The Factors Influencing Transit Ridership: A Review and Analysis of the Ridership Literature

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Introduction

What explains transit ridership? The answer to this simple question is both obvious and complex. Public transit systems carry large shares of person travel in older, larger metropolitan areas around the globe, but in most places – old and new, large and small – transit is losing market share to private vehicles. Nationally, only 2.1 percent of all trips were on public transit in 2001, compared to 85.8 percent by private vehicle, 9.9 percent by foot and bicycle, and 2.2 percent by other means (2001 National Household Travel Survey).

Even the most casual observer of cities can offer informed speculation on why the share of year 2000 commuters using public transit in metropolitan San Francisco (19 percent) in nearly five times higher than in metropolitan Atlanta (4 percent). Population density, levels of private vehicle ownership, topography, freeway network extent, parking availability and cost, transit network extent and service frequency, transit fares, transit system safety and cleanliness, and so on all surely play a role. But the relatively importance of these various factors, and the interaction between them is not well understood. Yet understanding the relative influence of these factors is central to public policy debates over transportation system investments and the pricing and deployment of transit services. But the research literature on explaining transit ridership is surprisingly uneven, in some cases poorly conceived, and the results are often ambiguous or contradictory.

The goal of this paper is to review the literature on explaining transit ridership, critique the sometimes significant weaknesses in previous studies, draw conclusions from the more rigorous studies on the factors which most influence transit use, and recommendations on the steps needed to better understand and explain transit ridership. To do this, we begin by offering a taxonomy of public transit ridership research.

Explaining Transit Ridership: Descriptive and Causal Approaches

Studies of transit ridership factors can be grouped into two general categories: 1) research that focuses on traveler attitudes and perceptions, with both travelers and operators as the units of analysis, and 2) studies that examine the environmental, system, and behavioral characteristics associated with transit ridership (Figure 1). This second category includes both aggregate studies, where transit systems are the primary the unit of analysis and metropolitan level variables are used as explanatory variables, and disaggregate studies focusing on the individual mode choice decisions of travelers.

In general, the studies of attitudes and perceptions are descriptive in character, while system-focused studies tend to be structured as causal analyses. Further, these two types of studies tend to have different consumers. Transit operators often employ descriptive analyses for marketing, service planning, and fare policy purposes. In contrast, transportation researchers then to develop more empirical causal analyses for travel demand analyses, project evaluation, and behavioral research.

Figure 1. Previous Studies of Transit Ridership

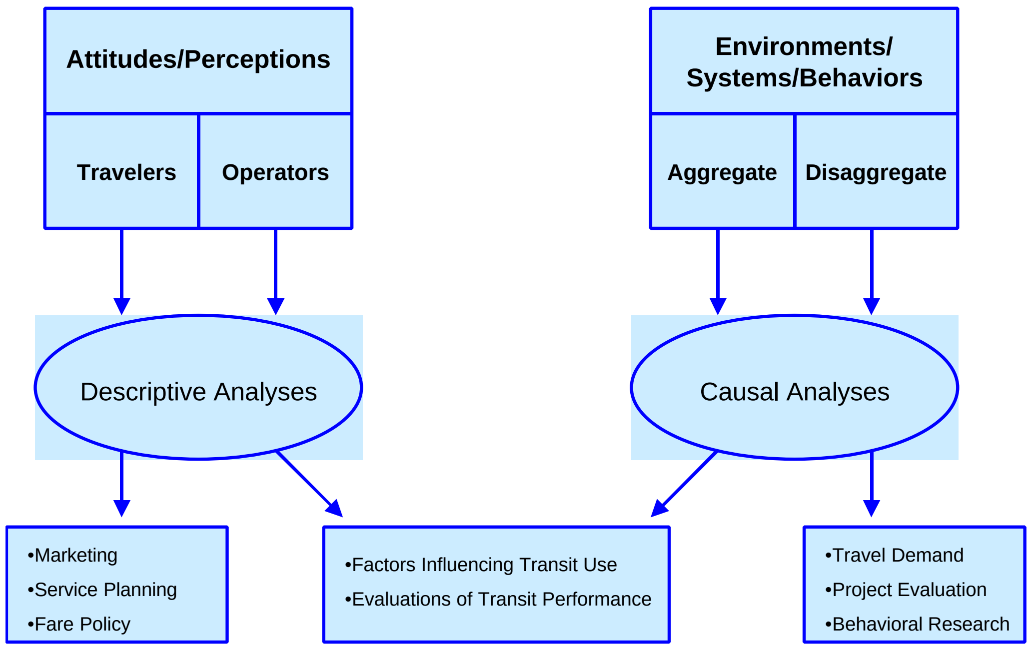

Table 1 provides of summary of the various descriptive and causal analyses reviewed in this paper, and for each their principal findings and main methodological weaknesses.

Table 1. Overview of Transit Ridership Research

Overview of Transit Ridership Research				
	Typical Research Approach	**Principal Findings**	**Methodological Weaknesses**	**Studies Reviewed**
Descriptive Analyses	Use survey and interview data	Studies based on operators' perceptions tend to emphasize internal factors: service improvements and adjustments; fare innovation and changes; marketing and information; new planning approaches and partnerships; service quality and coordination	Data are highly subjective; biases based on limited or incorrect information; data collection processes often not outlined in detail; questionable causal linkages; no questions about perceived causality; many studies are old	TCRP, 1995, 1998; Brown, et al., 2001; Sale, 1976; Bianco, et al., 1998; Abdel-Aty and Jovanis, 1995; Taylor, et al.2002
Causal Analyses	Generally multivariate regressions	Models include combinations of internal and external variables; external factors tend to have greater effects than internal factors; of internal factors, service quality more important than fares	Generalizability is limited due to mostly small sample sizes; some only include readily available data; most look only at unlinked trips rather than linked trips; some studies only consider work trips; problems with multicollinearity between individual variables; endogeneity problems between service supply variables and demand; some variables are hard to quantify; many promising variables are not included in models	Liu, 1993; Kain and Liu, 1995, 1996; Chung, 1997; McLeod, et al., 1991; Gomez-Ibanez, 1996; Nelson and Nygaard, 1995; Spillar and Rutherford, 1998; Kitamura, 1989; Cervero, 1990; Syed and Khan, 2000; Hartgen and Kinnamon, 1999; Kohn, 2000; Hendrickson, 1986; Morral and Bolger, 1996

A Problematic Literature: Assessing Descriptive and Causal Analyses of Transit Ridership

The descriptive and causal analyses outlined above each offer a range of methodological advantages and disadvantages. Descriptive analyses are based on sets of often interesting and rich qualitative data from surveys of and interviews with transit operators to identify factors experts believe affect ridership. However, such studies also pose methodological and interpretive concerns. Such information is highly subjective and dependent on respondents' perceptions and assumptions about internal and external factors related to ridership (TCRP 1995, 1998), thus the data are subject to biases based on limited or incorrect information.

Other descriptive studies fail to outline the specific data collection processes used to obtain information (Bianco et al. 1998). In addition, the asserted causal linkages between perceived factors and actual ridership are in some cases questionable. Many of these studies are relatively old, and most of them do not specifically ask about perceptions of causality or the relative influence of internal and external factors. Some identify commonalities among agencies with ridership growth and conclude that they are related to ridership increases (Sale 1976, Taylor et al. 2002)

Causal analyses have the advantage of being more sophisticated empirical studies—of one, a few, or many agencies—that allow researchers to employ a wider array of data than those found in descriptive studies. However, the generalizability of studies examining a small number of systems is limited, but there is more opportunity for the conceptual development of models. In empirical causal analyses of many agencies, the use of data from a large number of agencies and outcomes produces more robust results. In addition, the results are more likely generalizable to other places and systems.

However, these data sets have their own limitations. Studies of large numbers of transit systems tend to include data that are the most readily available, particularly Census data (Spillar and Rutherford 1998) to measure external variables. Most studies look only at unlinked trips (Kain and Liu 1995, 1996, Chung 1997, Gomez-Ibanez 1996, Hendrickson 1986, Kohn 2000, McCleod et al. 1991, Spillar and Rutherford 1998). Linked trips, which measure door-to-door travel rather than transit-link to transit-link travel, more accurately measures transit use; but because linked trips are more difficult to collect, they rarely are analyzed. Finally, several studies consider only work trips in the models (Hendrickson 1986, Morral and Bolger 1996), which exclude over three-fourths of all metropolitan trips from the analyses..

The models are often not fully specified and there is inconsistency in the variables included in the models. The studies also vary widely in the types of modes examined. Some focus specifically on rail or bus (Chung 1997, Kain and Liu 1995, 1996) and others consider multimodal systems (Gomez-Ibanez 1996, Hendrickson 1986). Further, there are persistent problems of multicollinearity, or a high degree of correlation, between independent variables in the same model. There can also be serious endogeneity problems between service supply variables and demand. While transit use is, to a large extent, a function of transit service supply, transit service supply is, of course, largely a function of transit demand. Thus, analyses finding that transit ridership can be explained largely by transit service levels (Liu, 1993; Kohn, 2000; Kain and Liu 1995, 1996, Gomez-Ibanez 1996) tell us little about the underlying causality of transit use.

Additionally, some probably important factors are hard to quantify into variables. For example, more complete auto access and auto operating costs measures would capture the trade-off between auto use and transit in a particular geographic area, but such data are very difficult to obtain. Further, driver friendliness and transit employee esprit d'corps may be an important, independent explanatory factor, but very difficult to measure consistently across transit systems. Models should properly include measures of transit service quality – including reliability, comfort, and convenience – and service efficiency, but usually just measure service quantity. As discussed above, budget constraint measures are also an important factor related to transit ridership, but rarely measured. For example, a system with more limited funding may reduce the service quantity below levels called for by the demand for service. Finally, all of these studies suffer from loss of information due to aggregation; fully understanding the determinants of transit mode choice requires that analyses be disaggregated to the household or even trip level. But such analyses are extraordinarily data intensive and expensive to conduct.

Given the methodological issues raised here, the discussion of the discussion of external and internal influences on transit ridership considers both the findings and the principal methodological limitations of the literature.

External and Internal Influences on Transit Ridership

Both descriptive and causal analyses outlined above examine a host of factors related to transit ridership. These elements can be broadly divided into two categories: (1) external factors, and (2) internal factors.[1] External factors are largely exogenous to the system and its managers, such as service area population and employment. Such factors typically function as proxies for large numbers of factors thought to affect transit demand. Internal factors, on the other hand, are those over which transit managers exercise some control, such as fares and service levels.

There is, of course, no hard line separating internal from external factors. For example, increased population growth may change demand for transit services, which in turn may change the levels of service provision. While many agencies attribute increased ridership to service expansions and the introduction of new and specialized programs, it is important to note that these changes in service are usually in response to changes in demand. In fact, many agencies report that an obstacle to increasing ridership counts even further is the lack of funds for more rolling stock and operating costs to meet rising demand. Nevertheless, most studies of transit ridership – both descriptive and causal – consider external and internal factors separately.

A 1996 European Commission on Transportation Research (ECTR) literature review of transit ridership enhancement projects outlined a somewhat similar distinction in its extensive list of variables used in previous studies. The authors categorize variables into two groups; what they term direct strategies and indirect strategies. Direct strategies aim to increase efficiency and effectiveness of transit operations, and are roughly equivalent to internal factors discussed earlier. According to the ECTR, direct strategies include changes in the fare levels, service quality and quantity, marketing, facilities, and technologies employed in the provision of service. In contrast, indirect strategies are

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[1] Researchers use different terms to categorize ridership variables. In this paper, we use the terms "internal" and "external" factors. The European Commission on Transportation Research (1996) separates variables into "direct" and "indirect." Kain and Liu (xxxx) distinguishes between "policy" and "control" variables. The categories are similar, but not always equivalent. For example, as noted in the text, our listing of external factors is broader than that of indirect factors.

broader public policies thought to influence ridership, but over which transit agencies exercise little control. These include taxes on car ownership and use, area-specific car use restrictions (e.g., road pricing, parking costs, access restrictions), and other policies from land use planning to telecommuting to flexible working hours.

The dichotomy of direct and indirect factors outlined for this paper differ from the direct and indirect strategies catalogued in ECTR (1996) in that we include indirect factors, such as climate or topography, that are not necessarily related to public policy. These notions of ridership-influencing factors that are internal and external to transit systems, while not always explicitly outlined in the literature, are a useful way to examine the factors influencing transit ridership.

Analyzing External Factors Affecting Transit Ridership

Studies of transit ridership have examined a wide range of factors external to transit systems thought to influence ridership. We group and discuss three categories of factors below: socio-economic factors, spatial factors, and public finance factors. In the first two of these categories, variables which directly or indirectly explain access to and utility of private vehicles tend to the most important factors. Transit thus functions in most places for most trips as an "inferior good" to private vehicles, such that the demand for transit service is largely determined by the supply of private vehicle access. Thus, in places like Manhattan and downtown San Francisco, the relative utility of private vehicles is low, and transit service levels and use are high. And in places like Nashville or Birmingham, private vehicle access and utility are relatively high, and transit use is relatively low.

As public transit systems in most metropolitan areas have lost market share for most trips to private vehicles, the importance of two transit travel markets has grown: travelers (children, the elderly, the disabled, and poor people) with limited access to private vehicles, and commuters to large employment centers (especially downtowns with limited and/or expensive parking). So in addition to direct and indirect measures of private vehicle access (which include parking), employment variables, especially measures of central business district employment are shown to significantly influence transit use.

And finally, public funding of transit service – which of course reflects demand for and popular support of public transit and economic vitality – have been shown to influence transit use. Such factors raise questions of circular causality similar to those raised by measures of transit service supply discussed in some detail below.

Socio-Economic Factors

Studies identify and include a host of socio-economic factors to explain aggregate transit ridership levels. Transit use has long been thought to be more sensitive than private vehicles to changes in employment levels. During the Great Depression of the 1930s, for example, transit patronage nationwide declined by over 25 percent (APTA, 2001), while private vehicle travel actually increased. Thus, employment levels – both regional and within central business districts – are common demographic variables used in causal analyses. Liu (1993) and Kain and Liu (1995, 1996) include levels of and changes in regional employment as variables in their regression analyses. Chung (1997) finds that employment and regional development had greater impacts on ridership than did fares in the Chicago Transit Authority (CTA) system from 1976 to 1995.

Similarly, Gomez-Ibanez (1996) finds that ridership in Boston between 1970 and 1990 was affected largely by external factors beyond the transit agency's control and less by internal factors such as fare changes. Of the external factors he analyzed, employment was more significant than per capita income: each percentage decrease in central city jobs was associated with a drop in ridership of between 1.24 and 1.75 percent, while each percentage increase in real per capita income was associated with a patronage decline of 0.7 percent. Hendrickson (1986) also examines the relationship between central business district (CBD) employment levels and public transit use in a study of 25 large U.S. metropolitan areas. For 1970 and 1980, he finds that CBD employment explains a very high percentage (R^2 = 0.96 and 0.90, respectively) of the number of transit commuters (i.e. transit work trips).. When he added metropolitan population to his model, the R^2 increased to 0.98. Hendrickson finds that, in his sample, CBD employment is a more important than regional population in explaining transit commuting levels.

Income levels and auto ownership are other socio-economic variables frequently included in regression analyses of transit ridership. Liu (1993) and McLeod (1991) use per capita income measures, while Gomez-Ibanez' (1996) uses a per capita income variable for one of his ridership models for Boston, and a time-trend variable (reflecting a consistent trend in suburbanization and income growth) in another. He concludes that the positive effect of employment growth on ridership was offset by the impact of rising incomes and suburbanization. This led to net ridership decreases; substantial fare reductions and service increases were required to counterbalance this effect.

Liu (1993) and Kain and Liu (1995, 1996) include measures of auto ownership (using per capita passenger car registrations or percent carless households) in regression models for various metropolitan areas. However, because car ownership, car use, and transit use are interrelated, a change in one variable affects the others, although the magnitude of effect may not be symmetrical in terms of direction. Kitamura (1989) examines the causal relationships between car ownership, car use, and transit use using surveys and trip diaries given to nearly 4,000 people in the Netherlands. He finds that a change in car ownership leads to a change in car use, which in turn, influences transit use. He finds that the reverse relationship, where a changes in transit use lead to changes in car use, is weak. Thus, he concludes that increasing car use may not be suppressed by transit improvements.

McLeod et al. (1991) include the number of registered passenger vehicles as a variable in two time-series regression models. However, they find that this variable and others thought to be important to ridership (number of tourists, gasoline prices, percentage of free riders) are in fact not significant factors.

In addition to automobile ownership, the price of gasoline is included in many ridership models. Most, however, find little or only a small influence on transit ridership, due to the fact that motor fuels comprise a relatively small share of overall automobile operating costs. For example, McLeod et al. (1991), in their study of Honolulu, Hawaii, hypothesized that gasoline prices were an important determinant of ridership, but did not find fuel prices to be a significant factor. One exception is Sale (1976), who studied the effects of the energy-crisis-driven fuel price increases during the early 1970s; he found that these significant increases in fuel prices had an immediate and positive effect on increasing transit ridership.

Finally, strategies to increase parking costs or the probability drivers will have to pay for parking are found to be more effective in increasing transit mode share than increasing the level of transit service in terms of frequency and accessibility (TCRP 1980).

Spatial factors

A large and growing body of recent research examines the relationships between transportation systems, land use and urban form, and travel behavior. While transit use is often considered in this research, the focus tends to be on travel behavior more broadly. Significant attention has been devoted to this topic because policy makers and planners have some direct control over land use and the deployment of transportation systems, but less control over many of the socio-economic factors discussed above. Further, the New Urbanist movement has captured the imagination of many planning scholars and practitioners, which has prompted research on the effects of various New Urbanist principles (such as compact, mixed-use developments and dense, interconnected street/sidewalk networks) on travel behavior.

Perhaps no aspect of land use and urban design affects the relative utility of automobile use more than the availability and price of parking. Bianco et al. (2000) examine the relationship specifically between parking strategies and transit ridership. They consider various strategies, including increasing the cost of parking, changing parking regulations, cashing out employer-provided parking, and transportation demand management (TDM) approaches. They find that, not surprisingly, the approach with the highest effectiveness in shifting mode share to transit – a tax on parking spaces – has the lowest political feasibility. This suggests that combinations or "packages" of parking strategies will be most effective in increasing transit ridership.

Parking was also a primary variable in a Moral and Bolger (1996) study of the relationship between downtown parking supply and transit use in various Canadian and U.S. cities. They found that the number of downtown parking stalls per CBD employee explained 92 percent of the variation in percent transit modal split for Canadian cities and 59 percent for Canadian and U.S. cities. The authors note significant differences between Canadian and U.S. cities – including the higher density of Canadian cities, the higher rate of car usage among Americans, and the stronger governmental land use and development decision-making control in Canada – which suggest the combined data results should be interpreted with caution. Using regression analysis, Chung (1997) also finds that parking availability is the most significant factor affecting ridership.

Despite the strong observed relationships between parking and transit use, most research on urban form and transit use has focused on other spatial factors. In particular, residential and employment densities, have long been thought to be critical determinants of transit use. In addition, others have hypothesized that the effects of land use mix and urban design are important factors as well (Crane 2000; Cervero 1993, Pushkarev and Zupan 1977, TCRP 1996, Spillar and Rutherford 1998, Hendrickson 1986). Collectively, these studies find that decentralized residential and occupational locations are difficult to serve with traditional fixed-route public transit because transit works best when a large number of people are traveling to and from concentrated nodes of activities. Not surprisingly, dense, compact development is found to be more conducive to efficient transit operations than dispersed and sprawling patterns of urban development.

In an analysis of transit demand in Portland, Oregon, Nelson and Nygaard (1995, cited in TCRP 1996) find that of the 40 land use and demographic variables included in their study, the most important for determining transit demand among the land use and demographic variables tested are overall housing density per acre and overall employment density per acre. Similarly, Pushkarev and Zupan (1977) find that residential densities in transit corridors, together with the size of the downtown and the distance of the stations from downtown, explain the level of demand for a variety of transit modes.

Spillar and Rutherford (1998) examine the relationship between urban residential and transit ridership. They find that transit use per person grows with increasing density up to a ceiling of somewhere between 20 and 30 people per acre and 0.1 to 0.2 daily per capita transit trips. The authors conclude by stating that their findings do not suggest that as density increases, total transit ridership reaches a maximum. Rather, total ridership will increase as density increases because greater numbers of people have access to transit. These findings indicate that individual personal transit ridership characteristics (i.e., per capita ridership) increase to a maximum point.

An important methodological issue is the generally high levels of colinearity among the various spatial variables, and among the spatial variables and many socio-economic variables. In other words, places with certain characteristics – such as low population densities – tend also to share a similar set of other characteristics – such as separated land uses, ample free parking, and so on. In addition, while transit use tends to be higher in areas with higher-density, multi-family housing, such areas tend to be populated by lower-income households with lower levels of automobile access. Untangling the influence of these various spatial and socio-economic factors on one another and on transit ridership is a significant methodological challenge (Crane, 2000; Gomez-Ibanez, 1996).

Public Finance

The level of funding for transit subsidies also has been shown to importantly influence transit patronage (though, of course, the level of transit use surely helps to explain political support for transit subsidies). Sale (1976) fines that the availability of substantial and stable financial resources influences transit ridership levels. Gomez-Ibanez (1996) includes a dummy variable in his regression models for years with severe budget crises. Kain and Liu (1996) consider the public or private operation of transit systems as a relevant variable in understanding ridership influences.

Analyzing Internal Factors Affecting Transit Ridership

Pricing Factors

Not surprisingly, pricing factors and fare levels are most frequently analyzed in studies of the factors influencing transit ridership. Sale (1976) examined seven systems (Eugene, Madison, Minneapolis-St. Paul, Portland, Salt Lake City, San Diego, and Vancouver, B.C.) with annual ridership increases of 5 percent or more between 1971 and 1975. He found stable or declining fare levels to be an important factor, although secondary to ridership gains attributable to service expansion. Liu (1993) and Kain and Liu (1995) include fare variables in regression models for ridership in Portland, San Diego, and Houston. They find that a combination of internal factors, such as fares, and external factors (employment, gas prices, service quantity) contribute to transit ridership.

Kain and Liu (1996) conducted econometric analyses of factors influencing transit ridership for 184 systems over a 30-year period between 1960 and 1990. Their findings indicate that the mean fare elasticities for ridership changes during the 1970 to 1980 and 1980 to 1990 periods, and the 1980 and 1990 cross-section models range from -0.34 to -0.44, and the mean revenue mile elasticities range from 0.70 to 0.89. These results imply that transit agencies will increase ridership less by reducing fares than by increasing service, though both changes are likely to reduce overall transit system cost-effectiveness.

Other studies find a similar relationship between pricing and service variables as the primary factors influencing transit ridership. Kohn (2000) conducted a study of 85 Canadian urban transit agencies using data from 1992 to 1998 to identify significant independent variables related to ridership. He finds that average fares, together with revenue vehicle hours, accounts for 97 percent of the variation in ridership. McLeod et al. (1991) developed two multivariate time-series regression models of transit ridership for Honolulu, Hawaii, from 1956 to 1984. The models include a fare variable (ln of inflation-adjusted fares) as well as service quantity and quality variables (ln of the number of buses in the fleet and a dummy variable for service disruptions due to strikes).

A few studies find that pricing schemes, such as the deep discounting, induce significant ridership increases, because such schemes account for different sensitivity to price among various market segments. Some transit agencies have experienced considerable success in providing discounted transit fares to students through partnerships with universities, particularly in increasing ridership without increasing service (Brown, Hess, and Shoup 2001).

Service Quantity Factors

As previously discussed, service quantity variables – particularly service coverage and service frequency – are another important set of factors influencing transit ridership; and much of this research has shown service quantity factors to be even more significant than the fare and pricing variables. In their multiple regression analyses, Liu (1993) and Kohn (2000) find that revenue vehicle hours of service are strongly associated with transit use. Revenue and vehicle miles of service are service quantity variables have also been found to be significantly related to transit ridership (Kain and Liu 1995, 1996, Gomez-Ibanez 1996).

Service Quality Factors

In addition to fare and service quality factors, several studies find that the quality of service – customer and on-street service, and station and on-board safety – is more important in attracting riders than changes in fares or the quantity of service (Cervero 1990). In other words, riders are more attracted by service improvements than fare decreases. The results of a Syed and Khan study (2000) support Cervero's findings. Their factor analysis of the determinants of public transit ridership in Ottawa-Carleton, Canada, finds the following ranking of factors related to ridership (from most important to least important): (1) bus information; (2) on-street service; (3) station safety; (4) customer service; (5) safety en-route; (6) reduced fare; (7) cleanliness; and (8) general attitudes towards transit.

Although Sale (1976) attributes most ridership gains to service expansion, fares, and external variables, he does discuss various indirect, but seemingly successful actions many of these agencies employ in their operations, including: transportation systems management (TSM); route structuring that was less central business district (CDB) oriented; coordinated arrival and departure at focal points; ongoing operational planning and evaluation; strong marketing programs; and effective organizational structures.

Abdel-Aty and Jovanis (1995) explore a different aspect of service quality influencing transit ridership. Using transit survey data from Santa Clara and Sacramento, California, they find that most respondents were satisfied or very satisfied with available transit information. Binary logit and ordered probit models estimate that ITS-delivered transit information might encourage shifts to transit: 58.7 percent of respondents were likely to use transit at least once per week given the availability of ITS-delivered transit information, and about half of the non-transit users who might consider transit would be more likely to use it if certain information items were available.

What Do We *Really* Know and What are the Next Steps?

<u>Methodology</u>

The findings of the descriptive, perceptional studies are rather consistent, but suffer from problems of self-selection bias and improperly implied causality. Causal analyses suffer from problems of aggregation (which masks important within group variance), lack of conceptual model specification, high levels of colinearity among the independent variables (and, importantly for policy, between the spatial and socio-economic variables), and endogenity problems between the service supply variables and service consumption.

Findings

Taken as a whole, variables which directly or indirectly measure automobile access and utility (including auto ownership and parking availability) explain more of the variation in transit ridership than any other family of factors. Next, economic factors, such as unemployment levels, CDB employment levels, and income levels explain substantial portions of transit use. Spatial factors, such as population and employment density, traffic congestion levels, and parking availability, are shown in many studies to explain much variation in transit ridership, but the colinearity among these variables, and their colinearity with socio-economic variables related to transit use raise questions about both the direction of cause and effect, and the relative influence of the various factors measured on transit ridership.

With respect to internal factors, improvements in service supply – for example, frequency, coverage, and reliability – have been shown to be more important than price (fares) in determining riderhsip. However, most research has measured service supply rather than service quality (variables such as on-time performance); those that have measured service quality have found that service quality is a more significant factor than both quantity and prices. Measures of service and price elasticities find that responses to service changes are substantially more elastic than changes to fares. However, focused fare programs that target populations, including students and transit-dependents, with relatively high price-elasticities of demand have been very effective in attracting riders.

To sum, transit ridership is largely, though not completely, a product of factors outside of the control of transit managers. Among those factors that transit systems do control, the quality of transit service and adroit pricing of transit services to target particular travel markets have proven most effective. The quantity of transit service is, of course, strongly related to transit use, but it is also determined by ambient levels of transit service demand.

While many of the factors which most affect transit ridership are outside of the control of transit managers, they are not beyond the bounds of public policy. Policies which support private vehicle use – such as extensive arterial and freeway systems, relatively low motor fuel taxes, policy which require parking to be provided to satisfy all demand at a price of zero – affect transit use more than policies such as substantial public transit subsidies which encourage transit use. In addition, private vehicles provide travelers with spatially and temporal flexibility that traditional fixed-route transit services can rarely match. Thus, the utility of private vehicles and the wide array of public policies in the U.S. which support their use explain more of the variation in public transit patronage than any other family of factors.

Clearly, adopting policies to reduce the utility of private vehicles would bode well for public transit, but just as clearly maximizing transit ridership is not a meaningful public policy goal. Most economists would agree that an important goal of any transportation policy should be maximizing social welfare. Thus, altering auto-supporting policies to encourage drivers to fully compensate society for the externalities of private vehicle use would likely cause people to become more judicious in their use of private vehicles, and in metropolitan areas, would make public transit service relatively more attractive to auto users.

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