Title
Increasing Highway Capacity Induces More Auto Travel

Authors
Volker, Jamey
Handy, Susan

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POLICY BRIEF

Increasing Highway Capacity Induces More Auto Travel

Jamey Volker and Susan Handy
University of California, Davis

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Issue

Building additional roadway capacity—via constructing entirely new roadways or extending or adding lanes to existing roadways—is often proposed as a solution to traffic congestion and even as a way to reduce greenhouse gas (GHG) emissions. The logic for the latter is that increasing roadway capacity increases average vehicle speeds, which improves vehicle fuel efficiency and reduces per-mile emissions of GHGs and local air pollutants. But that logic relies on the flawed assumption that the amount that people drive does not change when the time it takes to drive places changes. In fact, the amount that people drive does respond to changes in driving times.

The basic economic principles of supply and demand explain this phenomenon. Adding capacity increases the average travel speed on the roadway (at least in the short term), improves travel time reliability, makes driving on the roadway safer or less stressful, or provides access to previously inaccessible areas. All of these reduce the perceived "cost" of driving. And when the cost of driving goes down, the quantity of driving goes up (Figure 1).

Empirical research demonstrates that as roadway supply increases, vehicle miles traveled (VMT) generally do, too. This is the "induced travel" effect—a net increase in VMT across the roadway network due to an increase in roadway capacity, which ultimately erodes any initial increases in travel speeds and causes increased GHG emissions.

Researchers at the University of California, Davis reviewed the empirical research on induced travel to understand the likely effects of adding roadway capacity in a variety of contexts.

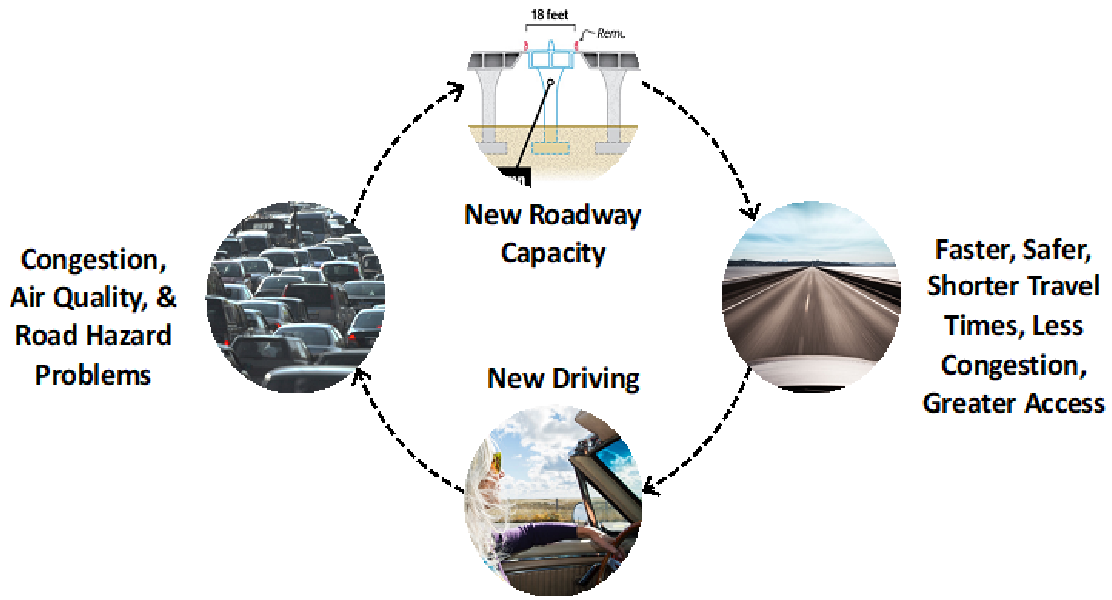

Figure 1. A conceptual illustration of the induced travel effect in response to roadway capacity expansion

Key Research Findings

The quality of the evidence linking highway capacity expansion to increased VMT is high. All 12 studies reviewed used time-series data and sophisticated statistical techniques to estimate the effect of increased capacity on VMT. All studies also controlled for other factors that might also affect VMT, such as population changes, income changes, geographic effects, and time period effects. Most studies were from the US, but studies from other countries produced similar findings.

A roadway capacity expansion of 10% is likely to increase VMT by 3% to 8% in the short-run and 8% to 10% or more in the long-run. Increased capacity can lead to increased VMT in the short-run in several ways: if people shift from other modes to driving, if people shift from carpooling to driving solo, if drivers make longer trips (by choosing longer routes and/or more distant destinations), or if drivers make more frequent trips. In the longer term, increased capacity can lead people to live farther away from where they work (or vice versa), cause businesses to relocate to more distant locations, and even spur commercial or residential growth in the region. The reviewed studies indicate that the full impact of capacity expansion on VMT materializes within 3 to 10 years. The studies mostly focused on major roadways (including interstates, other freeways and expressways, principal arterials, and minor arterials) and show a potentially greater effect for interstates. Expansions of collector streets and local roads are also likely to induce VMT, though the empirical evidence as to the relative magnitude of the effect is limited.

Capacity expansion leads to a net increase in VMT, not simply a shift in VMT from one road to another. Is it possible that the additional traffic on the new or widened highway is simply traffic that shifted from slower and more congested roads, meaning that overall VMT does not actually increase? The evidence suggests a resounding "no." For example, one study found "no conclusive evidence that increases in state highway lane-miles have affected traffic on other roads," while a more recent study concluded that "increasing lane kilometers for one type of road diverts little traffic from other types of roads."

The available empirical evidence suggests that new high-occupancy vehicle (HOV) and high-occupancy toll (HOT) lanes might have similar induced travel effects as general-purpose lane expansions. One recent study looked at two projects that added HOV lanes and one that added an HOT lane and showed that the additions resulted in increased traffic flows at similar levels to new general-purpose lanes. Other available evidence tends to support this conclusion. However, more research is needed to better understand any differences in effect between general-purpose, HOV, HOT, and traditional toll lanes.

Induced travel happens in rural and uncongested areas, too. Research shows that induced travel occurs in both urban and rural areas and on roadways with different levels of existing congestion. Indeed, induced travel can be expected to occur anytime a project increases average travel speed, improves travel time reliability, makes driving on the roadway perceptibly safer or less stressful, or provides access to previously inaccessible areas. However, the induced travel effect might be slightly smaller in rural areas, at least in the short run. Conversely, the limited available evidence indicates that relative increases in VMT following roadway expansion may be smaller in metropolitan areas with higher baseline levels of congestion than in those with less congestion.

More Information

This policy brief is drawn from "Updating the Induced Travel Calculator," a report from the National Center for Sustainable Transportation, authored by Jamey Volker and Susan Handy of the University of California, Davis. The full report can be found on the NCST website at https://ncst.ucdavis.edu/project/induced-travel-calculator-improvements.

For more information about the findings presented in this brief, contact Jamey Volker at jvolker@ucdavis.edu.

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