POLICY BRIEF

Urban Growth Boundaries and Land Conservation

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Project Description

This project reviews and summarizes empirical evidence for a selection of transportation and land use policies, infrastructure investments, demand management programs, and pricing policies for reducing vehicle miles traveled (VMT) and greenhouse gas (GHG) emissions. The project explicitly considers social equity (fairness that accounts for differences in opportunity) and justice (equity of social systems) for the strategies and their outcomes. Each brief identifies the best available evidence in the peer-reviewed academic literature and has detailed discussions of study selection and methodological issues.

VMT and GHG emissions reduction is shown by effect size, defined as the amount of change in VMT (or other measures of travel behavior) per unit of the strategy, e.g., a unit increase in density. Effect sizes can be used to predict the outcome of a proposed policy or strategy. They can be in absolute terms (e.g., VMT reduced), but are more commonly in relative terms (e.g., percent VMT reduced). Relative effect sizes are often reported as the percent change in the outcome divided by the percent change in the strategy, also called an elasticity.

Summary

Strategy Description

Urban growth boundaries are strategies for limiting, temporarily or permanently, the outward expansion of urbanized areas to encourage contiguous and compact urban development. Land conservation is an important tool for implementing urban growth boundaries.

Effect Size

The effect of urban growth boundaries and land conservation on vehicle miles travelled (VMT) is indirect and difficult to assess, but studies suggest that more compact (i.e., less sprawling) urban areas have lower VMT. To the degree that urban growth boundaries and land conservation slow low density expansion of an urban area and/or induce denser infill development, they are likely to reduce per capita VMT. The magnitude of this effect is uncertain.

Strategy Extent

Urban growth boundaries are implemented at the scale of urbanized areas by either cities or counties. They are widely used in California.

Strategy Synergy

Urban growth boundaries are most effective when implemented in conjunction with other growth management policies, including infill development. To the degree that urban growth boundaries encourage more compact

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development, they increase the viability of travel by transit, walking, and bicycling.

Equity Effects

Urban growth boundaries can increase housing costs and contribute to displacement but may reduce the cost burden of transportation.

Strategy Description

Urban growth boundaries are a strategy for limiting, temporarily or permanently, the outward expansion of urbanized areas. Development outside the boundary is discouraged or prevented in various ways. Studies how that such boundaries can be effective in promoting contiguous and compact urban development (Ewing, et al. 2022).

Urban growth boundaries are used by many cities and counties in California as a growth management strategy. They have often been established by voters through ballot initiatives.

Regulatory techniques for enforcing growth boundaries include zoning that limits both the types of land uses allowed outside the boundary and the intensity of any development that is allowed. Growth can also be discouraged through limitations on the public infrastructure provided outside of the boundary.

Land conservation is an important strategy for creating permanent growth boundaries. This strategy encompasses a variety of techniques for permanently protecting natural and working lands from urban development. Natural lands include grasslands, forests, and wetlands, while working lands including rangelands and agricultural lands.

Land can also be protected from development through purchase by public or private entities, but a more common approach is the purchase of conservation easements. A conservation easement is a voluntary agreement in which the landowner retains the ownership of and right to use the land but forfeits the right to develop the land to the entity purchasing the easements. Easements are sometimes purchased by public entities who then transfer the easements to non-profit land trusts that enforce the easement. Easements are attached to the property's deed and are granted in perpetuity, ensuring the permanent protection of that land from development.

Urban growth boundaries may influence travel patterns in a region by promoting more compact development with higher population and employment densities and closer proximity between different land uses. Land conservation that helps to effectively create an urban boundary (whether or not a formal boundary has been adopted) may similarly influence travel patterns. Land conservation that does not contribute to more compact urban development is not likely to influence travel patterns.

Strategy Effects

Effect Size

The effect of urban growth boundaries and land conservation on vehicle miles travelled (VMT) is indirect and thus difficult to assess, but studies suggest that more compact (i.e., less sprawling) urban areas have lower VMT. One study shows that more compact areas (as defined by higher population and employment densities and other characteristics) have higher shares of walking and transit as well as lower car ownership and shorter driving times (Hamidi et al., 2015). A connection between compactness and VMT is suggested by studies showing that the closer an individual lives to downtown, the lower their VMT (Ewing and Cervero, 2010).

To the degree that urban growth boundaries and land conservation help to slow the outward expansion of a given urban area, they are likely to dampen increases in VMT that would otherwise occur as an urban area grows. The

magnitude of this effect is uncertain and will vary depending on the specifics of the implementation of the policy and the regional context.

Extent

Scale of Application: Urban growth boundaries are implemented at the scale of urbanized areas. Cities that do not share borders with other cities often have their own growth boundaries (e.g., Davis and Woodland, California). In urbanized areas comprising multiple cities, the growth boundary is often set by the county (e.g., Sacramento County and Santa Clara County, California).

Efficiency or Cost: Setting a growth boundary is not expensive in and of itself. Implementing the boundary through regulation is also not costly, but purchasing conservation easements may require considerable resources. Limiting infrastructure investments outside of the boundaries can save public resources. Evidence shows that more compact development is generally more efficient from the standpoint of public resources than sprawling development (Burchell et al., 1998).

Time / Speed of Change: Urban growth boundaries are a long-term strategy for promoting compact development and deterring sprawl.

Geographic variation: The effectiveness of growth boundaries in promoting compact development depends on the amount of undeveloped land that is included within the boundary and the strength of policies adopted to implement the boundary (Ewing, et al. 2022), as well as the regional context, including development pressures and existing land uses outside of the boundary and cooperation with neighboring cities (Kim, 2013)

Equity

One potential side effect of urban growth boundaries is an increase in housing costs within the boundary, though evidence of this effect is mixed (Jun, 2006; Jaeger et al. 2012, Mathur, 2014). One study suggests that the effect on housing prices is higher in the lowest price ranges (Mathur, 2019). On the other hand, when a boundary promotes more compact development, travel distances are shorter and modes other than driving are more viable, thereby reducing the cost burden of transportation.

Community engagement is essential to ensuring that the secondary effects of land conservation and growth boundaries do not disproportionately harm disadvantaged areas. An increase in infill development in response to a growth boundary can contribute to displacement of current residents and potentially to gentrification and have other negative effects on already disadvantaged communities.

Synergy

Urban growth boundaries are most effective when implemented in conjunction with other growth management policies, including the encouragement of infill development. To the degree that urban growth boundaries encourage more compact development, they increase the viability of travel by transit, walking, and bicycling. They may also produce other benefits for the community, such as the preservation of ecological corridors and the creation of recreational landscapes (Kirby, et al. 2023).

Confidence

Evidence Quality

The available studies provide indirect evidence of the effect of urban growth boundaries and land conservation on VMT. The evidence is robust in suggesting that these strategies are likely to reduce increases in VMT that would otherwise occur as an urban area grows, especially if combined with other strategies that reduce VMT.

Caveats

The effectiveness of urban growth boundaries and land conservation in reducing VMT depends on their success in promoting more compact development.

Technical & Background Information

Study Selection

The effect of urban growth boundaries and land conservation on vehicle miles of travel (VMT) is indirect and thus difficult to assess. The most directly relevant studies examine the association between the compactness (or conversely the "sprawlness") of urbanized areas and VMT or other aspects of travel, measured for the area as a whole. Also relevant are studies that examine the association between distance to downtown and VMT for individuals or households. A limited number of studies of each type is available. The selected studies are shown in Table 1.

Table 1. Compactness and VMT

Study	Study Location	Study Years	Compactness Variable	Travel Variable	Elasticity
Hamidi, et al., 2015	U.S.	2010	Compactness Index	Walk share	+0.39
				Transit share	+1.15
				Household vehicles	-0.06
				Drive time	-0.05
Ewing and Cervero, 2010	U.S.	1997-2009	Distance to downtown	VMT	+0.22
Stevens, 2017	U.S.	1996-2014	Distance to downtown	VMT	+0.34

Methodological Considerations

These studies do not provide direct evidence of the impact of growth boundaries on VMT. They provide evidence of the potential effectiveness of growth boundaries in reducing VMT by creating a more compact urban area.

Studies that examine the association between compactness of an urban area and VMT or other aspects of travel use various measures of "compactness." For example, Hamidi et al. (2015) created an overall compactness/sprawl index calculated as the sum of four compactness factors: density, mixed use, centering, and street. Each of these factors was developed using principal components analysis to combine a number of specific measures. The street factor, for example, reflect the combination of the percentage of small urban blocks, average block size, average block length, intersection density, and the percentage of four-or-more-way intersections. Applying the effect size from this study would require an estimate of the change in this compactness index resulting from the proposed policy. Determining the change in the compactness index attributable to the adoption of an urban growth boundary would be quite challenging. This study updates earlier work that found a strong negative association between compactness and VMT (Ewing et al., 2003).

Studies that examine the association between distance to downtown and VMT for individuals or households are cross-sectional and thus do not establish a causal relationship. Two meta-analyses provide an estimate of the effect size derived from the set of available studies. Stevens (2017) provides

an effect size for studies that control for residential self-selection; Ewing and Cervero (2010) does not. Applying the effect sizes from these studies would require an estimate of the effect of an urban growth boundary on average distances to downtown. Urban growth boundaries are unlikely to reduce distances to downtown for existing development, though they may dampen the increase in average distances to downtown as an urban area grows.

References

Burchell, R. W., Shad, N.A., Listokin, D., et al. (1998). The costs of sprawl-revisited. TCRP Report 39, Transit Cooperative Research Program, Transportation Research Board, Washington, DC. https://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_39-a.pdf and https://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_39-b.pdf

Ewing, R., & Cervero, R. (2010). Travel and the built environment: A meta-analysis. *Journal of the American Planning Association*, *76*(3), 265-294. https://doi.org/10.1080/01944361003766766

Ewing, R., Lyons, T., Siddiq, F., Sabouri, S., Kiani, F., Hamidi, S., Choi, D. & Ameli, H. (2022). Growth management effectiveness: A literature review. *Journal of Planning Literature*, *37*(3), 433-451. https://doi.org/10.1177/0885412222107745

Ewing, R., Pendall, R., & Chen, D. (2003). Measuring sprawl and its transportation impacts. *Transportation Research Record*, *1831*(1), 175-183. https://doi.org/10.3141/1831-20

Hamidi, S., Ewing, R., Preuss, I., & Dodds, A. (2015). Measuring sprawl and its impacts: An update. *Journal of Planning Education and Research*, *35*(1), 35-50. https://doi.org/10.1177/0739456X14565247

Jaeger, W. K., Plantinga, A. J., & Grout, C. (2012). How has Oregon's land use planning system affected property values? *Land Use Policy*, *29*(1), 62-72. https://doi.org/10.1016/j.landusepol.2011.05.005

Jun, M. J. (2006). The effects of Portland's urban growth boundary on housing prices. *Journal of the American Planning Association*, *72*(2), 239-243. https://doi.org/10.1080/01944360608976742

Kim, J. H. (2013). Measuring the Containment and Spillover Effects of Urban Growth Boundaries: The Case of the Portland Metropolitan Area. Growth and Change, 44(4), 650-675. https://doi.org/10.1111/grow.12028

Kirby, M. G., Scott, A. J., Luger, J., & Walsh, C. L. (2023). Beyond growth management: A review of the wider functions and effects of urban growth management policies. *Landscape and Urban Planning*, *230*, 104635. https://doi.org/10.1016/j.landurbplan.2022.104635

Mathur, S. (2014). Impact of urban growth boundary on housing and land prices: Evidence from King County, Washington. *Housing Studies*, *29*(1), 128-148. https://doi.org/10.1080/02673037.2013.825695

Mathur, S. (2019). Impact of an urban growth boundary across the entire house price spectrum: The two-stage quantile spatial regression approach. *Land Use Policy*, *80*, 88-94. https://doi.org/10.1016/j.landusepol.2018.09.011

Stevens, M. R. (2017). Does compact development make people drive less? *Journal of the American Planning Association*, *83*(1), 7-18. https://doi.org/10.1080/01944363.2016.1240044