

A Green New Deal for the Duel Crisis of Energy and the Economy

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Outline

- **The Age of a Duel Crisis**
- **An Integrated and Consistent Approach to the Remedy for these Two Kinds of Quandaries**
 - **A Green New Deal**
 - **Stick to where the incentive goes**
- **An appraisal**



The Age of a Duel Crisis

- Since the 1970s, energy scarcity has caused a series of serious economic crises
- The global economic crisis of 2008-09 was the latest one
 - It is a **Duel Crisis** of Energy and the Economy
 - The economic and financial quandary
 - The energy and environmental profligacy



The Economic and Financial Crisis of 2008-09

- Symptoms observed or interpreted
 - Ubiquitous financial risk
 - Credit Crunch
 - Low expectation of permanent income
 - Drastic and potentially prolonged deflation
 - Drastic and potentially prolonged contraction in labor markets
 - Violent slump in consumption, investment, production, and current income



Causes suggested

- Interest rate manipulation and Monetary laxation after the dot-com bubble burst
 - It might have helped form hyper-optimistic expectations proved to be wrong, encouraging excessive risk taking
- Global imbalance
 - Twin deficits of USA
 - A global glut of savings from many of the emerging market countries
- Market failure
 - Asymmetric information in contractual arrangement and excessive risk taking in financial markets
- Oil shock and the Energy Crisis



Causes suggested

- Policy distortion
 - Mercantilism of many of the emerging market countries that might have been helping the global glut of savings
 - Export subsidies
 - Import barriers
 - Exchange rate manipulation
 - Policy distortion that accelerated the depletion of energy, which in turn helps produce the oil shock
 - Labor market rigidity
 - Minimum wage law impedes adjustments in the labor market, likely leading to large amount of layoff when the economy contracts, which in turn tends to slow the speed of recovering



Prescription suggested or adopted

- Cutting the interest rate and injecting liquidity into the market
- Fiscal expansion; public money directed to:
 - Forced consumption
 - Public infrastructure
 - New energy
 - Education
 - Social insurance
- Safeguarding international trade
- Deregulating the labor market; relaxing the minimum wage laws

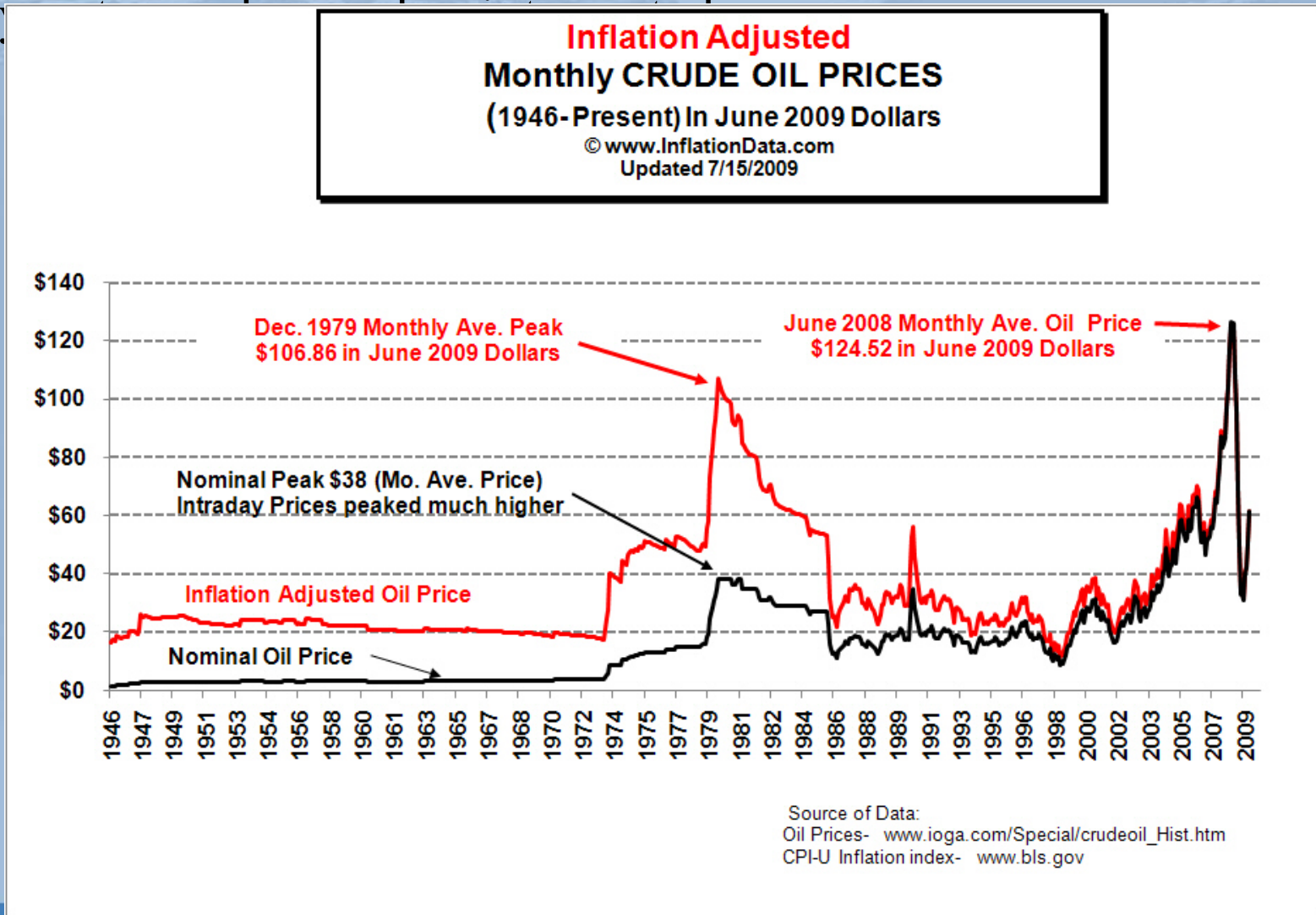


The Energy and Environmental Extravagance

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Crude Oil's World Price: real and nominal (Jan. 1946 – July 2009)

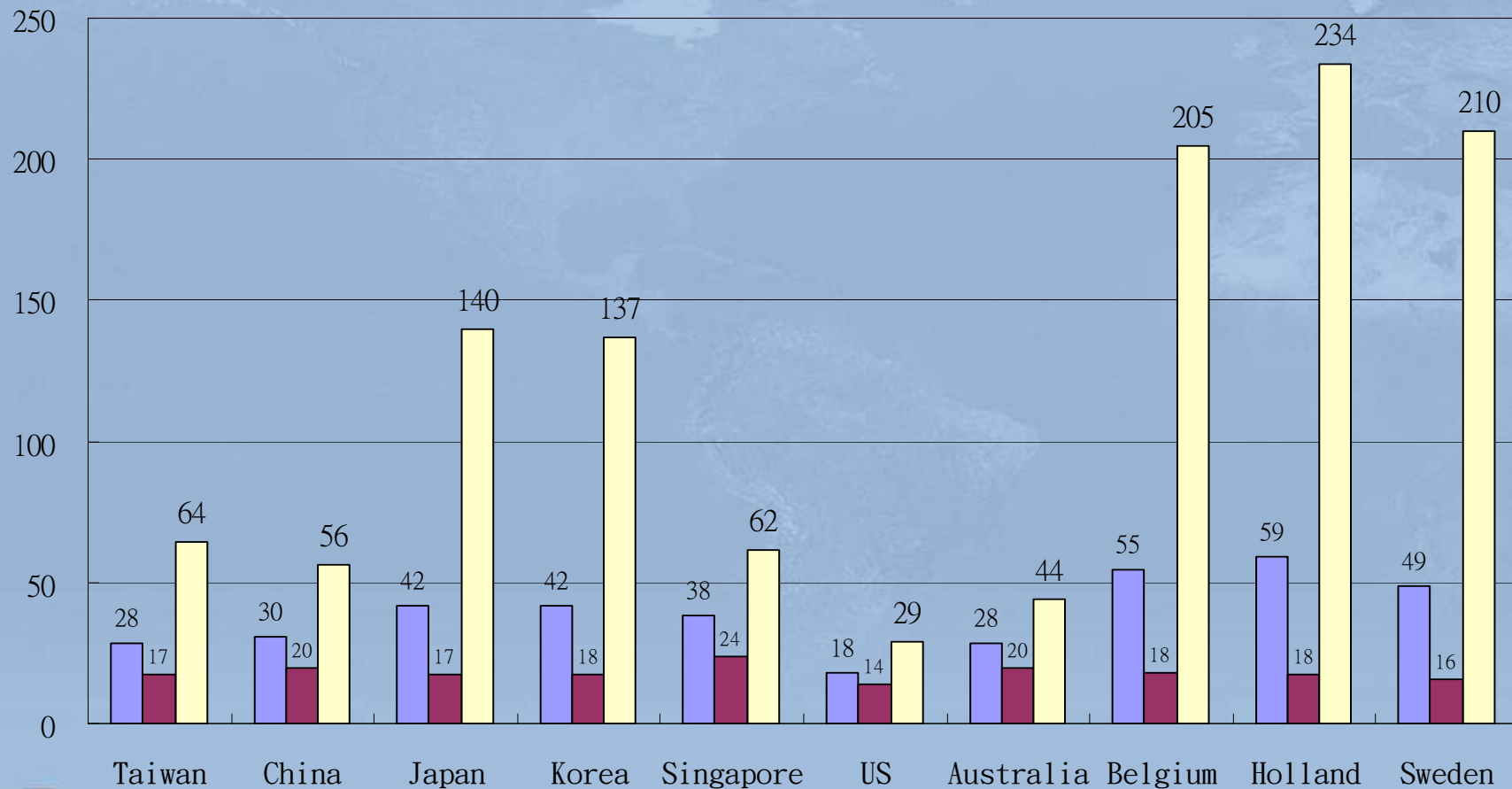
Real oil price has been increasing drastically since 2004



International Comparison of Regular Unleaded Gasoline Prices (June 2009)

Unit: NT\$/Liter

Price Price before Tax Tax rate (%)



Note: USD=NT\$33.72

Source: Energy Bureau, MOEA, Taiwan, ROC

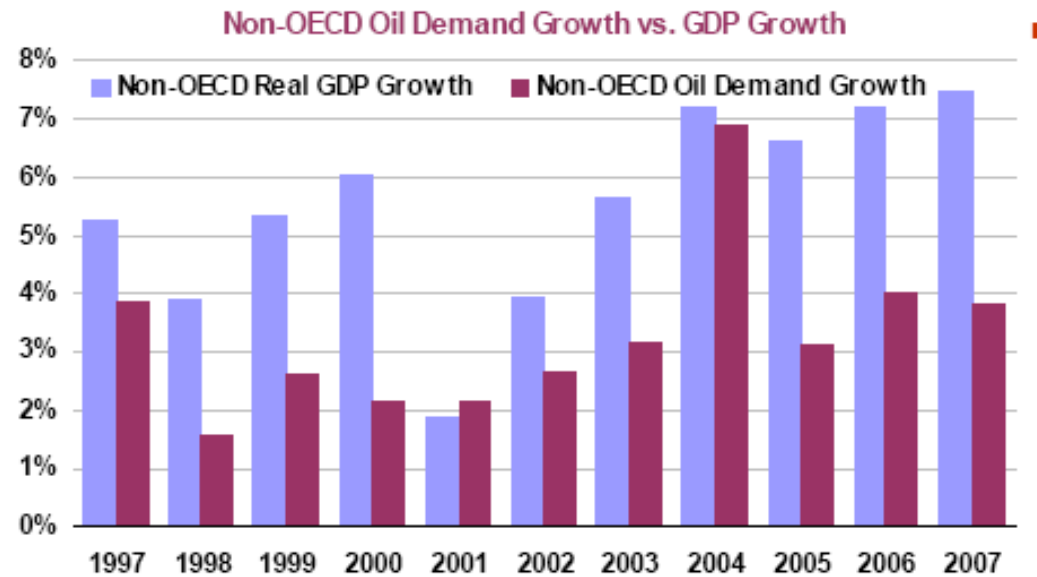
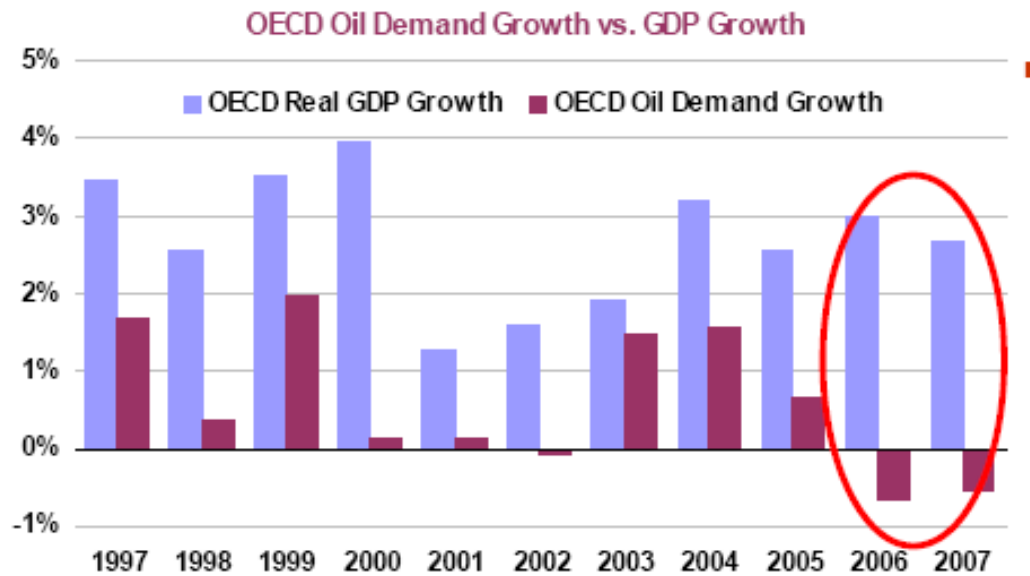


The Energy and Environmental Extravagance

- Interpretation
 - Is it due to market manipulation or speculation?
 - Demand side:
 - Stagnation in energy efficiency improvement since the mid-1980s
 - High energy intensity in the industrial sectors in developing countries
 - High energy intensity in the residential, commercial, and transportation sectors in developed countries
 - Strong expansion in energy consumption since 2005
 - Supply side:
 - Limited potentials of the increase in oil production: Will the Hubbert's Peak be coming soon?
 - Lower willingness to produce more: Hotelling Rule



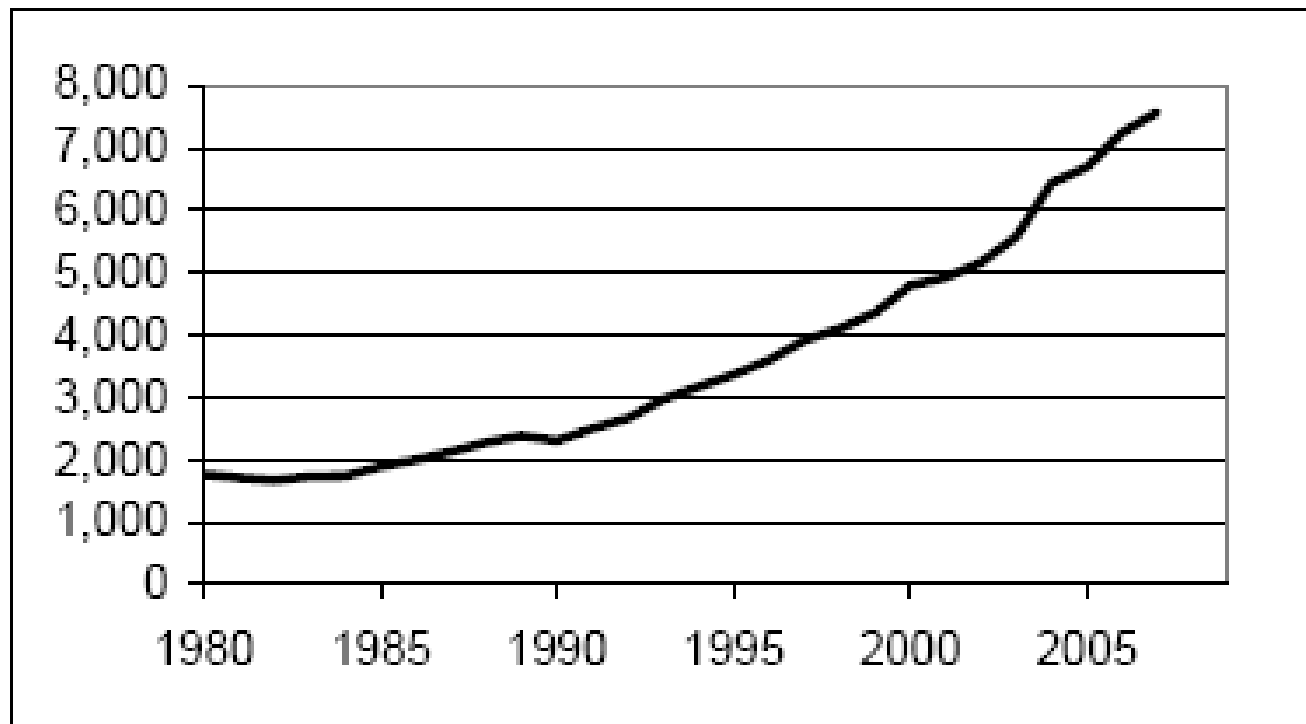
- Oil demand growth vs. GDP growth in OECD and non-OECD countries



Source: IEA

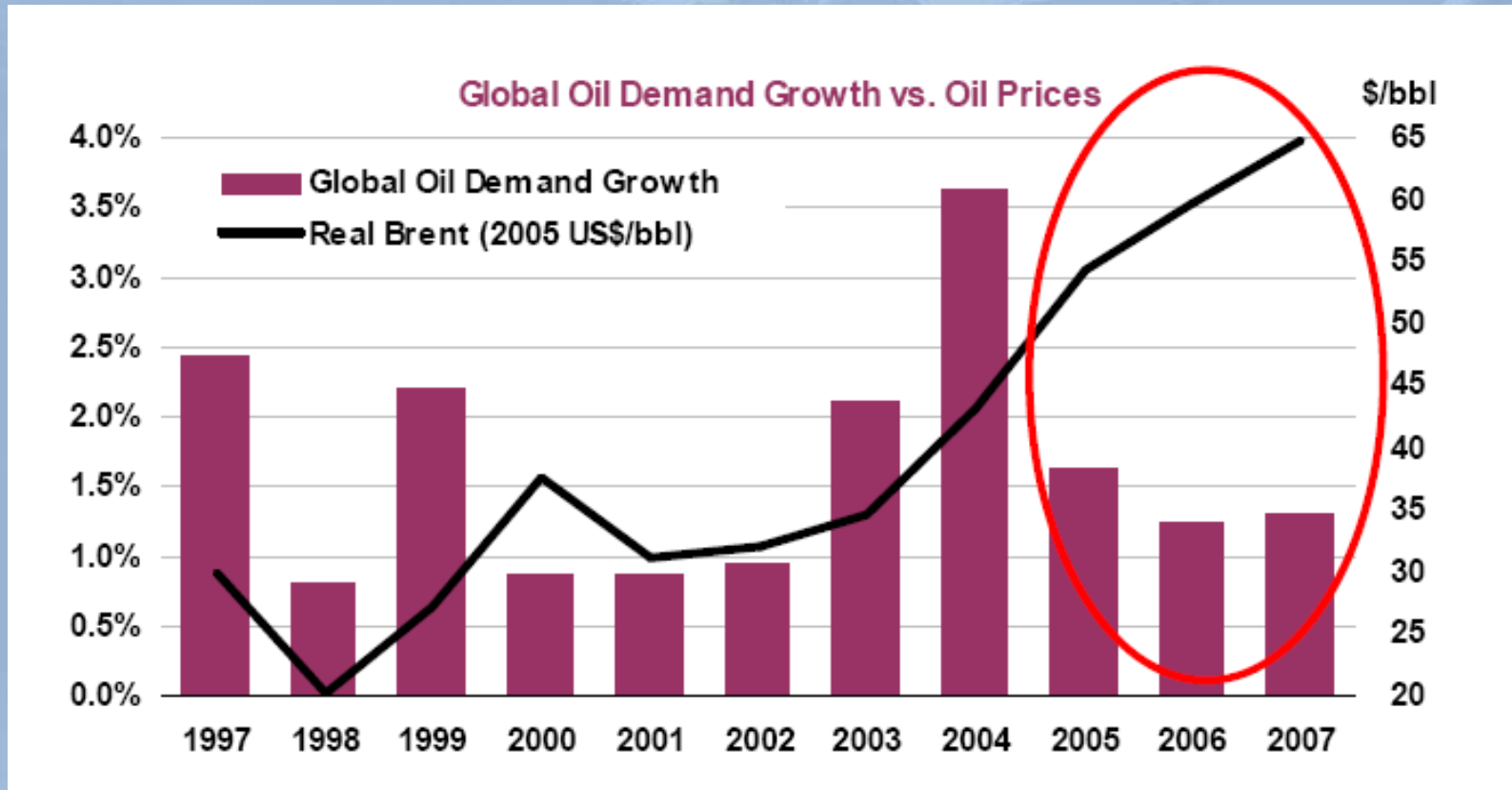
China's oil consumption, 1980-2007

Unit: thousands of barrel per day



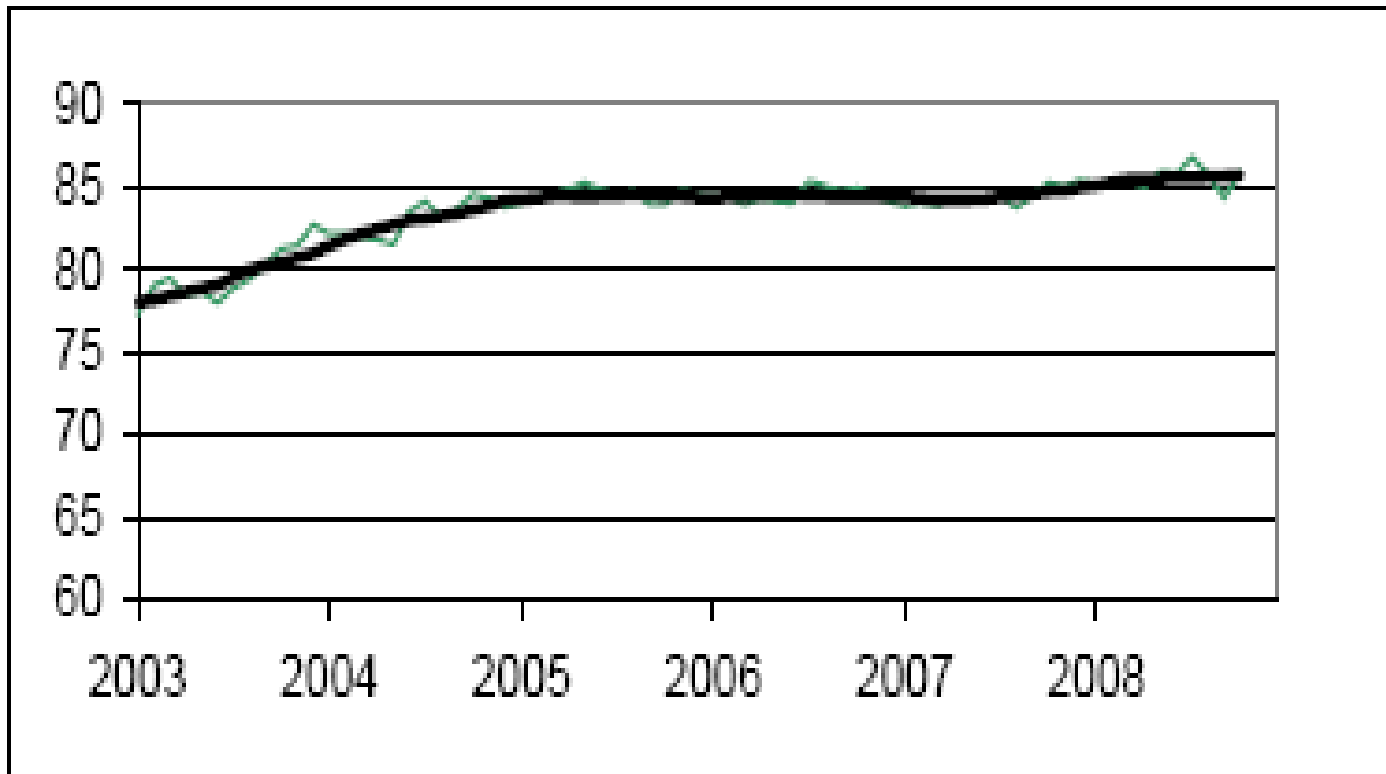
Source: EIA, "World Petroleum Consumption, Most Recent Annual Estimates, 1980-2007."

Global oil consumption and price, 1997-2007



Global crude oil production stagnated between 2005-2007

Unit: millions of barrel per day

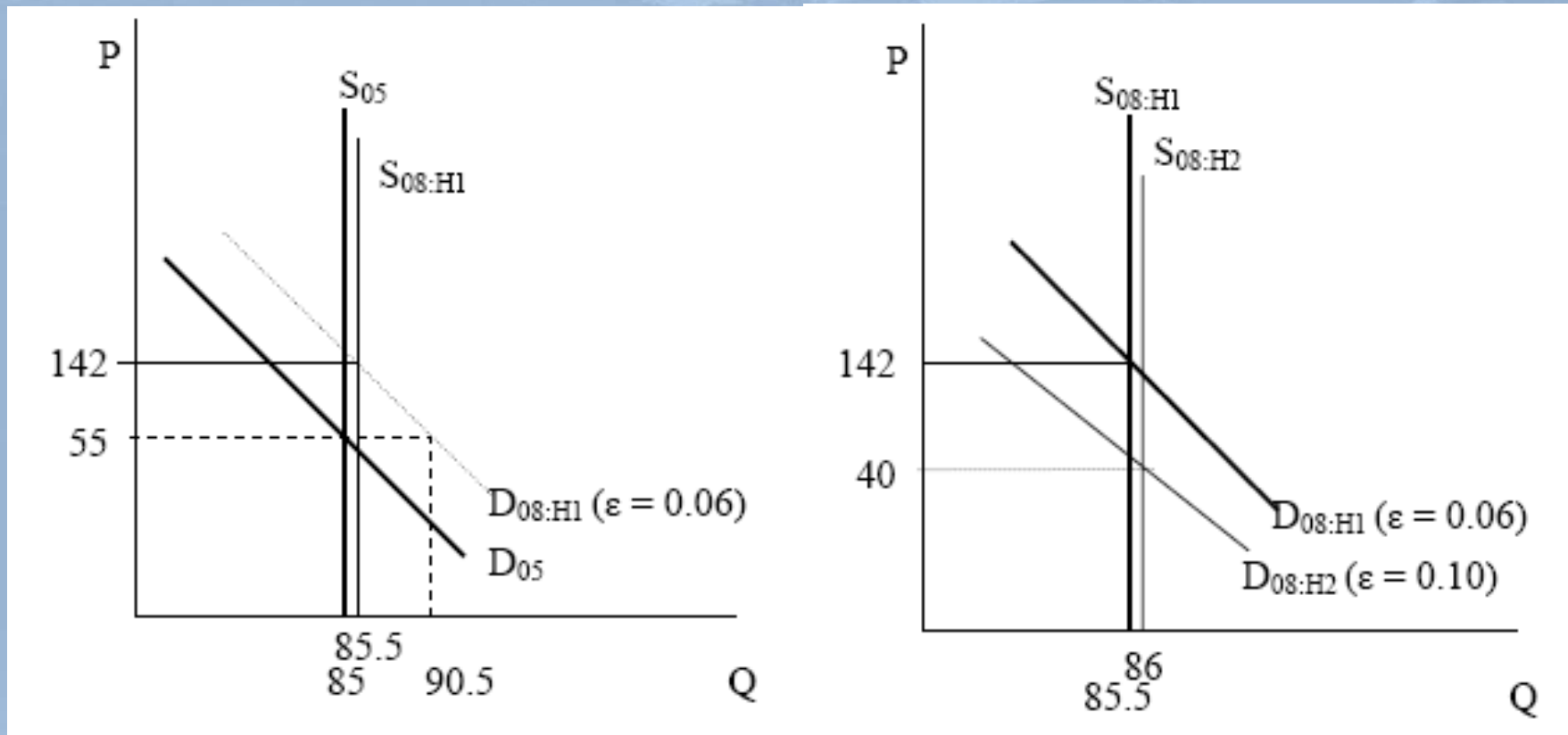


Notes: *Thin line.* Monthly global crude oil production. *Bold line:* 12-month moving average of values from thin line

Source: James Hamilton (2009), "Causes and Consequences of the Oil Shock of 2007-08."



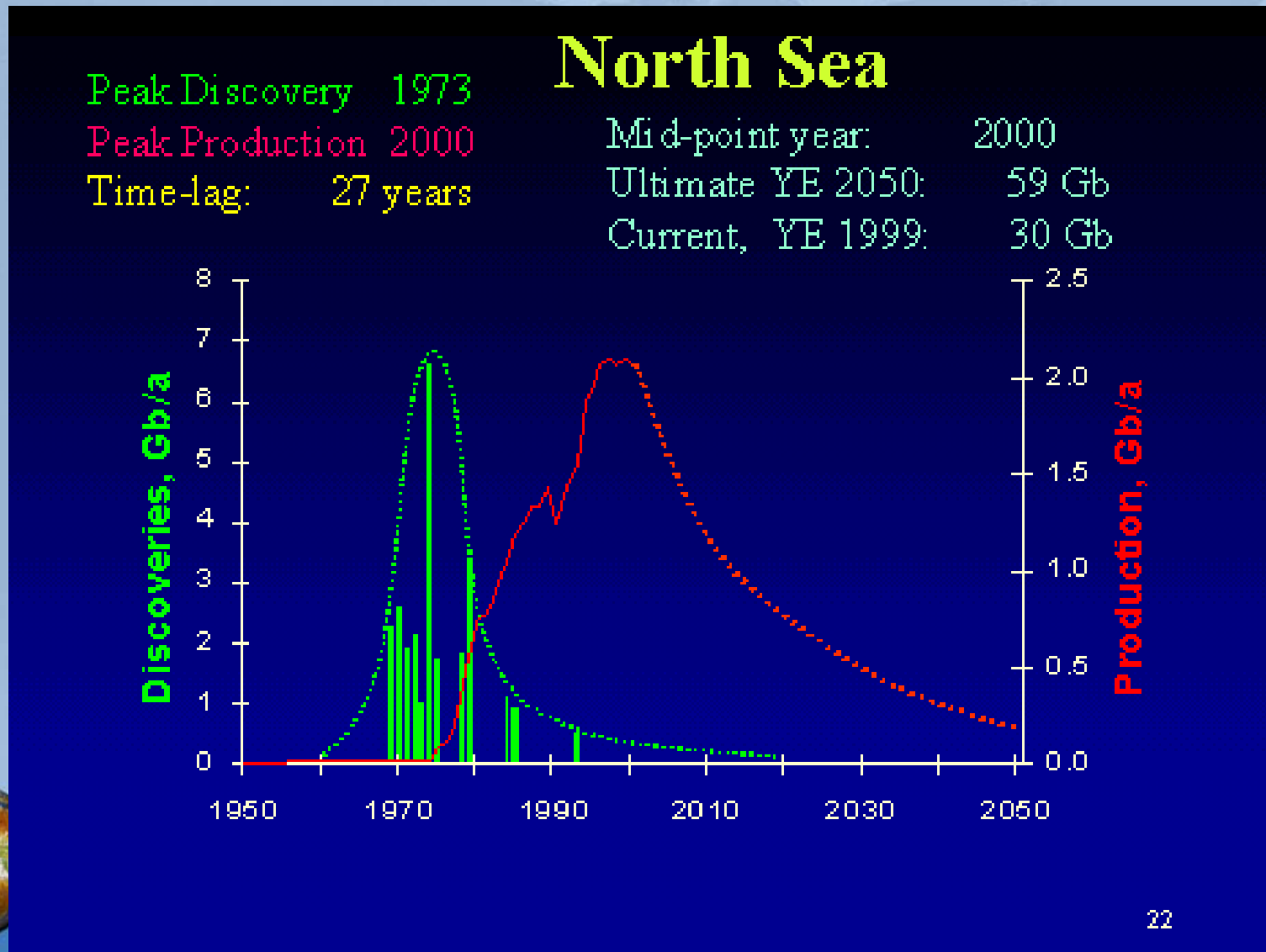
Supply and demand of crude oil, 2005-08



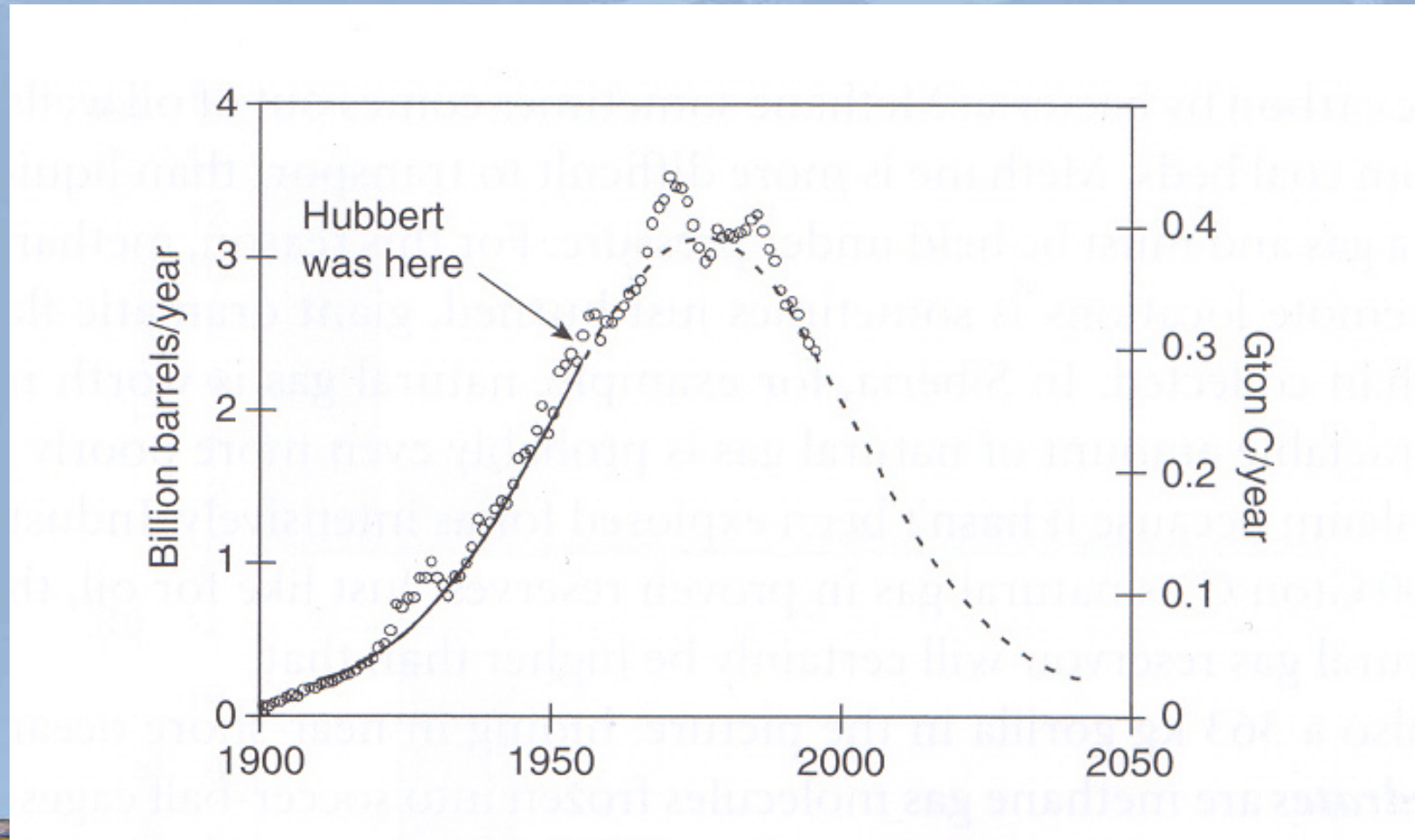
Source: James Hamilton (2009), "Causes and Consequences of the Oil Shock of 2007-08."



Oil discovery and production: North Sea



Oil production: US



David Archer (2007) *Global Warming, Understanding and Forecast*, Blackwell, Fig. 9.9, p. 105.

New Oil Discoveries Worldwide (1900-2004)

from Terzankian (2006) A Thousand Barrels A Second.

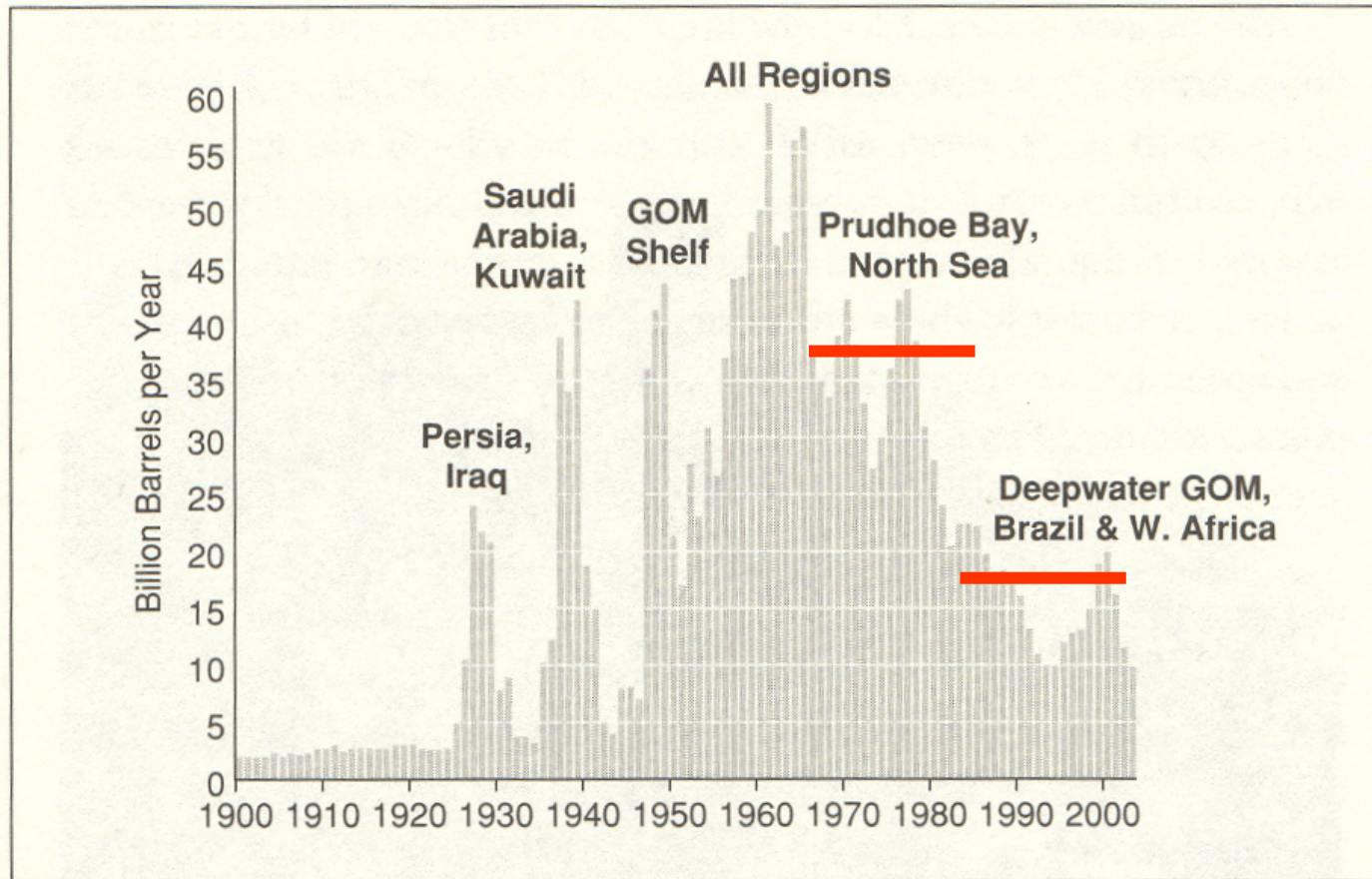


Figure 4.14 Total Volume of New Oil Discoveries Worldwide: By Year, 1900-2004 [Source: Adapted from Harper (2003) and Oil & Gas Journal (2004)]



New Oil Discoveries Worldwide (1900-2004)

from Terzankian (2006) A Thousand Barrels A Second.

It is close to peak production

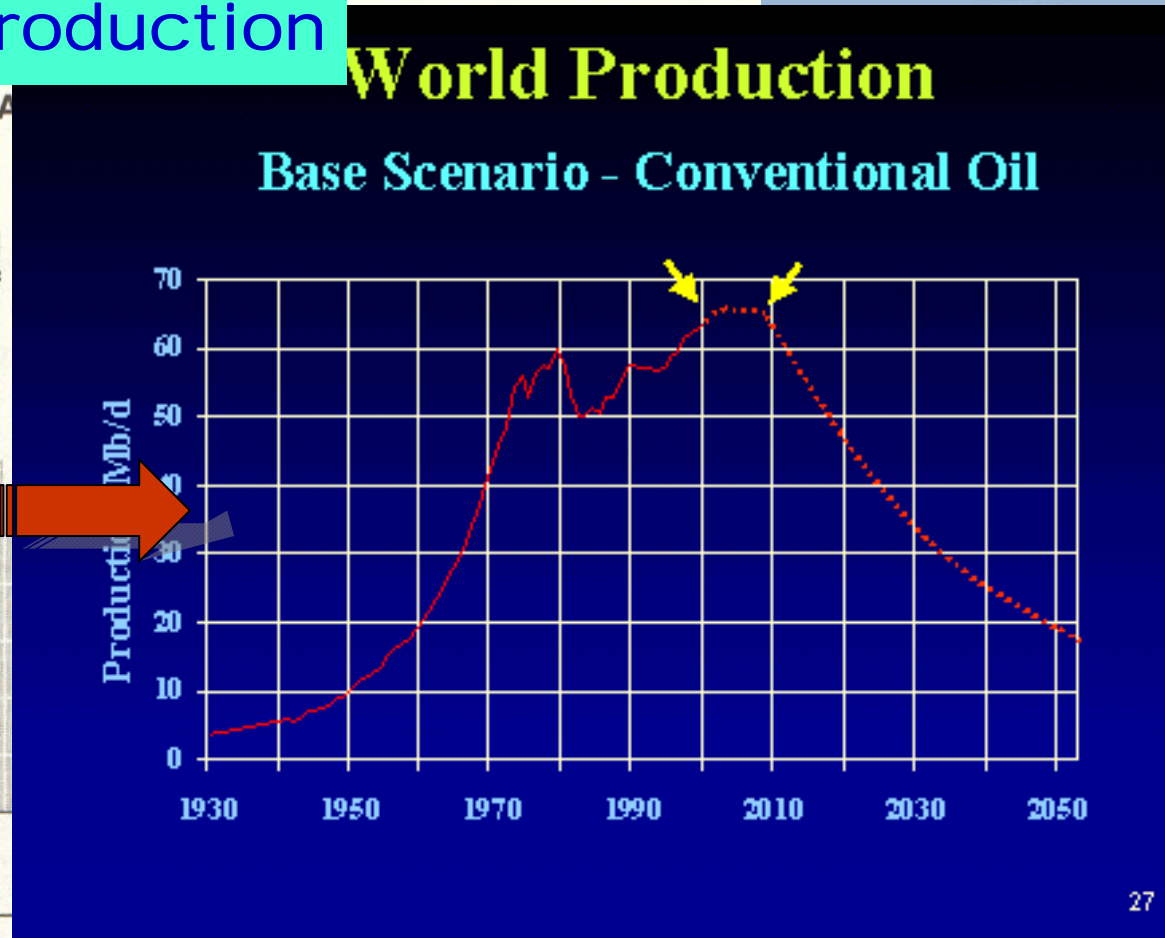
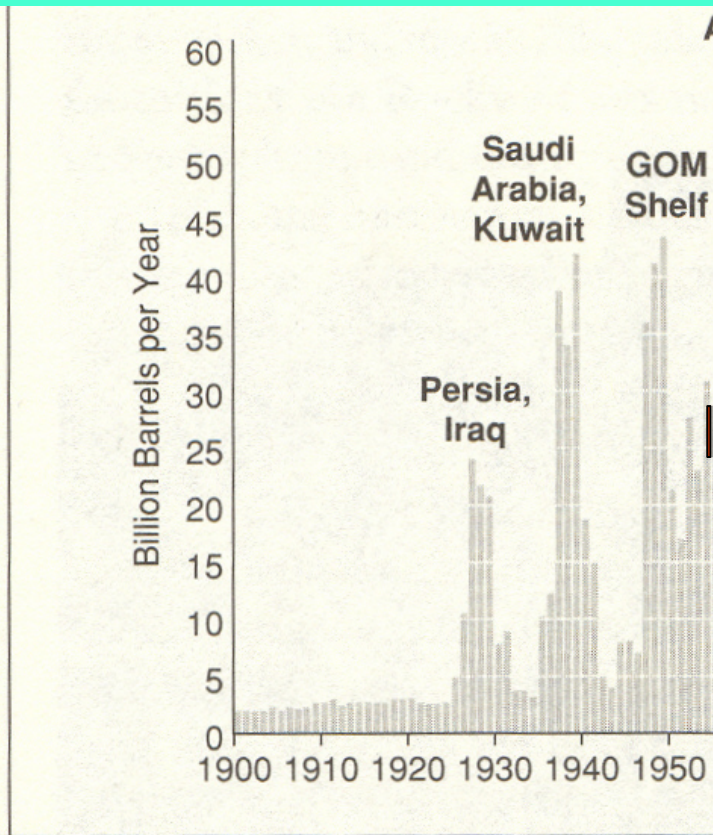


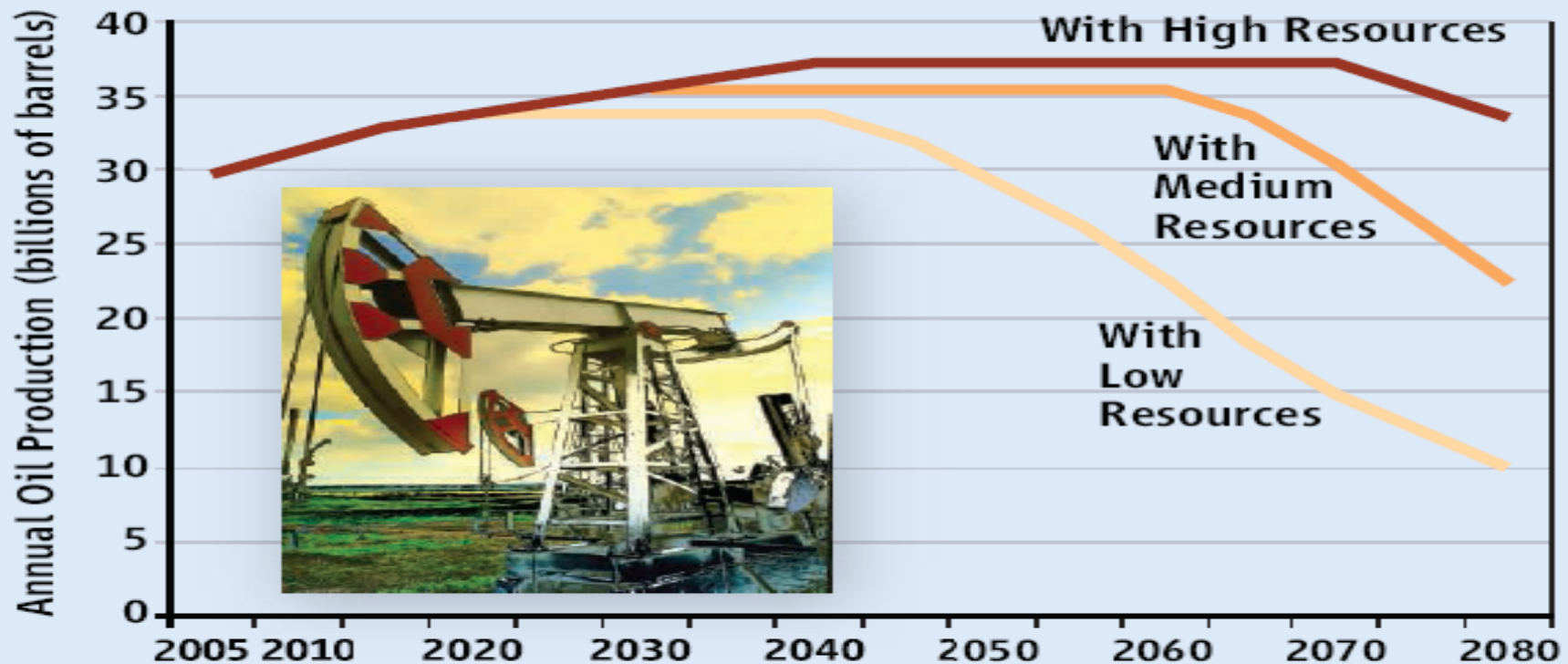
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The Looming Oil Crisis Could Arrive Uncomfortably Soon

www.sciencemag.org SCIENCE VOL 316 20 APRIL 2007

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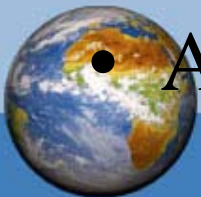
Three Oil Peak Scenarios



Sooner or later. The less oil left to be pumped from the ground, the earlier world production reaches a peak. In a new analysis, only the earliest, low-resource peak looks reliable.

After the Peak?

- Alternative energies
 - Not enough to meet the demand for oil
 - Not able to replace the functions of oil
- High oil price and inflation
- Peak globalization
- Energy consumption and economic growth declines
- Food shortage and famine
- Conflicts among nations
- Another Easter Island: the Earth



Warning:

Oil supplies are running out fast

- **Catastrophic shortfalls threaten economic recovery, says world's top energy economist, By Steve Connor, Science Editor, The Independent, 3 August 2009**
- The world is heading for a catastrophic energy crunch that could cripple a global economic recovery because most of the major oil fields in the world have passed their peak production, a leading energy economist has warned.
- Higher oil prices brought on by a rapid increase in demand and a stagnation, or even decline, in supply could blow any recovery off course, said **Dr Fatih Birol, the chief economist at the respected International Energy Agency (IEA)** in Paris, which is charged with the task of assessing future energy supplies by OECD countries.
- But the first detailed assessment of more than 800 oil fields in the world, covering three quarters of global reserves, has found that most of the biggest fields have already peaked and that the rate of decline in oil production is now running at nearly twice the pace as calculated just two years ago. On top of this, there is a problem of chronic under-investment by oil-producing countries, a feature that is set to result in an "oil crunch" within the next five years which will jeopardise any hope of a recovery from the present global economic recession, he said.



Causes suggested for the oil shock and the energy crisis



- Income-induced
 - Income-induced consumption extravagance of the developed countries
 - **Affluenza**
 - Catch-up from the emerging market countries
- Price-induced
 - Policy distortion that **accelerated the depletion of energy**
 - Energy subsidies
 - price ceiling of energy products in some countries
 - public subsidies to parkinga



Causes suggested for the oil shock and the energy crisis



- Market failure
 - External effects of energy consumption
 - Market price in itself might not fully reflect the social costs of using energy, and this also **accelerated the depletion of energy**
 - Hence we have done a lot of things we wouldn't have done if we had to pay the whole bill



Prescriptions suggested or adopted

- Direct regulation
 - Fuel-economy standards in residential, commercial, transportation, and industrial sectors
 - Eco-labeling
 - Mandatory integrated energy management system
 - Urban planning



Prescriptions suggested or adopted

- Market-based quantity control
 - Emission trading
- Price Policy
 - Subsidies specifically directed to the use of new energy
 - Taxation on carbon or energy products
- Public R&D investment in energy science and technology
- A minority view
 - To fasten economic development to strengthen the adaptation and mitigation ability



**Some Common Features of,
and Potential Interlinks between,
the Two Crises:**

Causes and Effects Reappraised



Common features of the two crises

- Market distortion
 - The economic and financial
 - Interest rate manipulation
 - Market distortion in international commodity markets (export subsidies and/or import barriers)
 - Market distortion in international financial markets (exchange rate manipulation)
 - Causes that are largely ignored: Labor market distortion (minimum wage constraint, which impedes market adjustment)
 - The energy and environmental
 - Energy market distortion: Energy subsidies; price ceiling of energy products
 - Distortion in other markets: Public subsidies to parking



Common features of the two crises

- Market failure
 - The energy and environmental
 - Externalities of using energy uncorrected
 - The financial
 - Asymmetric information in contractual arrangement, which might caused excessive risk taking



Common features of the two crises

- The government often left the market alone when the market failed to signal the full true cost of an economic activity
 - E.g., do not internalize external costs
- But the government frequently intervened in the market and distorted the market signals while the price signal could have correctly signaled a part of the true cost of an activity
 - E.g., subsidize the use (or sale) of (renewable) energy



Potential interlinks between the two crises

- **The prevailing manipulation of prices** (the interest rate, term of trade, exchange rate, etc.)
 - contributed to monetary laxation and savings glut, which in turn might have helped form hyper-optimistic expectations about asset appreciation and the future income flow, encouraging excessive risk taking.
- **Manipulation in energy prices and under-reflection of external costs in energy prices help fasten the depletion of oil.**
 - This, together with the fast expansion of energy consumption derived from continuing income growth in emerging market countries, had contributed to **the oil shock**.

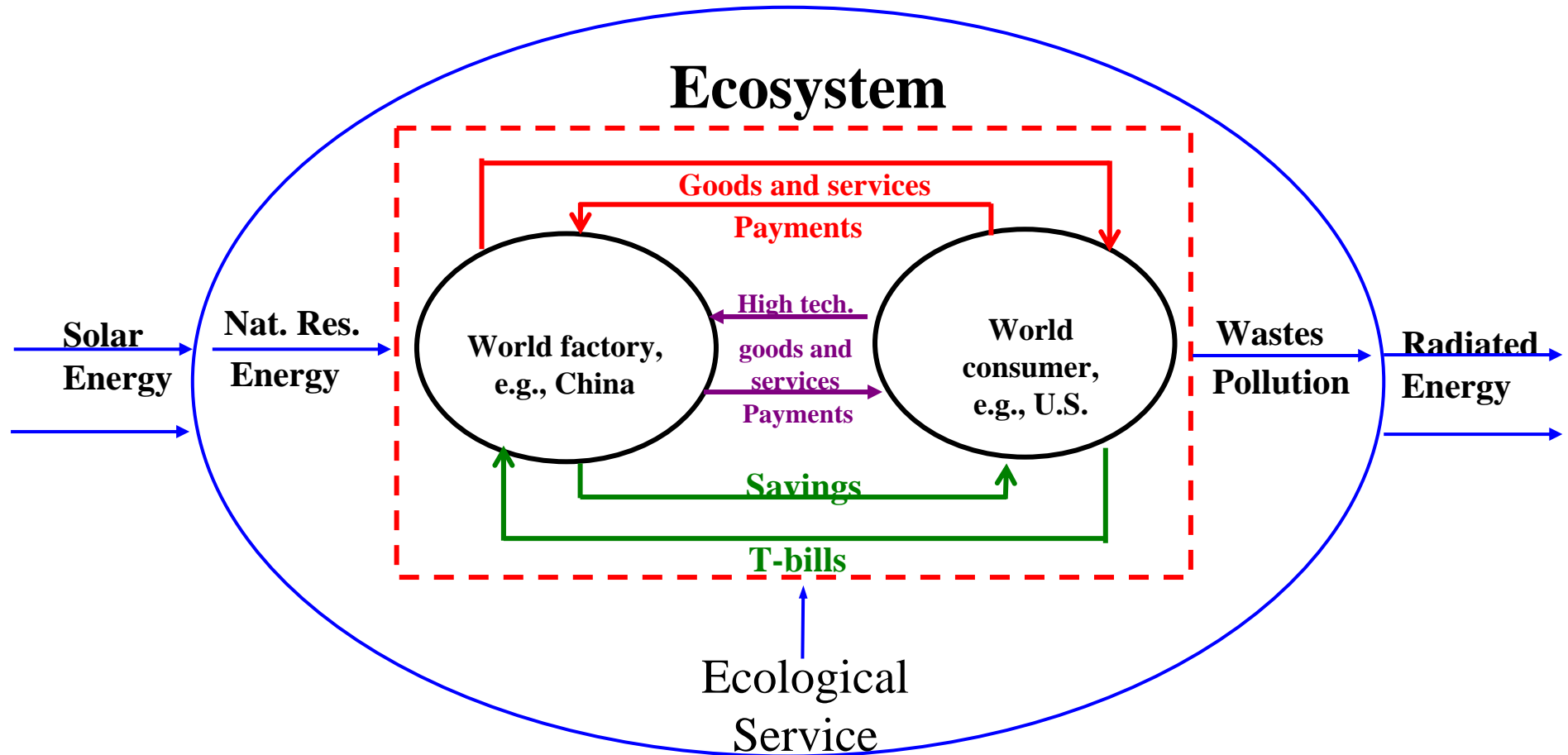


Potential interlinks between the two crises

- Inflated asset prices fostered by low interest rates and slack money supply produced pseudo wealth effect in wealthy countries
- Wealthy countries built more and more houses and bought more and more stuff, which was made in more and more Chinese factories powered by more and more coal that earned more and more dollars to buy more and more U.S. T-bills that got recycled back to America in the form of cheap credit to build more and more houses and to buy more and more stuff that gave rise to more and more Chinese factories. ...
 - adapted from Thomas Friedman
- Eventually, this system reached its financial and energy limits, leading to a general inflation pressure, prompting the Fed to rapidly raise its target interest rates, and then the bubble popped.



Potential interlinks between the two crises



Hotelling Rule

- Price of exhaustible natural resources

= marginal opportunity cost

Resource/energy tax

= marginal production or private cost

+ marginal **user cost**

+ marginal environmental or external cost

- User cost

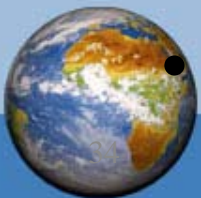
Environmental tax

- the opportunity cost our future generation will face when we use one more unit of the exhaustible resource

- Policy implications:

- Natural resource tax

- No subsidy for production and consumption



How to use the tax revenue of resource/energy taxes?



- Hartwick's Rule (Hartwick, 1977)
 - The amount of investment in produced capital (buildings, roads, knowledge stocks, etc.) that is needed to exactly offset declining stocks of exhaustible resources. This investment is undertaken so that the standard of living does not fall as society moves into the indefinite future.
 - Used to invest in produced capital
 - buildings, roads, knowledge stocks, etc.



An Integrated and Consistent Approach to the Remedy for these Two Kinds of Quandaries



•Green New Deal

- Deficit-financed spending on public projects with certain green flavors
- Fiscal stimulus packages to create a sustainable post-recession economy in the medium to longer term
- Stimulating the economy for growth, jobs and tackling poverty in the short run
- Domestic policy reforms. Stick to where the incentive goes



A large, light-colored world map with a grid overlay is centered on the slide. The map is split into two hemispheres. A purple line with a jagged, pulse-like shape on the left side runs horizontally across the top of the map.

Green New Deal



What is a Green New Deal?

- The UNEP, inspired by **Franklin D Roosevelt's New Deal** of the 1930s, proposed in 2009 a grand public spending program with green flavor. (Edward B. Barbier, 2009, UNEP)
 - Proposed **Investments** in
 - **R&D** in clean and renewable energies
 - **Education**
 - **Conservation** of natural resources and the environment
 - **Goals**
 - Reviving the world economy, creating or saving jobs, and protecting vulnerable groups
 - Reducing carbon dependency, mitigating ecosystem degradation, putting the economy onto a path of sustainable development
 - Achieving the MDGs, ending extreme poverty by 2015



Rationale for a Green New Deal

- The **Keynesian** Theory
 - A recession is caused by a slump in aggregate demand
 - Government should **spend** to lift aggregate demand to **stimulate** the economy
- **Potential Long-run Benefits** of a Green New Deal
 - Investment in the green technologies and the green industries will
 - not only **lift the aggregate demand in the short run**
 - but also **enhance energy efficiency, reduce carbon emissions, and increase productivity in the long run**



UNEP's Proposal for a Global Green New Deal (1)



(Edward B. Barbier, 2009, UNEP)

● Fiscal Stimulus

- To invest in retrofitting public **buildings**; making them more energy efficient
- To develop more energy-efficient, less polluting **transport modes and infrastructure**
- To invest in sustainable **agriculture and freshwater** systems, and improve water storage system and water quality
- Government of developed-countries: to invest in “**smart**” **grids**, and expand their investment in **renewable infrastructure**
- Developing country governments: to support the scaling up and diffusion of **small-scale off-grid technologies**



UNEP's Proposal for a Global Green New Deal (2)



(Edward B. Barbier, 2009, UNEP)

● Domestic Policy Reform

- A full review of domestic **subsidies**
- **Removing the subsidies** that are clearly harmful to the environment
- To operationalize **the Polluter Pays Principle**
- **An incentive system of subsidies, taxes, and regulations** to encourage environmentally responsible behavior and helps **to internalize externalities**
- Reforming of **land use and urban policies**
- Integrated management of **freshwater**
- Introducing or improving environmental legislation

● International Coordination

- Promoting **trade liberalization** of environmental goods and services
- Increasing development assistance to the sectors and actions that comprise the key components of the Global Green New Deal
- Establishment of **global carbon market** and **global markets for ecosystem services**
- Development and transfer of green technology



Green New Deal in the US

Environmental projects in the **American Recovery and Reinvestment Act of 2009**

NO.	Policies	NO.	Policies
1	Clean energy project	7	Authorize renewable energy bonds and energy conservation bonds to finance state and local government projects
2	Investment of "smart" grids	8	Includes money for near-zero emissions power plants, clean coal technology and carbon capture
3	Increasing energy efficiency in federal buildings	9	Establish a new 30 percent investment tax credit for manufacturers of advanced energy property
4	Clean energy R&D	10	Remove dollar caps on the 30 percent residential credit for solar thermal, geothermal and small wind property
5	Provide grants to manufacturers of advanced battery systems and car batteries in the United States	11	Provide consumers rebates for energy-efficient appliances
6	Ready-to-go drinking water and sanitation infrastructure project	12	Increase the tax credit for purchasing plug-in hybrid vehicles

Green New Deal in Japan

◆ Photovoltaic Development

- Promote more photovoltaic power generation
- Assist small and medium business and power companies in the installation of photovoltaic power generation facilities

◆ Energy-saving Autos and Products

- Provide low-interest financing to eco-friendly industries
- Finance the small and medium business for the introduction of energy-saving equipments

◆ Mass Transportation and Infrastructure

- Low-carbon transit, material flow infrastructure, superconductor for technology, electronic cars, energy-saving tech for boats, intelligent transportation system
- Promote convenience of public transit

◆ Nuclear Technology and Others

- Further development of nuclear-related industry and technological development subsidies
- Enhancement of international competitiveness of material and parts manufacturing



Green New Deal in South Korea

- Expanding mass transit and railroads
- Energy conservation (villages and schools)
- Fuel efficient vehicles and clean energy
- Environmentally friendly living space
- River restoration
- Forest restoration
- Water resource management (small and midsize dams)
- Resource recycling (including fuel from waste)
- National green information (GIS) infrastructure



Green New Deal in UK

- Executing a bold new vision for a low-carbon energy system (includes making ‘every building a power station’ and using renewable energy to generate electricity)
- Creating and training a ‘carbon army’ of workers
- Ensuring more realistic fossil fuel prices (by carbon taxes and revenue from carbon trading)
- Financing the development of new and efficient energy infrastructure
- Re-regulating the domestic financial system to ensure that the creation of money at low rates



Green New Deal in EU

- Enhance access to financing for business
- Step up investments to modernize Europe's infrastructure
- Improve energy efficiency in buildings
- Promote the rapid take-up of "green products"
- Increase investment in R&D, Innovation and Education
- Developing clean energy technologies for cars and construction



Green New Deal in Germany

- **First One**

- Funding available for renovation work on buildings aimed at cutting CO₂ emissions
- Urgent investment in transport
- The expansion of rail and waterways will be subsidized
- New cars with low emissions will be tax free for two years
- Funding available for credit granted by EIB for R&D and innovation

- **Second One**

- Investment in infrastructure projects and education
- Incentives for new car purchases



Green New Deal in Northern Ireland

- Refurbish existing homes with full insulation and renewable energy
- Transform the energy performance of public and commercial buildings
- Decarbonize, regionalize and localize the supplies of both electricity and heat
- Employ a ‘carbon army’ of high- and lower-skilled workers
- Transform transport system
- Create ‘green collar’ jobs



Green New Deal in China

Environmental projects in the **Economic Stimulus**

Plan 2009

- Eco-friendly infrastructure in rural areas
- Renewable energy plans
- Funding environment-related R&D and innovation projects



Green New Deal in Taiwan (1)

- **Assisting industries in transforming industrial structure**
 - Structuring systems of examining, registering, verificating, and identifying of CO₂ emissions and reductions
 - Promoting development of ESCOs
- **Investing in energy-saving and environment industries**
 - photovoltaic industry
 - LED industry
 - wind power industry
 - electric car industry
 - hydrogen and fuel cell industry
 - environmental equipment and material manufactories
 - resource recovery industry



Green New Deal in **Taiwan** (2)

- **Advancing clean production strategies**
 - R&D of green technologies
 - Development of green industry
- **Creating high-value green products**
 - Promoting the green mark, the green product certification
 - Structuring standards and verification platforms of energy efficiency product
- **Adjusting energy structure for Taiwan**
 - Subsidizing renewable energy facilities
 - Funding for R&D of green technologies
 - Increasing use of clean energy
 - Setting up renewable energy markets



A large, light-colored world map with a grid overlay is centered on the slide. The map shows the continents of North America, South America, Europe, Africa, Asia, and Australia. A purple line with a jagged, heartbeat-like pattern runs horizontally across the top of the map.

Domestic policy reforms.
Stick to where
the incentive goes



Domestic policy reforms

- Safeguarding the market mechanism, which often signals many true costs of an activity and provides the right incentive to do or not to do something
 - The economic and financial
 - Upholding voluntary cross-border trade, especially in a slump time
 - Repealing the rigidity in labor market to help avoid large amount of layoff, which in turn tends to accelerate the speed of recovering
 - The energy and environmental
 - Repealing any price ceiling of energy products to help reflect true internal costs of energy consumption
 - Let the market's signal works, to reflect true internal costs of transportation services such as parking, etc.
 - Repealing any subsidies to the use (or sale) to any kind of energy



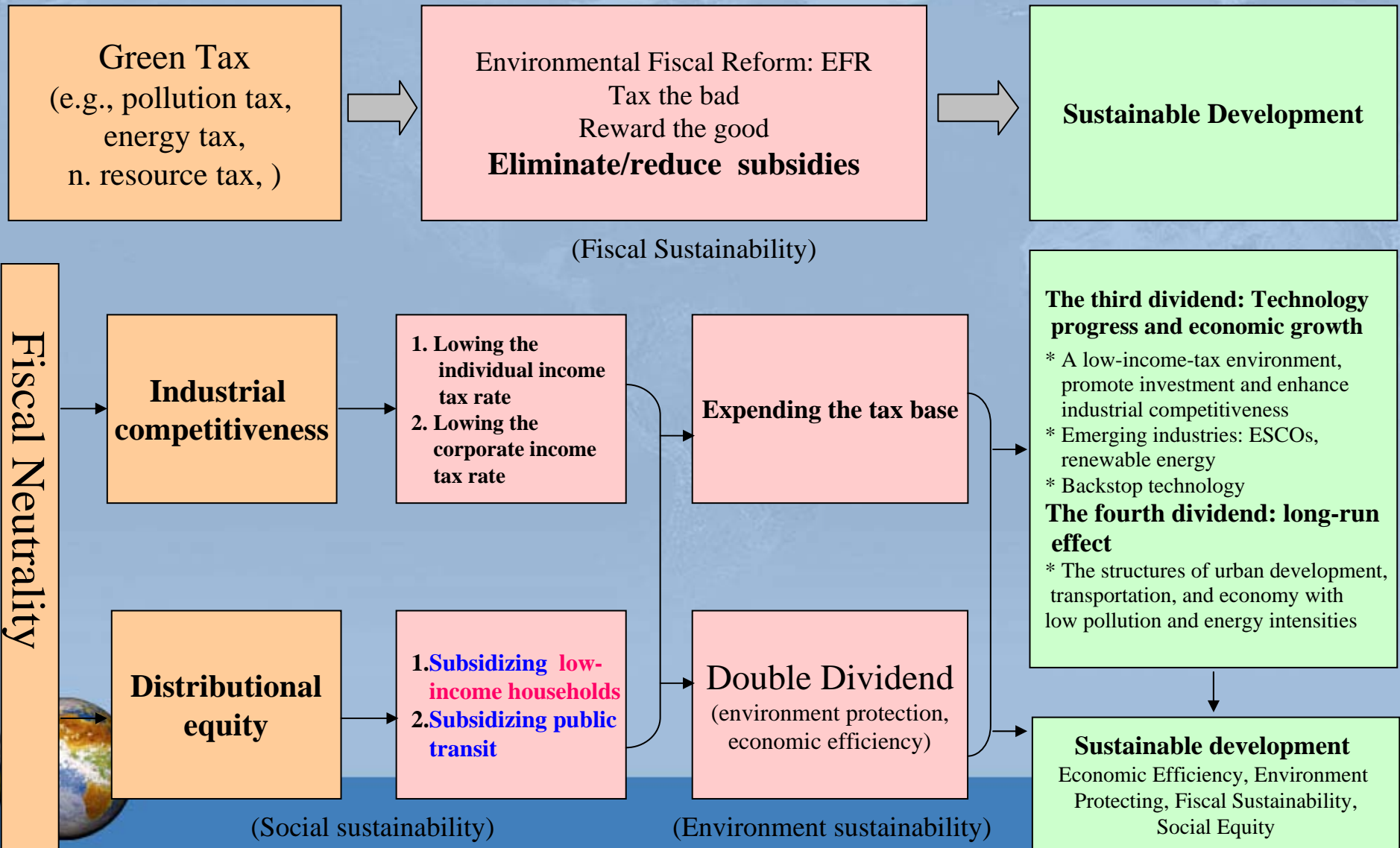
Domestic policy reforms

- Correcting the market failure
 - Internalization of external costs
 - Signaling the full true cost of an economic activity
 - Green tax reform
 - Energy tax or carbon tax of a reasonably sizable rate is a must
 - The revenues from environmental taxes are used to finance the reductions in existing revenue-raising taxes while maintaining fiscal neutrality
 - The “double dividend”
 - » the Pigovian effect: a cleaner environment
 - » welfare improvement



Domestic policy reforms

Visions of the Green Tax Reform



Domestic policy reforms

- Correcting the market failure
 - Public investment in, and only limited to, where the market fails to work efficiently
 - Infrastructure with long term positive marginal returns (a difficult task for the bureaucratic sector to make consistently sensible judgment) but shirked by the private sector, e.g.:
 - Basic research and R&D (knowledge with the nature of non-rivalry in its consumption) that help make potential breakthrough in energy efficiency
 - Some types of education (human capital accumulation) that are inputs intensively used in basic research and R&D
 - Mass transportation (high transaction costs in exclusive tolling)



Domestic policy reforms

- What we have not proposed
 - Subsidies for production and consumption of any kinds of energy either traditional or renewable
 - Infrastructures that encourage energy extravagance: highways, off-road parking lots



A large, light-colored world map with a grid overlay is centered on the page. The map is divided into three sections by vertical lines, representing the Americas, Europe/Africa, and Asia/Australia. A purple line with a jagged, heartbeat-like pattern runs horizontally across the top of the map.

An Appraisal



An Appraisal

- In the absence of domestic policy reforms, there is a risk that the sheer size and spread of perverse subsidies will jeopardize many elements of the GGND. (UNEP, 2009)
- Among those changes that need to be given the most urgent attention are
 - reform of perverse subsidies,
 - provision of right incentives and tax reform,
 - land use and urban policy reforms,
 - Integrated management of freshwater,
 - strengthening environmental legislation.



An Appraisal

- The **fiscal stimulus** part of the **Green New Deal** usually used to save the economy from **a short-run economic slump**. Its marginal benefit is **dubious because it would not** screen and select spending programs carefully.
 - ▲ **Weak fiscal discipline** due to very short project review process
 - ▲ Large-amount low-marginal-benefit spending projects may **exacerbate** the government debt problem
 - ▲ **The multiplier effect of government spending won't be large**, and would crowd out private investment
 - ▲ Strong fiscal discipline is needed: BCA, EIA
 - ▲ Governments, instead of the market, **select future technologies and enterprises** and **provide subsidies**



An Appraisal

● **Problems** of subsidy in the long run

✓ Energy saving subsidy

- ◆ **Low** energy-efficiency firms and industries will earn **more subsidies** than **high** efficiency firms and industries
- ◆ **Encouraging** low energy-efficiency firms and industries to enter the market or to **stay**, in order to get more subsidies

✓ Consumption subsidy of alternative energies

- ◆ Discouraging innovation and competition of new green-technologies by **protecting the chosen technologies**
- ◆ Those firms with **negative net energy outputs** are provided with subsidies (e.g., corn ethanol subsidy)



An Appraisal

● Debts

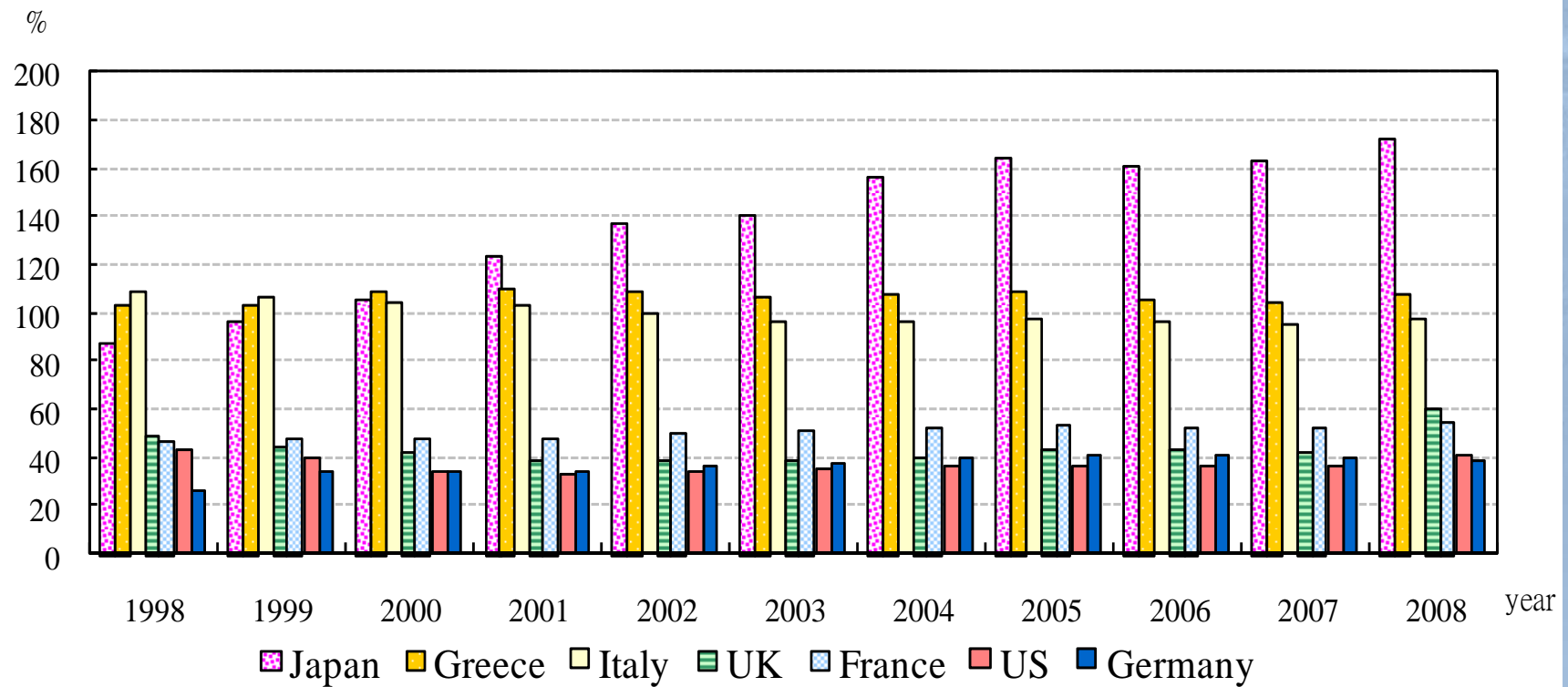
◆ US

- The budget gap reached 1.42 trillion dollars in the 2009 fiscal year (ending at September)
 - ✓ It amounted to 10% of US GDP, and increases of 0.96 trillion dollars compared to the previous year
 - ✓ The highest amount since the end of World War II
- Fiscal deficit in US reached 0.18 trillion dollars in October
 - ✓ US has had budget deficit for 13 consecutive months
 - ✓ The longest lasting period of having deficit in history
- **The Federal government's debt reached 51% of GDP in 2009 and was estimated to reach 54% of GDP in 2011**



An Appraisal

Total central government debt to GDP ratio (%)



Source: OECD



An Appraisal

- ◆ Debt to GDP ratio in 2009:
 - ◆ 187% in Japan
 - ◆ 127.3% in Italy
 - ◆ 113% in Greece
- ◆ The debt ratio of OECD countries was estimated to surpass GDP in 2010, a doubling of that in the 1990

● Potential Consequences


- ◆ Default risk
- ◆ Inflation pressure
- ◆ Pushing up interest rates



An Appraisal

- **Effective domestic policy reforms** provides a more **general incentive** to make development more sustainable
 - Used to correct market failures: public goods, external effect
 - Take natural resources' depletion into account
 - **Domestic policy reforms, for example a Green Tax Reform**, following the fiscal neutrality principle and the fiscal discipline **will meet the goal of sustainable development** without increasing **government debt burden**



A purple ECG (heart rate) line is positioned horizontally across the upper portion of the slide, starting with a small pulse on the left and then continuing as a straight line to the right.

Thank you for
your attention!

