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### Permalink

<https://escholarship.org/uc/item/00p0p6wm>

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### Publication Date

2015-11-01



# The Effect of Land Use Policies and Infrastructure Investments on How Much We Drive: A Practitioner's Guide to the Literature

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## Issue

A number of state governments have recently passed legislation aiming to rein in vehicle miles traveled (VMT), and many cities have begun to take action to reduce VMT in their jurisdictions. Policymakers often want to know what they should do to encourage less driving. Unfortunately, there is no “one size fits all” solution. The effectiveness of various policy options depends critically on context: who is driving, where are they going, and what alternative modes and destinations are available.

Fortunately, there is an extensive body of academic literature on this topic that practitioners can tap into when considering various policy options. When reviewing the literature, practitioners should keep the following in mind:

- Whenever possible, focus on studies that were conducted in built environment and socioeconomic contexts that are similar to the policy decision context.
- If available, before-and-after studies of actual policy implementation (i.e. program evaluation studies) can often provide the best evidence to inform policy decisions.
- If cross-sectional studies are used to inform policy decisions, focus on those that: (1) control for many aspects of the built environment and (2) control for residential self-selection in some way.

## An Introduction to Translating Research to Policy

Generally speaking, policies affect VMT by changing the underlying price, time, comfort, and overall convenience of travel choices. Land use and transport system investment strategies can lead to VMT reduction through (1) reducing trip distances, (2) reducing trip frequencies, (3) enabling or encouraging carpooling, or (4) enabling or encouraging travel via non-car modes. The matrix below provides examples of how changes in the built environment are expected to affect VMT in each of these ways. As evident in the matrix, some changes to built environment characteristics will affect VMT in multiple ways, and sometimes the directions of these effects are opposing.

Built Environment Characteristic	Auto Trip Distance	Auto Trip Frequency	Carpool	Non-Car Mode
Increase density	-	+		
Mix land uses	-	+		
Improve street connectivity	-	+		+
Improve transit				+
Improve walk/bike environment				+
Reduce parking supply		-	+	+

*Figure 1: The strategies in the action matrix affect VMT through physical changes to the built environment. They work by actually moving origins and destinations closer to one another, and by making alternative modes of transport safer and more convenient. The expected direction of how each strategy affects VMT is indicated with a plus or minus sign.*

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The challenge is replacing the “+” and “-” symbols in this matrix with quantitative estimates of the magnitudes of these relationships.

There are fundamental reasons why this is a surprisingly difficult task. First and foremost, the magnitude of these effects is likely to vary substantially from neighborhood to neighborhood even within the same metropolitan area.

Second, evidence of the effects of real-world policies on VMT is often not available. Built environment changes tend to occur over relatively long time periods, meaning that before-and-after studies of the effects of actual changes are often infeasible.

The alternative to before-and-after program evaluation is to conduct cross-sectional analysis, using variation in land use and transportation infrastructure across space to identify the relationship between built environment characteristics and VMT. Cross-sectional studies face two inherent challenges, however: high correlation between measurements of built environment characteristics (i.e. when one is high, others are often high) and the effect of residential self-selection. The first of these makes it impossible to be sure, for instance, if it is high density or high transit availability or high land use mix or high job access that leads to lower VMT in central areas. Studies that leave out important built environment characteristics

are likely to report incorrect effect sizes. The second of these makes it difficult to discern whether VMT is lower in more central areas because of the environment, or if people who prefer not to drive also happen to prefer to live in more central areas. Some studies employ methods that partially control for residential self-selection, but many do not.

Despite the challenges mentioned above, the existing body of research-based evidence does support policy action on reducing VMT. Selecting the best policy option(s) will require careful consideration of the specific local context and thinking through the storylines of how specific actions could affect driving, both immediately and over time.

### Further Reading

This policy brief is drawn from the full white paper, “The Effect of Land Use Policies and Infrastructure Investments on How Much We Drive: A Practitioner’s Guide to the Literature,” by Deborah Salon, which can be found at: <http://bit.ly/SalonNCST>.

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