

Access for Value: Financing Transportation Through Land Value Capture

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The worsening financial straits of governments at all levels pose a significant challenge to discretionary programs, such as transportation. The United States transportation system must become more efficient if it is to provide the same level of services with less money at all levels of government. At the same time, the competitive forces in the global economy require an increasingly effective U.S. transportation network, able to support a changing American economy. This study examines accessibility and its importance in assessing transportation performance and in creating a sustainable transportation funding source. It first delineates the concept of accessibility through a comparison with the common transportation performance metric of mobility. The paper then explains how accessibility can help fund transportation through a virtuous circle of access, land value, and transportation infrastructure. Local, state, and federal governments must better understand the structure and characteristics of value-capture policies if they are to develop their full potential as a sustainable funding source.

I. Introduction

The worsening financial state of the federal, state, and local governments is a frequent subject in media and political circles.² As discretionary expenditures, transportation programs likely face significant changes if they are to cope with spending cuts across all levels of government. These changes would require not only reprioritizing the use of scarce funds, cutting ineffective programs, and improving the performance of remaining programs, but also encouraging states and local partners to find other sources of funding for transportation.³

Measuring accessibility is an essential tool in such a makeover because it reveals the benefits of a transportation system.⁴ Accessibility is the ease of reaching valued destinations, such as jobs, shops, schools, entertainment, and recreation. As such, accessibility creates value. Capturing some of this value would allow state and local governments to invest in the operations, maintenance, and in some cases expansion of their transportation networks. Accessibility, as an outcome-oriented metric, can effectively assess transportation's economic impact, and capturing the value of accessibility would help states and metropolitan areas develop sustainable transportation funding streams.

This study examines accessibility and its importance in assessing transportation performance and in creating a sustainable transportation funding source. It first delineates the concept of accessibility by comparing it with a common transportation performance metric, mobility. The paper then explains how accessibility can help fund transportation through a virtuous circle: infrastructure creates access, access creates value, and value can be captured to fund infrastructure.⁵ Although this paper uses evidence mainly from the Minneapolis-St. Paul metropolitan area, the final section provides policy recommendations for all levels of government involved in funding the U.S. transportation system.

Accessibility may be defined in different ways. However, the goal in measuring it is to use a measure that is clear to all constituents; cumulative from block to neighborhood to city to metropolitan area;

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comparable on the same scale and across multiple modes; comprehensive across different types of land use; and readily computed with available data.⁶ On the basis of these criteria, this study defines accessibility as the number of jobs that can be reached from a location (for example, a residence) by car or transit within 30 minutes during the morning peak hour (7:30 to 8:30 am).⁷

II. Accessibility versus Mobility

The transportation problem is often posed as a mobility problem, in terms of ways of moving quickly on networks. As a result, concerns about congestion dominate and words such as “gridlock” pervade the media.⁸ Congestion was an important argument when the transportation network was undeveloped and demand far outstripped the road supply. During the past decade, data from the U.S. Federal Highway Administration suggests that the number of vehicle miles travelled (VMT) is flat and VMT per capita is declining, trends similar to those in other industrialized countries.⁹ Although the average level of traffic may be largely flat, in fast-growing areas, congestion problems continue to emerge. Value-capture strategies tie economic growth to infrastructure investment, and head off the consequences of inadequate public facilities.

Mobility measures the ease of moving on the network, and the travel time index—the ratio of travel time during congestion (in the peak period) to the travel time in uncongested conditions—is a common mobility proxy.¹⁰ Mobility is a significant issue in understanding how metropolitan areas and their transportation systems function. However, accessibility is a more complete measure because it considers not only mobility, but the other important problem: the location of activities. The concept of accessibility allows us to measure the efficiency of the metropolitan area in its primary role: enabling people to reach other people and places. A simple example illustrates the problem with considering only mobility.

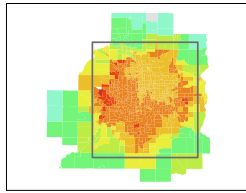
Manhattan, Kansas, versus Manhattan, New York. Compare two Manhattans: Kansas and New York. The population of Manhattan, KS, “the Little Apple,” is almost 53,000 people, with a metropolitan area population of 123,000 spanning 1,888 square miles.¹¹ The island of Manhattan, an area of 27.9 square miles, is home to more than 1.6 million people.¹²

In Manhattan, KS, the home to Kansas State University, there is a relatively high network speed with virtually no congestion, which would produce a travel time index of barely above 1.¹³ The travel time index for New York-Newark, NY-NJ-CT urbanized area is 1.37, ranking it among the top five cities in the United States. The index would be even higher for the notoriously congested island of Manhattan.¹⁴ This means it takes at least 37 percent longer to travel the same distance in Manhattan, NY, than Manhattan, KS. That said, one can reach many more destinations in the same amount of time in New York because of the high population and job density on the island. In a half-hour drive from an average point in metropolitan New York, one can reach 1.3 million jobs in Manhattan, and even more if one considers transit.¹⁵ From the center of Manhattan, KS, one could reach about 64,000 jobs in 30 minutes.¹⁶ As a result, Manhattan, NY, is more than 20 times as accessible as Manhattan, KS, despite speeds that are, at best, half as fast.¹⁷ The differences in accessibility are reflected in highly dissimilar land prices. For example, the average office rent in Manhattan, NY, was approximately \$52 per square foot, while in Manhattan, KS, it was about \$10-28 per square foot.¹⁸

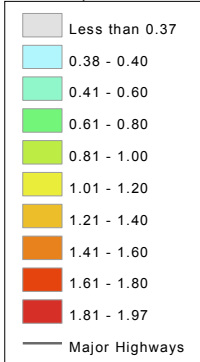
Typically, accessibility and congestion rise together, as more development, a cause of greater accessibility, also causes greater congestion. The evidence shows that it is possible for the accessibility increase from the ability to reach more destinations be larger than the accessibility decline from slower speeds associated with the traffic that development brings. For example, congestion in the Twin Cities region increased from 1995 to 2005, with the number of hours of delay per peak traveler rising from 31 to 43 per year.¹⁹ In the same time, this metropolitan region was more accessible in 2005 than 1995, with more jobs that could be reached in the same amount of time despite the rise in congestion.²⁰ This joint increase in congestion and accessibility was the result of some additional roadway capacity, more intense use of faster roads, and the movement of jobs to lower-density suburban centers.

The decentralization of employment in Minneapolis-St. Paul, similar to other large metropolitan areas, is the driving force behind these seeming paradoxes of higher congestion and greater accessibility.²¹ The suburbanization of jobs follows decades of suburbanization of people, with most of the

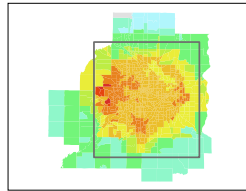
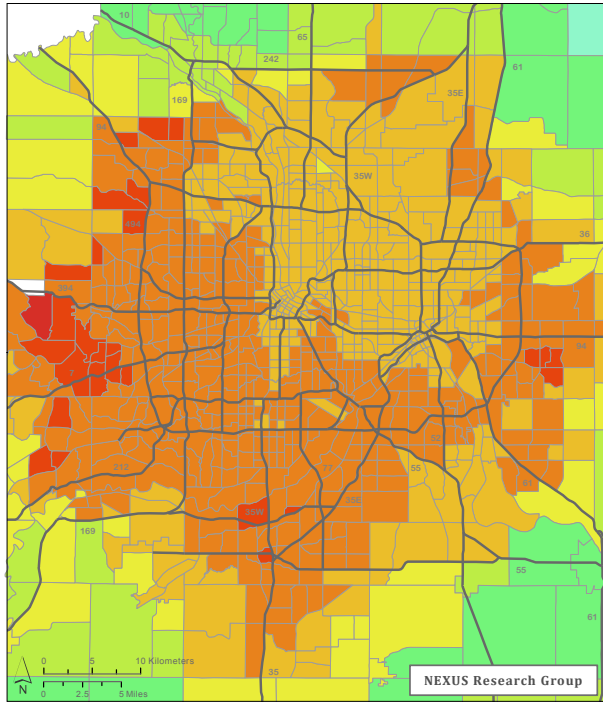
Figure 1. Balance of Accessibility to Jobs and Workers, Minneapolis-St. Paul Metropolitan Area, 1995-2005



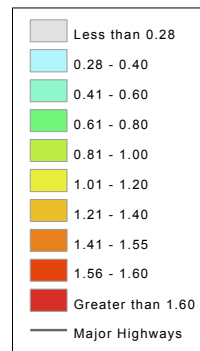
Ratio of Jobs to Labor Accessible from Origin Zone within 30 Minutes by Auto 1995 AM Peak Twin Cities, Minnesota USA



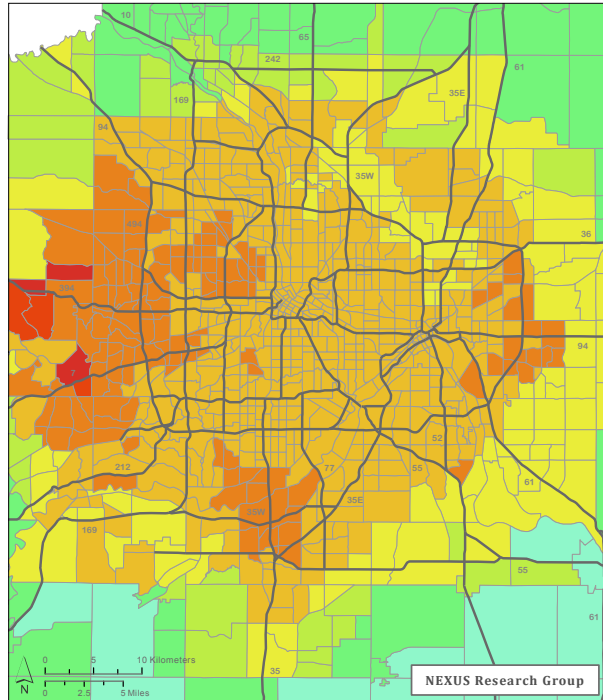
Zone Structure Displayed: Traffic Analysis Zone Boundaries (TAZ)
 Primary Data Sources: MNDOT, Twin Cities Metropolitan Council, US Census Bureau 2005 LEHD Files



Ratio of Jobs to Labor Accessible from Origin Zone within 30 Minutes by Auto 2005 AM Peak Twin Cities, Minnesota USA



Zone Structure Displayed: Traffic Analysis Zone Boundaries (TAZ)
 Primary Data Sources: MNDOT, Twin Cities Metropolitan Council, US Census Bureau 2005 LEHD Files



Note: The balance of accessibility to jobs and workers is the ratio of jobs reachable in 30 minutes to workers reachable in 30 minutes by car from residences in the morning peak (7:30 to 8:30 a.m.).

Source: Levinson and Marion, "The City is Flatter: Changing Patterns of Job and Labor Access in Minneapolis-St. Paul, 1995-2005." Working Paper 000077 (University of Minnesota Nexus Research Group, 2010).

Table 1. Average Network Speed Can Rise Along with Congestion

		Road 1	Road 2	Network
Initial period	Speed (miles per hour)	55	25	
	Flow (share of traffic)	10%	90%	
	Average network speed			28
After switch	Speed (Miles per hour)	40	20	
	Flow (Share of traffic)	50%	50%	
	Average network speed			30

region’s new residents moving into suburban locations between 1995 and 2005.²² An improved balance of accessibility to jobs and workers reflects this convergence phenomenon and indicates that employers respond to accessibility, as determined by network configuration and pre-existing land use (especially residential) (Figure 1). Firms take into account accessibility when they decide where to locate in an effort to be close to labor pools and reduce their labor costs.

The additional roadway capacity and more intense use of faster suburban roads between 1995 and 2005 contributed to a higher average network speed along with rising congestion in the Twin Cities region. When drivers switch from slow roads to faster roads (such as suburban highways) on the same network, the average speeds on each road segment may decline, resulting in congestion, but the overall network speed may nevertheless increase. Table 1 shows this phenomenon.²³

In Table 1, the speed drops on both links of the network after more drivers switched from the congested road to the faster road, while the system average speed rose to 30 miles per hour from 28. Although both roads got more crowded, the relatively faster route attracted more travelers. This example illustrates what happens in metropolitan areas around the country where the decentralization of employment leads more travelers (and more important, a greater share of travelers) to switch to faster suburban highways from congested urban arterials.

III. A Virtuous Circle

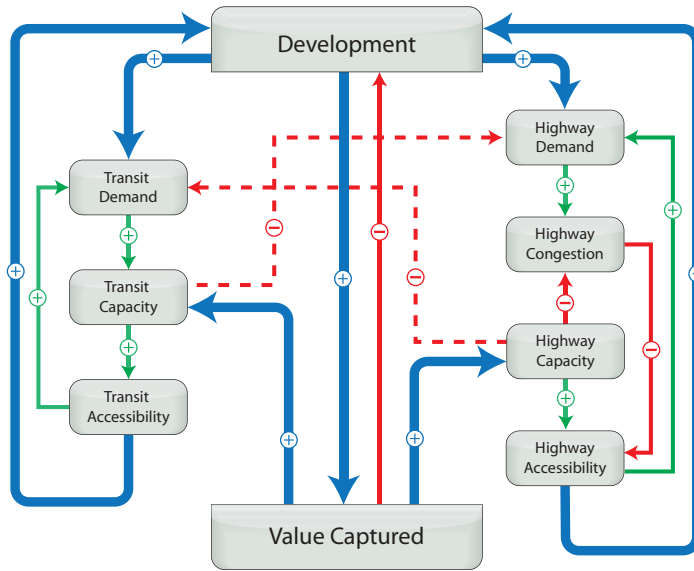
This section illustrates the “virtuous circle” among development, accessibility, value capture, and infrastructure. Infrastructure creates access, access creates value, value can be captured to finance infrastructure and therefore create further access, and thus value (See Figure 2).

For both transit and highways, accessibility and use create feedback loops, with more access creating more demand. For transit, that demand leads to increased capacity, which further enhances accessibility. For highways, increased demand increases congestion, which reduces accessibility. Although sufficient demand can lead to congestion on the transit side, that is not widespread in the United States. On highways, demand does lead to added capacity in new systems. However, in mature networks, many of those gains have already been exploited, and diminishing returns to new investment have set in.²⁴ Accessibility induces development, and with value capture in place, development leads to new infrastructure, which further increases accessibility and use.

A. Infrastructure Creates Access

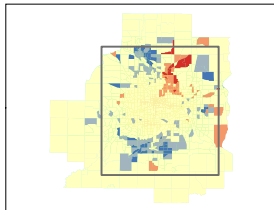
Well-located infrastructure creates access, as the example of the reopening of the collapsed I-35W Mississippi River Bridge in Minneapolis shows. Tragically, the collapse of the bridge occurred during the evening rush hour on August 1, 2007 and became emblematic of the poor state of U.S. infrastructure. The new bridge opened on September 18, 2008. As Figure 3 shows, the reopening of the bridge, an important link of the transportation network in the Twin Cities, led to higher accessibility in the metro area. While the bridge did not add accessibility for everyone in Twin Cities, overall, the number of jobs reachable by car within 30 minutes during the morning peak period increased after the bridge was reopened.²⁵

Figure 2. The Virtuous Circle of Development, Accessibility, Value Capture, and Infrastructure

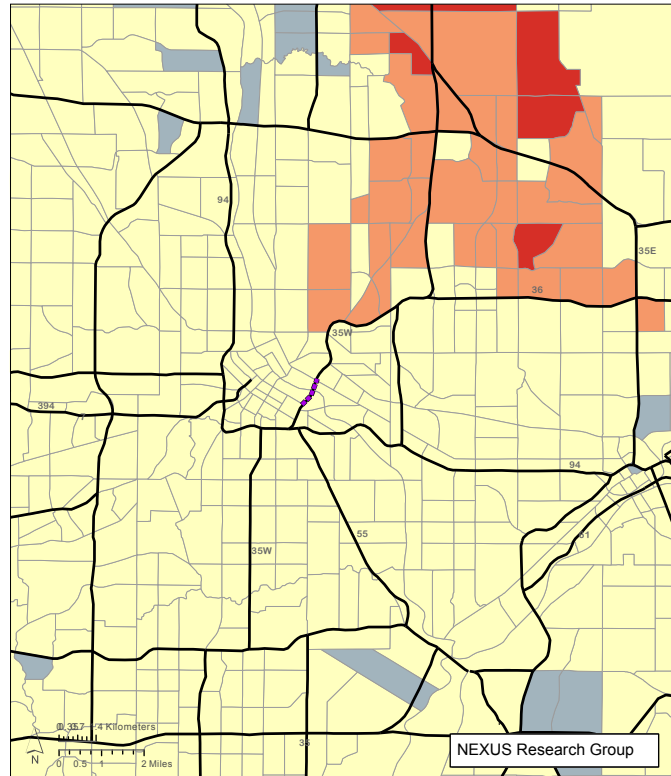
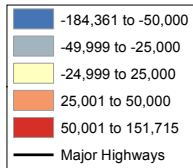


Source: Michael Iacono and others, "Value Capture for Transportation Finance: Report to the Minnesota Legislature." Report No CTS 09-18S (University of Minnesota Center for Transportation Studies, 2009).

Figure 3. Accessibility to Jobs Increased after the Minneapolis Bridge Re-Opened in 2008



Change in number of jobs accessible from origin Traffic Analysis Zones (TAZ) before and after the new I-35W bridge reopening within 30 minutes by auto during 7:00-8:00 AM period. Twin Cities, Minnesota



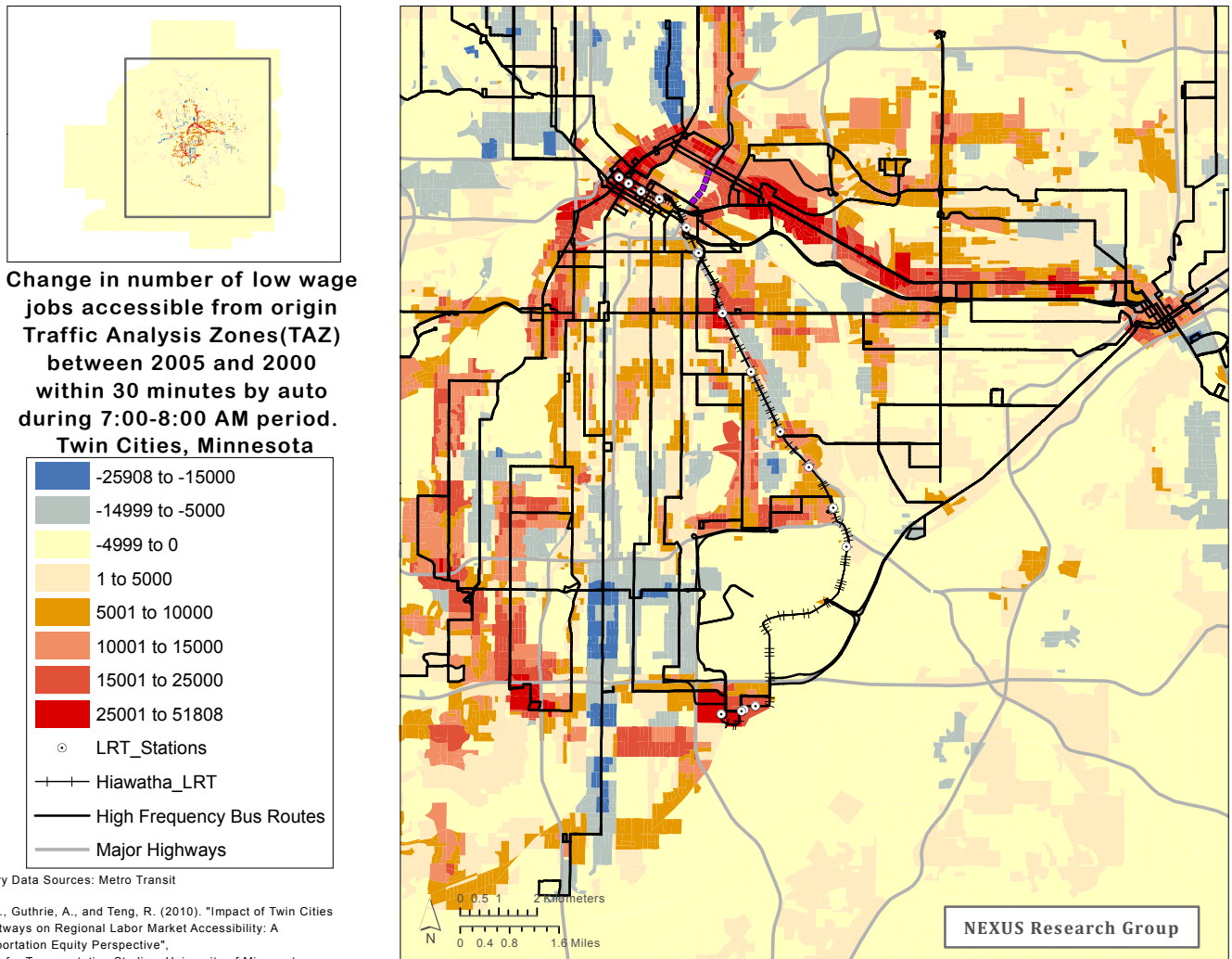
Note: This figure shows the measured difference in absolute accessibility to jobs within 30 minutes by car during morning commute (6:30 to 9:30 a.m.) before and after the reopening of the I-35W Mississippi River Bridge (shown in purple on the map). Other changes in the regional network were also occurring simultaneously, but in the region of the I-35W bridge, this was the dominant network change during this time period.

Source: Zhu and Levinson, "Traffic Flow and Road User Impacts of the Collapse of the I-35W Bridge over the Mississippi River"

Zone Structure Displayed: Traffic Analysis Zone Boundaries
 Primary Data Sources: MnDOT, Twin Cities Metropolitan Council, LEHD files; Speed estimation based on GPS data collected in the Fall of 2008 before and after the opening of the replacement I-35W bridge

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Figure 4. The Hiawatha Light Rail (LRT) and Other Transit Improvements Increased the Accessibility to Low-Wage Jobs in the Twin Cities Region between 2000 and 2005



Note: The difference in absolute accessibility to low-wage jobs is the gain/loss in the number of jobs reachable within 30 minutes by transit during morning commute (7:00 - 8:00 am) between 2000 and 2005.
 Source: Fan, Guthrie, and Teng, "Impact of Twin Cities Transitways."

Not only roads, highways, and bridges create access; transit lines are important links in the metropolitan transportation network for access to jobs. For example, the opening of the Hiawatha Light Rail Transit line in Minneapolis, together with other transit improvements in the Twin Cities, led to significantly greater access to jobs between 2000 and 2005.²⁶ Residents near Hiawatha Light Rail Transit stations experienced more than a 50 percent increase in transit accessibility to low-wage jobs between 2000 and 2005 (See Figure 4).²⁷

B. Access Creates Value

The value of access comes from the ability to reach places and people, as determined by the pattern of development and the transportation network. Without access, land only has value to the extent of its natural resources or building structures. As Adam Smith explained in 1776:

“Good roads, canals, and navigable rivers, by diminishing the expense of carriage, put the remote parts of the country more nearly upon a level with those in the neighbourhood of the town. They are upon that account the greatest of all improvements. [...] It is not more than fifty years ago that some of the counties in the neighbourhood of London petitioned the Parliament against the extension of the turnpike roads into the remoter counties. Those remoter counties, they pretended, from the cheapness of labour, would be able to sell their grass and corn cheaper in the London market than themselves, and would thereby reduce their rents, and ruin their cultivation. Their rents, however, have risen, and their cultivation has been improved since that time.”²⁸

Although the benefit of accessibility accrues to the community at large, most of it goes to private landowners. Landowners gain so much because land value captures much of the benefit of accessibility, as shown by the relationship between property value or rent and various measures of accessibility.²⁹ In those areas where one can reach the most activities in the shortest time, such as Manhattan, building density is higher, especially high rise structures, and rents and land prices are higher. For example, land is at a premium in the downtown areas, at major interchanges, and adjacent to important natural amenities such as the Chain of Lakes in the Twin Cities (see Figure 5).

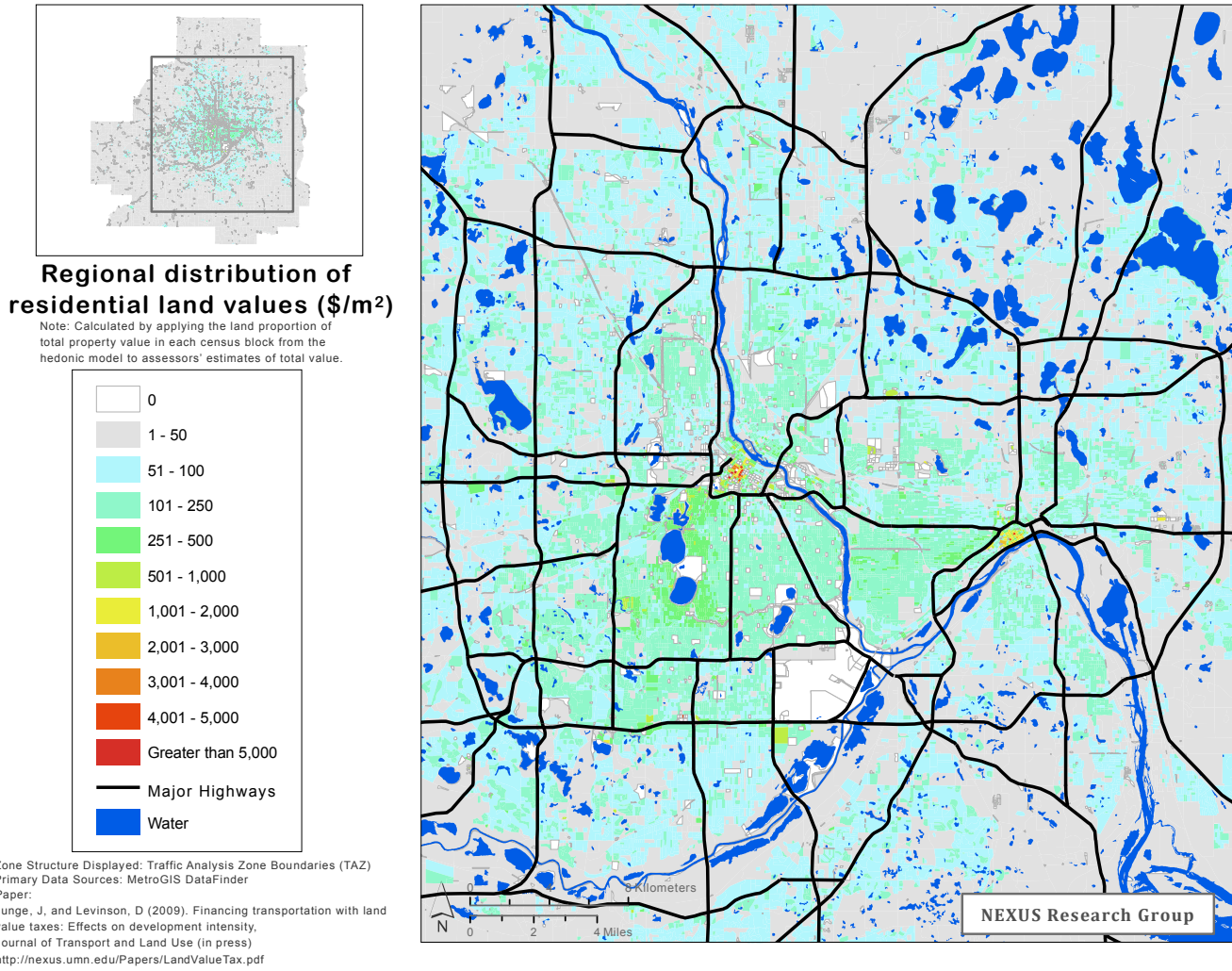
There is an extensive literature on the relationship between accessibility and land value, which can be separated into macro-level accessibility studies, which evaluate the impact of overall accessibility in a city or metropolitan area on patterns of land value or building value, and micro-level accessibility studies, which estimate the value of proximity to a particular node or link in the network (such as a highway or transit station) to land and property prices.³⁰ As an example of the macro-level studies, El-Geneidy and Levinson estimated that each additional job within 20 minutes added roughly \$0.25 to the sales price of a home in 2000 in the Twin Cities region.³¹

The impact of an enhancement to a highway or transit route or station (which increases accessibility) on property is more interesting from a policy point of view. Most of these studies focus on residential property values, and less on commercial and industrial properties. Although the general trend in the empirical studies points toward increased housing prices near transportation infrastructure improvements, the results vary in magnitude and with socioeconomic variables, such as income.

Studies of road upgrades confirm the higher property prices near road improvements, but when traffic and construction externalities are included, house prices decline in the areas very close to the project, before rising by successively declining rates with distance.³² Sales prices of apartments in Philadelphia between 1981 and 1991 dropped by 2.2 to 3.8 percent with each block farther from an arterial.³³ Between 1982 and 1999, the value of commercial parcels one-half a mile away from an improved highway corridor in Austin, TX, declined by \$50,000 per acre compared with parcels in the immediate proximity.³⁴

Empirical studies find that the closer homes or commercial properties are to fixed guideway transit system stations (subway/elevated rail, light rail, commuter rail) the higher the prices or rents. This effect varies by neighborhood income surrounding station areas.³⁵ Similar to the highway studies, immediate proximity to the rail tracks or right-of-way lowers property prices, likely because of noise and other nuisances.³⁶ Lewis-Workman and Brod found a price decrease in home prices in New York City of \$75 per meter away from a subway station.³⁷ In Portland, OR, a study using 1992-1994 home prices within 700 meters of the light rail system found that at 328 feet (100 meters) from stations, each additional meter resulted in a \$32.20 decrease in average home prices.³⁸ Cervero and Duncan also noted substantial impacts on commercial property values near commuter rail station in the San Jose metropolitan area.³⁹

Figure 5. Land Value in the Twin Cities Region, 2008



Note: Regional distribution of 2008 land values (dollar/squared meters), calculated by applying the land proportion of total property value in each census block from a hedonic model to assessors' estimates of total value. 1 meter² is 10.8 foot².

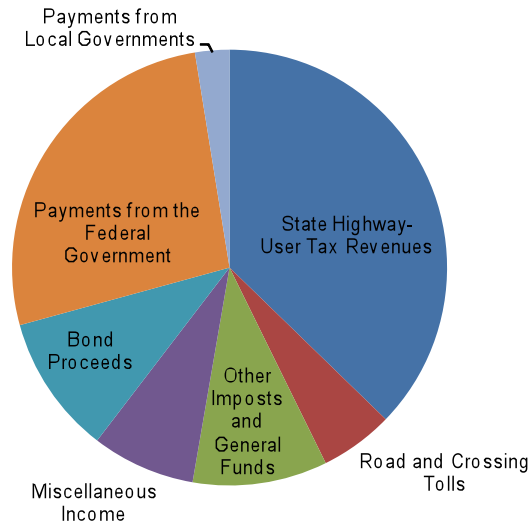
Source: Jason Junge and David Levinson, "Financing Transportation with Land Value Taxes: Effects on Development Intensity," Journal of Transport and Land Use (in press, 2011).

C. Value Can Be Captured to Finance Infrastructure

The term value capture refers to a family of public finance mechanisms that raise funds in proportion to the increase in land value associated with new or improved public infrastructure.

This method is not yet widely used in the United States. For example, states finance their highways through a mix of funding from general public revenue sources, transfers from the federal government (mostly federal fuel taxes), user fees such as the gasoline tax, and some nonuser beneficiary sources. The latter include value-capture techniques such as development impact fees, air rights, special assessment districts, or joint development (see Figure 6). Ideally, a congested transportation system would be "self-financing" by charging drivers the marginal cost of any additional delay they impose on other users (the so-called "marginal cost pricing") and using the resulting revenue to pay for the cost of infrastructure. Unfortunately, this ideal runs into many practical difficulties for widespread use, and

Figure 6. Funding Sources for U.S. State Highway Transportation, 2008



Source: U.S. Federal Highway Administration, "Highway Statistics 2008, Table SF-21: State Funding for Highways, Summary, 2008" (Washington: U.S. Department of Transportation, 2010).

second-best solutions, such as the gasoline tax, are more prevalent.

As a result, there is no universal best mix of funds; it depends very much on the specific place and time. Any revenue source must be balanced among administrative efficiency, equity, political acceptability, and other factors. In addition, the transportation funding mix must address the specific features of funding operations, maintenance, or capital expansion. For example, funding based on development rather than a user charge focuses on capital costs but does not affect transportation use.

At the local level, where land-value capture techniques would have the most impact, transportation funding relies primarily on property taxes, which provide the bulk of general fund revenues, rather than user fees. For example, Hennepin County, the largest county in Minnesota and which includes Minneapolis, had an operating budget for transportation of \$91 million in 2009, of which 55 percent comes from the general fund (primarily property taxes), 42 percent from state government (mostly state gas taxes), and 2 percent from other sources.⁴⁰

The reliance on local property tax revenue to fund roads stems from the function of the property tax as an access charge to the transportation system, independent of use. In addition, the property tax is widely collected, making it administratively efficient for local governments. Finally, in the absence of congestion, roads are dominated by fixed costs rather than variable costs, and thus the property tax, which does not affect road usage, can still be an effective transportation revenue source.

Value-capture mechanisms could provide a more targeted means to finance new or existing infrastructure by linking the benefit from infrastructure (the increase in value of adjacent land as a result of newly created or increased accessibility) with its cost. The new revenue sources could be used to fund capital or operating costs, such as the construction, operation, and maintenance of infrastructure. Therefore, these transportation funding methods ultimately maintain or improve accessibility, continuing the virtuous circle of access, value, and transportation infrastructure.

This paper analyzes seven of the most common value-capture mechanisms, based on four major cases that link existing or new benefits from accessibility accruing to land development to existing or new cost of infrastructure. Properly implemented, any of these value-capture schemes may have a role in funding local transportation, as shown by numerous studies on value capture.⁴¹

Case 1: New land development, new infrastructure

Impact fees can be used to ensure that a new development pays for any new infrastructure required to support new land development. These charges may be established in a number of ways, so long as a legal nexus can be found that ties the need for the new infrastructure to the new development.⁴² These impact taxes pay for master planned roadways nearby that otherwise could not be built in a timely manner, thereby ensuring public facilities are adequate. In places with adequate public facilities ordinances (APFOs), an adequacy test must be first passed to approve any subdivision.⁴³ These fees range widely. For example, in suburban Maryland, where 16 counties have an impact fee or development excise tax, Anne Arundel County charges \$11,400, while Prince George's County charges from \$8,177 (inside the Capital Beltway) to \$14,019 (outside).⁴⁴ Impact fees are used currently in more than half of U.S. states.⁴⁵

Joint development is development adjacent to (or on top of) a piece of infrastructure that serves it, such as a transit station or a highway interchange. The land development may be joined with the new piece of infrastructure in terms of location, timing, and organization. The joint development may be built by the same organization (public or private) or coordinated by different parties, with the land development cross-subsidizing the infrastructure. Joint development is used widely in Asia, and sporadically in the United States surrounding selected transit lines (for example, in Portland, OR, Miami, Philadelphia, Washington, and New York).⁴⁶

Joint development and impact fees arise from two different models of infrastructure and land development. Impact fees assume government provides infrastructure and land development consumes it, and without the fee, the infrastructure would be inadequate and uncoordinated. Joint development coordinates the infrastructure and land development simultaneously, with the parties involved being either the same or closely cooperating. Impact fees work better when there are many developers, none of whom would alone have the scale to do a joint development, and in the context of roads where there is a dispersed origin and destination pattern. Joint development is more appropriate when there is a large development that can be tied to a specific piece of infrastructure, such as a transit station or highway interchange.

These land-value capture mechanisms matching new land development with new infrastructure were used widely in the United States in the late nineteenth and early twentieth centuries. Joint development was quite common in the railroad and streetcar eras. In granting rights-of-way to the transcontinental railroad, the U.S. government gave large tracts of land to the railroad companies to pay for the new rail tracks. The example of the streetcar development in Minneapolis-St. Paul reveals the main limitation of this type of funding for transportation: once the land is developed, there is no money left for major rehabilitation and replacement of the infrastructure (See Box 1).

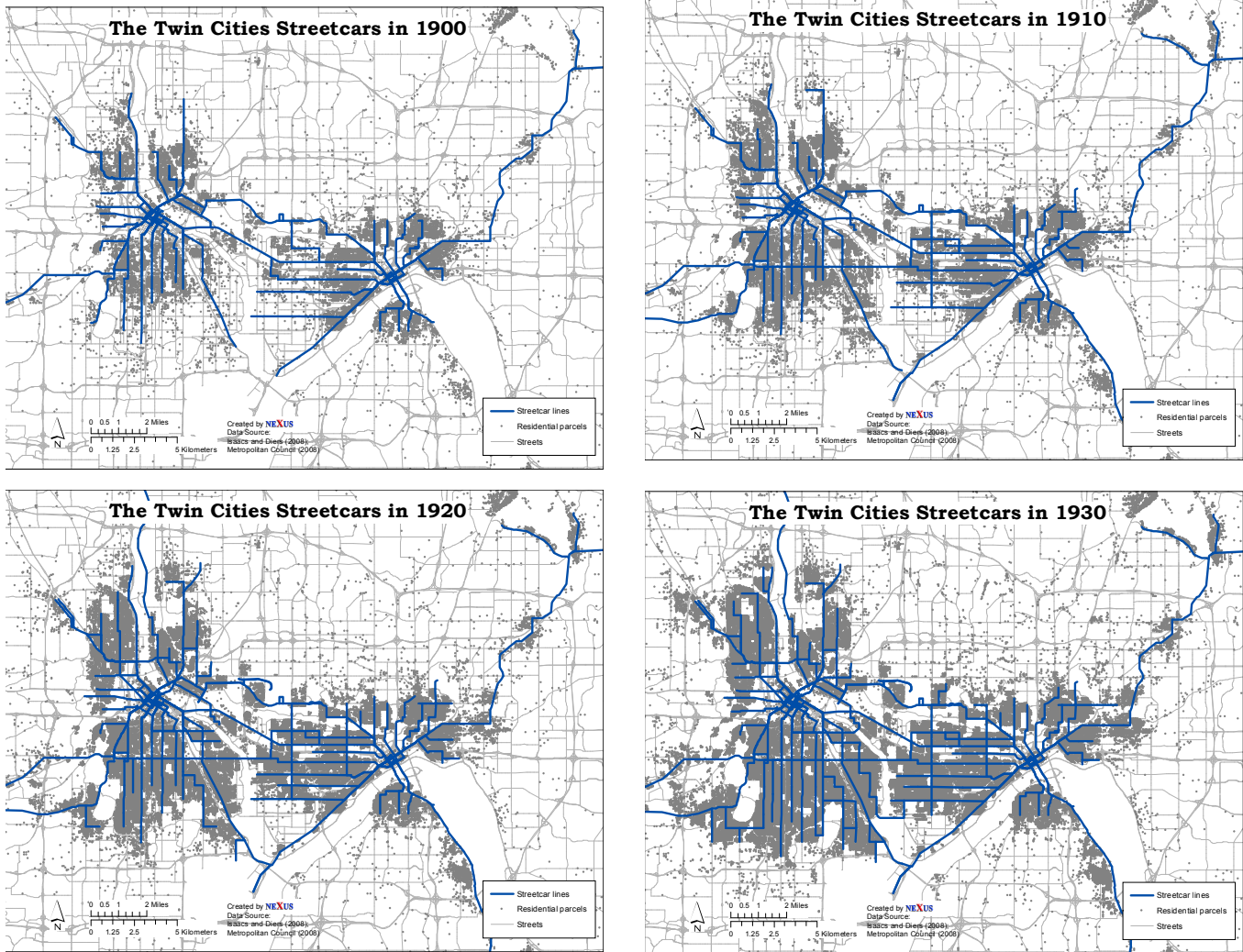
Box 1: Joint Development and the "Streetcar Suburbs": The Case of the Twin Cities

In the late nineteenth and early twentieth centuries, private transit companies were often developers of "streetcar suburbs." For example, streetcars led land development in large parts of Minneapolis and St. Paul (Figure 7).⁴⁷

Although it was used widely in the past, this deployment offers a lesson. Joint development was critical in paying for the initial capital costs of the streetcars, but it did not provide for replacement costs. As the Twin Cities streetcar network approached 60 years in the early 1950s and needed to be recapitalized or rebuilt, the cross-subsidy from real estate (the original funding source) was no longer available, as the land was already developed. The owners of the streetcars in Minnesota, still private, as were many others across the world, instead substituted buses for streetcar ("bustitution"), given that running a bus on public roads required much lower initial capital outlays than streetcars needing both vehicles and tracks. (It did, however, entail higher operating costs.)

This example shows that, should it be desirable to maintain a piece of infrastructure over a long period, the owner of the infrastructure should secure a continuing source of revenue that not only pays for operations, but also for periodic reconstruction.

Figure 7. The Joint Development of Streetcars and Suburbs in the Twin Cities, 1900-1930



Source: Feng Xie and David Levinson, "How Streetcars Shaped Suburbanization" (Minneapolis: University of Minnesota, 2008).

Case 2: Existing Development, New Infrastructure

A special assessment district is a fee levied over a certain area for an identified new transportation project to fund the infrastructure in part or in whole. Governments use this technique widely to fund streetlights, repaving, sidewalks, other local transportation public works, and transit stops. For example, Portland, OR, funded its streetcar in part using a local improvement district of nearby property owners. The effort was coordinated by the City of Portland, with support from the metropolitan government. The initial line was designed to connect redevelopment areas north and south of downtown with existing developed areas. In addition to special assessments, Portland upgraded the zoning of these vacant parcels. Proponents credit the streetcar with stimulating development in the area.⁴⁸

Tax increment financing (TIF) funds an infrastructure project by borrowing against the future stream of additional tax revenue the project is expected to generate. Tax increment financing can be applied to new development or redevelopment. For instance, the Fortune 100 retailer Best Buy financed an interchange serving its headquarters in Richfield, MN, in exchange for the right to keep future property tax increases that otherwise would have gone to the city over a 24-year period.⁴⁹ The

city is hopefully no worse off (given that without the development, the city would not have received the property tax anyway) and is likely better off should the project create positive spillovers to other properties within the municipality.⁵⁰ Tax increment financing has been favored in the Midwest and on the West Coast.⁵¹

Special assessments are likely to be more politically sensitive, given that the community must agree to raise local taxes, while a TIF diverts future tax revenues to a particular goal, which is often invisible to the general public. Assessment districts are more appropriate when the piece of infrastructure is important to the community but the future revenue stream is uncertain. Conversely, a TIF is more suitable when there is certainty in the future revenue.

Case 3: New Development, Existing Infrastructure

Air rights capture the real estate value of transportation by selling or leasing the space above (or below) transportation facilities for development.⁵² Typically this is imposed after the road, rail line, or transit station is constructed so it recovers value after creation, though it could be applied simultaneously with infrastructure creation. In the latter case, it would be a form of joint development. Governments have used air rights to fund development around transit systems in, for example, Atlanta, Washington, and Boston, and above interstate highways in high-density areas, in many cases for parks.⁵³

In Minneapolis, the new Minnesota Twins baseball stadium is built partly over I-394 and adjacent to a rail transit hub, creating a large site with good highway and transit accessibility to move large numbers of people 81 days a year (not to mention the ability to reuse parking garages that serve the daytime downtown office crowd). Although the Twins stadium does not directly create much revenue for the city or state, given that, like most public stadiums, it is subsidized, the amount of subsidy is less than otherwise when the land is used twice (for I-394 and the baseball stadium; the parking garages are also being used when they were otherwise vacant).

Air rights work when land is expensive (that is, when accessibility is high), justifying the added construction costs associated with building over existing infrastructure. It also works for land uses that value high accessibility, or when there is a desire to create a new public amenity when land is scarce.

Case 4: Existing Development, Existing Infrastructure

Land-value taxes reform the property tax by separating the value of a property associated with land from that associated with the structure.⁵⁴ Because the value of the land is determined by its accessibility, which is created by the community at large via transportation networks and the location of activities, a tax only on land value better captures the benefits of transportation than a tax on both land and structures. Such a system may also have beneficial side-effects of encouraging the development of valuable land (for example, surface parking in urban cores), which is now discouraged by the tax code that taxes buildings as well as land.⁵⁵ The nature of the land-value tax makes it difficult to use it to fund a single project; rather, it is more appropriate as a source for funding a comprehensive transportation program. Hawaii and Pennsylvania have used the land-value tax, but otherwise it is not widely across the United States.⁵⁶

Pittsburgh is the largest U.S. city to have experienced with a form of land-value tax (the split rate tax).⁵⁷ In 1976, Pittsburgh began to raise its land tax, from twice the rate levied on buildings to nearly six times greater. As other cities in the region saw a substantial drop in commercial construction in the 1980s, Pittsburgh witnessed a sharp increase in commercial construction. Research has shown that the higher land tax in Pittsburgh was a significant enabling factor to this development.⁵⁸

Transportation utility fees replace the share of general fund tax revenue going to transportation with a charge that is roughly proportional to expected transportation use.⁵⁹ An example would be to use standard trip generation rates as the basis for charging rather than using property improvements.⁶⁰ Although these fees tie the benefits to costs of infrastructure and are much simpler to implement than a more comprehensive user fee, their only aim is funding; they are not a travel-demand management tool. Oregon uses transportation utility fees to pay for maintenance in about a dozen of communities in the state, where they generate about \$6,000 per road mile per year.⁶¹ In addition, transportation utility fees have seen limited use in a few other states, including Colorado, Florida, Idaho, Texas, Washington, and Wisconsin. Mission, KS, recently implemented a transportation utility fee on single-family homes. Homeowners pay a flat fee of \$72 per year to finance city roads.⁶²

Transportation utility fees earmark transportation funding, separating it from general revenue, which has political advantages for transportation operations and maintenance budgeting. Further, this financing mechanism increases the tax base over which transportation charges can be levied more than property taxes, because nontaxable properties still must pay a utility fee. While the transportation utility fee is based on expected use, the land value tax is proportionate to the benefits produced by infrastructure, in the form of capitalized accessibility. The land-value tax can be used to fund both transportation and other government expenditures. Although there is no ban on both being used, at present, they are not nearly as widespread as the more typical property tax.

Various places have used these value-capture techniques to fund different transportation services, but as noted above, no one has deployed them widely enough to achieve their potential. The reasons for popularity of different mechanisms are likely as much an accident of history as any structural factors. Effective policies diffuse, first locally and then elsewhere if there is a need. Local communities, states, and federal government must better understand the structure and characteristics of value-capture policies if they are to develop their full potential as a sustainable funding source.

IV. Policy Implications

The U.S. transportation system must become more efficient if it is to provide the same level of services with less money at all levels of government. At the same time, the competitive forces in the global economy require an increasingly effective U.S. transportation network, able to support a changing American economy. Measuring and planning for accessibility and taking advantage of the “virtuous circle” among access, land value, and transportation infrastructure could contribute to the reform of the transportation policy and financing systems, especially at the state and local levels.

Possible approaches include:

1. Use accessibility as a performance metric in funding transportation projects

Accessibility is a useful performance indicator for determining how well the transportation and land-use system work collectively. However, most of the performance measures of the transportation systems around the country focus on mobility or congestion alone. This results in incomplete or even erroneous conclusions regarding the performance of transportation. As explained in Section 2, although congestion has increased across U.S. metropolitan areas, the increase does not necessarily mean that transportation systems are failing their primary function. Examining accessibility trends as both mobility and land-use change demonstrate that travelers can reach more activities in the same amount of time.

Cities, counties, metropolitan areas, and states should incorporate accessibility as a performance criterion in allocating transportation funding. Not only is accessibility a more comprehensive measure of the performance of the transportation system, but it also shows the economic benefit of transportation.⁶³

In the case of highways, states are the primary decision maker in selecting highway transportation projects for funding. Although more than three-quarters of the federal transportation investment supports state and local assets, the federal government focuses its highway investments in programs, without direct control over the vast majority of individual projects such as highways.⁶⁴ Once funds are appropriated (largely by formula), the states distribute them among projects within various program categories as they see fit.⁶⁵ To better distribute scarce resources, states should include accessibility of individual projects as a selection criterion. For example, proposed new projects can be ranked on the basis of units of accessibility (for example, operationalized as the increase in the number of person-weighted jobs within 30 minutes in the morning peak hour) per dollar spent, with only the best projects awarded funding.⁶⁶ If funding moves from grants to bonds or loans, projects that generate revenue become even more critical. Projects generating high accessibility, and a high value capture potential, can more easily repay borrowed funds.

The importance of using accessibility as a performance measure is even greater at the local and

metropolitan level. Accessibility shows to what degree the local transportation system fulfills its primary function of connecting people with other people and places. Therefore, local governments, metropolitan planning organizations, and transit agencies should include accessibility among their selection criteria, most of which currently are input based, such as number of miles paved or number of passengers, rather than output-based, such as accessibility.

The federal government can help states and local entities incorporate accessibility measures in two ways: provide a baseline accessibility metric and include increased accessibility as an objective of transportation programs. For many transportation agencies, it is difficult to develop a method for measuring economic impact or to obtain relevant data, given that the traditional focus has been on the engineering aspects. A recommended federal measure would provide a benchmark for the state and local agencies, which then could develop their own accessibility metrics. Further, federal transportation programs that allow for selection requirements could ask for the addition of an accessibility measure. For example, a recent analysis of the federal transit programs shows that U.S. transit agencies use federal requirements as a basis to develop some of their performance metrics.⁶⁷

2. Employ value capture techniques to fund local transportation

The idea of accessibility is much deeper than just a performance indicator. As a measure of benefit, accessibility suggests a path for reforming local transportation finance to better associate benefits with costs. If the costs of transportation were more proportional to the benefits, both efficiency and equity would improve.

Value-capture techniques enable this link between the benefits and costs of transportation, mostly at the local level. Impact fees, joint development, special assessments, tax increment financing, land-value taxes, transportation utility fees, and air rights are among the most widely discussed forms of value capture, and all have advantages and disadvantages from policy and political perspectives. As explained in Section 3, these financing mechanisms can prove critical to the transportation and economic development of an area.

The value-capture techniques suggested in this paper apply primarily to local governments, although there may be state and national analogues to value capture. This focus on the local level raises a couple of difficulties. First off is that local transportation planning (particularly for larger facilities) is conducted at the state or metropolitan levels, while land use is generally controlled at the township, town, city, or county level of government. Therefore, using value-capture techniques requires better coordination between the transportation agencies (at the state, metropolitan or local level) with the local entities in charge of zoning. Further, states must ensure that localities have the legal authority to implement these strategies if they so choose. The federal government can provide incentives to use value-capture techniques through both transportation and housing and urban development programs. For example, in case of new transportation or new land development proposals applying for discretionary federal funding, the federal government could give more weight to projects that provide matching funding based on land-value capture, or lend money to states and localities that commit to repay using value-capture revenues.

3. Increase accessibility by coordinating local transportation and local land-use policies

Increasing the accessibility of transportation networks requires planning and coordinating transportation policies more intensively with local land-use policies. For example, developing land at transportation nodes could increase transportation network efficiency. Local zoning that restricts development density at transit stations diminishes the effectiveness of many recent rail systems.⁶⁸ As these are among the most expensive transportation facilities, it is most important to coordinate the transportation and land use.

The federal government's recent initiatives on livability provide an opening to spur better transportation and land-use coordination. Grants could be made available for planning programs in transportation-land use coordination, much like the Urban Partnership program. These grants would be a first step in employing accessibility performance measures and value capture as a financing tool, responsibility that remains with the local and state governments.

Accessibility planning requires data and data evaluation tools. For example, to help local governments fulfill the goal of improved accessibility, the U.K. government commissioned a company (MVA)

to develop an accessibility planning software tool, “Accession,” for local entities around the country. The central government paid for the software for any local entity outside Greater London. The software has been in use since 2004.⁶⁹ Following the U.K. example, the U.S. federal government could collect the bulk of the data used in measuring and planning for local accessibility, thereby lessening the burden on local and state governments.⁷⁰ Further, the federal government could provide the software tools that would allow local and state entities to assess accessibility in their areas.

The governance issues in implementing accessibility planning in the United States ought not to be underestimated. Coordination will always be a challenge in the United States, given the numerous distinct layers of government from homeowners associations to the federal government, all of which have a greater or lesser say in particular decisions. Metropolitan areas have developed different levels of coordination, with some (for example, Portland, OR) having a relatively strong metropolitan level government, and others (for example, Washington, DC) remaining weak.⁷¹

V. Conclusion

Accessibility measures the primary function of our transportation system—the ability to connect people to other people and places. Not only does it assess the performance of transportation systems more completely than mobility measures, but it also highlights the economic benefits of transportation to an area. Accessibility is a metropolitan measure by nature, reflecting the concentration of population and jobs in metropolitan areas. Local and state transportation agencies should use accessibility as a performance measure in selecting transportation projects for funding, work together to plan for accessibility, and deploy value-capture mechanisms to fund local transportation projects. Although the federal government does not select highway projects or land use, it can act in a supporting role to states, metropolitan areas, and local entities in measuring accessibility along their transportation networks and reward states and communities that cooperate in accessibility planning. Accessibility points toward new ways to fund and measure the performance of the transportation system in the United States.

Endnotes

1. David Levinson is the R.P. Braun-CTS Chair of Transportation Engineering, Department of Civil Engineering, University of Minnesota. Emilia Istrate is Senior Research Analyst with the Metropolitan Policy Program at the Brookings Institution.
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10. 60 miles per hour on freeways and 35 miles per hour on principal arterials are common standard free-flow speeds in the congestion literature. See Schrank and Lomax, 2009 Urban Mobility Report.
11. As of July 2009. See U.S. Census Bureau, *2009 Population Estimates* (Washington: U.S. Department of Commerce, 2010).
12. Ibid.
13. The Texas Transportation Institute does not report a travel time index (TTI) for Manhattan, KS, but Wichita, the largest metropolitan area in Kansas, has a TTI of 1.02. See Schrank and Lomax, "2009 Urban Mobility Report."
14. Ibid.
15. Authors' calculation based "population estimates in U.S. Census Bureau, *2009 Population Estimates*, and network speeds from Schrank and Lomax, "2009 Urban Mobility Report."

16. Based on total employment, November 2010 in the Manhattan, KS, metropolitan area. *U.S. Bureau of Labor Statistics, Economy at a Glance: Manhattan, KS* (2011).
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