



Why Oil Prices Are Up, and What We Can, and Can't, Do about It

Published : May 03, 2006 in [Knowledge@Wharton](http://knowledge.wharton.upenn.edu/article.cfm?articleid=1466)

Rising prices for crude oil and gasoline have alarmed many consumers and put President Bush and other U.S. politicians in a position where they feel they have to do something -- anything -- in response, especially in an election year. But members of Wharton's finance department and private-sector economists say it's a good time to shun hysteria, take a deep breath, and look rationally at the reasons for the price hikes and their likely effect on the economy and on energy policy.



This is a single/personal use copy of Knowledge@Wharton. For multiple copies, custom reprints, e-prints, posters or plaques, please contact PARS International: reprints@parsintl.com P. (212) 221-9595 x407.

Higher prices are crimping the pocketbooks of motorists who are now paying \$3 per gallon or more at the pump, up from about \$1.50 in January 2003. Gasoline prices, which could continue to rise this summer, will have a ripple effect throughout the economy in the weeks and months to come and will dampen GDP (gross domestic product) growth in 2006. Indeed, a recent survey found that one group of American CEOs sees rising energy costs as the biggest threat to the world economy over the next two years. And as long as the United States continues to rely on oil producers in unstable parts of the world, high prices and price volatility will be the norm, these experts say. Bolivian President Evo Morales's decision, announced this week, to nationalize the country's natural gas sector, only underscores that point.

Still, several factors are working to mitigate the effects of higher energy prices on American wallets and psyches. For one thing, prices at the pump today are not as high, in relative terms, as in some past periods, and some forecasters see oil prices falling from a record \$75.17 per barrel on the New York Mercantile Exchange the week of April 23 to below \$65 a barrel in 2007. In addition, the U.S. economy is not as dependent on oil for GDP growth as it was in decades gone by because it is now much more of a service economy than an industrial one.

Prices of oil and gasoline are rising for any number of reasons: the growing demand for energy by the burgeoning economies of China and India, as well as developed automobile-dependent economies like the United States; a dearth of U.S. oil-refining capacity; and commodities traders bidding up the current price of oil to reflect the potential of future risks to supplies. This convergence of factors may, unlike previous oil shocks, finally prompt a fundamental, long-term shift in America's energy policy.

In the past, such as during the 1990-91 Gulf War, the United States could prevail on Saudi Arabia, the world's top oil producer, to increase production to meet demand and mitigate upward price pressure, but that is not possible today, according to Wharton finance professor [Richard Marston](#).

"Today we are stretched to the limit and the Saudis have nowhere near the excess capacity they did before," says Marston. "So we are relying on a group of producers in very unstable regions of the world [such as Iran, Nigeria and Venezuela]. You have a whole series of hostile regimes producing oil and we are very vulnerable."

Yet Wharton finance professor [Nicholas S. Souleles](#) points out that because of the nature of the relationship between supply and demand this time around, the oil-price shock is not as bad as it otherwise could be. "It's clear that some part of the rise in prices is from the demand side as opposed to the supply

side -- and that's an important distinction. Traditionally, we think of an OPEC supply-side shock where prices go up because supply is restricted. But there's a large demand component today. The U.S. and China have increased their demand for oil and that has bid up the price. If it's a demand-side increase, that means the economy has momentum. A demand-side increase in price may temper our growth but not stop it."

Souleles also notes that while today's oil and gasoline prices are high in nominal terms, they are, in real terms, close to, or even below, their 1980s peak. "A dollar isn't worth as much today as it was 20 years ago," he says. "Oil prices have not risen as much as people think in real terms. Our overall demand for oil can still rise. But the economy is more fuel-efficient than it used to be and the increased role of the service sector means we need less oil to produce each unit of GDP. My sense is we might be using half as much oil per unit of GDP now [than in the 1980s]. China and many developing countries are less fuel-efficient, so they use more oil per unit of GDP. And their demand for oil has increased."

Economic Resiliency

David Wyss, chief economist at Standard & Poor's in New York, agrees with Souleles that the U.S. economy has shown surprising resiliency in the face of higher energy prices in the past couple of years. The oil embargo of the 1970s sparked a recession but that has not happened this time around.

"What's changed is the economy is not as dependent on energy as it used to be," Wyss says. "Last year, energy was 7% of GDP. Back in 1981, it was 14% of GDP. There has been a combination of improved efficiencies. Automobiles get one-third again as much mileage per gallon -- about 20 miles per gallon today compared with 15 in 1981 -- which is still not very good but it's in the right direction. And we have [improved the] insulation in our houses. But mostly it's because of the changing structure of the U.S. economy: 80% of GDP is service sector."

Jason Schenker, an economist at Wachovia Bank in Charlotte, N.C., who follows the energy sector, notes that the high gasoline prices that motorists see at the pumps today stem more from a shortage of refining capacity than from the recent run-up in crude-oil prices. Indeed, Schenker says, gasoline prices have risen faster than the price of crude oil in recent weeks. There is no shortage of the light, sweet crude that oil companies prefer for gasoline making. Instead, he says, "you have tight refinery capacity; refiners are cranking out all they can." No major refineries have been built in the United States since the 1970s, he notes, adding that with U.S. demand for gasoline continuing to rise, prices might reach \$4 per gallon at the pump at some point.

Wyss points to another factor leading to higher gasoline prices, as well as gasoline outages in some areas: a 2005 federal energy bill requiring refiners to substitute corn-based ethanol for MTBE (methyl tertiary butyl ether) as an additive to gasoline because of MTBE's links to groundwater pollution.

Refiners have been having difficulty making the switchover, which has caused supply-chain disruptions. Service stations have to drain and clean their tanks before accepting shipments of the new ethanol-blended gasoline, according to AAA Mid-Atlantic, a motorists' advocacy organization based in Delaware. Unlike MTBE-blended fuel, ethanol cannot be transported by pipelines. Instead, it has to be mixed in at terminals and then transported by trains and trucks. Many refineries were not prepared for this switch, and disruptions to the supply chain occurred. At the same time, refineries are also making the changeover from winter blends of gasoline to summer blends, which cost more to produce.

Much of the recent hike in oil prices has been due to fears over confrontation with Iran, a major oil producer that has alarmed the world community by developing a nuclear-power program that may someday include the ability to produce nuclear weapons, Schenker says.

Iranian officials have been quoted in press reports as saying that they have no plans to cut back on oil

supplies as leverage against the United States and other countries. But Schenker notes that on two occasions in recent months, when the war of words between the West and Iran reached a particularly fevered pitch -- in December and at the end of January -- commodities traders bid up the price of oil. Prices later receded when tensions with Iran eased and press coverage subsided -- only to rise again sharply in the past few weeks.

Price Manipulation?

Schenker and others interviewed by Knowledge@Wharton dismiss suspicions that price manipulation by commodities traders has been the culprit behind the rise in oil and gasoline prices. "People are quick to say the price of crude is going up due to speculators," says Schenker. What is actually happening is the market is trying to be efficient by "rationally pricing into the market the [possibility of] genuine future disruption events."

Nonetheless, it is true that hedge funds and other investors are playing an increasingly important role in the oil markets as they view oil as an investment, not simply as a commodity that they wish to actually take delivery of. The precise impact of these traders on oil prices, however, remains unclear, according to Wyss.

"The general wisdom is these traders should have an effect," Wyss notes. "They are not taking delivery of the oil; when they are done with it, it has to go back into the market. But with the sudden expansion of funds, they are partly responsible for price increases. Yet I think people really are scared about not having oil [in the future]. Refineries, railroads and airlines are trying to buy into the futures markets to guarantee themselves some supply. The futures markets do play an important role because they allow consumers and producers to set prices. Airlines can set fares ahead of time by locking in prices of oil. [Futures markets] allow consumers to lock in the price of heating oil at beginning of the [winter] season. That's where futures-market trading comes in mostly, and it does serve a purpose. It comes at a price, but it's essential."

Wharton finance professor [Marshall E. Blume](#) puts it this way: "Speculating is a bad word. Traders are providing a useful function in price discovery. Most people in the U.S. take a very parochial view. The market for oil is worldwide. India and China are growing very rapidly. They are going to want more oil. That's going to increase the price of oil."

In addition, Blume says, each day seems to give rise to some kind of risk that will cause investors to worry about disruption of oil supplies in the future. "When that happens, people will bid up the price to reflect the probability of such an event. Some people call that speculation. It's not really speculation. It's setting the price right."

As a result of the rise in energy prices, Wyss has lowed his forecast for 2007 GDP growth to 2.5% from 2.9%. He also predicts that the price of a barrel of oil will drop into the low \$60s by 2007 as concerns over supply disruptions from oil-producing countries like Iran and Nigeria ease. But he warns that "relatively minor threats of disruption will have a disproportionate impact on prices."

A survey released April 13 by the Financial Services Forum, an association made up of the CEOs of 20 large financial institutions doing business in the United States, found that its members see energy prices as the biggest threat to U.S. economic growth, ahead of rising healthcare costs and terrorism. (In addition, the CEOs said rising energy prices were also the biggest threat to global growth, followed by terrorism and protectionism.)

The All-Important Voter

The rise in oil and gasoline prices has prompted Bush and members of the U.S. House of Representatives and the Senate to make several proposals. Bush has suggested temporary relaxation of some new

anti-pollution requirements and the cessation of additions to the strategic petroleum reserve this summer in order to free up some 11 million barrels of oil for consumption. Republican leaders have suggested sending \$100 checks to citizens to ease the burden of higher prices, and some elected officials have called for investigations into alleged price-fixing by major oil companies. Most observers view these ideas as examples of either pandering to voters during an election year -- congressional elections will take place in November -- or as steps that will have little, if any short- or long-term impact on prices.

Another idea being bandied about is a call for a windfall profits tax on oil corporations. But some of those interviewed say adoption of this idea would only serve to reduce the amount of money available for oil exploration. "People see the price of gas going up and big bad oil companies making all this profit, and the politicians have to react," Blume says. "Hopefully, they don't react too much." Blume recalls the disaster of long lines at the pumps after the Nixon administration responded to the 1970s oil embargo by implementing price controls and gasoline rationing. "During that same period, Japan did not do anything about prices. They let the markets do their job and they didn't have any problems with people filling tanks."

People who would like to see the United States use less fossil fuel may find it in their interest to welcome higher prices since price signals are powerful forces in the marketplace -- in this case serving as a significant incentive to conserve energy.

Says Wharton's Marston: "In the long term, if the price of oil stays in its current region of \$60 to \$70, we'll see major changes on the demand side. We'll see a switch to much more efficient capital equipment. The days of large SUVs are over. We won't be moving to smaller cars because of concern about the environment; we'll be moving to smaller cars because the price of gas is just too high and we simply cannot afford these big automobiles. The price mechanism is an amazing force in the long term."

European Perspective

According to Altina Sebastián González, a finance professor at the Complutense University of Madrid, while rising oil prices have less impact today on the European economy than they had years ago, it still remains extremely likely that the economic growth forecasts for 2006 will have to be revised, both for Spain and the rest of the European economies. In terms of GDP, the negative impact should be about 0.2% to 0.3% in 2006, and 0.4% to 0.5% in 2007, he says. Meanwhile, underlying inflation is expected to grow 0.1% this year and 0.2% next year.

Within the Eurozone, the consequences of successive oil price hikes will vary. Spain, in particular, could be the most affected because petroleum consumption per unit of gross domestic product (GDP) is almost twice as high as in France and Germany, González notes. "Our country suffers an unbalanced economy and greater dependence on petroleum. In addition, Spain's level of energy self-sufficiency is a lot lower than it is in the major developed economies."

Sergio R. Torassa, a professor of finance at the European University, suggests that in Europe, in the short term, "the root of the problem lies in the imbalance between supply and demand. The vigorous growth of the Chinese economy requires very sizable amounts of petroleum, and demand from the American markets continues to be unstoppable. Meanwhile, the supply side has been complicated in many producing countries given the violent confrontations in Iraq, nuclear ambitions in Iran, nationalists from leftist or indigenous groups in Latin America, instability in Nigeria, and so forth. We estimate that some \$15 of this year's price increase can be attributed to geopolitical risk."

The measures that European governments take "should be directed at increasing productivity and promoting research into alternative fuels," Torassa adds. "The American experience in recent years is an illustrative example of how to lower petroleum dependency. In 1980, the U.S. consumed 17 million barrels per day in order to produce \$5.2 trillion [in GDP], while in 2005, it needed only 20.7 million barrels per day to generate a GDP of \$11.1 trillion. For consumers, the change has been just as positive. According to the Bureau of Economic Analysis, in 1970, each American devoted 3.4% of his or her total

spending to gasoline and fuels; in 2005, despite the tremendous rise in prices, this percentage dropped to 3.3%."

Research into alternative fuels constitutes the second potential area for action, Torassa says. "The possibilities are many and varied, depending on the level of petroleum prices." For example, at a price of \$60 per barrel, it makes sense to produce ethanol based on a renewable resource such as corn. At a price of \$80, he suggests, biodiesel is the answer. "To the degree that financial resources are devoted to research that gets results, these price level balances will continue to decline, and these technologies will become substitutes for petroleum as we know it today. The process will put a new ceiling -- an increasingly lower one -- on the price of a barrel."

Collaboration between automakers and the petroleum industry offers a good example of the contributions that the private sector can provide, Torassa says. "Last March, the Audi R-10 competition car succeeded in a test run on the Sebring [international premium sports car] circuit, making it the first diesel-fueled racing car to get involved in that kind of competition. It is the first time that a diesel vehicle has beaten its gasoline-fueled competitors. ... If this technology expands, it will have a very significant impact on the automobile industry."

Despite everything, Torassa suggests, "today's world-record prices will probably be the last [world record highs] in history. The process of technological innovation just described, along with active exploration of new deposits, should saturate the market with oil within a period of two to three years. Starting in 2010, supply will clearly exceed demand."

González offers a different perspective: "When it comes to rising petroleum prices, geopolitical problems only reflect one side of the coin. The other side has to do with the growing fear, which sometimes approaches panic, that one of the greatest threats of the century will become reality -- that the so-called 'black gold' will be used up."

Analysts disagree in their forecasts of a possible ceiling, he notes. "In reality, their opinions are so divided that we could talk about 'petro-pessimists' and 'petro-optimists.' The first group bases its views on the thesis of a group of geologists who have argued for years that, as petroleum becomes scarce and there is an absence of alternatives for replacing it, global economic disaster will occur. The popularity of this idea has been strengthened by the recent publication of several books (*Out of Gas* and *The Empty Tank*, for example) that are enjoying great commercial success."

González, however, does not share that vision. He is a petro-optimist for the following reasons:

Far from being near its ceiling, petroleum production could increase by as much as 18% from its current levels, according to forecasts by Cambridge Energy Research Associates (CERA).

Although it is true that the major oil companies will have to make a big effort to replenish their reserves, this is not because there is a shortage of petroleum but because of restrictions on access to the enormous deposits in Russia and in OPEC countries where it would be easy and cheap to drill and extract petroleum.

The development of technology is another factor that will permit a higher return from those oil fields that are now being exploited. These developments include multilateral drilling, 4-D seismic analysis, and the direct electromagnetic detection of hydrocarbons.

The technology applied to the exploration of new fields has also become vastly more sophisticated. This should permit the detection of potential reserves, for example, in Siberia, Iraq and Saudi Arabia.

Finally, technology applied to extraction would permit drilling in deeper waters and more difficult terrain, including such hostile areas as the Arctic. In this case, ecological safeguards constitute an unavoidable requirement.

Meanwhile, Torassa, speaking specifically about the impact on gasoline consumption in Spain, notes that according to the latest data in the Statistical Bulletin of Hydrocarbons, the increasing price of petroleum in international markets is beginning to take a toll on consumption of oil products -- specifically a 3.8% drop in January.

"The most pronounced drop has been in the gasoline market, where consumption fell by 5.5% over the last 12 months, a general trend since 1999. This has led to a parallel increase in demand for diesel fuel," he says. "The cooling down of consumption explains the decline in imports of crude oil, which fell 0.6% in annual terms." Meanwhile, "Spanish oil companies' refining capacity is very high, at a level of 96.5%."

The high price of crude oil seems to have "inspired the petroleum companies to increase their reserves," Torassa adds. "Over the last 12 months, their stockpiles have grown by 1.08 million tons. This strategy is linked to the fact that the sector forecasts new rises in petroleum prices, as the market in [petroleum] futures makes clear."

The News from Latin America

The decision by Bolivian President Evo Morales to nationalize the natural gas sector -- and kick out any foreign companies that do not turn over control of their operations within six months -- is expected to have significant global repercussions, especially for those companies directly affected, including Brazil's Petrobras, Britain's BG Group and BP, France's Total, Spain's Repsol and the U.S.-based Exxon Mobil.

The larger impact of this move is not yet clear, but as an article in the May 2 *New York Times* points out, "it follows a trend by oil- and gas-rich Latin American nations to exact a larger share of profits from extraction of the fossil fuels" and it comes "less than a month after [Venezuelan president Hugo] Chavez ordered the seizure of oil fields" from companies that refused to turn over their operations to Venezuela's state oil company. Bolivia, the article adds, has South America's "second-largest natural gas reserves after Venezuela."

González, the finance professor from Complutense University, describes what he sees as the highlights of Morales's announcement:

- The Bolivian government recovers total and absolute ownership, possession and control over all its resources, requiring the oil companies that have a presence in Bolivia to deliver all their production of hydrocarbons to YPFB, the state-owned company.
- YPFB will be in charge of the commercialization process, defining the conditions, volume and prices both for the domestic market as well as for exportation and industrialization.
- The oil companies have six months to agree on new contracts with the Bolivian authorities. At the end of this period, the companies that have not signed contracts will not be able to continue to operate in the country.
- Companies owning natural gas fields that have the most production will have to deliver 82% of their income to the Bolivian government. With the remaining 18%, they will have to cover the costs of their operations, make necessary investments and generate a profit margin.

To "guarantee the continuity of production," YPFB will take over the operation of the fields of companies that refuse to comply or which impede the fulfillment of these arrangements.

"The nationalization process will be undertaken not only by the ministries and YPFB, but by the Armed Forces, which have occupied petroleum installations throughout the country" as of May 2, says González.

In terms of assessing the impact of Morales' decision, Torassa, the finance professor from the European University, notes that "Brazilian President Lula has reacted in a very firm way in defense of the interests of Petrobras, the company most affected by this measure." Torassa also points out that "with a percentage of only 18% of the revenues, it is physically impossible to make a profit from any investment in gas production, which means that any operation in Bolivia will become unviable."

For Spain's Repsol YPF, he adds, "Bolivia provides 18% of its proven reserves of petroleum, 11% of its production and 2% of its profits. If the negotiation with President Morales' team complicates things so that it is impossible to reach an agreement that makes a minimum of economic sense, the write-off that would be assumed by Repsol would be significant (equal in magnitude to the percentages cited above). ... If Bolivia's reserves are not included, the proven reserves of the Repsol YPF group would be reduced from 8.7 years to about 7 years. In that respect, Repsol's situation becomes quite delicate."

On a daily basis, Torassa suggests, Bolivia's "YPFB does not have either the human or financial resources to assume the tremendous responsibilities implicit in this" announcement.

Speaking more generally about rising oil prices, Jose Caio Racy, a professor of economics, accounting and administration at Mackenzie Presbyterian University in Brazil, suggests that the current trend will have several effects on Latin America. "Regarding inflation, for example, the average IMF forecast for the petroleum-producing nations of Latin America is lower inflation during 2006 and 2007 compared to 2004 and 2005. However, the existence of higher prices puts pressure on costs and increases the chances for inflation, and that will directly affect consumers. If governments do not impose some sort of monetary policy as a penalty, the changes in relative prices will wind up favoring those products for which demand doesn't change as much."

Regarding consumption, he says, "the higher revenues that result from [more costly] oil exports tend to improve the relative position of producers, even in terms of the consumption of exporting countries. Consumers, for their part -- given the low elasticity of prices and demand levels for many petroleum derivatives -- will have to spend more for these products, and that will wind up cutting their consumption capacity."

Finally, political influences in the region "will provide some margin for the emergence of populist rulers in the [energy] producing countries" and indeed, in Brazil, "any developments that affect [energy] self-sufficiency tend to be exploited politically. Nevertheless, we don't see any signs of policy changes that will affect consumers in the short term."

As to whether it is possible to reduce dependence on petroleum, Racy suggests that, short term, the chances "are quite limited. Historically, whenever there are major battles about petroleum prices, innovations emerge that make it possible to reduce consumption, in relative terms -- for example, automobiles that are more fuel-efficient. Another factor is that there has been a reduction in the inelasticity of [global] demand [for petroleum]. Even alcohol has been used as an alternative. However, it takes time to expand the fleet [of vehicles using that fuel], and to make changes in long-term expectations about the supply and prices of both fuels."

China: Lower Consumption Not an Option

Given that the demands for oil and oil imports are both growing at a rapid pace, increases in crude oil and gas prices are being closely watched by a number of different groups in China.

According to Zheng Hui, a finance professor at Fudan University in Shanghai, higher prices, in the short term, will have a negative impact on China's economy, especially since the country is unlikely to reduce its big expenditures on crude oil imports in the face of limited domestic supply. This spending will continue to soar even with the price increases, Zheng says. "Given the steady increase in China's per capita GDP, and because automobiles are [now owned by] many households, there is no sign of decline in China's demand for crude oil in the near future."

The problem is exacerbated by the fact that the international oil supply structure is complicated, Zheng notes, pointing out that nearly half of the supply is controlled by OPEC, which is increasing the price of oil "in order to make its own maximum profit. OPEC even purposely reduces the oil supply in order to keep the price high. Thus the international crude oil price depends mostly on OPEC's [actions] rather than on real demand." The fact that China's demand is growing while its own oil supply is limited means that "the country has no choice but to spend billions ... each year on imports, at least in the short term."

In the long run, however, China will most likely find alternatives to deal with this problem, Zheng suggests. "For instance, we can liquefy coal. Refining coal into oil is a good technology. But it has not been industrialized because the cost of doing it is higher than importing oil." But if that changes, he argues, "China will ... reshape its energy strategy."

Wang Yizhi, vice director of the Institute of Regional Economy, Shanghai Academy of Social Sciences, analyzes the impact of higher energy prices on certain industries. For example, oil price increases will raise the cost of automobiles and other oil-dependent products, resulting in fewer profits. "The bottom line of some petrol-chemical plants has dropped noticeably in the past two years." In addition, "as the cost of travel goes up, the tourism business will be hurt as well."

Wang suggests that while higher oil prices in the short term may have a negative impact on China's auto industry, in the long run it might be possible to promote a domestic auto industry, especially if the emphasis is on developing smaller cars. "China has an edge in small-size vehicles because there is less competition from global auto-makers," Wang says. "Higher oil prices may eventually change the domestic auto industry's structure."

According to Hua Min, director of the Institute of World Economy at Fudan University, oil is a strategic resource and its price depends on more than the supply and demand curve. "In fact, oil is an energy resource with multiple prices. It's mostly a financial price based in part on the U.S. dollar fluctuation, a speculative price influenced by international capital flows, and a political price dependent on regional politics as well. Recently, with the depreciation of the U.S. dollar," speculators started to flood the oil futures market. "What makes things more complicated is that instability in the Middle East still lingers. As a result, oil prices are expected to hit new highs."

As for how China should react to the oil price surge, Hua suggests a close look at the structure of China's economy. "After more than 20 years of reform and development, China is stepping onto a stage where huge amounts of resources have been put into production for economic growth. Even if oil prices keep soaring, we will have very few choices. We can't go back to the labor-advantage past and neither can we rely on talent and technical innovation because we are not there yet. The only thing we can do now is to hedge the risk of oil price increases." China can do that, he adds, by "purchasing the stocks of some major global oil companies or establishing long-term strategic cooperation with them to share the power to control the oil supply."