# The Economic Benefits of Vehicle Miles Traveled (VMT)-Reducing Placemaking: Synthesizing a New View

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A White Paper from the National Center for Sustainable Transportation

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# The Economic Benefits of Vehicle Miles Traveled (VMT)-Reducing Placemaking: Synthesizing a New View

A National Center for Sustainable Transportation Research Report

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## EXECUTIVE SUMMARY

This paper analyzes evidence on the economic benefits of placemaking efforts that prioritize pedestrian and non-motorized access and that, at times, reduce vehicle miles traveled. The previous literature on the economic impacts of transportation has focused on theorizing and gathering evidence on ways that transportation infrastructure generates economic benefits at large geographic scales – often states or nations. That literature overlooks many of today's transportation projects which are at the scale of a neighborhood and which typically include non-motorized transportation. We summarize evidence on how those more locally oriented placemaking efforts are associated with benefits that accrue to residents and firms. There is a high degree of evidence that there are economic benefits, on commercial property values, residential property values, business sentiment, and productivity, from density that are summarized as they relate to neighborhood oriented placemaking transportation policies. We conclude by suggesting a systems view of metropolitan transportation that has a hierarchy of networks, from high-throughput metropolitan arteries to local, multi-modal, neighborhood planning with connections between the different levels of the system.

## Introduction

California cities, and regions across the world, are embarking on a sea of change in transportation policy. Movements to limit the automobile, reduce driving, and support transit and non-motorized travel are now popular worldwide. This change is motivated in part by environmental regulations. California, for example, encourages local governments to reduce vehicle miles traveled (VMT) to comply with state regulations for greenhouse gas (GHG) emission reduction. But the trend toward lower VMT, and policies that are aimed at reducing VMT, goes deeper than compliance with environmental regulations. VMT-reducing planning – programs that include complete streets, pedestrian neighborhoods, bicycle infrastructure, or transit – is part of a movement to reconnect transportation to place and placemaking, and to view transportation not simply as a mobility tool but as an integral part of the built environment in our communities.

> The Project for Public Spaces defines placemaking as… "the collaborative, community-based process by which we can shape our public realm in order to maximize shared value. More than just promoting better urban design, Placemaking facilitates creative patterns of use, paying particular attention to the physical, cultural, and social identities that define a place and support its ongoing evolution." (Project for Public Spaces, 2009)

In this paper, we examine how VMT-reducing placemaking can help boost local (i.e. neighborhood) economies. This is a new question in two ways. First, the link between economic development and transportation has been largely a link from increased mobility – at times from increased VMT – to economic growth. Second, the academic literature on economic benefits and transportation has been regional and national, and rarely neighborhood focused.

Changing the focus to the economic role of less VMT and shifting the geography from the metropolitan area to the neighborhood are both challenging shifts. The increasing policy importance of multi-modal transportation, often with an explicit goal to reduce VMT, requires a better understanding of how VMT-reducing placemaking is, or could be, linked to neighborhood economic benefits. This paper addresses that gap for policymakers and researchers.

This paper proceeds in the following sections. In Section II, we discuss the motivation for a new view of VMT-reducing placemaking and the link to local economic benefits. Section III articulates both the old (or traditional) view of how transportation influences economic development, and a new view that we argue should be synthesized. The two views, we note, are not mutually exclusive, but rather focus on different problems at different geographic scales. Sections IV through VI articulate different categories of benefits from plans that reduce VMT in neighborhoods. Section IV summarizes evidence on agglomeration benefits (i.e. increases in business productivity), Section V discusses resident benefits that accrue from VMT-reducing placemaking, and Section VI summarizes business benefits. We close with conclusions in Section VII.

## II. Why Study the Economic Benefits of Placemaking?

California has a policy interest in encouraging alternatives to automobile travel. Senate Bill (SB) 375 (The Sustainable Communities and Climate Protection Act of 2008) requires that metropolitan planning organizations (MPO's) meet GHG reduction targets for the ground transportation sector. SB 375 does not require VMT reduction *per se* (the target is GHG emissions), but SB 375 has accelerated discussion about the co-benefits of policies that reduce GHG emissions, and those co-benefits are often related to quality-of-life attributes associated with reduced driving.[1] Additionally, in response to SB 743 (2013), the California Governor's Office of Planning and Research has proposed shifting the criteria for transportation impacts for California Environmental Quality Act (CEQA) review from level-of-service – a congestion criterion – to VMT, which will favor projects that reduce current levels or future growth of VMT.

At the sub-state level, cities and municipalities are increasingly pursuing policies that are consistent with VMT reduction. Los Angeles Mayor Eric Garcetti's Great Streets program has been a signature of his administration.[2] Complete streets – streets that accommodate pedestrians and bicyclists, that are environmentally sustainable, and that integrate the street space and associated sidewalks into public life – have been a priority in many California communities for some years.[3] Traffic calming is increasingly popular and is related to complete streets and pedestrianization. All of these reflect a policy context that has shifted from viewing streets and highways solely as mobility infrastructure to viewing those roadways as public space and hence valuing policies that favor lower levels of VMT.

For purposes of this paper, we define VMT-reducing placemaking as efforts that have two broad characteristics.

(1) VMT-reducing placemaking projects link transportation infrastructure to place, such that the transportation project becomes a neighborhood amenity. Examples include but are not limited to complete streets, pedestrianized streets or malls, highway caps, bike lanes and bicycle sharing.

(2) VMT-reducing placemaking projects have the effect of reducing VMT, either through purposeful efforts (e.g. traffic calming) or through a concomitant of the project (e.g. infrastructure that supports bicycle or walking travel.)

We focus on neighborhood scale geographies, because that is the scale for many VMT-reducing or similar placemaking projects, and because smaller communities (or small locales within

[1] See the set of 25 policy briefs developed for the California Air Resources Board. Each brief includes a section on co-benefits. Here: https://arb.ca.gov/cc/sb375/policies/policies.htm.

[2] See LA Great Streets Initiative website for more information on this program, here: http://lagreatstreets.org/.

[3] See, e.g., the proceedings of a 2011 UCLA conference, available here: http://www.lewis.ucla.edu/wp-content/uploads/sites/2/2015/02/2011-Complete-Streets-for-Los-Angeles.pdf.

larger cities) have often been most concerned about whether and how VMT-reducing placemaking will affect their local economy. Our research aims to inform other researchers and local policymakers on the effects of neighborhood scale VMT-reducing placemaking.

## III. How Might VMT Reduction Contribute to Neighborhood Vitality and Neighborhood Economies?

The idea that VMT reduction can have economic benefits might seem odd at first – particularly so after decades of practice and scholarship that focused on ways that mobility (and hence at times increased VMT) is associated with economic growth. In this sub-section, we discuss two things. First, we will discuss the traditional literature on transportation and economic development, to provide both a benchmark and lessons, and then theoretical perspectives on why and how VMT-reducing placemaking can have positive local (neighborhood) economic outcomes.

### A. The Old View: Transportation and Economic Development

The link between transportation and economic growth began, intuitively enough, with the idea that better transportation improves economic development. Increasing market access, by building transportation infrastructure, improves trade and increases economic growth. That is particularly true for the early stages of infrastructure construction which can have large impacts on the geographic scope of markets. Donaldson (2010) and Donaldson and Hornbeck (2016) found that early railway construction in both the U.S. and India in the 1800s led to economic growth. Those early railroads connected market towns and far-flung locations that, often, were not previously readily or reliably connected to the larger market.

The construction of the Interstate Highway system in the 1950s and 1960s provided another opportunity to examine the link between large-scale transportation infrastructure investment and economic growth. Nadiri and Manuneas (1996, p. 110) examined how highway capital is related to total factor productivity (TFP) for 35 industries in the U.S. They found that from 1964 through 1972, 25 percent of TFP growth in those industries was associated with increases in the stock of highways, but that in later years, when the Interstate Highway network was largely complete, the effect was smaller. From 1973 through 1979, highway capital accounted for two percent of TFP growth in the industries studied by Nadiri and Manuneas (1996). Like the railroads before them, the construction of a new, national transportation network was associated with economic growth (in this case measured by growth in productivity.) But the effect of additional changes to the transportation network is smaller when the network is mature.

Mohring and Harwitz (1962) examined the impact of the early Interstate Highway system and developed a critique which still applies today. In some cases, improvements in transportation infrastructure shift economic activity from one location to another. Distinguishing between

aggregate growth and shifts in activity across the landscape is an important issue. A good piece of intuition, which is consistent with theory and evidence, is that large investments in new national infrastructure (railways in the 1800s, highways in the mid-1900s), by connecting large numbers of previously poorly linked markets, can generate aggregate economic growth. Once the network matures, the economic impact of transportation investment is more likely to shift economic activity from one location to another, as businesses move to take advantage of the new pattern of transportation accessibility.

This has led to the double counting critique, first formalized by Mohring (1961) in a different context (land prices). Applied to economic growth, the double counting critique cautions us to be careful to distinguish between two cases: (1) when transformative new networks connect previously unconnected places, and hence lead to new economic growth, and (2) when more marginal changes in transportation infrastructure advantage some locations, shifting economic activity from one location to another. The double counting critique has been a mainstay of academic thinking on transportation and economics. The critique implies that new jobs near highways or rail stations ought not be counted as economic impacts, because those jobs moved from somewhere else, and hence are countervailed by job losses elsewhere. This critique has led many, including this paper's first author (Boarnet, 1997), to be skeptical of the role that highway building, or by extension, any improvement in transportation access in a mature system in a developed economy, can have on aggregate economic growth.

Yet there is one more nuance, and a potentially important one. Knowledge-based economies, relying on access within metropolitan areas, benefit from smooth transportation. Hymel (2007) found that traffic congestion is associated with lower rates of employment growth in a sample of U.S. metropolitan areas. The dampening effect of congestion on employment growth is larger at higher levels of congestion (Hymel, 2007, p. 134). Starting from a less congested network, in San Diego, a 10% reduction in travel time gives a 2.48% increase in employment growth. In the more congested Los Angeles - Orange County network a 10% reduction in travel time gives a 4.6% increase in employment growth.

This result has been reproduced by computable general equilibrium (CGE) models that examine how transportation investment is related to economic growth within a metropolitan area. The Southern California Association of Governments (SCAG) is the metropolitan planning organization for the greater Los Angeles region, a six-county area that is home to over 18 million persons. Beginning in the 2012 Regional Transportation Plan, and continuing with the 2016 plan, SCAG has modeled how transportation spending in the greater Los Angeles region will increase employment. The results show that the 2016 Regional Transportation Plan, a program of over $500 billion in transportation investments over 25 years, can create an average of 539,000 annual jobs from 2016-2040, of which 188,000 jobs in each year will be from the construction, operation, or maintenance of transportation projects. The other 351,000 annual jobs flow from increased economic competitiveness (SCAG, 2016).[4] This is similar to the market

[4] "Annual jobs" in the SCAG (2016) analysis is job years. One job for a duration of one year is one "annual job."

area results of Donaldson (2010) and Donaldson and Hornbeck (2016), but it reflects advantages within the metropolitan area that likely go beyond simple one-for-one shifts in economic activity from one location to another.

This result applies at the regional (metropolitan or county) level (the unit of analysis in Hymel's study and similar research) not at the neighborhood level. The research results suggest that improved regional transportation access, of the sort that would flow from congestion pricing or improved access to jobs, is associated with regional economic growth, while at the neighborhood level knowledge-based industries benefit from density and hence often congestion. The research literature does not give evidence that neighborhood congestion is a factor in local economic growth, but the literature (summarized below) does support the idea that VMT reduction can boost neighborhood economic growth.

Summarizing, the following results are important:

1. Most research has focused on how more transportation, often measured as more infrastructure, relates to economic growth. The results are twofold: (a) New networks, often built to respond to new transportation technologies, can connect far-flung markets, increasing market access, trade, and hence economic growth. (b) After the initial network construction, marginal changes (for example, adding a link to the network or expanding capacity by adding a lane) often have no or at best little relationship to economic growth.

2. Recent evidence (e.g. Hymel, 2007, SCAG, 2016) has linked congestion reduction to economic growth. Congestion reduction, however, is not the same as simply investing in more transportation infrastructure. In large, congested, metropolitan areas, evidence indicates that adding more highway lane miles induces more driving (Duranton and Turner, 2011). Managing the system, including pricing congestion, will be important for the relationship between transportation access and economic growth, particularly so in mature networks and systems.

3. The practice community should beware of double counting. In the early stages of network construction, the economic benefits from increased connectivity likely extend broadly and hence economic gains are likely to go beyond simply moving activity from one location to another. But as the network matures, continued improvements in transportation access most often shift economic activity from one location (with relatively poor access) to another, more accessible, location. Seeing a new office park develop near an intersection of two highways, or in a transit-oriented development (TOD), does not imply that all those jobs are new. Much of that economic activity might have located elsewhere absent the new freeways or TOD.

4. Double counting applies most clearly to cases where the economy is constant returns to scale – in simple terms, cases where doubling economic inputs leads to twice as much economic output. Knowledge economies rely on learning that is facilitated by interaction,

and is performed by workers who value amenities. Such economies may be characterized by increasing returns to scale if, as is often the case, firms become more productive when they and their employees interact with each other. This is the key to why congestion reduction in heavily congested locations is associated with more employment growth.

What does this all mean? We should draw two distinctions – between metropolitan and neighborhood geographies, and between efficiency of movement (access) and simply building more infrastructure. The evidence suggests that improving connections across a metropolitan area can increase economic activity (e.g. Hymel, 2007; SCAG, 2016). This is not a formula for simply building more infrastructure, but a call to build infrastructure wisely. The evidence suggests that ease of movement across a metropolitan area can be important, and in dense cities, such movement is usually multi-modal, requiring in part the higher passenger throughput that rail transit (particularly heavy rail) can provide. At the same time, foot traffic and inviting streetscapes are important for neighborhoods, and are likely increasingly valued by residents and business visitors alike. All of this suggests a place for a new view of transportation and economic development, which has a role for placemaking that can, at times, be linked to reductions in VMT rather than increases in driving.

## B. A New View: VMT, Placemaking, and the Value of Place

The idea that place is valuable is not new in planning. It is at the core of the field. But it is arguably new to transportation planning – at least new in the way we are currently asking the question and in the policy debates that the question informs. The purpose of this white paper is to summarize the evidence in ways that can inform policy.

There are three ways that VMT-reducing placemaking can enhance the value of and the economy in a neighborhood: (1) amenities associated with placemaking aspects of transportation policies or projects, (2) increased residential property values which reflect improved resident quality of life, and (3) increased business activity or economic benefits that flow from the VMT reduction. Each is described below.

### *1. Public or External Benefits*

VMT reduction can have many positive effects. Lower VMT, or the reduced car travel speeds that are often associated with lower VMT, can lead to lower accident rates, increased physical activity (from pedestrian and bicycle programs and projects), improved air quality, and amenities that range from inviting streetscapes to sidewalk cafes to walking neighborhoods that may be desired by local residents and shoppers. Some of these effects are reductions in what economists would call negative externalities. A negative externality is a cost to persons who did not buy a good but who are affected by others who purchase (or sell) the good. Emissions from cars are negative externalities, because persons who did not drive breath the emissions generated by trips from other drivers. Following that logic in reverse, improvements in local air quality from reduced driving are external benefits. Increased physical activity, to the extent that physical activity produces or reflects societal benefits that are not fully captured by

the individual (e.g. reduced societal healthcare costs) can be external benefits. Accident reduction, particularly when individuals cannot perfectly insure against the full effect of traffic accidents, can be external benefits.

There is a large literature on each of these topics, and for that reason this paper will not go into depth on each effect. These summaries cover the link between VMT reduction and neighborhood amenities: For driving speed and accidents, see Aarts and Schagen (2006); for VMT reduction and physical activity, see Frank et al. (2007) and Sallis et al. (2004); for driving and air quality, see Zhang and Batterman (2013).

All of these things are neighborhood amenities. As such, the benefits will be dispersed throughout the neighborhood – no single private actor can be expected to capture the full value. Having said that, a common way to measure amenities is to look for how those amenities are reflected in land values. If these impacts – lower accidents, improved air quality, inviting streetscapes, and a neighborhood that is visually attractive – are valued by residents, that value should be reflected in higher land prices and hence, holding all else equal, higher home prices. This is a time-honored concept – places with higher amenities have higher home values. The theory behind this dates to the pioneering urban economics work of Alonso (1960), Muth (1968) and Mills (1972), and large literatures have demonstrated that place based amenities are reflected in land values and home values. For a review of the literature on house prices and transit-oriented developments, see Bartholomew and Ewing (2011).

### *2. Resident Benefits*

Residents value living in neighborhoods with more desirable amenities. That value should be reflected in higher land prices and hence higher house values. Hence a common way to measure resident benefits is to measure increases in home prices. Those home prices will measure the overall package of amenity benefits – the combination of, for example, slower vehicle movement, pedestrianization, business activity, and inviting streetscapes, in addition to school quality, access to jobs, and a host of other factors. Some studies disentangle the effect of individual amenities on home prices, while other studies examine the effect of a package of amenities by measuring the house price premium associated with a neighborhood or specific kind of neighborhood without separating the effect of the several amenities in the neighborhood.

### *3. Business benefits*

Non-motorized and public transportation, pedestrianization, and traffic calming measures can increase retail business benefits by doing three different things. First, increased pedestrian activity and accessibility for customers can lead to more opportunities for walk-by or pass-by customer visits to retail businesses. That increase in retail sales can lead to an increase in commercial property values. Lastly, walkable business districts with links to high-throughput transit can increase pedestrian activity and transportation access in ways that might lead to more business interactions and hence higher business productivity.

We summarize the literature on each impact in turn. We first discuss ways that neighborhood-scale placemaking can lead to higher business productivity, then we summarize studies that measure resident benefits, followed by studies of retail sales and business property values.

## IV. Placemaking and Agglomeration Benefits

There is consensus in both the theoretical and empirical economic literature that increased urban density is beneficial for local economic growth. The phenomenon is called "agglomeration economies" and refers to the finding that firms are more productive, on average, when they locate near other firms. Several studies on agglomeration economies are summarized in Table 1.

Agglomeration benefits decline sharply with distance. For some industries, most of the productivity benefits from locating near other firms accrue within 1-5 miles (Rosenthal and Strange, 2003). In other words, firms are typically more productive when they locate near other firms in the same industry, but that effect operates over small distances, as small as 1 to 5 miles (Rosenthal and Strange, 2003). An older study that measured the effect of train stations on employment centers finds that the positive influence of stations on employment declines sharply, dropping at a rate of 20-25% per mile (McMillen and McDonald, 1998). In general, there is evidence that agglomeration benefits are strongest over short distances (McMillen and McDonald, 1998).

The Rosenthal and Strange (2003) study finds that small firms (1-20 people) benefit the most from co-locating near each other. Moreover, they find that some industries benefit more from co-locating. Firms in creative industries, such as software and fashion apparel, benefited more from co-locating near other similar firms, suggesting the importance of knowledge spillovers as a source of agglomeration economies. A series of studies finds that traffic congestion is negatively related to economic growth. For example, workers who spend more time commuting need to be compensated with higher wages (Wheaton and Lewis, 2002). As a result, if congestion leads to commute times that are excessively long, it is in the interest of firms to move closer to their employees to reduce commute times. One way to mitigate this shuffling is to allow for mixed-used zoning that enables firms and employees to co-reside (Wheaton and Lewis, 2002). Another study that modeled traffic flow in urban areas reached a similar conclusion that mixing land-use inside commercial districts, increasing density, and improving road network connectivity in order to stem congestion helps economic efficiency and spatial equity (Tsekeris and Geroliminis, 2013). Another study examined Britain's largest cities and found that congestion and increasing housing prices negatively affect economic growth (Hanlon and Miscio, 2017). These conclusions are consistent with those of Gordon, Richardson, and Wong (1986) who find that cities such as Los Angeles are highly polycentric, meaning that traffic congestion is encouraging firms to move closer to employees in order to reduce their commuting times. However, firm relocations to places outside of the urban core may also

reduce the benefits of agglomeration unless enough firms choose to locate in the same area. As a result, the Los Angeles area may not be as productive as it could be. Similarly, Hymel (2007) finds that high congestion reduces employment growth.

Importantly, benefits to firms from locating near each other do not benefit everyone equally. Services, shopping, and knowledge industries benefit the most from agglomeration (Graham, 2007b). Bacolod, Blum, and Strange (2009) find that agglomeration benefits accrue most to sectors requiring high cognitive and social skills. In a similar analysis, Rosenthal (2008) and Rosenthal (2001) find that benefits accrue from human capital spillovers as evidenced by high agglomeration effects among college educated workers. All of this is consistent with a view that agglomeration benefits – the benefits of firms and employees quickly interacting with each other – are strongest in creative and knowledge-based industries.

Although no studies examined agglomeration effects at the neighborhood level, presumably due to lack of appropriate data, some inferences can be made from the studies on agglomeration that may apply at the neighborhood level. First, for industries requiring social and cognitive skills, density leads to higher productivity. Second, congestion reduces productivity at all surveyed geographic levels and increases the spread of firms which can reduce agglomeration benefits. Combining these findings, we can surmise that shopping or high-skilled industry clusters would benefit from VMT reductions if high density transport alternatives (i.e., walking, cycling, transit) could enable retailers and firms to co-locate at the neighborhood level.

**Table 1. Summary of Studies on Agglomeration Economics**

| **Author (Year)** | **Results** |
|---|---|
| Bacolod, Blum, and Strange (2009) | Urban wage premium is a premium on cognitive and social skills. |
| Graham (2007a) | Transport infrastructure increases firm and residential density. |
| Graham (2007b) | All tested sectors experience positive returns from agglomeration. In the study, manufacturing has the lowest agglomeration benefits. The industries that benefits most from agglomeration economies are: public services, business services, and banking finance and insurance. |

| Author (Year) | Results |
|---|---|
| Hanlon and Miscio (2017) | Congestion, measured through commuting times, has a negative effect on city growth. |
| Hymel (2007) | High levels of congestion reduce employment growth in urban areas. |
| McMillen and McDonald (1998) | Average employment density decreases by 34% to 35% per mile from employment subcenters. |
| Rosenthal and Strange (2001) | For agglomeration benefits, labor market pooling works at the zip code level while knowledge spillovers work at the county level. |
| Rosenthal and Strange (2003) | The benefits of co-locating diminish rapidly with distance. For example, for software firms, 100 additional software workers within one mile is associated with 0.04 new software firm births and 1.17 additional employees at each firm. |
| Rosenthal and Strange (2008) | Being located closer to an employment center increases wages. Human capital spillovers are especially important for college educated workers. |
| Tsekeris and Geroliminis (2013) | Improving road network connectivity can reduce congestion and increase economic efficiency. |
| Wheaton (2004) | In a general equilibrium model with agglomeration economies and commuting costs, firms locate in a polycentric pattern to obtain agglomeration benefits while reducing commuting costs. |
| Wheaton and Lewis (2002) | A 1% increase in worker specialization leads to a 23% increase in wages. Specialization leads to 30% wage increases at the MSA level with variation between industries and occupations. |

## V. Resident Benefits

Benefits to residents can be capitalized into increased house prices or rental values. Those benefits would be of two types:

1. Benefits from accessibility created by projects associated with reduced VMT. Multi-modal transportation projects, improved non-motorized access, and clustering of destinations near residences might all increase transportation access while reducing VMT.
2. Benefits from larger "quality of life" impacts or amenities related to improved access.

Examining house prices or rental rates will capture both benefits, and most studies in the literature cannot disentangle the effect of accessibility from other quality of life or placemaking benefits.

One method for understanding if a characteristic is capitalized into property values is by performing hedonic house price models. Due to data availability, most studies use house prices rather than rents, and we summarize those studies here.

Hedonic house price models use property values as the dependent variable with a variety of environmental and home characteristics as the independent variables. The literature on hedonic house pricing models published since 2000 was reviewed. The studies looked at both commercial and residential property values as the dependent variable. Most of the studies used proximity (distance) to a transit station as the measure of accessibility. The measurement of walkability differed slightly; some studies used Walk Score, while others used neighborhood characteristics such as sidewalk density or the slope of sidewalks.

The impact of transit- and pedestrian-oriented development on property values varied across studies, likely due to geographical differences, walkability measurement differences, and other model-related factors. The studies and their results are listed in Table 2. The pattern in Table 2 aligns with the findings of the meta-analysis by Debrezion, Pels, and Rietveld (2007), who looked at the impact of transit railway stations on commercial and residential property prices.

Debrezion et al. (2007) find that accessibility to a market or central business district (CBD), measured as railway station proximity, is associated with property values. However, there is variability in the results of studies that attempt to measure that impact; some hedonic pricing analyses find statistically significant small, positive, and modest impacts, while others find negative or statistically insignificant impacts (Debrezion et al., 2007). Debrezion et al. (2007) performed a meta-analysis of 57 studies to better understand why there is variation in results. This analysis concludes that six features of the analyzed studies could explain the variation: type of property, type of railway station, type of model used, the presence of specific variables related to accessibility, demographic features, and the timing of the data. More detailed findings of the meta-analysis include (Debrezion et al., 2007):

- Properties near commuter railway stations show consistently and significantly higher values, controlling for other factors, compared to light and heavy rail stations.
- Commercial property values located within a 0.25-mile range from a railway station are, on average, 16.4 percent more expensive. As Debrezion et al. (2007, p. 176) explain, "…when the office is within walking distance of the station, it benefits, otherwise the station is of little use…"
- Residential home prices increase 2.4 percent for every 250 meters closer to a railway station.
- Omitted variable bias may occur. If a study leaves out highways in its regression, the regression can overestimate the impact of station access on property values.

Most research found that walkability is positively associated with home prices. Additionally, Matthews and Turnbull's (2007) research found that the design of the transportation network can affect the magnitude of walkability benefits; grid-like street patterns increased home values. Pivo and Fisher (2011) studied different types of properties and their values across the United States between 2001 and 2008 to understand how walkability affects different property types. Their study found that apartment properties with high Walk Scores were associated with a 6 percent increase in market value, while office and retail properties saw a 54 percent increase (Pivo and Fisher, 2011). In Cortright's 2009 CEO for Cities paper on the effect of Walk Scores on housing prices, he found a range of price impacts depending on the city studied. Looking at the California results, Fresno, Stockton, San Francisco and Sacramento each saw positive associations between Walk Score and house prices, while Bakersfield saw a negative association of Walk Score with house prices, , where a 1-point increase in walkability was associated with a $112 decrease in home value. However, the result for Bakersfield was not statistically significant at the .1 (two-tailed) level. For a 1-point change in Walk Score, the price of a home in Fresno increased $675, Stockton increased $795, San Francisco increased $2,985, and Sacramento increased $2,642 (Cortright, 2009, Table 5).

**Resident Benefits in Guerrero Street, San Francisco, CA**

In the quickly transforming Mission District in San Francisco, residents along Guerrero Street came together in an effort to make their street more pedestrian-friendly. With speeding cars along its six traffic lanes and eight unsignalized intersections, the community called for Guerrero Street to be included in traffic calming plans (Project for Public Spaces, pg. 58). The citizen's organization, San Jose/Guerrero Coalition to Save Our Streets, successfully advocated for the following pedestrian-friendly improvements:

- Changed the street from three lanes of traffic each way to two lanes of traffic with a bicycle lane
- Created wider medians
- Installed new traffic lights

These changes resulted in residents feeling safer to walk in their neighborhood and a reduction in driving speeds (Roth, 2009).

Images:

After traffic calming, before greening: http://pavementtoparks.org/wp-content/uploads//2015/10/plaza-guerrero-park-before.jpg

After greening: https://www.flickr.com/photos/54560762@N04/22199523316

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Several studies observed that transit-oriented developments coupled with pedestrian-friendly neighborhood environments are associated with higher home sales prices (Bartholomew and Ewing, 2011; Duncan, 2011). Duncan (2011) examined whether proximity to transit adds more value to a condominium property in a good pedestrian environment than it does in a bad pedestrian environment. His study focused on San Diego and measured good pedestrian environments in neighborhoods with three variables: density of commercial activity, flat path to

a station, and well-connected street network (intersection density). Results found that transit stations in pedestrian-friendly neighborhoods see higher market values (estimated premium of $20,000) than transit stations in poor pedestrian environments (Duncan, 2011, p. 120). This supports the use of a more holistic land use and design approach to transit station projects, to ensure pedestrian-oriented projects are provided. Duncan's results also emphasize the value that residents place on good pedestrian accessibility in TOD's.

The study by Boyle, Barilleaux, and Scheller (2013) differs from the more general trend of positive associations between home prices and pedestrian character. Using data from Miami, Boyle, Barilleaux, and Scheller (2013) used fixed effects to control for unobserved heterogeneity in the data. Walkable neighborhoods might be valuable for reasons that are correlated with the walkability (such as, possibly, better access to downtown job centers), rather than the pedestrian character itself. The Boyle, Barilleaux, and Scheller (2013) study attempted to control for neighborhood characteristics other than walkability by including controls for the subdivision, one square mile section, and zip code of each house in the data, and when any of those geographic controls were included (to measure neighborhood characteristics), the Walk Score variable in their hedonic house price regression was insignificant. While the data were cross-sectional, the use of these "fixed effects" to control for neighborhood characteristics is a strong analytical approach, and so the results provide some caution. Duncan (2011) also used neighborhood controls in his San Diego study – in his case, using dummy variables for neighborhoods ranging from 0.5 to 4 square kilometers to control for neighborhood quality. Duncan found a strong and statistically significant house value premium for pedestrian characteristics in locations within a half kilometer of a rail transit station. Good pedestrian characteristics increase home prices within a half kilometer of rail transit stations by 15 percent, according to Duncan (2011). On the whole, the methodological quality of studies in this literature varies, with two of the strongest studies – Boyle, Barilleaux, and Scheller (2013) and Duncan (2011) – reaching opposing conclusions.

Summarizing, the hedonic house price models that focused on measuring the impact of transit saw less consistent results than did the studies examining pedestrian-oriented development. This suggests there is a premium associated with the quality of life amenities found in walkable neighborhoods, and that effect of a walkability house price premium is more robust in the literature than the evidence for transit access and house prices. With the exception of the Boyle, Barilleaux, and Scheller (2013) study, the evidence on pedestrian environments and house prices supports the idea that placemaking characteristics associated with VMT reduction bring residential and quality of life benefits. It must be acknowledged that property owners will be the primary beneficiaries of increased property value and there are displacement and gentrification impacts of placemaking amenities. These equity concerns are important and deserve further research.

**Table 2. Summary of Studies of Hedonic House Price Models**

| Author (Year) | Study Area | Methodology | Walkability Results | Transit Results |
|---|---|---|---|---|
| Bartholomew and Ewing (2011) | Meta-analysis summarizing several studies | Survey and summary of existing literature | Transit-oriented development paired with pedestrian-oriented development increases home values | Transit-oriented developments result in varying impacts due to differing magnitudes of amenities and disamenities |
| Boyle, Barilleaux, and Scheller (2013) | Miami, FL | Linear hedonic fixed effects regression | Walkability (measured by Walk Score) was not associated with home values using a fixed effects method to control for unobserved heterogeneity | |
| Cervero (2002) | Santa Clara County, CA | | | Commercial retail values increased by 23 percent for a typical commercial parcel near a light rail station<br><br>Commercial retail values increased by 120 percent located within 0.25 miles of a commuter rail station |

| Author (Year) | Study Area | Methodology | Walkability Results | Transit Results |
|---|---|---|---|---|
| Cortright (2009) | Multi-city | Log-linear hedonic OLS regression | Thirteen out of fifteen cities showed positive impact of Walk Score on house prices. | |
| Debrezion, Pels, and Rietveld (2007) | Meta-analysis summarizing several studies | Meta-regression model with the effect size of the impact of railway station proximity as the dependent (Y) variable | | Commercial properties within 0.25 mile of a rail station see a larger price gap from properties located outside that range than do residential properties - on average, commercial properties have a 16.4% price increase whereas residential properties have a 4.2% price increase<br><br>Commuter railway stations have a consistently higher positive impact on property values compared to light rail station or bus stop |

| Author (Year) | Study Area | Methodology | Walkability Results | Transit Results |
|---|---|---|---|---|
| Duncan (2011) | San Diego, CA | Linear hedonic fixed effects regression | Home values increased when transit station distance was interacted with pedestrian-oriented development (measured by sidewalk slope, intersection density, and population-serving businesses) | |
| Li et al. (2015) | Austin, TX | Cliff-Ord spatial hedonic regression (also known as General Spatial Model) | Home values increased in areas of high walkability (measured by Walk Score and sidewalk density)<br><br>Walkability premium on home prices is higher areas with: more college residents, higher proportion Hispanic residents, higher income residents, lower crime rates. | |

| Author (Year) | Study Area | Methodology | Walkability Results | Transit Results |
|---|---|---|---|---|
| Matthews and Turnbull (2007) | King County, WA | Linear hedonic OLS regression | Pedestrian-oriented neighborhoods with a more gridiron-like street pattern associated with higher home values | |
| Pivo and Fisher (2011) | Various across U.S. | Linear hedonic OLS regression | Using 2001-2008 real estate performance data from the National Council of Real Estate Investment Fiduciaries, found walkability (measured by Walk Score) increased the market values of office (54 percent), retail (54 percent) and apartment (6 percent) properties<br><br>Walkability had a statistically insignificant effect on industrial properties | |

| Author (Year) | Study Area | Methodology | Walkability Results | Transit Results |
|---|---|---|---|---|
| Song and Knaap (2003) | Washington County, OR | Semi-log hedonic OLS regression, data from 1990 to 2000 | Pedestrian walkability has mixed effects on home values: 1) single family units within a quarter-mile of commercial uses have higher prices; and 2) single family units within a quarter-mile of a bus stop have lower values, controlling for other characteristics | |
| Seo, Golub, and Kuby (2014) | Phoenix, AZ | Translog (ln-ln) hedonic OLS regression including spatial lag and spatial error model (to mitigate hetero-skedasticity and spatial dependence) | | Home values increased near light-rail transit nodes |

| Author (Year) | Study Area | Methodology | Walkability Results | Transit Results |
|---|---|---|---|---|
| Wang (2016) | Seattle, WA | Linear hedonic OLS regression; before, during, after TOD construction time periods | | After the construction period, transit-oriented development has a positive impact on single-family home values located within 0.25 to 0.5 miles from a light rail station |

## VI. Business Benefits

In some instances, neighborhoods reduce VMT in business districts through traffic calming, closing streets to vehicle traffic, or supporting alternatives to driving. There are multiple ways that VMT reduction can benefit neighborhood businesses. For instance, increased pedestrian activity and accessibility for customers can lead to more visiting opportunities for retail businesses which can increase property values and retail sales if the increased foot traffic or longer "lingering" times offsets the effect of reduced automobile accessibility. It is possible that closing streets might not reduce automobile accessibility much, if nearby streets remain open to vehicle traffic as is typically the case. The studies in this section include street closures and other efforts that install pedestrian or bicycle amenities or calm traffic while keeping streets open.

Several studies surveyed businesses on their perception of the impact of pedestrianization (including street closures) and walkability. (For a list of the studies reviewed, see Table 3.) In these studies, the sample size ranged from 9 to 777 firms. Surveys and questionnaires were used both before and after periods of different pedestrianization and traffic calming measures, some of which spanned years. The studies varied in their research period, with some examining timeframes being as early as the 1990's and the more contemporary studies being in the 2010's.

Some of the studies analyzed policies that close off streets from vehicle traffic or that limited vehicle traffic. Initially, businesses were concerned that the reduction in automobile traffic

would hurt their business. The studies showed that business owners shifted to a positive perception after the traffic calming policies or street closures were instituted. For instance, after the implementation of bicycle lanes on Valencia Street in San Francisco, 66% of merchants surveyed indicated that they believed that bike lanes had a generally positive effect on business and/or sales and would support more traffic calming (Drennan and Kelly, 2003). At times, business owners' positive perception led them to attribute several benefits such as increased public safety and increased business revenue to the traffic calming policies (Wooller et al., 2012; Kumar 2006). The retail gains of the business owners varied in each study but showed increases in the majority of studies. In the Khao San Road project (a street closure and pedestrianization in Bangkok, Thailand), 47% of retail shops reported an increase in sales volume (or turnover) with 35% reporting no change (Kumar, 2006). Similarly, in Hong Kong, the pedestrianization of a two-way street retail area led to an approximately 17% increase in retail sales on average (Yiu, 2011). Hass-Klau's (1993) work mirrored these findings. Hass-Klau (1993) conducted a cross-country study of retail businesses in Germany and the United Kingdom. In addition to increased retail sales, better pedestrian flow, and improved perception of pedestrian streets, the Hass-Klau study found that pedestrianization led to increases in house prices and rents in the pedestrian street areas after the policies were implemented (Hass-Klau, 1993).

**Complete Streets in Lancaster, CA**

The City of Lancaster, located in Los Angeles County, wanted to revitalize its downtown. Part of the problem in attracting people and businesses was due to the dangerous and un-walkable nature of Lancaster Boulevard. A four-lane road with many traffic signals, cars sped by at 50 miles per hour, making it inhospitable to pedestrians and shoppers (National Complete Streets Coalition, 2012, p. 22). The City began its revitalization efforts in 2006 and in 2008 the City Council passed its final plan which included a $10 million Complete Streets design. The goals of the project were to improve walkability, increase pedestrian safety and reduce speeds (George, 2013, p. 65).

The following changes were made to Lancaster Boulevard as part of its Complete Streets design:

- Reduced the number of lanes from four to two, removed several traffic signals, installed a roundabout
- Created a central "rambla" (resembling the famous Barcelona street) which includes pedestrian-friendly infrastructure, parking spaces, and a community event space
- Widened and repaved sidewalks, added street lighting, and landscaped with more greenery.

Lancaster Boulevard is now branded as "The BLVD." The Complete Streets design has spurred economic development in the downtown by improving roadway safety for pedestrians. More than 40 new businesses opened following the redesign, private investment is estimated to be $125 million in downtown, and sales tax revenue increased 26 percent (National Complete Streets Coalition, 2012, p. 22).

Images:

https://i.ytimg.com/vi/pojylzK2uSM/maxresdefault.jpg
https://www.huduser.gov/portal/casestudies/images/artist_hsg/Image_10.jpg
https://www.cnu.org/sites/default/files/LancasterBoulevard_streetscape.jpg

Sources:

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The BLVD website: http://www.theblvdlancaster.com/downtown-lancaster.html; City Council of the City of Lancaster. (2010). "Resolution No. 10-68, [Downtown Lancaster Specific General Plan]." Accessed: http://www.cityoflancasterca.org/home/showdocument?id=12940

According to Weisbrod and Pollakowski (1984), pedestrian projects increased the entry of new businesses into downtown areas. Increased property value was associated with pedestrianization and walkability initiatives in Toronto, Canada and Washington D.C. (Prokai, 1991; Alfonzo et. al, 2012). Alfonzo et. al (2012) studied 71 neighborhoods within the Metropolitan Washington D.C. area and found that more walkable places perform better

economically. On average, more walkable places had $6.92/sq. ft. per year higher retail rents and generated 80 percent more in retail sales when compared to the places with fair walkability (Alfonzo et. al, 2012). In addition, an increase in walk score resulted in an increase in retail sales, office rents, and residential property values (Alfonzo et. al, 2012).

**Union Square North, Manhattan, New York City**

Union Square in Manhattan, New York City (an area that is about 9 acres or a little less than 400,000 square feet) is a constantly traversed area, "sometimes seeing up to 200,000 pedestrians on peak summer days" (NYC Press Release, 2010). It is a popular destination known for its Greenmarket, shops, restaurants, street chess, and being a gathering point for social and political activism.

In 2010, the New York City Department of Transportation (NYCDOT) announced its street redesign project for Union Square. The goal was to improve pedestrian safety and park access while maintaining economic vitality in an area that had 95 pedestrian injury crashes from 2004 to 2008 (NYC Press Release, 2010).

The project, developed with input from the community, supported by the area's Community Board and backed by the Union Square Partnership and local businesses, was able to implement the following (NYC Press Release, 2010 and Union Square Project Proposal, 2010):

- Converting portions of 17th Street to one-way traffic
- Adding pedestrian areas
- Reducing through traffic lanes on Broadway from 23rd to 18th Streets to one lane with safety islands and protected bike path
- Simplified traffic signals to improve pedestrian safety.

The street redesign project allowed Union Square to remain a vibrant neighborhood while also becoming more safe (NYC Press Release, 2010). An NYCDOT evaluation in 2012 found that injury crashes in Union Square had dropped 26 percent while commercial vacancies had dropped by 49 percent.

Sources:

NYCDOT (2012) Measuring the Street: New Metrics for 21st Century Streets http://www.nyc.gov/html/dot/downloads/pdf/2012-10-measuring-the-street.pdf

NYC DOT Announces Completion of Union Square Redesign, Improving Safety and Park Access Press Release. http://www.nyc.gov/html/dot/html/pr2010/pr10_043.shtml

Union Square Project Proposal. New York City Department of Transportation. 6/21/2010. http://www.nyc.gov/html/dot/downloads/pdf/20100610_broadway_union_square.pdf

When analyzing the studies, the type of pedestrian project and the location of the efforts should be considered. When analyzing how downtown revitalization projects affected retail sales, Weisbrod and Pollakowski (1984) discovered that revitalization of downtowns had little to no impact on employment growth of existing retail business in the area but revitalization efforts did increase new business openings in the downtown areas. The studies of full street

closures are outside of the U.S., and we caution that the evidence of positive impacts of pedestrian projects in the U.S. is largely from projects that increase pedestrian and non-motorized travel, rather than full street closures. Pedestrianization efforts in Toronto, Canada saw an increase in vacancy rates even though prior literature had shown a negative relationship between pedestrianization and vacancy rates (Prokai, 1999).

Summarizing, there are relatively few studies in this area, but the surveys of business owners suggest that initial business concerns about pedestrian projects shifted to a positive attitude after the project was completed. Studies of property values, while relatively few in number, suggest that when implemented in areas of high foot traffic (or high potential foot traffic), pedestrianization is associated with increased sales and, through that, increased commercial property values.

**Table 3. Summary of Economic/Retail Benefits of Pedestrianization**

| **Author (Year)** | **Study Area** | **Methodology** | **Results** |
|---|---|---|---|
| Alfonzo, et. al (2012) | Walkable Places and Economic Performance, Metropolitan Washington, D.C. | Hedonic regression analysis using Walk Score and Irvine-Minnesota Inventory to measure walkability | Higher Walk Score locations performed better economically. Walk Score correlated with increases in retail sales, office rents, and residential housing values. In addition, higher Walk Score locations benefitted from being near other high Walk Score locations. |
| Drennen and Kelly (2003) | Economic Effects of Traffic Calming on Urban Small Businesses on Valencia Street in San Francisco | Interviews with street merchants, N=27 | 66% of merchants believed that the bike lanes have had a positive effect on business and/or sales. They stated they would support more traffic calming on Valencia Street.<br>37% of surveyed business owners believe that sales |

| Author (Year) | Study Area | Methodology | Results |
|---|---|---|---|
| | | | increased due to new customers from outside the neighborhood being able to visit their business because of traffic calming policies |
| Hass-Klau (1993) | How does pedestrianization affect retail in United Kingdom and Germany | Survey, Germany N=777 UK N=400 | Increases in pedestrian flow were associated with business turnover.<br>Housing rents/costs increase in pedestrian areas after traffic calming measures |
| Kumar (2006) | Khao San Road, Bangkok.<br><br>Effects of pedestrianisation on commercial and retail sales. Business types categorized by food stalls, shops, guest houses, and travel agencies | Survey, N=110 | 47% of retail shops had increase in revenue sales, 35% had no change, while 18% had a reduction<br>65% increase in favorability of pedestrian project after development from 20% favorability (before) to 85% favorability (after) |
| New York City DOT (2012) | New York City | Post-project metrics of economic vitality | Union Square North in Manhattan saw 49% fewer retail vacancies after the addition of a new pedestrian plaza and protected bicycle lanes. Pearl Street in Brooklyn saw 172% increase in retail sales after pedestrian plaza |

| Author (Year) | Study Area | Methodology | Results |
|---|---|---|---|
| Prokai (1999) | Impacts of pedestrian friendly streetscape improvements on two retail areas in Toronto, Canada | Indicator Analysis of Trends and Distribution, Often Simple Before-After Comparison of Data without Statistical Controls | Property values were higher where streetscape improvements were done.<br>Studies indicated an increase in vacancy following pedestrian projects. |
| Robertson (1991) | Examines the city centers of six Swedish cities to help better understand the extent to which pedestrian streets have changed over time in terms of retail trends. | Interviews | Interviewees' believed that pedestrian streets helped to strengthen the commercial cores of Swedish cities. Prior to the expansion of central pedestrian district, downtown merchants had a negative perception of central pedestrian districts. |
| Weisbrod and Pollakowski (1984) | Effects of Downtown Improvement Projects on Retail Activity | Regression of data for 14 shopping malls that were part of downtown pedestrian revitalization projects | Downtown revitalization projects sometimes had no statistically significant impact on observed growth or exits of existing establishments.<br>Revitalization projects did have a statistically significant positive effect on rates of new establishment entry into revitalization areas. |

| Author (Year) | Study Area | Methodology | Results |
|---|---|---|---|
| Wooller, Badlam, and Schofield (2012) | Pedestrianization Benefits, New Zealand | Semi-Structured Interviews, N=9 | Perception of interviewees was that pedestrianization encouraged leisure business.<br><br>Perception of co-benefits included public safety, accessibility, and exercise |
| Yiu (2011) | Pedestrianization and Retail Rents, Hong Kong, China | Two-street, Two-period Regression Model | Pedestrianization increased the retail rental value of the street by approximately 17%. |

## VII. Discussion: Synthesizing a Systems View of the Economic Benefits of Transportation

The literature on economic benefits of transportation falls into two parts – what we called the "old" and the "new" views – with little cross-talk or connections between those two literatures. The different views evolved at different times (roughly the early and mid-Interstate Highway era for the old view versus the past two decades for the new view), focusing on different policy questions (increased VMT versus neighborhood placemaking) and different geographic scales (metropolitan areas or larger geographies versus neighborhoods). We first summarize the results from the "new" view studies surveyed here, and then suggest a policy synthesis.

The studies on residential benefits of VMT-reducing placemaking provide evidence that house prices are higher, controlling for other factors, in neighborhoods with good pedestrian characteristics. Higher neighborhood Walk Score (indicating better pedestrian access to destinations) is associated with higher house values, suggesting that persons value the package of amenities that is associated with walkable neighborhoods. Transit access also is associated with higher house values, although that effect varies across studies and the transit house price premium is larger in more walkable neighborhoods.

Business surveys indicate that businesses in locations where streets were closed or where traffic lanes were reduced had a generally positive view of the impact on their retail sales. Some evidence indicates that increases in commercial property prices are associated with pedestrianization. Some of these business impact studies might be subject to "survivor bias",

surveying firms that remained in the neighborhood after the pedestrianization project was completed and hence missing firms whose business could not adapt and that thus left the neighborhood or ceased operations. Yet some of the survey studies contacted firms before and after pedestrian improvements, and those surveys showed large increases in business favorability from before-project to after the project was completed.

One caution for both the residential house price and business impact studies is that the research might have focused on places where pedestrianization and placemaking was most likely to have a positive impact. Policy activity often focuses on locations that are primed to benefit, and researchers might also choose neighborhoods where the placemaking activity was likely to provide benefits, if for no other reason than that such places are more visible to researchers. While the results suggest positive impacts on residents and businesses, it would be premature to generalize that every place will benefit. We suggest that the evidence is best interpreted as showing that thoughtfully applied placemaking activity has positive impacts; not that any and every VMT-reducing placemaking in any location will produce benefits.

The studies on agglomeration show that the benefits from businesses locating near other businesses is often a short distance phenomenon – in some cases at a scale of from one to five miles. Knowledge industries and creative activities particularly benefit from agglomeration economies, and hence transportation plans that allow firms, employees, and customers to interact quickly and seamlessly, often in a face-to-face fashion, will be important for the economic health of cities. The evidence does not indicate that those interactions need be at a walking scale, and the geographic scope of agglomeration benefits, while covering short distances, is larger than the scale of many neighborhoods.

The most applicable "old view" studies are those more recent works that show economic benefits from reduced congestion in a metropolitan area (e.g. Hymel, 2007; SCAG, 2016). These works indicate that increasing access within a metropolitan area is important for economic growth – a finding consistent with the literature on agglomeration economies. But building highways is not a fruitful way to increase access in metropolitan areas. Studies have shown that in congested metropolitan areas, additional highway capacity leads to induced travel, such that new highway capacity does not reduce congestion (e.g. Duranton and Turner, 2011). For that reason, congestion reduction is not nearly as simple as building more highways – and highway building alone will not lead to lower congestion levels in large metropolitan areas.

Overall, these results suggest a systems approach (Figure 1). At the scale of a metropolitan area, economic growth flows from transportation policies that reduce congestion and/or increase access, thus allowing more seamless business interactions and more easy reach from firms to output and labor markets. Many neighborhoods will benefit from policies that reduce VMT while producing placemaking amenities, but creating an entire metropolitan area of slow-moving traffic in pedestrianized places would not allow the high throughput that metropolitan areas need to increase accessibility. A hierarchy of transportation links is the best approach. High throughput routes, ideally congestion priced, should connect neighborhoods within

metropolitan areas, while those neighborhoods should, as often as possible, support multiple travel modes that have amenities associated with walkable locales. There will still be a role for suburban office parks with easy automobile accessibility (not every place can be an urban neighborhood), but even in those more suburban places planners should include the amenities and transportation options that, research has shown, produce value for residents and firms.

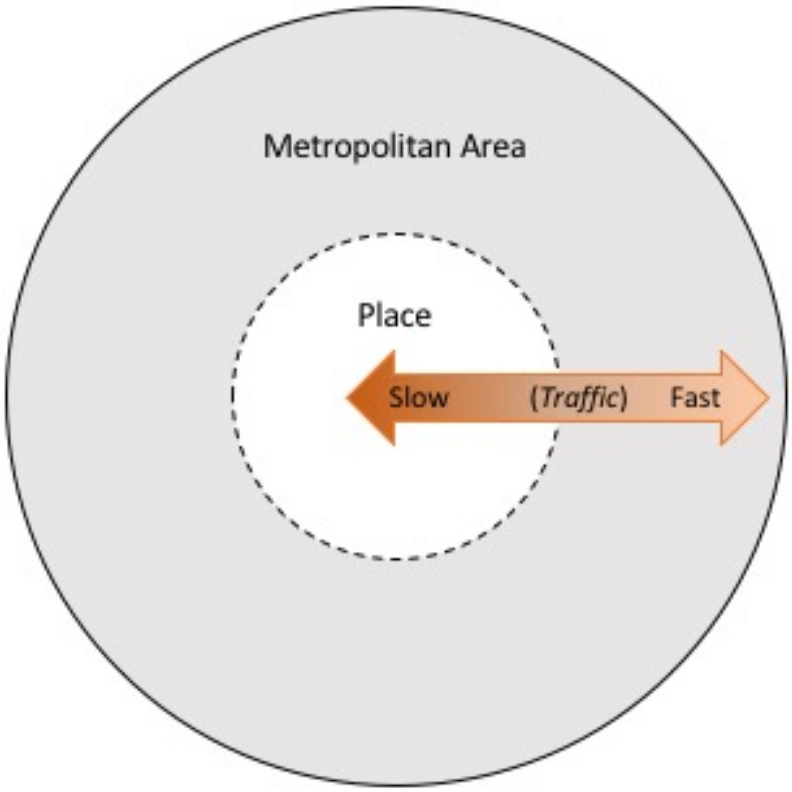


**Figure 1. Systems approach to transportation policy promoting economic benefits in both place and larger metropolitan area**

Can a car-only transportation system support this hybrid of regional accessibility and neighborhood placemaking? We believe the answer is "no", particularly in larger metropolitan areas. The walking-oriented design elements and pedestrian neighborhoods that help create placemaking benefits are often seamlessly associated with alternatives to automobile travel. Those designs are often associated with first-last mile transit access or with plans to increase non-motorized travel. There is a role for the car, but a car-only metropolitan transportation plan leaves little room for walkable placemaking at the neighborhood scale. The best approach is the one being pursued in many cities – travel options and alternatives that view the automobile as one of many ways to travel, but not the only travel mode. In large metropolitan areas, a systems view will require high throughput transit that can support densities that highways cannot support (e.g. the central business districts in Los Angeles or San Francisco),

ideally congestion priced highways and major transit links, and careful focus on first-last mile neighborhood accessibility that has a robust role for placemaking amenities.

Neighborhood placemaking, in this view, is a concomitant of transportation systems based on a backbone of high throughput intra-metropolitan connectors that link to neighborhoods through a range of modes that include transit, walking, and bicycling. The transportation system, in this view, is about more than movement. It connects people and firms at the metropolitan scale, while focusing on providing amenities and weaving into the urban fabric at the neighborhood scale. Transportation planning, in this view, includes urban design, human interaction, and accessibility.

Equity considerations will be important in a placemaking-oriented view of transportation planning. Higher income neighborhoods are often the places with the resources and political clout to pursue placemaking initiatives. Pedestrianized streets, traffic calming, and bicycle lanes are more commonly found in high-income than low-income places. One risk of neighborhood-led planning is that those neighborhoods with the resources to engage in placemaking will do so, leaving other neighborhoods behind. For that reason, placemaking should have a strong role for equity, with purposeful efforts to bring placemaking to neighborhoods that may not have the resources or political power to pursue such initiatives by themselves. Such an equity-focused placemaking should empower local communities. The best placemaking is typically organic and informed by local needs, and hence it would be unwise to foist a placemaking view on a neighborhood from the outside. As neighborhoods become more important in transportation planning, transport planners will have to shift from top-down approaches to methods that empower and engage communities.

Overall, the evidence suggests that placemaking initiatives, pursued in ways that reduce neighborhood VMT, bring benefits that are valued by residents and firms. Placemaking will require a more multi-modal transportation planning, focusing on neighborhood context and engaging and empowering communities while building system backbones that increase access throughout the metropolitan area. This synthesis is appropriate and necessary for an era in which the automobile, while still important, cannot meet all our accessibility needs. There is a need for more research that further explores the impacts of small scaled placemaking and its effects on local economies and redefining accessibility.

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