

Induced Demand: A Flawed Rationalization For Punishing Drivers

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“The trouble with most folks isn't so much their ignorance. It's know'n so many things that ain't so.”
—often [misattributed](#) to Mark Twain

From time to time, mankind adopts an idea and takes it to a regrettable extreme. In the 20th century, eugenics, the belief that we can improve our gene pool (which is admirable for eliminating genetic diseases such as Huntington's), was used as a basis for forced sterilizations and murder. Induced Demand (to be defined below), sometimes called “Induced Traffic” or “Induced Travel,” may not be killing people directly, but belief in it is resulting in wasting much of our lives in unnecessary traffic congestion. For example, in the small town of Aspen, CO, the daily traffic jam that is intentionally kept by not adding a lane in and out of town has resulted in the loss of over 2 million person-hours/year, which is more than 4 lifetimes per year...and that's in one small town. This problem is replicated all over the world. This flawed concept is also exacerbating the housing crises in many cities, contributing to record homelessness. With so much riding on it, it deserves reexamination.

Induced demand (ID) is the theory/observation that if a new road or lane is built to alleviate congestion, within a short period of time, that bit of road is just as congested as the roads were prior to building it, so that all that would be accomplished is to **induce** more people to drive at that time...consequently, society would be better off not building it. This bit of “conventional wisdom” has become one of the primary excuses to not expand road capacity despite a growing population, more and more homes and offices being built—all of which necessitate travel. This concept is causing a traffic congestion crisis in every US city (except those that are shrinking), yet it is deeply flawed in several ways.

The observation that the roads or lanes that are added to alleviate congestion seem to fill up quickly is usually true in most places. What's questionable is *what we should conclude from that observation*. If travel times per lane across the congested segment don't improve much after about a year's adjustment, to conclude that it therefore did not materially benefit drivers or society is akin to observing that the Earth looks flat from down here, so it must be. Observing that the Earth is a sphere requires zooming out to see the larger picture. So it is with adding road capacity.

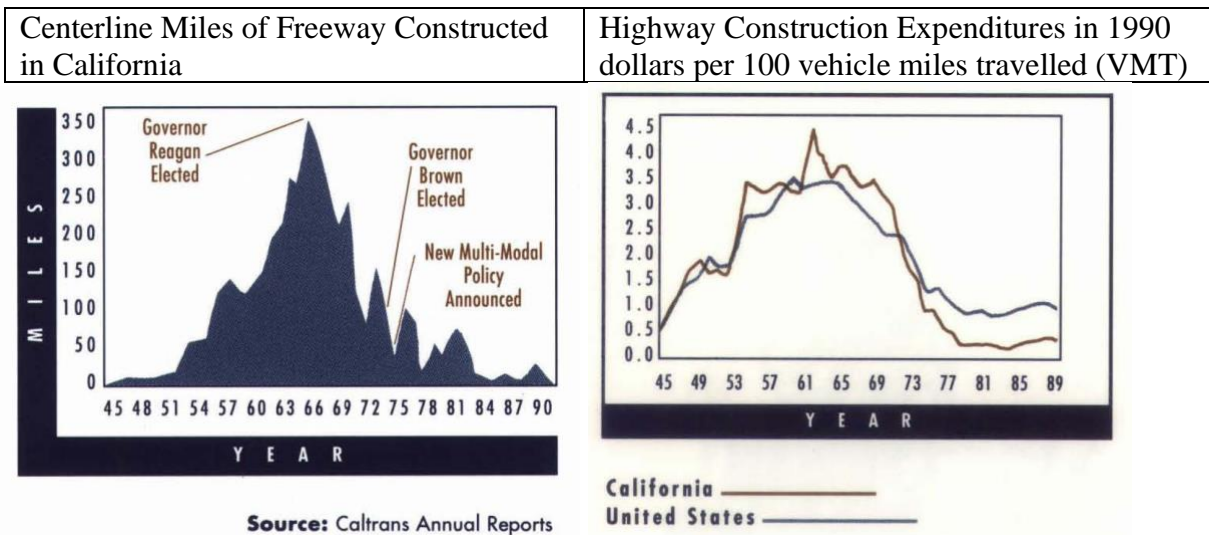
It is reasonable to conclude that SOME more trips will occur (not to be confused with commuters shifting from shoulder periods to peak), but the extent of this has often been exaggerated. Studies estimate the elasticity of increases from 20%* to 100%†, the latter being used to justify the “build it and they will come” aphorism. The footnoted meta-analysis of 25 papers on ID found that 20% is most realistic. That means that doubling road capacity would only lead to 20% more trips, which means that it should meaningfully decongest.

Due to limited budgets, environmental impact assessments, NIMBY-ism, legal challenges, the belief in ID, anti-growth & anti-car sentiments, etc., the rate of road and highway construction has not kept pace with the rate of development and population growth. Consequently, congestion has grown across many American cities. Belief in ID is the major

* <https://www.rand.org/randeurope/research/projects/a-review-of-induced-travel-demand.html>

† https://www.urbancruiseship.org/cities/cities_mobility/cities_latent

new obstacle that has emerged in the past 30 years, and if one looks at public deliberations of roadway expansion, in many cases it is the most significant obstacle. It is also accepted as an article of faith and not examined nor deliberated.



Source: “Why California Stopped Building Freeways,” by Brian D. Taylor. Access Magazine, Fall 1993 <http://www.accessmagazine.org/articles/fall-1993/why-california-stopped-building-freeways>

As a result of the congestion/queuing in the system, when a part of the system adds capacity, drivers adjust their routes to take advantage of that change. The additional capacity enables drivers to traverse the roadway system faster, but in order to measure it, one has to try. The many studies of ID don't. In a large city, even if one wanted to, it would be very hard to measure the impact of a new road or lane on **aggregate** travel time unless it is a major addition. It is self-evident that when drivers shift from old routes to new faster ones, it has the unmeasured benefit of decongesting the old routes. With the advent of Waze and similar navigation apps, drivers can now be expected to instantly shift routes to newer less congested ones such that the new level of congestion will be in equilibrium with the next best alternatives.

One can test the hypothesis that adding roads does decongest the system and benefit travel times with a simple [thought experiment](#). (If thought experiments were sufficient for Einstein to derive Special Relativity, it can suffice for this.) Imagine an hourglass with sand flowing through the bottleneck. The bottleneck has a certain level of congestion (rate of flow). Now imagine the same hourglass with two parallel bottlenecks of the same size delivering sand to the bottom. Both of them will have the same level of congestion, but the upper grains of sand will get to the bottom in half the time since the total flow is doubled. If you look only at the new bottleneck, it is just as congested as the old one. To conclude that it did not help the sand get to its destination faster would be false. This is the primary logic of ID studies, but it's not the only flawed logic.

ID studies correctly infer that traffic congestion changes behavior. It causes people to:

- commute during less congested hours,
- live closer to work/work closer to home/reject better jobs that are too far
- telecommute/WFH or not work
- take public transit
- car pool/ride-share

While those effects exist, they all add up to a minority of commuters. The vast majority will just be frustrated by the queue due to inability to do the above (e.g. workmen w/heavy tools, lack of public transit for getting close enough, etc.) Also, most people, who don't have those

excuses, prefer to drive despite the queues for many legitimate reasons (still faster than public transit, need to drop off children, elderly, pickup and deliver things, pets, uncertainty in schedule/spontaneity, not getting rained on nor slipping on ice, less risk of robbery, infectious diseases, privacy, can eat/shave/apply makeup, sing along, etc.). The growth in congestion we see over time is after already subtracting the above behavior changes. While those changes exist, outside of major cities, they are marginal compared with those who still choose to drive.

If increasing the supply of empty roads induces *some* demand for more driving (but it's small), then the inverse must also be true: congestion somewhat discourages driving (but obviously not so much as to eliminate the congestion). Self-driving features that now exist in new cars that allow the car to follow the car ahead in bumper-to-bumper traffic will (*ceteris paribus*) cause drivers to become more indifferent to congestion while binge-watching their favorite TV shows such that congestion is likely to worsen. Thus traffic congestion as a strategy to get people to not drive is likely to fail more severely with each passing year.

Part of the analytical flaws in ID studies are that they ignore factors such as:

- Growth in population means growth in homes and jobs, and therefore trips; and city enlargement causes more people to drive farther.
- Real estate development is often timed to coincide with the opening of new freeways.
- Many more flaws are described in the publications at the bottom of this essay.

Another proof that ID is not inevitable is that [Highway 280](#) on the San Francisco peninsula was uncongested for the first 40 years of its existence, and only started developing jams in the 2000's, yet it still remains mostly uncongested. It's rare that capacity is added long prior to when it's needed, but the fact that it was and that it did not fill right up as ID zealots claim is further proof of the flaws in that logic.

An even more definitive proof comes from Phoenix, AZ. Quoting from a short article on this[‡]:

"The view is often expressed that building or expanding freeways "induces" significant amounts of new highway travel, and that, as a result roadway expansion is fruitless as a strategy for reducing traffic congestion. This "building maternity wards" creates babies logic is disproven by the experience of Phoenix relative to other large urban areas.

In 1985 Phoenix had the lowest number of freeway lane miles per 1,000 population of any of the US urban areas with a population of more than 1,000,000 in 2000. Phoenix began a program of massive freeway construction, with additions to its freeway system being more than double that of second ranked Las Vegas, and 7.6 times average. The rate of freeway lane addition was also 16.5 times that of Portland, Oregon, which has implemented strategies to limit freeway expansion.

The "it is fruitless to add capacity" theory would predict that this inordinate expansion of freeway capacity, roadway travel would induce an inordinate increase in roadway travel in the Phoenix area. In fact, the opposite occurred.

1. From 1985 to 2000, per capita roadway travel increased 27.1 percent in Phoenix, well below the 40 urban area average of 43.1 percent and less than one-third the 86.3 percent increase rate of Portland.
2. In 1985, per capita travel in Phoenix was above the 40 urban area average. By 2000 per capita travel in Phoenix was below average.

[‡] Massive Freeway Expansions Accompany Lower than Average Travel Increases in Phoenix, <http://www.publicpurpose.com/hwy-phx-induce.htm>

Adding freeway capacity does not, in and of itself, induce inordinate increases in roadway travel.”

There is another level of illogic and cruelty inherent in invoking ID as a rationale to not build roads: one group of people (usually unaffected by their decision) decide that another group of people should suffer in traffic jams as part of a futile plan to change their behavior to avoid some feared problem (e.g. pollution, more drivers causing parking or congestion problems in town, etc.). Most urban planners have been steeped in anti-car philosophy for most of their education and careers. Cars have been the *root of all evil* in urban planning for decades...for many good reasons: pollution, congestion, parking requirements, accidents, noise, too much urban space consumed by roads & parking, etc. For these and other reasons, many planners live their values and commute by bike, live near work or in transit-oriented developments, and avoid driving whenever possible. They therefore feel justified in expecting others to do as they do. Unfortunately, that doesn't work for everybody for myriad reasons, some of which were cited above. It is also the case that the evilness of cars is diminishing with time:

- Pollution from combustion keeps declining, and EV's share is growing.
- I drive an electric car powered by solar panels from my roof, so zero pollution
- Parking requirements diminish with services such as Uber & Lyft
- Automated vehicles hold the prospect of reducing accidents and not needing parking (at least not where it's scarce).

The insistence that others give up their cars or suffer is a [Procrustean](#) punishment that betrays a lack of empathy for those affected. If there are good public policy reasons to have fewer cars, there are many better ways to induce that than causing traffic jams by not accommodating driving growth with more road capacity. Examples of other tools include: tolls (easy to administer with license plate readers & RFID), parking taxes, gas taxes, congestion pricing, etc. If governments allow more homes and workplaces to be built, they have a responsibility to add road capacity to service them—or transit, but there are few cities in which that can make a difference and where roads are not the bottleneck. If they really don't want to add road capacity, then they should prevent development in the first place.

Road capacity is a public good that cannot be privately obtained. If the price of road use is too low (mostly free), then the demand may be too high. In economics we are taught that scarce resources are allocated by 3 means: price, queuing or lottery. In most cities, queuing becomes the allocation mechanism. That should instead become price, which will reduce the queuing as well as provide the funds to expand the supply of roads. For those who believe that a given city is out of surface area to build more roads (rarely true), there are things that can be done that improve the utilization of existing roads (e.g. replacing traffic lights with roundabouts, which lead to continuous flow). Also, Elon Musk has made a compelling case for using the 3rd dimension via tunneling (see his [TED talk of 4/17](#)). Tunnels can be short underpasses such as exist all over Madrid. The cost of tunneling is declining and the need is growing.

Sometimes the political bodies that make these decisions don't represent the affected parties. For example, in Aspen, CO, the city has been debating how to reconfigure the entrance to Aspen for more than 40 years. As a result of their indecision, traffic queues to get in and out of town waste over 2,000,000 person-hours/year, which is the equivalent of >4 human lifetimes per year[§]. Most of the people affected live out of town, so they are not the ones who vote for the city council, thus the political consequences have been nil. For them, it's easy to claim ID and other fears as an excuse to do nothing to solve the real problem.

[§] For these calculations and a whole lot more, see my TED talk from 2012: “Designing the Future as if Your TIME Mattered” <http://bit.ly/GML-TEDx> (11 minutes)

Many cities face congestion delays that are growing at double-digit rates per annum. This is the inevitable outcome of increasing trips without increasing road capacity due to the nature of traffic congestion delay that is shown in this graph. As additional cars are added to a road or intersection, since the throughput is limited, the congestion (queue) grows in a non-linear way.

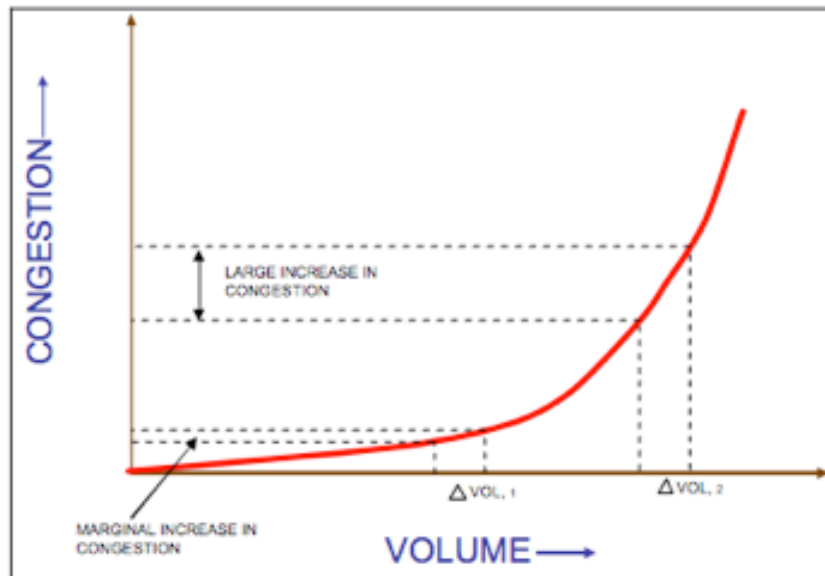


Figure 1: Illustration showing the effect of incremental vehicle volume on congestion.

If ID were as strong a force as its proponents allege, then with additional congestion, we should see dramatic discouragement of additional private vehicle trips. Such effects would substantially mitigate congestion's growth. That is not happening enough to meaningfully ameliorate congestion growth, which is another bit of evidence that should send this theory back to the ivory towers from whence it came.

Many cities are facing affordable-housing crises. Historically, cities have grown outwards and added road capacity to enable commute times to be reasonable. Ever since cities have given up on adding roads and highways, the housing crises have worsened. Improving transportation time enables people to live further away where housing is cheaper. It often costs way less to alleviate bottlenecks that add commute time than it does to subsidize affordable housing. Few recognize how these concepts are interrelated.

The question comes down to whether more roads induce a lot more driving or only a little more. The RAND evidence (cited on p.1) indicates that it's the latter (elasticity of only 20%), but many lives are being wasted based on the unproven religious belief in ID.

So the main reason that we don't build more bridges, tunnels and highways is not that we lack the money or technology, but rather that our society has succumbed to doubt about the right path due to sloppy thinking and poor data interpretation.

In any community, it takes a lot of momentum to get roads built, so any small thing can provide the excuse needed to delay action indefinitely. ID fears have been the most cited excuse of the past 20 years. It's time for governments to apply more critical thinking and to show empathy for the people who use their roads.

“What is right is not always popular and what is popular is not always right.”

— Albert Einstein

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Relevant reading:

Massive Freeway Expansions Accompany Lower than Average Travel Increases in Phoenix,
<http://www.publicpurpose.com/hwy-phx-induce.htm>

Examining Claims About Induced Demand, Adding Road Capacity and Traffic Congestion:
The “iron law of roadway congestion” isn’t., by Robert Poole, 8/19/19
<https://reason.org/commentary/induced-demand-adding-road-capacity-and-traffic-congestion/>

Examining the induced demand arguments used to discourage freeway expansion, by Steven
Polzin, 12/22/21 <https://reason.org/commentary/examining-the-induced-demand-arguments-used-to-discourage-freeway-expansion/>

‘Induced demand’ a poor excuse not to build highways, by William L. Anderson, 5/4/23
<https://www.pacificresearch.org/induced-demand-a-poor-excuse-not-to-build-highways/>

Are Induced-Travel Studies Inducing Bad Investments?, by Robert Cervero
Access Magazine, Spring 2003: <https://www.accessmagazine.org/wp-content/uploads/sites/7/2016/07/Access-22-04-Induced-Travel-Studies1.pdf>

More Highways, Less Congestion: The theory of ‘induced-demand’ fails the road test.
by Jonathan V. Last, 3/7/11, <https://www.washingtonexaminer.com/weekly-standard/more-highways-less-congestion>

Debunking the Induced-Demand Myth, by Randal O'Toole, 6/18/14
<https://www.cato.org/blog/debunking-induced-demand-myth>

Induced traffic: Setting the record straight, by Wendell Cox, 6/1/01
<https://www.heartland.org/news-opinion/news/induced-traffic-setting-the-record-straight>

Assessing the Issue of Induced Travel: A Briefing on Evidence & Implications from the
Literature, Prepared for Washington Metropolitan Council of Governments by Transtech
Management, Inc. & Hagler Bailly, July 2000
https://lauderpartners.com/aspen/Transtech_Briefing_for_Washington_Metropolitan_Council_of_Governments_on_Induced_Travel.pdf
See P.8 (10 of the PDF) “5.3. Weaknesses in Elasticity Research Methodologies”

A review of induced travel demand, 11/28/18 (meta-analysis of 25 ID papers finds elasticity
of 0.2 (i.e. that a 10% increase in road capacity leads to a 2% increase of trips)).
<https://www.rand.org/randeurope/research/projects/a-review-of-induced-travel-demand.html>

If bottleneck were modified, would traffic floodgates open?, 1/15/20
https://www.aspendailynews.com/opinion/if-bottleneck-were-modified-would-traffic-floodgates-open/article_b72f20ce-3743-11ea-aa6f-d34db91c3136.html

Several of the sources cited above are from conservative publications. I am not a
conservative, and, as with anthropogenic climate change, I don’t think that these issues
should be politicized. To discount the content based on who is saying it is fallacious
reasoning. See the [ad hominem fallacy](#).

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Proposal: One way of testing the ID hypothesis would be to analyze cell phone location data
(the anonymized kind that Google uses for measuring traffic congestion) for all of the
residents in a city for one or more days before and after a new highway opens up. If the
sample is representative, then it should provide a holistic picture of commuting in a city. The
same technique could be used a year later to test the longer-term elasticity.