



国际经济学

全球贸易典型事实与贸易量的决定

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提纲

1 Stylized Facts about World Economy

- Global Trade 的大趋势
- What does the world trade?
- Who trade with whom?
- the role of China in the world economy

2 贸易背后的影响因素初探：以美国为例

3 How is the Trade Volume determined: the Gravity Model

- The Simplest Gravity Model
- Border Effect in GE



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全球贸易大图景 (1500-2011)

- 过去五个世纪，全球贸易的 scale 与日俱增
- 这种趋势是否还会延续 (glob or deglob?)

Globalization over 5 centuries (1500-2011)

Shown is the sum of world exports and imports as a share of world GDP (%)
The individual series are labeled with the source of the data

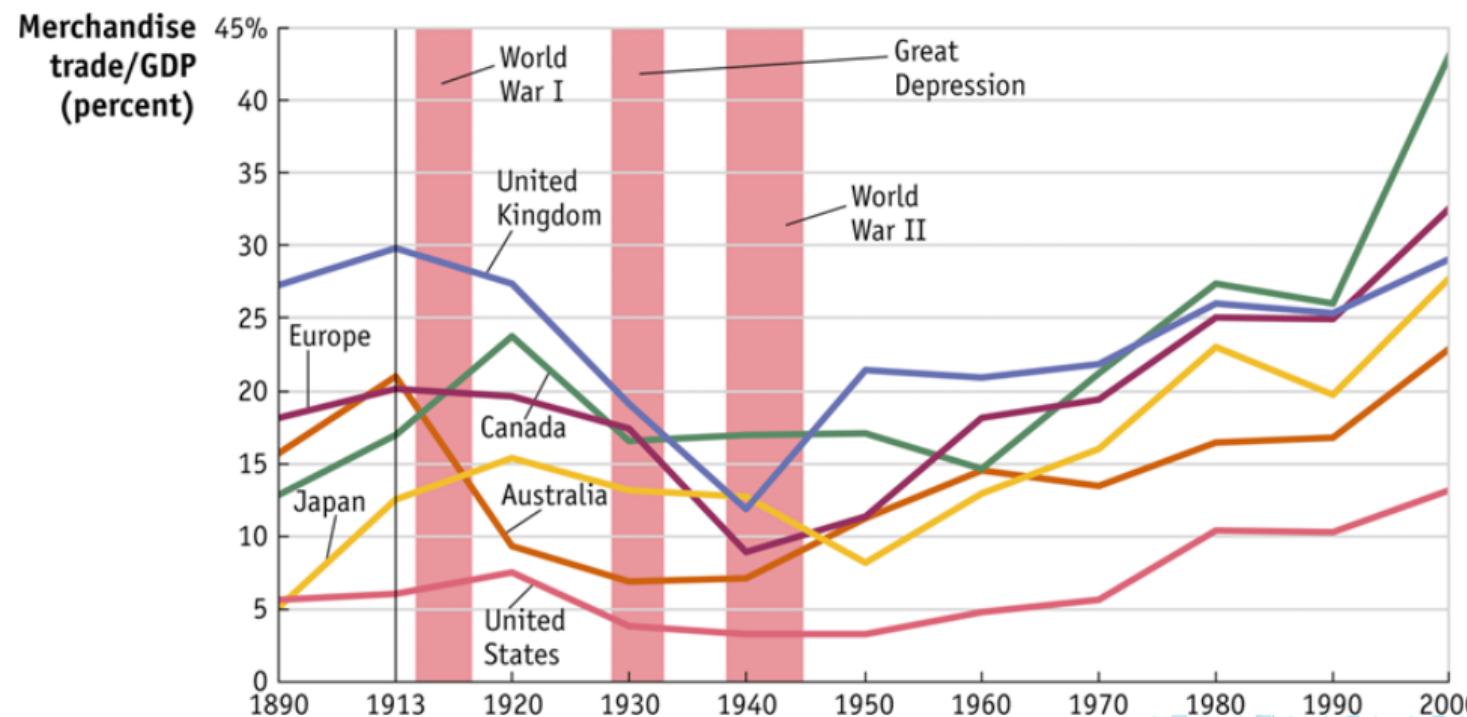
Our World
in Data



Data sources: Klasing and Milionis (2014), Estevadeordal, Frantz and Taylor (2003) and the Penn World Tables Version 8.1



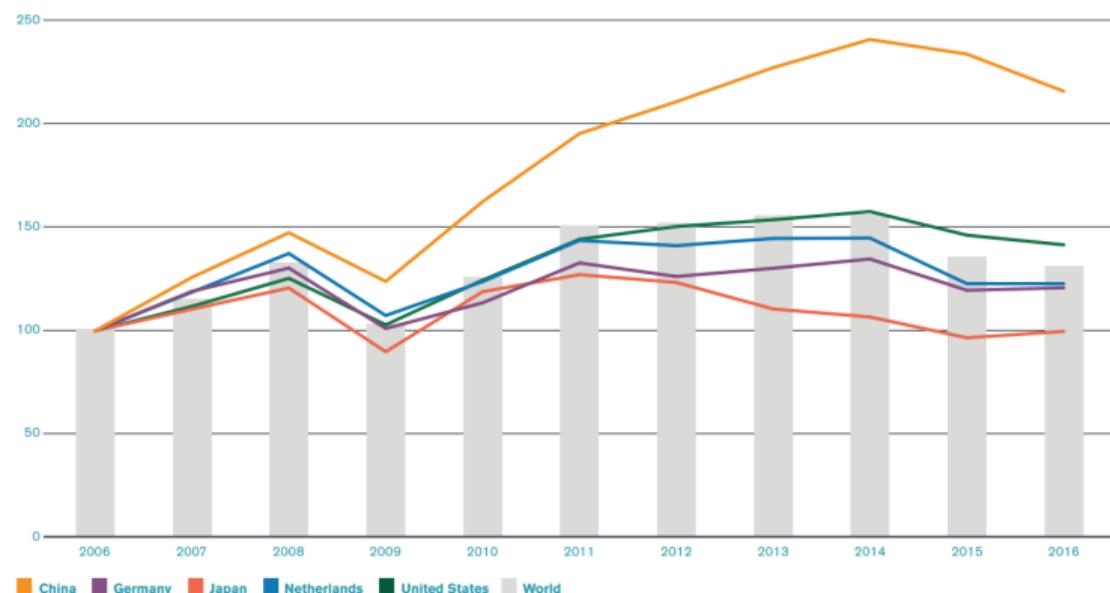
全球化的两次浪潮





谁在参与贸易

Leading traders and world exports of merchandise trade, 2006-2016
(Indices, 2006 = 100)



Source: WTO Secretariat.

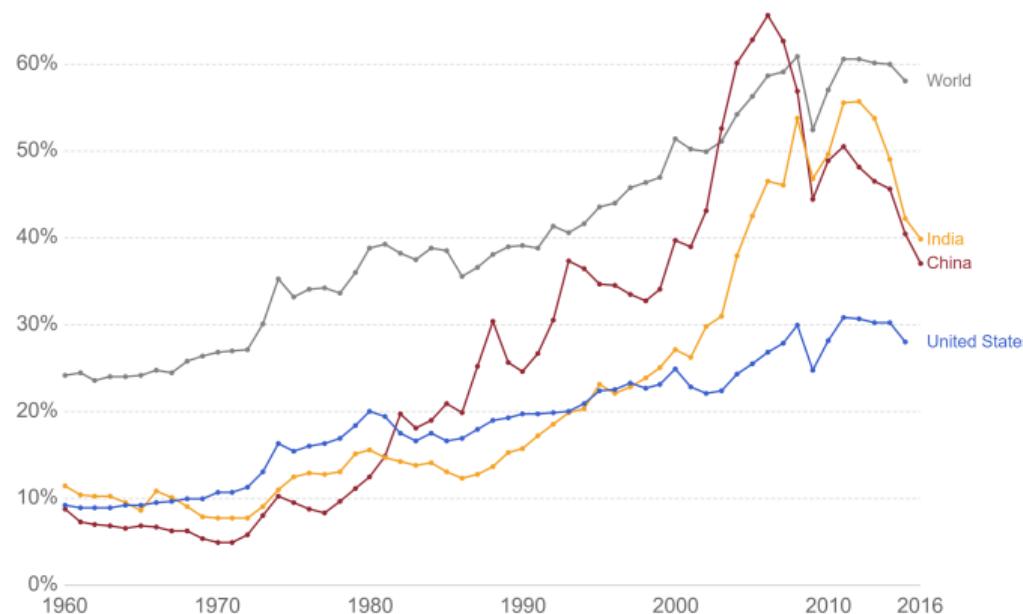


全球主要经济体贸易依存度

Trade as share of GDP

The map shows trade openness – the sum of exports and imports of goods and services measured as a share of gross domestic product.

Our World
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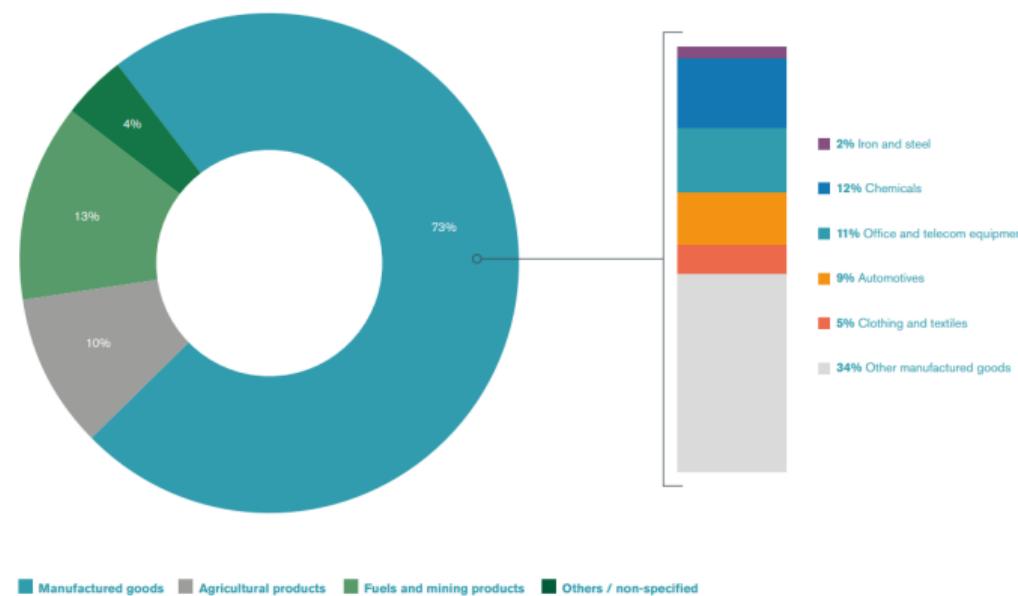
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- Mostly manufactures
- Trade in services is growing as a share of world trade

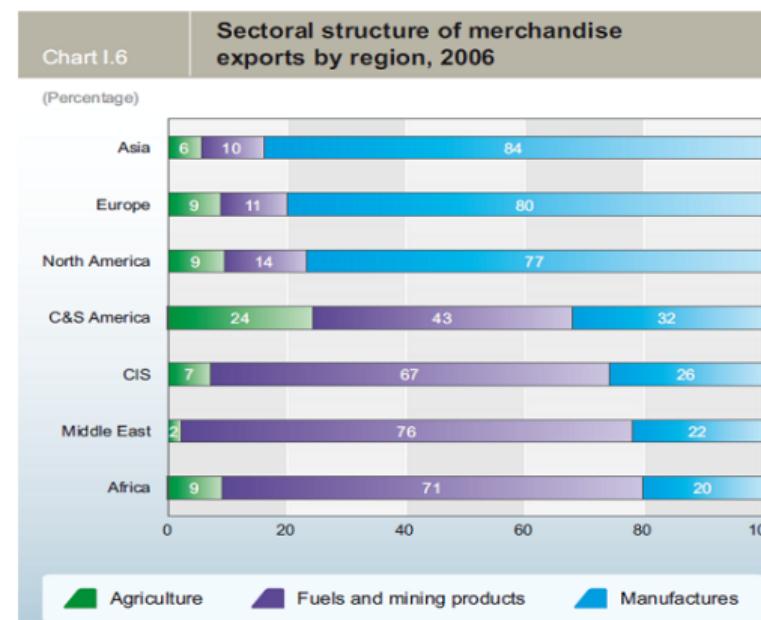
World merchandise exports by major product groups, 2016
(Share, %)





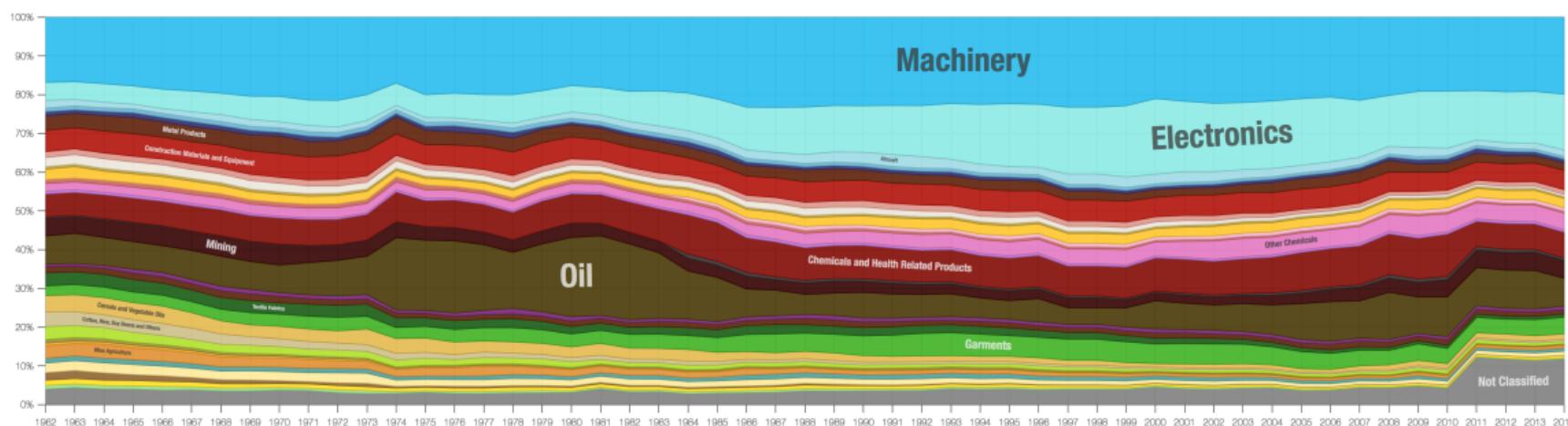
What Does the World Trade?

- Fuel and mining products are key exports for some countries





What is traded around the world





出口的 quality

- 产品技术复杂度
- 产品单价
- 产品质量
- 出口产品附加值
- 出口产品差异度
- 经济复杂度-人类想象力的具象化

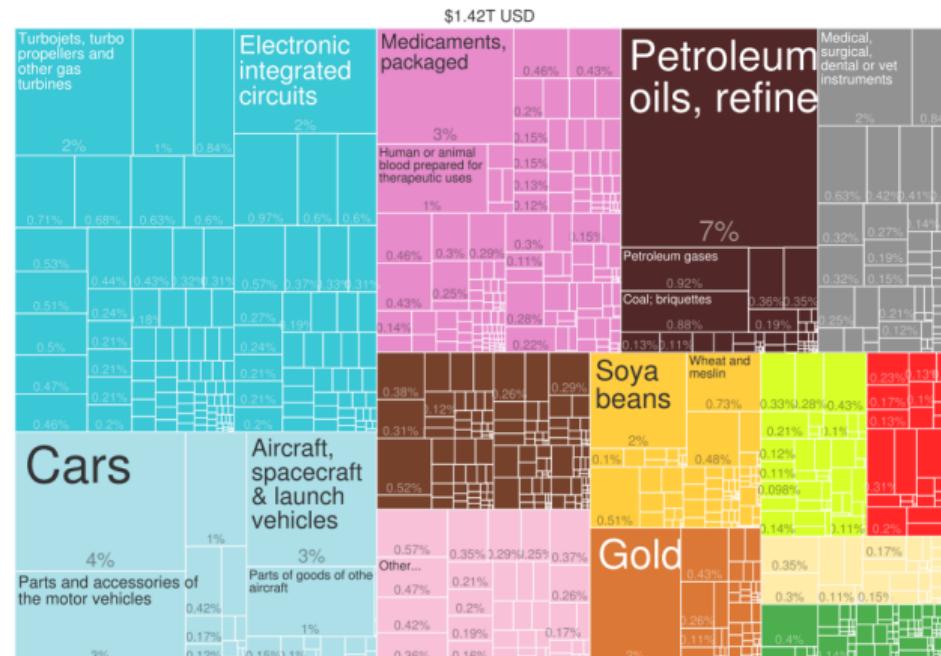
隆重介绍一个物理学家和他写的经济学著作：塞萨尔·伊达尔戈 (CÉSAR A. HIDALGO)

<http://atlas.cid.harvard.edu/rankings>





What Did XXX Export in 2013?

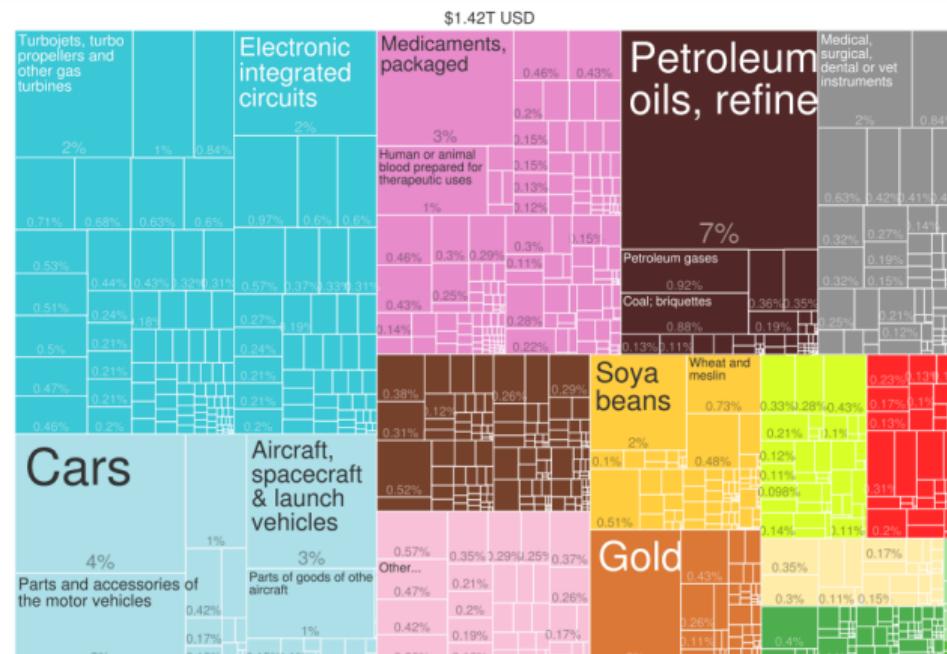


Courtesy of AJG Simoes, CA Hidalgo. The Economic Complexity Observatory: An Analytical Tool for Understanding the Dynamics of Economic Development. Workshops at the Twenty-





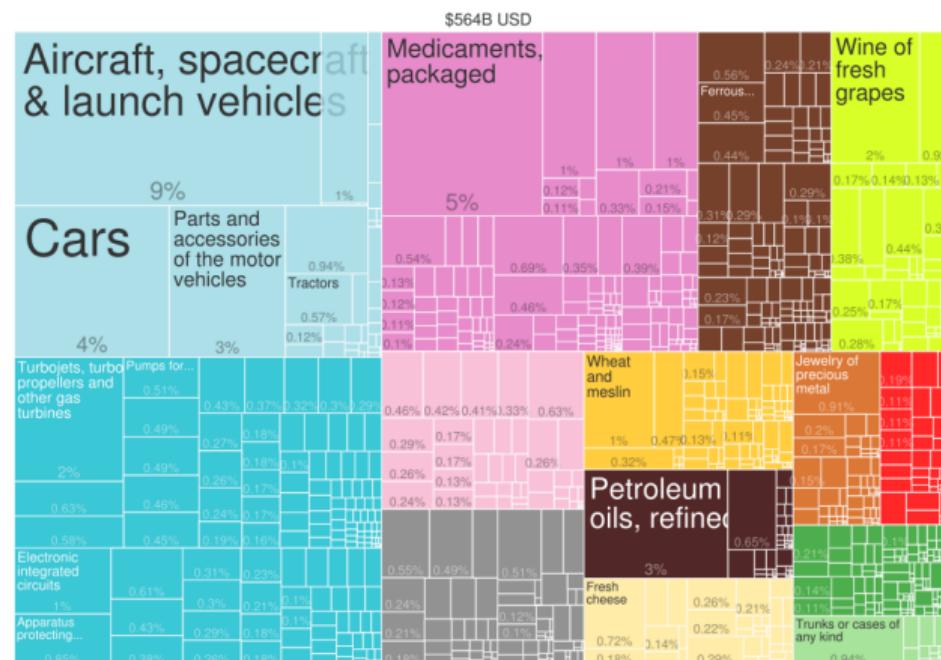
What Did U.S. Export in 2013?



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What Did XXX Export in 2013?

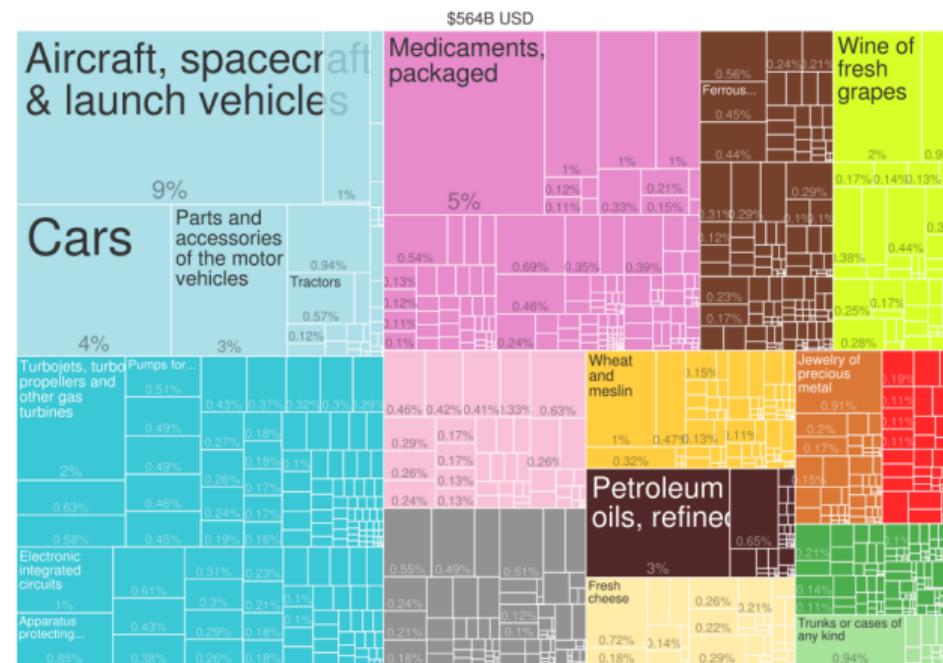


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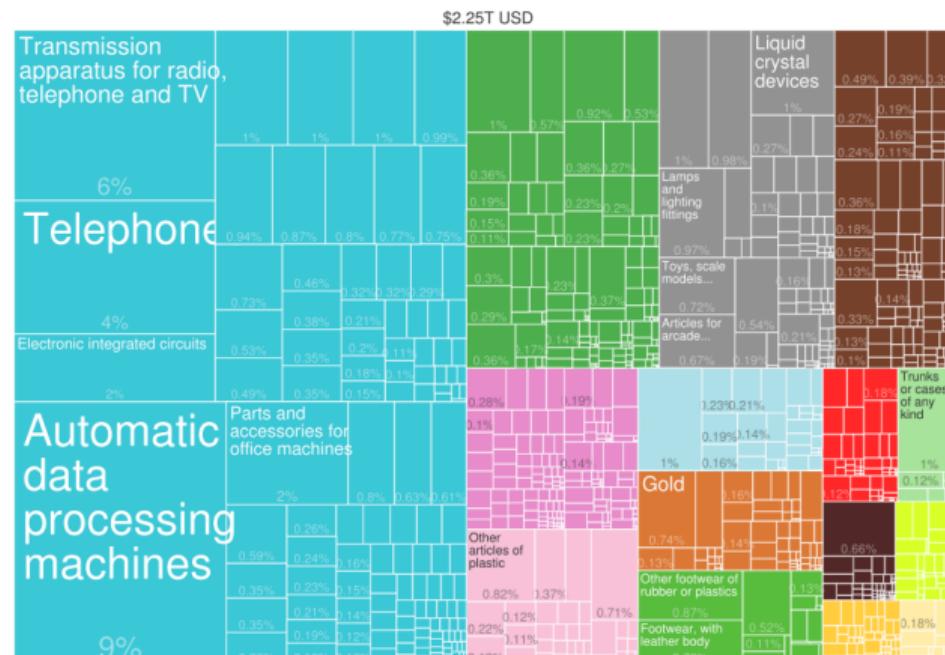
What Did France Export in 2013?



Courtesy of AJG Simoes, CA Hidalgo. The Economic Complexity Observatory: An Analytical Tool for Understanding the Dynamics of Economic Development. Workshops at the Twenty-



What Did XXX Export in 2013?

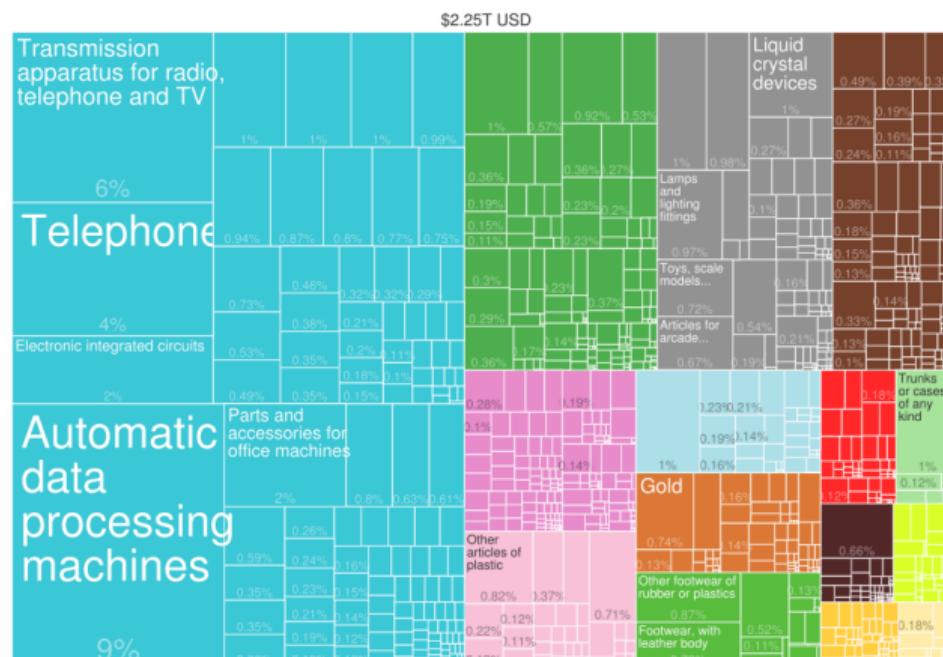


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What Did China Export in 2013?

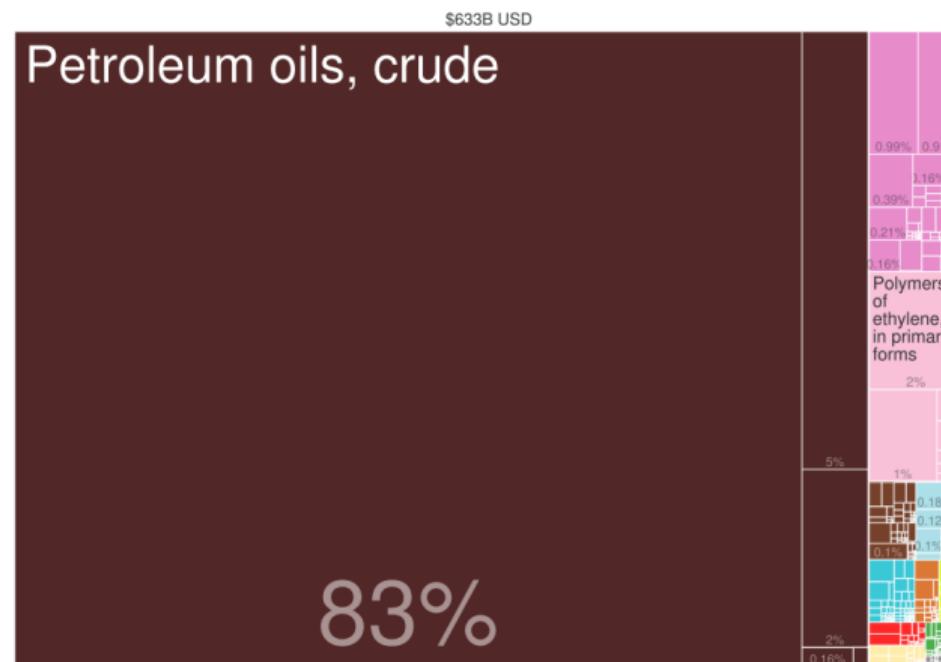


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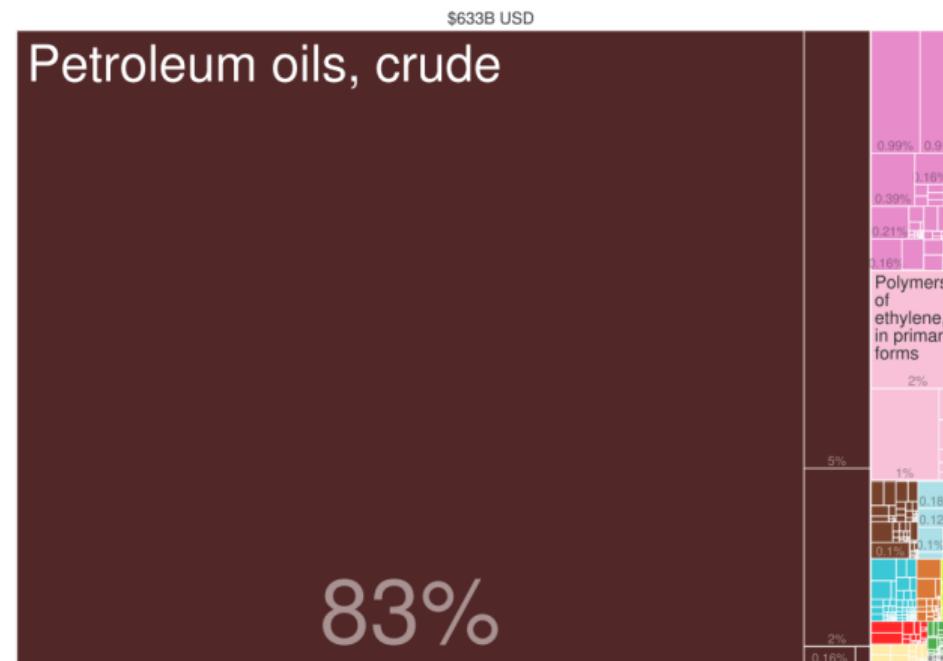
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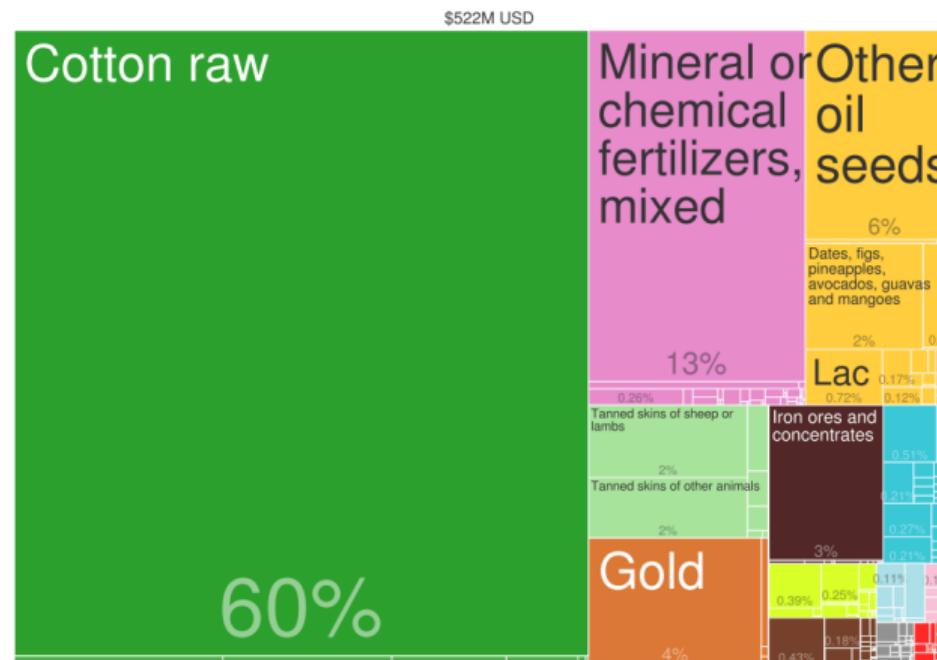
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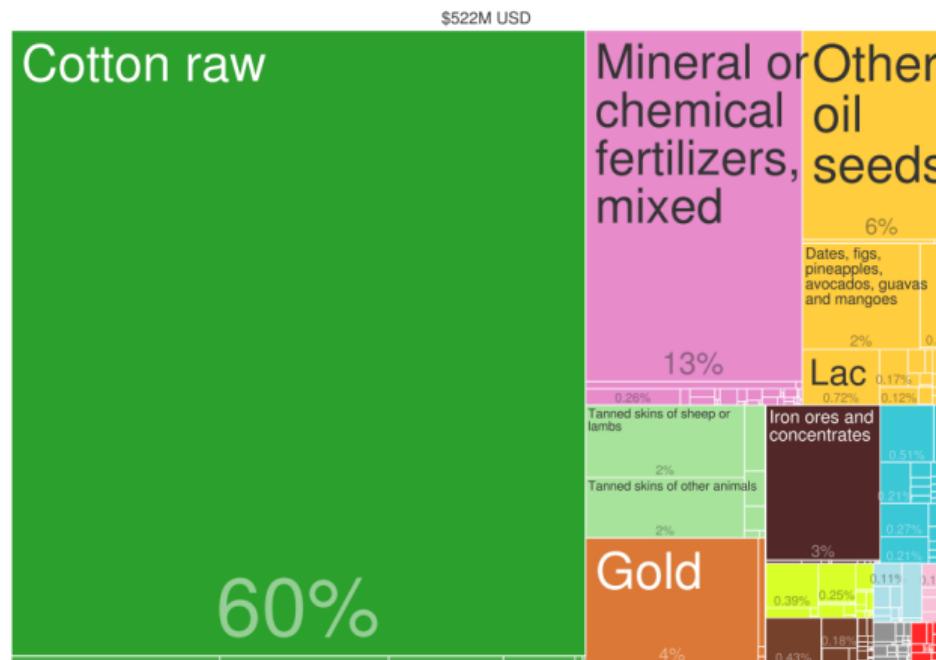
What Did XXX Export in 2013?



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What Did Mali Export in 2013?



Courtesy of AJG Simoes, CA Hidalgo. The Economic Complexity Observatory: An Analytical Tool for Understanding the Dynamics of Economic Development. Workshops at the Twenty-



Export Composition of LDCs

- Developing countries have substantially changed the composition of their exports
- In 1960, 58% of exports were agricultural products; 12% manufactured products
- In 2001, 65% of exports were manufactured products; 10% agricultural products

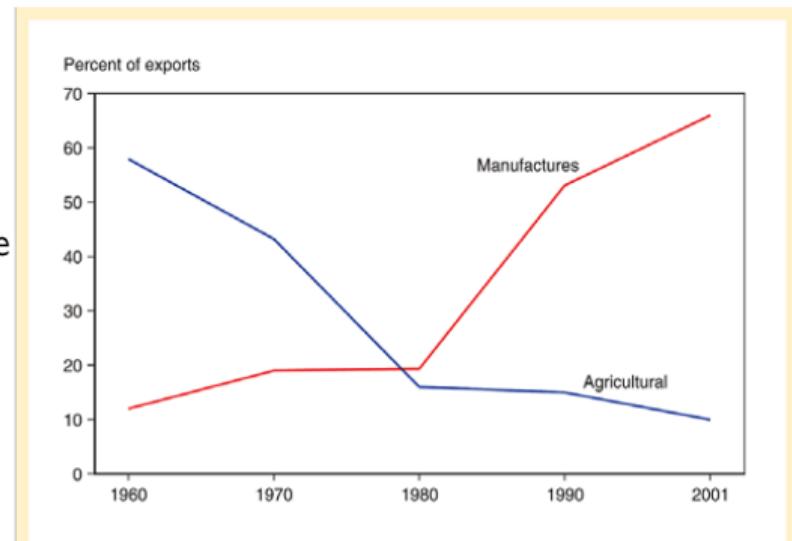


Figure 2-7

The Changing Composition of Developing-Country Exports

Over the past 40 years, the exports of developing countries have shifted toward manufactures.

Source: United Nations Council on Trade and Development.



Also True in Historical Perspective

TABLE 2—COMMODITY COMPOSITION OF U.S. TRADE,
1890 AND 1990

Year	Percentage distribution	
	Exports	Imports
<i>Agricultural Goods:</i>		
1890	42.2	33.1
1990	11.5	5.6
<i>Raw Materials:</i>		
1890	36.6	22.8
1990	11.6	14.8
<i>Manufactures:</i>		
1890	21.2	44.1
1990	77.0	79.6

Notes: Figures may not total to 100 due to rounding.
Agricultural goods includes processed foods.

Sources: U.S. Bureau of the Census (1975), series U213–24; *Statistical Abstract of the United States* (1991 pp.



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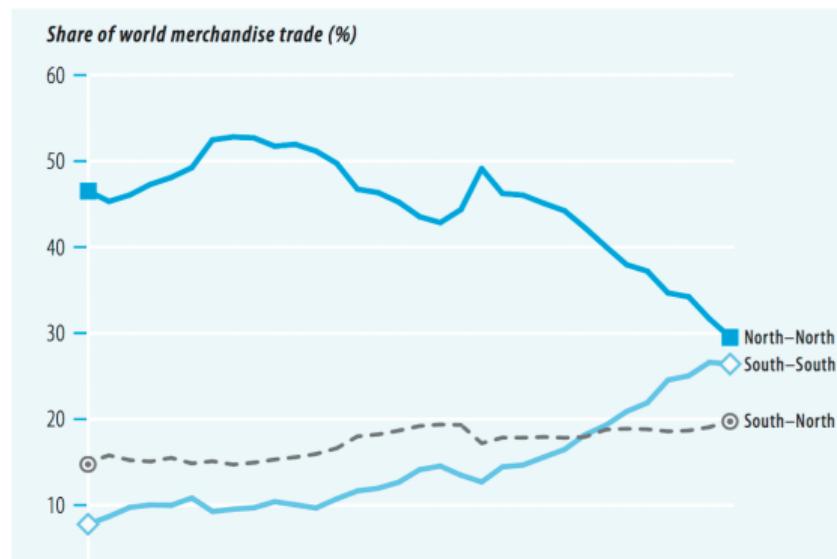
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Who Trades with Whom?

- as a share of world merchandise trade, South–South trade more than tripled over 1980–2011, while North–North trade declined.
- China has been a key driver of this dynamic





认识一下全球贸易中的 leaders

A6. Leading exporters and importers in world merchandise trade, 2016 (Billion dollars and percentage)

Rank	Exporters	Value	Share	Annual percentage change	Rank	Importers	Value	Share	Annual percentage change
1	China	2098	13.2	-8	1	United States of America	2251	13.9	-3
2	United States of America	1455	9.1	-3	2	China	1587	9.8	-5
3	Germany	1340	8.4	1	3	Germany	1055	6.5	0
4	Japan	645	4.0	3	4	United Kingdom	636	3.9	1
5	Netherlands	570	3.6	0	5	Japan	607	3.7	-6
6	Hong Kong, China domestic exports re-exports	517 26 491	3.2 0.2 3.1	1 95 -1	6	France	573	3.5	0
7	France	501	3.1	-1	7	Hong Kong, China retained imports a	547 121	3.4 0.7	-2 -10
8	Korea, Republic of	495	3.1	-6	8	Netherlands	503	3.1	-2
9	Italy	462	2.9	1	9	Canada b	417	2.6	-5
10	United Kingdom	409	2.6	-11	10	Korea, Republic of	406	2.5	-7



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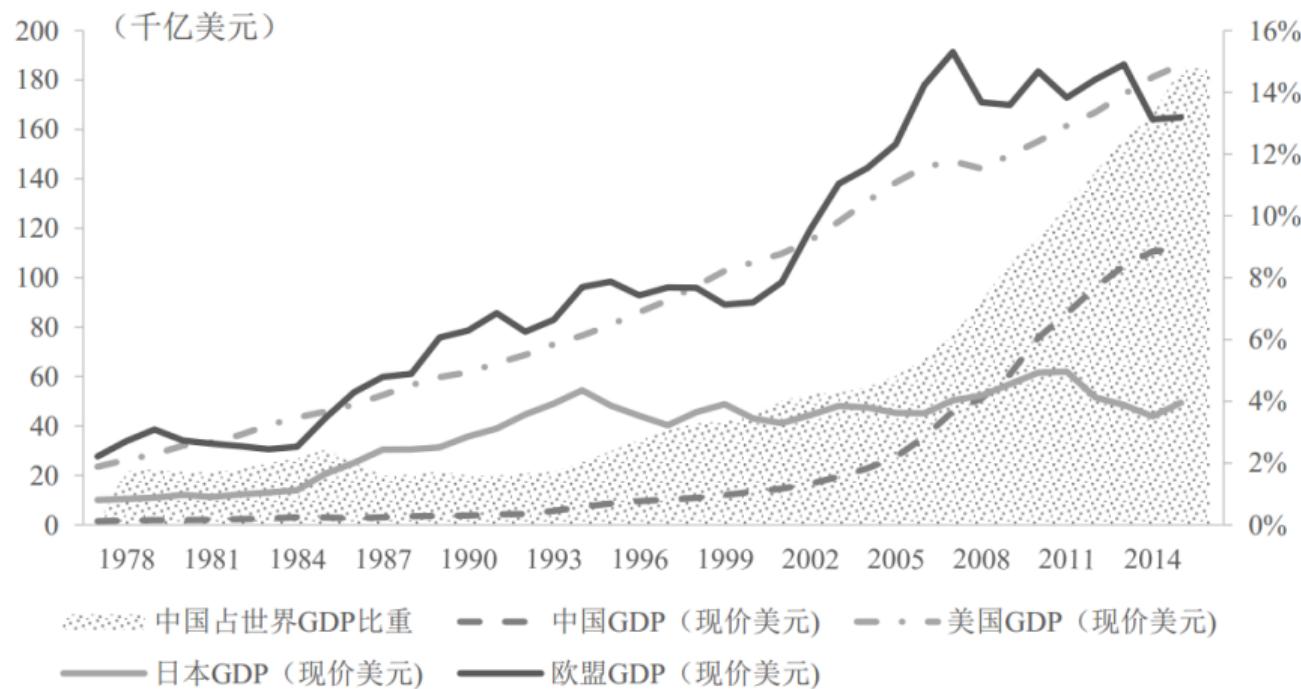
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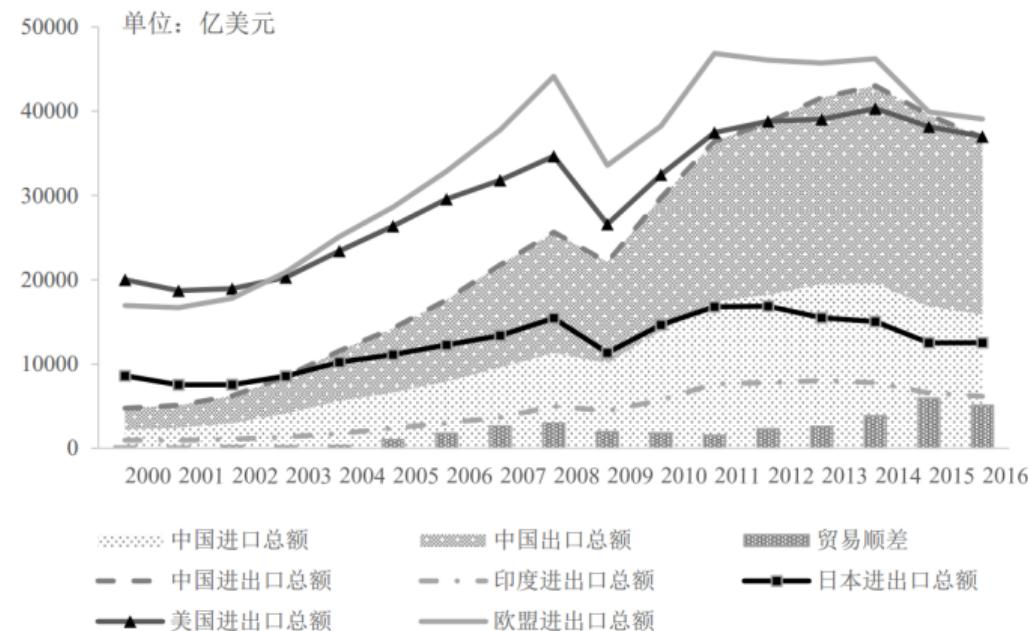


世界经济中的中国



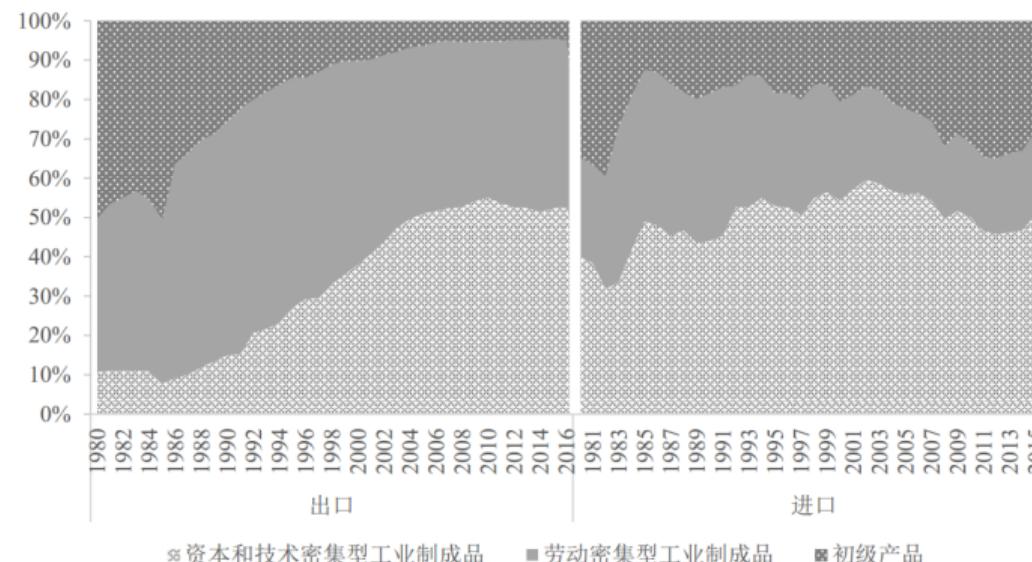


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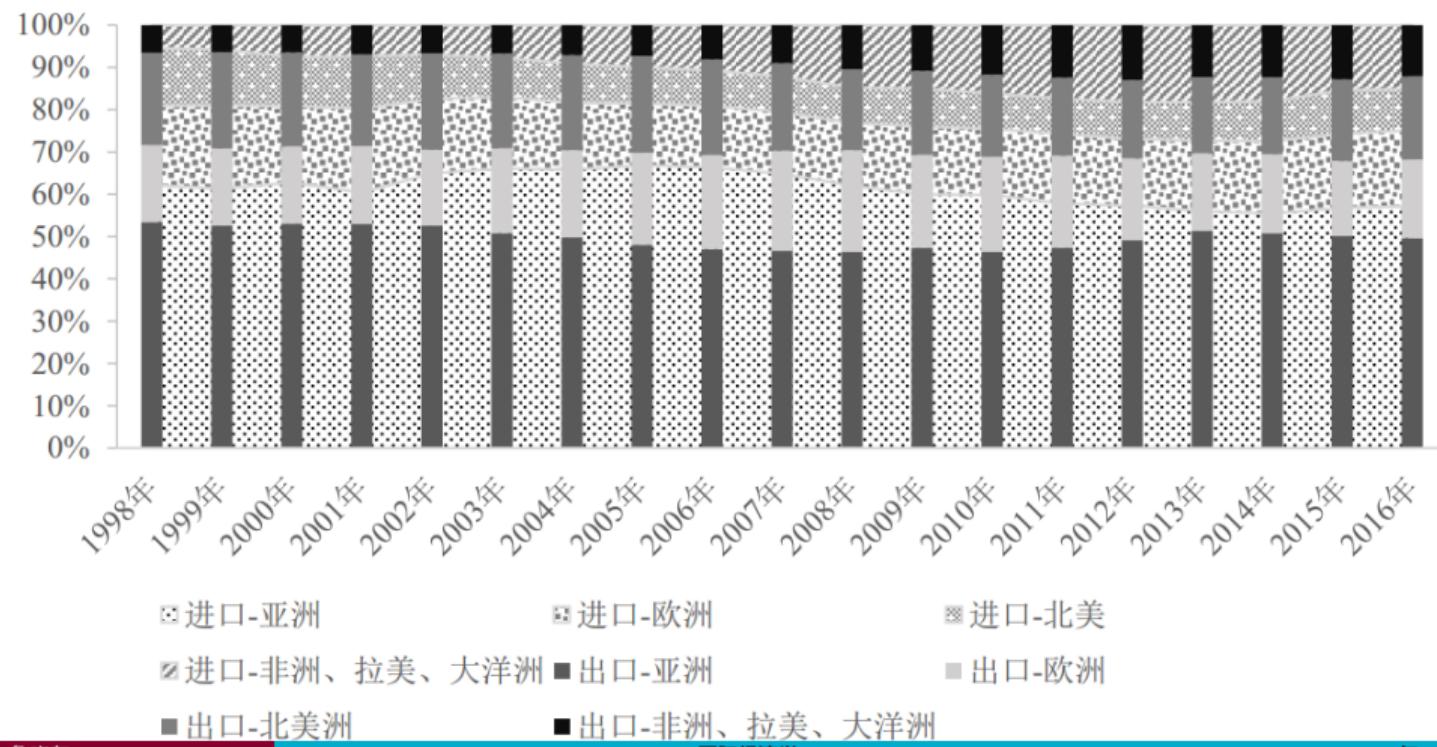


中国进出口结构的变化 (1980-2016)



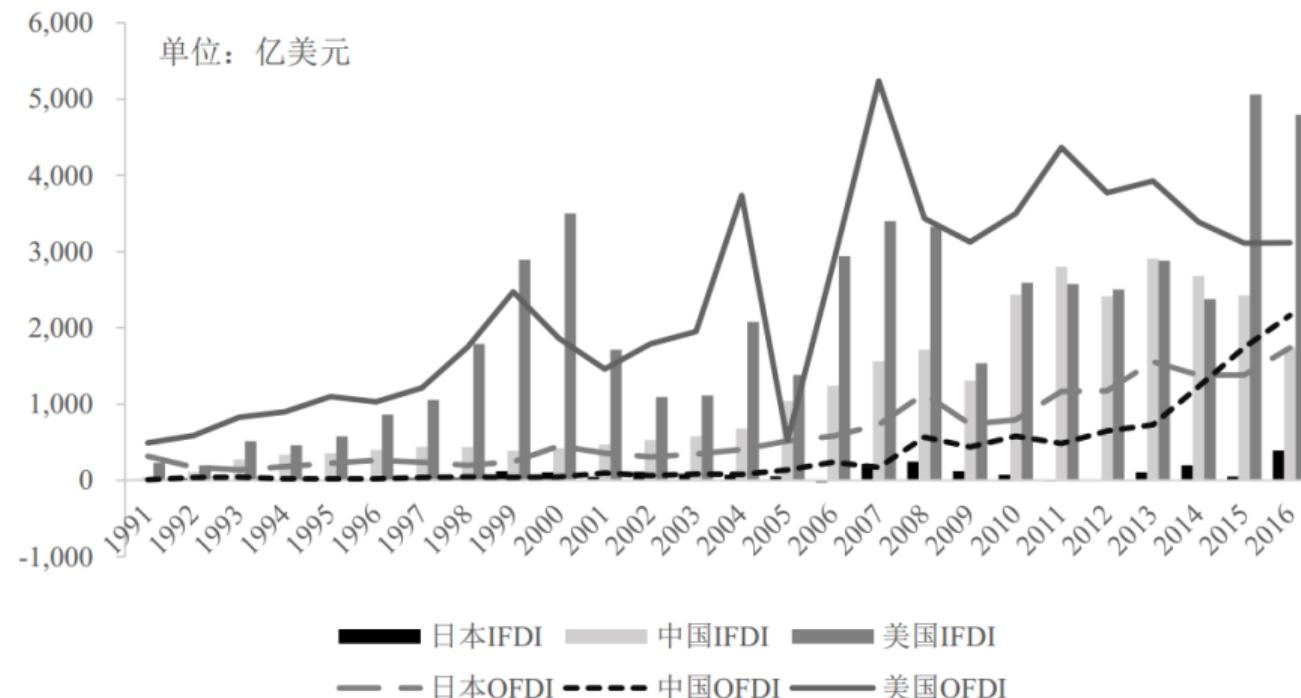


中国进出口流向的变化 (1998-2016 年)



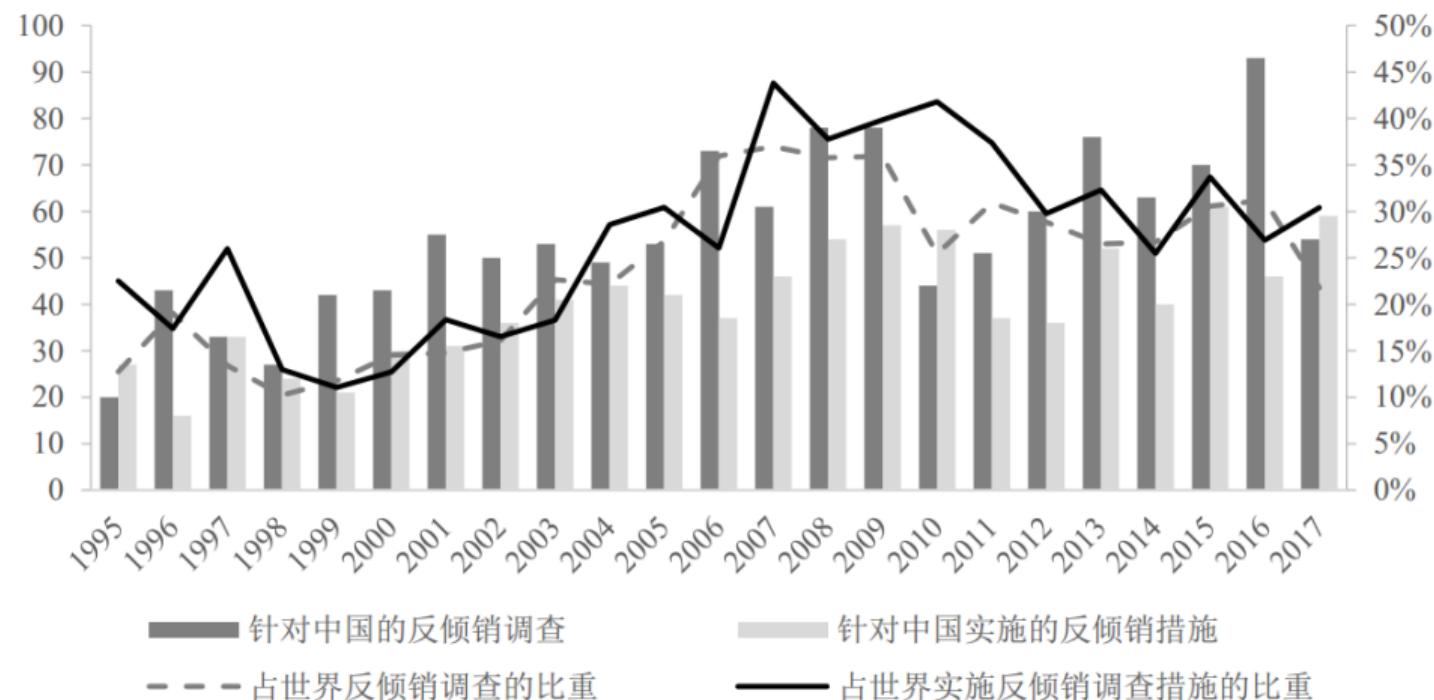


全球直接投资中的中国





中国受到的反倾销调查和措施





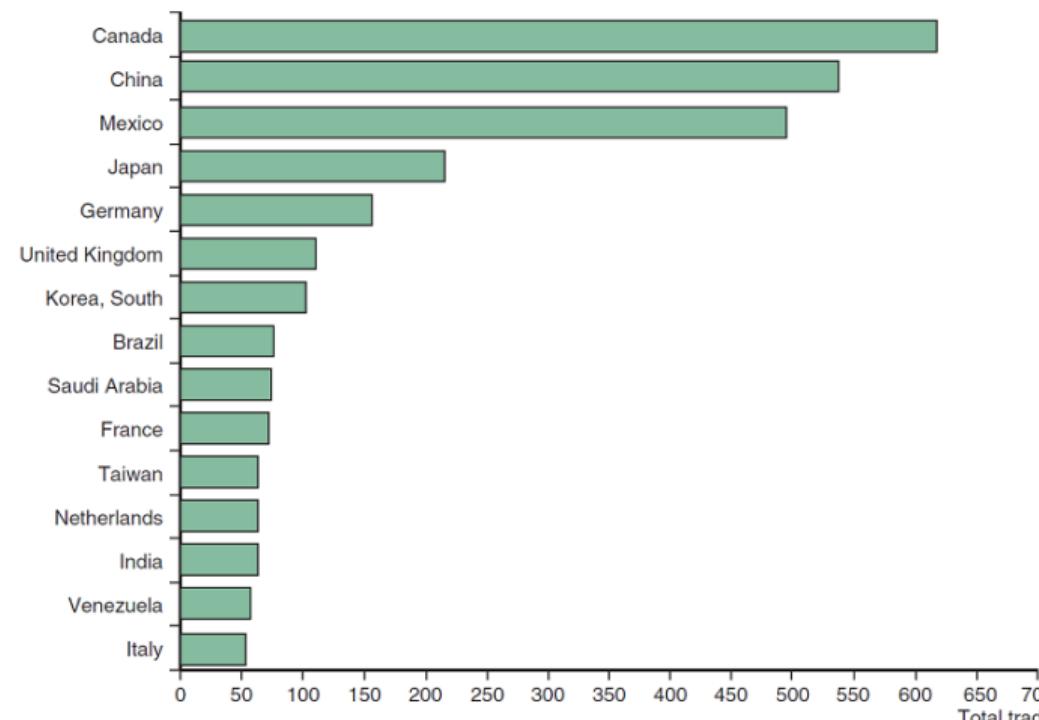
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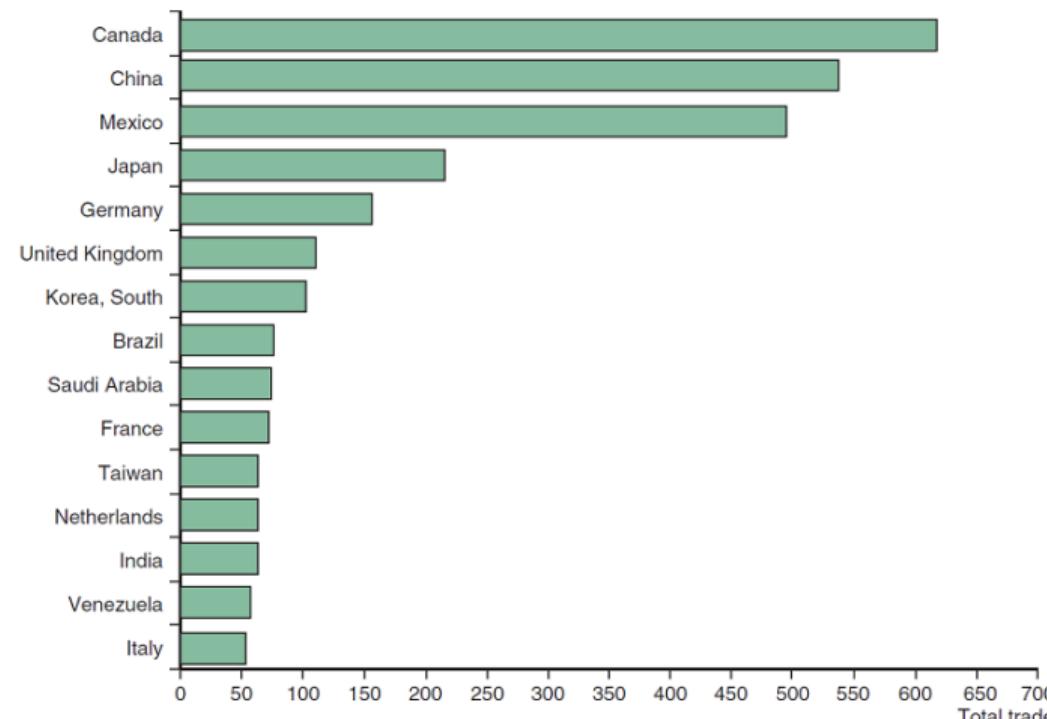


Main U.S. Trading Partners in 2012





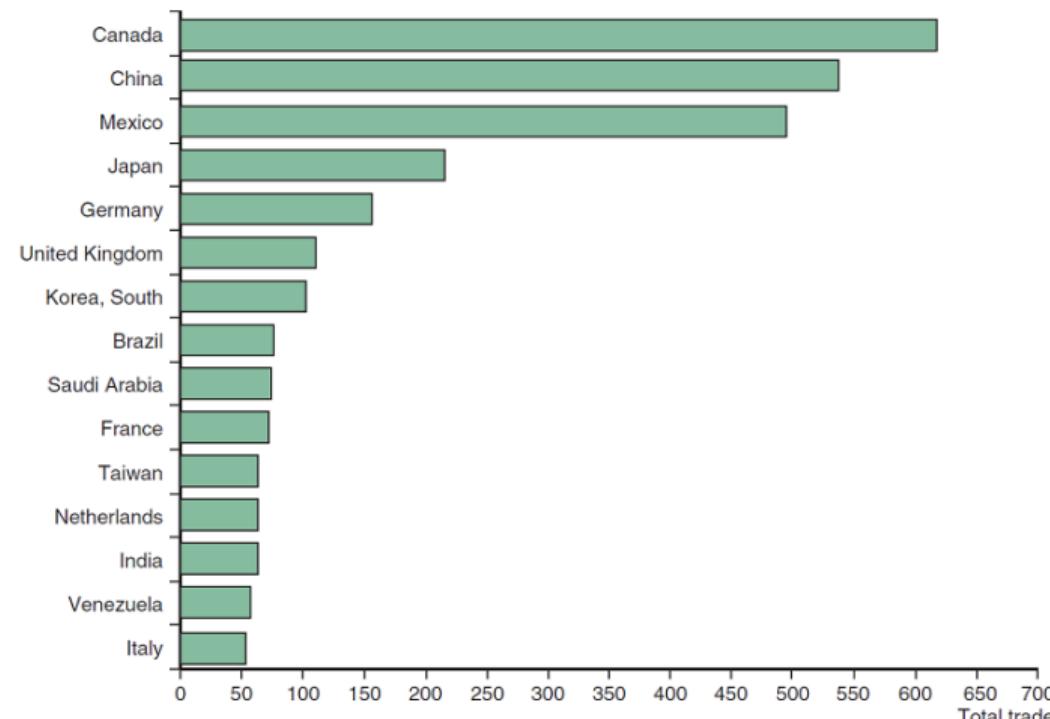
Main U.S. Trading Partners in 2012



- Geography and size are important determinants of bilateral trade flows



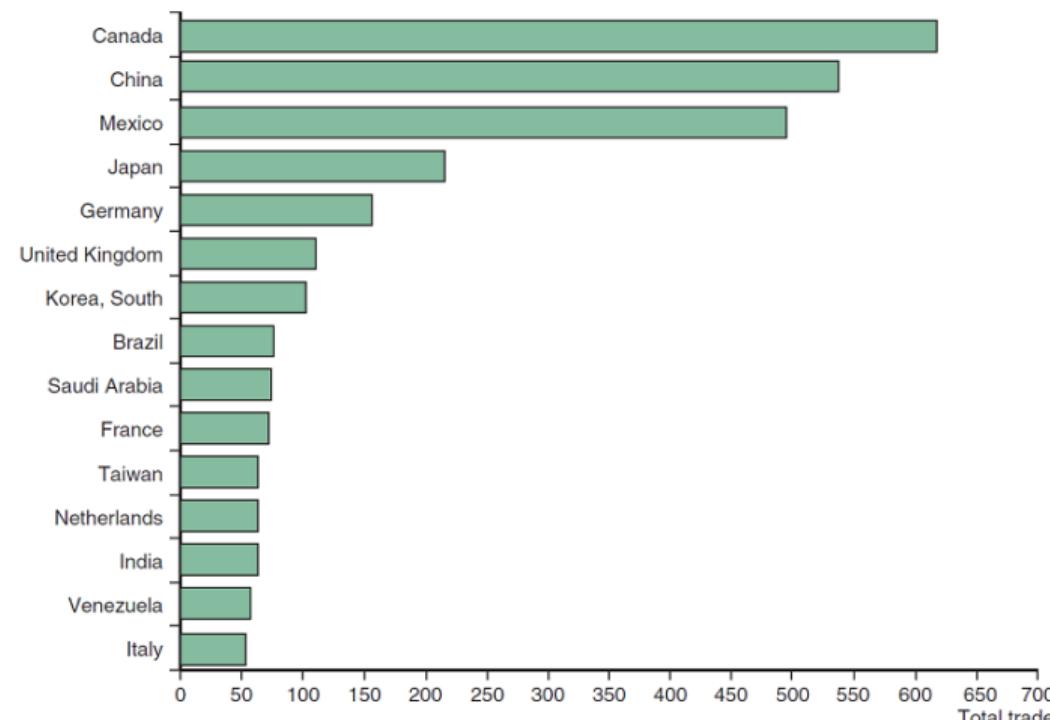
Main U.S. Trading Partners in 2012



- Geography and size are important determinants of bilateral trade flows
- 5 largest U.S. trading partners in 2012: Canada, China, Mexico, Japan and Germany



Main U.S. Trading Partners in 2012



- Geography and size are important determinants of bilateral trade flows
- 5 largest U.S. trading partners in 2012: Canada, China, Mexico, Japan and Germany
- The largest 15 trading partners with the U.S. accounted for 69% of the value of US trade in 2012

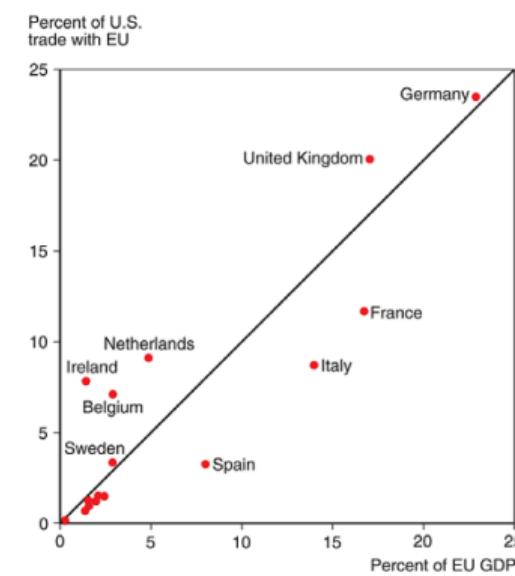


The Effect of Size on U.S.-EU Trade

Figure 2-2

The Size of European Economies, and the Value of Their Trade with the United States

Source: U.S. Department of Commerce, European Commission.



- Note that the slope is close to 1



Towards A Quantitative Equation

- Suppose that the fraction of income that any foreign country (say U.K.) spends on U.S. goods is equal to the share of U.S. goods in world spending...
- ...which is equal to the U.S. share of world GDP
- The total spending of consumers from any given country (say U.K.) is equal to that country's GDP
- So exports from U.S. to U.K are equal to:

$$X^{US, UK} = \frac{GDP^{US}}{GDP^{World}} \times GDP^{UK}$$



Distance Matters

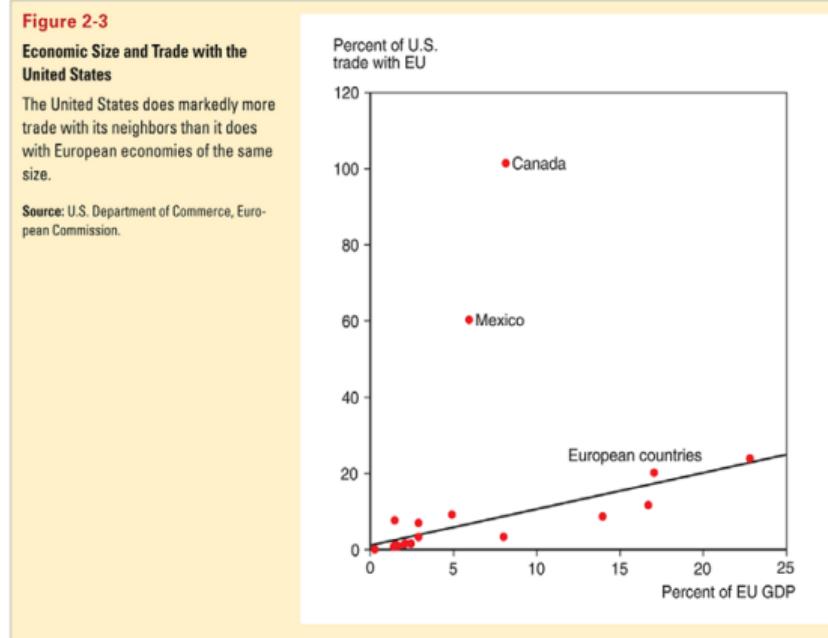
- It makes intuitive sense that distance between markets will reduce trade flows
- Directly through higher costs of transports
- Indirectly through less personal contact and communication

Figure 2-3

Economic Size and Trade with the United States

The United States does markedly more trade with its neighbors than it does with European economies of the same size.

Source: U.S. Department of Commerce, European Commission.





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The Gravity Equation: Benchmark

- In its basic form, the gravity model assumes that only size and distance are important for trade in the following way:

$$T^{ij} = \frac{AY^i Y^j}{D^{ij}}$$

- where

- T^{ij} is the value of trade between country i and country j
- A is a constant
- Y^i is the GDP of country i
- Y^j is the GDP of country j
- D^{ij} is the distance between country i and country j

- Analogy to Newton's law of gravitation

- Gravitational attraction is proportional to the product of masses and inversely proportional to the square of distance



The Gravity Equation: an Extended Version

- The assumptions needed to get proportionality of GDPs are strong
- A more general form is

$$T^{ij} = A \cdot (Y^i)^a \cdot (Y^j)^b / (D^{ij})^c$$

$$\ln T^{ij} = \ln A + a \ln Y^i + b \ln Y^j - c \ln D^{ij}$$

- where a , b , and c are allowed to differ from 1
- The gravity equation is very easy to run (widely available data online –e.g., Andrew K. Rose' s website)
- Perhaps surprisingly, the gravity model works fairly well in predicting actual trade flows
- Coefficients a , b and c are all close to 1
- Typical R^2 80%



Embellishing the Gravity Equation

- Obviously, there are many other determinants of bilateral trade flows
- The evidence confirms the “statistical significance” of:
 - sharing a common border (beyond the effect of distance);
 - sharing a common language or colonial links;
 - having signed a free trade agreement;
 - having cultural ties
 - Business networks
- useful resource of the above information: CEPII gravity database



经济学中的孤儿：The Theoretical Fundation of GE

- The gravity model was popular in the 1960's by Tingbergen(1962) initially, because it could account for empirical regularities of world trade that were not explained by traditional theories.
- However, most of its first economic applications were empirical studies, without any serious attempt to justify the model theoretically.
- The development of theories of intra-industry trade made it possible to give theoretical foundations to this “orphan” equation.
- There is today a wealth of economic justifications for this equation:
 - general equilibrium model with pure and perfect competition and differentiated products
 - models with monopolistic competition
 - the Heckscher-Ohlin's model
- the gravity equation can be justified by **almost any model** in which countries specialize in the production of differentiated goods.



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Border Effects

- Other things equal, countries trade more with their neighbors
- First Raised by McCallum(AER, 1995)
- But borders significantly impede trade flows (relative to intra-national trade flows)

TABLE 2-3 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.



Border Effects



Figure 2-4

Canadian Provinces and U.S. States That Trade with British Columbia

- Estimates suggest that the border between the U.S. and Canada is around 2000 miles wide



Estimating border effects

The basic gravity equation with BE is

$$\ln x^{ij} = \alpha_0 + \alpha_1 \ln y^i + \alpha_2 \ln y^j + \alpha_3 \ln d^{ij} + \alpha_4 \delta^{ij} + u_{ij}$$

where

$$\delta^{ij} = \begin{cases} 1 & \text{if } i \text{ and } j \text{ are two Canadian provinces} \\ 0 & \text{if } i \text{ is a Can. province and } j \text{ a US state or vice versa.} \end{cases}$$

It makes intuitive sense that distance between two Canadian provinces is smaller than between a Canadian province and a US state.

Estimated BE: Let \hat{x}_{can}^{ij} be the estimated trade between two Canadian provinces and \hat{x}^{ij} the estimated trade between a Canadian province and a US state.

$$\ln \hat{x}_{can}^{ij} - \ln \hat{x}^{ij} = \hat{\alpha}_4$$

so BE is

$$\frac{\hat{x}_{can}^{ij}}{\hat{x}^{ij}} = e^{\hat{\alpha}_4};$$

$\hat{\alpha}_4 = 3.09$ implies a BE of 26.97. Suspiciously large!



引力方程的后续进展

- McCallum(1995) 的结果出乎经济学家的预料推动了该领域的进展
- Anderson and Wincoop(2003) 提出一种猜想：由于美国加拿大经济规模悬殊，故而可能导致估计错误，因为贸易中存在“多边引力”
- 在 Melitz(2003) 之后，国际贸易研究开始全面向微观领域进发，推动了引力方程向企业层贸易延伸
 - Helpman, Melitz and Robinstein(2008) 基于异质企业贸易模型，引入一个考虑企业自主选择出口目的地因素的广义引力等式 *Generalized Gravity Equation*, 并将贸易流量分解为 Intensive and Extensive 两个 Margins.
 - Chaney(2011) 做出一个更为大胆的尝试，考虑贸易网络与初创不成熟贸易网络两分的情形，引出了企业间的匹配问题，该模型被称为**考虑匹配摩擦约束下的贸易模型** *Model of Trade Subject to Matching Frictions*



总结

Today's Takeways