Energy, Environment and Market Mechanism
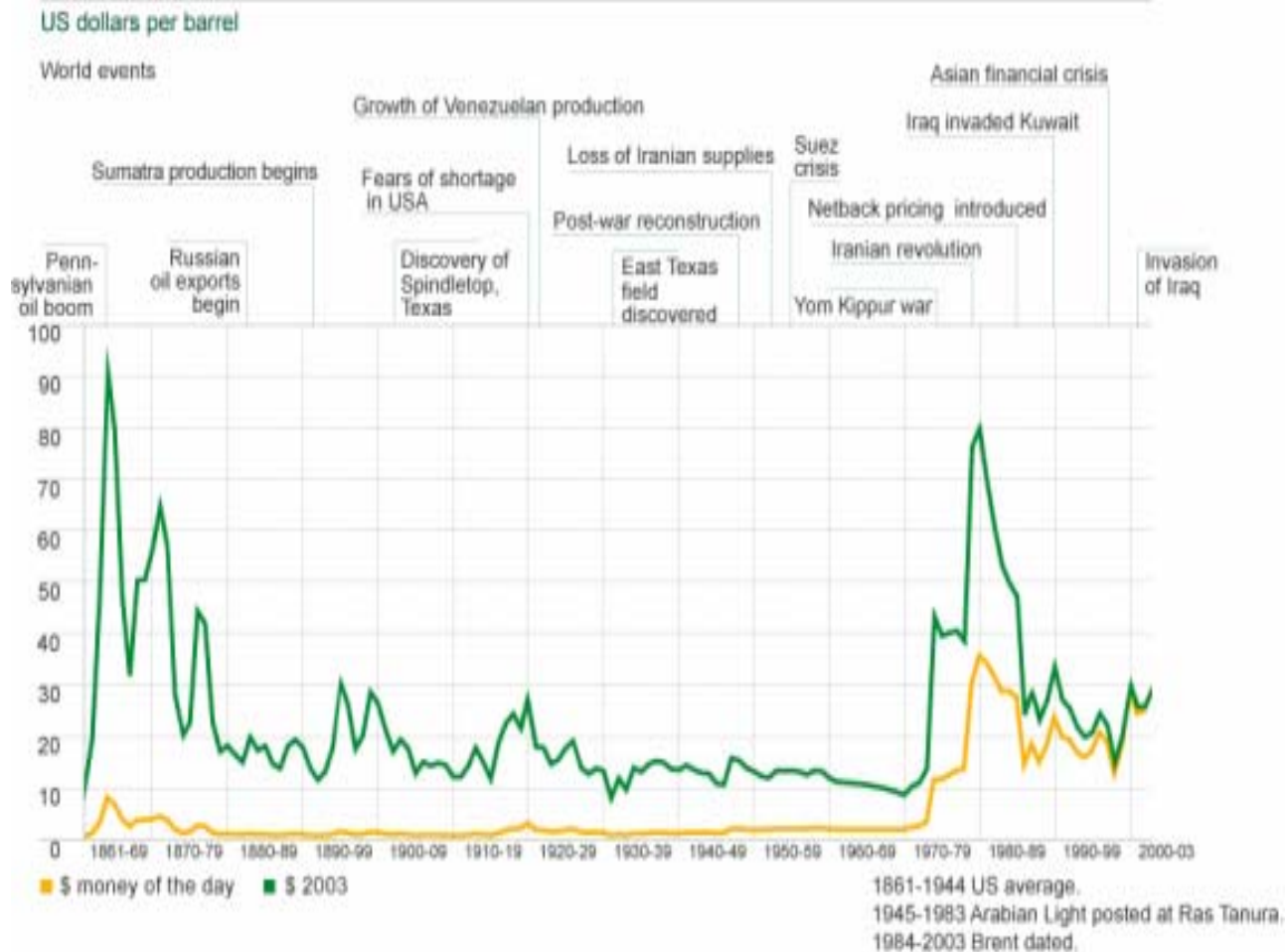
Toshihiko Hayashi
Chairman, Stanford Japan Center
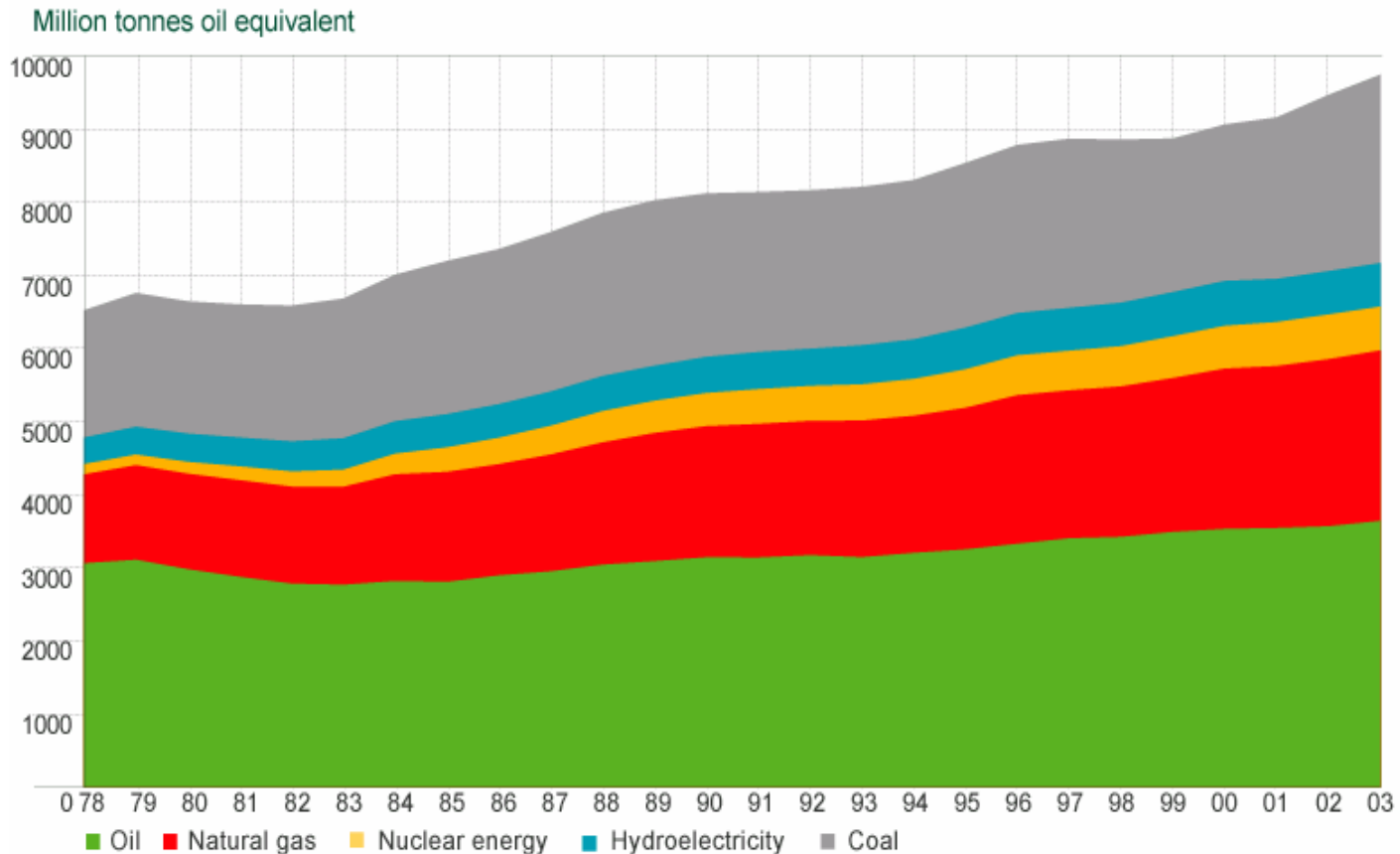
Crude oil prices since 1861


US dollars per barrel

World events

Asian financial crisis

Growth of Venezuelan production

Iraq invaded Kuwait

Sumatra production begins

Loss of Iranian supplies

Suez crisis

Fears of shortage in USA

Netback pricing introduced

Post-war reconstruction

Penn-sylvanian oil boom

Russian oil exports begin

Discovery of Spindletop, Texas

East Texas field discovered

Iranian revolution

Yom Kippur war

Invasion of Iraq

■ $ money of the day   ■ $ 2003

1861-1944 US average.
1945-1983 Arabian Light posted at Ras Tanura.
1984-2003 Brent dated.

World primary energy consumption

Million tonnes oil equivalent

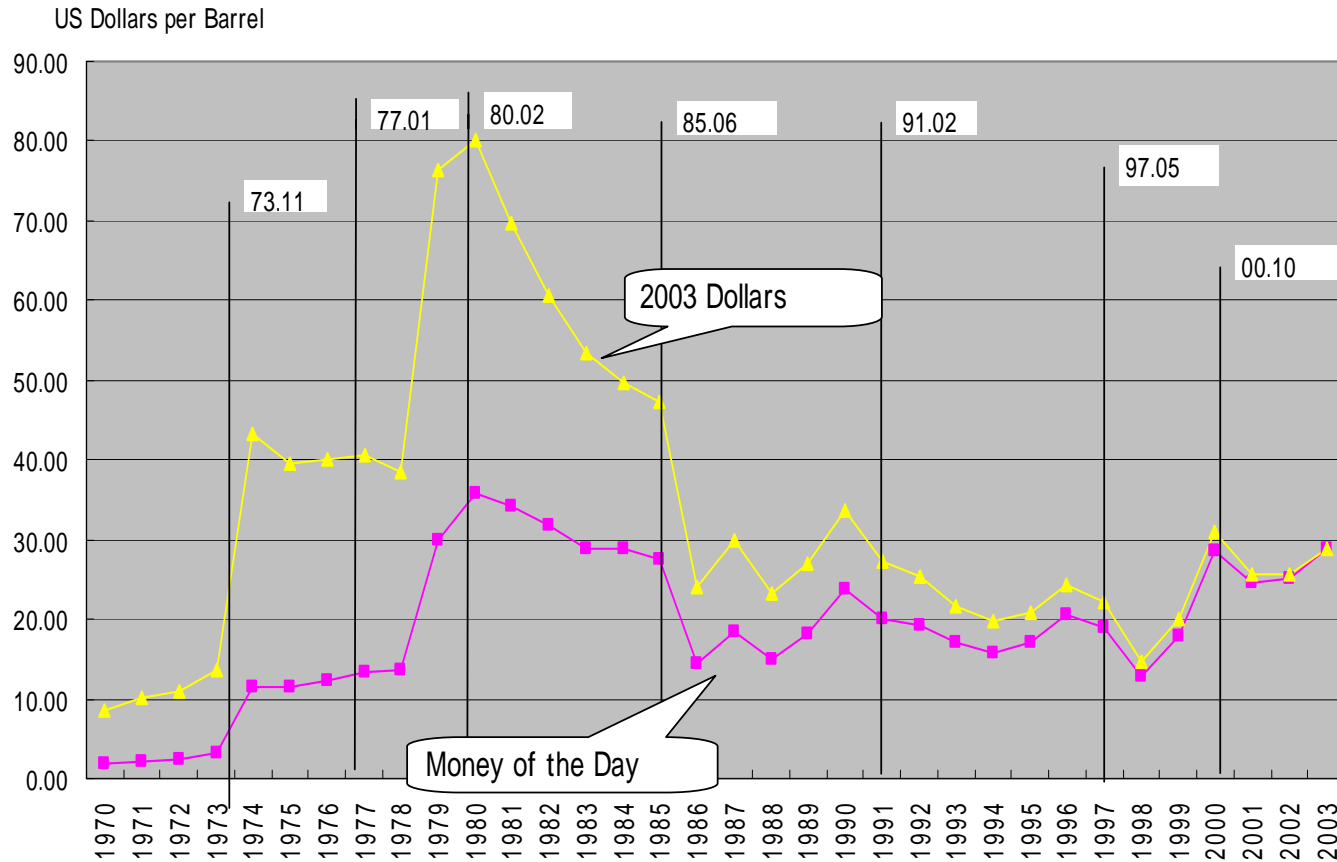Legend: Oil, Natural gas, Nuclear energy, Hydroelectricity, Coal

World primary energy consumption grew by 2.9% in 2003, well above the 10-year trend growth rate of 1.7% per annum. As in 2002, the global figure was heavily influenced by China, where reported energy use increased by almost 14%.

Oil price and the world real growth rate
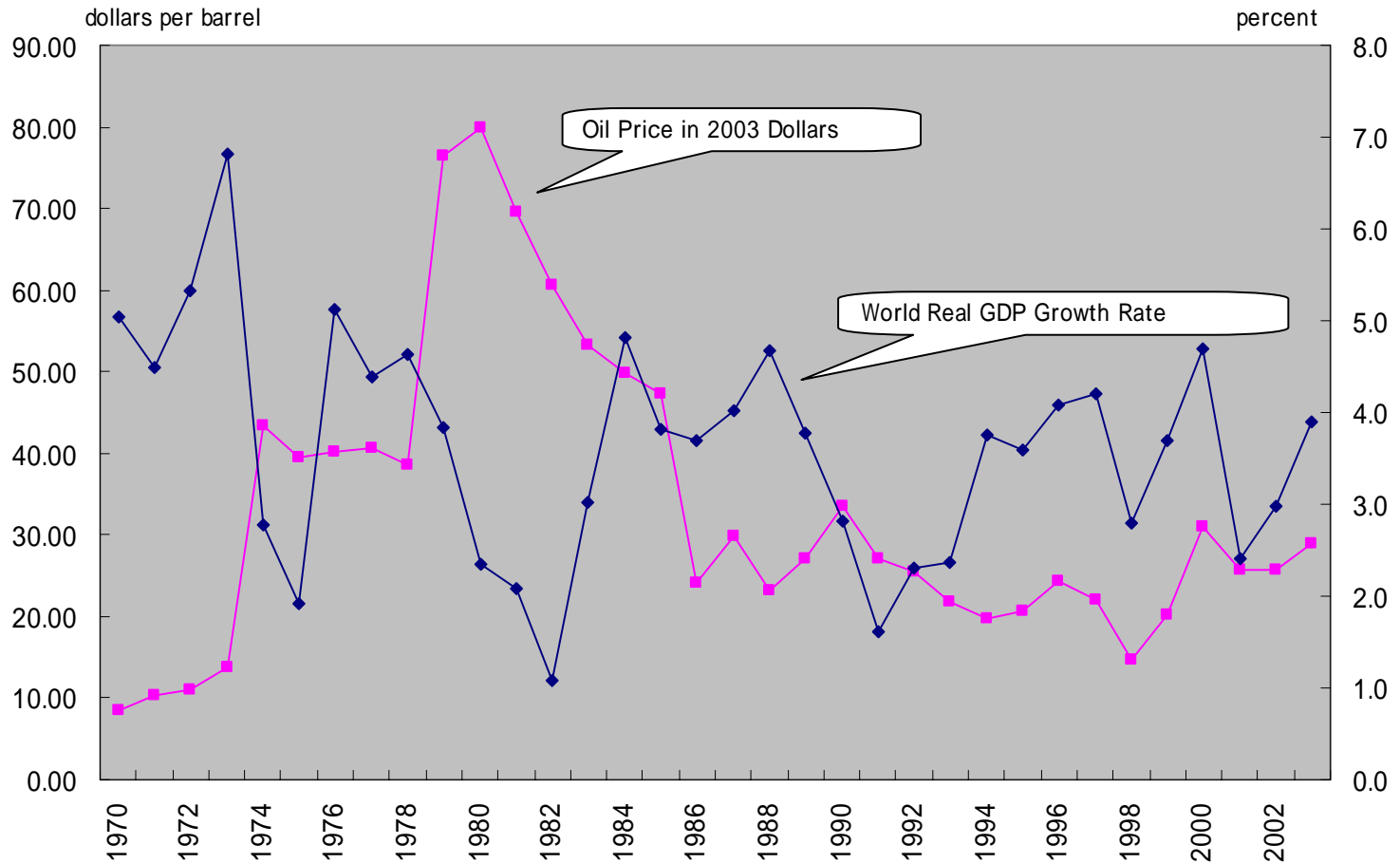
Oil price and Japanese recessions

A reverse causality?

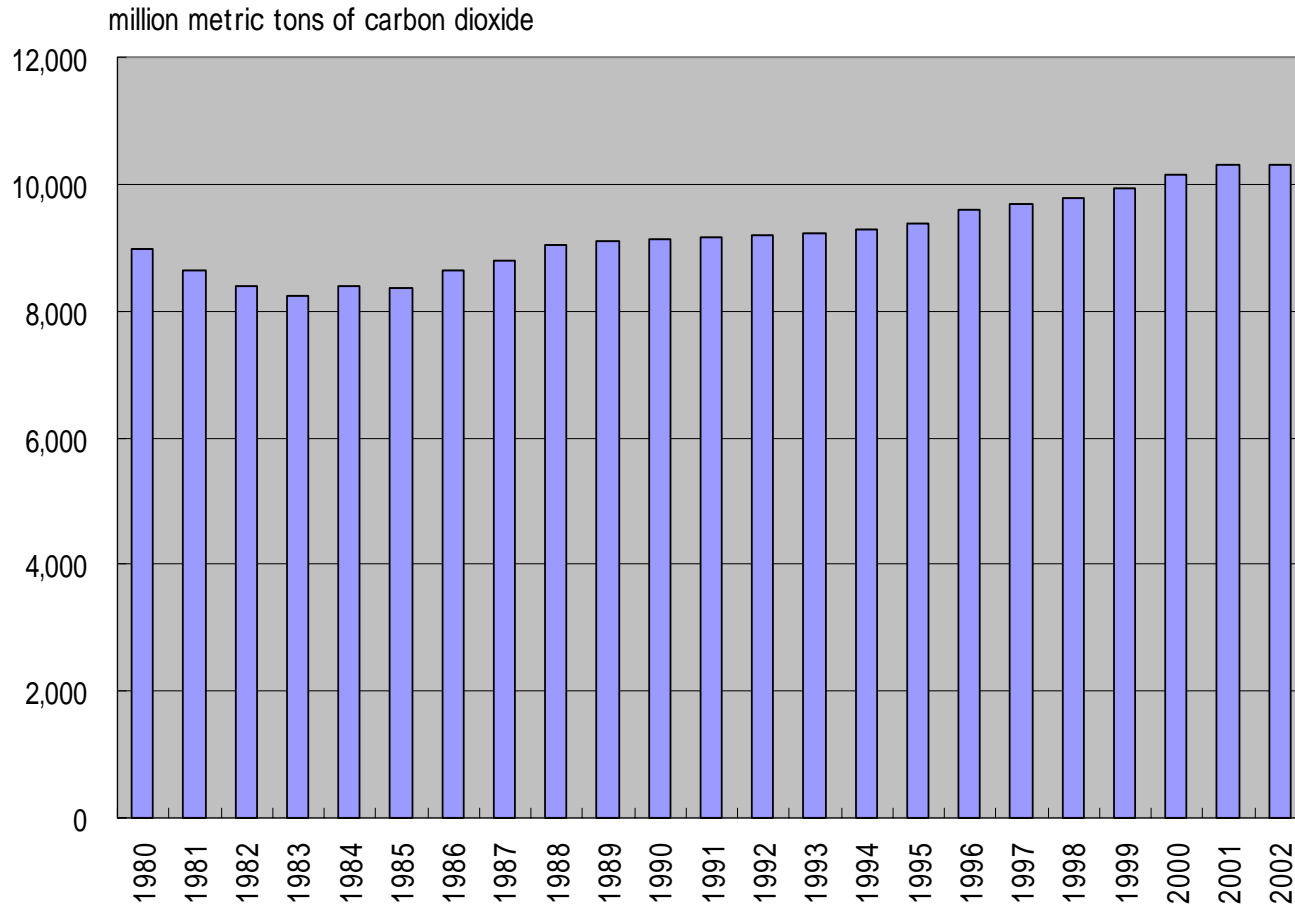<Popular View>

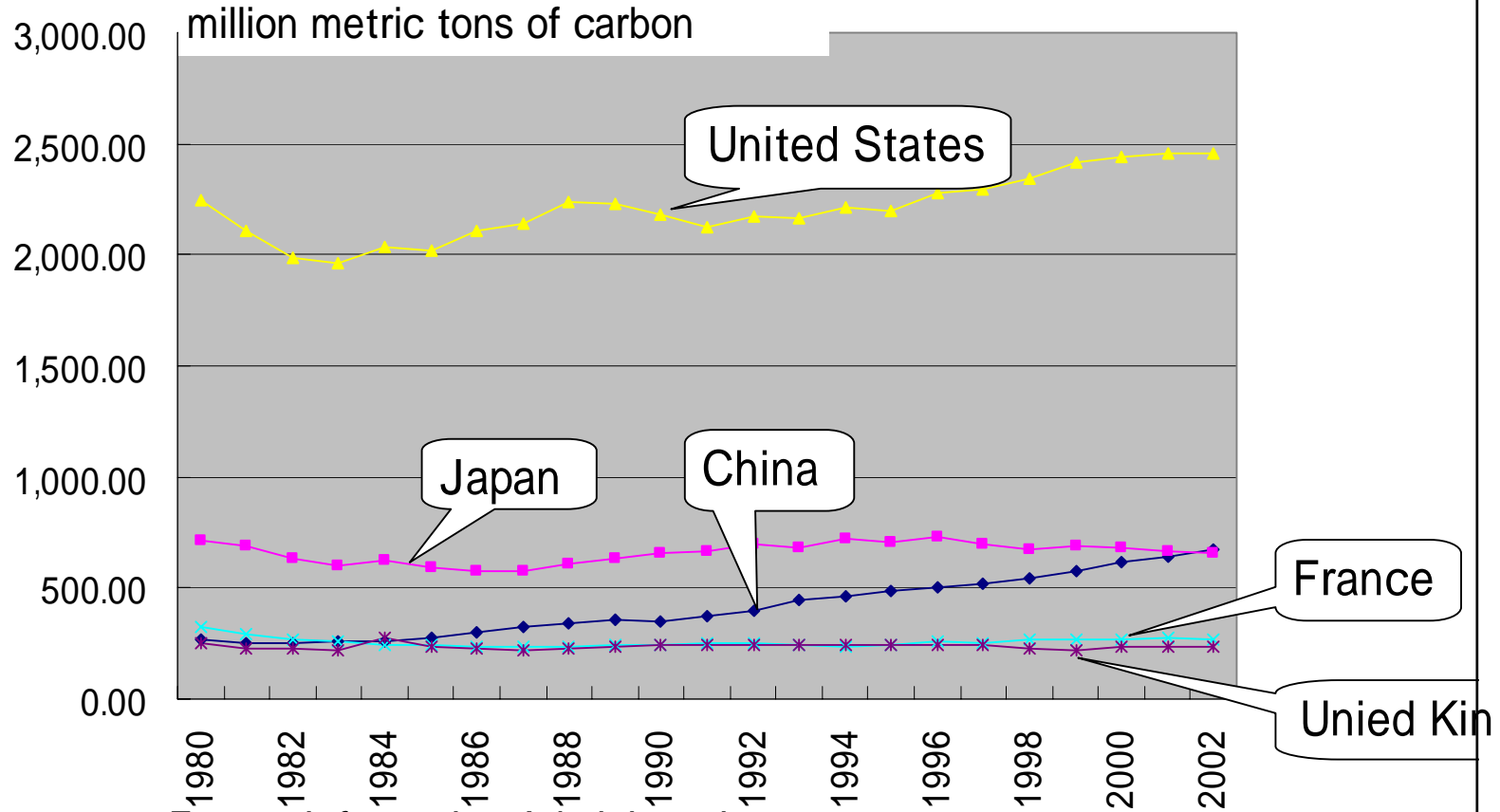Exogenous political events led to oil price increases that slowed down the world economy.

<Reverse Causality>

Autonomous recession in the world economy created a weaker demand for oil that sent oil price down.
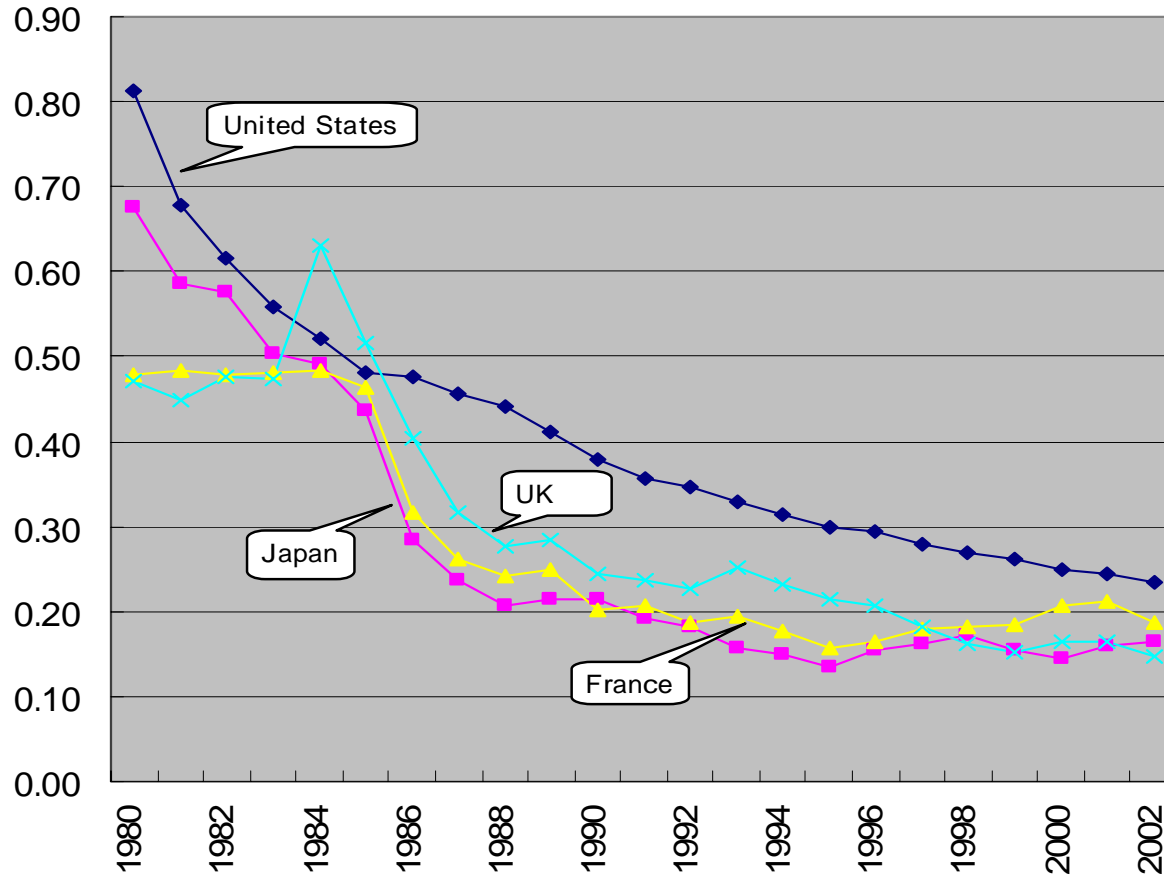
Global CO$_2$ emissions

million metric tons of carbon dioxide

CO$_2$ emissions from the consumption of petroleum

million metric tons of carbon

United States

Japan

China

France

Unied Ki

Energy Infromation Administration, *International Energy Annual,* 2002

CO$_2$ emission per GDP

Two global commons

- Primary energy source:
  - Disparity between location of use and endowment.
  - Conservation question
- Global environment
  - Transnational causality
  - Global management

Tragedy of the commons?

- International conflicts over energy
- Energy overgrazing
- Irreversible environmental deterioration
- Global climate, biological diversity, Gaia in jeopardy

⟹ Tragedy of the global commons

Can technology save us?

- Commercial applications of promising technologies
- International public policies for energy security
- Kyoto Protocol and beyond

Decentralized coordination needed

Global public policy issues

- Construction of energy infrastructure

- Market policy for energy

- Emission permit market

A thought on emission trading scheme

Proposal:

- Allocate assigned amount units evenly among countries on a per capita basis.

  Japan 100, US 200, China 1000 Units.

- Create the market to trade AAUs.

- Make rule that international trade must be cleared with foreign reserve and the equal dollar value of AAUs.

Expected results

- By trading AAU entitlement, international income distribution will be more equitable.
- The international trade will result in the "No Envy" equilibrium.
- By controlling the price of AAU, the world can contain the total emission of greenhouse gases.

⟹   Impossible dream?