Tending to Transit:

The Benefits and Costs of Bringing Public Transport in the Chicago Region into Good Repair

Chaddick Institute for Metropolitan Development

October 10, 2012

Joseph P. Schwieterman, Ph.D.*
Laurence F. Audenaerd, Ph.D.**
Marisa Schulz***

*Professor, School of Public Service and Director, Chaddick Institute
**Visiting Scholar, Chaddick Institute
***Assistant Director, Chaddick Institute

Schwieterman, the corresponding author,
can be reached at jschwiet@depaul.edu or312/362-5732

EXECUTIVE SUMMARY

This study explores the status of public transit in the Chicago region and the costs and benefits of investments to bring the system into a state of good repair. By evaluating available data and research, the analysis shows the following:

- ***Strength of demand for transit service:*** After several years in which passenger traffic was hurt by recession, transit ridership is growing much faster than the rate of GDP expansion. Use of transit is more than 5% higher than it was in 2010—one the largest increases since 1999—while the level of public support for investment in improvements is strong.
- ***Backlog of Capital Projects:*** The condition of the transit system is deteriorating due to the recent downturn in capital investment. The system's needs, adjusted for inflation, are approximately 20% greater than they were just two years ago. Without additional investment, system performance will be seriously impaired.
- ***Return on State of Good Repair Investment:*** Each dollar invested in transit generates $1.21 - $1.90 in benefits, not including factors that cannot be effectively measured, such as the role of transit in tourism and shaping the indemnity of the city.
- ***Enhanced agency sophistication:*** Agencies have enhanced capability to manage investments intended to bring their system into a state of good repair than during the public-transit crisis of 2009. More research should be done, however, to assess the benefits and costs of particular capital projects.

These findings point to an urgent need for greater capital support to bring the transit system into a state of good repair.

I. INTRODUCTION

Public transit systems require sustained investment to keep capital assets in a state of good repair. In the Chicago region, however, much public and political discourse surrounding this issue has taken place without a clear understanding of the benefits and costs associated with such investment. As a result, there is a heightened risk that policy will not be properly aligned with the system's needs.

This report takes a critical look at the benefits and costs associated with investments to bring the transit system in the Chicago region into good repair. It considers a wide body of research devoted to this issue and provides new analysis about the payoffs of modernizing the region's bus, rail rapid transit, and commuter rail systems.

The report is organized into five sections. Section II explores the role and status of transit in the region and summarizes the condition of the system's equipment and right-of-way. Section III evaluates the evidence that exists about the benefits and costs of bringing the system into good repair. Section IV provides perspective on how maintaining transit affects various types of transit users. The final section offers conclusions and recommendations. Readers will also find additional perspective and analysis in the Technical Supplement Section at the end of this report.

The research for this report was conducted in two phases between July and October 2012. The first involved assessing the available research and the data used in these reports, as well as reviewing estimates about public opinion and costs. The second phase involved statistical analysis and stakeholder discussions used to provide new perspective on the issue.

II. The Role and Status of Transit

The Chicago region's transit system, encompassing 735 miles of rail routes and 248 bus lines, carries more passengers today than it has at anytime in the last 20 years and more *rail* passengers than any other year in the past 40 years.[1] Rising gasoline prices, worsening congestion and technological advances improving the ease of transit-riding have also fostered significant ridership gains.[2] The vitality of downtown Chicago—in which approximately two-thirds of employees arrive to work by bus or train—has also kept transit at the region's forefront. New markets for urban transit have also emerged as a result of housing development near the central core of the city.[3] As noted below, however, the system faces serious challenges, and transit accounts for a diminishing share of total trips made by travelers in the region.

The following four observations highlight key aspects of the Chicago region's transit system and provide a brief synopsis of the opportunities and challenges that the region is now facing regarding sustained investment to this system.

Observation 1: **The State of Illinois has historically had more intensive involvement in transit planning and capital improvements than most other states due to the enormous size and transit-dependency of the Chicago region. Our state ranks third among states in per-capita transit ridership, with residents taking an average of about 56 transit trips annually.**

The number of transit trips per capita in Illinois (55.6 annually) is exceeded only by New York (216.1) and Massachusetts (61). Residents in the Chicago region alone make an average of 84 trips per year.

Such intensive reliance on transit is largely a function of historical development patterns in the Chicago region. Between 1850 and 1930, most residential construction was heavily concentrated along rail corridors. For more than a century, the region's commuter-rail, rapid-transit, and bus routes have carried more riders than any other metropolitan region except New York.

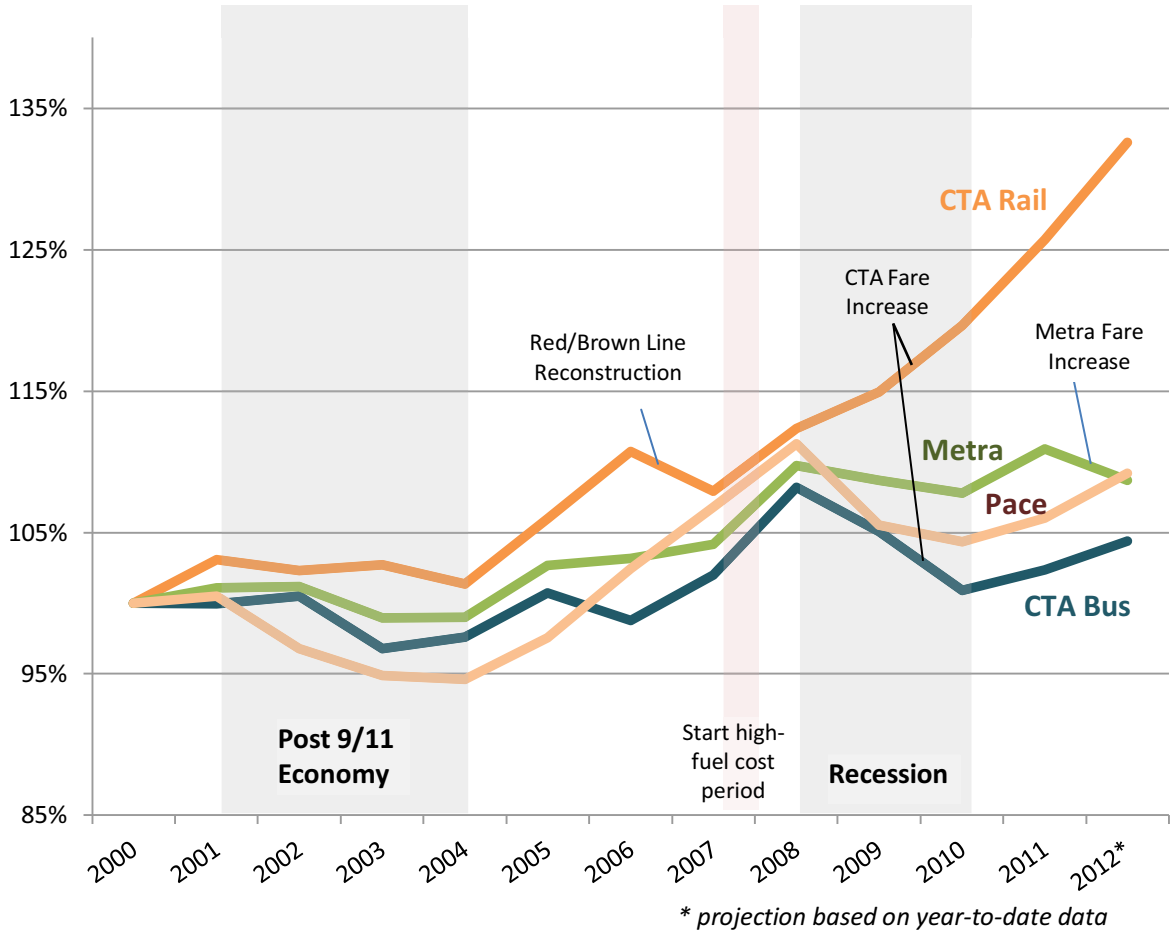
State government has been actively involved in transit planning and investment for most of the past century. The Chicago Transit Authority (CTA), created by the state legislature in 1947, received heightened financial support from Springfield in the following decades as concerns about the deterioration of service gradually increased. The state created the Regional Transportation Authority in 1974 to provide oversight and financing for the CTA, the commuter rail lines, and suburban bus system. More recently, in 2008, the state amended the act creating the RTA in 2008 to strengthen its oversight of the system while increasing revenues for transit through increased sales taxes, which have for decades been the predominant source of funds for transit operations.

Observation 2: **The push to bring the transit system into a state of good repair draws vitality from renewed optimism about the passenger-carrying potential of this system. Transit ridership in the region is more than 5% higher than it was in 2010, restoring the sense of momentum that was lost during the recent recession.**

Transit ridership has been strong this year at each of the three "service boards" under the auspices of the RTA, which include the CTA, Metra, and Pace Suburban Bus. The CTA is reporting its highest ridership levels in 20 years, with year-over-year gains averaging about 4%. Pace traffic was up about 2% during the first half of this year. Metra posted its third-highest ridership ever in 2011 and is reporting a modest 0.4% decline in ridership in so far this year in the wake of a 25% increase in fares taking effect in February, the largest in Metra's history.

Fig. 1: Passenger Trips on Public Transit Since 2000

Expressed as % of Base Year

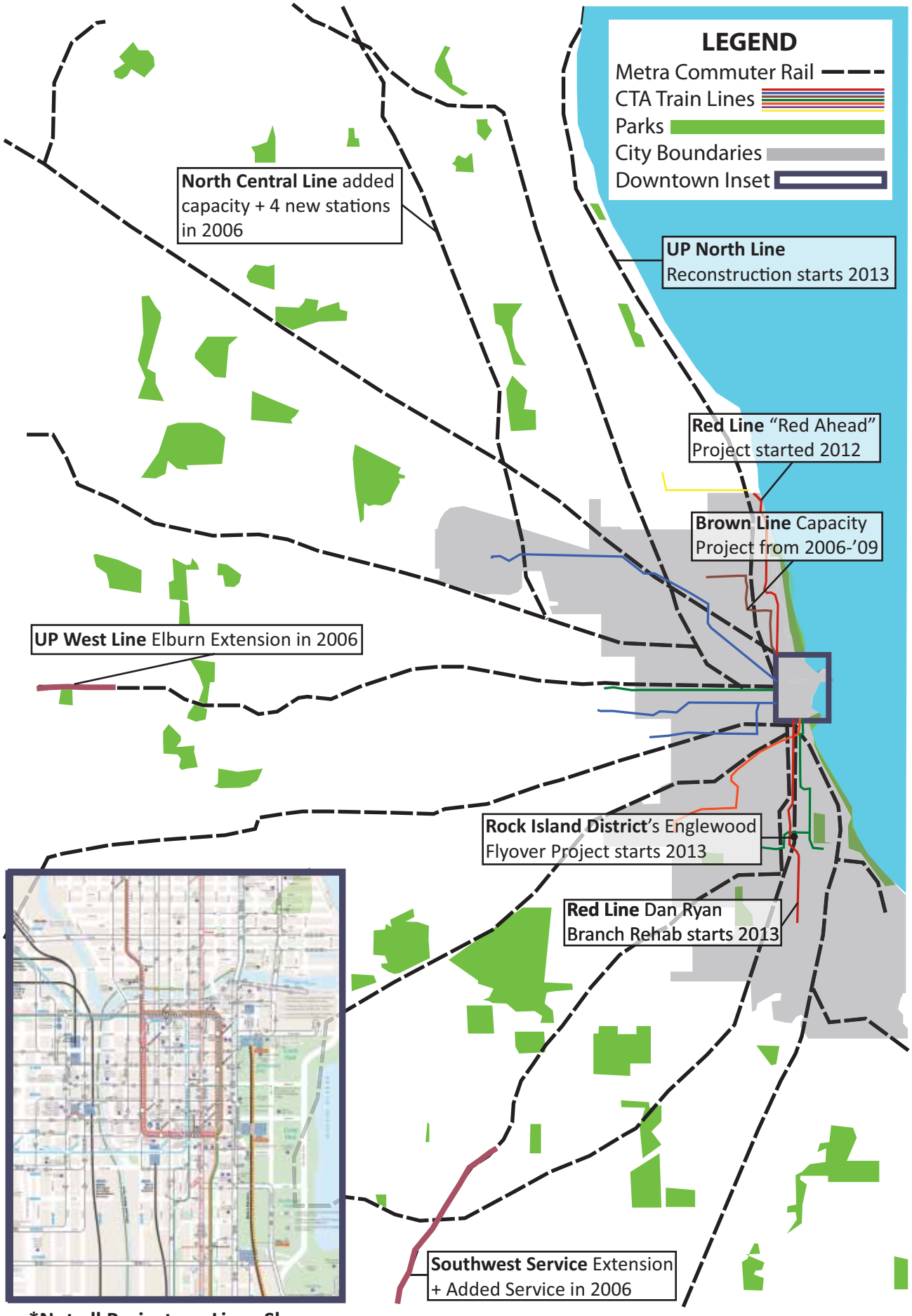


** projection based on year-to-date data*

The increasing transit demand over this past summer and a modest rise in employment suggest that annual growth across the system (by our estimate) will be up more that 2.5% for the second straight year—the first time this has happened since 2000. Such growth is taking place despite soft ridership on certain CTA bus routes, several of which remain the weakest performers of the system and are targeted for elimination.

On the whole, the sense of momentum that was lost in 2009 and 2010 as a result of recession-induced ridership declines has been restored. Recent improvements, such as the opening of two new CTA rapid transit stations in May, the elimination of certain slow zones, the impending introduction of bus-rapid-transit service (linking the Loop to South Chicago), and improvements to Bus Tracker and Train Tracker (providing information about departures on mobile devices), have boded well for next year's ridership levels. Please refer to *Figure 2* for a summary of notable recent capital projects.

Notable Capital Projects on Rail Routes *2006 - present*



***Not all Projects or Lines Shown**

Observation 3: **The Chicago region's system performs well relative to its peer group in other cities with respect to both the service provided, the share of cost paid through the fare box, and the efficiency of that service. Nevertheless, powerful historical forces have greatly impaired the system's success in serving markets that do not involve travel to and from downtown Chicago.**

Comparisons show the Chicago region's system is favorable among 10 peer systems, with respect to:

Service Coverage: measured by such factors as transit capacity per resident and passenger trips per resident. The region ranks 2nd in the amount of transit service per square mile.[4]

Service Efficiency and Effectiveness: measured by operating cost per unit of transit capacity and operating cost per passenger trip. The region ranks 4th with respect to the cost per "unit of capacity" provided.

Service Level Solvency: measured by such factors as fare revenue per trip and capital expenditures. The region ranks 2nd in the share of costs paid through the fare box, but in the lower half in capital expenditures per capita.

The share of all trips made by transit, however, has gradually fallen. This is partly due to the fact that all rail routes—unlike those of Los Angeles and New York—radiate from downtown Chicago. The appeal of low density suburban settings, rising automobile access, and the mobility afforded by convenient expressway travel have all encouraged growing numbers to inhabit areas poorly served by transit. Although commuter-rail lines and bus lines have gradually expanded, residents living in less-dense parts of the region remain far less apt to use transit service than their closer-in counterparts.

Social and technological change and the rising cost of doing business in the Greater Loop have similarly encouraged businesses to migrate toward the periphery. Only a tiny share of employees and customers regularly reach these businesses on transit. Partially as a result of the dispersion of people and businesses into an ever-expanding geographical area since World War II, the Chicago region today ranks only 11th among U.S. cities in per-capita transit usage.[5]

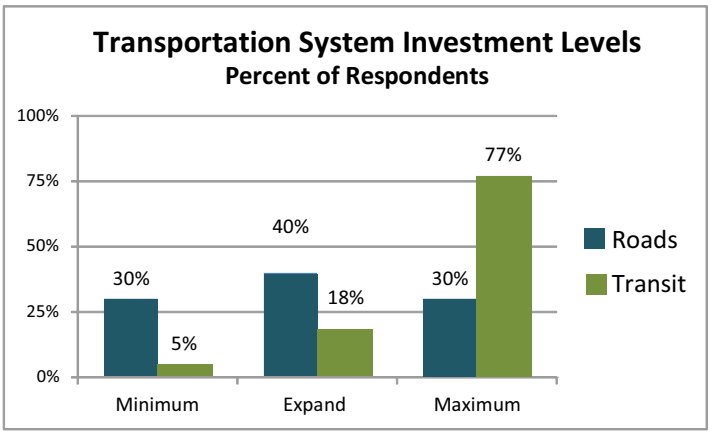
The region has experienced slow growth of ridership over the last 20 years compared to other major cities. Chicago Metropolis 2020, noting that our region's growth has greatly lagged behind that of Los Angeles, New York and other cities, has called for plans to double ridership over the next 20 years. [6]

Observation 4: **Public support for transit investment remains much higher than support for highway investment. Only one in 20 respondents believe that transit funding should be limited to maintaining the system as it is configured today.**

Two recent efforts to solicit citizen opinion about transit indicate that support for transit or transit-oriented investment remains strong. As part of the input for the Chicago Metropolitan Agency for Planning (CMAP) *GO TO 2040* plan, respondents expressed considerable support for transit and alternative transportation options, with 95% expressing support for expanding or maximizing investment in transit. Support was much weaker for maximum investments in highways (*Figure 4*).[7]

Respondents also expressed their desire to see more moderate-density development that is more suitable to expanding the role of transit than low-density development (Cervero and Guerra, 2011).

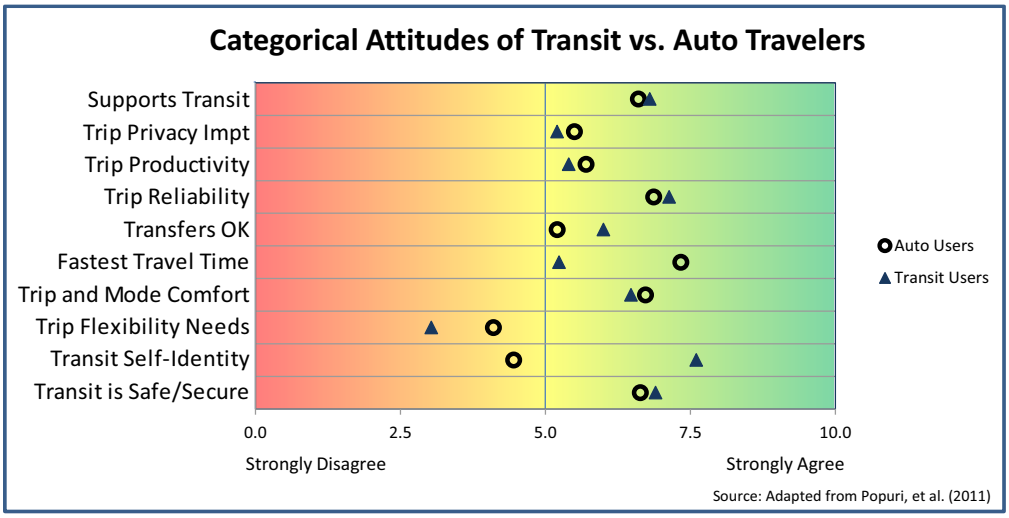
Fig. 2: Public Interest in Transportation System Investment



(Source: CMAP, 2009)

The second survey, conducted by the RTA and evaluated by Popuri, Y., et al., in 2011, shows that highway and transit users favor policies to improve the performance of the transit system.[8] Both groups consider trip reliability and predictability (features common to well-functioning transit systems) more important than privacy and flexibility (features most commonly associated with auto travel), while expressing strong support for transit investment in general.[9]

Fig. 3: Attitudes of Auto and Transit Users



The RTA results are especially noteworthy considering that they suggest that transit investment is viewed favorably in spite of the region's sensitivity toward higher sales taxes, which became evident during the backlash to Cook County's one-cent increase in 2009.

Observation 5: **Enhanced federal and state capital investment between 2008 and 2010 temporarily alleviated crisis conditions at the CTA. Since then, capital support diminished appreciably, with the result being further deterioration of systems' equipment and right-of-way.**

Trends in funding for the three service boards over the past five years, without adjustments for inflation, appear in *Figures 4-6* below. Capital spending appears as a solid white line.

Chicago Transit Authority: A spike in capital funds in 2008 allowed for the elimination of many slow zones and other critical repairs. These funds, made possible largely by a temporary boost in federal and state infrastructure spending to combat the recession, were not sustained. Since then, both capital and total funding have fallen considerably. Approximately $100 million of the annual decline in funding since 2008 is attributed to the transfer of certain ADA services to Pace. The bulk of the drop, however, is due to a trailing off of grants, weak sales tax revenues, and other factors.

Metra and Pace: Total funding for Metra has actually risen, most recently due to the sales tax increase, which took effect in 2008. Due to the dire situation facing the agency's budget in 2008, however, capital spending it is still well below that considered necessary to keep its system in good repair. Pace fared the worst between 2010 and 2011, seeing declines in *both* total and capital funding.

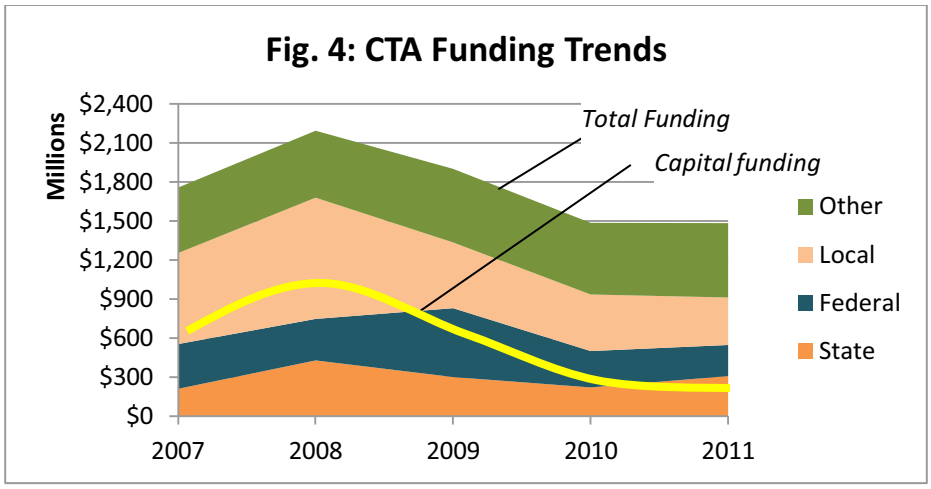


Fig. 4: CTA Funding Trends
Millions
$2,400
$2,100
$1,800
$1,500
$1,200
$900
$600
$300
$0
2007
2008
2009
2010
2011
Total Funding
Capital funding
Other
Local
Federal
State

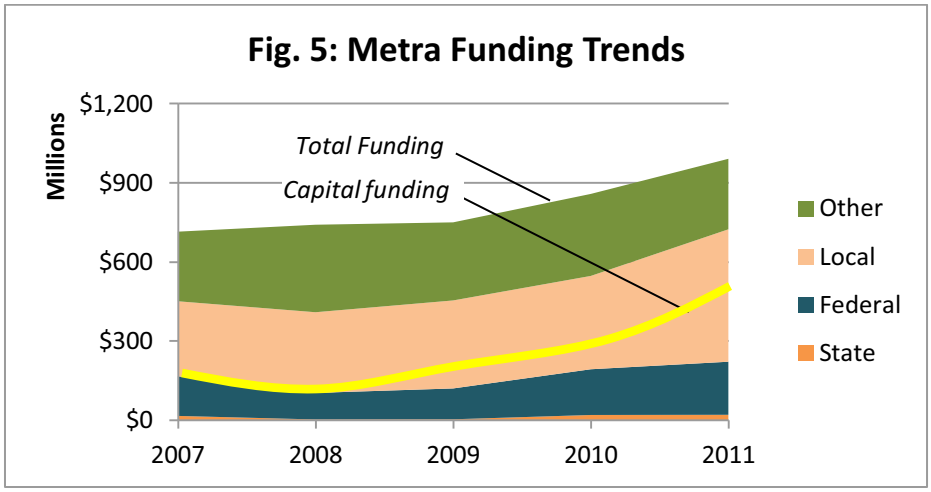


Fig. 5: Metra Funding Trends
Millions
$1,200
$900
$600
$300
$0
2007
2008
2009
2010
2011
Total Funding
Capital funding
Other
Local
Federal
State

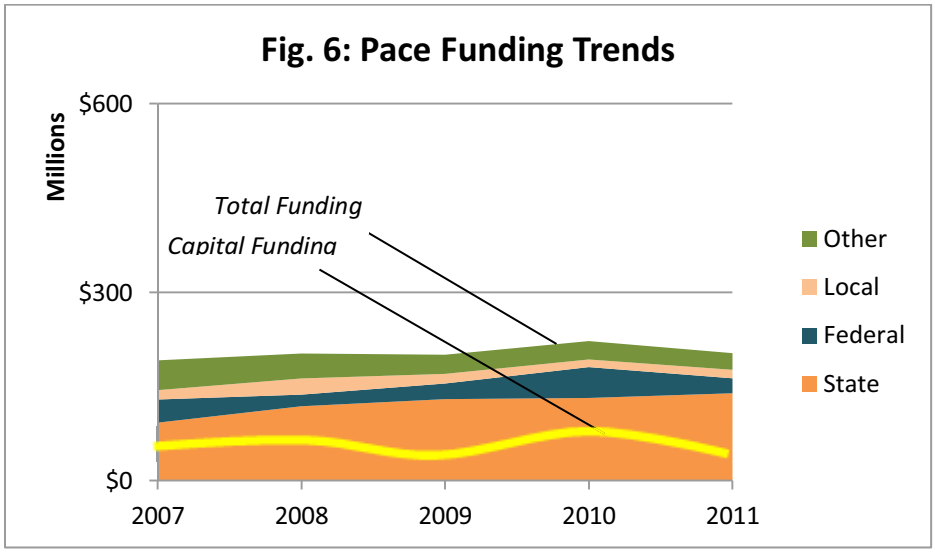


Fig. 6: Pace Funding Trends
Millions
$600
$300
$0
2007
2008
2009
2010
2011
Total Funding
Capital Funding
Other
Local
Federal
State

Reliable projections for capital and total spending for 2012 are not yet available, but the budget suggests that total funding will rise modestly while capital spending will remain relatively flat.

The resulting backlog in capital projects is creating a growing risk of declining system performance. The funds needed to bring the system to good repair, based on an estimate by URS Corporation publicized in a RTA report released on September 28, 2012, has risen to $30.9 billion from $26.1 billion in 2012 (these figures are in current dollars). This represents, by our estimate, a need of about $9,900 per household in the region.

URS drew these conclusions by sampling inventory and estimates that 191 bridges will need renovation by 2019, 42% of rail cars are beyond their useful life, and over a third of Metra stations are in poor condition. We used this information to develop estimates of gaps between annual funding needs and recent appropriations, which are shown in *Figure 7*.

Fig. 7: Annual Capital Funding Needs

Ten year planning cycle in current dollars

While capital funding has averaged $650 million over the past several years, the need is closer to $3 billion. The backlog in projects has increased by more than 25%.

Considerable uncertainty is associated with these figures. We were unable to find any "second opinion" about the system's capital needs. Some assets in which replacement is considered necessary may well be able to function longer than previously anticipated. Nevertheless, the evidence is compelling that the equipment and infrastructure has deteriorated to a point that the efficiency of operations is being impaired, and that the problem will grow appreciably worse over the next several years.

III. BENEFITS AND COSTS OF BRINGING THE TRANSIT SYSTEM INTO A STATE OF GOOD REPAIR

A wide body of research explores the benefits and costs of investment in transit systems. This section, using the results of 20 studies on transit investment—including three focusing on the Chicago region—assists the reader in understanding the dynamics of transit investment by:

- analyzing these various studies and the different assumptions made that impacted their findings
- highlighting similar—and conflicting— findings
- discussing important benefit areas that are missing from these types of studies
- offering suggestions to policy makers and transit organizations

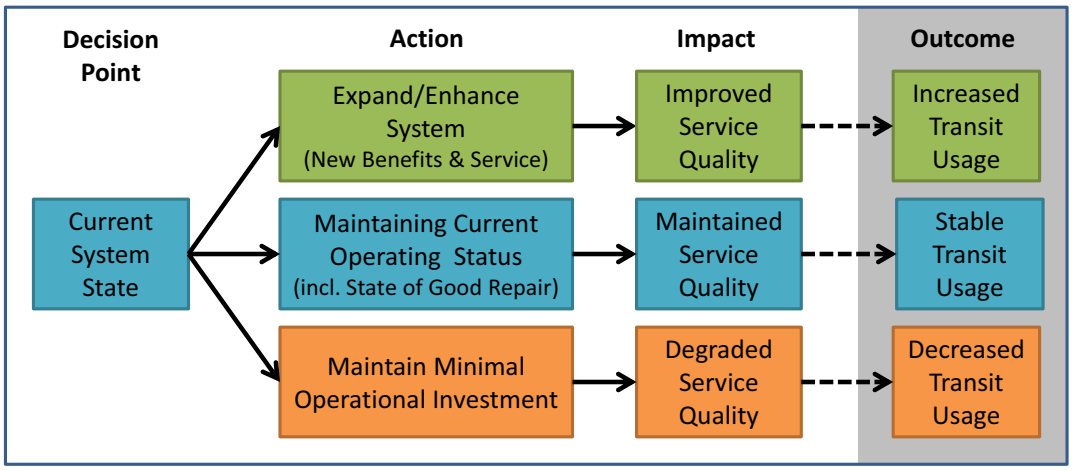
Despite the differences between the studies, almost all of the studies focus generally on three possible scenarios for transit funding:

1) **Maintain Minimal Operational Investment:** Adopting a strategy that involves only maintaining operations as they currently exist and not investing in the established backlog of maintenance and capital investment. As vehicles and infrastructure extend beyond their service lifetimes, this results in increased vehicle failures, track slow zones, service cuts, and a rising level of unreliability.

2) **Maintain Current Operational State:** Adopting a strategy that involves making additional capital investment to remedy the backlog and service-lifetimes issues identified above *and* to provide reliable service at the current levels. This can help mitigate the degradation of performance.

3) **Expand/Enhance the System:** Adopting a strategy that involves not only the capital maintenance investments identified in Scenario 2, but also includes funds for enhancements, such as new routes or increased capacity on existing routes. This scenario allows for new service to areas not currently served.

Fig. 8: Approach Framework for Economic Analysis



These strategies, of course, are simplified characterization of the choices available to policymakers, but they serve to provide a framework for considering the benefits and costs of various options.

Our analysis generated the following conclusions:

FINDING 1: **Adopting the "minimal investment" scenario will result in ridership losses of at least 15% - 20% relative to today's levels, as well as additional losses stemming from growth that will not occur. This result is corroborated by recent research about the effects of "slow zones" on the CTA rapid-transit system.**

Investing to bring the transit system to a state of good repair is supported by three studies on the region's transit system, which measure the consequences of allowing for continued deterioration of the system. A large-scale Cambridge Systematics study, published in 1995, making it somewhat dated but nevertheless still quite relevant, projected a 14% - 16.9% decline in ridership from levels after 15 years of sub-adequate investments. The Regional Transportation Authority's *Moving Beyond Congestion* (2007) estimates a reduction of 20% on the CTA and somewhat less of a reduction on Metra and Pace. Chicago Metropolis 2020, in its *Time is Money* (2007), estimates a 23.9% decline over 13 years.[10]

Table 1: Estimated Loss in Ridership from System Deterioration

Studies on Chicago-area transit

Cambridge Systematics (1995)	14.0% - 16.9% loss within 15 years
Chicago Metropolis 2020 (2007	23.9% loss by 2020
Moving Beyond congestion (2007)	> 20% less on CTA; less on Metra and Pace[11]
UIC study on slow zones (2011)	Ridership decline significant at .01 level

Ridership declines, of course, are affected by many factors other than service quality. Low funding will also affect fares, the image of the transit system, and potentially safety. A "middle ground estimate" that traffic would fall by 15-20%, however, is consistent with studies from other regions (see Litman, 2011, State of Wisconsin, 2006, and TranSystems, 2005).

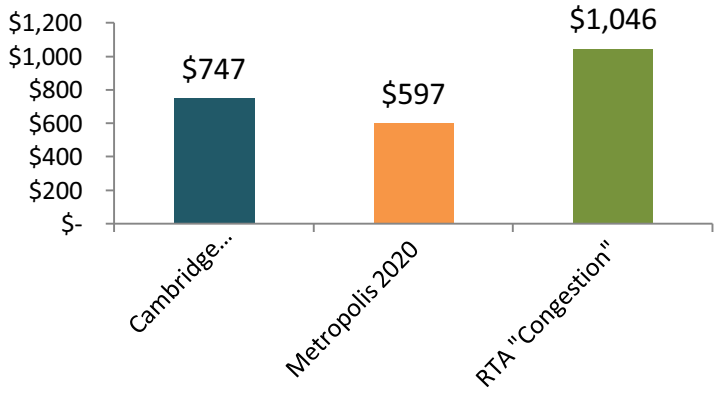
These results are reinforced by a 2011 study by the University of Illinois-Chicago exploring the effects of "slow zones" on the CTA rail lines. This study concluded that "delays have a significant effect on ridership" (with a result that is significant at a .01 level of significance) and that "prolonged slow zones… affect ridership to a greater degree." [12]

FINDING 2: **Empirical evidence shows that the deterioration of the transit system will impose costs on existing highway and transit users of more than $500 million annually, primarily as the result of higher travel times and congestion. This equates to at least $175 per household within the region annually.**

The three aforementioned studies indicate the costs to existing highway and transit users that would result from deterioration of the system, which results in slower transit trips and greater levels of vehicular traffic on the highway system. When adjusted to current dollars, the Cambridge Systematics estimates the losses at $747 million per year. Chicago Metropolis 2020 and *Moving Beyond Congestion* place it at $597 billion and $1,046 billion respectively. None of these estimates include the benefits from new trips generated by improvements to the system.

Fig. 9: Annual Cost of Congestion and Travel Time due to Transit System Deterioration

Cost to Chicago regions to Existing Users Estimates in millions of 2012 dollars



The changes that have taken place since these estimates warrant discussion. Automobile traffic has grown more sluggishly than these studies likely anticipated (delays per rush-hour for travelers have dropped since), partially due to rising fuel costs.[13] As a result, the number of hours of motorist delays from less efficient transit service may be less than projected. Conversely, rising fuel costs and increases in the perceived value of time have increased the cost associated with each hour of delay. Accordingly, it is unclear whether these estimates *understate* or *overstate t*he costs.

On the whole, however, the estimates appear to be robustly made and reasonable in size. Economist Jack Wells put the cost of *all* highway-related forms of congestion in metropolitan Chicago, excluding that for airlines and railroads, at $10.9 billion (in current dollars) in a 2006 federal study. The l Texas

Transportation Institute estimated highway congestion costs in the region in 2010 to be $8.2 billion annually. Neither study explored how investment in transit could reduce congestion but they did suggest that increases of congestion of around 10% (as suggested by the estimates shown on Figure 3) due to declining transit performance are in fact quite reasonable.

FINDING 3: **The return on every $1 invested to help bring the system into a state of good repair generates a return of between $1.30 to $1.90, not including benefits that are more difficult to quantify, such as those pertaining to health, land-use, and the image of the region.**

The return on investment for transit spending is a focus of a rich body of economic research. These studies, as noted below, employ different methods and make different assumptions. Their results, however, are relatively consistent across the various scenarios considered.

Chicago Metropolis 2020 (2007) estimates that each dollar invested returns between $1.21 and $1.64. The first lower figure was derived from estimated differences between maintaining the current funding levels and investing in backlogged maintenance and capital programs. The upper bound is derived from comparing the current funding scenario with one based on the benefits of expanding transit while concurrently adopting new land-use strategies, which are beyond the scope of this paper. Metropolis' estimates, while highly sophisticated, are unfortunately derived from proprietary models about which relatively little is published.[14]

Table 2: Studies on Transit Investment Relevant to the Chicago Region

Studies on Chicago-area transit	
Cambridge Systematics (1995)	$1 returns > $3 in benefits
Metropolis 2020 (2007)	$1 returns 1.21 - $1.62 in benefits
Moving Beyond Congestion (2007)	$1 returns $1.90 in benefits
Studies in other regions	
CUTA/ACTU (Canada, 2010)	$1 returns $1.22
State of Wisconsin (2006)	$1 returns $3.41
Litman (U.S., 2010)	$1 returns $2.79

The *Moving Beyond Congestion* study concludes that every $1 in investments generates a $1.90 return, while Cambridge Systematic puts the ratio of benefits closer to $3 per investment dollar, not including major gains resulting from rising person income. We excluded some of the Cambridge Systematics income related multiplier effects, however, since we consider them speculative.[15]

All three estimates are within transit-research norms. Litman's (2010) analysis of U.S. cities suggests that for every $1.00 collected in subsidies, fares, and high quality transit returns $2.79 in benefits.[16] The state of Wisconsin estimates a $3.41 return per dollar invested.[17] For large-scale capital investments in Canada, every dollar invested in transit has been shown to return $1.22 annually over its lifetime (CUTA-ACTU, 2010). Another study found a new light rail line in Montreal, Quebec, for example, returned

$1.11 in benefits for every $1 spent.[18] As some of these other studies focus on "new start," one might expect them to show a lower rate-of-return.

We place less weight on a study commissioned by the American Public Transit Association, which estimates that, in the aggregate, the national surface transportation network produces over $4 in direct benefits for each $1 in direct costs (Shapiro and Hassett, 2005). This study does not look specifically at the cost of declining transit performance.

Both the Chicago Metropolis 2020 and *Moving Beyond Congestion* studies include the benefits of reduced numbers of traffic incidents and accidents, including bike and pedestrian accidents strikes, which generate significant private and public expenses. As noted below, however, these estimates all exclude certainty of difficult-to-measure benefits.

Finding 4: **Most studies on benefits of transit investment do not include measures of health and land use impacts or the role of transit-related development in the "branding" and marketing of cities—benefits that are appreciable in major cities such as Chicago.**

A growing body of literature suggests that transit projects have benefits in areas not considered in most of those mentioned above. These benefits are particularly noteworthy in three areas:

1. Ancillary benefits associated with transit-oriented land development and lifestyles: Increases in transit use improve *air quality* and the *social costs of decentralized land uses*, such as the prevalence of non-permeable pavement that aggravate flooding problems. Transit has been also shown to reduce the public cost of on-street parking, social costs associated with energy usage, and more speculatively, the stability of housing costs. (Litman, 2012).

More recent research focuses on the benefits of the increased level of physical activity associated with transit use, which many posit as being beneficial. Studies show that when a commuter shifts from auto to transit, that commuter typically walks an additional 50 miles annually (Kittelson & Assoc, 2003).

2. Benefits to the occasional user: Research suggests the benefits flow from providing transit service to the periodic user, which account for as much as 15% of ridership in the Chicago region (Weyrich and Lind, 2003). Some consider the mere availability of transit an important benefit (even for households that infrequently use it) while others use transit to reach stadiums, entertainment venues, leisure events, and other activities in which travel demand is subject to heavy peaking. In these instances, transit greatly reduces pressures for investment in highways. Transit's role in evacuation planning in Chicago also provides an economic benefit (Moulton, 2007).

3. Branding and Civic Identity: Transit is inseparable from the identity of Chicago. Simply put, Chicago would not be the cosmopolitan city is has become without a well-functioning transit system. The density of downtown, which is made possible by transit, and its art and architecture, are inseparable from its image. One of the three studies mentioned above, the Cambridge Systematics report, considers these benefits.

Not only do rapid-transit lines handle a significant share of travelers using Midway and O'Hare airport, the Loop Elevated Tracks are a historic backdrop to the economic activity of the urban core. The "L" is an icon and a well-known architectural symbol. Researchers have indicated that this is indeed a recognizable value to users, albeit one difficult to quantify (Popuri, Y., et al, 2011).

Finding 5: **Increased investment in projects to bring the system to a state of good report should be guided by additional analysis showing which projects will generally result in the highest rate of return. The needs are sufficiently large that the CTA, Metra, and Pace should more extensively study the tradeoffs they face to assure maximal public benefits.**

The service boards are much better equipped to deal with complex investments and management of life-cycle of capital assets than they were five years. The CTA uses two separate computer-aided tools, including a maintenance infrastructure management system, for its vehicles and rights-of- way. This year, Metra and Pace have stepped up their efforts to assess the condition of its assets.

Our investigation, however, suggests a need for additional research to prioritize projects in the time of growing financial stress. Although published estimates of the backlog of capital projects are compelling, additional analysis on how limited funds would be spent—and benefits and costs of payoffs of these investments—is urgently needed.

In addition, our analysis suggests that the benefits of *expanding* the transit system are less clearly documented in the literature than the benefits of bringing the system into good repair. In two of the three studies noted in *Table 2*, ratios of benefits to costs are lower for system expansion than for more effectively maintaining it. Our review similarly suggests a need for independent analysis about the long-term effects of the underfunding of capital projects.

IV. WHO BENEFITS FROM CAPITAL INVESTMENT?

Every investment made in transit systems, of course, will not have the same effect on the performance of the system. Funds can flow to infrastructure needs or purchasing new vehicles, or they can be spent to increase speed, improve stations, or enhance reliability.

Extensive data, fortunately, has recently become available to study the effects of changes to the system. CMAP's *Travel Tracker* household travel survey allows particularly valuable insights on how the region's transportation system is changing.[19] Among the major trends it shows are:

Travel is growing: Total mileage traveled within the region increased by 26% from 1990 to 2008, primarily due to population growth and increases in miles traveled per person. The average person travels about 16 miles daily, with those in outlying suburban areas traveling twice that of those in central urbanized area.

Automobile travelers increasingly avoid carpooling: Passenger vehicles account for 86% of all person-miles traveled. Over the past two decades, commuters have carpooled less, increasingly favoring driving alone—ranging from 73% in some close-in areas to 90% in outlying areas—even though the cost of auto travel has steadily increased.

We have evaluated much of the data provided by travelers in the aforementioned Travel Tracker Survey and the RTA's travel market analysis and attitudinal survey.[20] We also use analysis of the attitudinal survey provided by Popuri, Y., et al. (2011). We consider different "rider classes," such as travelers within the city, between city-and-suburb, and connecting to intercity transportation modes.

The following provides a snapshot of several implications suggested by this data.

1. Transit is well-positioned to benefit from the downward trend in vehicular ownership: Vehicle ownership has a large effect on transit usage. With rates of vehicle ownership declining among younger populations, transit operators have a new opportunity to attract high-intensity users.

2. The use of transit tends to be an important part of how individuals identify themselves, suggesting that the branding and image of transit service are critical: Using transit is more than a utilitarian choice for many users; many regard it an extension of their personality and values. For this reason, Popuri et al. even suggest that agencies should consider a "friends and family" marketing plan to attract transit users.

3. Attracting passengers who put a premium on privacy and comfort and have complex schedules requires extensive emphasis on convenience and reliability: The need to manage complex schedules, such as dropping children off at day care, tend to outweigh the benefits of transit even among most people who have a high tolerance for walking and waiting. Providing highly reliable service and putting customer-friendly services adjacent to major transit stops—which is being done with success in many suburbs—can make transit more viable for these travelers.[21]

Please refer to the Technical Supplement section of this report for more extensive discussion of our data analysis, including the sensitivity of travel demand to various changes to the system.

V. RECOMMENDATIONS FOR POLICY

Public policies to close the "infrastructure gap" for transit in the Chicago region are supported by several findings of this study:

1. The opportunity exists to capitalize on strong public support for transit to bring the system into good repair: After several years in which passenger traffic was hurt by recession, a sense of momentum has been restored to the transit system. Public support for investment remains strong.

2. Backlog of Capital Projects: The condition of system has deteriorated due to chronic underfunding and a recent downturn in capital investment. These needs are roughly 20% greater than just two years ago.

3. Return on State of Good Repair Investment: Each dollar of transit investment generates $1.21 - $1.90 in benefits, not including factors that defy accurate measurement, such as the role of transit in tourism and shaping the identity of the city.

4. A stronger institutional framework to assure capital investment exists as compared to five years ago: CMAP and the RTA are both more active participants in analysis of the region's infrastructure priorities than they were five years ago. Agencies can nonetheless do more, such as conducting additional benefit-cost analysis to show how capital funding would be channeled to deal the deterioration of the system.

VI. REFERENCES

American Public Transit Association (2009) Economic Impact of Public Transportation Transit Cooperative Research Program Report J-11. Transportation Research Board.

American Public Health Association (2010). The Hidden Health Costs of Transportation. Found at http://www.apha.org/advocacy/reports/reports/

Audenaerd, L. et al. (2010). Beyond Transportation: The Economic impact of Rail in Illinois. Prepared for Illinois Governor Pat Quinn, May 14.

Audenaerd, L., Schofer, J., and Boyce, D. (2012). Trade-Space Analysis of Surface Alternatives for Short-Haul Passenger Air Travel. In Transportation Research Record – Aviation, 2012.

Bailey, L., P. Mokhtarian, and A. Little (2008) The Broader Connection between Public Transportation, Energy Conservation and Greenhouse Gas. ICF International. February.

Frank, P. (2010). Chicago Regional Household Travel Inventory, Chicago Metropolitan Agency for Planning. June.

Cambridge Systematics, Inc. (1995) Investment in Public Transportation: The Economic Impacts of the RTA system on the Regional and State Economies.

Cambridge Systematics, Inc. (2010) Regional Transportation Authority Travel Market Analysis. The Cambridge Systematics, Inc. Chicago, IL. September, 21.

Cambridge Systematics, Inc. with Economic Development Research Group (1999) Public Transportation and the Nation's Economy: A Quantitative Analysis of Public Transportation's Economic Impact. American Public Transit Association. Washington, DC.

Cambridge Systematics, Inc (2008) Measuring the Economic Development Benefits of Transit Projects: Proceedings of an Expert Panel Workshop, US Department of Transportation – Federal Transit Administration, Washington, DC. March.

Cervero, R. and E. Guerra, (2011) Urban Densities and Transit: A Multi-dimensional Perspective. Paper UCB-ITS-VWP-2011-6, Institute of Transportation Studies, University of California – Berkeley. September.

Chicago Metropolis 2020 (2007), various studies available at www.chicagometropolis2020.org, including "Time is Money: The Economic Benefits of Transit Investment (2007); Building a Great Transit System for the Chicago Region (2007); The Metropolis Freight Plan: Delivering the Goods (2004)

Chicago Metropolitan Agency for Planning (2009), "Memorandum: GO TO 2040 Public Engagement Results" September 2.

Chicago Metropolitan Agency for Planning (2012), "MAP-21 -- Major Programmatic and Policy Changes" Posted on July 05 at http://www.cmap.illinois.gov/policy-updates/-/blogs/map-21-major-programmatic-and-policy-changes

CUTA-ACTU (2010) The Economic Impact of Transit Investment: A National Survey. Canadian Urban Transit Association.

Davis, T. and M. Hale (2007). Public Transportation's Contribution to U.S. Greenhouse Gas Reduction, Science

Applications International Corporation (SAIC). Septmeber.

Illinois Department of Transportation (2011), Illinois Highway Statistics Sheet. Office of Planning and Programming http://www.dot.state.il.us/travelstats/2011_IHSS.pdf

Kittelson & Associates, Inc. et al. (2003), Transit Cooperative Research Program - Report 100: Transit Capacity and Quality of Service Manual, 2nd. Transportation Research Board.

Litman, Todd; various studies available at Victoria Transport Policy Institute, Vancouver, BC, www.vtpi.org.[22]

Paaswell, R., L. Audenaerd, and M. Jafari (1997). Application of Industrial Standards to Bus Maintenance Procedures. Transportation Research Record - Public Transit No. 1571, pp. 50-55.

Popuri, Y., et al. (2011) Importance of Traveler Attitudes in the Choice of Public Transportation to Work: Findings from the Regional Transportation Authority Attitudinal Survey. Transportation Vol 38, No. 4.643-661.

Regional Transportation Authority (2007) Moving Beyond Congestion: 2007 - The Year of Decision, Regional Transportation Strategic Plan, Regional Transportation Authority.

Regional Transportation Authority (2012) Regional Performance Measures – 2010 Regional Peer Report Card, RTA Department of Finance & Performance Management. February.

Shapiro, R. and K. Hassett (2005) Healthy Returns: The Economic Impact of Public Investment in Surface Transportation. American Public Transportation Association.

TranSystems Corporation (2005), Elements Needed to Create High Ridership Transit Systems, Transportation Research Board TCRP Web Document 32.

Washington Metropolitan Area Transit Authority (2011) Making the Case for Transit: WMATA Regional Benefits of Transit –Technical Report. Washington Metropolitan Area Transit Authority, Washington DC.

[1] Rail ridership is up more than 10% since Metra began operations in 1980. These estimates exclude transit use on routes in northwestern Indiana.

[2] For a summary of the growing prevalence of portable technology on commuter trains in the Chicago region, and evidence of its significance to growth in ridership, see Growing Use of Tablets and other Electronic Devices on Commuter Trains: Technology Brief, published by the Chaddick Institute in May 2012 and available at las.depaul.edu/chaddick

[3] US Census data from 1950 until 1970 indicates a significant migration from City of Chicago to the surrounding suburban region. This effect continued to a lesser extent from 1970 to 1990. The city's population grew between 1990 and 2000 but has fallen again since 2010. The population living in the central business district, however, has steadily risen since the mid 1990s.

[4] [Detailed footnote on Peer Review Report to be added here=.

[5] Ibid.

[6] See Chicago Metropolis 2020, "Time is Money: The Economic Benefits of Transit Investment," 2007.

[7] These results are corroborated by the public interest in creating policy for increasing and maximizing options for transportation alternatives and managing natural resources (90% and 89% of respondents, respectively).

[8] This analysis considers a wide variety of factors that can affect the choice to travel by auto or transit, such as trip flexibility needs, travel time requirements, and acceptance of modal transfers.

[9] Part of the reason for the consistency in responses between automobile and transit users is that auto users would prefer to invest in transit to ensure that transit riders remain out of their cars and not add to area roadway congestion.

[10] This estimate is derived by adding the losses from the decline (11%) and the normal gains associated with maintaining the system (12.8%), which would not occur if the system declines The latter estimate was based on a 10% increase in travel time and significant reductions in schedule frequency assumed in the study.

[11] This estimate is based on a finding in the study that system deterioration would result in the loss of 100 million rides lost on the CTA. This is equivalent to about 20% of total ridership at the time the study was conducted.
[12] The study does not, however, indicate the degree of the traffic loss.
[13] [Detailed footnote on TTI report to be added here]
[14] The study used consultants, including SmartMobility, Inc., TREDIS, and Fregonese Associates, to derive these estimates.
[15] We exclude income-multipliers that contribute to an overall ratio of benefits to costs of more than 7 in this study.
[16] This value is estimated by showing that for every $1.00 in fare revenue collected, $2.58 is required in subsidies to produce high quality transit. In doing so, $10.00 worth of vehicle operating costs, parking costs and congestion costs are saved.
[17] [Detailed footnote on WI report here]
[18] In Vancouver, British Columbia, proposed network connection links of elevated light rapid transit was analyzed to indicate that dollars invested returned between $1.13 and $1.27 depending on the selected corridor. These values were determined by several proprietary models estimating many of the same measures used above.
[19] This analysis is partially based on the US Census *American Community Survey* (ACS) [2005-2007] as well as older regional travel surveys and census data.
[20] See report by Cambridge Systematics, Inc., 2010, listed in reference section.
[21] See "Chicago Top Transit Suburbs," Chaddick Institute Policy Study, July 2012.
[22] Litman, Todd (2010). Raise My Taxes, Please! Evaluating Household Savings from High Quality Public Transit Service; (2010a) Evaluating Public Transit Benefits and Costs: Best Practices Guidebook. Victoria Tranport Policy Institute, Vancouver, BC. (2012) If Health Matters: Integrating Public Health Objectives in Transportation Planning. (2012a) Safer Than You Think! Revising the Transit Safety Narrative. Victoria Tranport Policy Institute, Vancouver, BC. Submitted to Transportation Research Board 2013 Annual Meeting as Paper 13-4357. (2011), Valuing Transit Service Quality Improvements – Considering Comfort and Convenience in Transport Project Evaluation. November 24; Litman, Todd (2002), "Evaluating Transportation Equity," World Transport Policy & Practice, Volume 8, No. 2, Summer, pp. 50-65.