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The Mobility-Productivity Paradox

Understanding the Negative Relationship Between Mobility and Economic Productivity

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This study finds that economic productivity tends to decline when motor vehicle travel increases.

Abstract

This study explores a paradox: the negative relationship between mobility (motor vehicle travel) and economic productivity. Contrary to popular perceptions, more driving tends to make communities less prosperous. Conventional planning often assumes that faster, cheaper and more vehicle travel supports economic development but evidence described in this study indicates that, on the contrary, in mature economies productivity tends to decline with more driving and increases with non-auto travel. This study investigates why this occurs. It identifies six specific ways that automobile-oriented planning reduces productivity including higher user costs, increased public infrastructure and external costs, reduced non-auto mobility options, higher sprawl-related costs, reduced spending on local goods and services, and less attractive urban environments. These impacts filter through the economy, reducing overall productivity, employment, incomes, economic opportunity, property values and tax revenues. This study indicates that productivity increases with more efficient transportation, so economic activities require less driving. It identifies ways that transportation agencies, business and individuals can better achieve economic goals.

Urban areas tend to be more economically successful if they are compact and multimodal, with complete sidewalk and bikeway networks, convenient transit, narrow roads and limited land devoted to parking, which minimize vehicle traffic speeds and volumes. This provides access to non-drivers as well as motorists, reduces total transportation costs, and creates environments attractive for residents, customers and workers.

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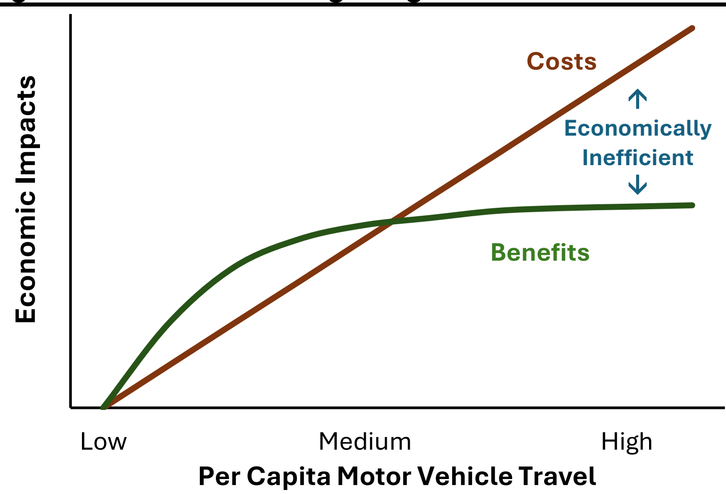
Introduction

This study investigates the relationship between *mobility*, the amount that people travel, and *economic productivity*, people's ability to produce and ultimately consume goods and services. It finds that in developed country cities, increases in urban vehicle travel tend to reduce productivity. This occurs despite the fact that increased productivity increases incomes which allows residents to purchase more mobility. This contradicts conventional assumptions that faster and cheaper driving are economically beneficial.

Of course, in many situations, motor vehicle travel does increase productivity. Farmers, carpenters and visiting nurses usually accomplish more if they travel by automobile than using other modes. However, motor vehicle travel also imposes large costs to users (to own and operate vehicles), governments and businesses (for roads and parking facilities) and communities (from congestion, crash risk and pollution damages imposed on other people). Motor vehicles tends to displace other modes, reducing non-drivers' productivity. As vehicle travel increases, benefits tend to decline marginally while costs increase linearly, so a growing portion of driving is economically inefficient, its costs exceed its benefits, as illustrated below.

Figure 1 **Diminishing Marginal Benefits and Linear Costs**



When vehicle travel is low it tends to serve higher value trips such as freight, essential services and public transport. As mobility increases, benefits increase at a declining rate since the most valued trips have been taken, so additional vehicle-miles are incrementally less productive, while costs tend to increase linearly. As a result, at high levels of mobility an increasing portion of travel is economically inefficient: its marginal costs exceed its marginal benefits, which reduces productivity.

This suggests that in most developed country cities, the best way to increase productivity is to increase transportation system efficiency, so economic activities require less vehicle travel. When it comes to transportation, less is often more.

This paper explores this paradox. It summarizes research concerning the negative relationships between mobility and economic productivity, investigates ways that increased mobility can reduce productivity, discusses the implications of these findings for planning, and provides guidance for transportation policies to support economic development goals. This should be of interest to policy makers, economists, business managers, transportation practitioners, and anybody who wants transportation planning to better balance economic, social and environmental goals.

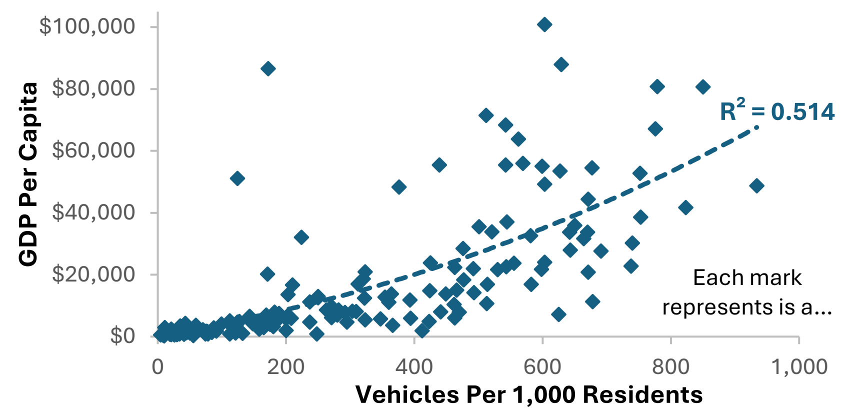
Mobility-Productivity Relationships

This section examines the relationships between economic productivity and transportation factors.

Productivity refers to the value of goods and services produced. When possible, it should be measured directly. For example, affluent suburbs can have high household incomes but low productivity, while central cities often have lower household incomes but high productivity, wages, property values and tax revenues due to agglomeration efficiencies.

Economic productivity (measured as gross domestic product, or GDP) tends to increase with vehicle ownership, as illustrated below. The high R^2 value indicates a statistically strong relationship but the direction is unclear: vehicle ownership may increase productivity or increased prosperity may allow more vehicle purchases. Researchers who investigate this conclude that in developed countries the primary effect is that higher productivity increases vehicle ownership (McMullen and Eckstein 2011).

Figure 2 **Productivity Versus Vehicle Ownership** (Vehicles and GDP)



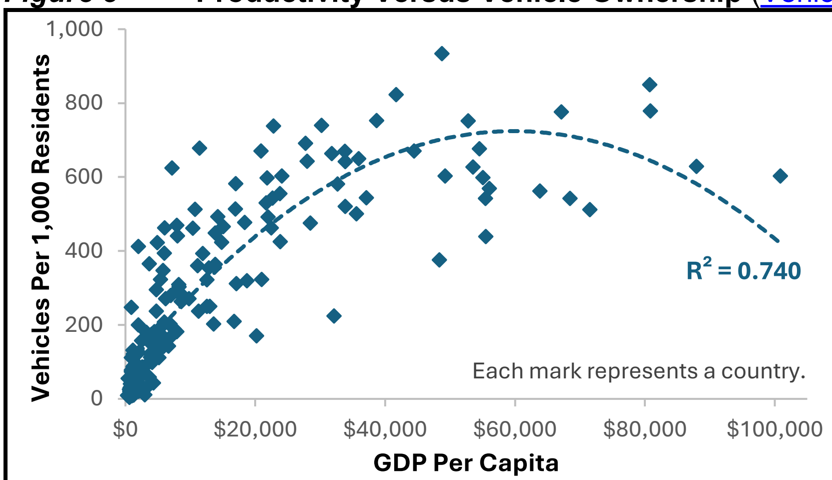
Since there is no reliable source of vehicle travel data, vehicle ownership is used as an indicator.

Researchers conclude that this mainly reflects households' greater ability to afford vehicles as their prosperity increases.

The 0.514 R^2 indicates a strong statistical relationship.

The figure below presents the same data in a different format. Vehicle ownership increases with GDP up to about $50,000 per capita and subsequently declines. Mode share data have similar results (Fountas, et al. 2020). This suggests that beyond optimal levels, additional vehicle ownership and use does not increase productivity.

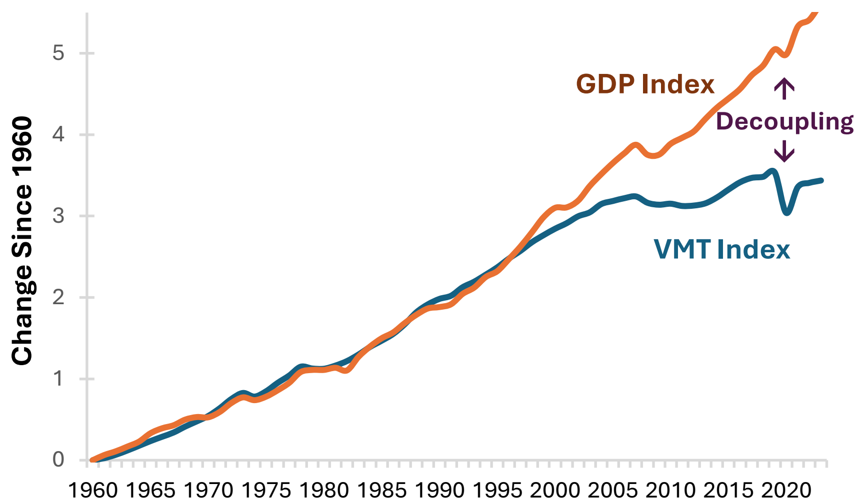
Figure 3 **Productivity Versus Vehicle Ownership** (Vehicles and GDP)



Per capita vehicle ownership increases as productivity grows from low to moderate levels, but peaks at about $50,000 GDP per capita and declines slightly at higher levels. This indicates that at high levels vehicle ownership saturates, and more affluent people tend to drive less. The 0.740 R^2 indicates a very strong statistical relationship.

Productivity and vehicle travel have *decoupled* in developed countries. During the twentieth century, vehicle travel and economic productivity were closely aligned. but in the twenty-first century vehicle travel peaked while productivity continued to grow as new efficiencies and technologies reduced the amount of vehicle travel required for economic activities (Ecola and Wachs 2012). The following figure illustrates these trends in the U.S.

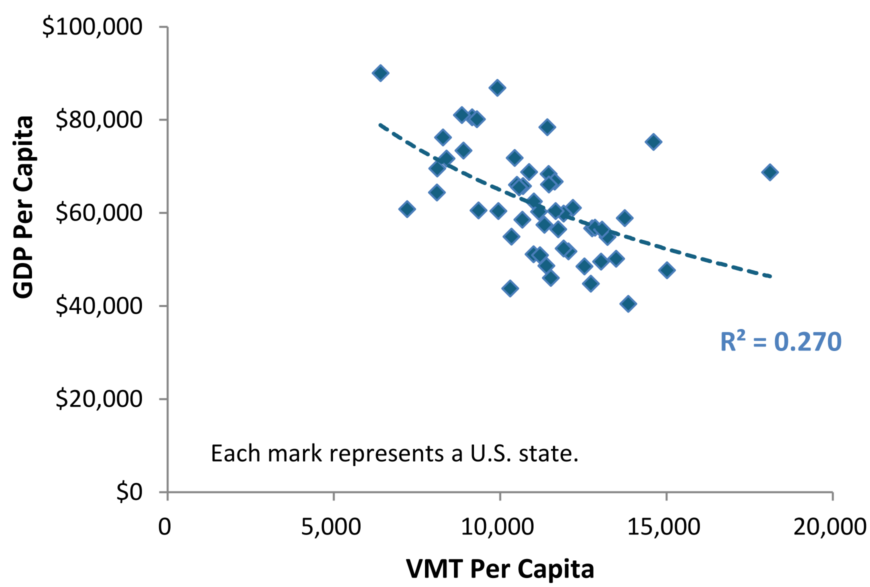
Figure 4 **U.S. Productivity and Vehicle Travel Tends** (FHWA and BEA Data)



Although vehicle miles travelled (VMT) and economic productivity (GDP) were closely aligned during the twentieth century, early in the twenty-first century they decoupled as new efficiencies and technologies, such as telework and e-bikes, reduced the vehicle travel that economic activities require.

The following figure shows the negative relationship between mobility and productivity for U.S. states: productivity declines as vehicle-miles increase, the opposite of common assumptions.

Figure 5 **Productivity Versus Vehicle Travel for U.S. States** (FHWA 2020, PS-1)

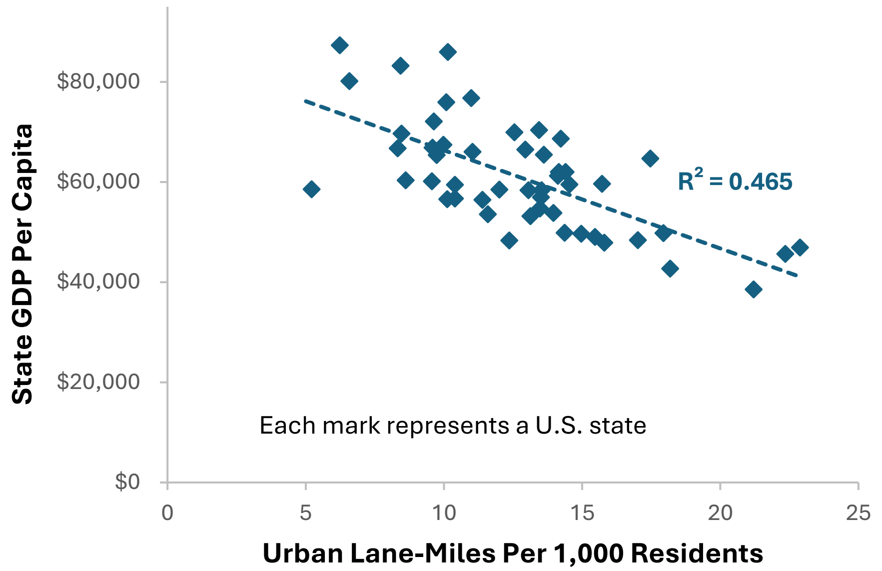


States with lower per capita vehicle miles travelled (VMT) tend to have higher gross domestic product (GDP). This contradicts the common assumption that increasing vehicle travel increases productivity.

The R^2 of 0.270 indicates a moderate statistical relationship.

The figure below shows that productivity declines as urban lane-miles increase, indicating that expanding urban roadways is economically harmful. This does not apply to rural roads.

Figure 6 **Productivity Versus Urban Lane Miles** ([FHWA 2024, PS1](#))

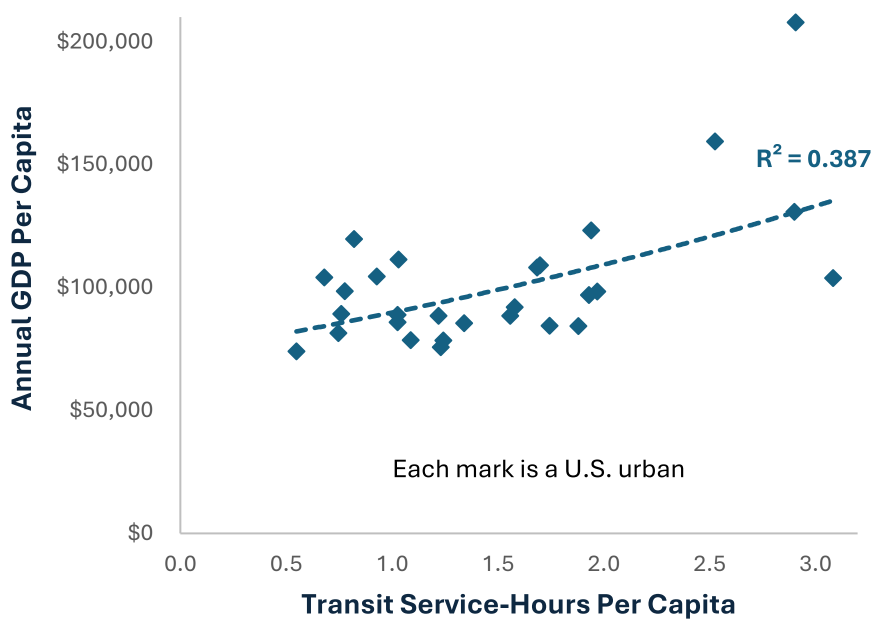


Economic productivity declines with more urban roadway supply. The 0.465 R^2 value reflects a moderate statistical relationship. The relationship between GDP and total state lane-miles per capita is much weaker.

This indicates that urban roadway expansions are often economically harmful because they degrade other types of travel, particularly walking, and they induce inefficient vehicle travel and sprawl.

The figure below shows that regional productivity tends to increase with transit supply (the amount of transit service provided).

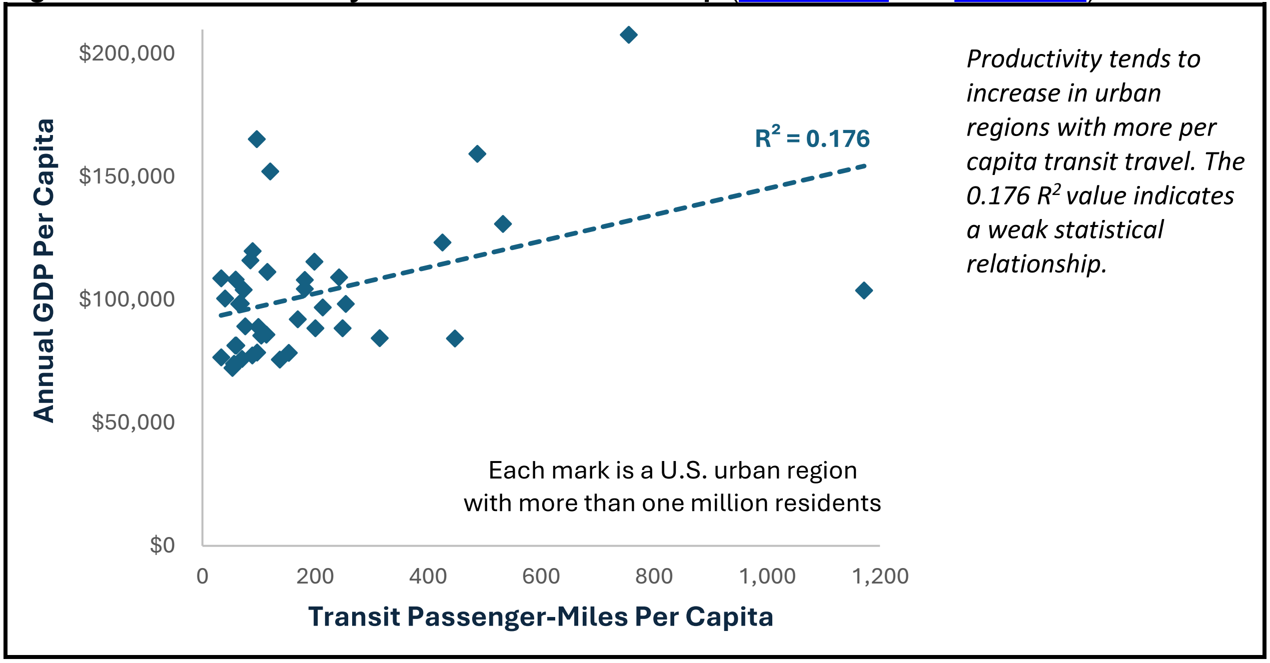
Figure 7 **Productivity Versus Transit Supply** ([APTA 2020](#) and [BEA 2024](#))



Productivity tends to increase in urban regions with more per capita transit service measured as train and bus revenue-hours per capita. The 0.387 R^2 value indicates a moderate statistical relationship.

The figure below shows that regional productivity tends to increase with transit ridership.

Figure 8 **Productivity Versus Transit Ridership** ([APTA 2020] and [BEA 2024])



The figure below shows that urban region productivity increases with active (walking and bicycling) commute mode shares.

Figure 9 **Productivity Versus Active Mode Shares** (([FHWA 2024] and [ABW 2024])

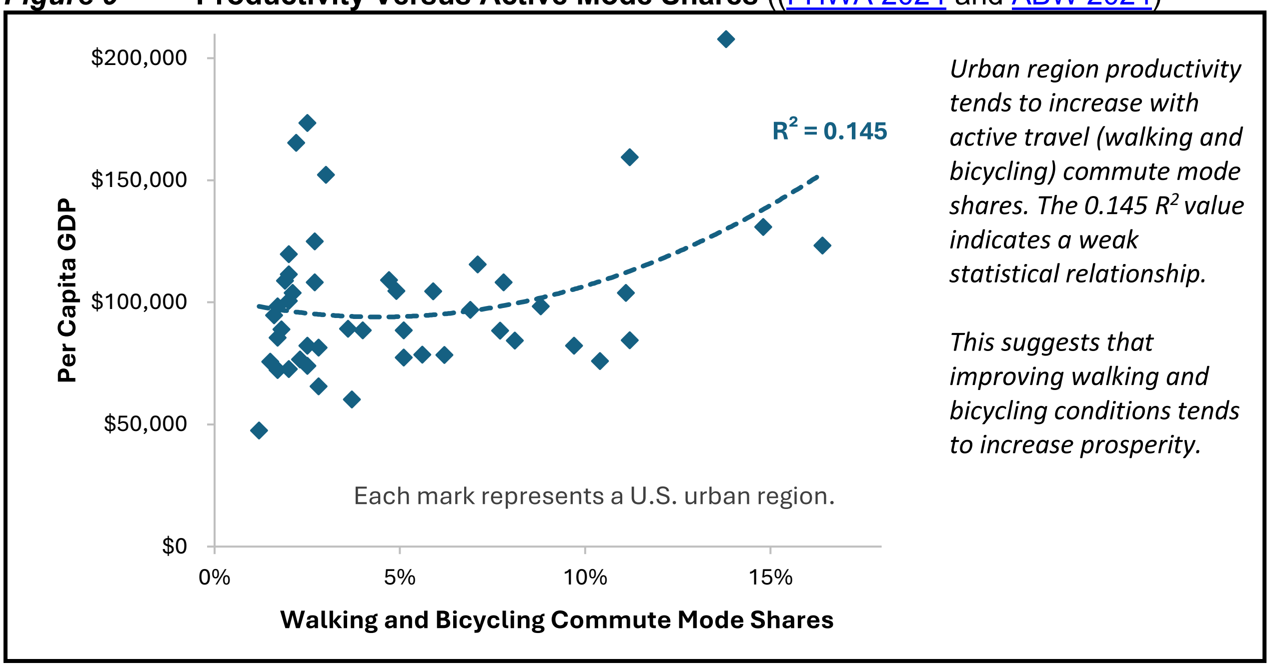
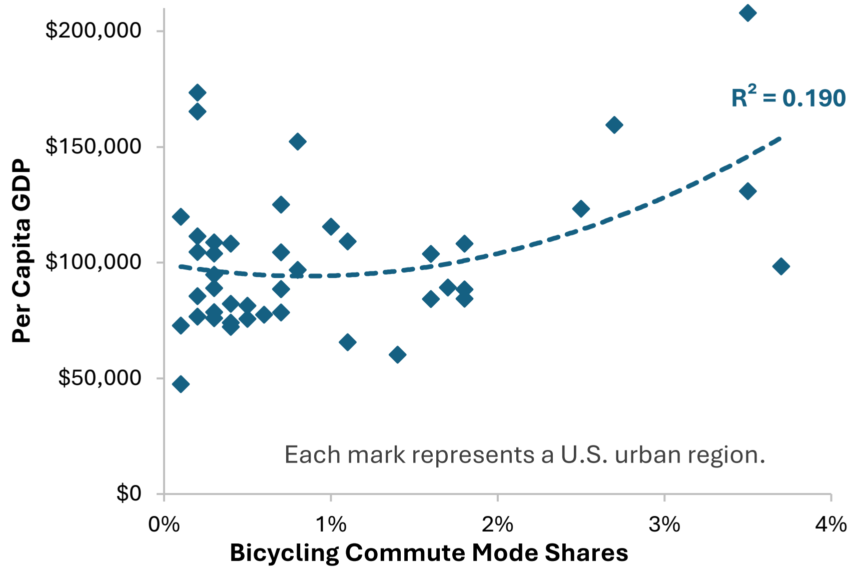


Figure 10 **Productivity Versus Bike Commute Mode Shares** (FHWA 2024 and ABW 2024)



Urban region productivity tends to increase with bicycle commute mode shares. The 0.190 R^2 value indicates a moderate statistical relationship.

This suggests that improving bicycling can conditions increase prosperity.

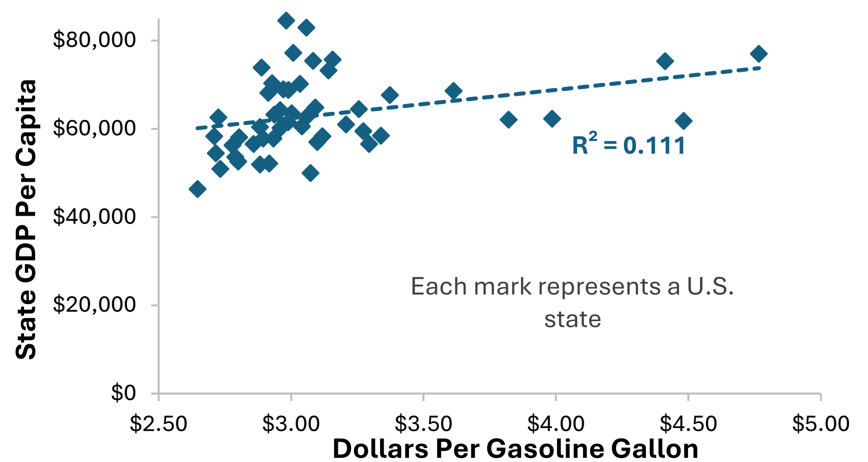
The figure below shows that productivity tends to increase with regional population density, an effect called *agglomeration efficiencies* (Ahrend, Lembcke and Schumann 2017; Angel and Blei 2015; Melo, Graham and Noland 2009). The statistical relationship is strong. This reflects the benefits of increased proximity (reduced travel distances) and travel diversity (better non-auto travel). It implies that policies that improve non-auto accessibility, so less economic activities require less vehicle travel, tend to increase productivity.

Figure 11 **Productivity Versus Urban Density** (FHWA 2024, PS1)

Productivity tends to increase with urban region population density. The 0.325 R^2 value indicates a moderate statistical relationship.

It indicates that policies that encourage compact development tend to increase productivity.

Figure 12 **Productivity Versus Fuel Prices, US States** ([Gas Buddy 2025])

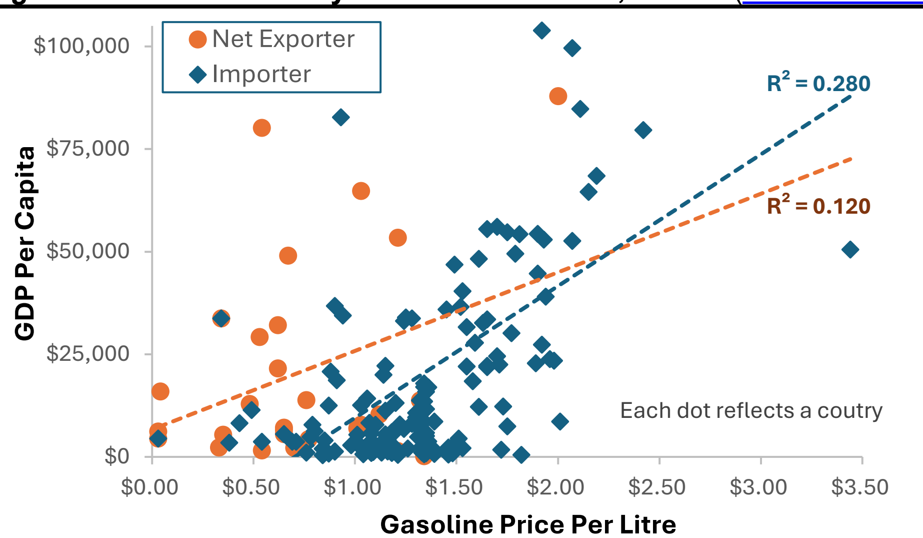


Productivity tends to increase with fuel prices. The 0.111 R^2 value indicates a weak statistical relationship.

It implies that, contrary to common assumptions, higher fuel prices tend to increase productivity.

Many people assume that low fuel prices increase economic productivity by reducing producer and consumer costs, but the relationship is actually positive; higher fuel prices are associated with more economic productivity, as illustrated in these two graphs. This suggests that by encouraging more efficient energy use and transportation, higher fuel prices help increase economic productivity.

Figure 13 **Productivity Versus Fuel Prices, Global** ([Global Petrol Prices 2025])



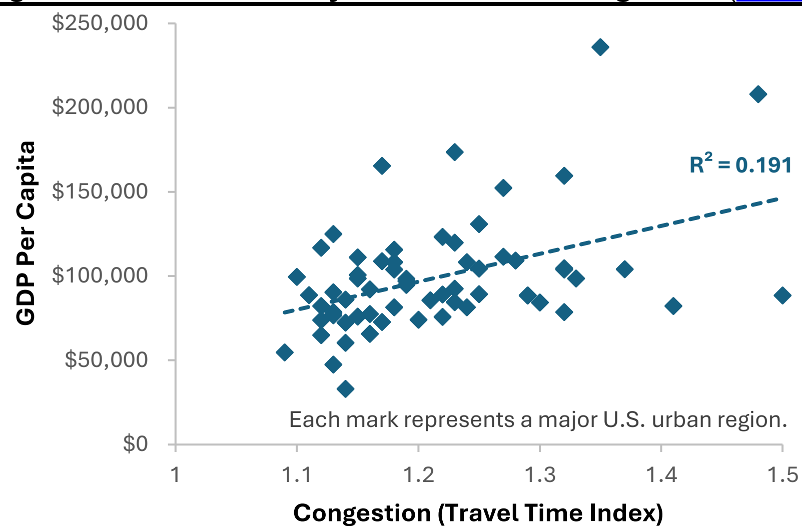
National productivity tends to increase with fuel prices, particularly for petroleum importing countries, indicated by a higher R^2 (0.280) and steeper slope.

This suggests that higher fuel prices increase productivity by encouraging more efficient energy consumption and transportation.

This relationship is particularly strong for petroleum importing countries, which makes sense since higher fuel prices increase transportation system efficient and dampen fuel and vehicle import costs which leaves more money circulating in their national economy. Petroleum producing countries can also benefit from high fuel prices to discourage domestic consumption, leaving more product to export. A good example is Norway, a major petroleum producer that maintains one of the world's highest fuel taxes and invests heavily in non-auto modes, resulting in a diverse and successful economy. In contrast, oil producing countries with low fuel prices, such as Venezuela, Nigeria and Iran, fail to develop non-petroleum industries, reflecting what economists call the *resource curse*.

Conventional planning assumes that traffic congestion is economically harmful and urban roadway expansions increase productivity (TTI 2023), but the figure below indicates the opposite: productivity tends to *increase* with congestion intensity. As previously indicated, productivity tends to decline with more urban lane-miles, indicating that efforts to reduce congestion by expanding roadways tend to be economically harmful overall; their costs exceed their benefits (Litman 2023; Metz 2021).

Figure 14 **Productivity Versus Traffic Congestion** (FHWA 2024, PS1) and TTI 2023)

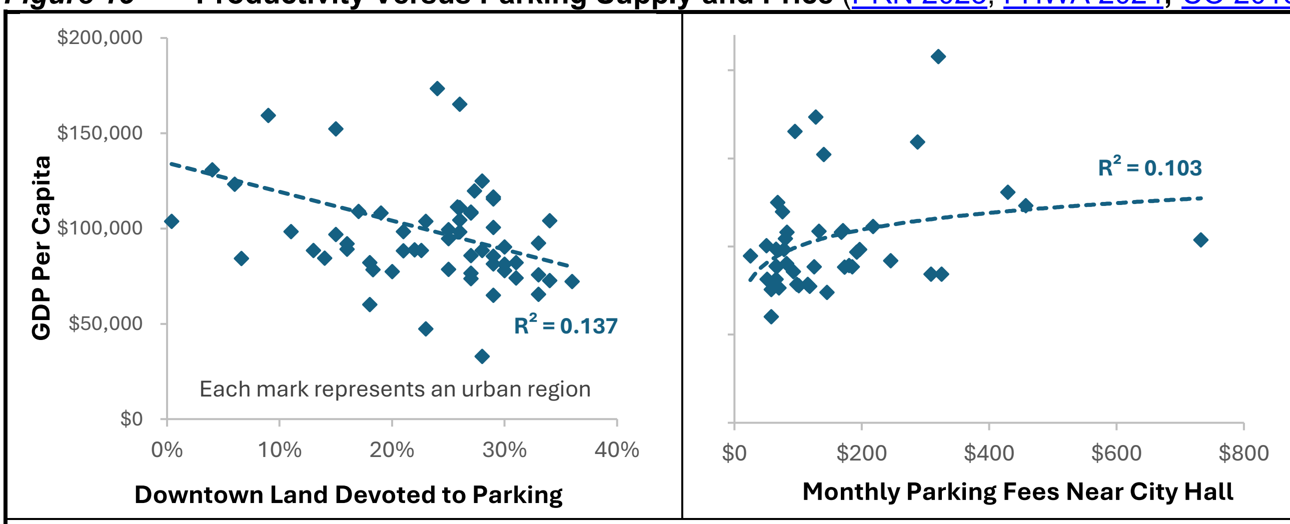


Productivity tends to increase with urban traffic congestion. The 0.191 R^2 value indicates a moderate relationship.

This contradicts the common assumptions that congestion constrains economic activity and that faster vehicle traffic increases productivity. It suggests that other types of accessibility improvements, such as multimodal planning, can do more to improve prosperity.

Similarly, businesses often argue that commercial districts need abundant and free parking, but productivity tends to increase with less city center parking and higher parking prices, as indicated below. Reducing parking supply and increasing fees can improve urban efficiency by freeing up urban land for more productive uses and encouraging more resource-efficient travel.

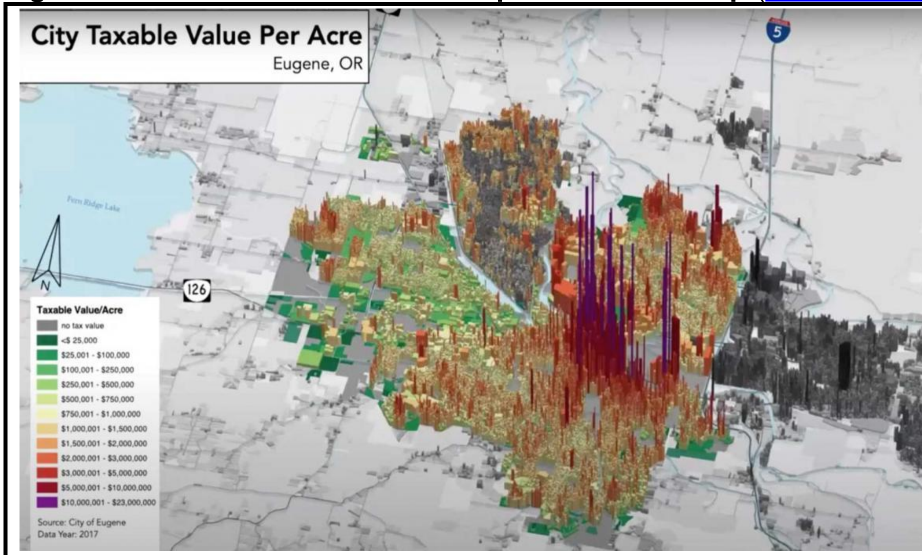
Figure 15 **Productivity Versus Parking Supply and Price** (PRN 2023; FHWA 2024; CO 2016)



Productivity increases as downtown parking supply declines and prices increase. This suggests that commercial districts become more successful if they limit driving and parking, and encourage more efficient alternatives.

Similar patterns occur at finer geographic scales. Neighborhood productivity, employment, incomes, property values, tax revenues and innovation tend to increase with density, mix and non-auto travel (Boarnet, et al. 2017; Ahlfeldt and Pietrostefani 2019; Minicozzi 2012). The heatmap below shows how urban property values and tax revenues increase with density.

Figure 16 **Taxable Value per Acre Heatmap** (Urban Three)



Compact and multimodal development tends to generate higher property values and tax revenue per acre than auto-dependent sprawl, as illustrated in this heatmap. Column height and color indicate taxable value per acre. Improving non-auto modes, reducing auto trips, and reducing the land area devoted to parking supports such development.

In the past, businesses often assumed that motorists are better customers and workers so improving automobile travel supports economic development, but this research indicates otherwise. Many cities are attracting economically successful residents who prefer non-auto travel and want less vehicle traffic. More compact and multimodal urban neighborhoods tend to attract more residents, customers, and workers by increasing development density and mix, improving multimodal accessibility, reducing vehicle traffic and reducing parking costs. For example, in auto-dependent areas where most customers and workers drive, parking subsidies represent about 20% of rents; in multimodal areas where only half drive, rents can decline about 10%, and the pool of potential workers increases 10-30%, representing non-drivers.

These savings and benefits tend to increase property values. A-10 point Walk Score increase typically raises residential and commercial property values 5-10% (Alfonzo 2015; Bokhari 2020); proximity to transit stations typically raises property values 10-40% (Smith and Gihring 2023); complete streets and bikelanes tend to increase business sales and profits (Arancibia, et al. 2019; Liu and Shi 2020). One study found that of 11 complete streets projects studied, most increased local employment, property values and private sector investments, and many saw new businesses (SGA 2015).

These are not just economic transfers in which some areas benefit to others detriment; compact, multimodal communities provide true resource savings and efficiencies that can benefit everybody. The results of this analysis are very consistent: productivity declines with virtually every indictor of urban vehicle travel (more vehicle-miles, urban lane-miles, parking supply and sprawl), and increases with every indicator of multimodalism and urbanization (reduced VMT, higher non-auto mode shares, density and higher parking and fuel prices). This validates related research on agglomeration efficiencies and the economic productivity benefits of urbanization.

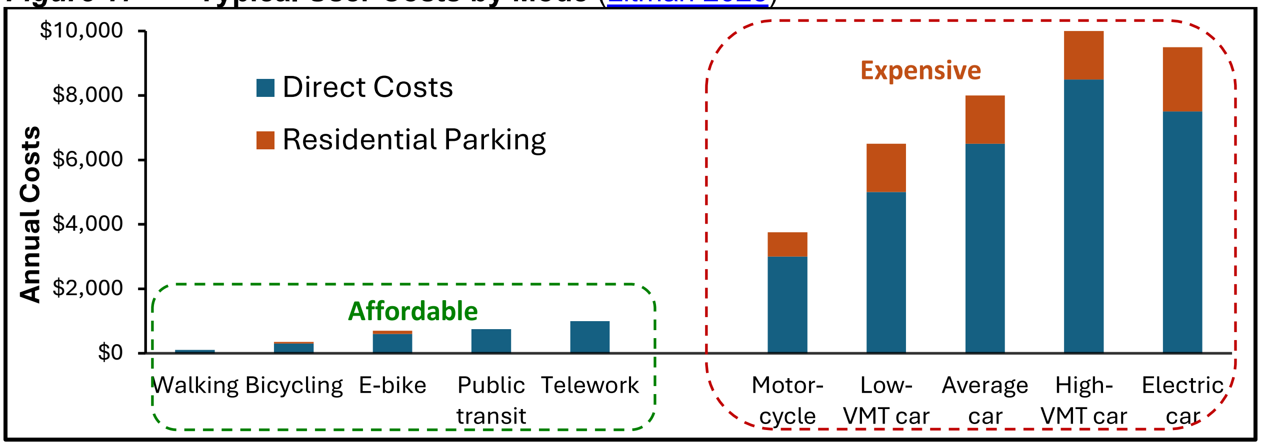
Explaining the Paradox

This section examines possible reasons that productivity declines with increased motor vehicle travel.

User Costs

Driving is much more expensive than other modes, as illustrated below. Owning, operating and parking an average automobile typically costs $8,000 annually, more than 10% of average household budgets. These cost burdens reduce economic opportunity and productivity. For example, high vehicle expenses prevent some people from affording education that would increase their future productivity and incomes, and auto-dependent areas have high home foreclosure rates due to occasional financial shocks caused by vehicle failures, crashes and citations (Gilderbloom, Riggs and Meares 2015).

Figure 17 **Typical User Costs by Mode** (Litman 2025)

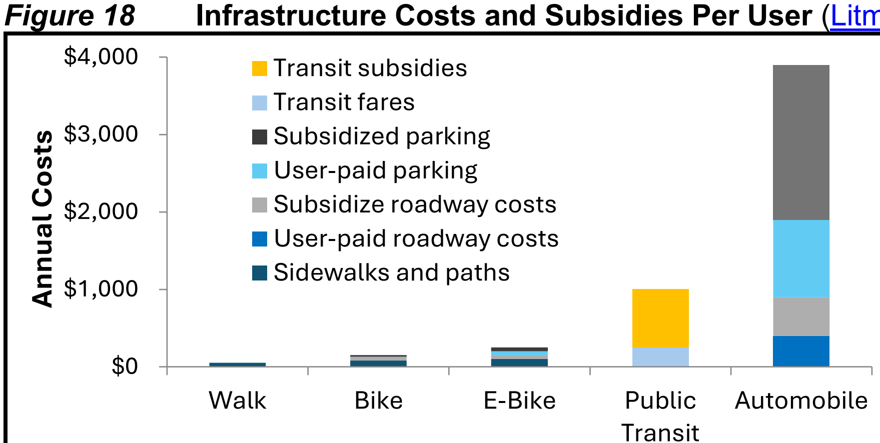


Average motorists spend about $6,500 annually on vehicles and $1,500 for parking, far more than other modes.

Public Infrastructure Costs

Automobile travel requires governments to provide roads and businesses to provide parking for their use. These costs total about $4,000 annually per vehicle, much more than other modes, as illustrated below. They are mostly borne indirectly through general taxes and building rents. For example, a restaurant that provides "free" parking for customers who drive must charge $2-4 extra per meal, reducing its profits, competitiveness and productivity.

Figure 18 **Infrastructure Costs and Subsidies Per User** (Litman 2025)

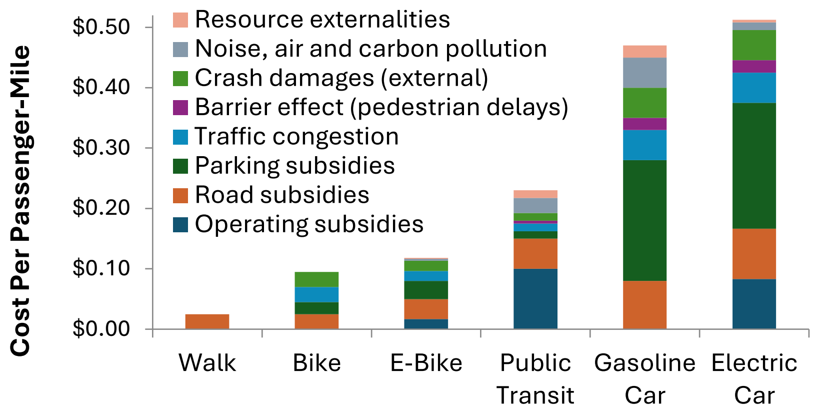


Automobiles require more costly infrastructure than other modes. These are mostly borne indirectly through general taxes (for roads), housing costs (for residential parking) and higher prices for other goods (for customer and employee parking). This tends to reduce productivity.

External Traffic Costs

Vehicle traffic imposes various external costs on other people including infrastructure costs not borne by user fees, congestion, crashes, and environmental degradation. These costs filter through the economy as higher taxes and building rents, travel delays, injuries and disabilities, and less valuable properties. Driving imposes higher costs than other modes per passenger-mile, as illustrated below, and since motorists tend to travel far more miles per year than non-drivers, their annual external costs per capita are much higher.

Figure 19 **External Costs by Mode** (Litman 2025)

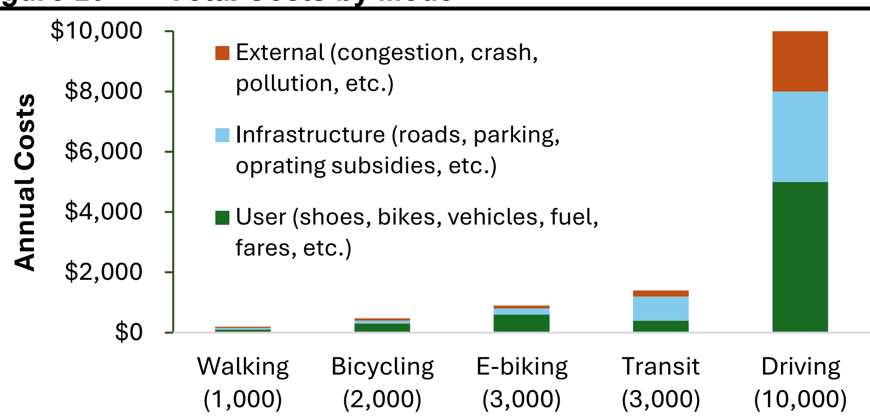


This figure compares external costs (infrastructure subsidies, congestion, barrier effect, crash risk, noise and air pollution, and fuel production external costs) of six modes. Automobile travel has higher costs per passenger-mile and since motorists travel more annual miles than non-drivers, their annual external costs are much higher.

Total Costs

The table below compares total annual costs by mode, reflecting differences in per-mile costs and annual miles travelled (indicated in parentheses). This suggests that owning and operating an automobile adds nearly $10,000 in total costs.

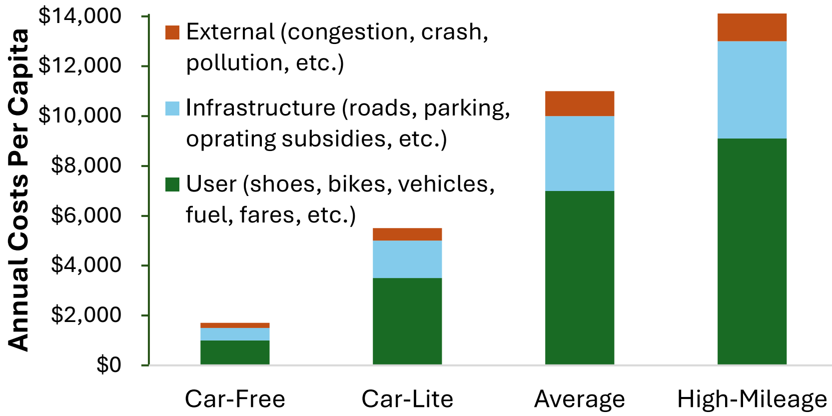
Figure 20 **Total Costs by Mode**



Driving has much higher costs per mile, and motorists tend to travel more annual miles than users of other modes so their total annual costs are much higher. These additional costs filter through the economy, reducing productivity.

Of course, most people rely on a combination of modes depending on their location and lifestyle. The figure below compares per capita total transportation costs for car-free (household owns no automobile but rents them when needed), car-lite (one vehicle is shared by multiple adults), average (household owns one 10,000 annual mile vehicle per adult) and high mileage (household owns one 15,000 annual mile vehicle per adult).

Figure 21 **Total Costs by Transportation Lifestyle**



Total annual costs to users, governments, and businesses increase with vehicle ownership and use. Many of these costs are indirect or external, filtering through the economy as higher taxes, housing costs and prices of other goods, plus increased time spent travelling, injuries and disabilities, and lower property values.

Many of these costs are indirect (road and parking subsidies) and external (congestion, risk and pollution), and are often overlooked in transportation planning. They filter through the economy as higher taxes, housing costs and prices of other goods, plus increased time spent travelling, injuries and disabilities, and reduced property values which reduce productivity.

Reduced Mobility Options

This research reflects the ways that increased mobility can reduce overall accessibility (SSTI 2021). Increased automobile travel displaces other modes, as summarized in the box to the right, which reduces non-auto travel options and therefore non-drivers' ability to access economic opportunities, reducing worker and business productivity. For example, inadequate non-auto commute options reduces pool of workers available to businesses by 10-30%, more for low-wage service jobs, representing those that cannot drive or temporarily lack a vehicle due to mechanical failure. Extensive research indicates that employment and productivity increases with worker's access to jobs, particularly for disadvantaged groups (Bastiaanssen, Johnson and Lucas 2020).

Inadequate non-auto travel options increases chauffeuring burdens. Chauffeuring trips often generate empty backhauls, which increases traffic problems. For example, a parent chauffeuring a child one mile to school generates four vehicle-miles (two round trips) per day. This increases household vehicle costs, driver's time costs, plus infrastructure and travel external costs.

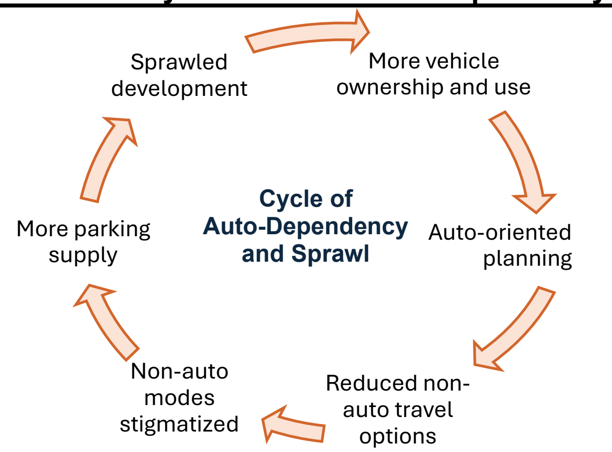
How Driving Displaces Non-Auto Travel

- Motor vehicle traffic risk, noise and pollution degrade walking and bicycling conditions.
- Investments in roads and parking displace investments in other modes.
- Non-auto travel becomes less integrated. For example, most public transit trips include walking links, so degraded walking conditions make transit travel less efficient.
- Sprawl encourages regional shopping, reducing neighborhood services and jobs.
- Driving requires more space for travel and parking, discouraging compact development.
- Reduced transit ridership reduces fare revenues, resulting in less frequent service.
- Reduced non-auto travel makes these modes less safe.
- Non-auto travel becomes stigmatized.

Sprawl Costs and Reduced Accessibility

Because driving is space-intensive and imposes danger, noise, dust and pollution, it discourages compact development and increases sprawl. Sprawl tends to reduce economic productivity by increasing transportation, infrastructure (roads, utilities, emergency services, schooling, etc.) and health costs, and by reducing agglomeration efficiencies and innovation (Ahlfeldt and Pietrostefani 2019; CNT 2024; Litman 2024; Hamidi, Zandiatashbar and Bonakdar 2019).

Figure 22 **The Cycle of Automobile Dependency and Sprawl** (Litman 2024)

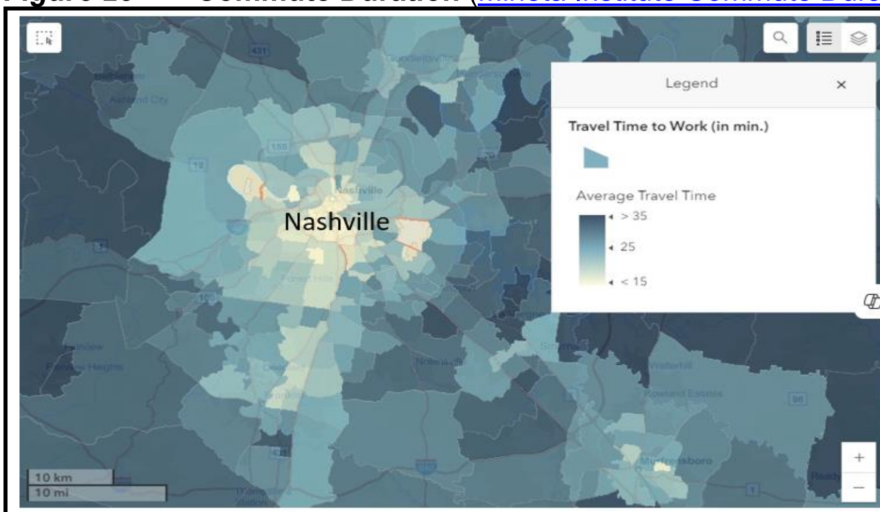


Automobile-oriented planning contributes to a self-reinforcing cycle of automobile dependency and sprawl.

This reduces the efficiency, safety and status of non-motorized modes, reducing independent mobility for non-drivers and increasing drivers' chauffeuring burdens, which tends to reduce economic opportunity and productivity (Ewing, et al. 2016; Litman 2024).

By increasing travel distances and reducing mobility options sprawl reduces *accessibility* and economic opportunity, particularly for non-drivers. The figure below shows that time spent commuting is much higher in urban fringe locations than central neighborhoods, and sprawl increases travel times for errands. Central urban neighborhood residents can typically access more jobs and services by non-auto modes than urban fringe residents can be car, which reduces disparities between drivers and non-drivers. This reduces transportation costs required for economic activities such as commuting and shopping, increasing productivity.

Figure 23 **Commute Duration** ([Mineta Institute Commute Duration Dashboard])



Because they are compact and multimodal, central neighborhoods tend to have shorter commute durations, more nearby services, and less need to chauffeur non-drivers than in urban fringe areas. This increases economic opportunity and productivity. This figure illustrates this effect in Nashville, Tennessee. Similar patterns are seen in most urban regions.

Less Productive Expenditures

Because motor vehicle and fuel production are highly automated and many inputs imported from other regions, vehicle and fuel expenditures generate fewer local jobs and business activity than most other consumer spending, so increased spending on vehicles reduces productivity.

People often exaggerate the economic importance of vehicle manufacturing. At its peak the industry employ up to 10% of workers and paid better than average wages, but this has significantly declined; vehicle production (NAICS codes 3361-3363) now represents just 0.6% of U.S. employment and pays below average wages (FRED 2024). Vehicle dealer profit margins average less than 4%, so buying a $50,000 vehicle adds less than $2,500 to the local economy, and fuel sales generate even less since most pumps are now automated (Hawley 2023). In a typical community, only about 11% of vehicle-related spending stays in the local economy, indicated in the following table. In contrast, about 75% of transit spending consists of local labor and goods. As a result, reducing vehicle travel and associated spending increases local business activity, employment and productivity.

Table 1 **Local Components of Vehicle Expenditures** (BLS 2023)

Expenditures (Consumer Spending Survey)	Per Vehicle	Estimated Local Portion	Local Amount	Non-Local Amount
Purchase	$2,915	5%	$146	$2,770
Fuel	$1,418	5%	$71	$1,347
Insurance	$934	10%	$19	$171
Maintenance and repairs	$513	60%	$308	$205
Vehicle rental, license, fees	$386	10%	$39	$348
Vehicle finance	$190	10%	$93	$841
Totals	*$6,356*		*$676 (11%)*	*$5,681 (89%)*

Vehicle and fuel purchases generate little local employment and business activity because production is highly automated and largely located in other regions, and low dealer profit margins.

Neighborhood Accessibility and Attractiveness

Housing, retail, office, entertainment and tourist industries depend on attracting customers and workers, and therefore on local accessibility and environmental quality. Urban neighborhoods and commercial districts tend to be more economically successful if they are compact, multimodal and walkable, with low traffic volumes and speeds (Boarnet, et al. 2017). Surveys indicate that many households prefer such neighborhoods and will pay a premium for them (NAR 2023). Property values, sales revenues and tax revenues tend to increase with density and walkability (Alfonzo 2015). Residents of such communities save on transport, leaving more money to spend on other goods.

Businesses sometimes fear that bike- and bus lanes and traffic restrictions will discourage their best customers by displacing parking spaces and reducing car access, but numerous studies find that such projects usually increase total sales and profits, indicating that reduced drivers' convenience is more than offset by improved access by other modes (Arancibia, et al. 2019). Business managers tend to overvalue customers who drive; non-auto customers tend to spend less per trip but shop more frequently and spend more in total than motorists (Volker and Handy 2021). Parking displaced by bike- and bus-lanes is often offset by reduced demand, reducing total parking problems. For example, Victoria, BC's bikeway network displaced about 200 parking spaces, but after it was completed there were 12,000 more daily bike trips, 46,120 fewer daily car trips, and households owned 6,000 fewer vehicles, so the loss of parking was more than offset by reduced parking demand (CRD 2022).

Summary

The table below summarizes ways that increased vehicle travel can reduce economic productivity and accessibility, and planning strategies to correct them.

Table 2 **Summary of Ways that Vehicle Travel Can Reduce Productivity**

Factor	Effects on Productivity	Accessibility Impacts	Productivity Strategies
User costs	Households spend less on other goods, including education and housing that increase future productivity.	Reduces access to economic opportunities such as jobs, particularly for lower-income people.	Improve affordable modes and increase affordable housing in compact, multimodal neighborhoods.
Infrastructure costs	Vehicle infrastructure subsidies increase taxes, rents and the costs of other goods.	Wider roads and larger parking lots degrade walking and bicycling.	Favor modes with lower infrastructure costs. Charge users for roads and parking facilities.
External costs	Vehicle traffic causes congestion, crash and pollution that reduces productivity.	Congestion delays cars and buses. Risk and pollution degrade active travel.	Favor resource-efficient modes. Impose congestion, crash and pollution fees.
Reduced non-auto mobility options	Reduces non-drivers' economic opportunities and increases chauffeuring costs.	Reduces non-auto accessibility.	Create compact, multimodal communities where it is easy to get around without driving.
Sprawl-related costs	Increases travel and public service costs, and reduces agglomeration efficiencies.	Reduces accessibility, particularly for non-auto modes.	Favor space-efficient modes, compact development, plus reduced road and parking supply.
Less productive expenditures	Vehicle and fuel purchases generate fewer local jobs and less business activity than most other expenditures.	Sprawl encourages regional shopping, reducing local services and jobs.	Improve affordable modes and compact development to reduce unnecessary vehicle and fuel spending.
Neighborhood attractiveness	Heavy traffic and ugly parking lots make an area less attractive to residents and customers.	Wider roads and increased traffic degrade walking and bicycling access and transit efficiency.	Create attractive streets and parking lots with less driving, slower traffic speeds, improved walkability and streetscaping.

This table summarizes ways that vehicle travel can reduce productivity and accessibility, and potential corrections.

This indicates that increased motor vehicle travel tends to reduce productivity by increasing costs, reducing accessibility, and making neighborhoods less attractive to residents, customers and workers. These impacts can be large. For example, compared with a compact, multimodal community, automobile dependency and sprawl add many thousands of dollars in annually per capita in user, infrastructure and external costs, and by increasing trip distances and chauffeuring burdens total travel times. Similarly, in automobile-dependent areas businesses must subsidize customer and employee parking, have fewer potential customers and workers (those who cannot drive), and operate in less attractive environments. More compact, multimodal communities provide savings and benefits that filter through the economy, increasing productivity, affordability, economic opportunity, property values and tax revenues.

How Much Mobility is Economically Optimal?

To better understand what level of mobility is optimal, it is helpful to understand a few economic principles. Economic efficiency has two basic requirements: *consumer sovereignty*, which means that markets (in this case, transportation systems can be considered a market for mobility) respond to consumer demands, and *efficient pricing* which means that the price consumers pay for a good equals its production costs (Litman 2023; SSTI 2018; Vickerman 2024). In other words, efficient pricing ensures that consumers "get what they pay for and pay for what they get."

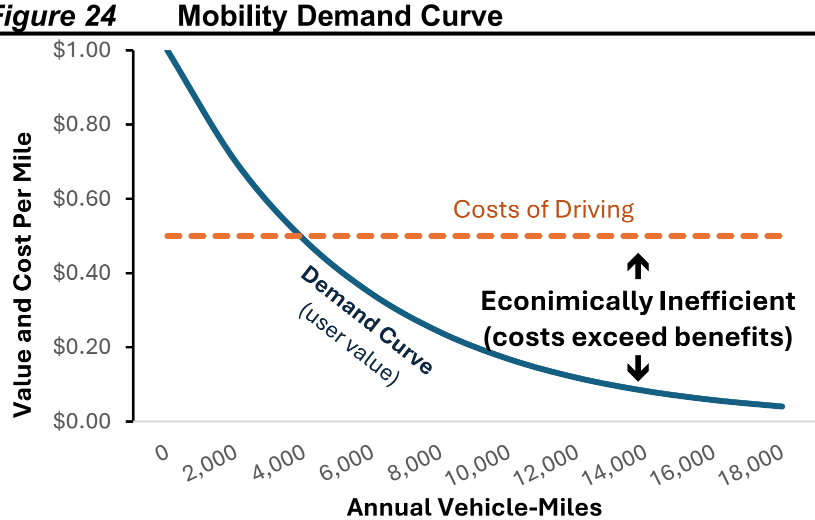
Current practices often violate these principles:

- *Communities underinvest in non-auto travel.* Although 20-40% of travellers typically cannot or should not drive, and improving non-auto travel provides many economic, social and environmental benefits, most transport agencies spend less than 5% of their budgets on non-auto infrastructure.
- *Vehicle travel is underpriced.* About half of roadway costs and most parking costs are borne indirectly through general taxes (for road not funded through user fees), housing costs (for residential parking) and higher prices for other goods (for customer and employee parking), and motorists are not charged for imposing congestion, risk or pollution (CE Delf 2019; Litman 2023; Olson, et al. 2019).
- *Development policies favor auto-dependent sprawl.* Most communities limit density, mandate off-street parking and fail to charge for the higher costs of providing services at urban-fringe locations.

These distortions increase automobile travel and total costs beyond what is efficient, that is, beyond what users would choose if they paid these costs themselves. Consider parking. Compared with unpriced parking, cost recovery parking fees typically reduce vehicle trips about 20%. If a worksite would require 100 unpriced parking spaces it only needs 80 spaces if parking is priced, and congestion, crash and pollution costs decline about 20%, increasing transport system efficiency.

Most travellers have some high-value vehicle trips (emergencies, important business travel, freight deliveries, special event travel), plus lots of moderate- and low-value vehicle trips (commuting, errands, social and recreation). By underpricing driving and reducing non-auto travel options, market distortions increase low-value vehicle-miles, resulting in more economically inefficient travel, in which costs exceed benefits, and more total costs. The following figure illustrates this.

Figure 24 **Mobility Demand Curve**



The mobility demand curve (blue line) indicates the value users place on vehicle travel and their willingness to pay to drive. The orange line indicates costs imposed by driving. Efficient pricing requires users to pay these costs directly so motorists only take trips with benefits that exceed costs. Market distortions underprice driving resulting in economically inefficient vehicle travel with costs that exceed benefits.

Roadway Expansion Productivity Impacts

Advocates often claim that increasing road and parking supply increases economic productivity, but this study finds that productivity tends to *decline* with more urban lane-miles, vehicle travel and parking supply, and *increases* with parking prices and traffic congestion. Although building the first paved roads in an area can significantly increase productivity, as a road systems expand their additional capacity provides declining marginal benefits since the most productive links and trips have already been accommodated (Iacono and Levinson 2013). Other urban transportation improvements tend to be more cost-effective and beneficial (Litman 2022; Parshall 2025; SSTI 2018).

This study also finds that productivity declines with increased parking supply and reduced parking prices. Large parking lots make urban areas unattractive and displace other land uses, reducing density and land values, inducing more vehicle travel, and reducing non-auto travel (PRN 2023).

Studies find that highway expansions had high economic returns during the 1950s and 60s, but this subsequently declined since the most cost-effective projects have been implemented (Boarnet, et al. 2017; Eberts 2009). Melo, Graham and Canavan (2012) found that between 1982 and 2009 U.S. urban highway expansions increased economic output, but concluded that other transportation system improvements would provide greater economic benefits. Duranton and Turner (2011) and Murray and Welch (2021) concluded that interstate network expansions do not provide sufficient time savings to justify their cost. Phillips (2014) found that between 2000 and 2010 productivity growth was larger in states with less urban highway expansion: those that increased urban road-miles less than 20% experienced 18% productivity growth compared with only 9% productivity growth for states that added more than 20% urban road-miles. He concluded,

> "While politicians and advocates love to tout the job-creating value of new road and highway capacity, congestion reduction rarely lasts more than five years and widened roads ultimately only succeed in extending the boundaries of wasteful, unproductive sprawl. In the case of road widenings, it's entirely possible that the disruption caused during the construction phase completely erases —or even exceeds — the fleeting benefits of reduced congestion. Then there's the opportunity cost: think of all the good that could have been done with the hundreds of billions of dollars spent on roadways over that period."

Transportation agencies often claim that roadway expansions reduce congestion, which saves travel time, allowing commuters to be more productive, but experience indicates that traffic congestion tends to maintain equilibrium – it increases to the point that delays discourage additional peak-period vehicle trips – so additional road capacity soon fills with latent demands, causing traffic to return to equilibrium speeds (Litman 2022; Metz 2021). Higher traffic speeds don't increase productivity, instead, they increase automobile dependency and sprawl which increase the travel distance required for economic activities.

This research indicates that, although a basic highway network supports productivity, in developed countries urban highway expansions provide only temporary congestion reductions, and by inducing more total vehicle travel and sprawl, increase many costs and reduce overall accessibility. Other strategies – resource-efficient mode improvements, transportation demand management (TDM) incentives such as efficient road and parking pricing, and smart growth development policies – tend to be better at improving accessibility and supporting economic development goals in ways that reduce total vehicle travel.

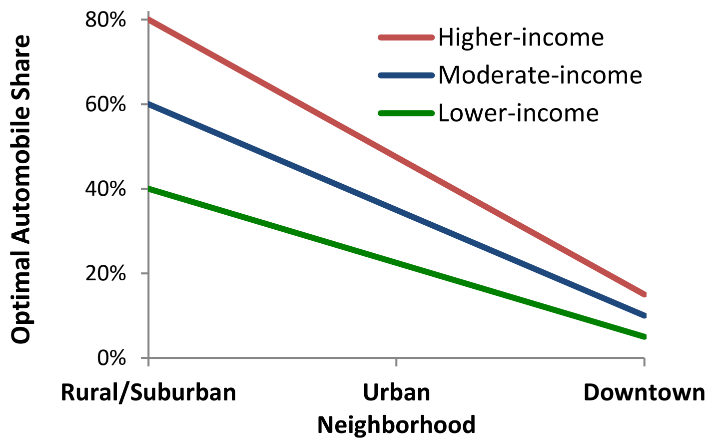
Implications and Applications

This section describes how to apply this research to support economic development.

Implications for Transportation Agencies

This research indicates that agencies can support economic development goals by increasing transportation efficiency, so economic activities require less vehicle travel. To support efficiency this some jurisdictions apply street economic performance metrics (NYCDOT 2012), and establish vehicle travel reduction and mode share targets that planning decisions should support (Caltrans 2020). This research suggests that optimal vehicle travel is about 4,000 annual vehicle-miles per capita and 50% auto mode shares, more in rural areas and less in cities and lower-income areas, as illustrated below.

Figure 25 **Optimal Automobile Mode Shares (Litman 2023)**



Annual vehicle-miles and automobile mode shares should reflect geographic and demographic conditions. In affluent rural and suburban areas more than half of trips can be efficiently made by automobile, but this should decline in urban neighborhoods where infrastructure, congestion, crash risk and pollution costs are high, and downtowns should have less than 20% auto mode shares

The following strategies support these goals.

- Apply multimodal transportation planning that prioritizes resource-efficient modes.
- Use street economic performance indicators such as customer visits, employment and property values.
- Apply TDM incentives to increase transportation system efficiency.
- Convert fixed and external costs to internal, variable costs, such as parking cash out and unbundling.
- Support development policies that create compact, multimodal, affordable communities.
- Manage parking for efficiency so fewer spaces are needed and subsidies are minimized.
- Streetscaping that creates attractive and multimodal roads.

Implications for Businesses

This research indicates that businesses can be more productive and competitive by locating in districts with more multimodal access for customers and workers, and less vehicle traffic create more attractive environments. They should support these strategies:

- Locate in compact, multimodal areas that has good non-auto access.
- Reduce traffic volumes and speeds to minimize risk, noise and pollution and enhance walkability.
- Support transportation demand management incentives that encourage travellers to choose the best option for each trip, including walking, bicycling and public transit when possible.
- Manage parking efficiently. Price, cash-out and unbundle parking.
- Support bikeways, even if they displace some on-street parking.
- Provide information to help visitors choose the most efficient travel and parking options.

Implications for Individuals
Most people are more economically successful living in compact, multimodal neighborhoods (Ewing, et al. 2016; Otero, Volker and Rozer 2021). Although automobiles can increase workers' incomes, this is offset by higher costs: one study found that after households obtained a car they typically earned $2,300 more but spend $4,100 more on transport annually, making them financially worse off overall (Smart and Klein 2015). Automobile dependency reduces household economic resilience; many hard luck stories begin with a vehicle failure, crash or traffic citation that leads to financial, health and legal crises. Off-street parking typically increases housing costs 12-18% (Gabbe and Pierce 2016).

Households often face trade-offs between housing and transportation costs such as between a cheaper suburban home with higher vehicle expenses, or a more expensive urban home with lower travel expenses. In the short-run their total costs may be the same but over the long run houses appreciate while vehicles depreciate in value, so spending less on vehicles and more on housing can increase long-term wealth. In a typical example, a household builds $300,000 more equity over two decades by choosing a $480,000 urban home that only requires one car over a $335,000 suburban home that requires two high-annual-mileage vehicles (Litman 2020).

Households can maximize their prosperity in the following ways:

- As much as possible, live, work and shop in compact, multimodal neighborhoods, with Walk Scores of 70 or higher, where it is easily get around without driving.
- Minimize household vehicle ownership; rely on non-auto modes, and share or rent vehicles.
- Walk and bicycle for local errands and use transit when travelling on busy urban corridors.
- Support policies that improve non-auto modes and increase affordable infill housing.
- Support parking reforms so people are not forced to pay for parking facilities they don't need.

Conclusions
This study explores a paradox: contrary to common assumptions, prosperity is negatively associated with mobility. Economic productivity tends to *decline* with high levels of vehicle travel, and *increases* with more multimodal travel, higher vehicle fees, and more compact development. Similarly, individuals tend to be more economically successful if they live in compact, multimodal communities. These results are very consistent among various indicators, geographic scales and data sets.

These results can be explained by recognizing trade-offs between mobility and accessibility. Mobility-oriented planning creates auto-dependent communities which reduces non-drivers' productivity and increases vehicle travel and associated costs. Accessibility-oriented planning reduces the vehicle travel needed to reach services and activities, providing efficiency gains that increase productivity.

Table 3 **Mobility Versus Accessibility Indicators**

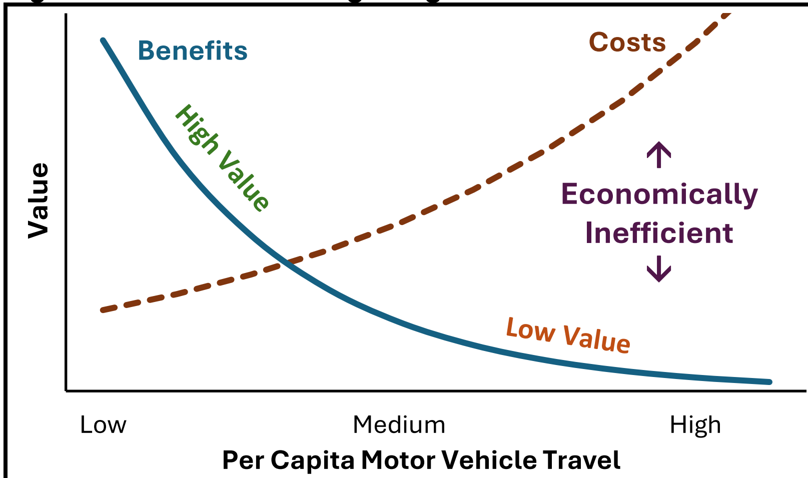
Mobility	Accessibility
• More urban vehicle travel	• More non-auto travel (walking, bicycling and transit)
• More urban roadway supply	• More non-auto infrastructure (sidewalks and bikeways)
• More parking supply	• Higher fuel and parking prices
• Lower fuel and parking prices	• More density and mix (indicated by Walk Score)

Increased accessibility reduces the amount of mobility required for economic activities.

This study identifies specific ways that high levels of mobility can reduce productivity. Driving is costly, particularly in cities. A typical urban automobile imposes about $10,000 annually in total user, infrastructure and external costs, impacts that filter through the economy as higher taxes, business expenses and living costs, and less spending on local goods. Automobile dependency reduces accessibility, particularly for non-drivers, reducing their productivity. More compact, multimodal neighborhoods with less vehicle traffic attract more residents, customers and workers; and provides agglomeration efficiencies that increase creativity and productivity.

Although some vehicle travel is extremely productive, underpriced driving increases lower-value vehicle travel, so a growing portion of vehicle-miles are economically inefficient: their costs exceed its benefits. Productivity tends to peak at about 4,000 annual vehicle-miles per capita, more in affluent rural and suburban areas, and less in cities and lower-income neighborhoods, beyond which more driving is economically harmful. Policies that reduce low-value mobility increase productivity.

Figure 26 **Diminishing Marginal Benefits and Increasing Costs**



Some vehicle travel, such as emergency, freight, public transport, and high-value trips, is very productive. However, as driving increases the additional travel provides incrementally less benefit, while costs increase due to congestion and external costs. As a result, an increasing portion of travel is economically inefficient: its costs exceed its benefits.

A rich vocabulary to describe overpricing; we say that consumers are gouged, chiselled, ripped-off or cheated. There is no comparable vocabulary to describe underpricing although it is equally unfair and inefficient since people bear the subsidy costs indirectly. Efficiency requires recognizing this bias.

This analysis indicates that the best way to achieve economic development goals is to improve transportation system efficiency so our economic needs are satisfied with less mobility. This requires a diverse transportation system that prioritizes higher value trips and more efficient modes so travellers choose the best option for each trip: walking and bicycling for local errands, transit when travelling on busy corridors, and driving when it is truly optimal. This is not to suggest that everybody must live car-free in high rise apartments; some of the largest benefits result from moderate increases in density and non-auto travel, and moderate vehicle travel reductions. This efficiency helps achieve many goals including affordability, equity, health and safety and environmental quality.

This research primarily reflects North American conditions but has implications for any urban region that wants its transportation policies to support economic development goals.

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Note: this analysis is based on various data sources including the FHWA's Highway Statistics reports that include per capita GDP and other data for states and urban regions, available in spreadsheets.

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