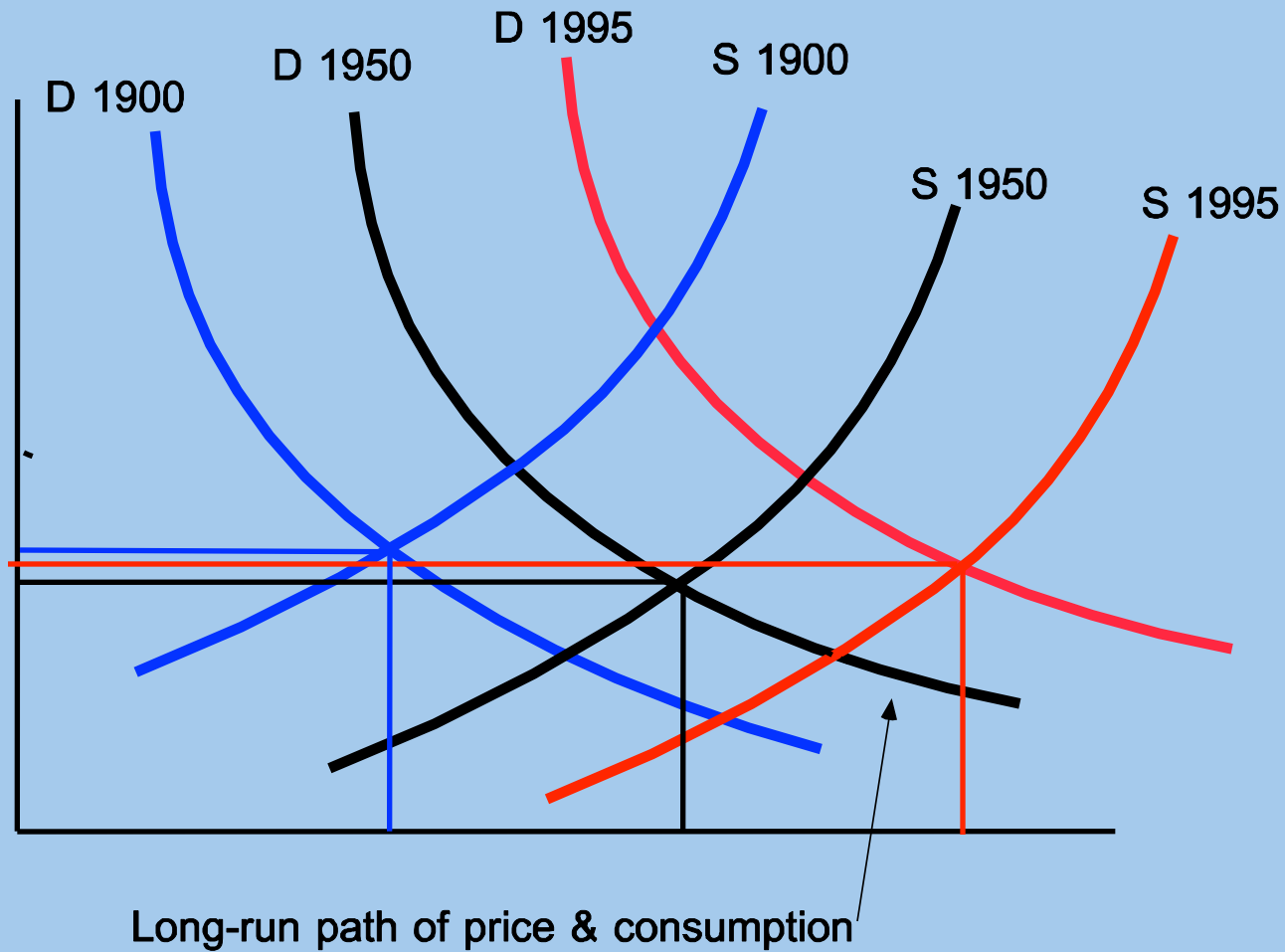
Competitive Market

A **competitive market** is one in which a large numbers of producers compete with each other to satisfy the wants and needs of a large number of consumers. In a competitive market **no single producer, or group of producers, and no single consumer, or group of consumers, can dictate how the market operates.** Nor can they individually determine the price of goods and services, and how much will be exchanged.

Consumption & Price of Copper 1880-1998



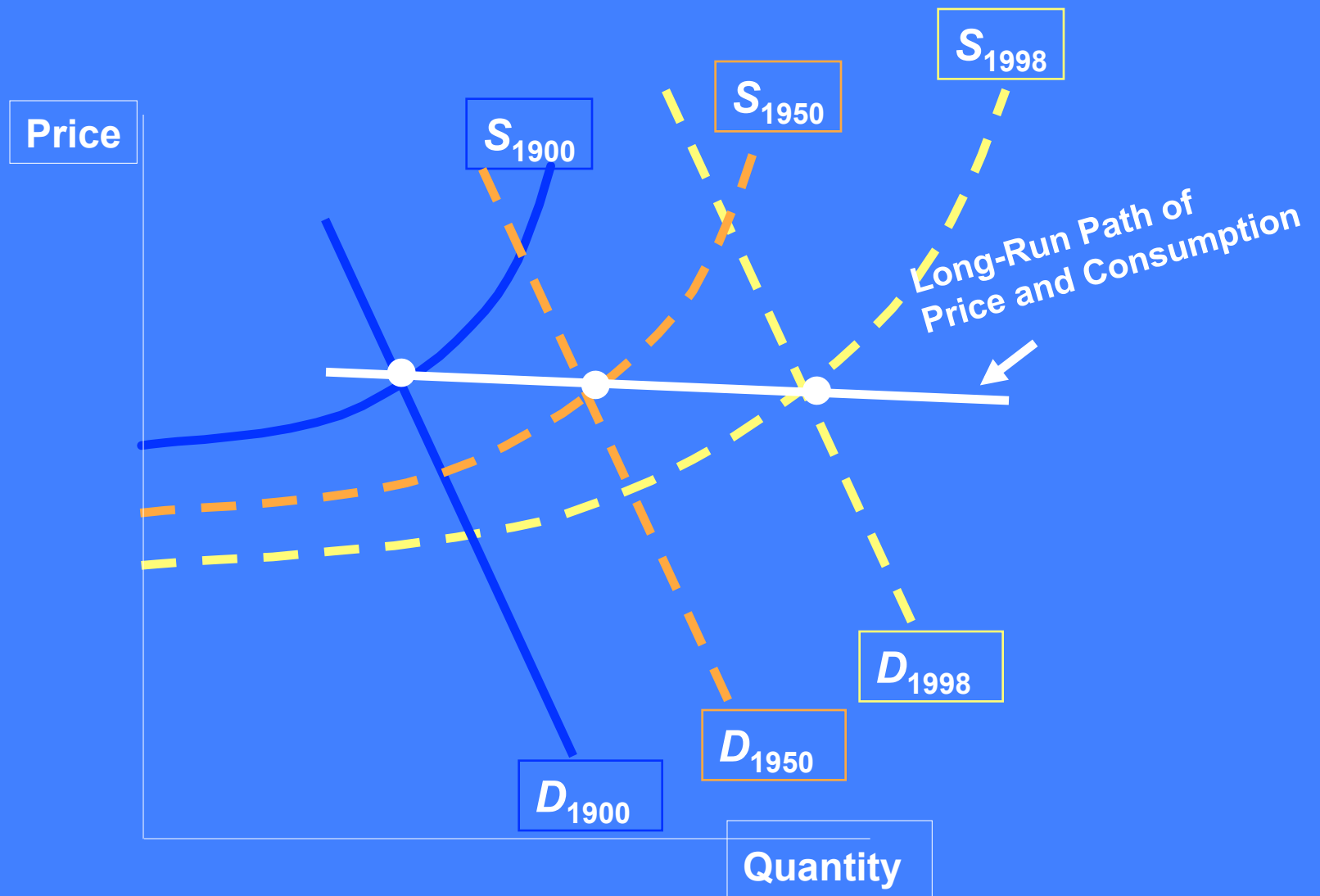
Supply and Demand for Copper 1900-1950-1995



The Long-Run Behavior of Natural Resource Prices

- Observations
 - Consumption of copper has increased about a hundred fold from 1880 through 1998 indicating a large increase in demand.
 - The real price for copper has remained relatively constant.

Changes In Market Equilibrium



Modified from Geoffrey Heal 2004

Changes In Market Equilibrium

- Conclusion

- Decreases in the costs of production have increased the supply by more than enough to offset the increase in demand.

Price elasticity of demand:

Measures responsiveness of demand to price.

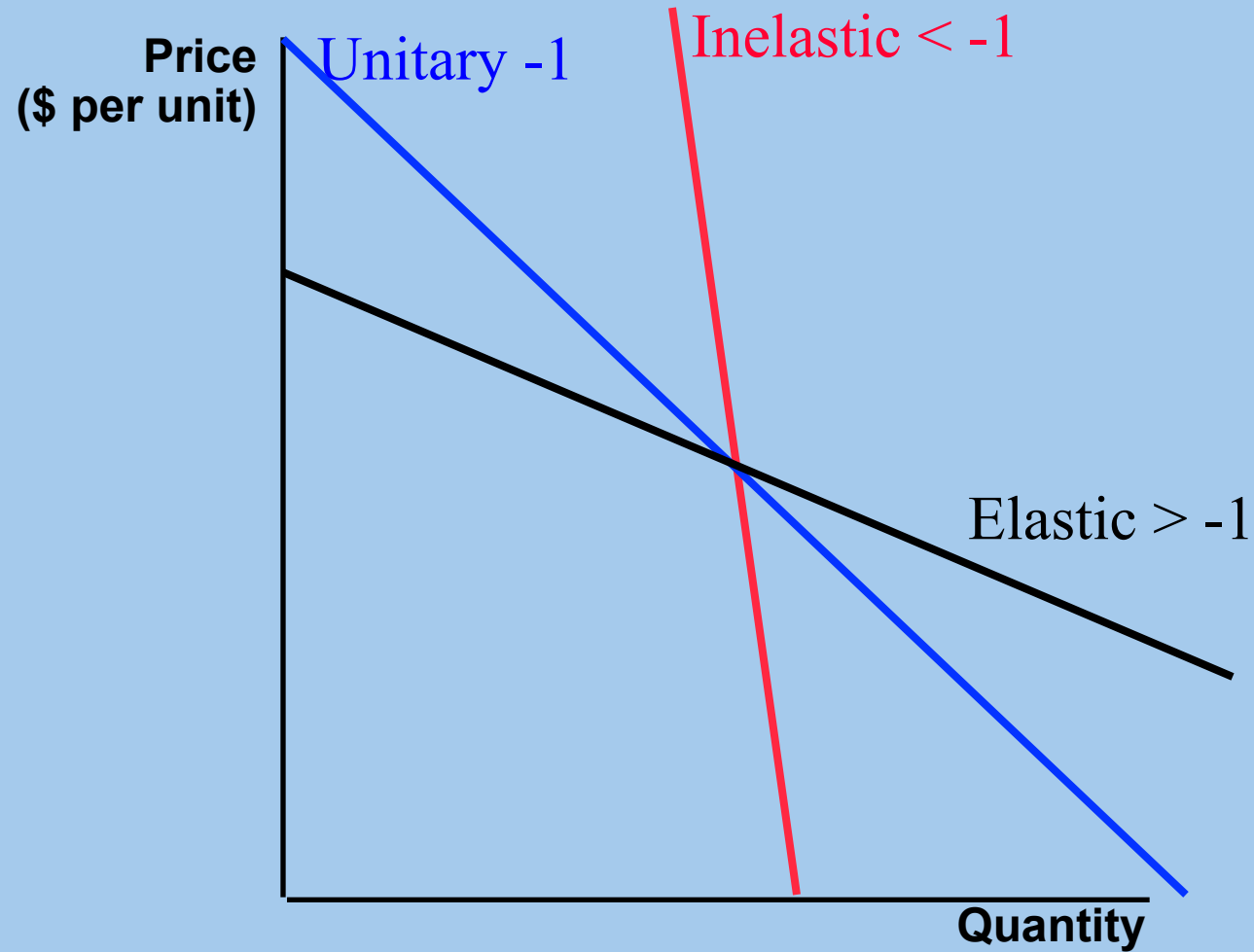
Defined as $E = (\Delta Q/Q)/(\Delta P/P) = (\Delta Q/\Delta P)*(P/Q)$

Why is it defined in proportional terms?

- Unit free.
- Scale sensitive.

A negative number.

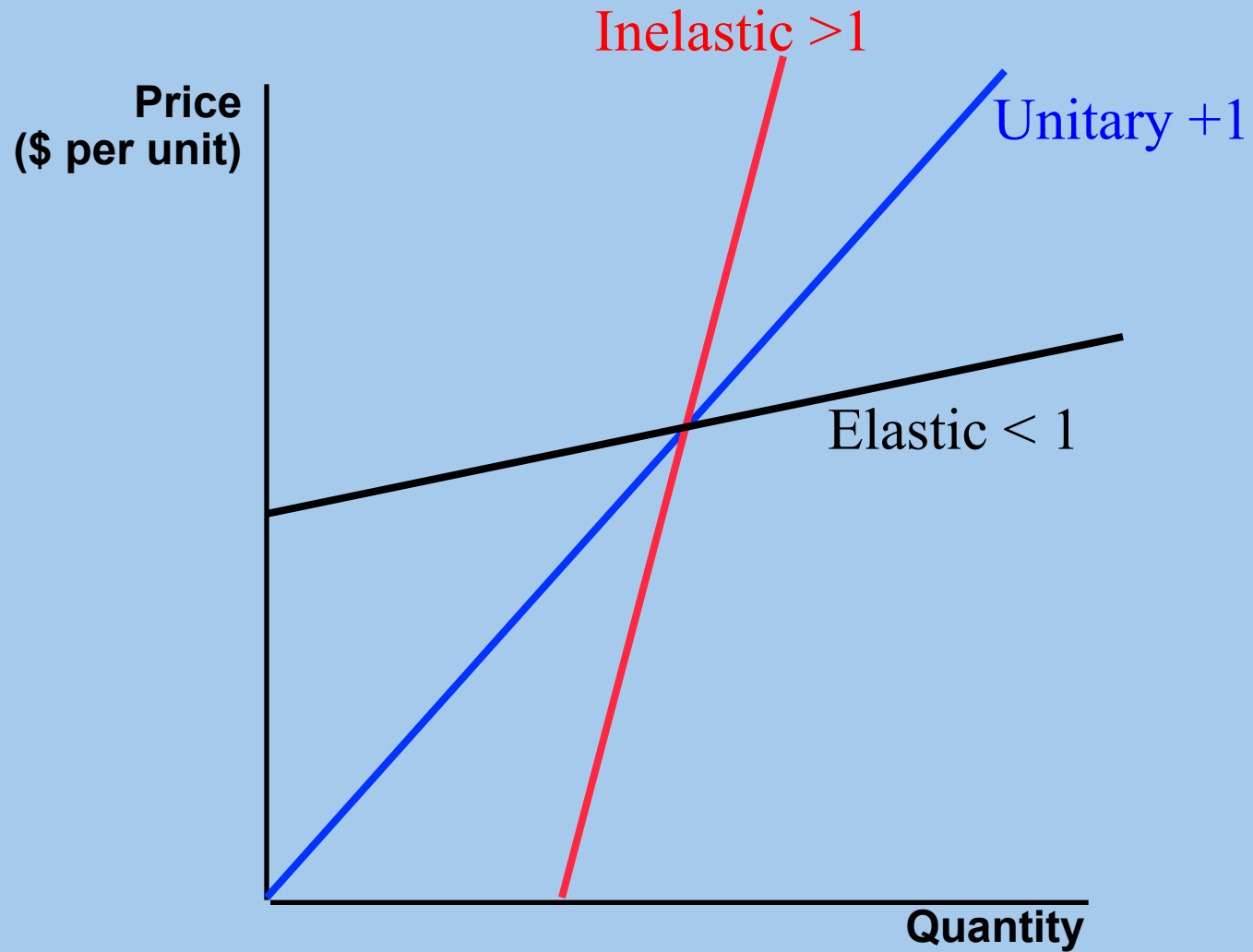
Demand Elasticity



Supply Elasticity

- The responsiveness of supply to price changes.
- $(\Delta S/S)/(\Delta P/P)$, proportional change in supply divided by proportional change in price.
- Usually positive.

Supply Elasticity



Short-run vs. long-run elasticities

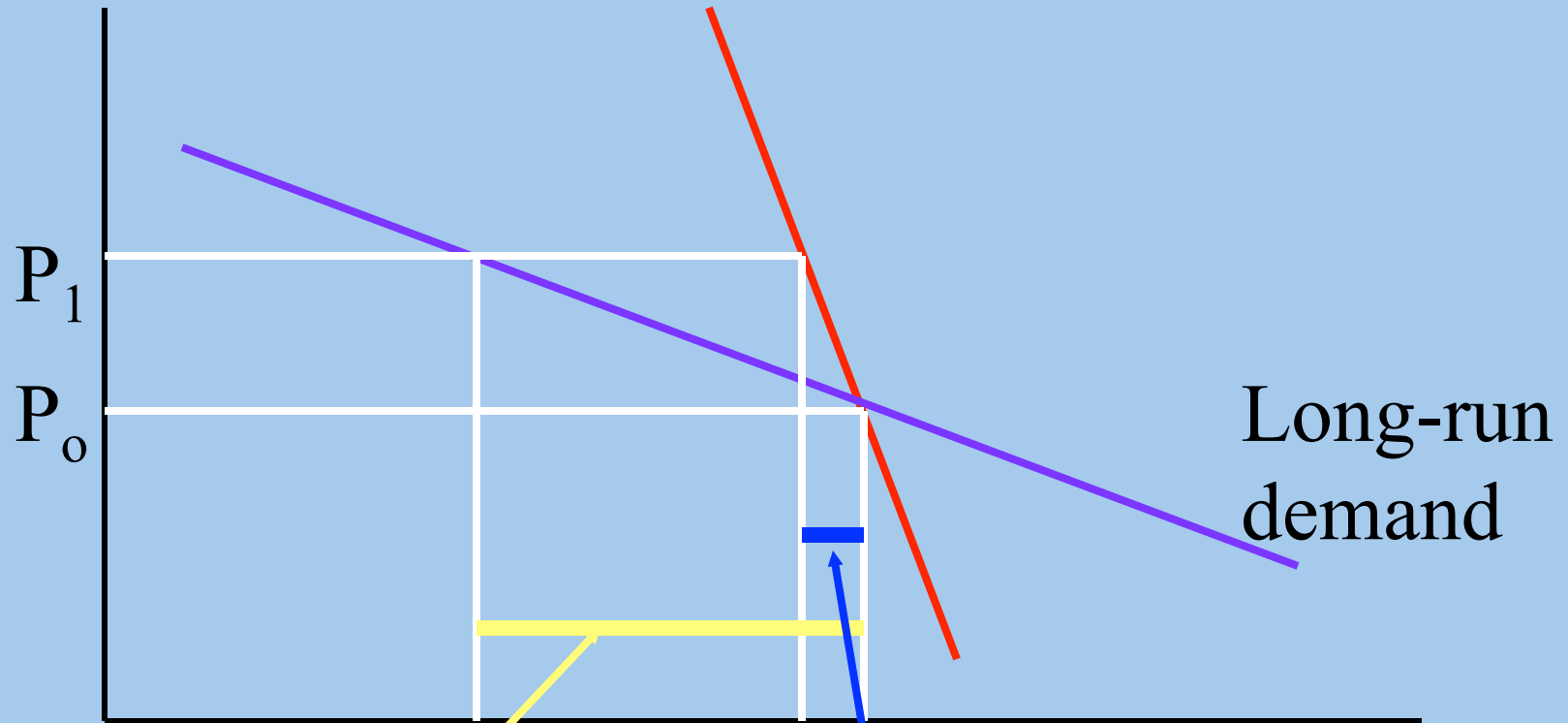
Critical in understanding oil market, energy markets, metal markets

Responding to a price movement takes time - possibly many years

Long-run elasticity measures **total** response

Short-run elasticity measures **immediate** response

Short-run demand



Long-run demand

Long-run drop in demand

Short-run drop in demand

Why is Supply Inelastic in the Short Term?



Why is Supply Inelastic in the Short Term?



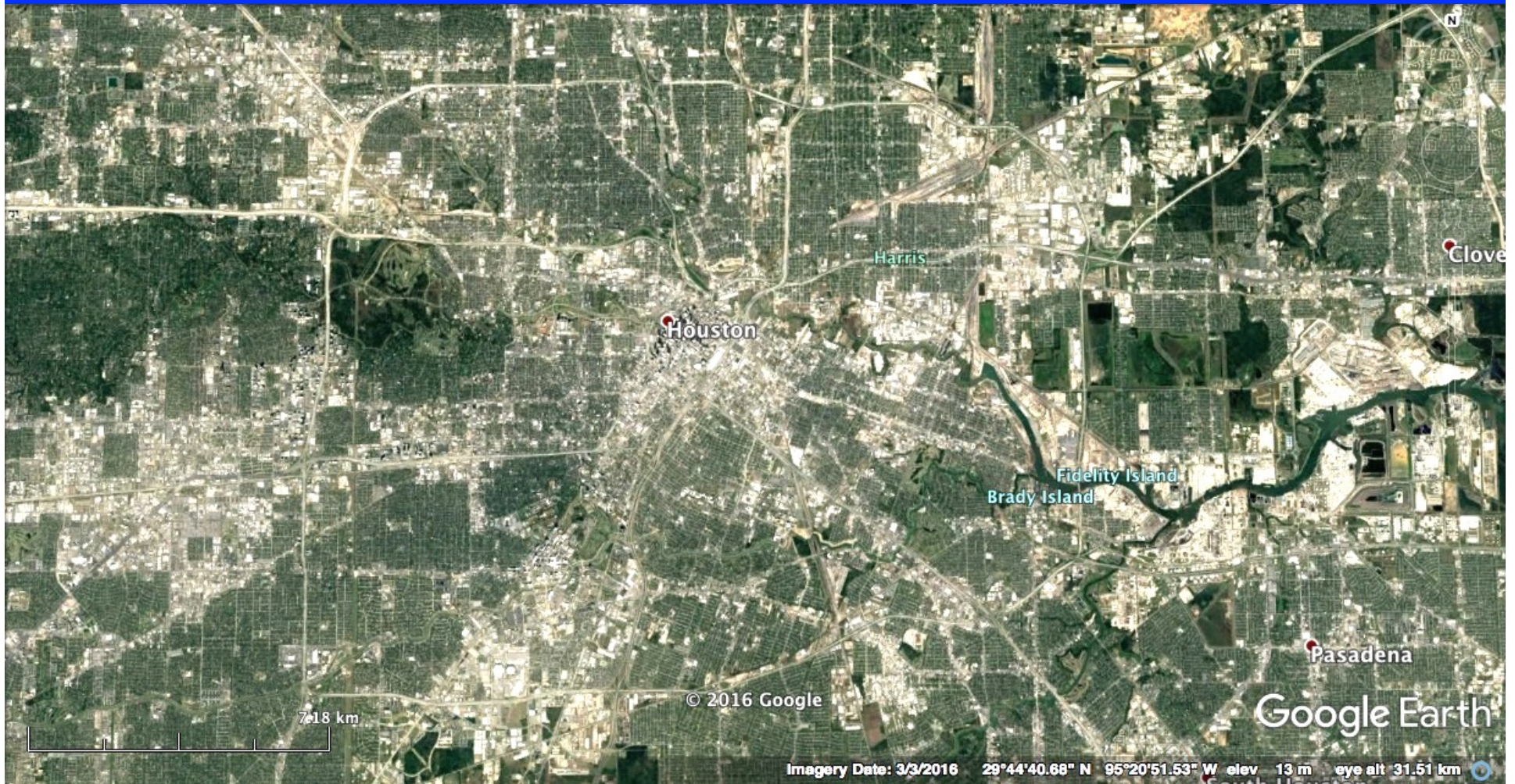
Why is Supply Inelastic in the Short Term?



Why is Supply Inelastic in the Short Term?



Why is Demand Inelastic in the Short Term?



Why is Demand Inelastic in the Short Term?



ISS009E18788

Demand and Supply

- demand and supply curves provide tools for analyzing how various shocks (input costs, customers' income, competitors' prices, etc.) affect sales and prices.
- Elasticities provide summary numbers
- **Short Run \neq Long Run.** Use numbers appropriate to the time scale of the decision

al Soundtrack from Motion Picture

't Break My Heart

शकों को जलाना बुरी बात है

CINEMASCOPE

- AIRTEL - HELLO TUNE - TYPE SET<SPACE>591752 & SEND IT TO 543211
- VODAFONE - CALLER TUNE - TYPE CT<SPACE>10023064 & SEND IT TO 56789
- IDEA - DIALER TUNE - TYPE DT<SPACE>D212149 & SEND IT TO 55456
- BSNL NORTH - BSNL TUNE - TYPE BT<SPACE>55641 & SEND IT TO 56700
- BSNL SOUTH - BSNL TUNE - TYPE BT<SPACE>116931 & SEND IT TO 56700
- LOOP - TYPE SET<SPACE>200000381 & SEND IT TO 55666
- FOR RELIANCE CALLERTUNES DIAL 51234848
- FOR TATA WELCOME TUNES DIAL 12800
- FOR AIRCEL DIALER TUNES DIAL 5555

recinema@gmail.com

VALENTINE SPECIAL

"If U Break My Heart..." I Will Break UR Bones...!



GIRGAUM, MUMBAI

Gordon Terminal, Port of New Jersey, Bayonne, NJ



<http://www.gordonterminal.com/images/fullscreen/b-loc-b-b.jpg>

Houston Ship Channel



http://farm3.static.flickr.com/2324/2054441122_d28cb993bb.jpg

Terminal Island, Los Angeles, CA



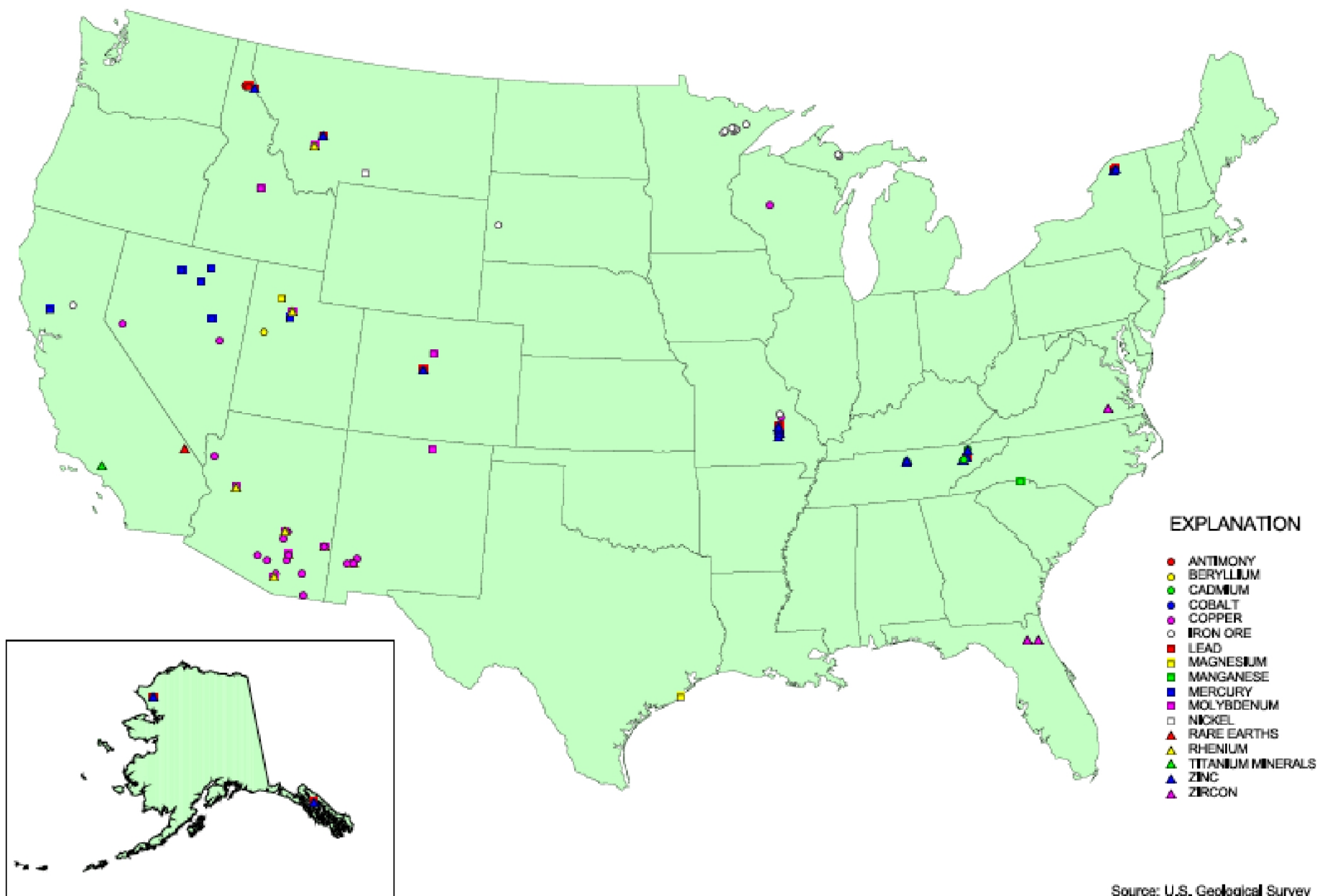
Rotterdam, NL



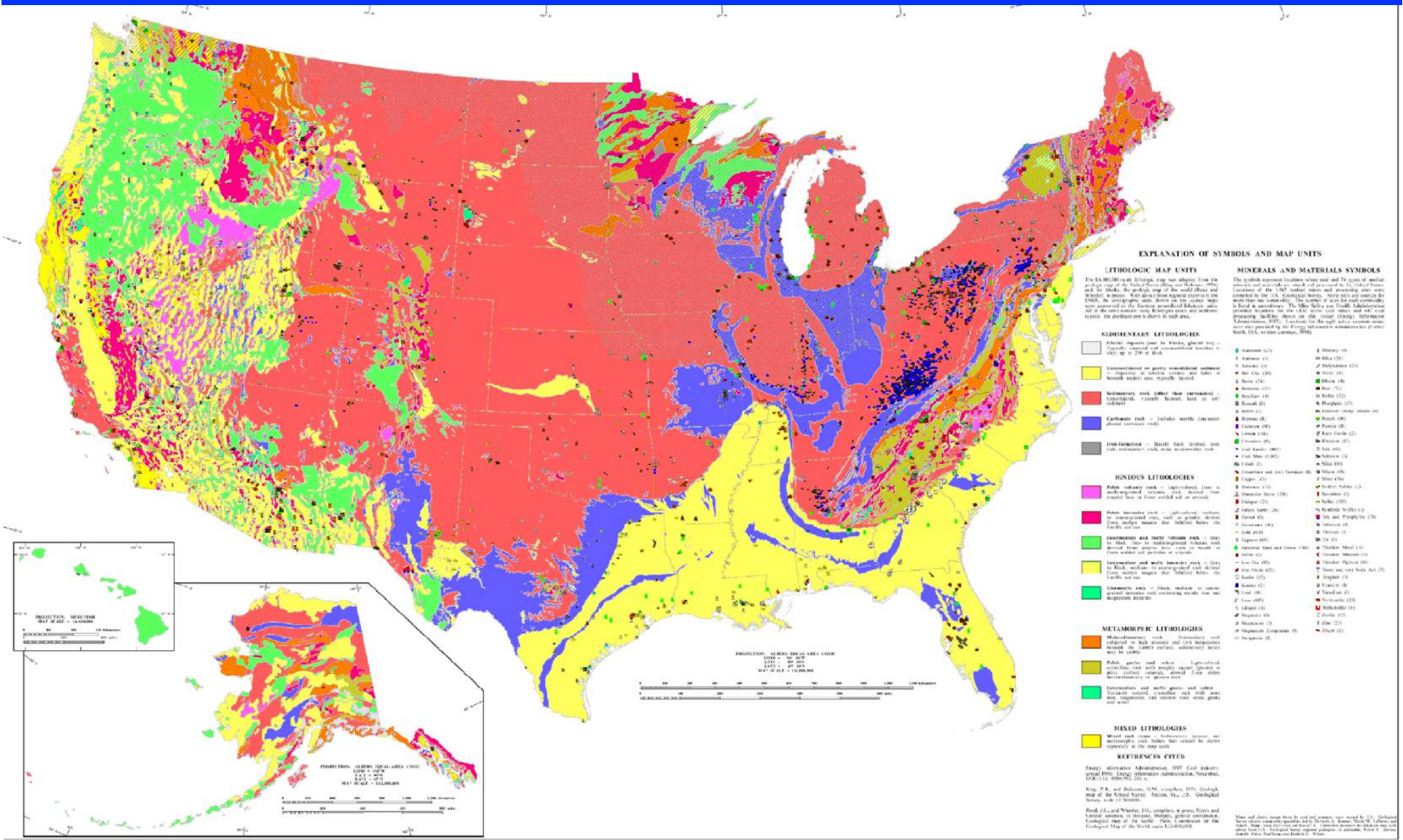
Singapore



NONPRECIOUS METALS MINES



Source: U.S. Geological Survey



EXPLANATION OF SYMBOLS AND MAP UNITS

The 1:500,000-scale lithologic map was adapted from the 1:250,000-scale map of the United States and Alaska, the geologic map of the world (Blair and Wright, 1963), and other maps. The geologic map of the United States and Alaska, the geologic map of the world (Blair and Wright, 1963), and other maps. The geologic map of the United States and Alaska, the geologic map of the world (Blair and Wright, 1963), and other maps.

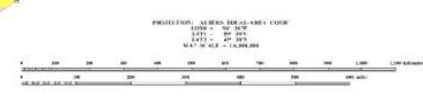
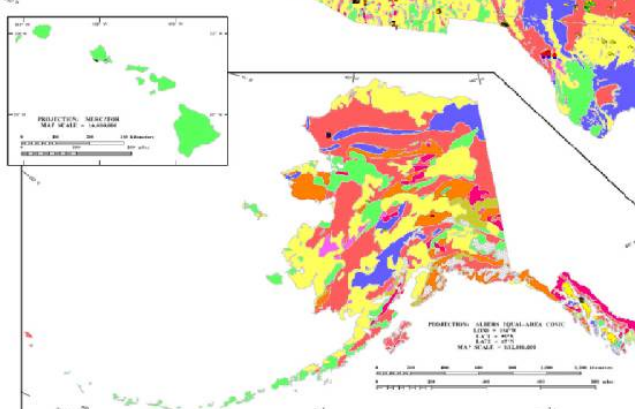
- SEDIMENTARY LITHOLOGIES**
- Fluvial deposits (see in Alaska, glossed by):
 - Clayey, laminated and unconsolidated sandstone to siltstone or shale
 - Unconsolidated or poorly consolidated sedimentary rock, including sandstone, siltstone, and shale, in North America, except, typically, bedrock
 - Sedimentary rock (other than carbonate):
 - Unconsolidated (includes bedrock, but not soil)
 - Carbonate rock - includes marble (includes fossiliferous limestone)
 - Intermediate - includes sand, siltstone, clay, and shale, and other sedimentary rock
- IGNEOUS LITHOLOGIES**
- Public volcanic rock - igneous, flow, in unconsolidated, volcanic, rock, formed from cooled lava or from welded ash or tephra
 - Public intrusive rock - igneous, batholith, pluton, dike, sill, or stockwork, in unconsolidated, volcanic, rock, formed from cooled lava or from welded ash or tephra
 - Intermediate and mafic volcanic rock - (see in Alaska, glossed by) Intermediate and mafic volcanic rock, formed from cooled lava or from welded ash or tephra
 - Intermediate and mafic intrusive rock - (see in Alaska, glossed by) Intermediate and mafic intrusive rock, formed from cooled lava or from welded ash or tephra
 - Carbonate rock - thick, massive, or irregularly bedded limestone and dolomite, and other carbonate rocks
- METAMORPHIC LITHOLOGIES**
- Metasedimentary rock - sedimentary rocks, including sandstone, siltstone, and shale, that have been metamorphosed to schist, gneiss, or other metamorphic rock
 - Public gneiss and schist - light-colored, crystalline, rock with complex, angular, or foliated texture, formed from other metamorphic rocks
 - Intermediate and mafic gneiss and schist - crystalline, crystalline, rock with complex, angular, or foliated texture, formed from other metamorphic rocks
- MIXED LITHOLOGIES**
- Mixed rock types - sedimentary, igneous, or metamorphic rocks, which are not clearly identifiable as any one of the above
- MINERALS AND MATERIALS SYMBOLS**
- The symbols represent locations of coal and the types of metallic minerals and materials found in the United States and Alaska. The symbols are based on the list of minerals and materials found in the United States and Alaska, the geologic map of the world (Blair and Wright, 1963), and other maps. The symbols are based on the list of minerals and materials found in the United States and Alaska, the geologic map of the world (Blair and Wright, 1963), and other maps.

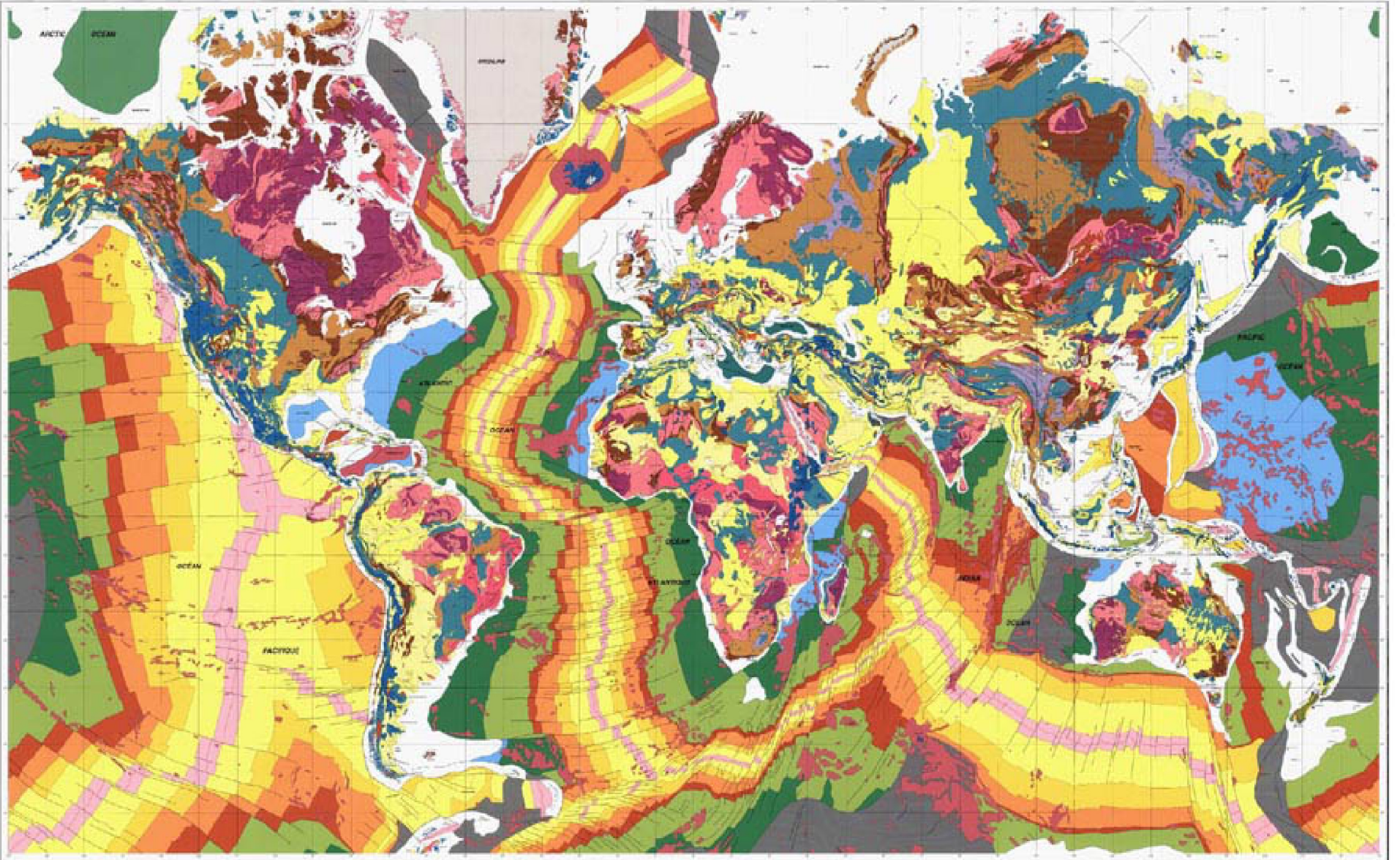
REFERENCES CITED

Energy Information Administration, 1977. Coal Industry annual report. Energy Information Administration, November, 1977. 110 pp.

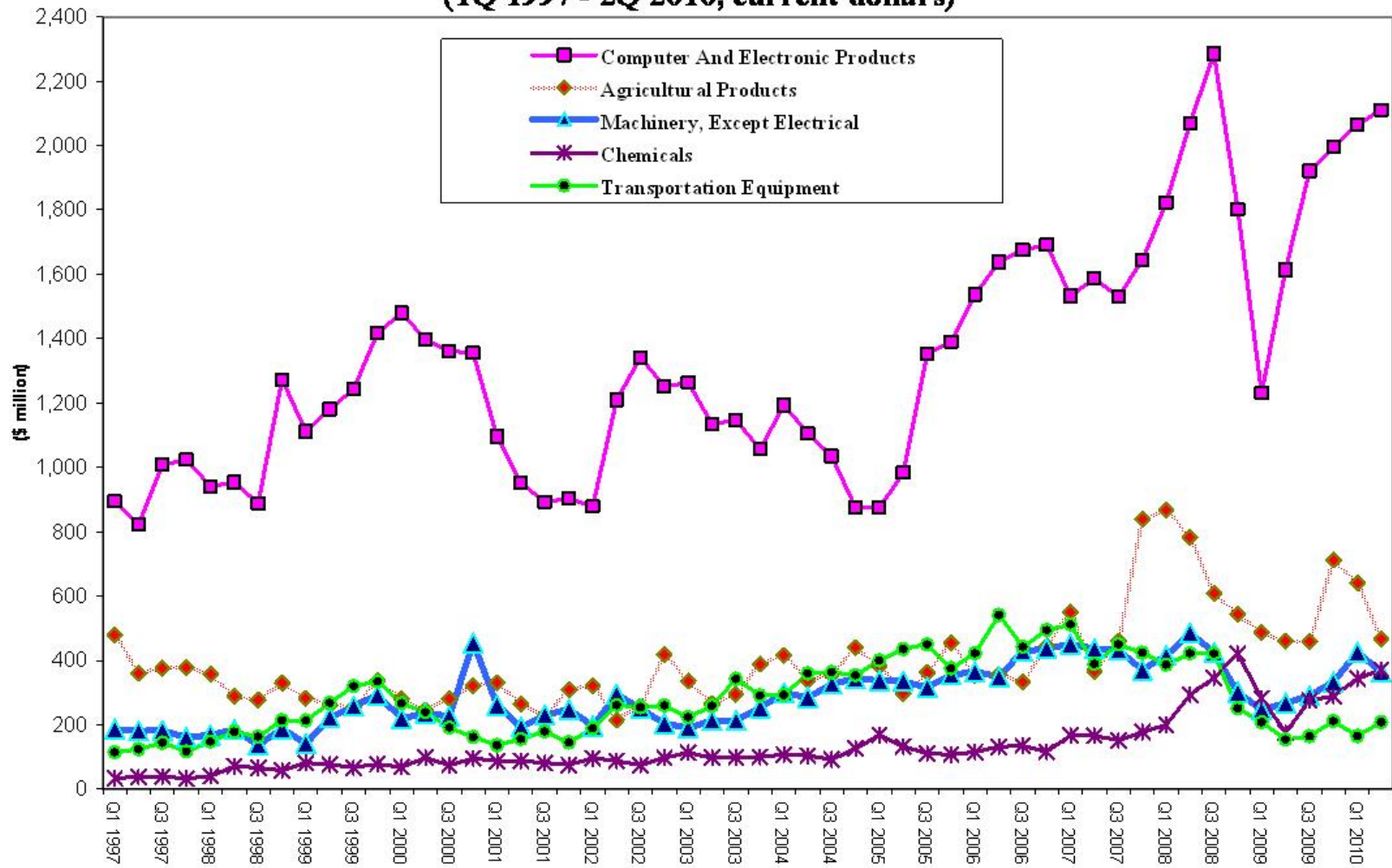
Blair, P. B., and Wright, J. L., 1963. Geologic map of the United States and Alaska, 1:500,000 scale. Geological Survey, Washington, D.C., 1:500,000.

Blair, P. B., and Wright, J. L., 1963. Geologic map of the United States and Alaska, 1:500,000 scale. Geological Survey, Washington, D.C., 1:500,000.





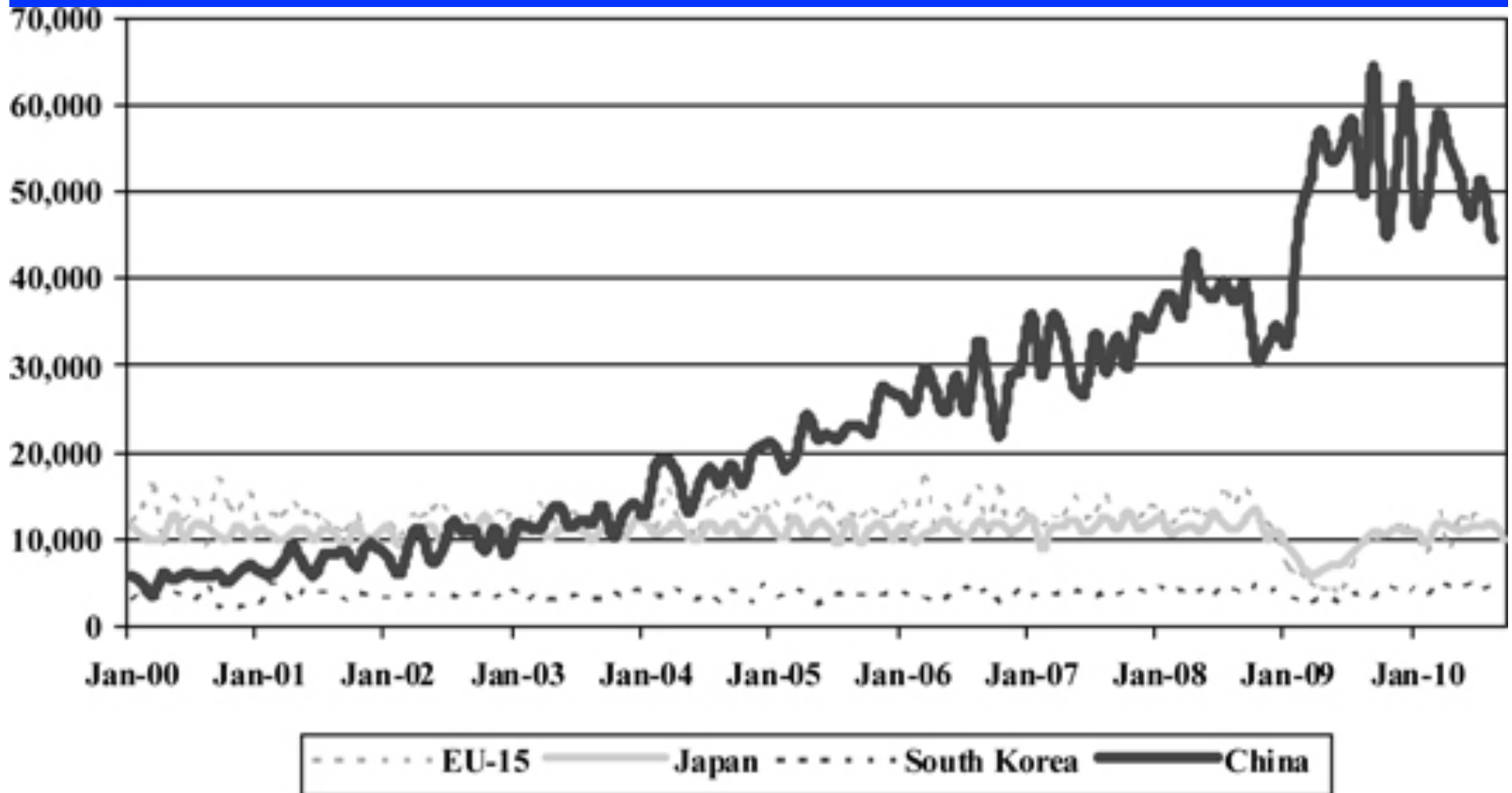
Oregon Exports by Major Industry (1Q 1997 - 2Q 2010, current dollars)



Oregon Office of Economic Analysis

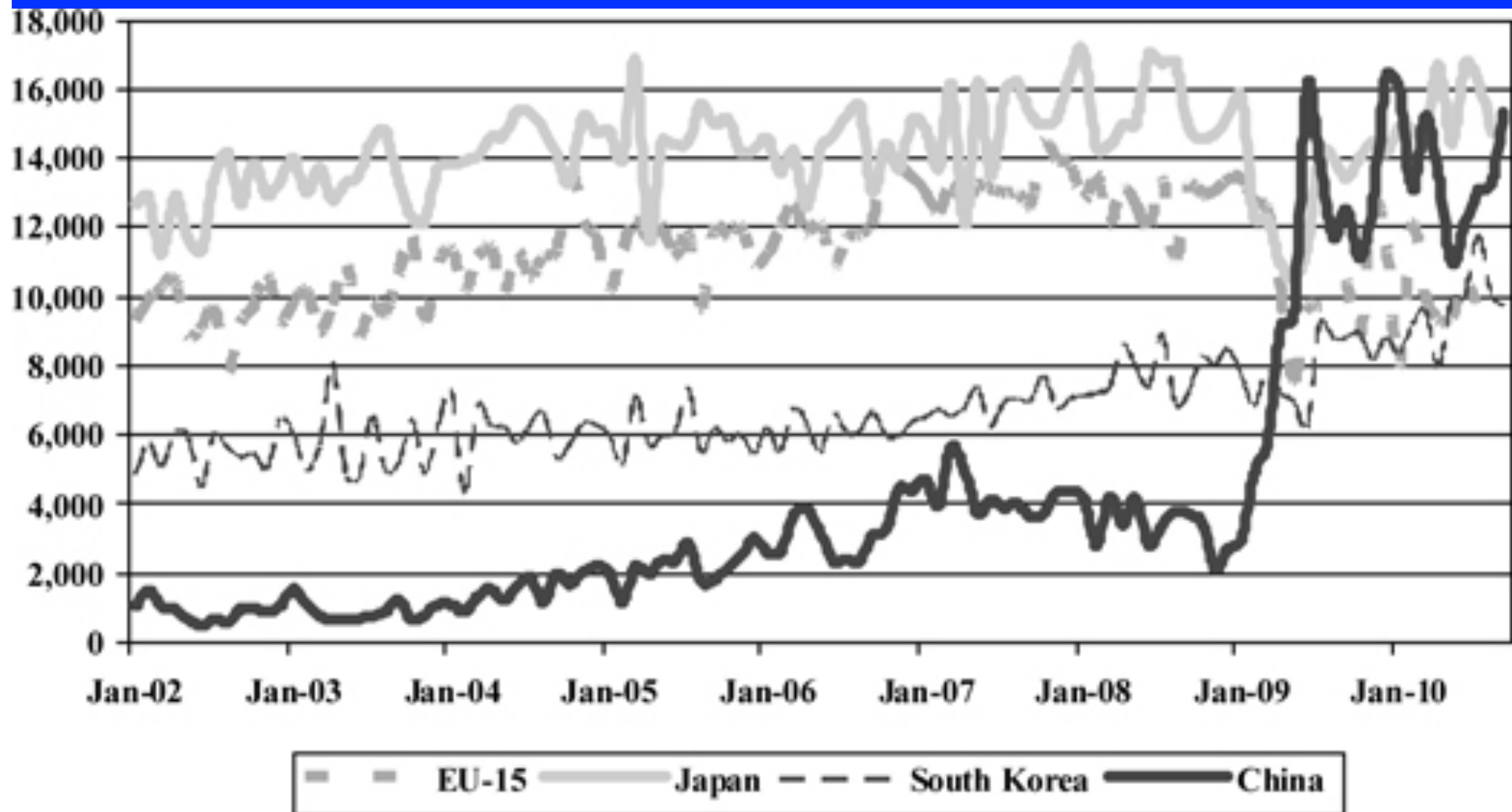
Iron Ore Imports: EU Japan South Korea China

Thousands of tonnes

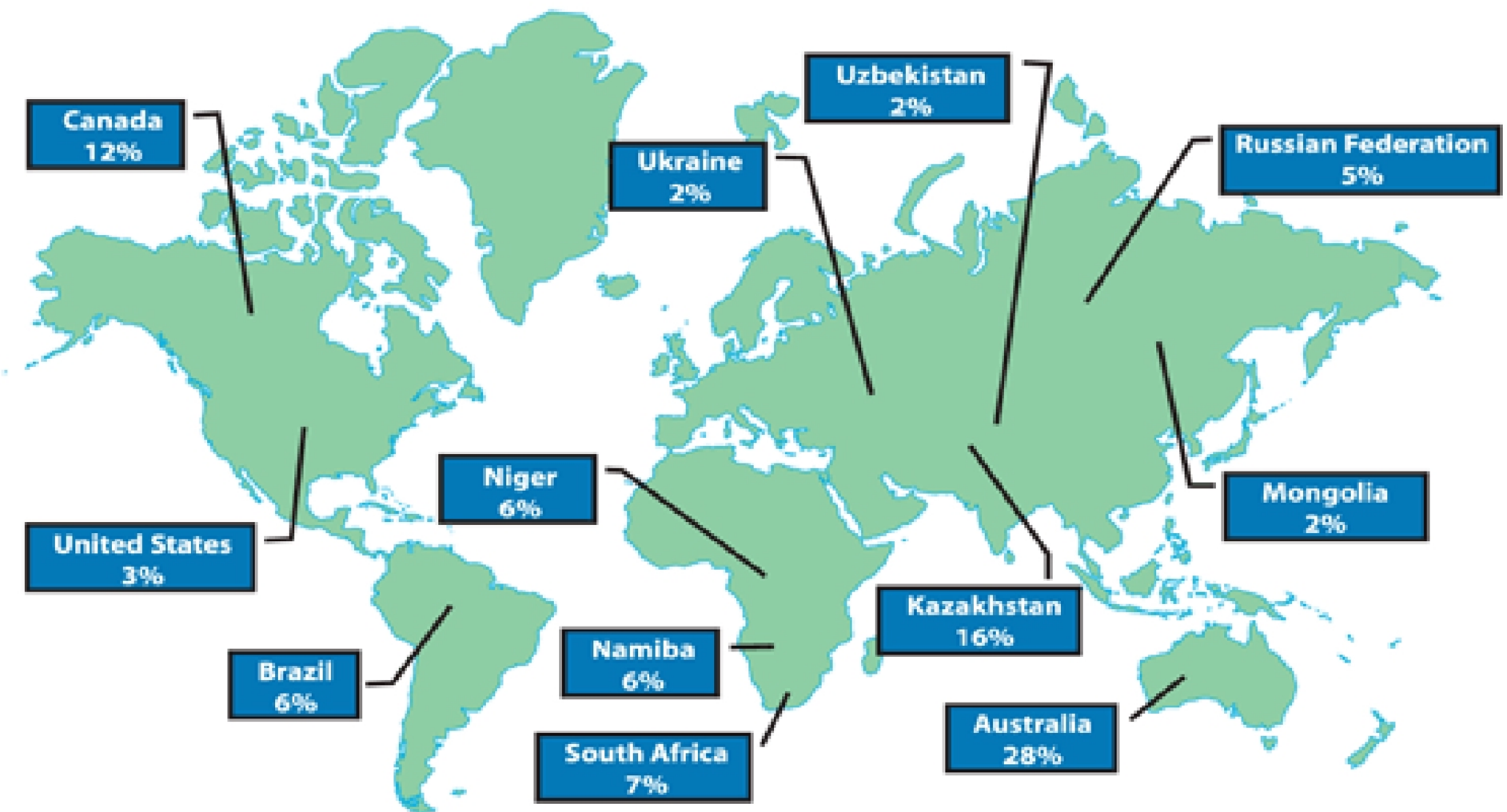


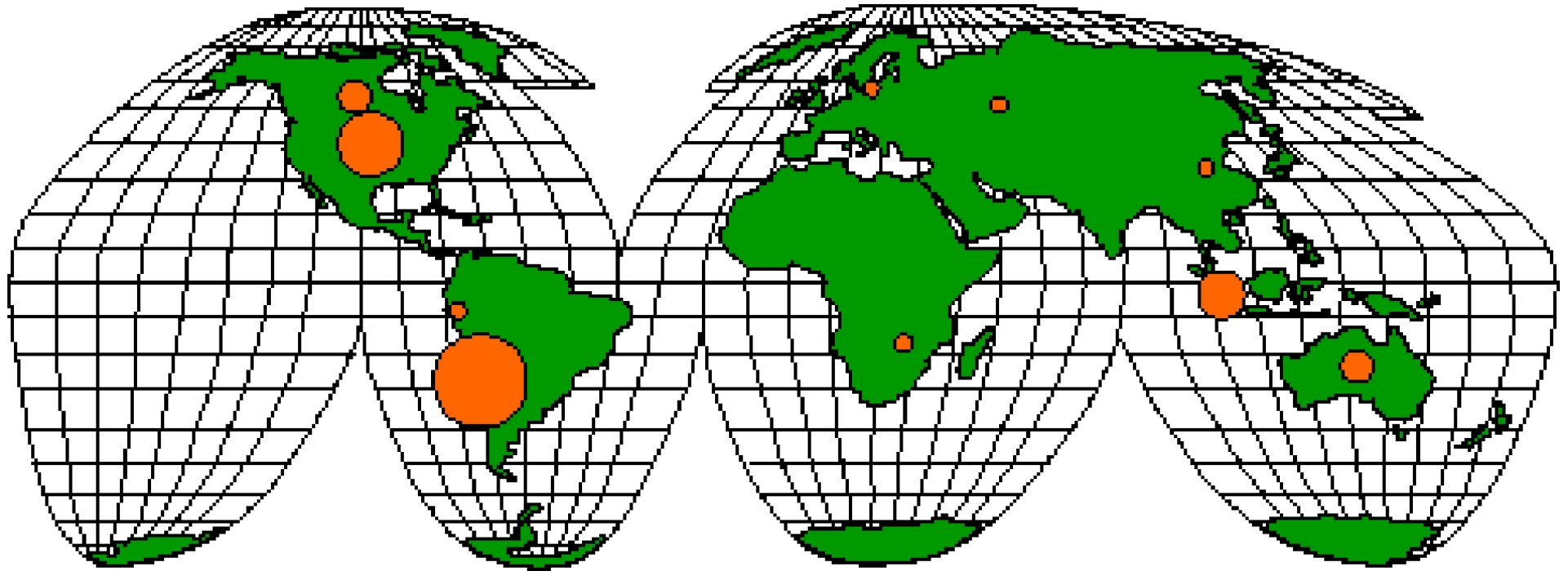
Coal Imports: EU Japan South Korea China

Thousands of tonnes

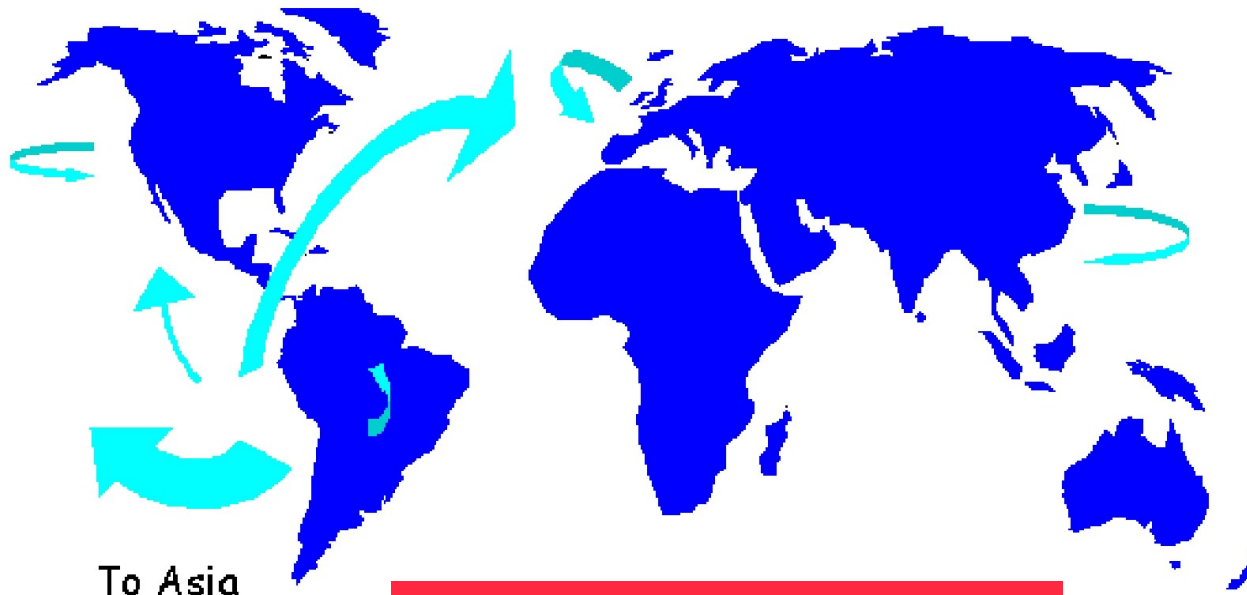


World Uranium Production by Country



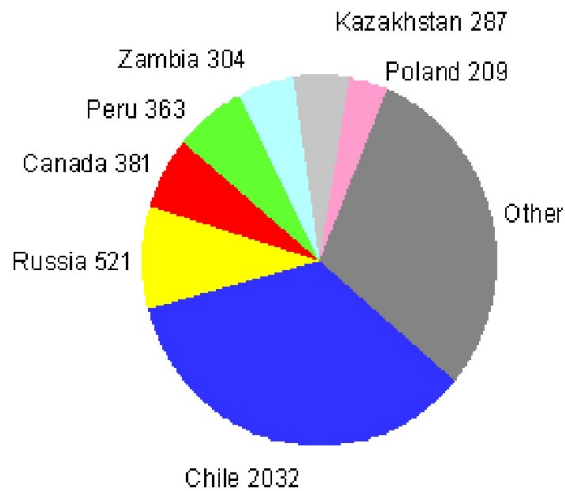


Principle Copper Producing Countries.

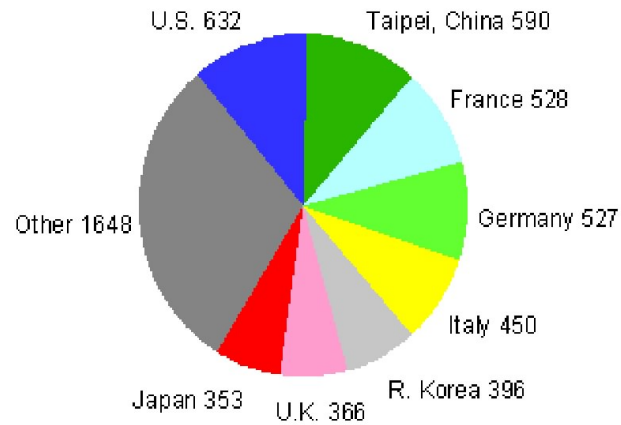


Refined Copper Trade

Exporters
(thousand metric tonnes)



Importers
(thousand metric tonnes)



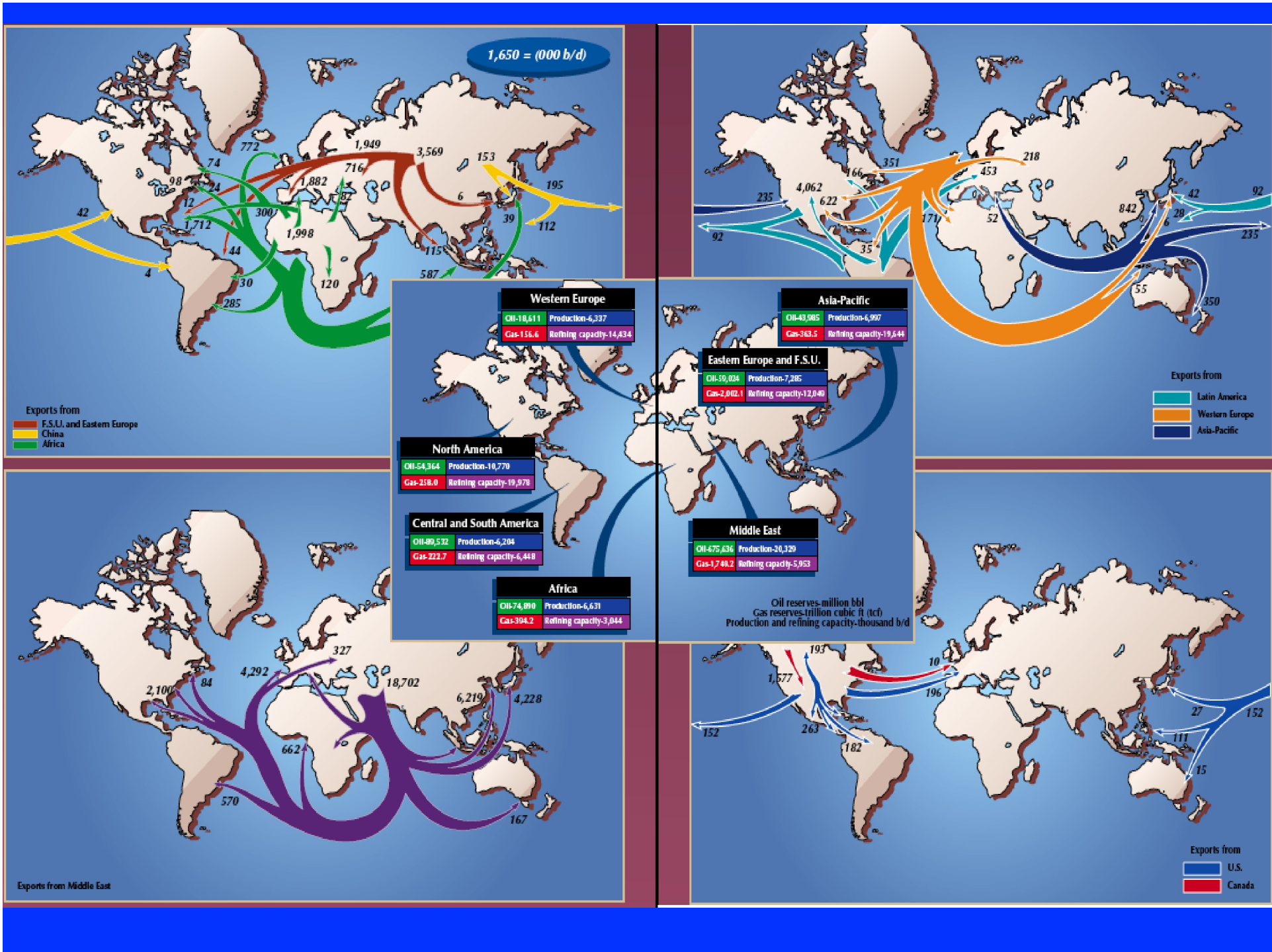
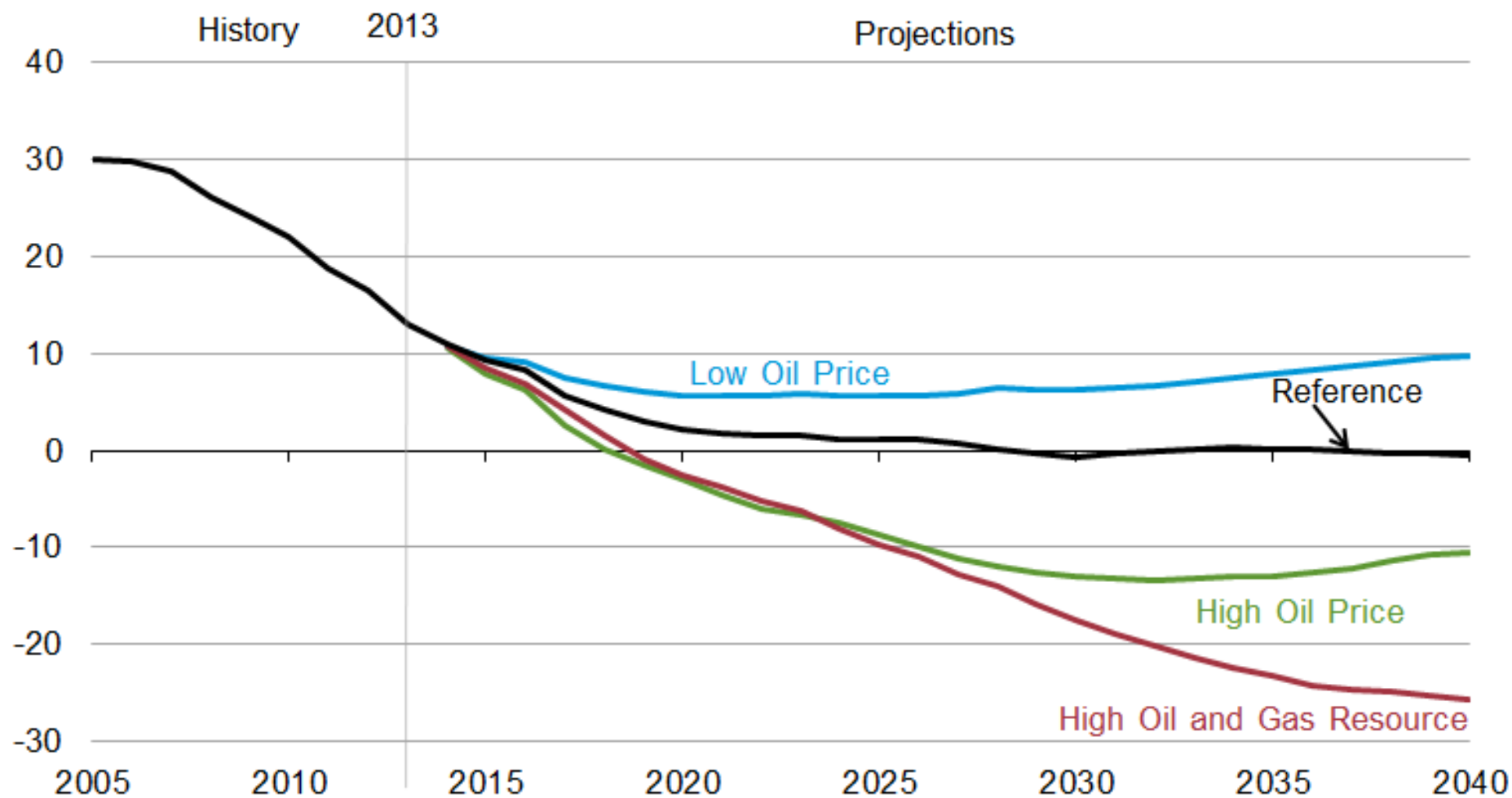


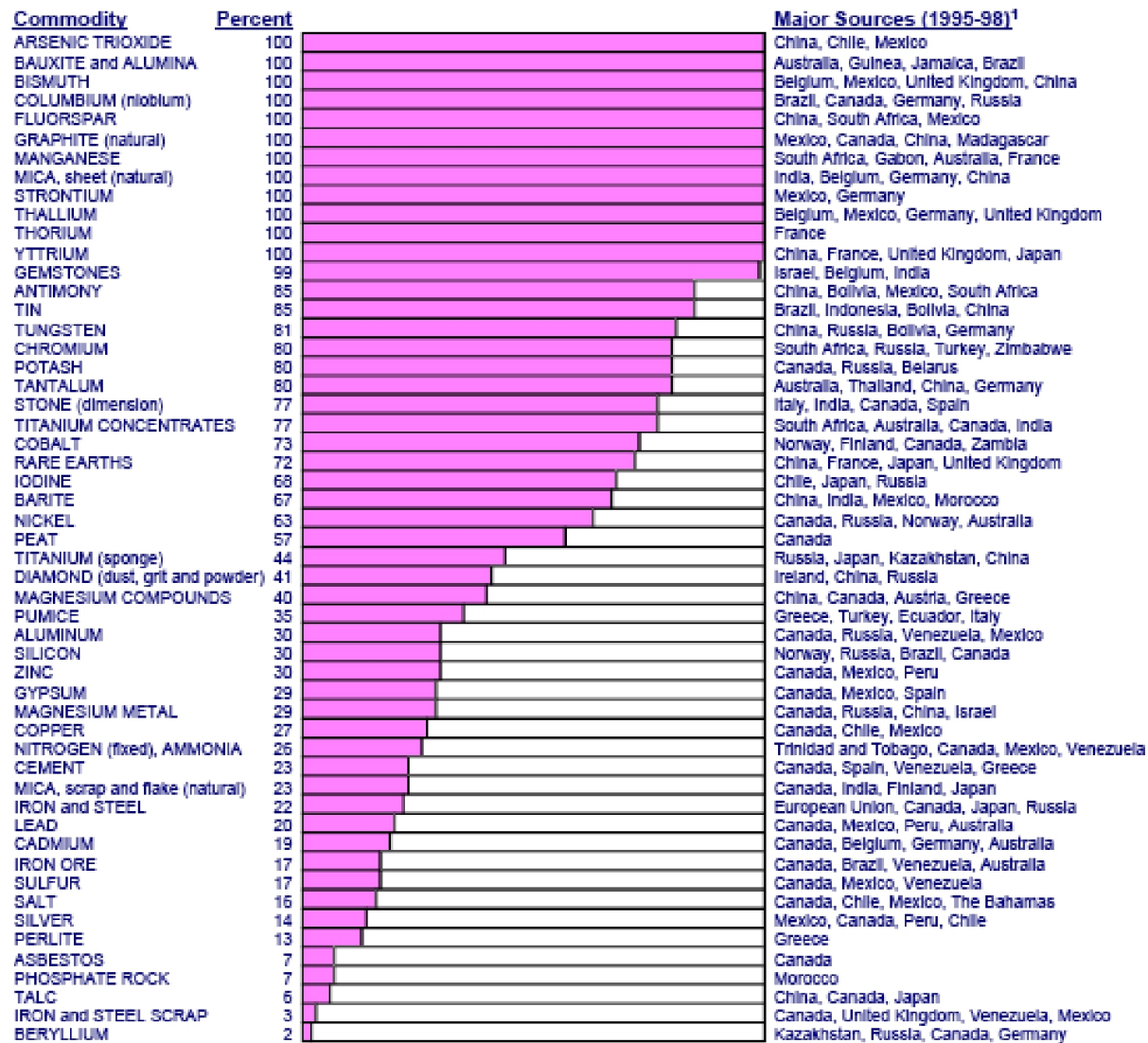
Figure 1. U.S. net energy imports continue to decline in the near term, reflecting increased oil and natural gas production coupled with slow demand growth

U.S. net energy imports
quadrillion Btu



Source: EIA, Annual Energy Outlook 2015

SELECTED NONFUEL MINERAL MATERIALS



¹In descending order of import share.

Additional mineral commodities for which there is some import dependency include:

Gallium	France, Russia, Canada, Kazakhstan	Rhenium	Chile, Germany, Kazakhstan, Russia
Germanium	Russia, Belgium, China, United Kingdom	Selenium	Canada, Philippines, Belgium, Japan
Indium	Canada, China, Russia, France	Vanadium	South Africa, China
Mercury	Russia, Canada, Kyrgyzstan, Spain	Vermiculite	South Africa, China
Platinum	South Africa, United Kingdom, Russia, Germany	Zirconium	South Africa, Australia

**Source: U.S. International Trade in Goods and Services
Balance of Payment Goods and Services: United States
Jan-1992 to Dec-2016**

Seasonally Adjusted Balance

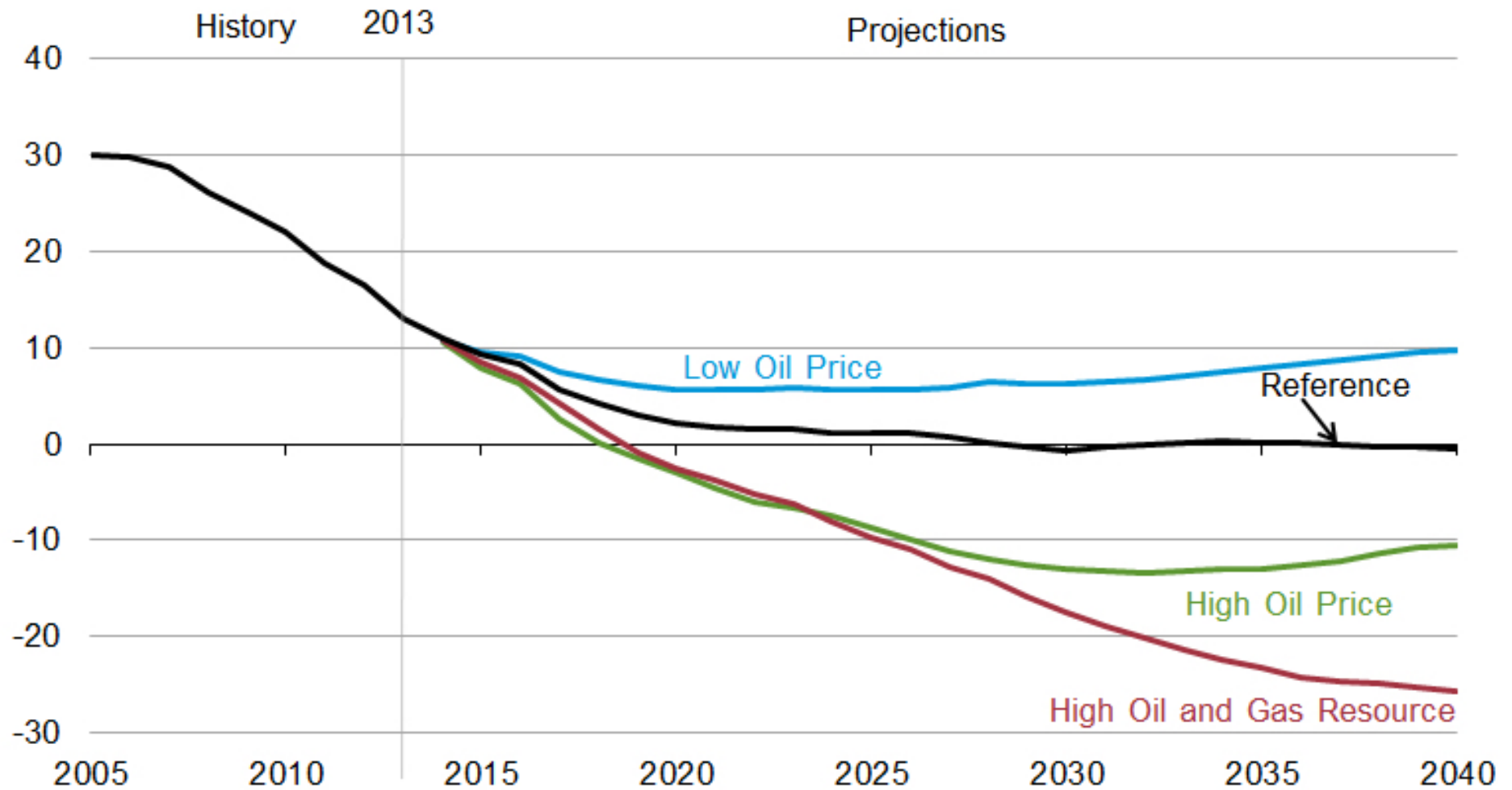


Data Extracted on: February 16, 2016 (2:16 pm) EST

These data are subject to nonsampling error. For more information see
<http://www.census.gov/ft900>

Figure 1. U.S. net energy imports continue to decline in the near term, reflecting increased oil and natural gas production coupled with slow demand growth

U.S. net energy imports
quadrillion Btu

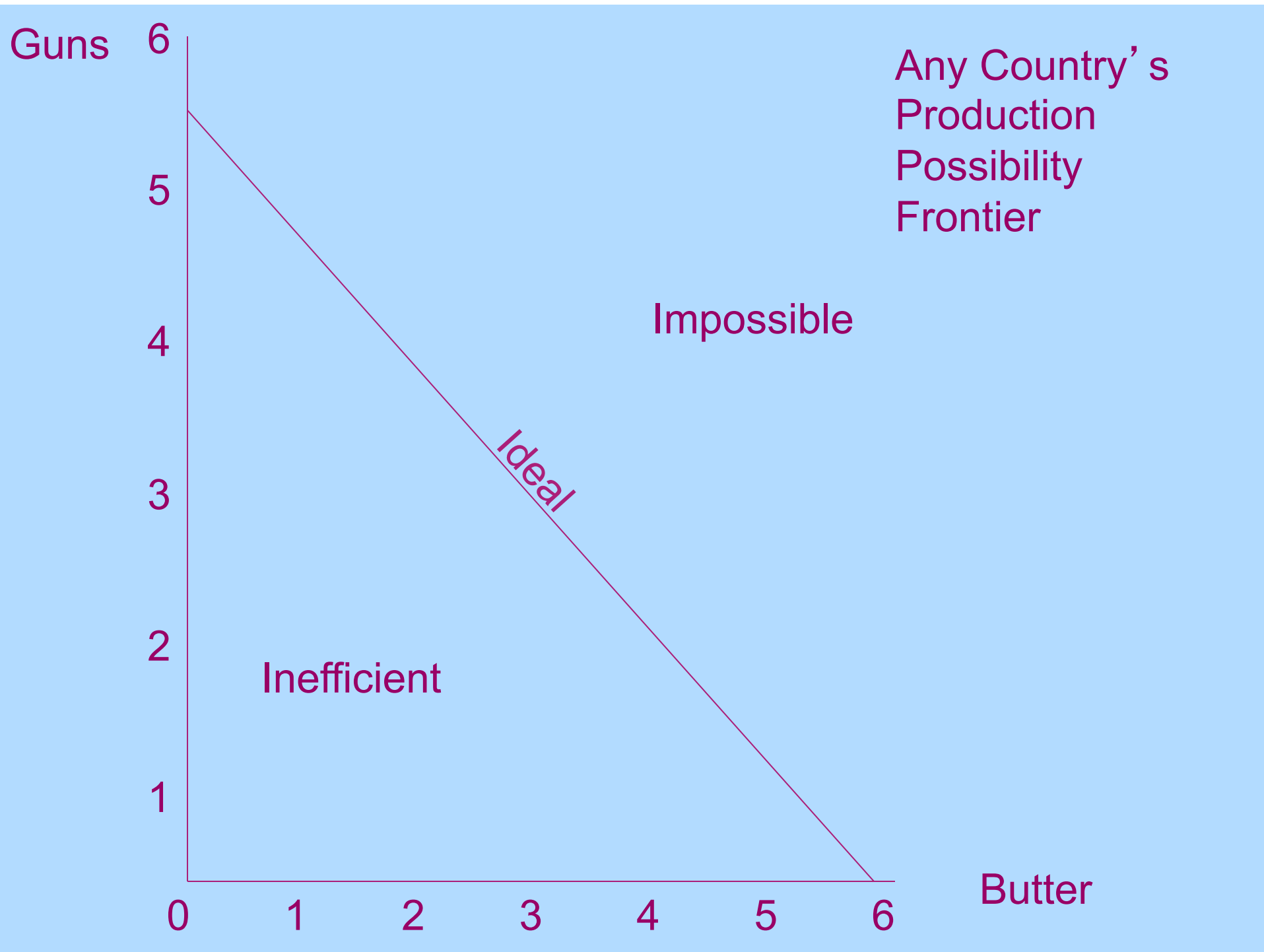


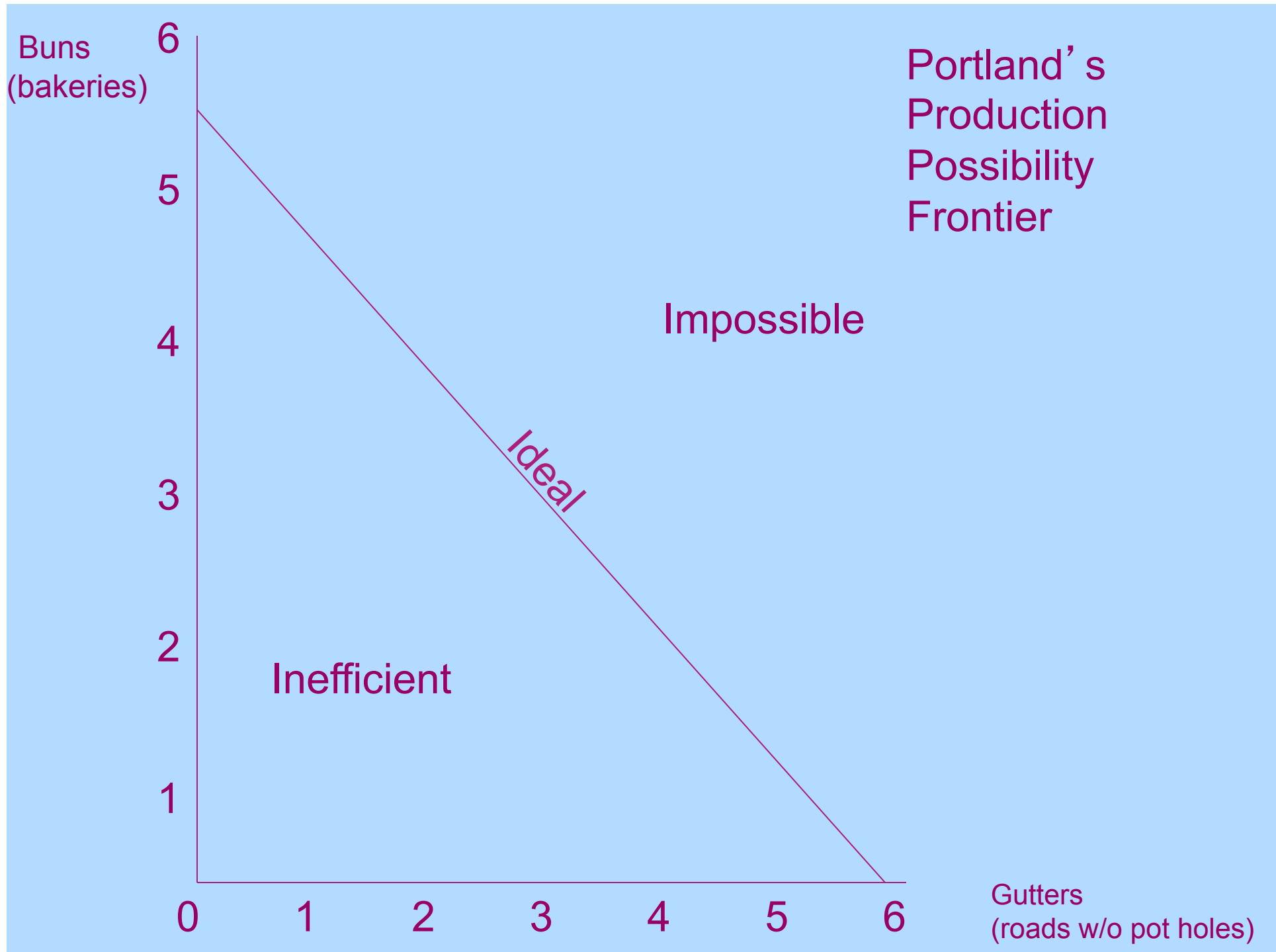
Source: EIA, Annual Energy Outlook 2015

Ricardo's Comparative Advantage

Easy to Use Version







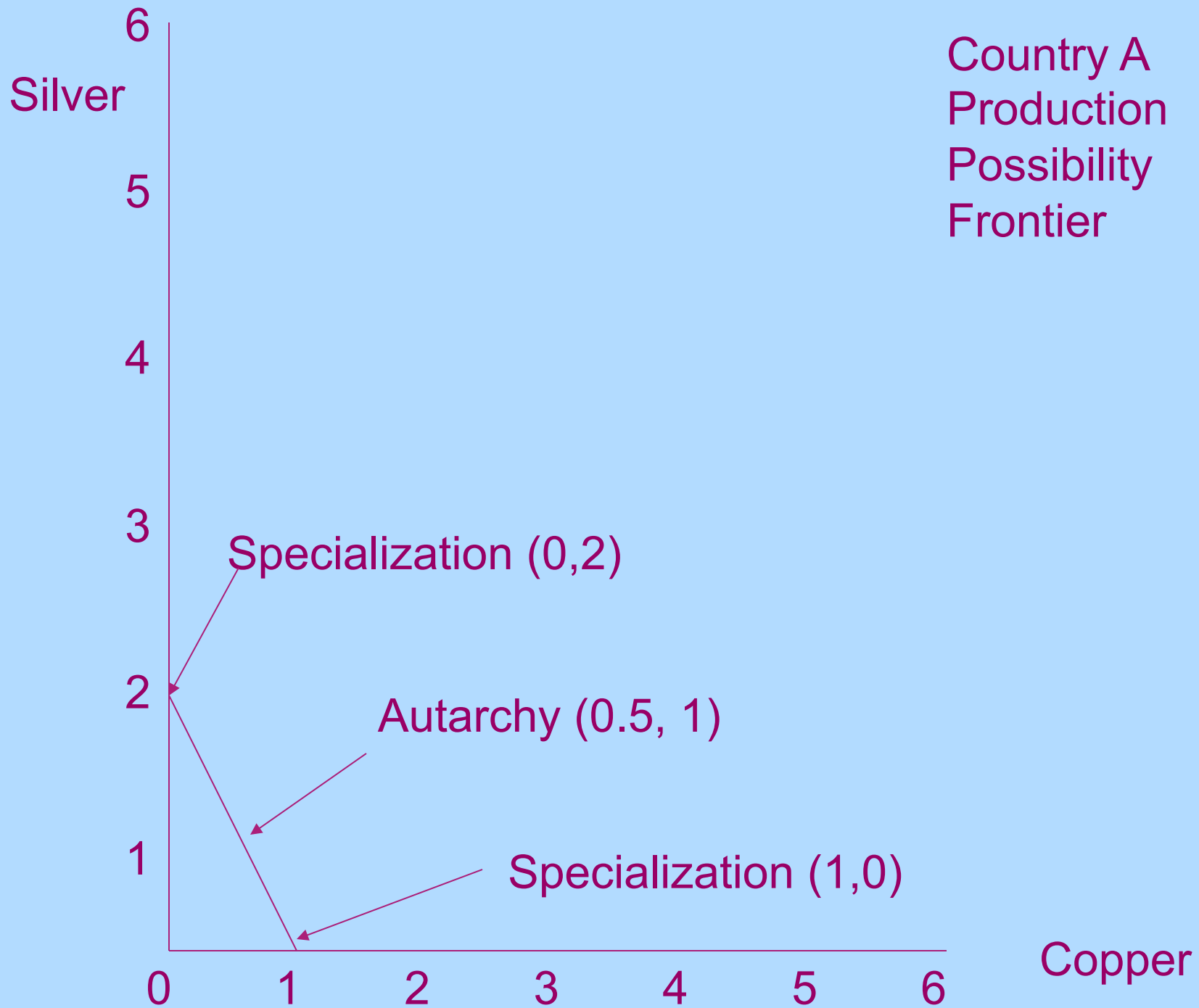
Comparative Advantage depends on Productivity Ratios

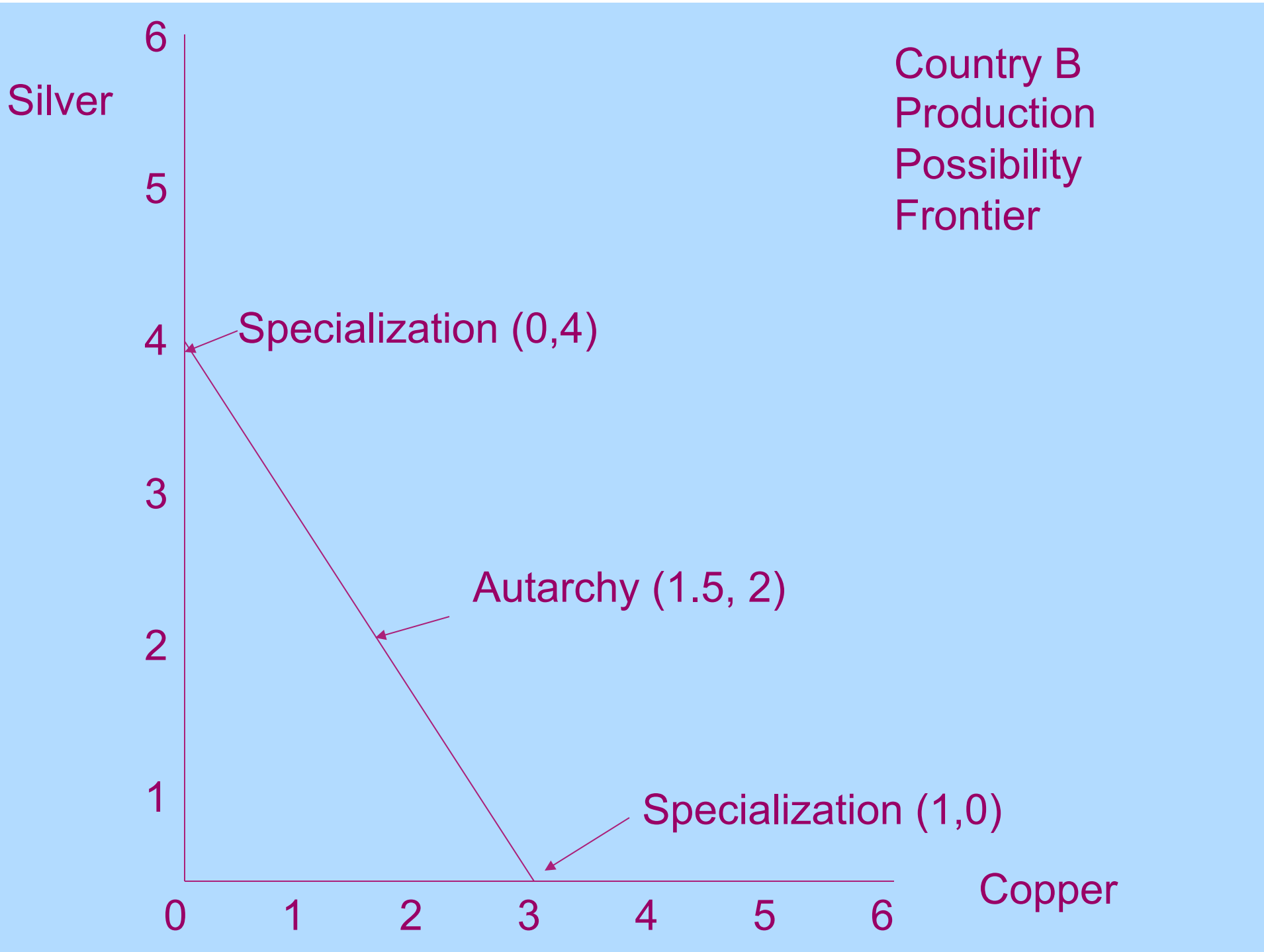
Units per day for two countries:

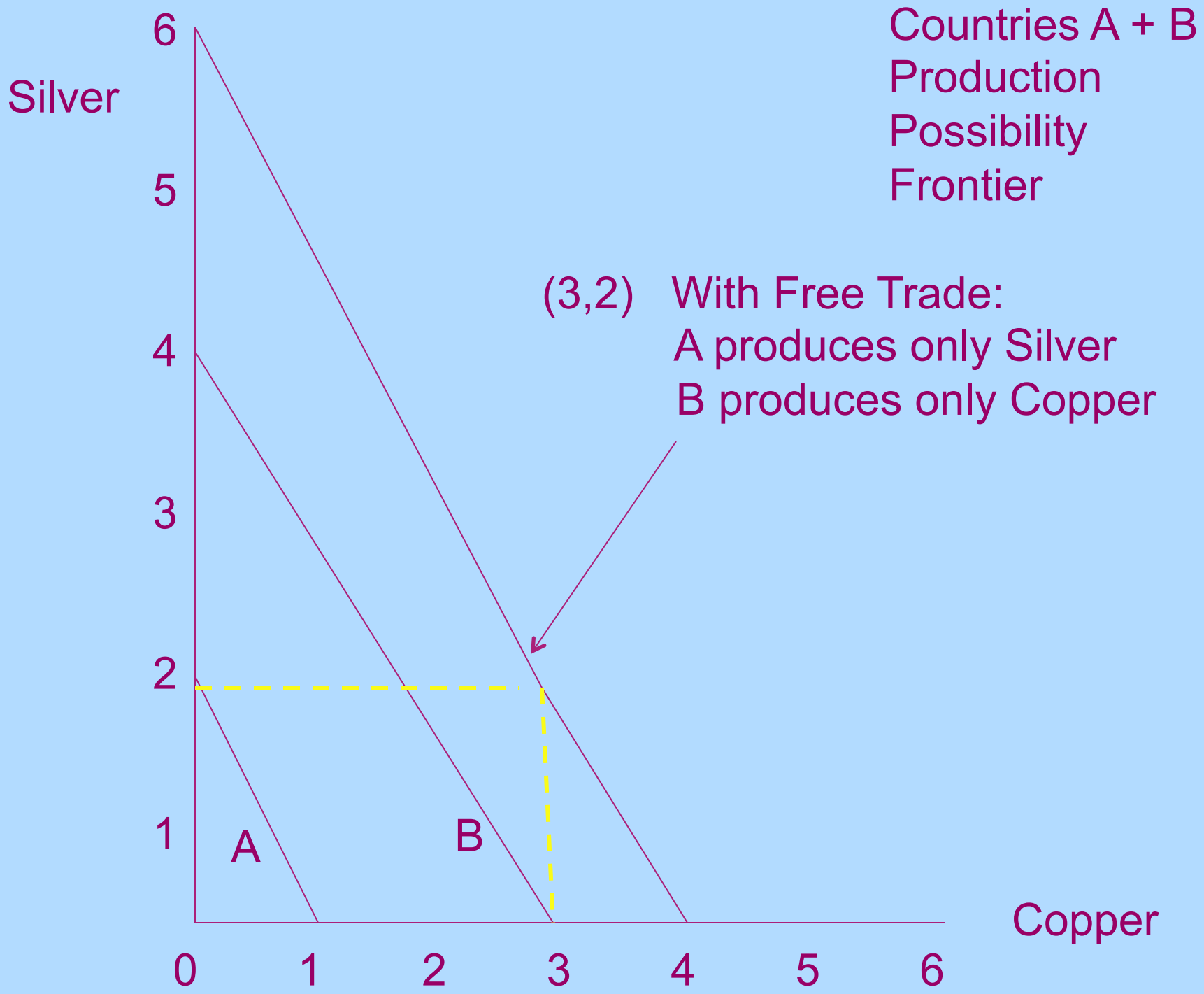
Product	Country A	Country B
Copper	1 per day	3 per day
Silver	2 per day	4 per day

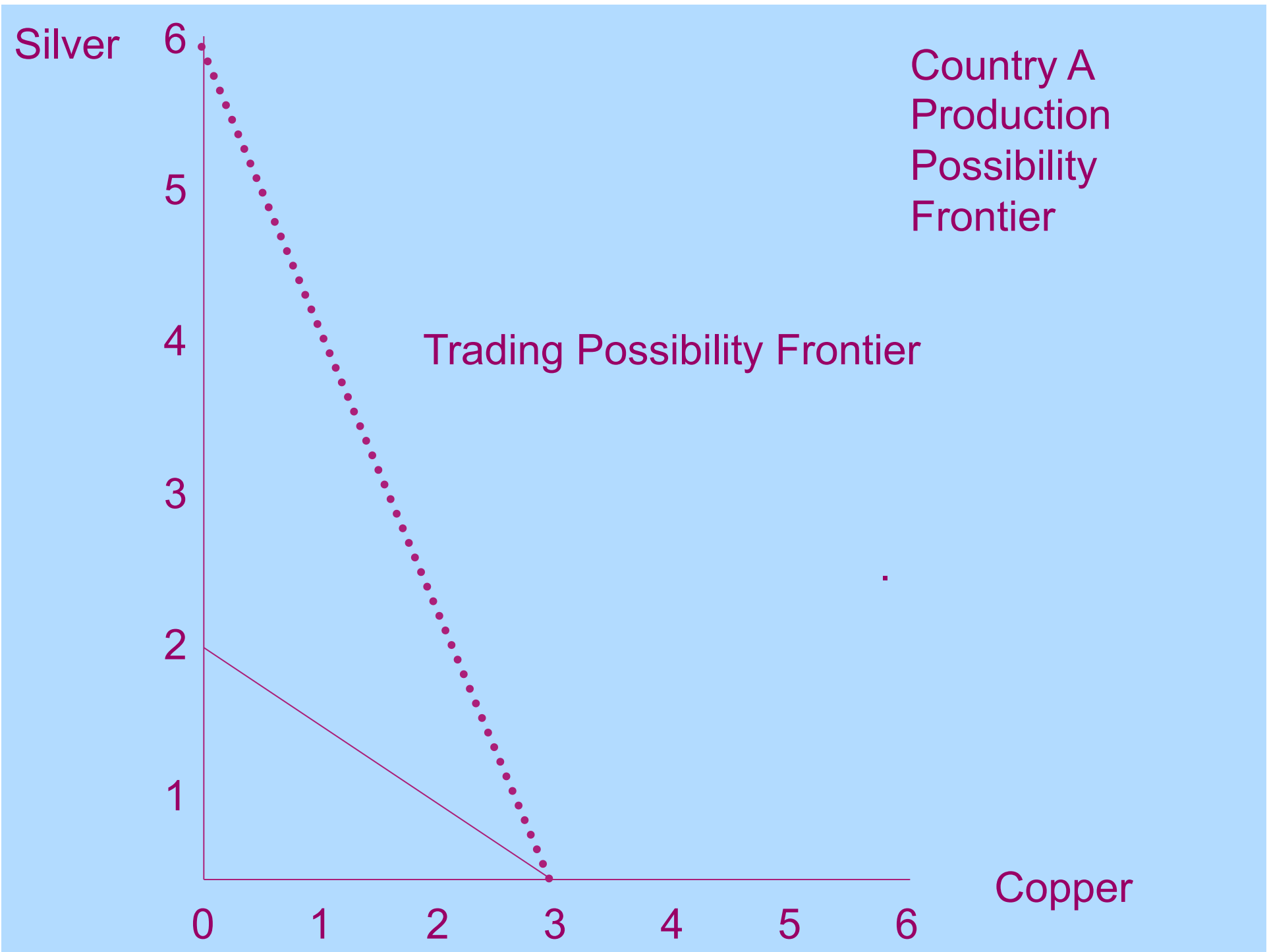
Autarchy:

economic policy of national independence









Silver

Country A
Production
Possibility
Frontier

Trading Possibility Frontier

Copper

Silver

6

5

4

3

2

1

0

1

2

3

4

5

6

Copper

Country B
Production
Possibility
Frontier

Trading Possibility Frontier



Recent Critiques of Trade: 1999 Seattle Protests

- Abuse of Child Labor
- Dupont, ADM, etc genetically modified seeds and pesticides
- Globalization's impacts on national sovereignty

Continuing Critiques

- Mercantile Exchange Rate Policies
- Copyright Infringement
- Professional Services
- Corporate Accounting Practices
- NAFTA
- Loss of jobs to other countries

Globalization

- Trade in resources and labor is one thing
- Do these arguments apply to trade in financial instruments?
- Do they apply to “free capital” investments?
- Do they apply to pollution?

Almost the final word:

“The principle of comparative advantage restated: Whether or not of two regions is absolutely more efficient in the production of every good than is the other, if each specializes in the products in which it has a comparative advantage (greatest relative efficiency), trade will be mutually profitable to both regions. Real wages of the productive factors will rise in both places.

An ill-designed prohibitive tariff, far from helping the protected factor of production, will instead reduce its real wage by making imports expensive and by making the whole world less productive through eliminating efficiency inherent in the best pattern of specialization and division of labor” Samuelson 1964



**Whenever
Trade
Increases
Someone's
ox may be
gored . . .**



Whenever
someone's
ox is
gored . . .
Trade might
be blamed.