

## Are gasoline prices really going up?

Well, it was inevitable. It's spring and again our news media are saturated with discussions of the high price of gasoline. I just searched for "high gas prices" on Google and got 495,000 hits. Not bad. Here are a couple of the headlines:

"Californians Cope with Sky-High Gas Prices"- National Public Radio

"Bush to speak on high gas prices"- USA Today

Here's a quote from the USA Today piece: "*The average price of a gallon of regular unleaded gas is \$2.25, according to the American Automobile Association's Web site, [www.fuelgaugereport.com](http://www.fuelgaugereport.com). A year ago it was \$1.78.*" Right, that confirms it- prices are high! Or are they?

What's generally missing from media reports like this is a context, a way to compare the numbers to something else. Fortunately, facts are readily at hand. The Energy Information Administration (<http://www.eia.doe.gov>) provider of "Official Energy Statistics from the U.S. Government" contains thousands of pages of quantitative information and analyses of the hydrocarbon and energy industries. I'll use their records of product and raw material prices, which go back to 1949, to make the case that gasoline prices really haven't changed much in the last 56 years.

Let's look first at the price of gasoline in Figure 1- as expected, it's going up. In 1949 gasoline sold for 26.8 ¢/gal and in 2005 the price has risen to 1.82 \$/gal. This is nearly a 7-fold increase over the last 56 years. However, it's common knowledge that in 1949, 25¢ was worth a lot more than it is today. So what happens if we correct the price of gasoline for inflation?

**Figure 1- Gasoline prices over the last 56 years**

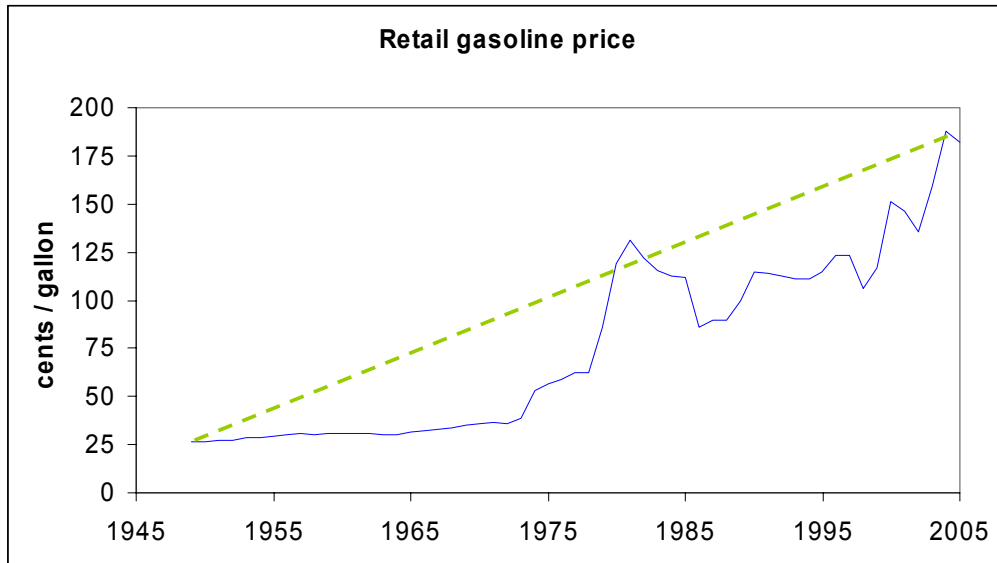


Figure 2 shows the same gasoline prices, but this time, corrected into constant dollars. The calculation to correct a past price into constant dollars is not complicated. Each past year is assigned a number which reflects how much one dollar could buy compared to how much a dollar buys today. For example, the correction factor for 1949 is 5.79. This means that a dollar in 1949 was worth 5.79 times as much as it is today. In approximate terms, if a dollar today buys a single chocolate bar, in 1949 a dollar would have bought 5.79 chocolate bars.

**Figure 2- Gasoline prices over the last 56 years- corrected for inflation**

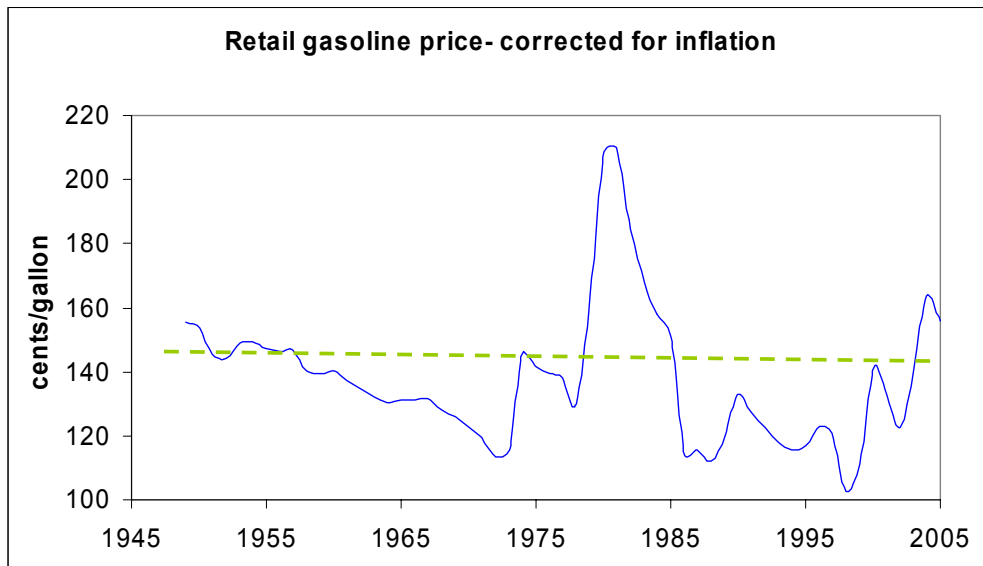


Table 1 shows an example of how the data for Figure 2 were generated. To get the inflation-corrected price for each year, you multiply the uncorrected price by the Inflation Factor, e.g.  $26.8 * 5.79 = 155.3$ .

**Table 1- Example of how Figure 2 was generated**

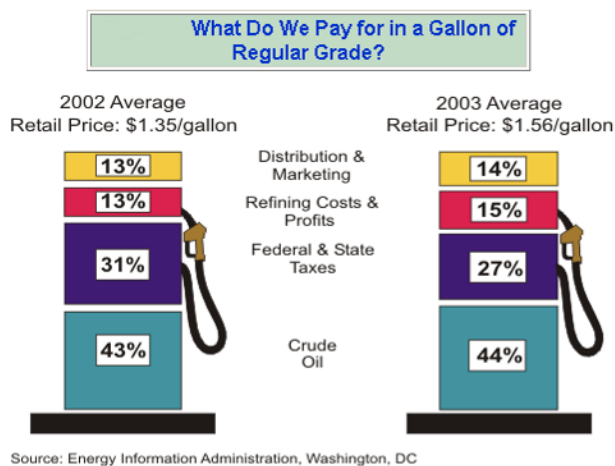
Year	Uncorrected price (cents/gal)	Inflation Factor	Price corrected for inflation (cents/gal)
1949	26.8	5.79	155.3
1960	31.1	4.51	140.2
1970	35.7	3.44	122.8
1980	119.1	1.75	208.8
1990	114.9	1.16	132.8
1996	123.1	1.00	123.1
2000	151	0.94	141.3
2005	182.3	0.85	155.8

Back to Figure 2: yes, there are bumps and wiggles in the price, but the general trend is that historically, gasoline averages around \$1.50 per gallon in constant 1996 dollars. Over the last 46 years, gasoline prices have not changed all that much, in real terms

(Figure 2)- but because the price we pay at the pump goes up each year (Figure 1), our perception is that we are spending more of our income on gasoline as time goes on.

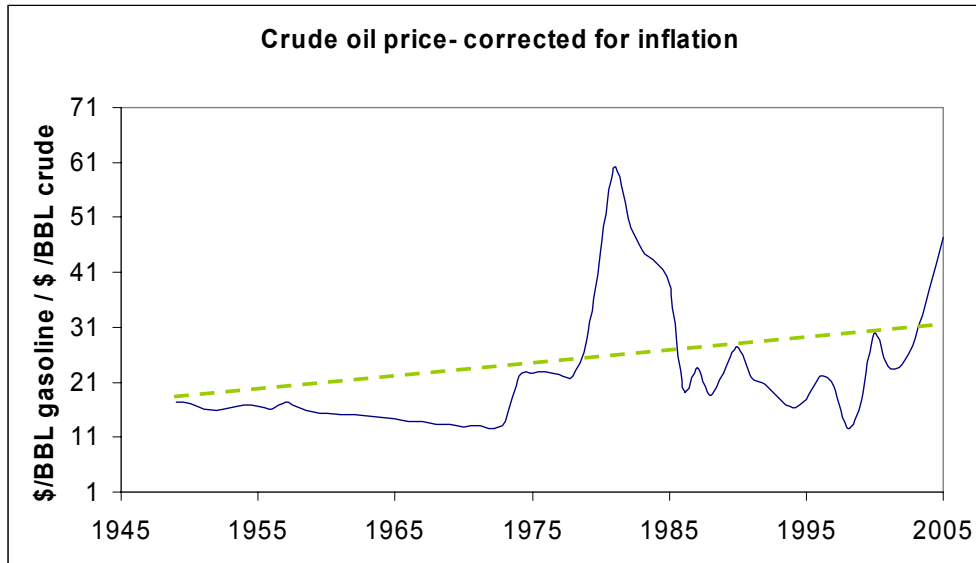
Recently we've been made very aware that when crude oil prices go up, so do gasoline prices. This is because gasoline is made from crude oil. In fact almost half the price of a gallon of gasoline comes from crude oil- see Figure 3. What Figure 3 shows is that in 2003, 44% of the cost of a gallon of gasoline was due to the cost to buy the raw materials (mainly crude oil), 27% of the cost of gasoline is taxes, 15% is profits made by refining companies and the remaining 14% comes from the costs to market and distribute the gasoline.

**Figure 3- What makes up the cost of a gallon of gasoline?**



What have crude oil prices been doing over time? Figure 4 shows that indeed, crude oil prices have been rising recently. Note that Figure 4 is based on the crude oil cost corrected for inflation, using the same calculation as was detailed above for gasoline. In constant (inflation corrected) dollars, crude oil has historically averaged around 20\$ per barrel. Of course, in recent years the costs has climbed to near 50 \$ per barrel for a number of reasons including uncertainty due to the situation in the Middle East, the rapidly increasing demands of third-world countries like China and India and production constraints in Saudi Arabia. It's too early to say whether this is a permanent shift in crude prices or whether these will return to more normal levels with time.

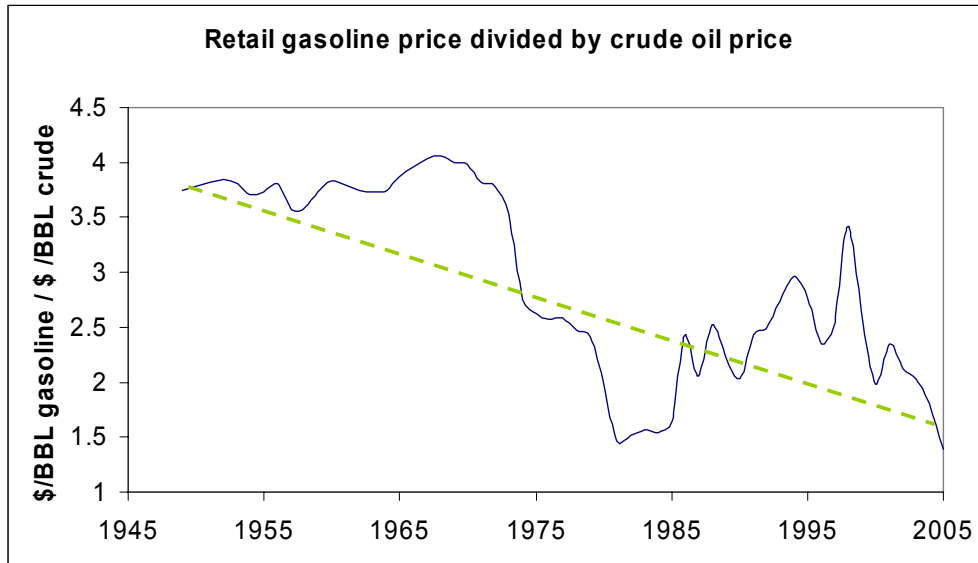
**Figure 4- Crude price in constant dollars**



Getting back to gasoline, an interesting way to put gasoline prices into a historical context is to look at the cost of gasoline divided by the cost of crude oil- see Figure 5. This calculation reflects how efficient the oil companies are in making a gallon of gasoline. One way to think of this is to compare making gasoline to making a loaf of bread. Since bread is mainly made from flour, you would expect the price of bread to go up and down with the price of flour. If you divide the price of a loaf of bread by the price of the flour that goes into the loaf, this ratio should remain fairly constant over time. If, however the ratio goes down (price of a loaf of bread decreases faster than the price of flour) this means that you have figured out how to make bread more efficiently over time.

The same calculation applies to gasoline. Interestingly, gasoline prices relative to crude prices have been generally declining over the years. The main reason is that oil companies are figuring out more efficient processes to manufacture gasoline. Figure 5 also indicates that despite frequent media and political investigations, there is sufficient competition in the marketplace to keep gasoline prices reasonably low. Looking again at Figure 5 the gasoline / crude ratio was close to 4 in 1949. Now it is close to 1.5. Today gasoline still costs 50% more than crude oil, but in 1949, the gasoline cost was 400% of crude oil cost.

**Figure 5- Gasoline price divided by crude price**



There's one more interesting way to put our gasoline prices into context, and this is to compare them to what people pay in other countries. Table 2 is taken from a CNN article dated May 2004. In a worldwide context, the United States is not doing badly. Our prices are much lower than European ones, a bit higher than what people pay in China and Russia and Tajikistan. (Venezuela has heavily subsidized its gasoline prices using tax dollars. However, the country has a 22% inflation rate, so is not the best economic example for how to run a country).

**Table 2- Worldwide gasoline prices in 2004**

Nation	City	Price (\$/gallon)
UK	TEESIDE	5.64
HONG KONG	HONG KONG	5.62
GERMANY	FRANKFURT	5.29
DENMARK	COPENHAGEN	5.08
NORWAY	STAVANGER	5.07
ITALY	ROME	4.86
TURKEY	ISTANBUL	4.85
PORTUGAL	LISBON	4.80
KOREA	SEOUL	4.71
SWITZERLAND	GENEVA	4.56
KOREA	KOJE/OKPO	4.53
AUSTRIA	VIENNA	4.50
CROATIA	ZAGREB	4.32
JAPAN	TOKYO	3.84
AUSTRALIA	SYDNEY	2.63
CAMBODIA	PHNOM PENH	2.57
TAIWAN	TAIPEI	2.47
GEORGIA	TBILISI	2.31

LAOS	VIENTIANE	1.66
UNITED STATES	DOE AVERAGE	1.64
THAILAND	BANGKOK	1.60
CHINA	TIANJIN	1.54
RUSSIA	MOSCOW	1.45
KAZAKHSTAN	ALMATY	1.36
TAJIKISTAN	DUSHANBE	1.32
AZERBAIJAN	BAKU	1.15
VENEZUELA	CARACAS	0.14

The summary is that yes, gasoline prices have gone up lately. Prices are up largely because crude oil is more expensive than it has been historically. However, gasoline prices have not gone up as fast as crude oil prices because oil companies are getting better at making the stuff. Things here could be worse. Europeans pay more than 3 times what we pay for gasoline. And despite what the media would have you believe, you're not paying much more than your grandparents were, if you consider the higher relative buying power of 25¢ back in 1949.