Energy Price Spikes Siphon High-Octane Fuel from State’s Economy

By Steven P. Lanza

Production changes by oil-producing nations and a demonstrably rickety electricity grid are making energy markets as volatile as ever. But a fact of economic life in Connecticut is that energy is already expensive, and high prices have encouraged us to become the leader among states in energy efficiency. So if we’re less dependent on energy, it stands to reason that we should be less vulnerable to the vagaries of energy markets, right? Wrong. It turns out that a spike in energy prices can really sap some juice out of the state’s economy.

Unlike states with significant endowments of energy resources, or those located within easy reach of energy suppliers, Connecticut sits at the end of the proverbial energy pipeline. Thus, prices are high here compared with many other states. According to the latest data from the U.S. Energy Information Administration (EIA), Connecticut’s cost in 2000 for energy from all sources—coal, natural gas, electricity, and petroleum—averaged $12.66 per million Btu. That same year, the U.S. average was just $9.85, so energy prices in our state exceeded the national average by about 29%. Only four other states—Vermont, Hawaii, New Hampshire, and Arizona (in that order)—faced an average energy price above ours.

High energy prices encourage conservation and discourage energy-intensive production. As the scatterplot below suggests, high prices generally mean low levels of energy expenditure. The chart compares the price of energy in 2000 to each state’s spending on energy as a percentage of gross state product. A trendline drawn through the scatterplot summarizes that relationship: a 1% rise in price is associated with a 1% drop in expenditure. Connecticut is the dot at the extreme left of the chart, with spending on energy equal to just 5.1% of gross state product—the lowest of any state. In contrast, the average for all states was 8.1% of gross state product. Louisiana, with its petroleum-based economy, headed the list (at the rightmost extreme) at 14.3%.

Relative prices not only influence total energy consumption; they also affect the mix of energy sources used. In high-cost Connecticut, for example, coal is particularly pricey, while oil is relatively cheap. With the price of coal 80% above the U.S. average in 2000, Nuttmeggers understandably drew just 4% of their energy from coal, compared with 22% for the U.S. Oil, by contrast, was “only” 30% more expensive than the U.S. average, so state residents met 44% of their energy needs using petroleum, as compared with 39% for the U.S.

Despite our state’s relatively high dependence on oil, we’ve made a science out of energy efficiency. But does that mean Connecticut can easily navigate a rough road in energy prices?

Shopping for the Right Model

Energy appeared abruptly in the public’s headlights back in the mid-1970s, when a succession of OPEC-induced energy crunches exacerbated the economy’s woes and exposed its addiction to fossil fuels. It was common then, as now, to think of economic output as produced with varying combinations of two factors of production: capital and labor. The energy crisis suggested that adding energy as a variable might increase the

THE BOTTOM LINE?

Connecticut wants improved power reliability … but don’t put any new generating plants in my backyard, don’t expand the role of the market, and don’t ration my power. And whatever you do, remember that many of us don’t want to pay for it. Maybe California will lend us Governor Schwarzenegger—but as Mr. Universe, hitched to a turbine generator.

Energy Spending as a Fraction of GSP in 2000

Source: The Connecticut Economy based on data from EIA and BEA.

The Connecticut Economy

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The link between energy prices and performance is straightforward enough: higher prices should reduce energy use, and, with less energy being used, output should decline, too. But as we have seen, energy does not play the same role everywhere, so states may not all respond the same way to changes in the energy market.

To test the comparative effects of changing energy prices, I followed Rasche and Tatom in estimating output as a function of capital and labor inputs and energy prices. I updated the analysis to include data from the period 1977 to 2000, but also customized the model to provide separate estimates for each of the fifty states.

My measure of output is real gross state product in private industries, an inflation-adjusted measure of the value of final goods and services produced by the private sector. In 2000, for example, Vermont had the smallest state private output, $14.8 billion in 1996 dollars, while California was largest at $111,23 billion. Connecticut ranked 22nd at $138.8 billion.

There are no reliable, readily available figures for capital stock by state. But the U.S. Bureau of Economic Analysis (BEA) does publish annual estimates of the size of the U.S. capital stock. Assuming that each state’s capital-output ratio is the same as the nation’s (about 2.8 to 1 over the period), I can guesstimate the state figures by just scaling real output by each year’s appropriate capital-output ratio.

Unlike capital, estimates of labor inputs by state are easy to find. I used BEA data on total private-sector employment by state. Predictably, California led the states in 2000 with an employment total that topped 17.1 million, but this time Wyoming ranked last, with 264,000 private-sector employees. At 1.9 million, Connecticut ranked 27th.

For energy prices, I used the state-by-state EIA data referred to above. In 2000, the price of energy was highest in Vermont at $13.68 per million Btu, and lowest in Montana at $6.50. In nominal terms, energy prices held fairly steady across states through-out much of the 1977-2000 period, but adjusted for inflation the trend was actually downward. And for purposes of estimating changes in real output, real prices are what matters.

Taking the Model for a Test Drive

So how does the model perform? The bar graph below shows the range of effects on real private-sector gross state product associated with a 10% increase in real energy prices, holding constant any influences from other input variables. For the average state, a 10% increase in real energy prices is associated with a 1.3% decrease in real output, holding capital and labor constant. This result is nearly identical to the 1.4% figure for the U.S. as a whole identified by Rasche and Tatom 26 years ago.

Connecticut is among the group of states (located chiefly in the Northeast and along the West Coast) for which an increase in energy prices has the biggest negative effect. Arizona’s economy would bear the greatest burden from an increase in energy prices, suffering a 3.4% fall in real output from a 10% increase in price. But Connecticut’s burden wouldn’t be much less, at 2.5% less output.

For some states—Wyoming, Oklahoma, Texas, and Alaska—an increase in energy prices would actually improve economic performance. These are big energy-producing states that gain income when energy prices go up. But for Alabama and Louisiana, the gains to their energy-producing sectors are largely offset by the losses to their energy-consuming sectors. For all other states, higher real prices mean lower real output.

What accounts for the varying responses among states to changes in energy prices? As already suggested, the mix of industries among states is important. States with industry concentrations in energy extraction are helped by rising prices. States like Arizona and Colorado, with extensive mining operations, or New Jersey and Delaware, with high concentrations in refining and petrochemicals, are hurt when energy prices go up. Although Connecticut’s energy-intensive manufacturing sector has waned over time, the state retains a higher-than-average industry concentration in this sector and in subsectors, such as chemical products, that are particularly energy-sensitive.

Why isn’t Connecticut’s sensitivity to price changes mitigated by its relative energy efficiency? After all, if we don’t use much energy to begin with, an increase in price should have fairly modest negative consequences for production. But it doesn’t, and we’re not alone. Other states, such as California, New York and Massachusetts, where energy is also a small part of total output, are also among the more sensitive to changes in energy prices. Perhaps it is precisely that sensitivity, along with relatively high energy prices, that encourage states to find ways to use energy more efficiently. This much is clear: energy prices matter everywhere, but they’re especially important in Connecticut.