ECON 422: International Economics
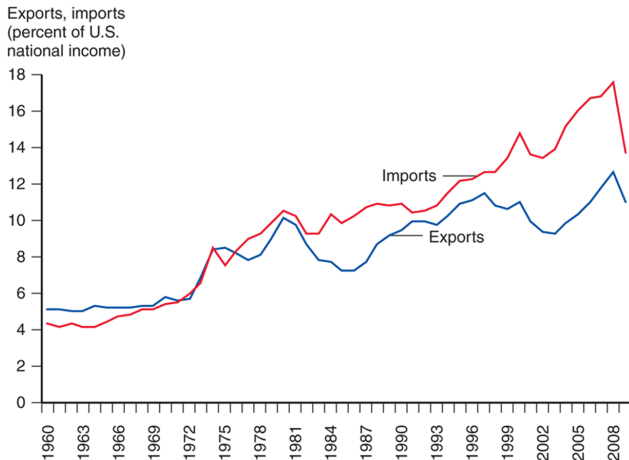## Lecture 2: Facts

Pablo Fajgelbaum

UCLA

Winter 2019

How Can Openness be Measured?

How Can Openness be Measured?

- Goods
  - Share of trade (exports and imports) in GDP
  - Price differentials for similar commodities (why?)
  - Tariffs
  - Freight rates
- Labor
  - Share of foreign-born migrants in the population
  - Wage differentials for similar workers
  - Immigration policies
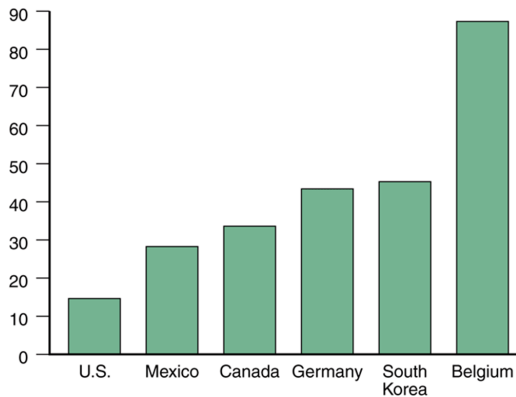- Capital
  - Foreign asset ownership

Trade is Relatively Important for the U.S....

Exports, imports (percent of U.S. national income)

Imports

Exports

...But Even More So For Other Countries

Exports, imports (percent of national income) by country: U.S. about 14, Mexico about 28, Canada about 33, Germany about 43, South Korea about 45, Belgium about 88.

...But Even More So For Other Countries (cont'd)

Country	Trade/GDP (%)	GDP ($ billion)
Hong Kong (China)	216	229
Singapore	193	213
Malaysia	85	247
Hungary	83	129
Thailand	68	319
Austria	52	377
Denmark	48	313
Sweden	46	463
Switzerland	46	552
Germany	44	3,284
Norway	35	418
United Kingdom	32	2,256
Mexico	31	1,035
Canada	30	1,577
China	29	5,931
Spain	28	1,380
Italy	28	2,044
South Africa	27	364
Greece	27	292
France	27	2,549
Russian Federation	26	1,488
India	25	1,684
Turkey	24	731
Indonesia	24	708
Venezuela	23	394
Argentina	20	369
Pakistan	17	176
Japan	15	5,488
United States	15	14,419
Brazil	11	2,143

Who are the major trade partners of the U.S.?
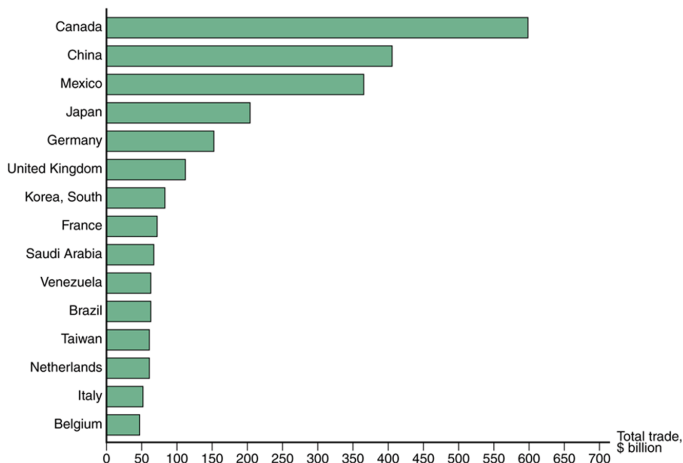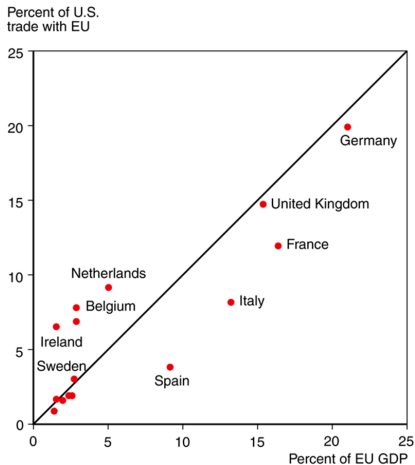
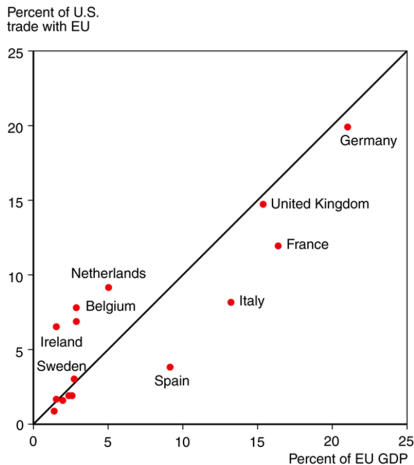# What are the Determinants of U.S. Trade Partners?

- Across U.S. trade partners we see some key determinants of trade
  - Economic Size (Germany, U.K.)
  - Trade Barriers (e.g., Canada, Mexico)
    - Physical (distance)
    - Policy (free trade agreement)
  - Other factors
    - Cultural affinity, Language
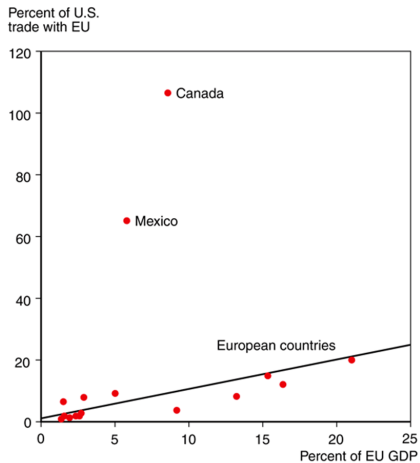 - Specialization Patterns (Venezuela, Korea)

Economic Size Matters for Trade

Economic Size Matters for Trade

Points are around 45 degree line→ Economic size matters for trade

Distance Matters for Trade

Percent of U.S.
trade with EU

• Canada

• Mexico

European countries

Percent of EU GDP

Distance Matters for Trade

Percent of U.S. trade with EU (vertical axis), Percent of EU GDP (horizontal axis). Data points labeled Canada, Mexico, and European countries.
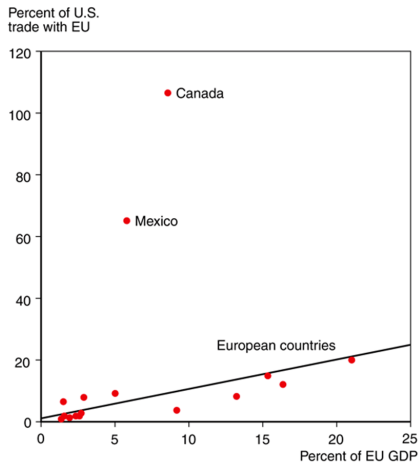
Close-by countries are big outliers→ Distance matters for trade

The Gravity Model

- The roles of economic size and distance for trade are captured by the gravity model of trade.

- Gravity model of trade:

$$T_{ij} = A * Y_i^a * Y_j^b / D_{ij}^c$$

 - T_{ij} is the value of exports from i to j
  - Y_i is aggregate income at i
  - Y_j is aggregate income at j
  - D_{ij} is distance
  - A, a, b and c are constants chosen to fit the actual data

- Why "gravity" model? Analogy to Newton's law: gravitational attraction is:
  - proportional to the product of the masses (economic sizes)
  - and inversely proportional to the square of distance

The Gravity Model

Taking the log: $\ln T_{ij} = \ln A + a \ln Y_i + b \ln Y_j - c \ln D_{ij}$

Bilateral Trade and Distance, 1950

Taking the log: $\ln T_{ij} = \ln A + a \ln Y_i + b \ln Y_j - c \ln D_{ij}$
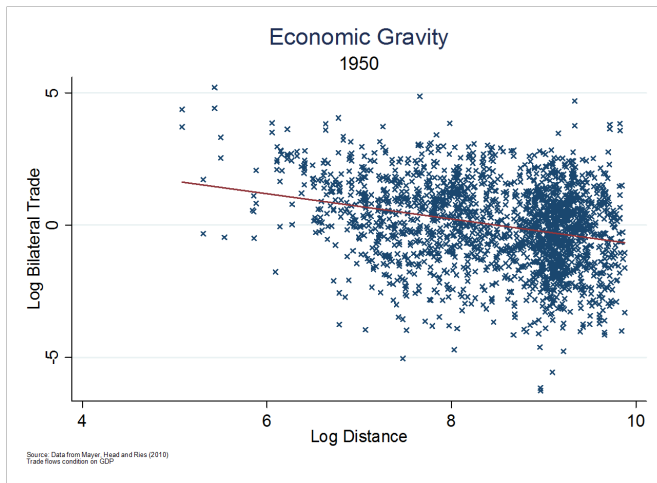
The red line shows the average relationship between log-trade and log-distance

Bilateral Trade and Distance, 1970

Taking the log: $\ln T_{ij} = \ln A + a \ln Y_i + b \ln Y_j - c \ln D_{ij}$

The red line shows the average relationship between log-trade and log-distance

Bilateral Trade and Distance, 1990

Taking the log: $\ln T_{ij} = \ln A + a \ln Y_i + b \ln Y_j - c \ln D_{ij}$

The red line shows the average relationship between log-trade and log-distance

Bilateral Trade and Distance, 2006

Taking the log: $\ln T_{ij} = \ln A + a \ln Y_i + b \ln Y_j - c \ln D_{ij}$
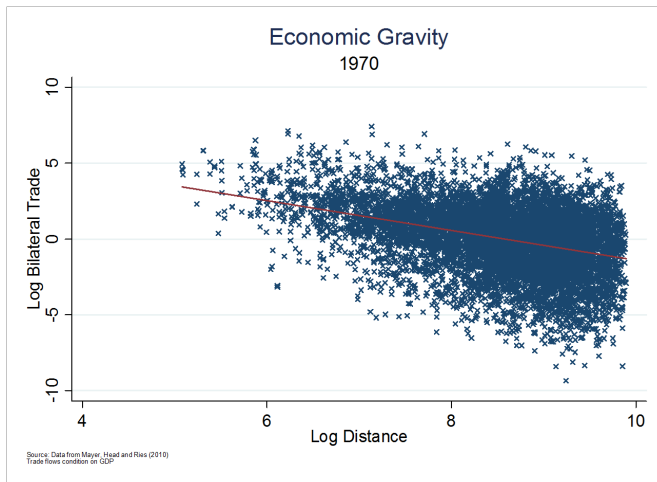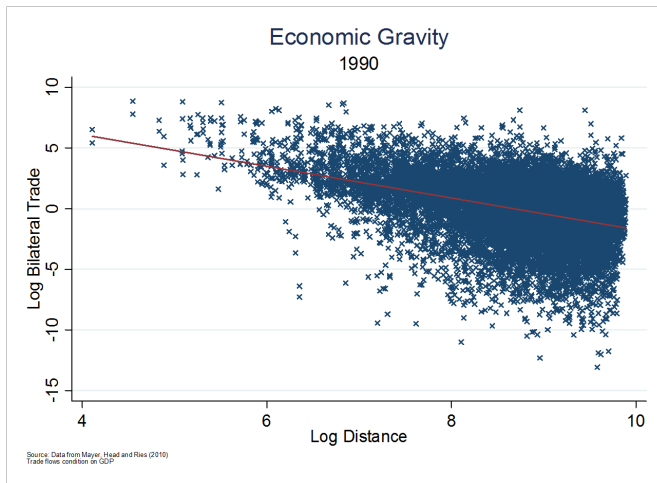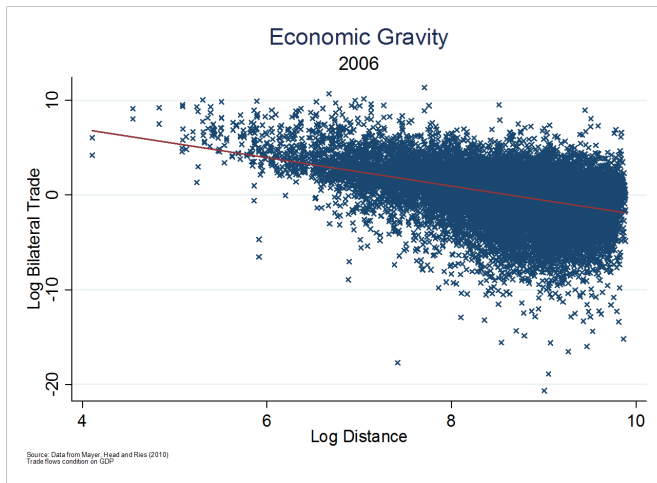

The red line shows the average relationship between log-trade and log-distance

Bilateral Trade and Distance

Taking the log: $\ln T_{ij} = \ln A + a \ln Y_i + b \ln Y_j - c \ln D_{ij}$

Economic Gravity
2006, Original 1950 Trading Pairs

Source: Data from Mayer, Head and Ries (2010)
Trade flows condition on GDP
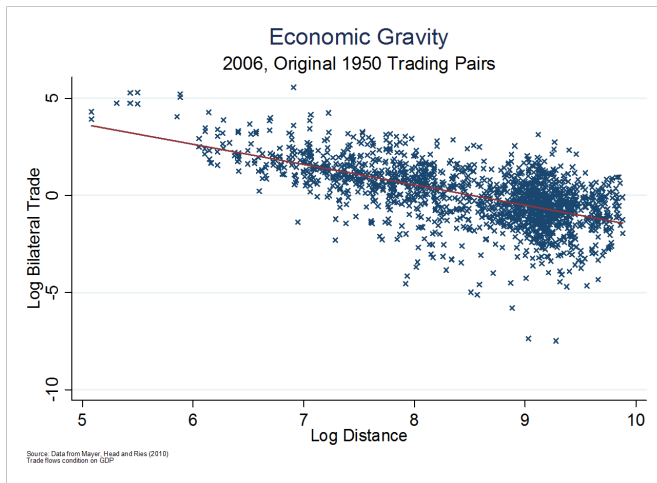
The Gravity Model

- Surprisingly, the role of distance does not diminish (!)

- I.e., the elasticity of trade with respect to distance (the slope of the red line in the figure) is constant over time

- I.e., the coefficient c is approximately constant over time:

$$\ln T_{ij} = \ln A + a \ln Y_i + b \ln Y_j - c \ln D_{ij}$$

And it is usually very close to 1

Borders Matter for Trade

Canadian Provinces
0. British Columbia
1. Alberta
2. Saskatchewan
3. Manitoba
4. Ontario
5. Quebec
6. New Brunswick

U.S. States
1. Washington
2. Montana
3. California
4. Ohio
5. New York
6. Maine

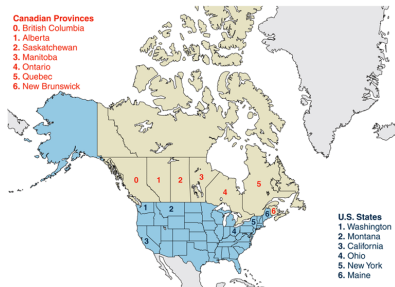| TABLE 2-1	Trade with British Columbia, as Percent of GDP, 1996		
Canadian Province	**Trade as Percent of GDP**	**Trade as Percent of GDP**	**U.S. State at Similar Distance from British Columbia**
Alberta	6.9	2.6	Washington
Saskatchewan	2.4	1.0	Montana
Manitoba	2.0	0.3	California
Ontario	1.9	0.2	Ohio
Quebec	1.4	0.1	New York
New Brunswick	2.3	0.2	Maine

Source: Howard J. Wall, "Gravity Model Specification and the Effects of the U.S.-Canadian Border," Federal Reserve Bank of St. Louis Working Paper 2000–024A, 2000.

Source: Krugman et al.

Cultural Factors Matter for Trade
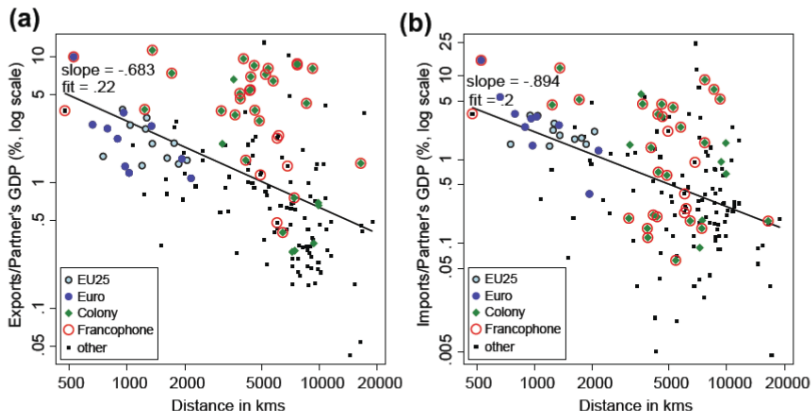
Figure 3.2 Trade is Inversely Proportional to Distance; (a) France's Exports (2006); (b) France's Imports (2006)

Specialization Patterns Matter for Trade

- We just saw that gravity (distance and size) matters for trade

- We also saw that other factors (border, cultural) also matter

- What else?

Imports of ??? in 2015 (HS2)

Total: $2.13T

Machines 28%	**Transportation** 14%	**Textiles** 5.1%	**Miscellaneous** 3.5% **Plastic and Rubber** 3.4%
Mineral Products 17% **Petroleum...** 9.71%	**Chemical Products** 7.8%	**Instruments** 3.4%	**Foodstuffs** 2.6% **Vegetable Products** 1.9%
	Metals 5.5% **Footwear and Headwear** 1.3%	1.9%	**Animal Products** 1.2% **Stone and Glass** 0.82% **Wood Products** 0.77% **Paper...** 1.2% **Animal...** 0.53% Arts and Antiques 0.31% Weapons

Imports of U.S. in 2015 (HS2)

Total: $2.13T

Machines 28%	**Transportation** 14%	**Textiles** 5.1%	**Miscellaneous** 3.5%	**Plastic and Rubber** 3.4%

Chemical Products 7.8%

Instruments 3.4% **Foodstuffs** 2.6% **Vegetable Products** 1.9%

Mineral Products 17%

Petroleum... 3.71%

Metals 5.5%

1.9%

Animal Products 1.2%

Stone and Glass 0.82%

Wood Products 0.77%

Footwear and Headwear 1.3%

Paper... 1.2%

Animal... 0.53%

Arts and Antiques ...31%

Weapons

Source: MIT observatory of Economic Complexity

The U.S. import basket is concentrated on Machines and Minerals...
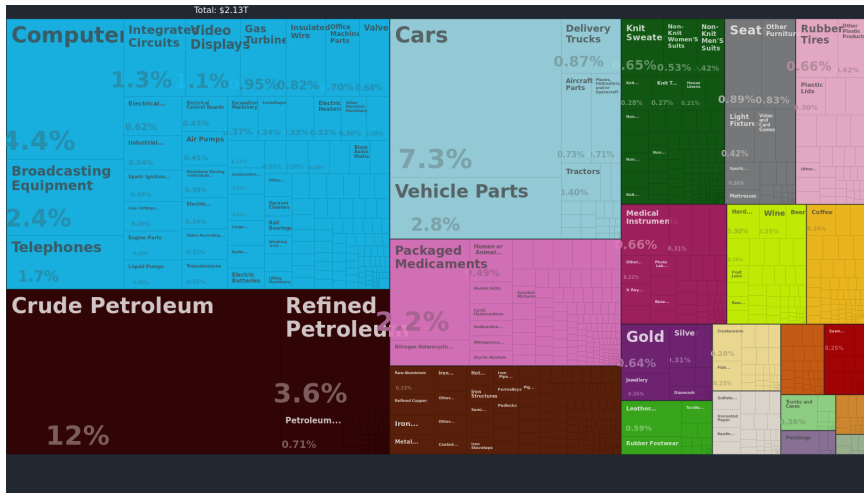
Imports of U.S. in 2015 (HS4)

...zooming in at 4 digits of the Harmonized (HS4), most minerals are Crude Petroleum...

Exports of ??? in 2015 (HS4)

Total: $144B

Crude Petroleum

Refined Petroleum

8.3%

89%

Petroleum Coke   Iron...

0.30%
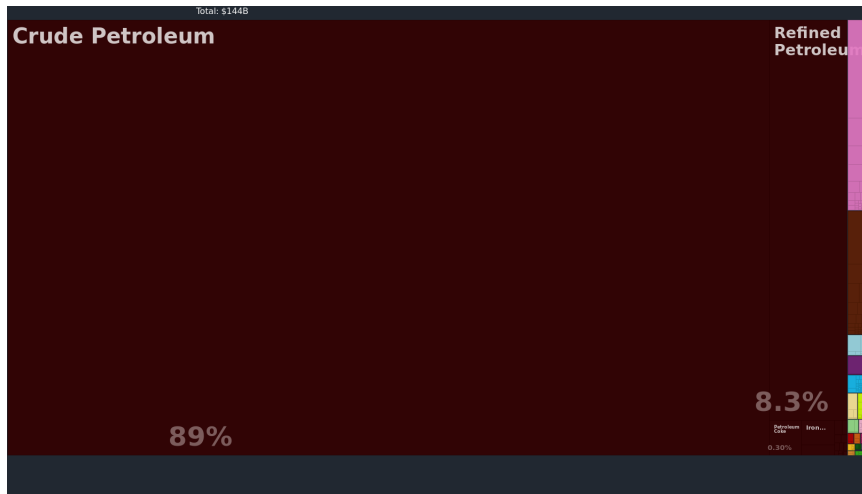
Exports of Venezuela in 2015 (HS4)

Total: $144B

Crude Petroleum

89%

Refined Petroleum

8.3%

Petroleum Coke
0.30%

Iron...
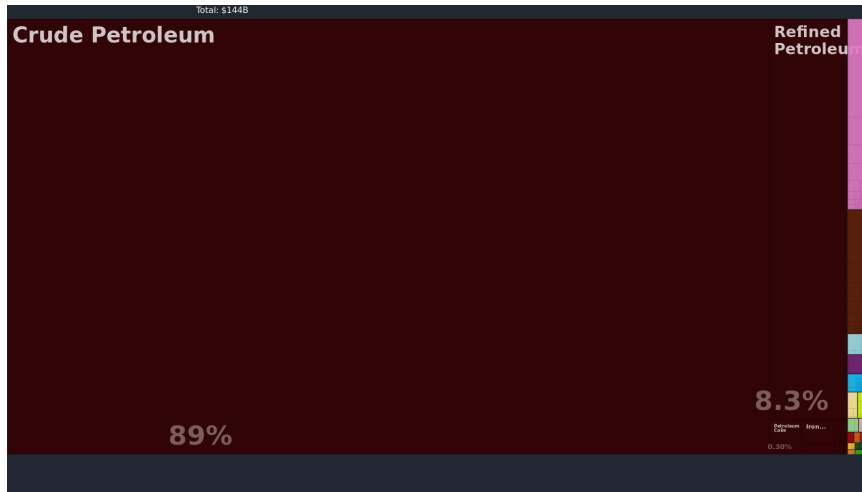
Source: MIT observatory of Economic Complexity

Venezuelan Exports are concentrated in Crude Petroleum...

Total: $29.4B

Crude Petroleum

Refined Petroleum

86%

9.8%

Petroleum...

Gold
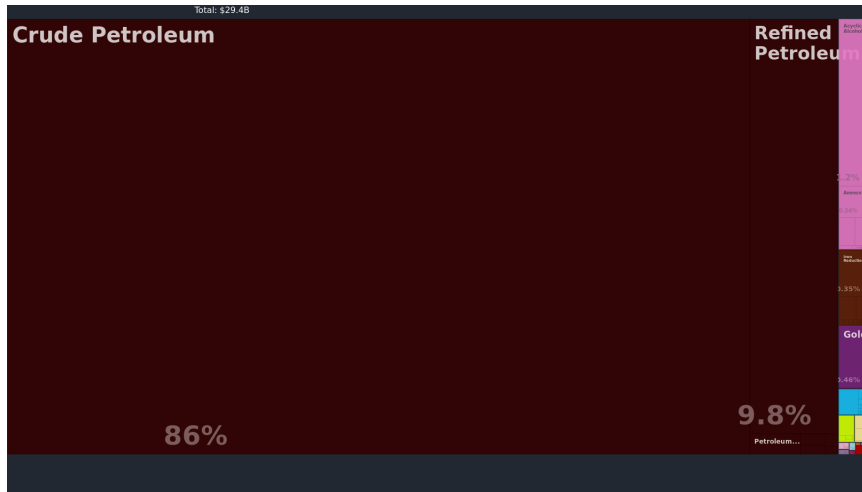
Source: MIT observatory of Economic Complexity

...and so are Venezuelan Exports to the U.S..

Korea's Exports (HS2)

Total: $572B

Machines 37%

Transportation 19%

Mineral Products 9.2%

Metals 8.3%

Plastics and Rubbers 7.1%

Chemical Products 6.9%

Textiles 2.7%

Precious Metals 0.78%

Instruments 6.0%

Foodstuff 0.70%

Miscellaneous 0.59%

Stone and... 0.40%

Paper... 0.69%

Animal...

Animal Hides
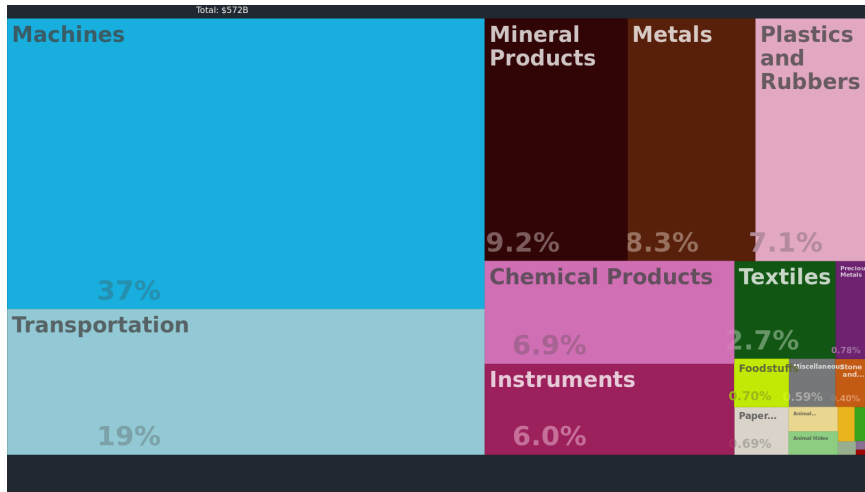
Source: MIT observatory of Economic Complexity

Korean's exports are concentrated in Machines...

Korea's Exports to U.S. (HS2)

Total: $64.1B

Machines — 40%

Transportation — 29%

Metals — 9.0%

Plastics and Rubbers — 5.7%

Mineral Products — 5.0%

Chemical... — 2.7%

Instruments — 2.1%

Textile — 2.1%

Miscellaneous — 0.93%

Paper... — 0.91%

Foodstuffs — 0.73%

Stone and... — 0.32%

Weapons — 0.49%
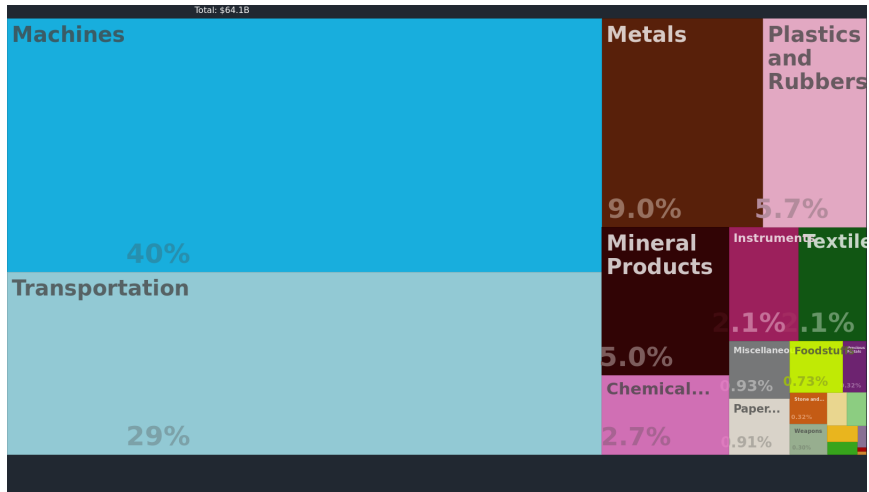
Source: MIT observatory of Economic Complexity
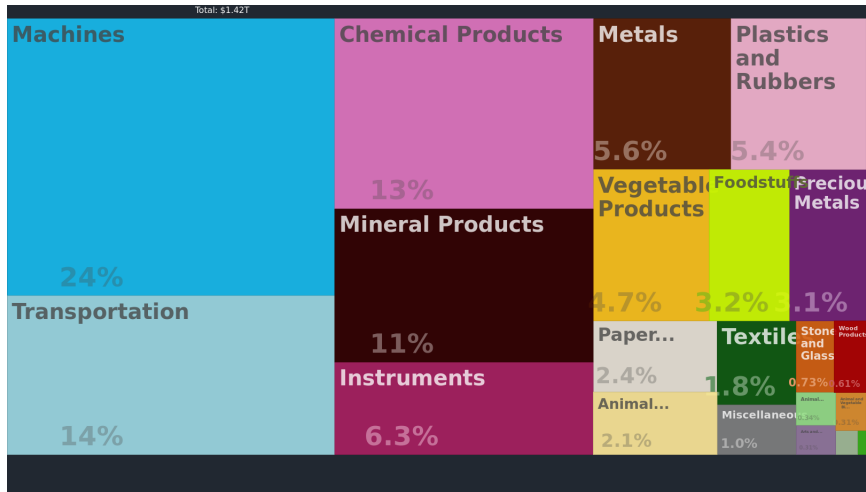
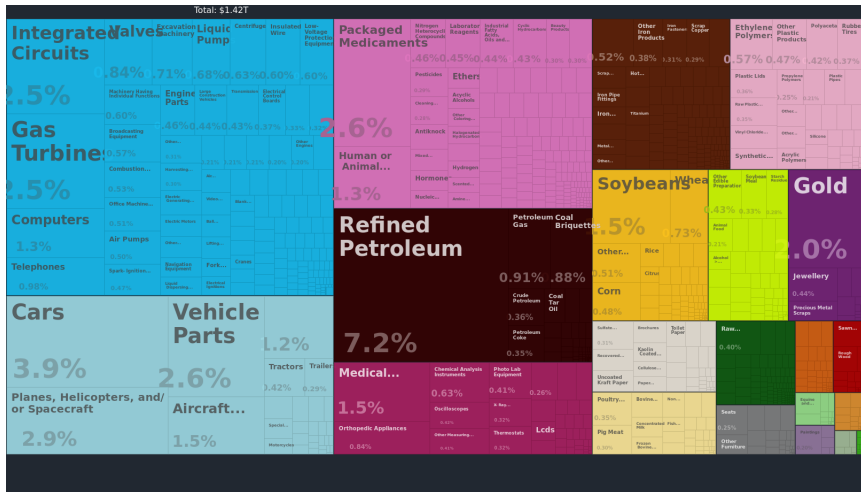...and so are Korean exports to the U.S..

U.S. Exports (HS2)

Source: MIT observatory of Economic Complexity

However, the U.S. is also a large exporter of Machines...

U.S. Exports (HS4)

Source: MIT observatory of Economic Complexity

but only an exporter of refined Petroleum.

Two Types of Trade

- The case of U.S., Venezuela, and Korea highlights two very different types of trade

- Inter-industry trade (e.g., between U.S. and Venezuela):
    - some countries do a lot of imports and others do a lot of exports in a sector
    - between relatively "dissimilar" countries (in terms of income per capita)
    - lower-income countries are net exporters in primary sectors
    - higher-income countries are net exporters of manufacturing sectors

- Intra-industry trade (e.g., between U.S. and Korea):
    - countries do a lot of imports and exports in the same sector
    - between relatively "similar" countries (in terms of income per capita)
    - within manufacturing sectors
    - happens more often among higher-income countries

E.g., Intra-Industry Trade Dominates U.S.-Mexico Trade

Table 2
U.S. Trade With Mexico, 1998

Imports from Mexico	Billions of dollars	Percent
All commodities	94.7	100
Electrical machinery and equipment and related parts	25.8	27
Vehicles, other than railway	16.7	18
Nuclear reactors, boilers, machinery and mechanical	11.6	12
Mineral fuels, mineral oils	5.3	6
Articles of apparel and clothing accessories	3.8	4
Insulated wiring sets for vehicles, ships, and aircraft	3.7	4
Optical, photographic, cinematic, measuring	3.3	3
Total for top seven imports	**70.2**	**74**
Exports to Mexico		
All commodities	79.0	100
Electrical machinery and equipment and related parts	18.8	24
Nuclear reactors, boilers, machinery and mechanical	11.2	14
Vehicles, other than railway	8.0	10
Plastics and articles thereof	5.0	6
Optical, photographic, cinematic, measuring	2.3	3
Parts and accessories for vehicles	1.9	2
Paper and paperboard	1.9	2
Total for top seven exports	**49.1**	**61**

US imports of golf clubs (HS 950631), 2014			
Imports from	Value ($m)	Units (k)	Avg price
China	339.4	13507	$25
Taiwan	24.7	396	$62
Vietnam	24.3	1187	$20
Japan	7.1	62	$115
Mexico	.93	24	$38
Thailand	.75	8	$88
Hong Kong	.31	11	$26
United Kingdom	.21	14	$15
Australia	.18	3	$51
Canada	.17	2	$67
Bangladesh	.13	57	$2
Cameroon	.02	.6	$41

US exports of golf clubs (HS 950631), 2014			
Exports to	Value ($m)	Units (k)	Avg price
Japan	30.5	232	$131
Canada	24.4	380	$64
Korea	23.5	172	$136
Australia	12.1	135	$90
Hong Kong	7.4	39	$188
United Kingdom	5.9	48	$123
Singapore	3.1	23	$135
New Zealand	1.4	16	$86
Mexico	1.0	13	$82
Argentina	.8	9	$91
Thailand	.5	4	$138
Netherlands	.5	3	$144

Total US imports of golf clubs in 2014: 398 million
Total US exports of golf clubs in 2014: 159 million

Importance of intra-industry trade

- A simple measure of intra-industry trade:

$$IIT = \frac{\min\{imports, exports\}}{0.5 \times (imports + exports)}$$

  - IIT index is 1 if (imports = exports) and 0 if trade is one-way

- Variation in this IIT index for US sectors, 2009

TABLE 8-2	Indexes of Intra-Industry Trade for U.S. Industries, 2009
Metalworking Machinery	0.97
Inorganic Chemicals	0.97
Power-Generating Machines	0.86
Medical and Pharmaceutical Products	0.85
Scientific Equipment	0.84
Organic Chemicals	0.79
Iron and Steel	0.76
Road Vehicles	0.70
Office Machines	0.58
Telecommunications Equipment	0.46
Furniture	0.30
Clothing and Apparel	0.11
Footwear	0.10

What Does the World Trade?

- Most (about 55%) of the value of trade is in manufactured products (automobiles, computers, machines)
    - Services (shipping, insurance, tourism) is about 20% of trade

- A similar share of world trade (60%) is intra-industry trade
    - i.e., of the kind that U.S. and Korea do
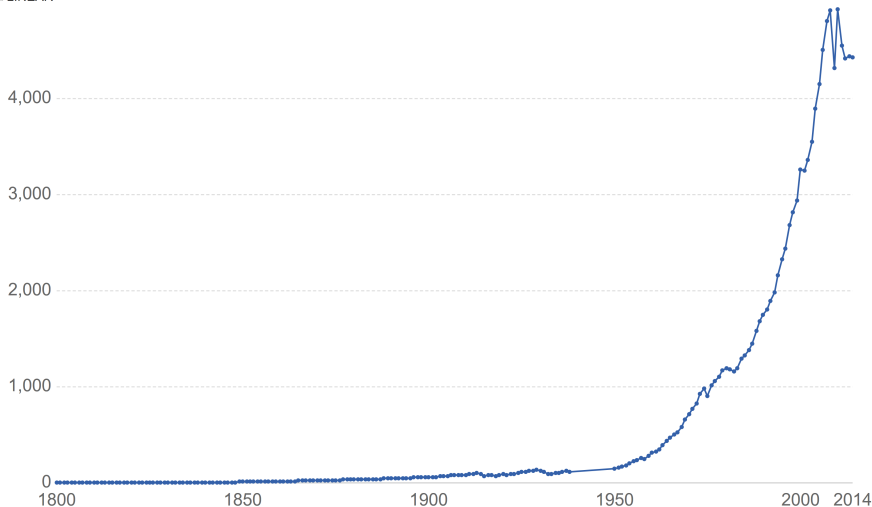
What Does the World Trade?
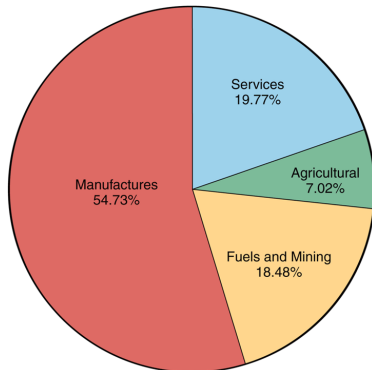
Increase in World Trade

The value of global exports

Time series of value of world exports at constant prices, relative to 1913 (i.e. values correspond to world export volumes indexed at 1913=100)
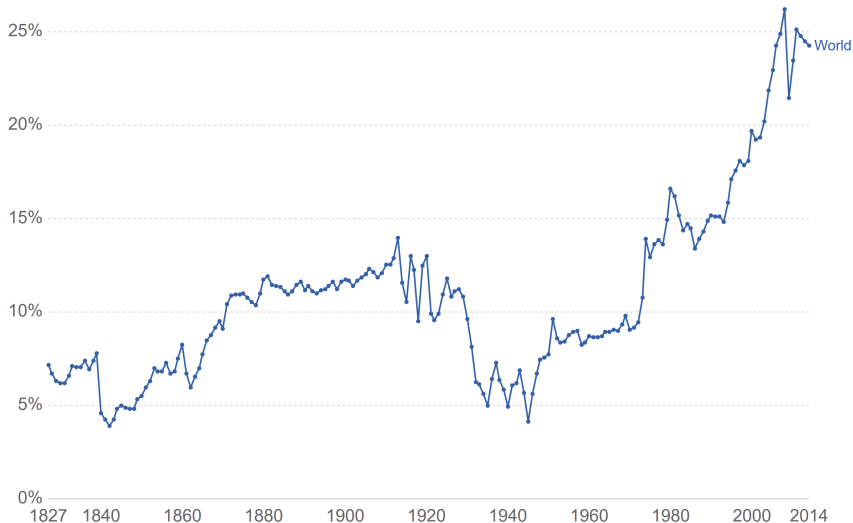
LINEAR

OurWorld in Data

Trade Grew More than GDP

Value of exported goods as share of GDP
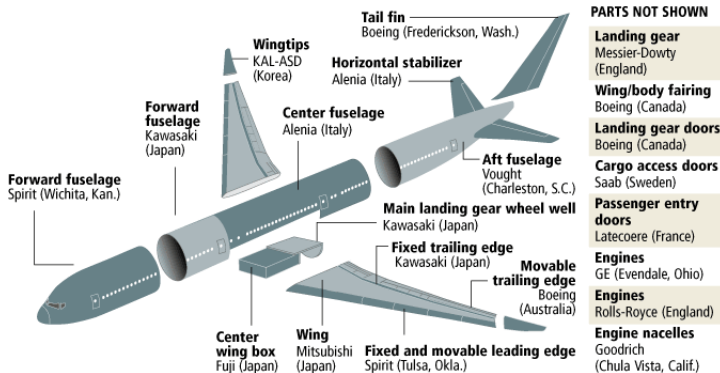Estimates correspond to merchandise export-to-GDP ratios.

Source: Fouquin and Hugot (CEPII 2016)

What explains the growth of world trade?

- Transport and communication technologies
  - Steam power
  - Air shipping
    - today, about 50% of U.S. exports and 30% of U.S. imports
  - Containers
  - Internet

- Tariff reductions

- Vertical fragmentation

Vertical Fragmentation in Manufacturing

Tail fin
Boeing (Frederickson, Wash.)

Wingtips
KAL-ASD
(Korea)

Horizontal stabilizer
Alenia (Italy)

Forward fuselage
Kawasaki
(Japan)

Center fuselage
Alenia (Italy)

Forward fuselage
Spirit (Wichita, Kan.)

Aft fuselage
Vought
(Charleston, S.C.)

Main landing gear wheel well
Kawasaki (Japan)

Fixed trailing edge
Kawasaki (Japan)

Movable trailing edge
Boeing
(Australia)

Center wing box
Fuji (Japan)

Wing
Mitsubishi
(Japan)

Fixed and movable leading edge
Spirit (Tulsa, Okla.)

PARTS NOT SHOWN

Landing gear
Messier-Dowty
(England)

Wing/body fairing
Boeing (Canada)

Landing gear doors
Boeing (Canada)

Cargo access doors
Saab (Sweden)

Passenger entry doors
Latecoere (France)

Engines
GE (Evendale, Ohio)

Engines
Rolls-Royce (England)

Engine nacelles
Goodrich
(Chula Vista, Calif.)

http://www.modernairliners.com

International Beef Primal Cut Utilization

Note: when open, Russia was also a top market for rounds

www.USMEF.org

- In the past, larger fraction came from agriculture
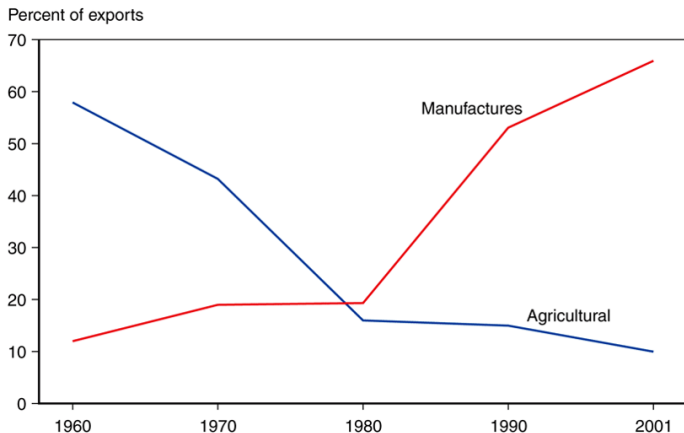
blank	Exports of United Kingdom	Imports of United Kingdom	Exports of United States	Imports of United States
1910	75.4	24.5	47.5	60.7
2015	72.3	73.6	74.8	78.4

Changing Export Composition: Developing Countries

- Same pattern for developing countries


Percent of exports

In the end, who trades with whom?

- How do all the forces discussed so far shape the map of bilateral world trade?

- Gross trade flows are about 30% of world value added
  - Note: International transactions only register gross trade flows (not value-added trade flows)

- More than $1/2$ of world trade is bilateral trade between developed (industrial) countries

- Only 10-15% between developing countries

Map of World Trade
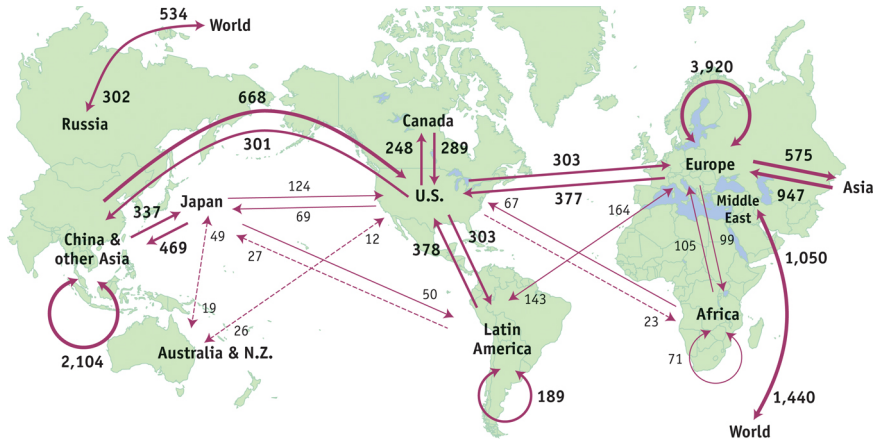
Total world trade flows in 2010: $16,800 billion

World Trade in Goods
- - - - - < $50 billion
——— $50–150 billion
——— $150–500 billion
——— > $500 billion

Summing Up

1. What are the determinants of trade between countries?
   - The gravity model
     - Economic size
     - Distance, barriers, and borders
     - Other forces (e.g., common language)
   - Specialization patterns

2. What do countries trade?
   - Inter-industry vs. intra-industry trade
   - Intra-industry trade became more important over time

Online Resources with Trade Data

- Academic
  - World Bank
  - CEPII
  - FAOstat
  - Feenstra
  - WIOD

- Maps
  - MIT observatory of Economic Complexity
  - FAO Stat
  - Worldmapper