To: City of Bend Citywide Transportation Advisory Committee
Attn: Karen Swirsky
From: Steve Porter
Date: October 11, 2019

Public Comment:

Induced Traffic Questions & Answers

Dear Bend Citywide Transportation Advisory Committee:

Following the submission of my previous public comment (dated October 9, 2019) discussing project funding and prioritization, I was contacted by a City official and asked questions about some of the topics addressed in that comment. I replied to those questions and, since the exchange seems relevant to the proceedings of CTAC, this document organizes the discussion into a question-and-answer format and includes additional notes and citations that may be useful to CTAC.

In general, the questions related to "induced traffic," which occurs when new vehicle infrastructure is built. Upon expansion of vehicle infrastructure (generally, roadways and other vehicle-oriented accommodations), the induced traffic effect consumes much - if not all - of the new capacity in a relatively short time frame (typically about 3 to 5 years). This means that additional vehicle infrastructure development does not meaningfully alleviate road congestion, reduce travel times, diminish fuel wasting, or improve travel-time reliability. Instead, vehicle infrastructure investments largely become a waste of financial and other resources. Roughly $0.78 to $0.94 of each dollar spent on vehicle infrastructure becomes waste.

Induced traffic is a widely-recognized and empirically-validated effect of vehicle infrastructure development. There is no question about its existence, causes, or general quantitative effects. Empirical studies demonstrate remarkable agreement on these matters, despite the studies' varied observational protocols, methods, geographic subjects, and periods of analysis.

These findings should form the basis for any transportation investment decision-making as a means of ensuring taxpayer dollars are spent responsibly and in accordance with public officials' fiduciary duties. Indeed, spending on vehicle infrastructure is tantamount to throwing away taxpayer money. To ignore the best available scientific evidence during investment allocation proceedings is to shortchange Bend, its taxpayers, and its future.

Questions and Answers Regarding Induced Traffic

1. I have heard things like, "More roadways cause more traffic," many times, but this concept does not resonate with me. Can you explain?

It is likely that the claim "More roadways cause more traffic" has been brought up many times because it is a fact that has been empirically proven - in a variety of ways, under numerous conditions - many times. An earlier public comment I submitted to CTAC outlines some of the relevant empirical work on this issue, with studies having been conducted a number of decades ago through to present day. (See: Porter, "Public Comment: Evidence & Implications of Supply-Induced Demand in Transportation Systems," July 9, 2018.)

In basic economic terms, the expansion of roadways represents an outward shift in the vehicle infrastructure "supply curve," thus establishing a new consumption equilibrium at a higher quantity of driving. The above-mentioned public comment provides a simple graphical demonstration of this effect in its "Graphical Appendix."

2. Applying the concept more generically, isn't it also true that more food causes more people to eat? More homes cause more people to be in homes?

In fact, generally, yes. And this can be shown in a number of ways.

First, it can be broadly observed that *less* food causes *fewer* people to eat. This is seen in any number of least-developed countries (LDCs), where food shortages cause widespread starvation. In this instance, an increase in the quantity of food supplied in LDCs would be expected to cause more people to eat, consistent with the notion that "more food causes more people to eat."

Second, it has been empirically shown that "more food causes people to eat *more*," which is an effect highly analogous to that of induced traffic. Just as more vehicle infrastructure encourages more driving, more calorie availability encourages higher calorie consumption on population-wide levels.

Regarding homes, it is likewise true that greater housing availability improves population-level housing outcomes. Housing shortages, on the other hand, harm the distribution of housing consumption by leading more people to be "underhoused" and/or "house poor." The latter condition is especially prevalent in Bend, where a quarter of Bend's population spends 50% or more of gross income on housing. When there is an increase in housing (i.e., more homes), that supply growth causes price adjustments that enable a greater share of people to afford appropriate housing. (Interesting recent empirical work has been done on this issue by economist Evan Mast at the W.E. Upjohn Institute for Employment Research: "The Effect of New Market-Rate Housing Construction on the Low-Income Housing Market," Upjohn Institute Working Paper (July 2019).)

All this exemplifies exactly how markets work. When there is more of something, more of that thing is consumed. This is a precise restatement of the supply-induced demand effect that we see in induced traffic: When there is more vehicle infrastructure, more vehicle infrastructure is consumed via more driving.

Importantly, induced demand effects are also found in pedestrian, cycling, and transit: More, safer, and better-connected pedestrian, cycling, and transit infrastructure causes more walking, cycling, and transit use. The key difference between more driving and more ped/bike/transit use is that driving generates negative externalities (e.g., air and noise pollution, safety reductions, road depreciation, etc.), while pide/bike/transit generates positive externalities (e.g., improved public health, enhanced social connectivity, better economic outcomes, etc.).

3. The induced traffic effect would not be uniform on every road, though. I've never met a person who said, "Now that there's a road to the landfill, I'm going to drive to look at garbage."

This is broadly correct. Most people would not drive to the landfill to look at garbage. However, in the *absence* of a road to the landfill, it's almost certainly the case that *fewer* people would drive there to dump their garbage. Which means that, in the *presence* of a road to the landfill, there would be *more* driving there. So, even regarding the "road to the landfill" example, one would expect to find some supply-induced demand effects.

Nonetheless, induced traffic does not manifest uniformly on every road. A road segment that only connects two rural farms (and nothing else) could be expanded to 15 lanes and not see an increase in traffic. But this counterexample serves to prove the point: Nobody, to my knowledge, is suggesting that lightly-used roads or routes should be expanded. Instead, it is popular roads and routes that are subject to calls for expansion, and these are the sorts of vehicle infrastructure that exhibit the greatest levels of induced traffic. In general, if there is sufficient existing traffic to cause someone to suggest vehicle infrastructure expansion, the targeted roads/routes will exhibit significant induced traffic upon expansion. This is all made very clear in the body of empirical study on induced traffic.

4. But people move from point A to point B for the purpose of getting to point B. They don't move because it's possible to move.

In fact, what empirical study shows is that transportation system users desiring to move from point A to point B use the system in a variety of ways, and their habits are substantially affected by the type of transportation system infrastructure in place. So ultimately what is found is that drivers do move (more) because it's possible to move (more easily) when driving on expanded roadways, even though this "ease" is ephemeral and comes at the expense of overall transportation system efficiency.

The general finding is that more vehicle infrastructure encourages more driving because:

1) It reduces the "cost" of driving (for 3 to 5 years), so drivers are less likely to emphasize efficient trip/route planning or group errands into rational round-trip circuits; drivers are less likely to participate in ride-share or carpool programs; and drivers are less discriminating about the timing of their trips. (This grouping of factors is known as "latent demand.")[1]

2) It displaces non-driving transportation modes since those alternative modes are "crowded out" by vehicle infrastructure; anecdotally, this can be intuited by considering the palatability of walking across a two-lane road versus a five-lane road, or the stressfulness of cycling on a lightly-trafficked street or next to a freeway. (This grouping of factors is known as "displacement" or "redistributive effects.")

3) It alters land use patterns, which can lock in vehicle dependence and promote vehicle usage even for shorter trips owing to network and similar effects. (Additional discussion of land use occurs later in these questions-and-answers.)

5. The policy question is about which mode(s) to finance to promote the mobility we need given our climate, demographics, land use, and economy. There certainly must be good justifications for each mode.

In the end, there are *not* good justifications for much spending on vehicle infrastructure. The justifications are very much one-sided, and they all fall on the side of pedestrian, cycling, and transit spending.

Yes, the policy question is about which modes to finance, given the various interests and needs of our community. And the answer to that question is obvious: Spending should *not* be done on vehicle modes, and *should* be done on pedestrian, cycling, and transit modes because of their differential externality profiles (driving causes negative externalities, while non-driving promotes positive ones), vast public cost differences (driving costs the public about 26 and 133 *times* what cycling and walking do, respectively, on a per mile basis), and implications for economic health, public well-being, and so on.

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[1] A related question asked was: "Isn't the cost of maintaining a vehicle a disincentive to driving around merely because a road is there to drive on?" Actually, per-mile vehicle maintenance costs are not shown to exhibit meaningful drags on vehicle usage for a few reasons. Among those is that per-mile maintenance costs are "hidden" (i.e., "out of sight, out of mind"), "lumpy" (i.e., most costs occur at irregular intervals in "bunches"), and not easily estimated *ex ante*, so they do not have strong signaling effects on behavior. Also, per-mile maintenance costs are small and obscure relative to upfront or ongoing vehicle purchase costs, which dominate behavioral effects. What is observed is something like "sunk cost claiming," in which the sunk costs of purchasing vehicles act to motivate *more* driving as people attempt to "get their money's worth" out of their vehicles. This is consistent with empirical evidence showing that higher rates of vehicle ownership are associated with more driving.

Climate

Suggested in the question is that Bend's gorgeous climate, which attracts many people, is somehow incompatible with anything but vehicle usage. This is facially incorrect since, if that were the case, there would presently be zero pedestrian, cycling, or transit use. Because there are pedestrians, cyclists, and transit users, it is incorrect to suggest that only vehicle usage can be accommodated in Bend. What is seen in Bend's transportation statistics is that people are rationally responding to the state of Bend's transportation system infrastructure: Pedestrian, cycling, and transit are held back by the undeveloped state of Bend's pedestrian, cycling, and transit infrastructure. Bend already is experiencing significant induced traffic because of poor (i.e., vehicle-dominated) past investment choices and policies.

Besides, there are countless examples of cities with climates objectively harsher than Bend's that have modest vehicle dependence and substantial dependence upon non-driving modes. Copenhagen has terrible winters and yet most people get around by walking and cycling even during those winter months. Hong Kong suffers oppressive heat and humidity, but vehicle usage is very light. Vancouver, BC, has incessant rain, and yet over half the total trips made in that city are by walking, biking, and transit. Chicago has infamous snow and cold wind (not to mention heat and humidity) and yet most Chicagoans manage to commute, shop, and live without regular personal vehicle use. Portland, Eugene, and Corvallis all have much higher rates of cycling and pedestrian commuting than Bend despite their rainy climates that, if anything, would discourage those modes relative to Bend's famed 300 days of sun per year.

Of note with respect to climate is that higher levels of vehicle usage cause more carbon emissions, which contribute to anthropogenic climate change. So, with respect to the importance of climate, it is critical to reduce vehicle usage to stave off more wildfires, forest loss from pests, and drought from snowpack loss, all of which affect Bend directly. This also urges more investment in pedestrian, cycling, and transit infrastructure.

Demographics

Bend's demographics argue strongly in favor of investments in pedestrian, cycling, and transit infrastructure. This is because "required" vehicle ownership, which occurs when a transportation system is highly vehicle-oriented like Bend's, places extreme financial hardships upon lower-income households. Already, many of Bend's residents face significant financial duress associated just with affording housing (i.e., over a quarter of Bend's population spends more than 50% of gross income on housing). Vehicle ownership and maintenance can cost thousands of dollars per vehicle per year and therefore exacerbate this financial stress. Maintaining a vehicle-oriented transportation system is a severely regressive policy that is at direct odds with Bend's demographic composition.

Land Use

In fact, land use and transportation policies are closely linked. The interesting thing is that transportation policy choices drive land use outcomes much more than land use choices drive transportation habits. If current land uses

are not amenable to non-driving modes, then by adopting transportation policies that prioritize walking, cycling, and transit, land use patterns will change organically. (For interesting work on these topics, see the writings of Harvard urban economist Edward Glaser on the interplay between land use and transportation policies. The work of Donald Shoup, UCLA urban economist, found in *The High Cost of Free Parking*, also elucidates this and related topics. Practitioners who have written about these connections include urban planner Jeff Speck and transportation planning expert Janette Sadik-Khan.)

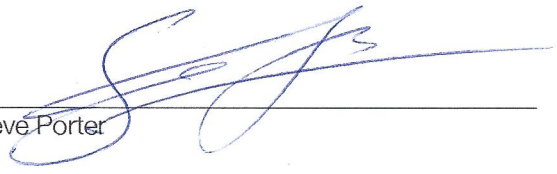
Economy

As for economy, the empirical evidence is overwhelming: More road building and driving damage the local economy, and less road building and driving benefit the local economy. There are numerous reasons for this. When non-driving modes displace driving, economic effects include: increased innovation rates from improved social connectivity, public health, and education attainment; elevated local employment levels; intensified local shopping habits; increased number of discrete local shopping trips by consumers and higher total spending over time; improved local consumption patterns from reduced financial distress associated with automotive use/ownership; increased public support of local businesses due to reduced vehicle infrastructure spending demands; enhanced land use patterns and property values that support an improved municipal tax base and collections level; reduced fiscal spending requirements for police, fire, and other emergency services due to lower crime and fewer traffic collisions; and so on. (The works of Jeff Speck, Janette Sadik-Khan, Edward Glaser, Donald Shoup, urban economist Enrico Moretti, and many others support and summarize these findings.)

The Role of Empirical Findings

It is hoped that the vast empirical study on these topics will be directly considered and appropriately weighted in any decision-making about funding and spending for Bend's transportation system. The empirical evidence is clear, and any fact-based decision-making would depend heavily upon it. Bend has the opportunity to use such empirical work as the best evidence available for making wise policy choices, or it may ignore good science and consign itself to a substandard future.

Thank you for your consideration.



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