全球化与中国能源利用
China's Energy Use Under Globalization

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问题 The Question

- 全球化对中国的能源消费有什么影响?
- What is the impact of globalization on energy consumption in China?

提纲 Outline

- 全球化诸要素
- 中国的货物与能源进出口
- 贸易中的蕴含能
- 能耗问题

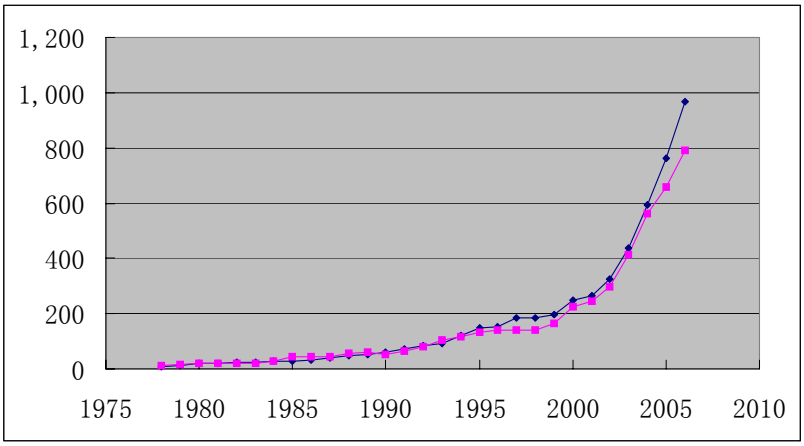
- Elements of globalization
- Import/Export of Goods and Energy
- Embedded energy in trade
- Energy intensity

经济全球化 Globalization

- 资源的全球配置
- 资本的全球流动
- 市场的全球扩张
- 生产的全球导向
- 环境的全球关注

- Global allocation of resources
- Global flow of capital
- Global market system
- Global orientation of production
- Global focus on environment

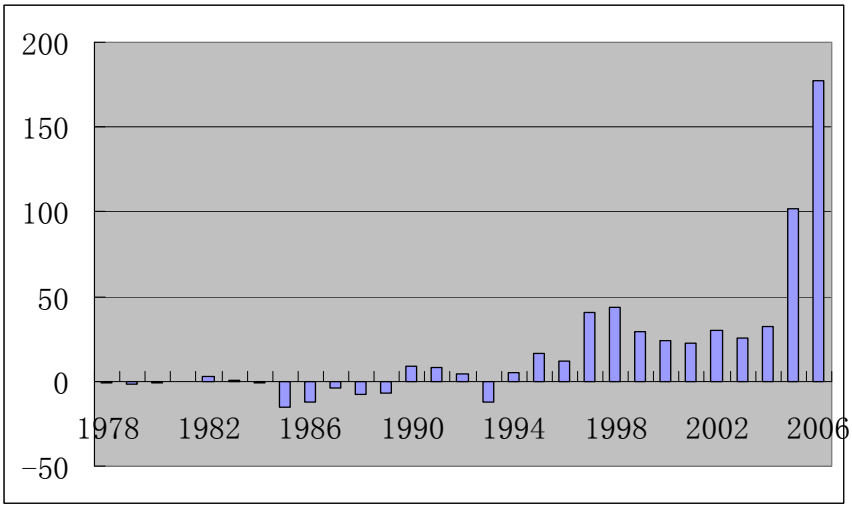
国际贸易：经济全球化突出标志
International Trade in Globalization



1978-2006中国进出口呈指数增长（十亿美元）

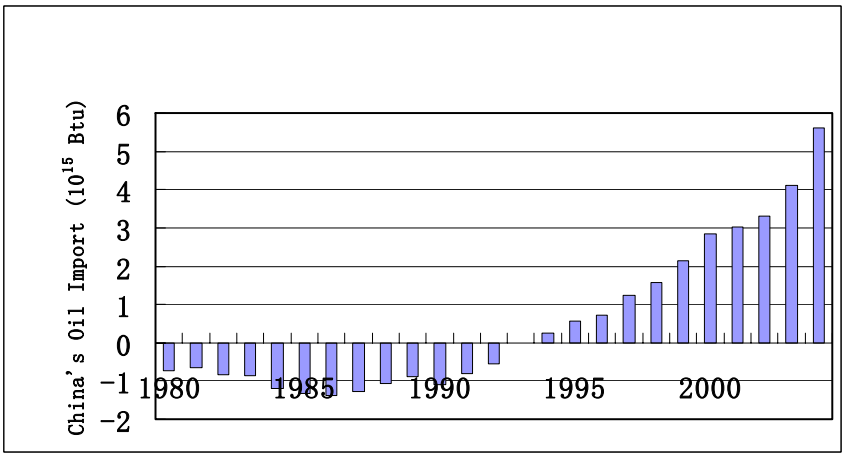
Import and Export in China 1978 -2006 (Billion US$)

国际贸易中的顺差 1978-2006
China's Trade Surplus 1978-2006



单位：十亿美元 (Billion US$)

贸易顺差的增长与石油进口同步
Trade Surplus Growth Matches China's Oil Imports



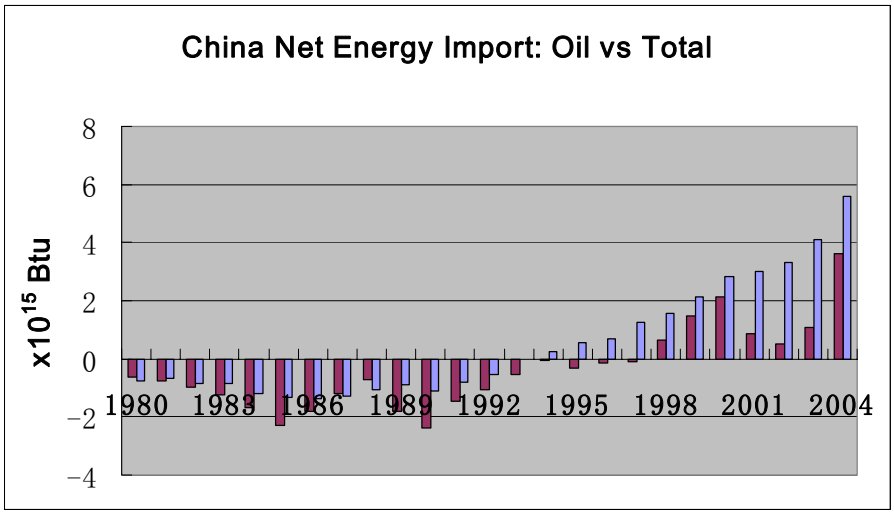
中国经济全球化与石油进口相伴
China's Globalizing Economy and Oil Imports

- 中国的经济全球化表现在国际贸易的大量增加
- 同时伴随石油的大量进口

- China's economic globalization is characterized by
  - growing import and export
  - growing trade surplus
  - growing oil import

中国能源进出口 1980-2004

China's Energy Import/Export 1980-2004



中国能源进口以石油为主

China's Energy Imports is Oil Imports

- 中国的能源进口体现在石油的进口
- 石油的进出口以1994年为转折点
- 1980-2004年中国石油净进口：12.69x10^{15}btu，相当于美国的2.6%

- China's energy import is characterized by oil imports.
- 1994 was the turning point.
- China's cumulative oil import from 1980 to 2004 is 12.69 quadrillion Btu, 2.6 of that of the U.S.

中国在1980-2004年间能源贸易中为净出口国

China Was a Net Energy Exporter From 1980-2004

- 中国的能源净出口为： 59 QBtu;
- 中国的能源出口以煤炭为主
- 同一时期美国的能源净进口为：484 QBtu，稍高于石油进口总量

- China's cumulative net energy export is 59 Qbtu.
- China's energy export is mainly coal.
- U.S. cumulative net energy import is 484 Qbtu. slightly more than its oil import.

能源利用与碳排放

Energy Use and Carbon Emissions

- 中国的能源消耗，特别是石油利用快速增长
- 碳排放量快速上升
- 累计排放依然较小

- China's energy consumption, particularly oil consumption is growing rapidly.
- Carbon emissions are growing fast.
- Cumulative carbon emissions is relatively small.

经济全球化中的能源
Energy in Globalization

- 地理分布不均匀
- 国家占有不平衡
- 地区局势不稳定
- 能源生产不应求
- 全球流动不安全

- Uneven geographical distribution
- Imbalanced national access
- Regional instability
- Demand surpasses Supply
- Unsecured global flow

中国经济全球化中的能源与贸易
A Closer Look at China's Trade and Energy under Globalization

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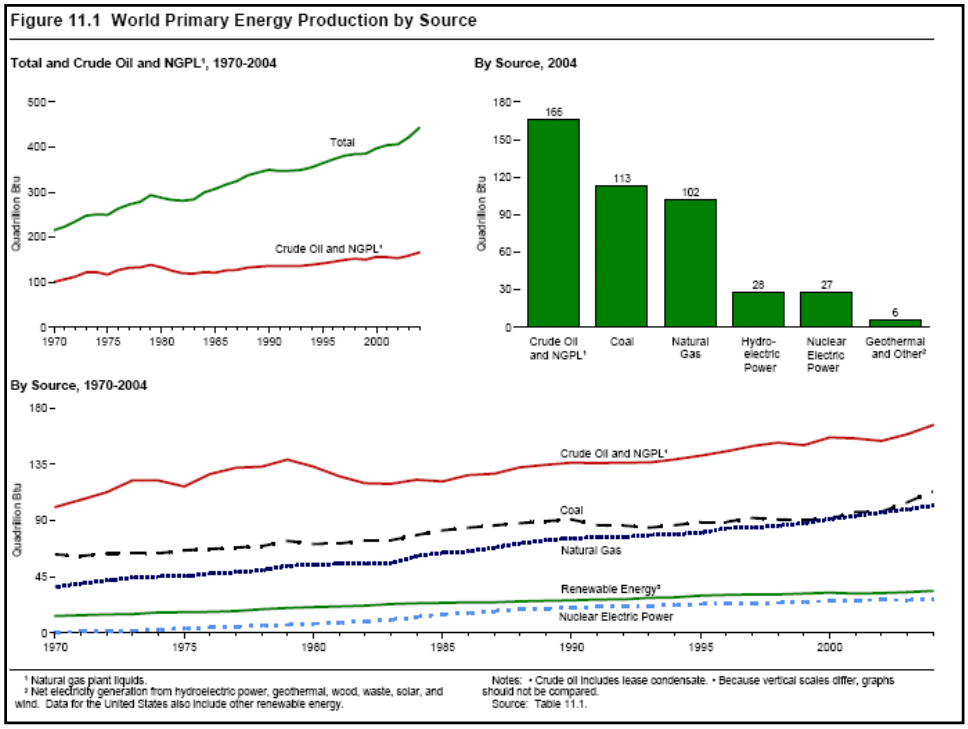
See next page.



中国贸易的基本物理特征
Basic Physical Features of China's Trade

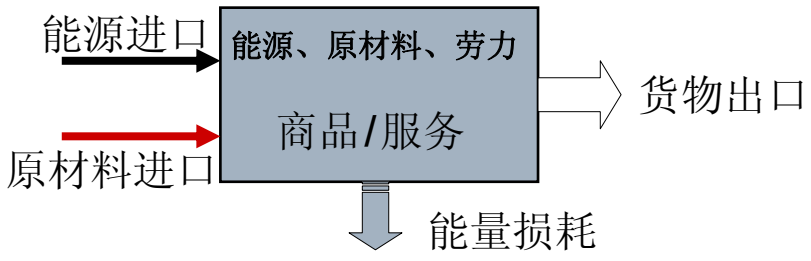
- 货物"顺差"：出口多、进口少
  Surplus in goods
- 能源"逆差"：进口多、出口少
  Deficit in energy

中国在全球生产链中的位置
China's Position in the Global Production Chain

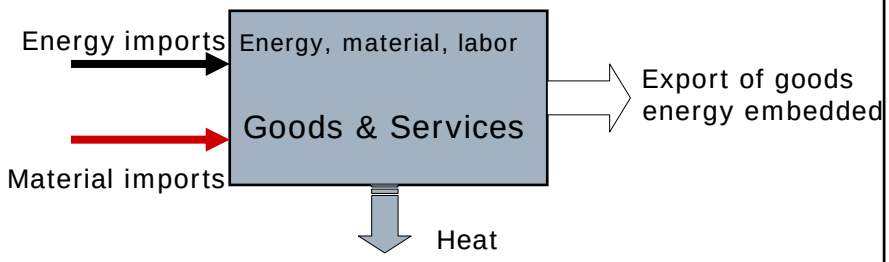
- 初级和中间位置，来料加工特点突出
- 进口初级产品、零部件、和资源、能源
- 出口终端产品
- 附加值源于能量、资源、劳动力和环境

- Primary and intermediate manufacturing.
- Depend on import of raw materials, energy, parts, and components.
- Final product export.
- Added value from energy, resources, and labor.

世界工厂的资源组合与进出口



Embedded Energy



进口的能源栖身何处？
Where is the Energy Embedded?

- 提供服务（交通运输）Transportation
- 作为原料（石油化工）Petrochemical
- 生产产品（工业能源）：成为蕴含能（Embedded energy in trade）

虚拟能：进出口货物和服务中的蕴含能
Virtual Energy: Embedded Energy in Traded Goods

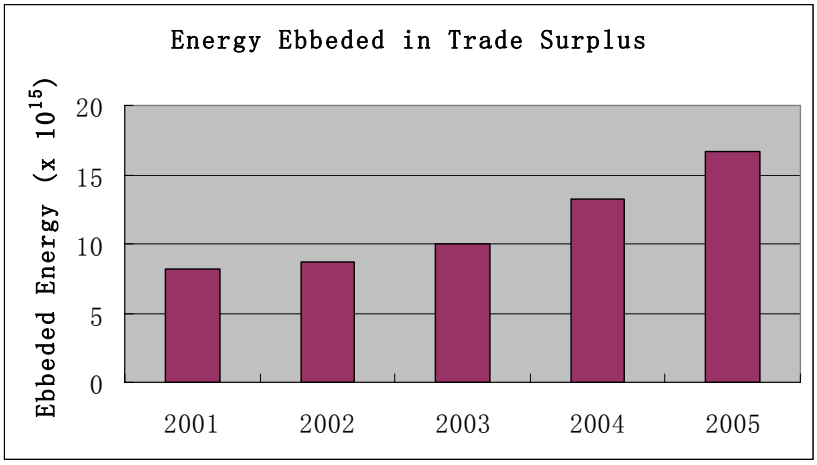
- 虚拟能 （defining virtual energy）
  - Energy embedded in the traded goods and services.

进出口中的蕴含能(百万吨标煤）
Embedded Energy in Trade （Mtce）

	隐性出口 Exported EE	隐性进口 Imported EE	隐性净出口 Exported Net EE
2001	351.8	57.3	294.5
2002	385.7	72.1	313.5
2003	449.6	89.1	360.5
2004	601.4	123.7	477.7
2005	731.5	131.6	599.9

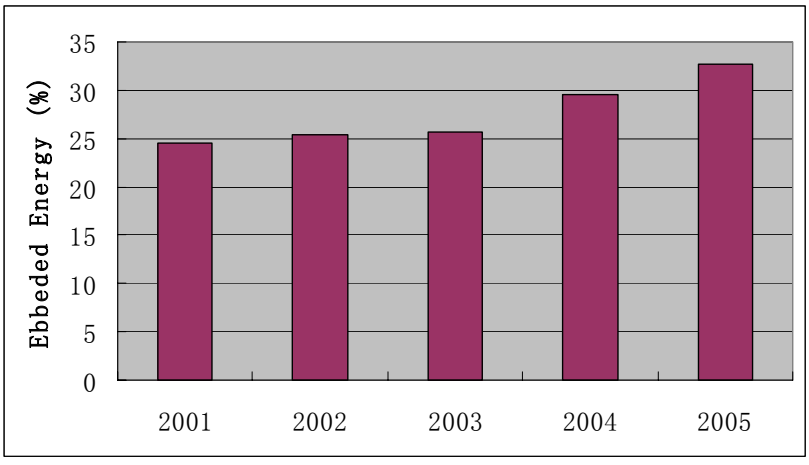
资料来源刘峰（2007）

中国进出口顺差中的蕴含能 （10^{15}Btu)
Energy Trade Surplus (Quadrillion Btu)



资料来源刘峰（2007）

中国进出口顺差中的蕴含能占总能耗的比例
Proportion of Energy Embedded in the Trade Surplus



资料来源刘峰（2007）

对碳排放的启示
Implication for Carbon Emissions

- 1/3 碳排放来自贸易顺差
- 1/3 碳是为他国生产而排放

- 1/3 of carbon attributed to trade surplus.
- 1/3 of carbon is emitted due to production of goods and services consumed by citizens of other countries.

单位产值的能量密度
Energy Intensity

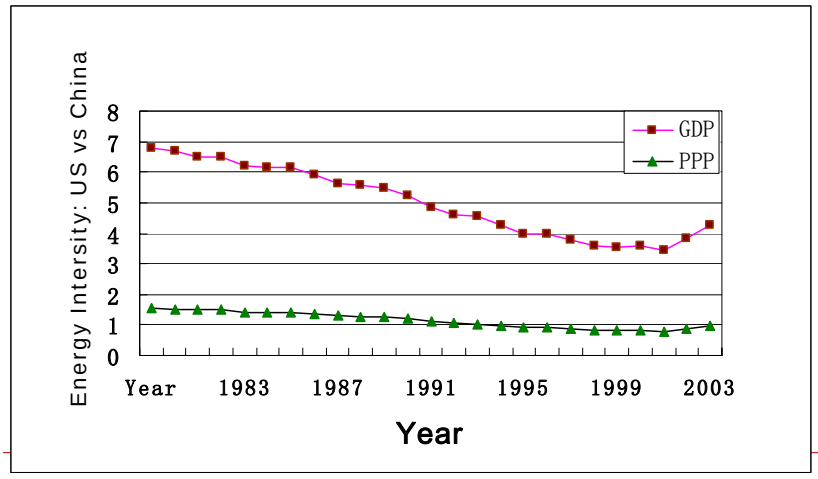
- Defining energy intensity: energy used (Btu) per $ of GDP or PPP (2000)
- GDP measures (2004):
  - US: 9,336 Btu
  - China: 39,760 Btu
  - China: US = 4.26:1

- 能源强度定义：单位GDP(国内生产总值)还是单位GDP PPP（按实际购买力计算的国内生产总值）计算的能源消费
- GDP标准
  - 美国: 9,336Btu
  - 中国：39760Btu
  - 中国：美国=4.26:1

单位产值的能量密度
Energy Intensity

- Defining energy intensity as energy use (Btu) per $ of GDP or PPP (2000)
- PPP measures (2004):
  - US 9,336
  - China: 9,080
  - China: US = 0.97:1
- 能源强度定义：单位GDP能源消费还是单位PPP能源消费
- PPP标准
  - 美国: 9,336Btu
  - 中国：9,080Btu
  - 中国：美国=0.97:1

中美能效相对比较:GDP 和 购买力指标
Relative Energy Efficiency Change: China vs. US



能源强度变化诠释
Interpreting the Changes in Energy Intensity

- There is a huge gap in EE between China and US, when measured by energy use per $ GDP.
- The gap in EE between China and US has been closing steadily since 1980, indicating that EE in China has been increasing.
- Cooperation between US and China can help improve EE and reduce carbon emissions while increasing GDP in China.

- 以单位GDP计算能源效率，中美间有很大差距，
- 1980年以后，中美间能源效率差距持续缩小，说明中国能源效率一直在提高，
- 中美间的合作将有助于中国在发展经济的同时提高能源效率，减少碳排放

总结 Summary

- 中国的能源消耗，特别是石油利用快速增长
- 碳排放量快速上升，累计排放依然较小
- 大量能源(>1/3)消耗在为他国生产的贸易上

- China's energy consumption, particularly oil consumption is growing rapidly.
- Carbon emissions are growing fast, but cumulative carbon emissions are relatively low.
- More than 1/3 of energy is consumed for production of goods for trade.

政策含义 Policy Implications

- 国内节能
- 改变经济发展模式
- 气候变化谈判中的贸易国共担原则

- Energy conservation
- Change of economic development mode
- Shared responsibility of trading partners