

Energy Price Impacts on the U.S. Economy

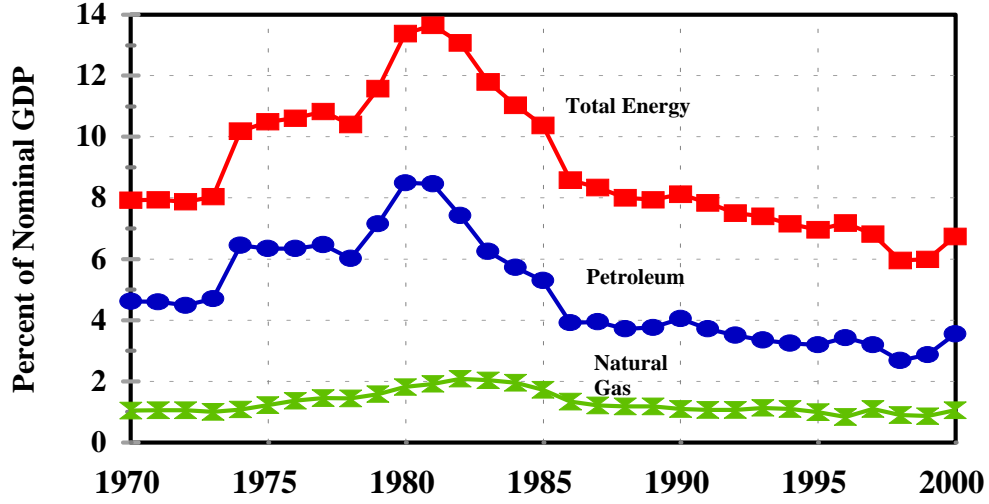
What has happened to the share of energy in the U.S. economy since the early 1970s?

- Prior to the embargo of 1973-74, total energy expenditures constituted 8 percent of U.S. gross domestic product (GDP), the share of petroleum expenditures was just under 5 percent and natural gas expenditures accounted for 1 percent. The price shocks of the 1970s and early 1980s resulted in these shares rising dramatically to 14 percent, 8 percent, and 2 percent respectively, by 1981. Since that time, the shares have fallen consistently over the last two decades to current levels of about 7 percent for total energy, while petroleum has fallen even further to 3.5 percent and natural gas to just over 1 percent. The shares were lower during 1998, when oil and natural gas prices were lower, but have risen recently in response to higher oil and natural gas prices. (Figure 1)
- Part of the reason for the overall decline in the energy shares is the decline in the world oil price from its peak in 1981. The other reason is the steady decline in energy intensity, measured by energy consumption per dollar of GDP. This ratio has declined due to structural shifts in the economy and improvements in energy efficiency. (Figure 2)
- Although the U.S. has reduced its use of petroleum as a share of its economy, there is a growing dependence on imported oil. In 1973, net imports of petroleum made up 35 percent of petroleum product supplied (consumption). For 2000, this share has risen to over 50 percent and is expected to reach 64 percent by 2020. (Figure 3)

What does history tell us about how energy prices affect the economy?

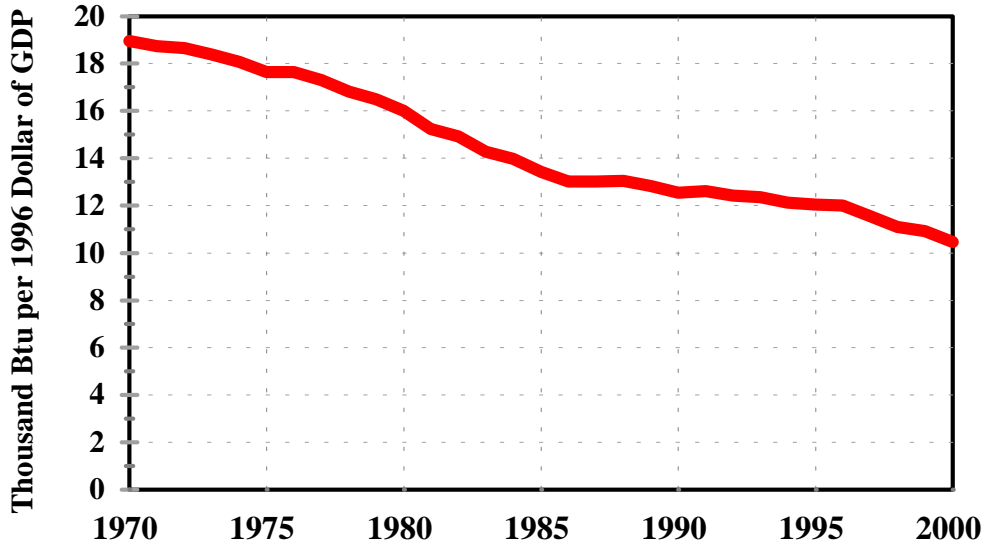
- Viewed from a long-term perspective, inflation, measured by the rate of change in the consumer price index (CPI), tracks movements in the world oil price. Not only do oil and other energy prices constitute a portion of the actual CPI, but downstream impacts on other commodity prices will have a lagged effect on the CPI inflation. (Figure 4)
- Looking from the 1970s forward, there are observable, and dramatic changes in GDP growth as the world oil price has undergone dramatic change. The price shocks of 1973-74, the late 1970s/early 1980s, and early 1990's were all followed by recessions, which have then been followed by a rebound in economic growth. The pressure of energy prices on aggregate prices in the economy created adjustment problems for the economy as a whole. (Figure 5)
- In the past year, forecasters have acknowledged that higher energy prices can become a drag on the overall economy. Initially, overall CPI inflation was still very low, principally because inflation in commodities other than energy and agriculture was extremely low. However, the sustained high level of oil prices has begun to effect core inflation (minus energy and food) through continued pressure on prices of other commodities, in the United States and worldwide. And as historical events suggest, a downward adjustment in the growth of economic activity might be expected. In 1999, the inflation rate for the Consumer Price Index (All Urban Consumers) was 2.2 percent and the core inflation rate was 2.1 percent. However, during 2000 the CPI inflation rate rose to 3.4 percent, led by energy prices. Moreover, the core inflation rate also rose to 2.4 percent. The economy was no longer able to absorb the energy price rise, and higher energy prices began to affect prices of other goods and services. (Figure 6)

Figure 1. Energy Expenditure Share of the Economy



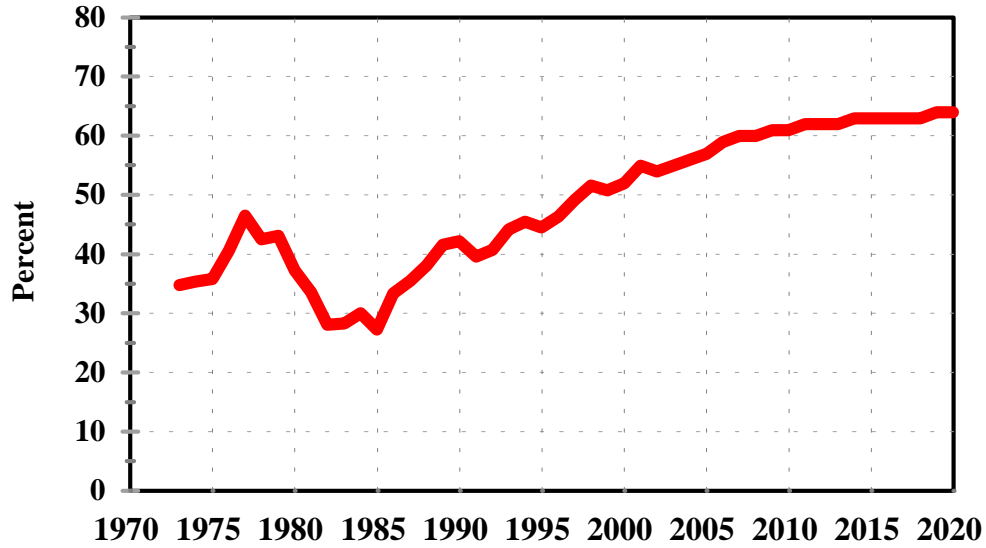
Sources:
 State Energy Price and Expenditure Report 1997, Energy Information Administration, Aug. 2000;
 Annual Nominal GDP Data from the Bureau of Economic Analysis found at <http://www.bea.doc.gov/bea/dn1.htm>
 Annual Energy Outlook 2001, National Energy Modeling System run AEO2001.d101600a.

Figure 2. Energy Consumption per Dollar of GDP



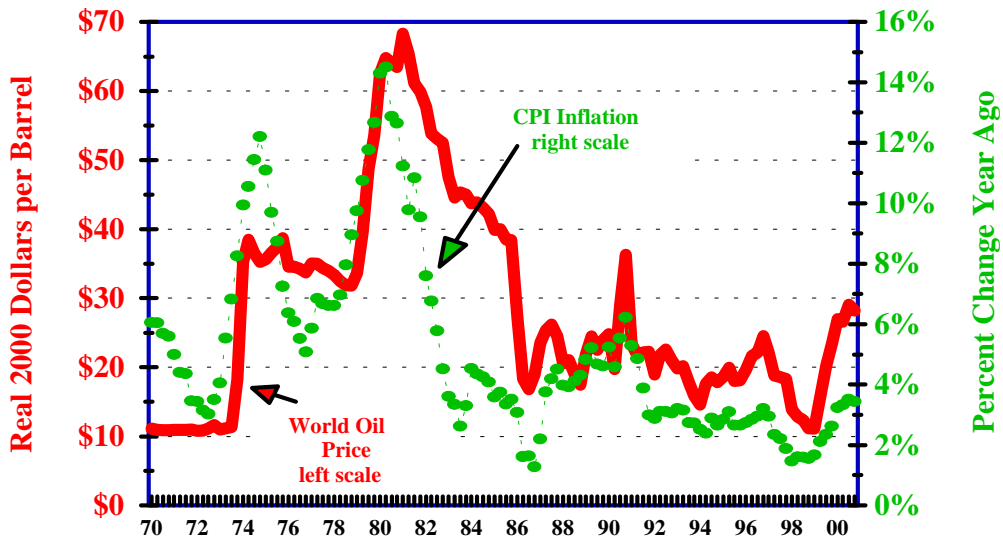
Sources:
 Monthly Energy Review, January 2001, Table 1.8
 Annual Energy Outlook 2001, National Energy Modeling System run AEO2001.d101600a.

Figure 3. Net Import Share of Petroleum Consumption



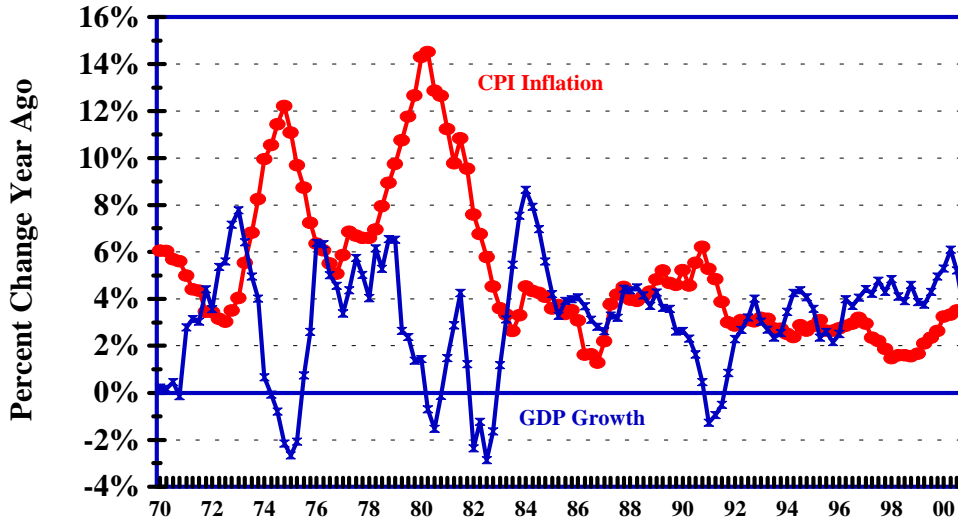
Sources:
 Monthly Energy Review, January 2001, Table 1.8
 Annual Energy Outlook 2001, National Energy Modeling System run AEO2001.d101600a.

Figure 4. Movements in the World Oil Price and Inflation



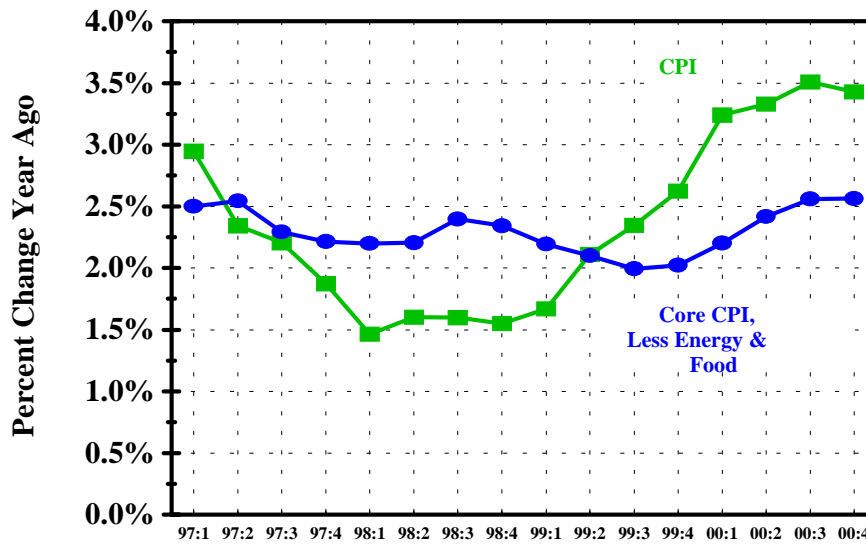
Sources:
 CPI: Bureau of Labor Statistics at <http://stats.bls.gov/cpihome.htm>
 World Oil Price: Refiner Acquisition Cost for Imported Oil: Energy Information Administration,
 Monthly Energy Review at <http://www.eia.doe.gov/mer/contents.html>

Figure 5. Movements in Inflation and GDP Growth



Sources:
 CPI: Bureau of Labor Statistics at <http://stats.bls.gov/cpihome.htm>
 GDP: Bureau of Economic Analysis at <http://www.bea.doc.gov/bea/dn/st-tabs.htm>

Figure 6. CPI & Core Inflation



Sources:
 CPI and Core CPI: Bureau of Labor Statistics at <http://stats.bls.gov/cpihome.htm>

How are these events shaping the forecast of economic growth for the near term?

- Most forecasters are suggesting that a soft-landing for the economy is probable, with a significant reduction in expected growth in the next year, but with no recession. The table below shows forecasts for the year 2001 from four groups. The forecasts done in January for the year 2001 indicate expected growth in the 2.4 percent to 2.8 percent range, clearly less than the growth of 5.0 percent that took place in 2000. Note however, that the DRI, WEFA and EIA forecasts prepared one month earlier in December, projected higher growth for the year 2001 than the forecast in January. Forecasts in February and March revised projected growth further downward because of the trends indicated by new data.

Comparison of Forecasts for the Growth Rate of Real GDP for 2001				
	December 2000	January 2001	February 2001	March 2001
Standard&Poor's DRI	3.1	2.5	2.1	1.7
The WEFA Group	3.0	2.8	2.0	1.8
EIA, Short-Term Energy Outlook (STEO)*	3.2	2.6	2.2	1.9
Congressional Budget Office		2.4		

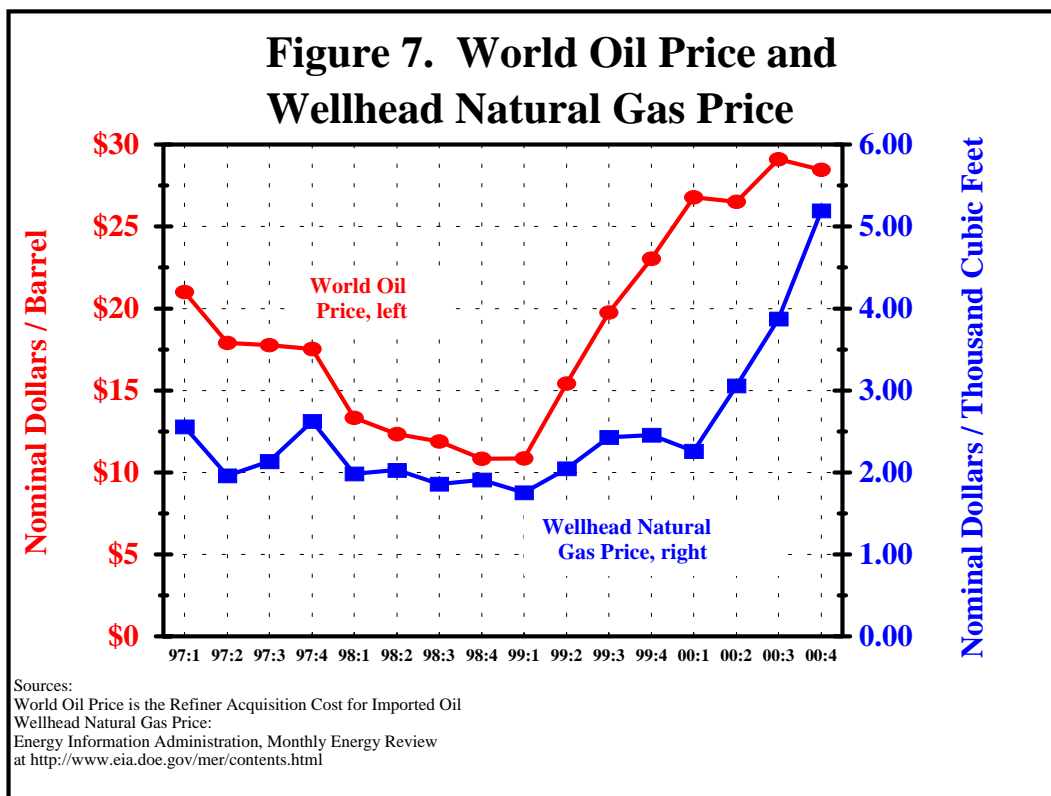
* Since the EIA forecast is a modified version of the DRI forecast, the date for the EIA forecast is the month of preparation of the macroeconomic forecast and matches up with the vintage of the DRI and other forecasts. The STEO based on this macroeconomic forecast is released one month later when the energy forecast is complete. The March forecast of 1.9 percent GDP growth will support the April STEO.

Sources:
 - Standard&Poor's DRI, *The U.S. Economy*, issues 2000/12, 2001/1, 2001/2 and 2001/3.
 - WEFA, *US Outlook*, issues December 2000, and January, February and March 2001.
 - Energy Information Administration, *Short-Term Energy Outlook*, <http://www.eia.doe.gov/emeu/steo/pub/contents.html>
 - Congressional Budget Office, <http://www.cbo.gov/showdoc.cfm?index=2727&sequence=3>.

- It is important to note that, while energy prices and events have contributed to the slowdown, there are many other events that have affected the economy in the past two years. For example, between June of 1999 and May of 2000, the Federal Reserve Board's Federal Open Market Committee made a number of upward adjustments in the federal funds rate citing concern about the risk of rising inflation while providing for sustainable economic growth. In total, the federal funds rate rose by 175 basis points during this period. In January of 2001, the Federal Reserve Board expressed concern about weakening sales and production, lower consumer confidence, tight conditions in some financial markets, and high energy prices sapping household and business purchasing power. In response to these conditions, the Federal Reserve Board twice lowered the federal funds rate in January by 50 basis points for a total reduction of 100 basis in one month. In March the federal funds rate was lowered another 50 basis points.

How has the economy reacted to the volatile energy prices of the past four years?

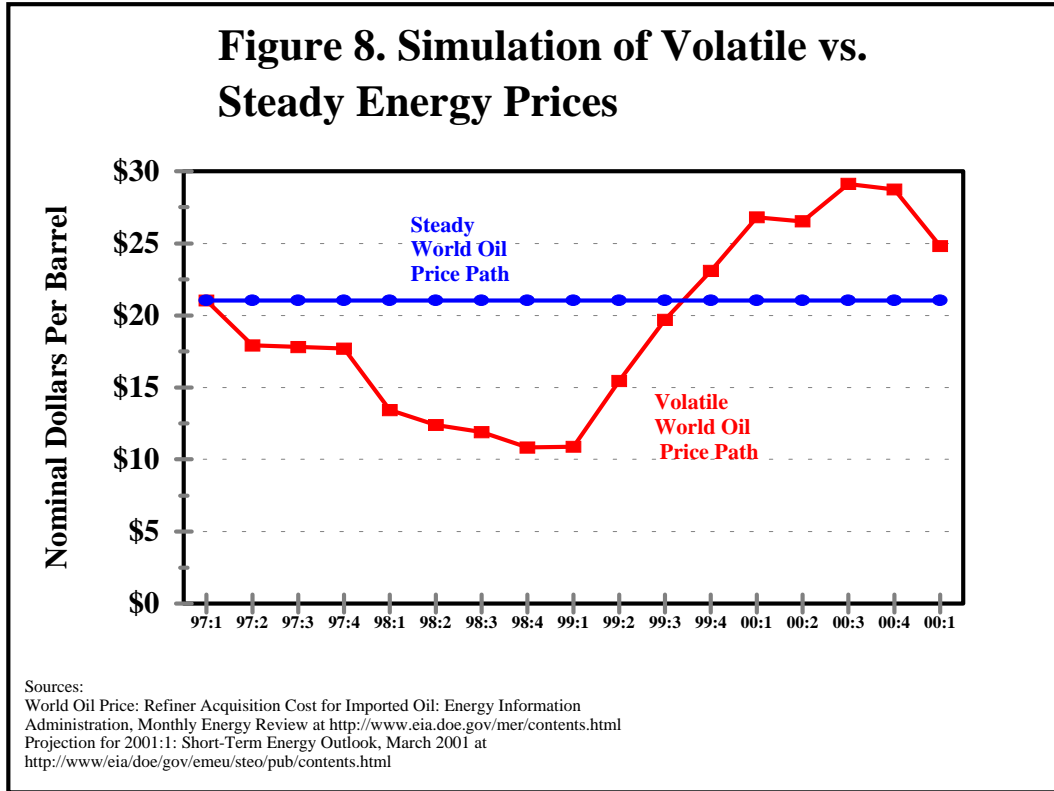
- Most of the recent concern about energy prices has focused on their rapid rise beginning in the second quarter of 1999 to the present, with less attention given to the decline in energy prices during 1997 and 1998. Looking back to the first quarter of 1997(1997:1), the world oil price expressed in nominal dollars per barrel fell from \$21.02 to a low of \$10.86 in the first quarter of 1999. Then, in the second quarter of 1999, the world oil price began to rise dramatically, ultimately almost tripling to a high of \$29.11 in the third quarter of 2000. The path for the wellhead natural gas price was less volatile than for oil between 1997:1 and 2000:1, fluctuating between a high of \$2.63 per thousand cubic feet to a low of 1.76. However, beginning with the second quarter of 2000, the wellhead natural gas price increased dramatically. From the first quarter to the second quarter of 2000, the wellhead natural gas price rose from \$2.26 to \$3.06 and by the fourth quarter to \$5.19 per thousand cubic feet. (Figure 7)



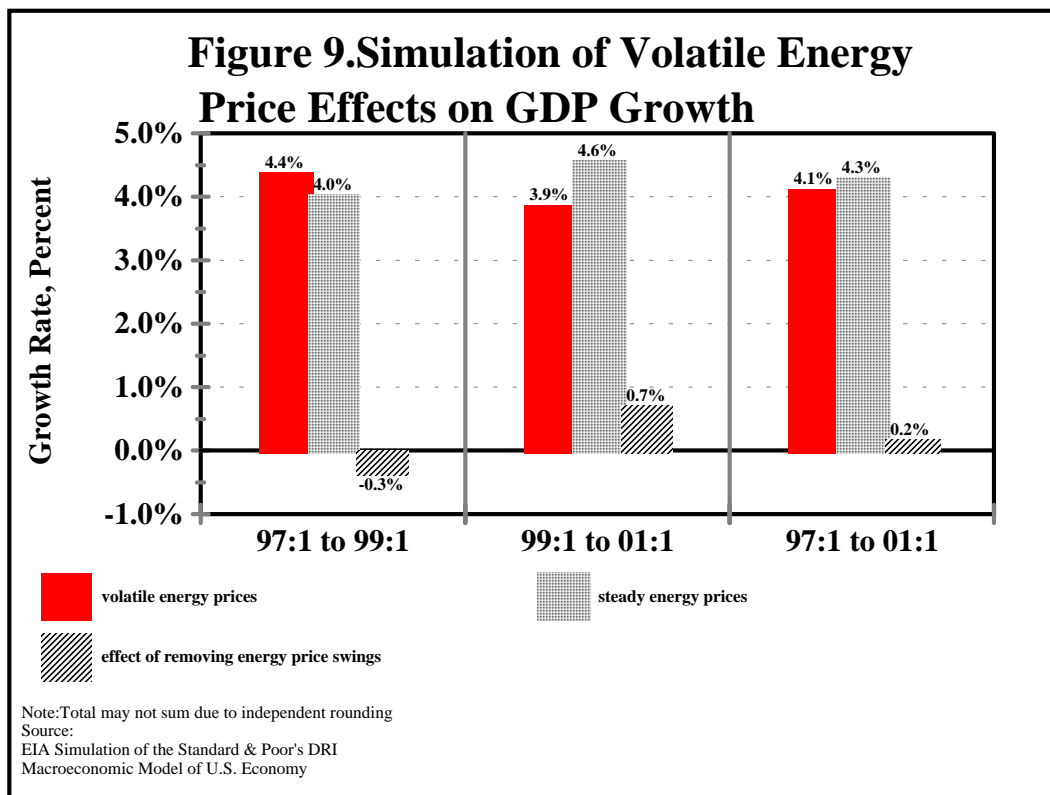
- Each of these events — first falling, then rising energy prices — undoubtedly had effects on the growth of the economy. To assess the economic impacts of these rapidly changing energy prices, EIA compares two cases:

 - (1) the Volatile Energy Price case mimics the energy price percent changes seen from the period between 1997:1 to 2001:1. This includes the prices movements for petroleum, natural gas, coal and electricity; and
 - (2) the Steady Energy Price case assumes steady energy prices throughout the four-year period.

Figure 8 shows the alternative paths for the world oil price. Other energy prices were done in a similar fashion.



- The experiment asks the question “ **If energy prices remained steady throughout the four-year period from 1997:1 to 2001:1, what impact would this have had on the growth of the economy?**”
- Two distinct patterns emerge. During the two-year period from 1997:1 to 1999:1, falling energy prices boosted the economy. If energy prices remained steady over this period instead, the growth rate of GDP may have been reduced by 0.3 percentage points (Figure 9). However, during the next two-year period from 1999:1 to 2001:1, energy prices first rose dramatically, then began to decline again. If this rapid rise in energy prices had not occurred, there may have been as much as 0.7 percentage points of additional GDP growth. Over the entire four-year period, a steady energy price path could have potentially boosted GDP growth by 0.2 percentage points. In interpreting these values, keep in mind that any attempt to make a judgement about what might have occurred in the past based on an hypothetical experiment, cannot fully account for the dynamic events which shape history. Nonetheless, such an experiment can help to provide insights about the likely direction and potential magnitude of impact.
- Volatility matters for all consumers and producers in the economy. Business firms, both energy and non-energy, make investment decisions based on expectations about prices. If decisions are made on the expectation of low (or high) energy prices, and the energy market varies sharply from these expectations, firms may make inappropriate investment and business decisions. Even



those firms that expect volatility may be adversely affected by simply putting off a decision until the market is more stable. Consumer purchases of housing and consumer durables such as autos and appliances are also affected by instability in energy markets. The economy would most likely perform better with stable or predictable energy prices, than when the price of energy fluctuates greatly.

How will oil price movements affect other countries?

- Similar to the U.S., all countries stand to experience higher inflation due to rising oil prices. While the U.S. has been successful in reducing its dependence on oil from a consumption-per-unit of output perspective, this is not the case in many other countries, where oil use is key to their developing industrial and transportation sectors. Moreover, for the U.S., the net import share of total oil consumption is above 50 percent, and this share is expected to rise steadily in the future. Other countries face the same prospect. Higher oil prices have direct and dramatic effect on the trade patterns between countries. Here, trade in oil is just one side of the story. As higher oil prices get translated into higher commodity prices, there are likely to be changes in the prices of non-energy exported and imported goods which will affect trade beyond just the oil accounts.

Contacts: Ronald Earley (rearley@eia.doe.gov, 202/586-1398)
 Kay Smith (ksmith@eia.doe.gov, 202/586-1455)