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Publication Date

2020-10-01



EXPLAINER ESSAY #1

Roads, Prices, and Shortages: A Gasoline Parable

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October 2020

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Transportation Studies

Abstract

Can pricing roads really help reduce congestion? One way to answer this question is to ask if *not* pricing roads *causes* congestion. This essay makes that case, and does so by demonstrating the general principle that when goods are underpriced, shortages result, and congestion is essentially a shortage of road space. People react and adjust in many ways to shortages, but accurate pricing is the only reliable way to end a shortage caused by mispricing. I illustrate this concept with oil and gasoline price controls. In the 1970s, the United States inadvertently created a gasoline shortage by mispricing gasoline, and in response to that shortage made a series of increasingly complicated and largely ineffective adjustments. While today most people agree that these gasoline price controls were unwise, an analogous situation persists on our roads, which most people tacitly accept.

This study was made possible through funding received by the University of California Institute of Transportation Studies from the State of California through the Public Transportation Account and the Road Repair and Accountability Act of 2017 (Senate Bill 1). The contents of this report reflect the views of the author(s), who is/are responsible for the facts and the accuracy of the information presented. This document is disseminated under the sponsorship of the State of California in the interest of information exchange and does not necessarily reflect the official views or policies of the State of California.

Project ID: UC-ITS-2020-36

Roads, Prices, and Shortages: A Gasoline Parable

The premise of congestion pricing is simple: traffic gets jammed because roads are underpriced, so pricing roads correctly can reduce congestion. Central to this idea is the premise that roads are like any other goods: at different times and places they will have different values, because at different times and in different places more or fewer people will want to use them. A freeway going into downtown Boston is more valuable than one crossing rural Arkansas. That Boston freeway is also more valuable at 8 a.m. than it is at midnight. As a result, the Boston freeway should cost more to use than the Arkansas freeway, and it should cost more at 8 a.m. than it should at midnight.

But that is not the way our roads are set up. All these roads, all the time, cost nothing to drive on at all.¹ The road into Boston at 8 a.m. is therefore likely to be underpriced. Anyone who has endured an economics class knows (or has at least been told) that when goods are underpriced, shortages result. And anyone heading into Boston at 8 a.m. can see evidence for that proposition. They will encounter traffic congestion, and congestion is, at root, just a shortage of road. At busy times, lots of people want to use the road, and there isn't enough road space to hold them all. The result is a queue, which we call congestion. Since we don't pay, we wait.

In some ways this explanation seems too simple. How can *that* be the story of congestion? Congestion is a problem that legions of planners, pundits and pilots of traffic helicopters have spent decades trying to solve. Congestion is complicated and multifaceted, the topic of blue-ribbon panels, learned commissions, and massive studies. Ask a random person, or even a random traffic expert, why congestion occurs and you'll hear a variety of explanations, and very few will involve the price of the road. You might be told about the growing economy, or underinvestment in public transportation. You'll hear about housing development that is too dense, or not dense enough. Failure to stagger work hours, or to have people work from home. Lousy sidewalks. Not enough bike lanes. Cheap cars. Cheap gas. Cheap Ubers.

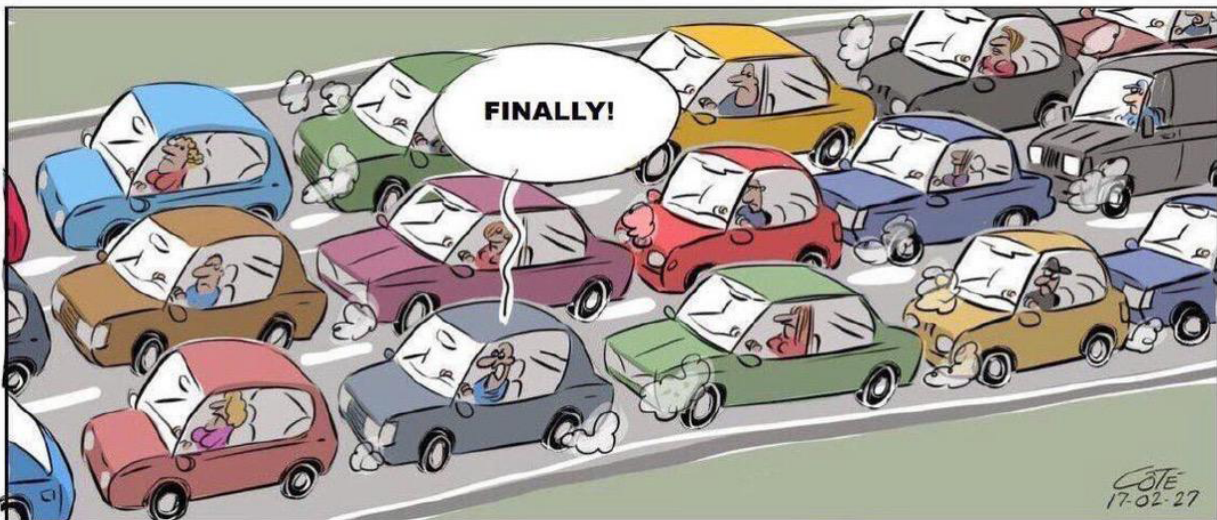
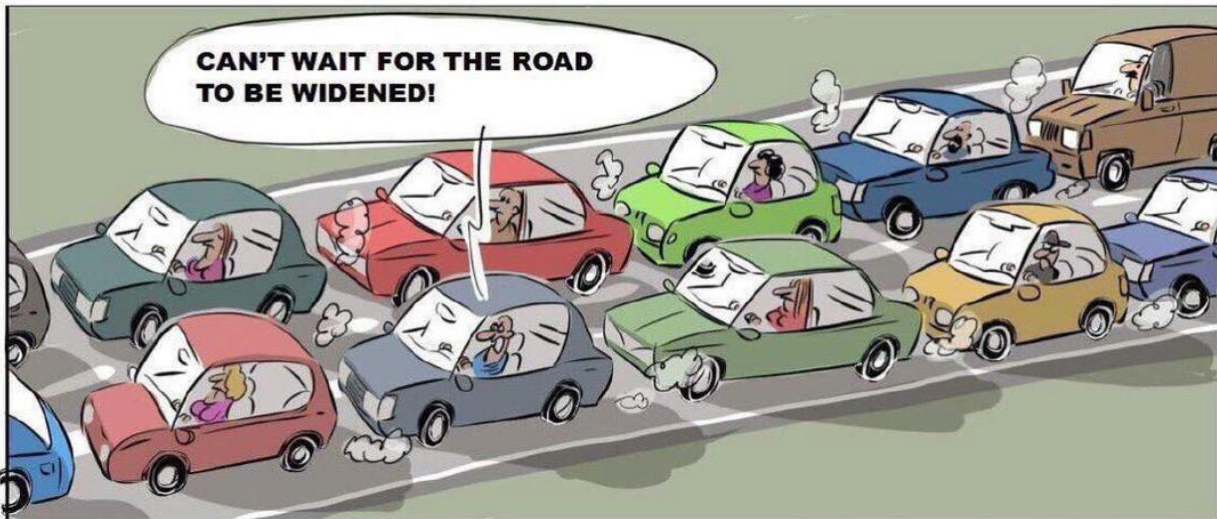
To be sure, all these factors matter. But they matter for a particular reason: they make people *want to use the roads*. That desire, by itself, can't create congestion. Congestion arises when lots of people want to use the roads at the same time *and* we don't manage that demand with a price. Giving away a good that people want is a reliable way to run out of it. It is the failure to attach a price to demand, not the source of demand itself, that matters.

Here is an example. On hot summer days, it's rare to see beachside stores run out of cold drinks or ice cream. It's also rare, on your way to the beach, to pull into a gas station and learn that they've run out of gas. But space on the beach itself does fill up, and it isn't rare at all, on your way to the beach, to find yourself stuck in traffic. You could blame hot weather for the traffic — hot weather is why you went to the beach, after all — but if hot weather creates a road shortage, why doesn't it create an ice cream shortage? The answer is simple: the ice cream is priced, and space on roads and beaches isn't.

Perhaps that example seems rigged. Maybe I'm ignoring the role of supply. Roads or beaches aren't the same as ice cream and gasoline. Stores, after all, can *get* more gas or ice cream. Cities can't (or won't) produce more beach sand or road space. We could have a boring argument over whether this is true (cities *do* expand roads, and it isn't unheard of for them to truck in beach sand either) but for now let's assume it's correct. How much difference would that make? Imagine the same hot summer day,

1. If you just shouted "what about gas taxes!", be patient.

but now both the road and the beach are 10 feet wider. Would either be less crowded? They could hold more people, certainly, so maybe they'd fill up a bit more slowly, but by late morning the typical beachgoer would probably not be moving any faster along the road, nor have a lot more room around her blanket when she arrived. If that's not convincing, turn the example around: suppose the store starts giving ice cream away. Yes, the store can always order more, but would that really prevent a shortage?



Cartoon by [André-Philippe Côté](#)

A true skeptic could say the example is still rigged. Ice cream vendors have no choice but to charge prices, because they need to produce a new ice cream for every new customer. Without prices, and the revenue they create, the store couldn't buy the ice cream it needs to turn around and sell. Roads are different: they don't disappear when one person uses them. Since we don't need to produce new road space for each new user, once we've built a road there's no reason not to give it away.

It's true that road space doesn't need to be produced anew for every driver. Managing a road just requires freeing up some space that already exists. But that's not true only of roads. It's also true of airplane seats and hotel rooms. JetBlue doesn't physically construct a seat every time a passenger boards a plane, and Marriott doesn't build a room whenever a guest checks in.

And yet: if the Marriott near the beach on a hot summer day stopped charging for rooms, it would run out of rooms pretty fast.

Maybe you think I'm still missing the point: Marriott and JetBlue are private firms, with shareholders who want profits. So of course they will charge for their goods. But suppose the government took over Marriott and financed it through everyone's income taxes. Now there's no need for profit, or even for revenue. If in this situation Marriott gave rooms away, would it somehow not run out? If that example sounds fanciful, think of the world's many government-owned airlines, all of which charge fares that vary by time and place, and do so largely to manage demand.

Make no mistake: people who sell things are happy to see large profits. But there's a reason ice cream costs more at the beach on hot days than it does at the grocery store on cold days: more people want it. That's what sends the price higher. The people charging the higher price *can* make more money as a result, which is good for them and not much fun for us. But the rising price does serve a purpose for the rest of us. It keeps the ice cream from running out. It's true that if the price is higher, some people won't be able to get as much as they'd like, but that's also true if the price is lower and the store runs out.

If it makes sense for ice cream and hotel rooms to cost more at the beach on hot days — to cost more at a time and place when more people want them — then it should also make sense for a road into downtown Los Angeles at rush hour to cost more than a road in the desert at midnight. But that doesn't happen. Those two roads always have the same price, and that price is zero. In the desert that doesn't usually matter. In Los Angeles, day in and day out, it creates congestion.

Picture a Monday morning in a booming urban area. Some people are sitting in their cars on a jammed freeway, while others — since the traffic has backed down the on-ramps — are sitting in their cars waiting to get on the jammed freeway. Everyone is in a hurry, and no one is moving. If you're in one of these vehicles, it's hard not to be discouraged, frustrated, and maybe even curious. Who *are* all these people? Where have they come from, and why are they slowing you down? You start to think that your cranky neighbor who always complains about development might have a point. Economic growth really is a double-edged sword. There are too many people, the infrastructure is overwhelmed, and the city is full to bursting. Maybe it's time for that sternly worded letter to the city council: no more new homes.

It's a common way of thinking, and understandable. But it also has a hole. That same morning, all the drivers now slowing you down woke up, rolled over, and flipped a switch. When they did, lights came on. When they walked to the bathroom and turned on the tap, water came out. They stepped into the shower, pushed the handle toward warm, and the water temperature rose. On their way to the jammed freeway, some of these people pulled into gas stations. Inside those stations there was coffee in the carafes, newspapers on the racks, and doughnuts on the doughnut trays. Outside, gas was in the pumps.

You get the picture. When you are literally sitting in a shortage, which is what's happening when you're sitting in traffic, you tend to focus on the shortage, and it becomes easy to lose sight of all the things we *don't* run out of. But this overall abundance is important to keep in mind. If the mere fact of people or development triggered shortages, then shortages should be much more widespread. But they aren't. Big, fast-growing cities suffer chronic shortages in their transportation systems, but not in their water or electric systems. Even within the transportation system, chronic shortages only occur in things we don't price. Los Angeles regularly runs out of road space, but never runs out of cars. It is telling that when a new apartment building goes up the neighbors worry about traffic, but not about blackouts. Every day, a huge crush of people puts a giant simultaneous burden on our electric grid, our water systems, our heating fuel infrastructure and yes, our all-important doughnut infrastructure. And in every case, those infrastructures rise to the challenge. It's only the roads that buckle.

Let me pause and emphasize what I am *not* saying. I'm not arguing that underpricing is the only way to create a shortage. Sometimes goods are priced and we still don't produce enough of them (housing in California comes to mind). My point is also not

that the private sector is great and the public sector is not. Far from it. The private sector has plenty of failings, and anyway both the public and private sector use prices. The private sector might get us doughnuts and gasoline, but the public sector often gets us water and electricity (The water from my tap comes to me, priced, from a public agency). Nor is my point that water, electricity and heating fuel are perfectly managed. They aren't. A lot of our infrastructure is old; the way we allocate it could be rethought. Finally, my point is not that everything should be priced, or that prices should never be regulated.

My point is simpler, and (I hope), less controversial: pricing matters. Underpricing isn't the only way to create shortages, but it's a reliable way to create them. Whether those shortages are worth the low price is a matter of judgment, and that judgment will vary by circumstance. A crowded beach is probably harmless, and sometimes fun. A crowded road is neither. For all the problems with our water, electric, and heating fuel infrastructure (which are, again, both publicly and privately owned), these services clear a low but important bar: they are there when we need them. Our road system doesn't pass this test. It is highly unreliable, and we can rely on it least when we need it most. It is when we are on the way to or from school or work or daycare that the system is most likely to fail from overuse: slowing us down, creating more pollution, and increasing the risk of crashes.

We have lived for so long with congestion that we've come to see it as normal and inevitable, something that only a complicated 10- or 20-point program could ever hope to solve. And while it's correct to say congestion has no silver bullet, and that completely eliminating it would be very hard, thinking of this sort nevertheless gives the problem too much credit. We *have* made a terrible mess on our roads, but even a terrible mess often has a simple source. Sometimes that simple source is a wrong price. If you don't believe that, read on. Not long ago we created, and then undid, all the problems that currently exist on our roads. We just didn't do it with our roads. We did it with gasoline.

On Aug. 15, 1971, President Richard Nixon made a startling announcement: he was freezing all wages, prices, and rents for 90 days. Nixon made this move to fight inflation, which during his administration had leaped from its postwar norm of 1%-2% per year to levels well above 4%, and sometimes over 5%. So for three months, the government would regulate what people paid, and what they earned, across a huge swath of the economy. In November 1971, as the 90th day neared, he announced that he was extending the freeze until January 1973.²

Thus began a case study in unintended consequences. The public liked the price freeze. Others saw trouble. The president, libertarian Chicago economist Milton Friedman wrote in *Newsweek*, "has a tiger by the tail ... He will find it hard to let it go." Friedman was easy to dismiss — he *would* think that — but his warning turned out to be prescient. The price controls covered petroleum products and retail gasoline, which was important from a political perspective. Americans loved cars, especially big cars, and as the country suburbanized they were buying more of these big cars and driving them further than ever. So high gas prices weren't popular.

Price controls on gasoline were a problem practically, however, because the global price of oil—gasoline's main ingredient—was rising, and domestic oil supplies weren't large enough to meet U.S. demand. Imports could cover the shortfall, but companies would lose money if they bought foreign oil at the world price and then sold it in the U.S. at the lower, controlled price. Perversely, the price control encouraged exports, not imports. It made more sense for companies to sell domestic oil overseas, not bring foreign oil in.

The result was a situation where demand was high and supply was limited. Situations like this would normally lead to

2. For details, see Executive Order 11615 –Stabilization of Wages and Prices, at the American Presidency Project <https://www.presidency.ucsb.edu/documents/executive-order-11615-providing-for-stabilization-prices-rents-wages-and-salaries>). Also Executive Office of the President, 1972. *Stemming Inflation*, Office of Emergency Preparedness, and Jacobs, Meg. 2018. *Panic at the Pump*. Hill and Wang.

higher prices, but that couldn't happen here because prices were controlled. As the summer of 1973 approached, demand surged even more, as families prepared for vacation travel. Now the U.S. was looking down the barrel of a shortage, and observers warned that some service stations might enter the summer without enough gasoline. To head off that problem, Nixon established a system of "voluntary allocations": the government asked the major oil companies to supply all refiners and retail gas dealers with the same percentage of the total share of oil products they had received between September 1971 and August 1972. In other words, if Exxon had sent an independent service station in Wisconsin one-tenth of one percent of its oil products between 1971 and 1972, it should make sure that service station got one-tenth of one percent of its products going forward.³

This method didn't work, for two reasons. First, the allocations didn't do anything to manage demand (they left prices low) or increase supply (with low prices, suppliers had little incentive to get new oil). The allocations only tried to spread the problem of limited supply more equitably. Second, the allocation program was voluntary, and the big oil companies didn't always abide by it. Many of them used what gas they had to prop up their own retail outlets (e.g., Exxon sent its gas to Exxon stations) and dramatically reduced their shipments to independent service stations. The independent stations began having shortages, and even some stations owned by the major oil companies found themselves running out of gasoline. As some stations ran out, drivers flocked to others. Lines started to form. Gas stations started to look like rush hour freeways: places where too many people wanted too much of something all at once.



WAITING FOR GAS—About 300 cars line up to buy gasoline at service station on Interstate 10 in Tucson. Station owner Wayne Hodgson esti-

mated he sold 6,000 gallons of gas in four hours Sunday afternoon. Hodgson's seven children helped; three directed traffic, others pumped gas. AP Wirephoto

3. See 'From John F. Kennedy to Jimmy Carter', 1981. *The Wilson Quarterly*. 5(2): 70-90. Also Jacobs, 2018.

Normally a price can dispel, or at least reduce, a line. Higher prices encourage consumers to economize, and give producers an incentive to deliver more product. They also prevent panic buying: if a higher price prevents a station from having a shortage, it also prevents drivers from reacting to that shortage — and compounding and perpetuating it — by running around to other stations and buying up all the gas they can find. But in 1973 gas prices were hard to raise. The initial price freezes had ended, and gas stations were allowed to pass higher costs on to customers, but the government was still regulating gas station profits. Because the shortage was acute, a price high enough to reduce the line would generate profits higher than what the government allowed. The result was that prices sometimes rose, but not high enough to meaningfully reduce waiting times. Drivers faced both higher prices *and* long lines.

In this situation some stations just sold gas until they ran out, and closed early each day. Others tried to stay open for all their business hours, but had to ration gasoline to do so, by limiting customers to a few gallons at a time.⁴ Exxon, for example, which owned all the service stations along the New Jersey Turnpike, limited every motorist to 10 gallons.⁵ Still others tried to sell only to their regular customers, and turned strangers away. Some stations couldn't stay in business, and closed altogether. By June 1973, over 1,500 gas stations had closed at least temporarily. Four hundred more, mostly independents, had shut down for good. Thousands more were rationing.⁶ As summer approached, public and private entities alike warned drivers to prepare for shortages. Phillips Petroleum took out full-page ads in major newspapers, and in a surreal effort to be reassuring, told readers that "It's unlikely that all stations in any one area will be out of gasoline at the same time. But," it added, "it would be wise to stay on top of the situation [in case] you do find yourself at a station without gasoline."⁷

The Nixon administration looked at the rising prices and long lines and decided, unhelpfully, to tackle only the former. On June 13 it issued an order that froze gas prices for 60 days. On August 11 it issued a second order, extending that freeze indefinitely.⁸ The administration then tried to address what it wrongly considered the root of the problem, which was the rising price of crude oil. This was a tricky endeavor. Simply capping the price of crude could discourage drilling and exploration. If the government held down the price of all oil, some oil would become too expensive to extract. This would perpetuate the shortage, drive global prices up even more, and impede the administration's goal of "energy independence" — relying on U.S. oil instead of imports.

What the administration settled on, and here I am simplifying greatly, was a program that capped the price of "old" oil — domestic oil that was already extracted from the ground — but that left the price of "new" oil uncontrolled. A barrel of oil freshly pulled from the earth would sell for a higher price than a barrel sitting in a warehouse.

This program backfired. Companies that held "old" oil now had an incentive not to sell it: it was better, if they could, to wait and hope the controls were lifted. The two-tier system also created inequities within the oil industry itself, since some refiners, under pre-existing contracts, had more access to "old" oil than others. These refiners suddenly had a government-granted competitive advantage over their rivals. Since it was not the government's intent to give some refiners an upper hand, it tried to rectify the situation by putting a patch on the program. The patch forced refiners with more access to old oil to sell some of it to their competitors who had less. This in turn created a byzantine system of transfers and subsidies within the industry, one made all the more surreal by the fact that the goods being traded — barrels of crude oil — were literally identical, and only had different values because the government said so. Presiding over these controls and trades meant the government was now fully in the energy business. Agencies that had not existed two years earlier were now refereeing transactions between companies large and small, and addressing the unintended side effects of these transactions. Over the next eight years, the crude oil controls would be amended or changed hundreds of times.

4. Fellows, L. Harried Gas Dealers Try Barricades. *New York Times*. December 28.

5. Jacobs, 2018.

6. "From John F Kennedy to Jimmy Carter", 1981.

7. Phillips Petroleum. 1973. "When Consumers Ask about the Summer Gasoline Shortage, There are Two Ways to Answer." *Los Angeles Times* (Advertisement). June 19.

8. Appleyard, RW. 1973. Nixon Freezes Prices for Up to 60 Days, *New York Times*, June 14, and Price Controls are Kept on Gas and Oil, *New York Times*, August 12.

Then things got worse. In October 1973, Egypt and Syria began a short and disastrous war against Israel. The United States supported Israel. In response, the petroleum-producing states of the Middle East launched an embargo that deprived the U.S. (along with much of Europe) of Middle Eastern oil. In 1973 the U.S. still supplied most of its oil domestically, so the embargo's supply shock was not monumental, the way it might be if something similar happened 20 years later. Probably 10% to 17% of the U.S. gasoline supply would be disrupted.⁹ While this wasn't tiny, it also did not need to portend disaster. To put it in context, if in 1974 total U.S. gas consumption fell by 10%, Americans would be using the same amount of gas they had in 1970. In 1970, Americans had been able to fuel their cars just fine. There were now more Americans, and more cars, but not so many more that this constricted supply should result in mass shortages. The price, however, would have to rise. And around the world, the price did rise. By January 1974, the global price of oil had almost quadrupled.

In the U.S., however, prices couldn't rise, or at least not rise enough, because the price controls remained. As a result, the embargo just aggravated the lines and shortages. With the world price of oil soaring, moreover, the U.S. faced a new problem. Oil can be refined to make gasoline, but also to make heating fuel. Much as Nixon didn't want to deprive American motorists of gasoline, winter's approach meant he also had to worry about homes going without heat. He ordered oil companies to reduce gasoline refining by 15%, to ensure that the nation would have enough heating oil.¹⁰ In doing so he headed off a humanitarian disaster in the Northeast and Midwest, but also further restricted the supply of gasoline. To manage the fallout of having even less gas, the Administration enacted a new round of mandatory allocations--orders that specified how much gas could go to different states, that oversaw where fuel was apportioned, and that continued to ensure that gas stations were not charging "too much."

The gas lines only grew. Some were miles long. One epic line in Maryland forced drivers to wait seven hours. For consumers, a task that had been mundane and mindless — filling up the car — suddenly required large helpings of planning and luck. In early 1974 researchers reported in *Science* that between November 1973 and January 1974 the share of American motorists who reported trouble getting gasoline more than tripled, from 17% to 56% nationwide. The situation was particularly bad in New England (where 83% of drivers had trouble getting gas), and on the West Coast (where 82% did).¹¹ In January, angered by the rising price of diesel fuel (which was subject to fewer controls), thousands of truckers launched a short but tumultuous nationwide strike. The strike was often violent — there were shootings and bombings — and it shut down the country's highways. Truckers shutting down the highways of course only made retail gas shortages worse, since gasoline arrived in trucks, on highways.¹² A survey conducted in March suggested that 20% of U.S. gas stations had no fuel.¹³

Drivers had to carefully plan their consumption, and then carefully plan their trips to get gas, since some stations would have shortages, or be rationing. It wasn't uncommon for drivers to visit multiple stations and buy small amounts of gas at each one, or to wait in a long line and then be able to buy only a few gallons of gas, or — worst of all — to sit for hours in line and have the gas station run out before they reached the pumps. The *New York Times* interviewed a young woman who had started searching for fuel at 7 a.m. and found none by midafternoon. "They closed four lines on me this morning," she said.¹⁴ On at least two separate occasions cars were demolished by passenger trains, because drivers in lines that stretched across railroad tracks didn't want to lose their place (no one was hurt; both drivers jumped clear).¹⁵ Because of rationing, you might burn as much gas searching for gas as you'd get when you finally found it. The *Baltimore Sun*, as a result, advised motorists waiting in line to start and stop their engines rather than leave them running: "in 40 minutes, you can save one-half gallon."¹⁶

9. Jacobs, 2016.

10. Jacobs, 2016.

11. Murray, J.R., MJ Minor, NM Bradburn, RF Cotterman, M Frankel, and A Pisarski. 1974. Evolution of Public Response to the Energy Crisis. *Science*. 184(4134). 257-263.

12. Jacobs, 2016.

13. Associated Press. 1974. Survey finds 20 Percent of Stations Out of Fuel. *Los Angeles Times*. March 6. Page 18.

14. Jensen, Michael. 1974. With Gasoline, Nothing is Certain but High Prices. *New York Times*. April 29.

15. "Happiness is a full tank" *Time Magazine* Feb 18 1974

16. Mike Klingaman. 2020. In the 1970s, it wasn't a pandemic that brought Baltimore to a standstill. *Baltimore Sun*. May 27.

People arrived at service stations before dawn and slept in line. A gas station owner who lived across from his business told a reporter: “When I get up and go into the bathroom to brush my teeth I can see them lining up in their cars with their lunch and their Thermoses, like they’re going on an outing. And I get sick.”¹⁷

The station owners worried they would go out of business; selling their limited gas at controlled prices didn’t always yield enough money to cover costs. They worried that they would run afoul of the government: by early 1974 over 1,000 IRS agents were spot-checking gas prices, and another thousand were being trained.¹⁸ And they worried about their furious patrons. Long lines made for short tempers. “Some of the customers get all hot and heavy,” a service station manager told the *New York Times* in 1973. “They scream up and down.”¹⁹ Another manager said: “They’ve broken my pump handles and smashed the glass on the pumps, and tried to start fights when we close.” A service station owner in Miami went furthest. The customers, he told *Time* magazine, were “like animals foraging for food. If you can’t sell them gasoline, they’ll beat you up, wreck your station, run you over with a car.”²⁰ At least one service station owner was shot by an irate customer. Police departments reported spikes in gasoline theft, as desperate people (and morally compromised entrepreneurs) siphoned gas from cars parked on streets and in driveways. Brisk new businesses emerged: selling siphons, and selling lockable gas caps to keep people with siphons at bay.²¹

Low prices, in short, had high costs. By one estimate, time spent waiting in lines was adding 12% to the cost of gasoline for urban residents in December of 1973, and 50% by March 1974.²² Another study concluded that price controls had added so much delay that any savings from lower prices were swamped by the value of the lost time.²³

The obvious solution — lift the price controls — was a political nonstarter. The public was having none of it. They suspected that oil companies were intentionally withholding gas,²⁴ and consistently told pollsters that they would prefer rationing over letting prices rise.²⁵

With the controls intact, the only hope was that people would voluntarily use less. The government partnered with the Ad Council to launch an ad campaign, “Don’t Be Fuelish,” which featured celebrities and sports stars urging people to drive less.²⁶ Nixon asked Americans to cut back on driving and keep their home thermostats lower. He proposed \$10 billion for research into alternative fuels, and asked service stations not to sell gas on Saturdays and Sundays (most obliged, making lines longer on weekdays). He pressed people not to speed, and lowered the national speed limit to 55 miles per hour.²⁷ The oil companies tried to help, and (somewhat incredibly) ran ads urging people to use less oil. NASCAR modeled good behavior and reduced the length of all its races by 10%; for one year only, the Daytona 500 became the Daytona 450.²⁸

The problem, of course, was that the government was sending mixed messages — keeping gas cheap while asking people to use less. Had gas been more expensive, people would have used less whether they’d been asked to or not. So the

17. Ferretti, 1974.

18. Jacobs, 2016.

19. Fellows, 1973.

20. “Happiness is a full tank” *Time Magazine* Feb 18 1974. Also See Ferretti Fred. 1974. *The Way We Were: A Look Back at the Late Great Oil Shortage*. *New York Times*. April 24.

21. “Gas Siphoning on Increase, Police Report.” *Los Angeles Times*. February 24, 1974. Also Ferretti, 1974, Klingaman, 2020, and Onion, Rebecca. 2013. *Gas Thieves and Gas Defenders in the 1973-74 Oil Crisis*. Slate. March 15.

22. Frech, H.E., and WC Lee. 1987. *The Welfare Cost of Rationing-by-Queue Across Markets*. *Quarterly Journal of Economics*. 102:97-108.

23. Deacon, R., and J. Sonstelie. 1989. *The Welfare Costs of Rationing by Waiting*. *Economic Inquiry*. 27:179-196.

24. Cowan, E. 1973. *The gasoline shortage: real or contrived?* *New York Times*. June 8.

25. See for example, Louis Harris and Associates Poll, December 6 – December 14, and National Opinion Research Center December 9 – December 22. Both accessed from Roper Center Ipoll Database.

26. Petroleum Service Company. “Don’t be Fuelish – A Look Back at the 1973 Oil Crisis.” <https://petroleumservicecompany.com/blog/dont-be-fuelish-a-look-back-at-the-1973-oil-crisis/>

27. Wilson Quarterly, also Jensen 1974.

28. Tom Jensen. 2016. *74 Days Until Daytona 500:1974 “Daytona 450” was a Weird One*. *FoxSports*. December 14.

shortages persisted, and the government considered bigger steps. By mid-1974 the Nixon administration had devised what it called a “standby” rationing plan: each household would be allowed 35 gallons of gas per month, per licensed driver aged 18 or older. The government would administer the system through gas-rationing coupons, each of which entitled their holder to “one unit” (35 gallons) of gas. The administration printed the coupons, but ultimately didn’t move forward with national rationing.²⁹ Some states were less hesitant. West Virginia prohibited gas purchases by anyone who already had more than a quarter tank, unless they commuted more than 250 miles per week.³⁰ Massachusetts, Maryland and Oregon adopted license-plate rationing, where motorists with even-numbered license plates could buy gas only on even-numbered days, and vice-versa.³¹ Service stations in these states also had to post flags (red, yellow, or green) indicating how much gas they had, to help drivers avoid long lines where they were unlikely to get gas.

Rationing, however, wasn’t conservation. Rationing didn’t make people want, or use, less gasoline. It just made them work harder to get it, and worry more about doing so. If you passed up an opportunity to buy gas on even-numbered days, what would happen if you suddenly needed to drive a lot on an odd one? It was better to make sure you were in line when you could be. The result, as one senator observed about American drivers in 1974, was that “Every time they pass a gasoline station they fill up with gas. It is just like a dog beside every telegraph pole.”³²

By the end of 1974, fortunately, the shortages were abating. The Middle Eastern states had lifted their embargo in March, and more oil started flowing to the U.S. The Nixon administration, in addition, allowed oil companies and gas stations to charge a bit more. On top of that, the U.S. economy entered a recession.³³ The combination of rising supply, falling demand, and freer prices allowed the system to sort itself out a bit. The price controls on crude oil were left in place, but the slack allowed by ample supply meant they did not translate into shortages at the pump. Life, or at least car-fueling life, returned to normal.

Then, in 1979, after a year of growing unrest, revolutionaries overthrew the U.S.-backed government of Iran, plunging the Middle East, and particularly America’s relations in the Middle East, back into chaos. Before the revolution, Iran had been the planet’s fourth-largest supplier of oil, delivering about 10% of the non-Communist world’s petroleum. The revolution cut the gusher from Iran’s oil fields to a trickle. In July 1978, Iran had produced 5.8 million barrels of oil per day. In January 1979, when the Shah of Iran fled and his government fell, it produced 445,000 barrels. For 69 days after the revolution, Iran exported no oil at all. When exports resumed, they did so at half to two-thirds their normal level.³⁴

For the United States, the unrest in Iran translated into a roughly 4% reduction in oil supplies, which while small was big enough — when combined with U.S. price controls — to trigger shortages every bit as bad as those from 1973 to 1974. President Carter, like Nixon before him, was preoccupied by inflation, and his administration, like Nixon’s, had kept price controls on retail gasoline. (Shortly before the revolution, in December 1978, he had asked Congress to loosen the retail controls, but leave the controls on crude oil intact).³⁵ Lines once again snaked around gas stations. Tempers again flared, as patience again ran thin. Fearful of running out, people again purchased gas whenever they saw an opportunity. This time some states tried to combat the urge to top off. Maryland, Virginia and Washington DC jointly imposed “minimum purchase requirements”: laws prohibiting motorists from buying gas if they didn’t need a lot. But laws like this--which tried to counteract a price ceiling by mandating a sales floor--were impossible to enforce.³⁶ Soon these states, and others (like California), had odd-even rationing. Households began stockpiling

29. Rationing: Spotty Local Starts. *Time*. February 25.

30. See, e.g. Testimony of John Sawhill, Deputy Administrator of the Federal Energy Office, in Hearings on Gasoline Distribution before the Joint Economic Committee of the US Congress, March 12 and 14, 1974. <https://fraser.stlouisfed.org/title/gasoline-distribution-89>

31. “Happiness is a full tank” *Time Magazine* Feb 18 1974

32. Jacobs, 2016, page 110.

33. Jensen, 1974.

34. Verglegger, Philip. 1979. The 1979 Oil Crisis. *Brookings Papers on Economic Activity*. 2:1979,

35. Halloran, Richard. 1978. Carter Will Ask Congress to Free Gasoline Prices. *New York Times*. December 8.

36. Paul W. Valentine. 1979. Odd-Even Rationing to Begin Here Thursday. *Washington Post*. June 19.

gasoline, prompting fire departments to warn that gas was unsafe to store in the home.³⁷ Once again, though, the public had little appetite for letting prices do their work. Surveys showed that only 17% of the public favored letting the price of oil rise, while about 50% favored a national odd-even rationing system. Forty-five percent supported a coupon-based national rationing system, more than double the 22% who favored “Allowing gasoline prices to increase so that vehicle usage would be discouraged and gasoline consumption would go down.”³⁸

Like Nixon before him, Carter considered rationing, printed up the coupons, and stopped short of using them. And like Nixon, he urged Americans to conserve, famously going so far as to install solar panels on the White House roof, and putting a wood-burning stove in his White House living quarters.³⁹ But the price controls remained. By one estimate, idling American cars burned 150,000 gallons of gas per day just waiting in line at service stations.⁴⁰

Carter knew, after eight years and three presidencies, that the controls weren’t working and weren’t sustainable. The primary obstacle to removing them was a fear that, especially with inflation still running high, prices would jump, and the oil companies would earn high profits even as the nation’s drivers felt the pinch. But Carter had a solution: roll back the controls and let prices do their work, and if people were upset about oil company profits, the government could just tax those profits away. Implicit in this policy was an understanding, perhaps belated, that prices did more than just create profits. A second, entirely separate, and socially important role of prices is that they provide information. Higher oil prices told people, more effectively than any advertisement or political campaign, to drive less, drive slower, and consider a smaller car. High prices conveyed that maybe the house could be insulated, or run on solar, and that maybe the people in it, if they were cold, could wear more layers rather than crank up the heat. People who face higher prices for oil conserve, not because conservation is the right thing to do, but because it helps them personally.

In 1979, Carter convinced Congress to remove most of the price controls and replace them with a tax on oil industry profits. In doing so he dampened the private benefit of prices (he taxed away the profits), but left the social benefits intact. When he announced his policy change, he was admirably blunt: “This is a painful step,” he said, “and I’ll give it to you straight: Each one of us will have to use less oil and pay more for it.”⁴¹

The United States has not had a sustained gasoline shortage since.



Gasoline rationing coupons, printed but never used

37. Schuon, Marshall. 1979. “There’s Just No Safe Way of Hoarding Gasoline.” *New York Times*. May 31.

38. See ABC News, Louis Harris Poll. February 8-February 12, 1979, and Time Magazine Poll, December 1979. From Roper Ipoll database.

39. Steven Weisman. 1979. A Wood-Burning Stove at the White House. *New York Times*. November 1.

40. *Half Gone*

41. Tolchin, Martin. 1979. Carter to End Price Controls on US Oil. *New York Times*. April 6.

Today, America's petroleum price controls, and their associated pains and follies, are largely forgotten. They are useful to recall, however, because they show how even relatively modest price regulations, when combined with even modest constraints on supply, can help cause chaos. Remember that during this time gas was never *free*, and that the constraints on America's oil supply, while real, were never huge. In short order, however, the moderately controlled price and the modestly constrained supply generated huge lines, massive stress, and occasional violence. It also birthed a small army of workers, public and private, devoted to predicting, managing, and ameliorating the seemingly insoluble shortages. One can only imagine what would happen if the gasoline price controls were more direct and more stringent, and gasoline supply even more constrained.

Actually, we don't need to imagine this: as of 2020, it's the reality in Venezuela. Gas in Venezuela is functionally free: it has a government-mandated per gallon price of — this is not a typo — two hundred-millionths of one cent. (If you're wondering, that's 0.00000002 cents per gallon). "Gas is so dirt-cheap that station attendants don't even know the price," the Associated Press reported in 2019. "Emptyhanded drivers get waved through, paying nothing at all."⁴²

Some of the absurdity in that price is a result of hyperinflation: inflation in Venezuela often runs above 200,000% and has by some estimates occasionally hit 1,000,000%.⁴³ Even before its runaway inflation, however, Venezuela kept its gasoline very cheap. In 2006, for example, gas cost about 11 cents per gallon, and at a high point in 1998 it was 53 cents per gallon.⁴⁴

Because Venezuela also has the world's largest supply of oil, for a long time this policy of free or almost-free gas didn't cause too many problems. In 2020, however, the country's refining capacity — its ability to convert oil into gasoline — fell sharply. This decline resulted in part from homegrown mismanagement, corruption and neglect, and in part from sanctions levied by a hostile U.S. government, which made investment difficult.⁴⁵ For our purposes, what's important is that a law and tradition of cheap gas (many Venezuelans consider inexpensive gasoline a right), collided head-on with a sharp constraint in supply. The result was predictable: massive shortages. Today motorists in Venezuela must either endure long lines that put those of 1970s America to shame (a typical line is six hours) or buy black market gasoline from the military at \$16 per gallon.⁴⁶ The *New York Times* describes the situation:

The streets of Caracas are lined with hundreds of waiting cars snaked around the few periodically functioning gas stations. Some motorists sleep in their vehicles or pass the night huddled by their motorbikes on the highway to get a better chance when armed soldiers begin organizing chaotic lines at sunrise.⁴⁷

Anyone outside Venezuela (and doubtless many people inside it) can see that this situation is insane. Today self-satisfied Americans can look at Caracas and tut-tut about the errors of socialism, just as they can look back at the gas lines of the 1970s and shake their heads at the Paleolithic ignorance of their elders. Such a reaction is at least somewhat justified. The mess in Venezuela, like the U.S. mess in the '70s, was largely avoidable: you can't take a good that lots of people want, and that is hard to supply, and make it free without causing a shortage.

42. In Venezuela, a Tank of Gas Costs Less than a Penny. Here's Why. *Associated Press*. October 26, 2019. <https://www.jacksonville.com/zz/news/20191026/in-venezuela-tank-of-gas-costs-less-than-us-penny-heres-why>

43. Inflation rates in Venezuela are a matter of political dispute between the ruling party and the opposition National Assembly. The International Monetary Fund also estimates Venezuela inflation on an annual basis: its estimate for 2019 was 65,000 percent.

44. See World Bank data on global gasoline prices over time: <https://data.worldbank.org/indicator/EP.PMP.SGAS.CD>

45. Kejal Vyas and Ginette Gonzalez, "Oil Industry is Fading Away in Land of World's Richest Reserves." *Wall Street Journal*. September 4, 2020.

46. Joe Parkin Daniels and Mariana Zuniga. 2018. Venezuela has Dirt-Cheap Fuel, so why is Driving Nearly Impossible? *Guardian*. August 10.

47. Kurmanaev, Anatoly. 2020. From Nearly Free to Out of Reach. *New York Times*. May 15.

On the other hand, we probably shouldn't be so smug. What Venezuela has done with its gas is basically what we've done with our urban roads. The demand for roads is every bit as high as the demand for gas. Probably, it is higher: almost everyone who wants gas also wants the road, but some people who want the road (such as those with electric cars) don't want any gas. And while it can be hard to produce new gasoline when supply chains are disrupted, new gasoline is far easier to produce than new urban roads. So if it is foolish or crazy to keep gas underpriced or almost free, how should we describe our decision to keep the roads literally free?

Perhaps you protest: America's roads aren't really free! After all, we pay gas taxes. The Venezuela example should give the lie to that line of thinking. Suppose Venezuela kept its gas unpriced but put tolls on its roads. Would we say its gas was no longer free? Probably not — a price on the road isn't the same as a price on gas. As long as we accept that fact, however, then it becomes hard to say that taxing gasoline makes America's roads more expensive. A statement like that makes no more sense than saying charging for cars makes gas more expensive. It's true that all these prices are related, in that you can add them up to get the price of *driving*, but the fact that driving is priced doesn't mean the road isn't free. It's more accurate to say that keeping the road free makes driving's price artificially low, because we give one big component of driving away. Arguing that *all* parts of driving are priced because the total cost of driving is above zero is illogical. Suppose you walked into a store and learned that cold cuts were free but bread was not. Would you argue that cold cuts really *weren't* free, since you'd still have to pay something to make a sandwich?

The U.S. today has price-controlled roads. These price controls generate chaos and confusion similar to those in the gasoline markets of the U.S. in the 1970s and Venezuela today. It's easy to marvel at the travails of American gas consumers in the 1970s, with their elaborate rituals for avoiding long lines, or their camping out overnight at service stations. But think of everything people do today to avoid the road shortages we call congestion. Drivers today expect and endure long lines on the road. They adjust, by getting up while it's still dark and leaving for work early, or working a few hours from home and then driving in late. Perhaps they go straight from work to a nearby gym, so they can exercise while "waiting out the traffic." They have rules about where they will and won't go at certain hours ("don't be on the 101 after 4 PM"), and they invest time and energy in learning back roads and side streets. They carefully plan large portions of their day, in sum, around the reality that the road system will be suffering shortages.

Nor is that all. Entire firms and industry niches have sprung up because we have all tacitly agreed that our road system will fail. In the 1970s, gas stations posted flags to let drivers know how bad the shortages were. We don't exactly have traffic flags, but news organizations have special traffic correspondents, often in helicopters, to tell us where road shortages are most acute, and which routes to avoid. Highway agencies post flashing signs to tell us of shortages ahead. Companies like Waze, which use real-time data to guide people around traffic, are *premised* on the idea that the most obvious route from one place to another will have collapsed from overuse. I would not need Waze to get from my office at UCLA to Los Angeles International Airport if the 405 Freeway — which directly connects UCLA and LAX and has prominent exits for both — was not always congested.

No one gets into fights over gasoline shortages anymore, but congestion certainly triggers violence. Sometimes the violence is between drivers ("road rage") and sometimes it falls on people who have the misfortune of living with hot-tempered people driven to distraction by their commutes.⁴⁸ It was strange, in the 1970s, to have oil companies urging people to drive less, and warning drivers who ignored them that there might not be enough gas. But today we think little of governments that build roads, give them away, and then ask us not to use them, on grounds that if we use them too much we will run out. And while it may seem bizarre that legions of bureaucrats tried to manage the demand for gasoline in the 1970s, today thousands of planners and

48. Louis-Philippe Beland and Daniel Brent. 2018. Traffic and Crime. *Journal of Public Economics*. 160:96-116. Also Gilbert C Gee and David T Takeuchi. 2004. Traffic Stress, Vehicular Burden and Well-Being. *Social Science and Medicine*. 59(2):405-414.

engineers, at state and local agencies and consulting firms, hatch complicated plans to manage road space. They build elaborate models, and use those models to call for more roads, or more transit, or more carpools, or more conservation. Like the gas planners of the 1970s, they will try anything but prices.

The failures of gas rationing seem evident today, but we nevertheless entertain anti-congestion proposals that involve staggered work hours, or odd-even driving days, or mandated telecommuting. Similarly, while we might see the folly, in hindsight, of investing in alternative energy sources while keeping oil cheap, we have few reservations about building transit systems to “fight traffic” even as we leave our roads free. Some motorists might be sufficiently fed up with congestion that they switch to a train, but the free roads ensure that other motorists will quickly take their places. And why should public transportation, a viable mode of travel in its own right, have as its mission nothing more than damage control for our mispriced roads? The solution to a mispriced road is a correctly priced road, not a train. Trains are wonderful, but we squander their potential when we run them next to congested roads, and task them with a mission that only a price on those roads can accomplish.

Americans in the 1970s consistently told their leaders (and pollsters) that almost any solution to the gas crisis was preferable to higher prices. Today people say the same about congestion: they prefer non-pricing solutions. That’s understandable. No one likes high prices. The trouble, then as now, is that the non-pricing solution doesn’t exist. This reality was easier to discern in the 1970s because gasoline shortages were such an aberration. Everyone sitting in a gas line in 1973 could easily remember when getting gas didn’t involve sitting in a line. They could also, with a bit of effort, learn that gas shortages weren’t universal. Almost every country was affected by the oil embargo. But Germany, for example, did not put price controls on gasoline. The price of gas rose in Germany, and Germans drove less, but they could get gas when they needed it. It was not that hard, in the 1970s, to link cause and effect: price controls made shortages worse.

It is much harder to make that connection today when we think about roads. Free roads are not a new experiment: they are longstanding and ubiquitous. Almost no one has experienced a correctly priced urban road, so they don’t attribute our current urban road shortage to mispricing. When they hear that mispricing is the culprit, they understandably resist. Sometimes they also object that priced roads would hurt low-income people, but the same objection was raised against gas prices in the 1970s. Does this objection make sense? I suspect that few people, if asked today about how best to help the poor, would answer by calling for an across-the-board reduction in the price of gas. Low-income people in America deserve more help than we now give them, but that help should come largely in the form of *money* — the sort of money we might raise by pricing our roads. Holding down the price of a good that is overwhelmingly used by high-income people is a lousy (and self-serving) way to help low-income people.

In 1979, as gas lines stretched down America’s streets, the *New York Times* made a solemn declaration. The “gasoline situation,” it told readers, will “probably not ... ever get back to normal.” The reason was simple: “If motorists get the idea that the problem has disappeared, and go back to their own ways, the shortages could become more acute.” If gas remained underpriced, then the *Times* was right: people would always want more of it, and anyone who exercised restraint would only be doing a favor for someone with less discipline and consideration. The same is true, today, of the roads. If enough people stay off the road to make congestion fall, the road just becomes more attractive to use — after all, there’s less congestion. So more people will want to drive, and congestion will go back up.

But the *Times*’ prediction was wrong. It was so wrong, in fact, that reading it today can seem unreal. The newspaper of record was forecasting permanent difficulty *filling up a car*. Today that difficulty is virtually unheard of, and usually occurs only briefly, after particularly bad hurricanes or winter storms. The prediction was wrong for a simple reason: the price of gas was allowed to rise.

With roads, most of us have resigned ourselves, as the *Times* once did with gas, to a world of permanent shortages. But this assessment rests on an unspoken and often unacknowledged assumption: the price of using the roads will never rise. That assumption needn't and shouldn't be valid. If we price our major roads, congestion will fall. Our road system will perform with a reliability that rivals that of our water, electric, and gas systems. Our roads will be there when we need them. Urban governments will deliver, for the first time in decades, a quality road service to their constituents. We will all drive a bit less, and the driving we do will be *better*: less stressful and more enjoyable. The people who use these high-performing roads will look back on an earlier age — full of shortages and short tempers, traffic helicopters and wayfinding apps — and wonder what took so long.

