World Oil Markets: Implications for Consumers, Producers, and the World Economy

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Inflation-adjusted price of crude oil
(West Texas Intermediate, 2008 dollars)
Key parameter in any economic model of oil effects: \textit{value share} = dollar value of expenditures on oil divided by dollar value of total expenditures

Reason: individual consumer has option to keep buying same amount as before, meaning \textit{dollar loss} = quantity purchased times price change
Observed average percent change in total consumption spending $m$ months following an energy price increase that reduces purchasing power 0.1% (e.g., $\%\Delta P = 5$ and share $= 0.02$). Source: Edelstein and Kilian (2007).
Observed average percent change in indicated category of consumption $m$ months following an energy price increase that reduces purchasing power 0.1% (e.g., $\%\Delta P = 5$ and $a = 0.02$). Source: Edelstein and Kilian (2007).
U.S. auto capacity by segment (thousands of units per quarter).
Shift away from domestically manufactured vehicles.
Shift away from light trucks (SUVs).
Average GDP growth in 4 quarters following big oil price increases

<table>
<thead>
<tr>
<th>Date of oil price spike</th>
<th>Average actual GDP growth following 4 qtrs</th>
<th>GDP growth if motor vehicles had no change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974:Q1</td>
<td>-1.9%</td>
<td>-1.2%</td>
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<tr>
<td>1979:Q3</td>
<td>-0.6%</td>
<td>+0.1%</td>
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<tr>
<td>1981:Q1</td>
<td>1.3%</td>
<td>1.5%</td>
</tr>
<tr>
<td>1990:Q3</td>
<td>-0.6%</td>
<td>-0.1%</td>
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</table>
Historical oil shocks also often followed by rapid loss of consumer confidence. Source: Edelstein and Kilian (2007).
Cumulative logarithmic change in U.S. real GDP since 1949 (horizontal axis) and in U.S. oil consumption (vertical axis)

\[ e^{1.94} = 7 \rightarrow \frac{2006 \ GDP}{1949 \ GDP} = 7 \]
\[ e^{1.27} = 3.6 \rightarrow \frac{2006 \ oil}{1949 \ oil} = 3.6 \]
Cumulative logarithmic change in U.S. real GDP since 1949 (horizontal axis) and in U.S. oil consumption (vertical axis)

Oil use fell 21%

Oil price rose 81%
Cumulative logarithmic change in U.S. real GDP since 1949 (horizontal axis) and in U.S. oil consumption (vertical axis)

- Oil use fell 2% 2003-04
- Oil price rose 8% 2003-04
- Oil use fell 1% 2005-06
- Oil price rose 40% 2005-06
Cumulative logarithmic change in U.S. real GDP since 1949 (horizontal axis) and in U.S. oil consumption (vertical axis)

1949-61: slope = 1.2
1961-73: slope = 1.04
1985-97: slope = 0.47
Smoothed annual growth rate of petroleum demand
GDP per capita and growth in petroleum demand

Annual % growth in petroleum use, 1960-2002

GDP/capita in 1960
Income elasticity for developing countries is closer to 1

Source: Gately and Huntington, 2001
7.2% per year!

Chinese oil consumption (mb/d)
By 2020, China would be using 20 mb/d (= current U.S.)
By 2030, China would be using 40 mb/d
Oil use per person in China is less than 1/3 current value for Mexico. China has 3.3 vehicles per 100 residents, compared with 77 in U.S.
World crude oil production (million barrels per day)
2005-2007:
• China increased consumption by 860,000 b/d
• World production actually fell slightly
• OECD countries decreased consumption by 720,000 b/d
Inflation-adjusted price of crude oil
(West Texas Intermediate, 2008 dollars)
Income elasticity of oil demand for U.S. is less than 1 (% change oil < % change GDP)

Implies dollar share of oil in GDP would fall over time

Price elasticity of oil demand is less than 1 (% change oil < % change price)

Implies dollar share of oil in GDP rises when price of oil rises
2008:H1 calculation used crude oil price of $111/barrel.
Figure 1 - Moving 12-Month Total on ALL Roads

Annual Vehicle-Distance Traveled (Billion Miles) vs. YEAR
U.S. gasoline consumption: this year (red) versus last (blue)
Down 28% June 07 to June 08
<table>
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<th>GDP from autos (2000 $)</th>
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<td>2007:Q3-2008:Q1</td>
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<td>2007:Q3-2008:Q1</td>
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• GM announced it will close 4 plants
• Ford will eliminate 15% of salaried positions
• Continental, United, Delta, and American Airlines all announced significant flight eliminations and employment cuts in the thousands
Temecula, CA

- 60 miles from downtown San Diego
- population doubled last decade
- 15% homes now in foreclosure
Figure 1. Unemployment
By 2020, China would be using 20 mb/d (= current U.S.)
By 2030, China would be using 40 mb/d
Dollar value of crude oil as percentage of U.S. GDP, 1970-2007 annually and 2008:H1 estimate