

Like a drink?

IN AN OLD FABLE, a palace was infested with mice until the king brought in cats. They took over, and scratched and sprayed everywhere until the king had them chased away with dogs, who were messy and loud. Elephants were called in to evacuate the dogs, but they were even harder to live with, so mice were used to chase them away, restoring the status quo.

It's a funny story, but what's the moral? Is it that sometimes the cure is worse than the disease? Or is it that, in order to get rid of mice, you should just clean up after yourself rather than try an expensive fix in which you are not a participant?

Methyl Tertiary-Butyl Ether

In 1995, following the letter of the Clean Air Act amendments of 1990, the federal EPA began to require oil companies to reformulate their gasoline to burn cleaner. Reformulated gasoline (RFG) has fewer volatile compounds in it, and also contains a source of oxygen, which helps the fuel burn more completely. Perhaps unfortunately, oil companies chose methyl tertiary-butyl ether (MTBE) as their oxygenator of choice. The good part about MTBE is that it does in fact help gas burn more cleanly, and makes the gas somewhat less volatile, which reduces pollution by evaporation, which is a major part of pollution-by-cars these days.

The down side to MTBE is that it loves water. It mixes well with water, and seems to have an amazing ability to travel through earth to foul people's wells. (It's chemically unfriendly to the carbon in soil.) It may or may not be a carcinogen: the evidence is unclear on the point. But it does have a foul odor and taste (vaguely turpentine-ish) even when it's very dilute. No one would suggest

that the fouled water is drinkable, even if it isn't harmful. The combination of these qualities is devastating. Leaking underground gas tanks, already a problem when they leak gas, have become substantially greater problems when they leak a substance that travels through the ground so well. MTBE doesn't biodegrade much, either, so even smaller sources of contamination—small spills, runoff from roads, or marine engine exhaust—can be problems for some wells.

It's not an exaggeration to say that the country has suffered an epidemic of well-fouling in the decade since MTBE has been in use. And state governments have reacted. So far, MTBE has been banned in 19 states, including California, New York, Connecticut, New Hampshire and Maine. The "Oxygenated Fuel Association," an association of oil refiners (see *cleanfuels.net*), has challenged the bans in court in New York and California, but has been turned down.

In Rhode Island, there have been a host of MTBE well-fouling incidents, most significantly in 2001, when the entire town water supply in Pascoag was fouled. There is an experimental cleanup going on there, but the basic story is that once fouled, a well is useless: expensive or impossible to clean. Doesn't this seem like a public-health issue?

Well, it does seem that way to many people, and this past term, Senators Leo Blais (R-Coventry) and Kevin Breene (R-Exeter) sponsored a bill (S-2033) to ban the sale of MTBE in Rhode Island. Somewhat unfortunately, it was referred to committee and buried there, possibly due to the fact that the RI Department of Environmental Management opposes such a ban.

Say what? Why would the state's environmental protectors oppose a ban on an environmental threat? An exchange with the DEM head of air resources shed some light. For one thing, apparently the stuff works. Since 2000, DEM measures a 22% reduction in toxic compounds, a 27% reduction in volatile organic compounds and 7% in nitrogen oxides compared to conventional gasoline. When reformulated gas began to be used in 1995 there was a perceptible drop in the ambient concentration of benzene.

And the alternate technology isn't perfect. The only EPA-approved substitute for MTBE is ethanol, which has some important problems. For one, ethanol likes water even more than MTBE. This is less of a problem if it spills, since it evaporates or biodegrades, but if you pipe or ship your gasoline with ethanol already in it, it will soak up water, and by the time it comes out of the pump, it will have too much water in it to use. This means that there must be a parallel distribution system—ethanol deliveries as well as gas deliveries—for getting ethanol to local

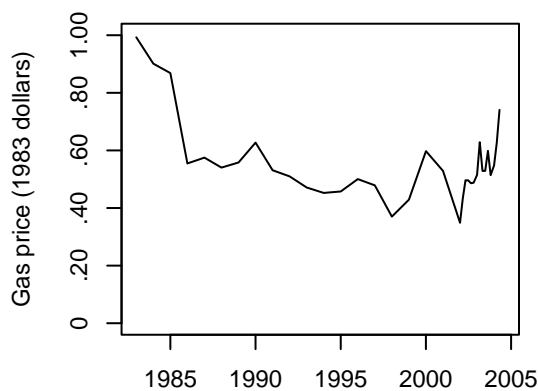


Figure 1: Gasoline prices in constant 1983 dollars. (Not counting state or federal taxes.) In real terms, gas prices are higher now than they've been in 20 years, but are still nowhere near the prices we saw before that. (Tax changes don't make up the difference.) Bellbottoms are back. Maybe conservation will become hip again, too.

gasoline distribution points, where it can be mixed with gasoline before trucking it to stations. Extra deliveries mean using more energy and increasing the risk of spills.

Another problem is that ethanol makes gas *more* volatile, increasing the evaporative pollution from gas, unless manufacturers put back in some of the toxic substances they reduced for MTBE. (This also reduces the refiners' profits, since most of those substances, like benzene, can be sold separately for industrial uses.) Also, since the volatility increase due to gas mixed with ethanol is way out of proportion to its volume, people who top off a tank of regular gas with a bit of ethanol-gas will see a lot more evaporative pollution.

But both these objections border on the silly. If some terminal distributes twenty tanker-trucks of gas each week to its customers, what does it matter if the gas comes pre-mixed in 20 trucks, or if 18 contain gas and two contain ethanol?

It's set up as a choice between protecting clean air and drinkable water. But it's oil companies who tell us to choose.

As far as the second objection, one can't dispute facts of chemistry. But it's also strange to insist that all such reforms must always be maximally effective to be used at

all. Even if you grant that ethanol is a less effective oxygen agent than MTBE, reformulated gasoline with ethanol is better than old gasoline with neither. DEM's objections have the disturbing whiff of information from refinery fact sheets. (Refineries don't make ethanol.)

It's set up as a choice between protecting clean air and drinkable water. But why must we choose? There are other alternatives, but right now, your government has chosen to value air over water. It's set up as an either/or choice: you can have clean air, but at the price of clean water to drink. This is absurd. Government is meant to protect the health and safety of its citizens. That's what it is *for*. If it doesn't do that, then what good is it? A "compromise" like favoring clean air over clean water is not a compromise between competing visions of cleanliness, but a compromise with the polluters who insist that their profit margins will collapse unless a certain amount of pollution is allowed. That is, some fouled wells, a little illness, and a few deaths will be tolerated so that Lyondell Chemical and several others can continue to sell a

Who's going to clean this stuff up?

MTBE is made from isobutylene, a once-useless toxic byproduct of refining oil. According to documents and testimony in a 2001 California court case, the EPA around 1990 proposed completely replacing gasoline with methanol in nine cities with poor air quality. Industry representatives countered by proposing instead that they reformulate gasoline, using MTBE, to make the gas burn cleaner. This was despite considerable evidence that already existed of MTBE's water-fouling qualities, amassed by industry scientists over a couple of decades. (See cbeval.org and ewg.org/reports/withknowledge for the story and copies of the court documents.) A running joke within the oil industry was that MTBE stood for "Most Things Biodegrade Easier" and "Major Threat to Better Earnings."

Five oil companies lost the case that exposed this evidence (brought by the town of South Lake Tahoe), and settled for \$60 million, before a jury had a chance to consider damages.

There are currently a number of MTBE liability suits pending around the country, in California and elsewhere. Some estimates put the cost of all the cleanups at around \$30 billion. But Congressional House Majority Leader Tom DeLay (R-TX), aided by Joe Barton (R-TX) and Billy Tauzin (R-LA) are determined to push through a bill relieving oil companies of any liability for cleaning up MTBE messes. This was attached to President Bush's energy bill, and was the major reason it didn't pass last winter. Barton, the chair of the House Energy and Commerce Committee, said, "if the price of a bill is that MTBE won't have a safe harbor, then there won't be a bill."

The defense of the MTBE waiver is that the government made the oil companies use MTBE, and therefore they shouldn't be held liable. But that claim was used in the South Lake Tahoe case, and, after testimony from oil company executives who admitted that using MTBE was their bright idea to deal with a toxic waste problem, the jury was not impressed.

poisonous substance at a high profit.

Government is all about balancing competing interests, but my interests in MTBE are of a qualitatively different kind than Lyondell's. That is, I need air to breathe and water to drink in a very different way than Lyondell's shareholders need their dividends. I know, I know, it seems undemocratic and downright rude to claim that my interests are worth more than theirs, but I've been called worse.

Conservation ex machina MTBE is not the only route to cleaner air. It's simply another version of a familiar story: the technological fix that supposedly will allow us to carry on without any change in how we live and plan our lives. Ice cream fattening? Don't eat less, just wait until marvelous food scientists engineer less fatten-

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ing ice cream. The ozone layer is thinning? Good thing we have SPF 45 sunscreen now. Roads are too congested? Let's put up electronic signs that tell us about it. But the funny thing about these technological fixes is that most of them don't really work: low-fat ice cream is best as a way to remind you of the real thing.

There are lots of other ways to clean our air, and anyone who examines the congestion on I-95 every day can suggest some: buses, rail, planning to conserve the density that makes transit possible, efficiency standards for cars. But we do none of these. Even the elimination of underground storage tanks would help. But that's not under serious consideration, either.

When our state and federal representatives talk about preserving air and water (i.e. preserving what makes life here possible), they only do it if the proposed solution wouldn't disrupt our economy or our way of life. When considering laws about the safety of bicycles or the construction of a casino, perhaps this is a responsible approach. But can it be true that to avoid economic disruption, we must allow our wells to be poisoned? ☹

Taxes: A Re-appraisal of Re-appraisal

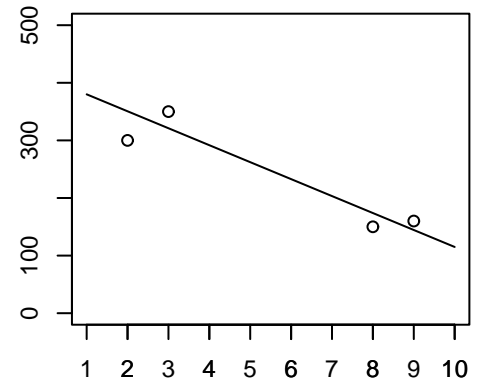
I hear you thinking, "What? Property tax again?" Well yes. And so, at no small risk of personal ridicule, here is yet another aspect of the property tax worth reconsidering. That is, there are profound problems with the way property taxes are levied in Rhode Island, and RIPR is already on the record decrying the idiocy of tying the health of our towns to the vicissitudes of the real estate market (see issues 2 & 4). But there are other issues, too, that guarantee that the property tax continue to be the most arbitrary and unfair of our taxes.

WARNING: What follows contains math. Lots of people, even including some of our elected representatives, don't like math. But what are we to do when compassion demands we understand the mathematical consequences of our laws?

We recently had the value of the sprawling RIPR campus reassessed as part of our town's mandated revaluation. We noted the many scientific factors the appraisal company puts into its scientific formula. There are numbers for the "quality" of our land, the quality of the street we live on, the age of our house, and the condition of our house. There's even a number for the size of our lot, which is different from the number that *is* the size of our lot. (This number increases as the lot size decreases.) When you inquire, you're told that the data are supported by sales data from hundreds of houses. What they don't tell you is that this can be quite true and the results can still be garbage. You're supposed to remember this from that statistics class in high school you maybe didn't take. But for those who indeed didn't take it, as well as for those who've forgotten, here's a recap.

Data are just a bunch of numbers. You might imagine that they represent some trend: maybe they should be more or less in a straight line, or maybe some kind of curve. You can try to figure out what kind of curve or line is the best approximation of your data, but you usually get that from somewhere else, not from the data itself. Entire scientific articles are devoted to determining—and justifying—the proper shape to be fitted to some data. These factors are derived by observation, by judgment, and sometimes by guess. This is as true of fitting curves to frog population data or measurements of rainfall as it is of finding trends in real estate sales numbers. What you can get from the data is a confirmation that your guess is right, but even that is dangerous, especially if you're going to use that fitted curve to estimate missing values. This, of course, is exactly what real estate appraisal companies do.

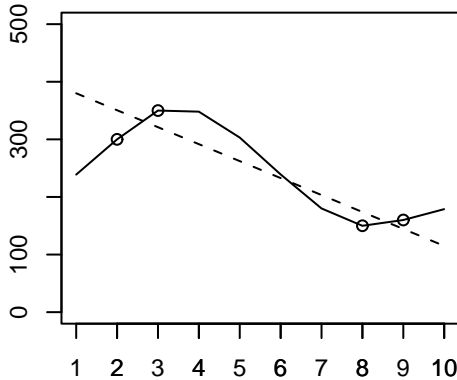
Here's an example: Suppose we have a town that consists of only of ten more-or-less identical houses on a single street, like some wild west movie set town. Our street has a lake at one end, and we expect the value of each house to be related to its position on the street, with the ones near the water the most expensive. Imagine we have some sales data from four of those houses, indicated by the points in the graph to the left. (The position of each house on the street is its number, with the low numbers on the fancy end of the street.) We know the values of the houses will roughly correspond to their position on the street, so one approach would be to draw a straight line, and figure that the buyers of houses number 2 and 8 were better bargainers than the buyers of 3 and 9. So we could use this line to determine values for houses 1,4,5,6,7 and 10.



But the line we've created doesn't actually go through the data points (in fact it can't). We could just chalk that up to the vicissitudes of the market, saying perhaps that Mr. 3 secretly had a crush on the real estate agent or that the 8 family actually bought the house from Mrs. 8's brother. But another approach—the one apparently taken by professional appraisal companies—would be to say that the

There's always a little random variation in data. You have to decide whether to use it or ignore it.

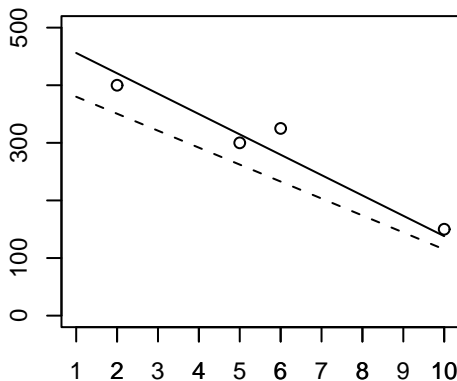
data clearly show that a straight line can't do justice to the complexity of the situation. So we add parameters, or fit curves instead of lines, alternatives which, for the present argument, amount to pretty much the same thing. For example, we could invent a "B factor" to account for the condition of a house's basement, or we could fit a third-degree polynomial curve (a curve with two wiggles) to the data, and thereby try to fit each point perfectly. Here's that attempt.



Now the curve hits all the data points right on, and we can boast to the town council (and to nosy newsletter editors who ask) how precisely we fit the data, effectively ending any debate on the subject. The curve is a little peculiar at each end, where it seems to deny what we know about the value of houses on the street (Mr. 1 gets a bargain and the 10 family is hit hard compared to the straight line) but the quality of the fit to the data is superb and claims of the "scientific" nature of the technique are usually all that is needed to overcome qualms like this. Especially since the appraisal company can usually count on the town council not being composed of statisticians.

But the qualms, in this case, are actually correct. For some curve fit to data, the quality of the fit has little to do with the quality of the interpolations you make from that curve. In fact, the *more* precise the fit is, the more likely that the curve fitters are allowing spurious effects (the quality of the real estate agent's perfume, the weariness of the sellers) to affect the interpolations. Too much precision can be the enemy. The reason why will become clear at the next revaluation.

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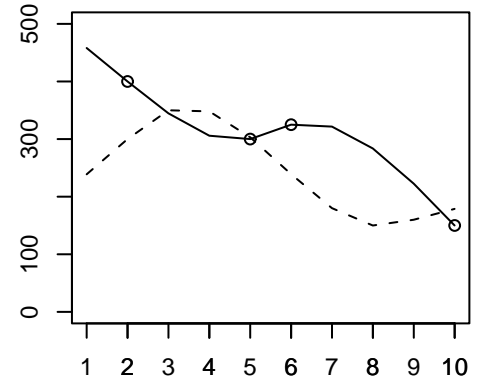


Now imagine that three years have passed, and the town suffers its legislatively mandated revaluation. In the intervening three years, prices have risen around 20%, but perhaps they've risen a bit more in the expensive neighborhoods. New sales data, and the straight line fit might look like the points on the graph to the left (the straight line assessment from last time is

shown dotted). The data still more or less preserve our idea that the expensive houses are on the left end of the street, and so does our new straight line.

But again, our straight line doesn't actually go through the new data points, so our professional assessor's standards demand we call it inaccurate and that we use another complicated curve to fit the new data. So we put the sales data into our equations and we get a wonderful new curve that precisely fits that data. This new curve might look like the one below.

The good part about this new curve is that it looks more like what we wanted in the first place, with values rising as you move into the tony parts of the street. But compare this curve with the one from the previous revaluation (the dotted line). Pity the poor 1 family, who have seen their assessments rise from \$238 to \$458. The 7 and 8 families also see their assessments almost double, while the 3 and 4 see little change, or a small decline. According to these curves, the average property values in the town have risen 27%. If the tax rate declines by this much, and the town budget remains unchanged, the poor 1 family will see their taxes rise by over 50%. On the other hand the 9 family and the new owner of the 6 house will see little change in their taxes, and the 3,4,5 and 10 families will see slight declines. Does this sound familiar? It should. This is exactly the kind of hardship visited on thousands of Rhode Island families every year by arbitrary and bizarre revaluations done "scientifically."



Imagine, though, that the town had relied on the much cruder analysis of the straight line (shown on the bottom of the previous column). The assessment isn't as "accurate" in that the fit of the curve to the data isn't as good, but look at the impact on the town residents: across the spectrum, the impact is consistent. Everyone is affected in the same modest way. Once the rates are adjusted, no one's taxes will change by any more than the increase in the town budget. It is perfectly true that the assessed value will understate slightly the sale price of the 6 family's house, but so what? Perhaps the price was high because the new Mr. 6 is an idiot. Should his neighbors suffer for that?

In other words, the precision claimed by appraisal companies is nothing to be proud of. That precision *guarantees* the creation of dramatic discontinuities like the ones shown here. "Dramatic discontinuities" is, of

course, a technical term for personal disasters, where families are driven from their homes by arbitrary increases in their taxes. More important, this is not an occasional bad side-effect; this is the necessary outcome of an over-precise statistical analysis foisted upon our municipalities by people who don't understand math. In other words, if ever there were an argument for improving the quality of math education in our state, this would be it.

OK, so what? No town is as simple as our wild-west example, but the principle is the same in real towns: complex assessment formulae, that take into account every possible factor in a house's value, are guaranteed to produce arbitrary swings in value from one revaluation to the next. But what to do instead? In **RIPR** issue 2, we suggested replacing the entire assessment apparatus with a system that relies on the purchase price of a house instead of an appraiser's opinion. We still think that's a good idea. But even if it's not adopted, Rhode Island towns could make a giant step toward decreasing the impact of property tax revaluations by *deprofessionalizing* the practice of appraising property.

Professional appraisal companies have only one duty, to assess properties in as "accurate" a fashion as possible. But the municipal governments that employ them have a different duty. They are supposed to seek a fair allocation of the burden of supporting the town's services. By delegating their responsibility to appraisal companies who have different duties, our state government and our towns have implicitly decided that adherence to a wholly imaginary high standard of "accuracy" in assessment is more important than the catastrophic effects on many citizens. We reintroduce the **RIPR** razor: any government policy that has the effect of turning people out of their homes faces a very high burden of justification.

Is strict adherence to an imaginary standard of accuracy important enough to price someone out of their home?

The ideal of accuracy is obviously worth striving for; this isn't a plea to rely on the seat of the assessor's pants. We shouldn't ditch the math. But we should use simpler formulae to assess values, and we should change the formulae only with great circumspection and concern for the impact of the changes, which is not how things work now.

Furthermore, the standard of accuracy in this case is not at all obvious. How do you calibrate an assessment, except by selling the house? The true value of your house is whatever you can get for it. But that price depends not only on the conditions of the market and the condition of your house, but also on the acumen of your agent, your patience, the bargaining prowess of the buyer, and on whether their banker slept well the

night before reviewing their loan application. Without actually selling the house, you'll never know how these factors will affect the price you might get. Whatever assessment the town puts on it is only an educated guess of that price. Educated guesses can vary a lot and still be educated guesses.

We need a way to raise funds for towns that doesn't depend on the real estate market.

There are profound problems with the way that Rhode Island towns assess taxes on their citizens. The towns need a way to raise the funds necessary to operate, but it must be a way that does not depend on the vicissitudes of the real estate market which are, as anyone with eyes can see, pretty bizarre. But this depends on changes in state law, and will not happen soon. In the meantime, the first step in finding a way to improve the situation is for town councils to cease delegating all their discretion in the matter to professional appraisers whose duty

Milton speaks

We've remarked with some distress the tendency of people to whom we describe the ideas in **RIPR** to recoil and not to engage. They'll say "you seem to have it all figured out," and then move on to ask about other things.

They misunderstand our purpose. None of what is here is meant to be taken as received truth. It's our attempt to look at data and see where it leads, and to review policy issues that really matter to people's lives, as opposed to the inanities that crowd the evening news. The views expressed here are meant to be taken as an opening salvo in the debate that so rarely happens.

In 1644, the English poet John Milton published a defense of free speech and an attack on censorship in a pamphlet called the *Areopagitica*. The work became the intellectual cornerstone to Enlightenment attitudes about censorship, and led to our first amendment and the Pragmatist jurisprudence that formed modern attitudes about free speech. In it, he had this to say about keeping your opinions to yourself:

I cannot praise a fugitive and cloistered virtue, unexercised and unbreathed, that never sallies out and sees her adversary but slinks out of the race, where that immortal garland is to be run for, not without dust and heat.

Better to make your opinions known and let them be stronger for having to defend themselves, which is pretty much what we're trying to do here.

If you think ours could be a useful addition to the policy discourse in Rhode Island, please help. You can help by adding debate, pointing out errors, contributing your own analyses, or suggesting an issue topic. Buying a subscription would help, too. \$35/11 issues, see p.2. —TS

is only to the standard of accuracy, and who feel no counterposed duty to avoid destroying what is valuable in a town by their actions. ©

More evidence about math education

There were headlines this past week when the Rhode Island Public Expenditure Council issued a report claiming that we are the state with the sixth highest taxes in the country. You can take these kinds of statistics two ways. For one thing, you could be pleased at our progress, since last winter the Governor was brandishing statistics that claimed we were fifth.

But more likely you would be disappointed in RIPEC, from whom we hope for better work. Their report compares taxes collected to personal income. The same complaints we made last winter about the Governor and the Tax Foundation study he quoted so often apply here. To avoid forcing you to burrow through the **RIPR** archives (even though issue 4 contains lots of other good stuff about the state budget), here are the short rejoinders to this kind of statistic:

- Property is owned both by people who live here and people who don't. The people who don't might not contribute to the state's personal income, but they very much do contribute to the property taxes collected by towns. States with lots of vacation homes tend to wind up at the high end of property tax comparisons with personal income. Maine, Hawaii, and New York are all good company for Rhode Island.
- Personal income measures do not measure all income. Capital gains are overlooked, for example.
- Personal income measures miss self-employed people. BEA statisticians try to estimate how many

quahoggers, independent writers, and in-law apartments there are, but they have few ways to confirm their estimates before income tax returns are available (at least a year later).

Worst of all, these measures completely overlook the incidence of taxes. Where the burden falls is not just a detail. It's usually the most important part of the story. For example, income taxes as a proportion of personal income went *up* over the last few years of the 1990's. Was this a case of greedy politicians grabbing more of your money? Well, no. Those years saw a 10% income tax *cut*. But people's incomes were headed up, and we have a progressive income tax, so collections went up, even though the rate went down.

No one will claim that Rhode Island is a tax haven, but the picture is much more intricate than the simple-minded version RIPEC presents. Putting property taxes aside, unless you earn more than twice the median income, your taxes would be higher in around 30 other states, depending where you live. Including property taxes, the picture is much worse, but it still depends on where you live and how rich you are.

All the evidence shows that, to no one's surprise, property taxes are a problem around here. But RIPEC's numbers will be used—as they have been so often in the past—as a club to beat anyone about the head who proposes any tax increase this winter, even one to be used for property tax relief. I'm sure someone will remind me to thank them for that contribution to the debate.

For more about similar studies, see **RIPR** issues 4 & 5. Issue 2 contains our own longitudinal study of RI taxes, looking at how the incidence has changed over the past 50 years. All are available at whatcheer.net. ©