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Economic Development Benefits of New Transit Service: RiverLINE

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Submitted by:

Daniel G. Chatman, Ph.D.
Stephanie DiPetrillo
Alan M. Voorhees Transportation Center
Rutgers University

NJDOT Research Project Manager
Edward S. Kondrath

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16. Abstract
This report documents the economic impacts of the RiverLINE, a light rail line connecting Trenton and Camden, New Jersey. The study examined whether and how the line impacted local land use, residential property values, travel behaviors and firm performance. Data included structured interviews, evaluations of local zoning ordinance and land use change, surveys of households and firms within a four-county area with an oversample of those located within a half-mile of the 20 stations, and real estate data. We find modest and mixed economic impacts of the line in its early years of operation.

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EXECUTIVE SUMMARY

In 2001 construction began on NJ TRANSIT's RiverLINE, a 34-mile interurban light rail line with 20 stations serving more than a dozen small towns along the Delaware River between Trenton and Camden, New Jersey. The line was completed in March 2004, providing a faster transit option between Trenton and Camden, along with connecting services to the major job centers of northern New Jersey, New York City and Philadelphia. The line is limited to single track operation along some stretches, and RiverLINE trains are not allowed to operate at the same time as the freight trains which use the tracks at night.

Unlike many light rail corridors around the country, such as the Hudson-Bergen Light Rail system in northern New Jersey, the RiverLINE traverses a lower-density suburban corridor that includes a few relatively compact historic town and village centers. The line is anchored by Trenton to the north and Camden to the south, both struggling urban centers. The RiverLINE was planned and constructed to provide better connectivity between southern and northern New Jersey with the hope of helping to revitalize these two cities and the river towns along the route.

This study is intended to establish a baseline description of conditions in the corridor; to help determine what economic development and community benefits may have resulted from construction of the RiverLINE in the first several years of its operation; and to document how residents, local officials, business owners and others perceive the RiverLINE after its first several years. Measuring such benefits is complicated and difficult. There are many measures to consider, and data availability often limits which of these can be used. It is also important to understand that economic benefits may take years to manifest.

In support of these objectives, the research team:

- Conducted a review of research literature on the economic impacts of transportation investment.
- Interviewed nearly 60 local officials, business owners and real estate experts with knowledge of development activity in the RiverLINE corridor.
- Conducted two surveys to collect data and opinions on how the RiverLINE has affected location decisions, travel patterns, and the business climate.
- Investigated changes in local development regulations in towns and cities with RiverLINE stations.
- Examined development activity trends comparing the period immediately prior to and after RiverLINE operations began.
- Analyzed how changes in residential property values in areas near RiverLINE stations compared to changes in nearby areas between 2001 and 2007.

Given that the RiverLINE had been open for four years at the time of this study, our findings are best understood not as a basis for evaluating its potential longer term economic impacts, but as a snapshot of existing conditions. As we discuss below, even the comprehensive data collection and analysis carried out in this study does not include key potential impacts. In particular, we do not study effects of the RiverLINE on nonresidential development or on rental housing. In addition, we did not study in depth the potential impacts upon local labor markets, though we do include in Appendix IV a preliminary examination of firm wages and employment data from the Department of Labor.

Key findings from the study are as follows:

Structured interviews

Public officials and members of the development community often stated that the RiverLINE has contributed to the economic revitalization of the river towns, reflecting an increased desirability of living in or operating a business in municipalities where stations are located, particularly those located in Burlington County. Real estate professionals largely agreed with this sentiment, but had not yet noticed appreciable increases in property values due to the line. Most business owners reported seeing little or no impact from the line. Several stated that the line has had negative effects such as increases in noise, traffic, parking demand and crime. Overall, interviewees tended to be more positive than negative about the line.

Many of those interviewed believed that property values near stations had increased since the RiverLINE opened in 2004, particularly in Burlington County, prior to the recent downturn in real estate prices. Whether this relative improvement was attributable to the RiverLINE was unclear to those interviewed. Officials working in Trenton and Camden viewed the construction and operation of the line positively, but saw it as one of many transportation options, playing an important but not central role in redevelopment efforts.

Household survey

Households living near the RiverLINE generally view it very positively, with the possible exception of noise impacts. The great majority of those living within a half-mile of stations believe that the RiverLINE had improved the quality of life in town (72 percent of households). About 34 percent of those surveyed said that the RiverLINE had increased noise, but 79 percent of respondents did not believe that the RiverLINE had increased pollution and 70 percent disagreed that it had increased crime.

Proximit*y* played a large role in whether or not individuals used the RiverLINE. Those living within a half-mile of a station were 4.5 times more likely than those living further away to report riding on the RiverLINE. About a quarter of households living near RiverLINE stations report using the line at least once per month.

Although many households viewed the RiverLINE positively and many of those living near stations used the line, the impact of the RiverLINE on household location decisions

was small. Four percent of all households, and seven percent of households who had relocated since 2004, named the RiverLINE as a factor that influenced their decision about where to live. About 10 percent of all households cited access to public transit as important, and this might have included the RiverLINE in some cases. The top five factors named were commute distance (29 percent), housing quality/type (25 percent), safety (24 percent), school quality (17 percent) and neighborhood attractiveness (16 percent).

Firm survey

The RiverLINE did play a role in some business location decisions during this period, although it was less important than other criteria. About half of responding firms located within a half-mile of stations reported the line was an important factor in staying or locating there. But other reasons were much more commonly prioritized. RiverLINE access was the second *least*-cited reason for relocating or staying in the current location. Substantially more important were highway access, availability of land, proximity to customers, proximity to workers, and some other reasons.

Firms near RiverLINE stations were more likely to have employees and customers who arrived at the firm by the light rail line than firms located farther away. Worker commuting via the RiverLINE to firms farther than a half-mile away from a station was negligible at 0.4 percent. Within a half-mile it was 4.3 percent; within a quarter-mile, 5.7 percent; and within an eighth-mile, 8.6 percent. Retail firms within a half-mile of a station were also substantially more likely to have employees and customers arriving at the firm by rail.

Firms within a half-mile of a RiverLINE station were more likely than firms farther away to report that their business was performing about the same now as in 2004 (a statistically significant difference). They were less likely to say that they were doing either better or worse than in 2004, but these differences were not statistically significant. Around half of all firms surveyed stated that they intend to make changes to their business in the coming two years, but there was again no statistically significant difference associated with proximity to the line.

Review of local land use regulation

A number of municipalities along the RiverLINE have adopted amendments to their zoning regulations or redevelopment zones in response to the RiverLINE; however, the changes have been on the whole relatively modest. Most municipalities appear to have done little to accommodate or encourage transit-oriented development along the line.

Construction activity

We compared permit data for RiverLINE communities with those for nearby communities and for the State as a whole and found that there was a higher rate of permitting in the corridor before 2004, and growth thereafter. Before 2004 the majority

of the growth was in Trenton and Camden. After the opening in 2004, modest growth was seen in towns between Trenton and Camden along the corridor.

Construction permit data are a relatively crude indicator of development impacts because the line is so new, because the permit data are not spatially specific, and because permits do not necessarily result in actual development. Thus we also conducted an analysis of property values (below).

Property value analysis

The property value analysis is the most controlled and most reliable component of our study, although there are significant limitations. Using repeat sales of single family-owned homes, we found that RiverLINE access was not strongly associated with property value increases for most owned homes. This suggests that the economic impacts have been limited so far.

There were large differences in effects by property type. Access to the RiverLINE was associated with smaller declines or higher increases in property value for smaller homes and homes in lower income Census tracts. The effects of the line tend to be neutral or negative for other properties, particularly larger single family homes and homes in higher income areas.

Properties near high-ridership stations lost more value (or appreciated more slowly) than properties near other stations. Meanwhile, homes within a half-mile of stations with ample parking also appreciated faster.

Conclusions

Perceptions of the RiverLINE are for the most part positive and there are indications that the line has had some minor to modest positive economic impacts. Certain subgroups of the population appear to benefit most: in particular, owners of smaller homes and attached housing, owners of housing in lower-income Census tracts, those households living near the line who actually ride it, and nearby retail firms. Other subgroups do not appear to have benefited. These results are generally consistent with findings from other documented studies for similar rail systems with relatively low ridership.

Though this study is one of the most comprehensive of its kind, some significant caveats are in order. The firm survey looked at private sector and nonprofit firms only and excluded governmental agencies. The property value study looked at single family owned homes only, and did not investigate potential impacts on rental housing or on commercial developments. These exclusions likely understate the positive economic impacts of the RiverLINE. Also, local land use plans and regulations suggest that communities along the RiverLINE have not aggressively pursued supportive development policies to encourage transit-oriented development and redevelopment. As documented in the literature, transit investment alone is likely not sufficient to spur economic development.

If residential development densification and additional commercial development were to occur over time near RiverLINE stops, economic benefits would most likely increase. Also, further study of broader economic impacts would provide improved evidence on the economic benefits of the line. Such study could include analysis of Department of Labor data on firm wages and employment, and a study of whether improvements to the RiverLINE rail bed and alignment have had ancillary benefits to freight firms.

INTRODUCTION

The RiverLINE runs 34 miles between Camden and Trenton, two formerly industrial cities that were anchors of a thriving economy in the southern New Jersey subregion many decades ago (Figure 1). RiverLINE passenger trains run on the same track as freight trains which have since opening of passenger service been restricted to nighttime hours. Trains make 18 stops along the route between the two cities, primarily in small towns in Burlington County near the Delaware River. The light rail line provides good connections to commuter transit lines serving northern New Jersey, Manhattan, and Philadelphia, and the trains travel about twice as fast as buses along the route. Some RiverLINE stations are park and ride stations while others have little or no parking nearby and are intended to be used either primarily as transit transfer points or as walk-up stations. RiverLINE vehicles are attractive, newer, and better maintained than the buses traveling similar routes in the corridor. The entire project was built by Bombardier; Inc. in association with Bechtel, and is currently operated by Bombardier with oversight by NJ TRANSIT.

The construction and capital cost of the line was about $1.1 billion, which was paid entirely by the state without a federal contribution from the Federal Transit Administration (FTA). Part of the rationale for the project was that the line could help spur redevelopment of the river towns along state Route 130 between Trenton and Camden, and bring tourism from other parts of the state to some of the historic locations in those towns. The line was also intended to provide a travel alternative serving large scale entertainment venues, including the state aquarium and amphitheatre in Camden, and commuters to the government complex in Trenton and the Camden campus of Rutgers University.

The line opened in March 2004 and immediately attracted about 3,000 average weekday riders. In the five years since then, the line has more than doubled its ridership, to 7,900 trips per weekday, about 80 percent of its capacity, with ridership on the weekends as high as 4,000 trips depending on the time of year. NJ TRANSIT estimates that as many as half of these riders were diverted from their previous auto trips, although almost half drive to the stations and park there to access the line.

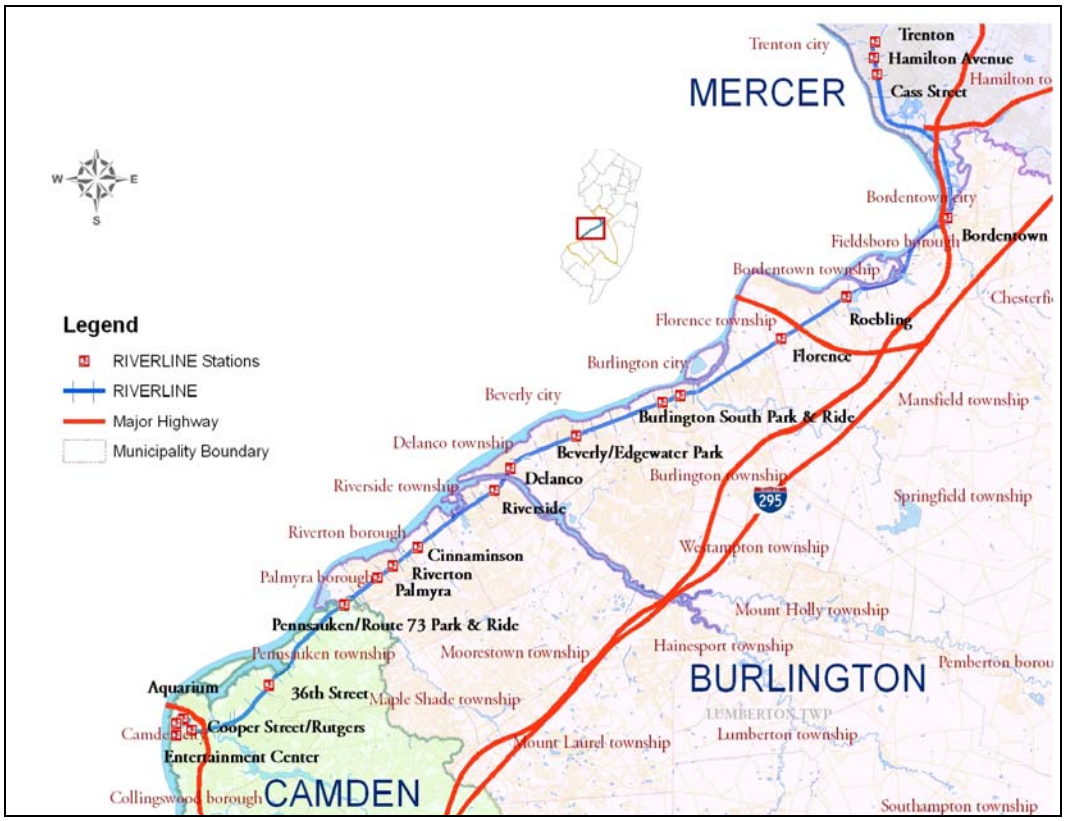

Figure 1. RiverLINE light rail line

The main purpose of this study is to provide a preliminary account of the economic development benefits attributable to the construction the RiverLINE. We examine existing secondary data sources including:

- National and international scholarly literature and pertinent data sources;
- RiverLINE planning and development activities;
- Property values through the lens of residential property value change;
- Building permit data; and
- Land use and zoning regulation in the RiverLINE municipalities.

Given that the RiverLINE has been in operation only five years, this study is also intended to establish a baseline upon which future analysis can be based. Thus considerable time and effort has been taken to collect primary data, in several forms, including:

- Interviews of municipal officials, real estate developers, real estate lawyers, and other knowledgeable individuals;
- A survey of households living in the region, with an oversample of those living near RiverLINE stations; and
- A survey of firms in the region, with an oversample of firms near stations.

Taken together, these data make possible a comprehensive picture of the short term impacts of the RiverLINE on the communities and region in which it is located, and provide a means by which to gauge future impacts of the investment.

LITERATURE REVIEW

Introduction

The primary purpose of our review of literature was to identify the most appropriate analysis methods and best practices in data collection and management to support analysis of the impacts of the RiverLINE light rail system. What follows is an examination of past work in two areas of greatest interest and relevance to our investigation: (1) land values and land development, and (2) employment and job creation. We also reviewed literature on the effects of transportation investment on the economy and local land use. In the conclusion we discuss methodological and data issues with particular relevance to our study.

Land values and land development

Literature discussing the economic benefits of transportation infrastructure investments is wide-ranging.[1-3] Transportation accessibility benefits generally, and industrial productivity specifically, may be primarily local, in that transportation investments may shift economic activity within a region, e.g., between counties of a metropolitan area.[4] But some benefits may represent genuinely new economic activity within a region (e.g., greater economic productivity overall).

Anderson and Lakshmanan present an overview of the methods and problems associated with economic impact assessment of transit projects and suggest that because impacts of large projects are far-reaching and complex, several different methods may be necessary in order to adequately assess a project.[1] Economic benefits refer not only to flows of money, but also to non-monetary improvements that users would be willing to pay for, such as a faster trip for the same fare. Thus economic benefits may justify the costs of a project even when revenues do not.

Anderson and Lakshmanan suggest the following analysis methods can be used to examine economic impacts: comparison studies, surveys of expert opinion, development support analysis, hedonic price models, and regional economic models (input-output and econometric methods). Study scope can range from a narrow focus on accessibility (i.e., “faster, cheaper, better” transportation) to a comprehensive approach taking into account more difficult-to-quantify concerns including quality of life and economic justice. Noting that highway and road infrastructure is thought to support dispersed patterns of accessibility and low density development patterns, while transit infrastructure can concentrate development near stations, they argue that land use impacts might be included in economic assessments of transit as well.[1]

A body of research in economics studies how regional economic growth and industrial productivity are affected by public capital investments generally and transportation investments in particular.[2] For example, Anderson and Lakshmanan assess the economic benefits of Puerto Rico’s Tren Urbano by conducting an input-output analysis.[1]

Studies of real estate values and rail have typically been carried out at the county or more local level. One would expect there to be positive impacts on land values at such local levels with possible declines in nearby counties. This has been borne out at least one study of highways.[4, 5] A number of studies, some discussed below, have found that accessibility benefits are capitalized in land rents and resale prices, though at modest levels and with benefits accruing unevenly among population subgroups.[6, 7] The accessibility value of commute travel has been the focus of most studies, but others have also addressed whether travel accessibility for non-work purposes is reflected in land prices.[8] If households highly value rail access, as suggested by a recent study of London rail stations, then part of the land value capitalization is likely for non-work travel.[9]

There have been several literature reviews covering the impacts of transportation investments and of rail specifically on real estate values. Parsons-Brinkerhoff evaluated nineteen studies on how rail transit affects real estate values—studies of different types of rail systems (rapid, commuter, and light rail); different kinds of property (residential or commercial), methods of measuring distance to rail (network distance, straight-line distance, and buffer-based measures), and other differences (e.g., whether they distinguish positive and negative effects of rail proximity).[10] A particularly relevant study is Armstrong's 1994 examination of MBTA's Fitchburg commuter line in Boston. Armstrong found that homes located in census tracts with rail stations had 6.7 percent higher selling prices while proximity to the line (within 400 feet) coincided with a 20 percent decrease in value. He suggested that for this particular line, disamenity effects may be caused by frequent freight trains.[11]

Diaz and Booz-Allen & Hamilton, Inc. review impact assessments for twelve rail projects, concluding that proximity to rail produces positive impacts on real estate values by increasing accessibility.[12] Proximity to industrial land uses or highways may limit or negate the rise in value. The studies reviewed relied upon various measures including sales prices of single family homes, apartment rents and median home values. The only studies not showing an increase in real estate values near rail were those conducted in Atlanta and San Jose. The authors attribute the counter-examples to greater sensitivity to the noise, vibration, and visual blight associated with rail lines by higher income residents in the Atlanta case, and, in both cases, to higher proximity to industrial uses. The studies reviewed include a 1991 examination of housing prices near the PATCO and SEPTA lines.

Studies of heavy rail or "rapid rail" tend to find stronger effects on real estate values than studies of light rail, likely because of the speed advantages of dedicated right-of-way systems, as well as the fact that such systems tend to be developed as part of denser transit networks. Nevertheless, we cover some studies of heavy rail in order to describe some of the more rigorous approaches.

Bowes and Ihlandfeldt studied the relationship between real estate values and rapid rail transit stations on Atlanta's MARTA system.[13] They accounted for a more complete set

of rail impacts than most studies including: accessibility to stations, increased retail activity, negative externalities (noise, pollution, and parking difficulty), and increased crime. They found that the direct effects of accessibility and negative externalities associated with proximity to rail correlated more strongly with change in real estate values than crime rates and nearby retail concentrations. They further found that retail generally had a larger effect on real estate values than crime, except in the immediate vicinity of stations located close to downtown with already-high crime rates. Total effects varied a great deal with neighborhood income level, distance to downtown, and distance to the station. Stations may help create retail nodes away from the CBD that homeowners find valuable.

McDonald and Osuji studied the effects on real estate values of Chicago's Southwest Side Rapid Transit Line, an elevated rapid rail line.(14) They found an increase of 17 percent in value for properties near proposed stations three years in advance of the line's opening but well after announcement of the construction of the line and substantial groundbreaking or completion of many of the stations. This study is notable for controlling for station area effects both prior to and after the line's announcement, using a sample of assessed values of 79 residential parcels in 1980 and 1990 prior to the line's opening in 1993. Data come from a set of commercially available land estimates for Chicago, updated annually based on comparative parcel sales, appraisals, and offer prices (271).

Landis, Guhathakurtakurta, and Zhang investigated the relationship between rail transit proximity and residential, single-family home prices near five heavy and light rail systems in the Bay Area and San Diego: the Bay Area Rapid Transit and CalTrain heavy rail (commuter) systems, and light rail systems in Santa Clara county, Sacramento, and San Diego county.(15) The authors compared several different cities using the same methods and variables, distinguishing the effects of freeway access vs. rail access; light vs. heavy rail accessibility; and station accessibility vs. the noise and vibration disbenefits of proximity to the line.

Hedonic price regressions were run cross-sectionally using the 1990 sales price of single family homes. Independent variables included characteristics of the properties (number of bedrooms and bathrooms, square footage, lot area); measures of transportation facility proximity (minimum roadway distance from each home to the nearest transit station and the nearest freeway interchange; dummy variables representing whether the nearest rapid transit line and the nearest freeway are within 300 meters); and measures of neighborhood quality.

Heavy rail transit was associated with significantly higher home values. In some counties BART station proximity was associated with a premium of about $2 for each meter closer to a station. Being near the line had a significant negative association only for the CalTrain system. Light rail proximity was not generally associated with higher home values. In Sacramento and San José, light rail station proximity was associated with lower home prices, while in San Diego County a light rail premium was statistically

significant only within the City of San Diego. No disbenefit effects were found for light rail systems. The authors concluded that quality of service may be a key factor in capitalization of proximity to transit service.

Cervero and Duncan studied impacts of light rail and commuter rail on residential parcel sales in 1999 in Santa Clara County, finding that apartments near rail stops were up to 45 percent more valuable than comparison properties.[16] Land values were most often derived as a net value, total value less the assessed value of building stock based upon age, type, quality and square footage costs. The estimated price per square foot of a parcel was modeled as a function of accessibility to job opportunities, proximity to major transportation infrastructure (e.g., light rail and commuter rail transit), neighborhood characteristics (land uses, income and racial composition), and controls (e.g., fixed-effect variables). Auto and transit accessibility to jobs, and proximity to the CBD, were associated with higher land values. A greater benefit was attributable to a 15-minute transit accessibility factor than to a 30-minute highway accessibility factor. Capitalization effects of commuter rail were less pronounced than those of light rail—with 20 percent premiums for proximity to commuter rail, but applied to all types of residential parcels. In a related work Cervero and Duncan found the opposite for commercial properties: higher values for commuter rail access than for light rail access.[17]

Dueker and Bianco studied the impacts of Portland, Oregon's light rail system, during its first ten years of operation, upon auto ownership, mode share, development density, and real estate values.[18] Portland's eastside light rail service began in 1986. Transit-oriented planning actions (such as auto pricing or significant TOD design) did not occur in conjunction with the line's development, except a limited amount of station-area planning activity within the LRT corridor. The study compares real estate values along the rail line and a parallel bus corridor. Census years 1980 and 1990 bracket the opening of the line in 1986; a trial of the American Community Survey provides mode choice and auto ownership for 1996. Investigators used a nested model of distance such that each parcel has a specific level of transportation access within a measured distance, in this case, within quarter-mile of rail stops, bus stops and major arterials.

Dueker and Bianco found that median single-family home values near light rail stations increased at a rate higher than that of comparable homes. The gain in value for homes nearest stations (and up to 200 feet away) was estimated at $2,300. The authors also assessed impacts of the system on the development of multifamily housing specifically, and development density. Travel behaviors in the two corridors compared rates of auto ownership and transit-use as well as journey-to-work differences. Based on this analysis, Dueker and Bianco suggest that those promoting light rail systems of Portland's type should have "modest expectations" for its impacts.

Chen, Rufolo and Dueker examined the impact of the same system on single-family home values along the outer part of the eastside corridor.[19] Controlling for other factors, the authors investigated whether a positive association with access (proximity to stations) was outweighed for some properties by a negative association with noise and

vibration (proximity to the rail line). In all cases accessibility to the station outweighed nuisance of the line.

Almost all of the above studies are conducted using a cross-sectional design, not accounting for repeat sales. A similar study to this one is Gatzlaff and Smith, which included both repeat sales (before and after line opening) and hedonic regressions.[20] The authors found no strong evidence of effects of the Miami Metrorail on single family detached residential properties. Their sample (912 properties) was small relative to this one, and their models had a comparatively limited set of variables; they did not compare near-station properties to those farther away; and they did not attempt to distinguish whether some stations might be more valued than others because they offer better accessibility, more connections, and so on. We make these improvements here.

Job growth, employment and income

An accepted maxim among transportation planners is that investments in transportation infrastructure always yield economic growth benefits in the form of employment and regional output, in addition to real estate values, as described above. Although often challenged by academic writers, many studies seem to have accepted this view as a principle and proceed to estimate economic growth benefits on the basis of extrapolated historical trends (see the survey paper by Lakshmanan and Anderson).[21]

Commonly, the interrelationships between transportation investment and economic growth are analyzed at two principal levels. At the micro-level the focus is on the economic development effects of a specific project on the local economy and local markets. At the macro-level, the objective is to estimate the economic returns from further expanding the transportation infrastructure capital stock. Below we review studies that assessed economic development benefits at both the micro and macro levels.

In a study of transportation investment and local employment, Berechman and Paaswell examined the effects of improved accessibility on labor market participation rates in a low income area (The South Bronx, NY).[22] They showed that enhanced accessibility has differential effects on labor market entry decisions with respect to employment sector and occupation type. Whereas some job types (e.g., managerial) in specific sectors (e.g., retail) exhibited high rate of market participation, following accessibility improvements, others (e.g., technician in the transportation and communication sectors) did not. Hence, to compute labor effects from a transportation investment, assuming a uniform labor effect is rather erroneous.

In another study of the link between accessibility improvements and changes in employment, Ozbay et al showed that while improved accessibility positively affect aggregate employment growth, this effect tends to taper off.[23] Using a database composed of trip and employment data from the state of New Jersey, the authors demonstrated the decreasing marginal rate of accessibility on employment growth. In

another study Ozbay et al investigated the effect of accessibility changes on output growth at the county level.[24] Using New Jersey data, they obtained similar results: when the initial level of accessibility is quite high, further transportation investment, even if substantial, will have only a minor effect on growth.

The questions of spillover effects and time lags in output growth from transportation investments were explored in a study by Berechman et al.[25] The authors hypothesized that measurements of growth taken at the MCD level may be misleading as there might be strong spillover effects: transportation investment done in one location may improve output and employment elsewhere in the region. They investigated economic development effects from transportation improvements at three levels: state, county and municipality. The analysis showed the existence of spillover effects, which need to be considered when examining the growth effects of local transportation investments. They also showed that, by and large, there are no significant time lags, so that growth effects, if any, accompany the transportation improvements; anticipation of accessibility improvements spurs growth even before the project is fully completed.

Bollinger and Ihlanfeldt (1997) studied the impacts of Atlanta's MARTA rail transit system on population and employment growth in 29 station areas in Dekalb and Fulton counties, using a model that accounted for the possibility that stations were opened in places with high or low population or employment.[26] The authors concluded that MARTA did not increase employment or population, but did increase the station area share of employment in the public sector. The study incorporates both descriptive data analysis and a simultaneous model including gravity components for measuring proximity to population and employment. Aggregate zonal population, housing and employment data come from the 1980 and 1990 Census and the Atlanta Regional Commission. The authors categorized stations in five groups: high-intensity urban node, mixed-use regional node, commuter station, community center, and neighborhood station. Each of these was previously defined in a regional planning document cited by the study. Employment was broken down by SIC industry.

Sanchez (1999) looked at Atlanta, Georgia and Portland, Oregon, and investigated whether access to public transit was correlated with a higher rate of employment in Census block groups near transit as measured by average annual weeks worked.[27] Distance to transit from residential and employment locations was calculated using Census block groups within a quarter-mile of stops. Atlanta showed a significant relationship between access to public transit and annual weeks worked, while in Portland there was no sign of a significant relationship among nonwhites and a much weaker magnitude among whites.

Transportation development effects and complementary policies

A major study on the effect of a new rapid transit investment on the economy and land use in Buffalo, NY, a declining urban area, applied a number of analytic techniques to evaluate the impacts of a planned rail line.[28, 29] Paaswell and Berechman concluded

that corresponding regional policies—where and how much to develop land, sustained policies to ease auto congestion, lack of more general transit support—could either counteract or enhance effects of the investment alone. Applying a Garin-Lowry type model, they also showed that in a region where the levels of accessibility (defined by travel costs and opportunities) are already high, addition of a rapid rail component will have a small impact on regional accessibility with the greatest changes occurring adjacent to the system. In this case, the greatest changes in accessibility occurred in the downtown section, implying that downtown is where the greatest changes in employment and the potential for changes in retail activity would occur. Based on a sector wide employment study, the authors anticipated that service based employment would show positive change.

A similar study of transportation investment in Northern New Jersey looked at the impact of infrastructure and service improvements known as “Midtown Direct” which significantly expanded direct rail service into Manhattan.(30) Paaswell and Berechman found that during its first year of operation the line attracted many young workers with new families, causing real estate values to jump 20 percent along the route. The sustained desire of firms to take part in the various agglomerations (health related, finance, logistics related, etc.) resulted in demonstrating that accessibility would drive up new employment. This was corroborated by interviews with firms that had moved into New Jersey.

Literature review summary

Few studies have taken a comprehensive approach to studying the effects of a rail line on the economy. Most use secondary data (such as property values or permit data).

Many studies of transportation impacts distinguish between real net regional economic gains associated with transportation investment, and redistribution of economic development that would have occurred in a different spatial pattern without the transportation investment.

Studies of land values, or studies using multiple measures, or a regional scale of analysis, provide a good overall measure of the net economic benefits of transportation investments. Those benefits are subject to the constraints imposed by policies; that is, land values reflect development restrictions. Studies of land development and land values indicate only part of the economic value of accessibility, because consumer surplus is likely not entirely captured by sellers in the land market.

There may be governmental barriers to land value capitalization and land development. If so, observable changes will not reflect the potential benefit of the investment. Local governments are likely reluctant to permit certain high density residential development near rail lines as it may impose costs on the municipal budget, or because current residents want to avoid parking problems and traffic, or current residents wish to exclude minority or low-income households.(31) Parsons-Brinckerhoff draw particular

attention to the degree that policies, institutional factors, and economic climate affect land markets. These conditions ultimately will determine whether transit investment will raise real estate values and encourage land development.[10]

STRUCTURED INTERVIEWS

Introduction

In order to gather opinions about the RiverLINE and its impact on the South Jersey economy, between May and November 2007 we interviewed municipal and state officials involved in planning or economic development, property owners and managers, developers and other real estate professionals, county and state economic development and housing funding agencies, local planners, and local business owners. A total of 59 interviews were conducted. Most of the interviews were conducted over the telephone. Others were conducted in person. (See Appendix I for list of interviewees.)

Opinions about the RiverLINE vary dramatically among the various groups. In general, government officials credited the RiverLINE with being a significant factor in the revitalization of Burlington County's river towns. Without the RiverLINE, some respondents said that they doubted that so many developers from New York and northern New Jersey would be interested in the river towns and specifically in municipalities like Riverside and Beverly City. Real estate professionals largely agreed, but had not seen significant increases in property values and did not feel that the RiverLINE added a premium to what they could charge.

Many respondents stated they believed property values had increased since the RiverLINE opened, although some said it was impossible to determine whether this increase was a result of the RiverLINE. Increases were particularly noticed in the municipalities in Burlington County with RiverLINE stations, and less so in Trenton and Camden. Many respondents also said they believed the RiverLINE had increased the value of the property immediately surrounding stations.

There was not a consensus on the RiverLINE's effects upon nearby businesses. Although a few of the business owners interviewed said they believed the RiverLINE has helped their business, most said they believed it had little or no impact on their business and the region. Some felt that it had hurt their business and/or the area. In addition, several respondents spoke about what they viewed as the negative impacts the RiverLINE. These included increased noise, traffic, parking, and crime.

Several respondents spoke about the overall revitalization of the South Jersey economy and specifically mentioned the revitalization of the Route 130 corridor, although this was not directly related to the RiverLINE. As a complement to the significant number of housing units that have been built along the RiverLINE, big box stores, including supermarkets and large national stores like Target, have opened along the Route 130 corridor.

Economic interest

During the past several years, developers have shown significant interest in vacant and underutilized properties in municipalities throughout Burlington County. Many interviewees suggested that developer interest has been stronger in municipalities prepared for development. This is particularly true in municipalities with RiverLINE stations, although the entire area may have been primed for growth (Dale). Other municipalities, especially those with little or no undeveloped land, have experienced less development since the RiverLINE opened. Though there appears to be no consensus as to whether development interest is the result of the RiverLINE, a majority of elected and appointed officials as well as developers interviewed credit the RiverLINE with increasing the value of parcels within walking distance of a station. Richard Harris, director of the Walter Rand Institute at Rutgers University in Camden, believes the progress is incremental, acknowledging that “gains are modest” and that “you are not creating Hobokens or Jersey Cities along the RiverLINE” (Harris).

In Bordentown Township, where there is no RiverLINE station, township administrator Len Klepner reported an overall increase in property values. He attributed this to the township’s proximity to a number of major highways and the township’s relatively low tax rate and said he does not believe it had anything to do with the opening of the RiverLINE (Klepner). In towns with RiverLINE stations, at least one developer expects no impact on values for properties outside walking distance of the station (D’Anastasio). Other officials credit the new service as a factor in increasing demand for residential property in their municipality (Collom).

Several respondents stated that the RiverLINE is used as a marketing tool to sell residential units that have been built near stations, especially units designed to appeal to young professionals. Respondents said this was true both in municipalities where construction of large-scale developments was underway before plans for the RiverLINE were announced and where project planning began after the line’s announcement (Minniti). For example, Jason Kaplan, president of Kaplan Companies, said that he always speaks of the RiverLINE as an amenity when marketing his company’s residential and commercial space in Cinnaminson (Kaplan).

According to Riverton’s mayor, Robert Martin, the RiverLINE service may have helped advance the two major redevelopment projects that have occurred near the line since service began (Martin). The RiverLINE was a factor in J.S. Hovnanian’s decision to build a high-density housing project in Delanco as well as the D’Anastasio Corporation’s decision to build townhouses in Burlington City (Ouellette, Salvidge, D’Anastasio). However, while the new homes in Burlington City were expected to sell for a significantly higher price than the surrounding, older housing stock, it was unclear to the developer how the RiverLINE affected the selling price (D’Anastasio).

Fewer respondents spoke about the impact the RiverLINE had on already existing residential units. When the RiverLINE first opened, Elmes said she noticed a significant

influx of residents from northern New Jersey and New York. She also said it was not uncommon for residents to receive unsolicited letters from people interested in purchasing their homes (Elmes).

Ambivalence about the RiverLINE's economic impact was also apparent in the statement by another developer, James Brandenburger. He stated that the presence of the RiverLINE encouraged him to build new retail and office developments in Riverton. Yet when interviewed in June 2007, he stated that he did not believe that many customers were traveling on the RiverLINE (Brandenburger).

The situation is somewhat different in Camden and Trenton, where the RiverLINE is one of a number of public transportation options available to residents and visitors. Although development is occurring around the RiverLINE stations in both of these cities, interviewees there were less likely to say that developers' interest in the area was the result of the RiverLINE. Most did say, however, that they believed the RiverLINE helped make the area more attractive by adding to the already existing transit.

Camden has a variety of ongoing and planned projects occurring near its transit stations as part of a downtown redevelopment strategy (Dragos). Major expansions of Cooper University Hospital and Robert Wood Johnson Medical School in Camden may have created momentum for redevelopment in the area (Lesmerises). Nearby, the Cooper Plaza Redevelopment Plan calls for significant housing redevelopment. Monica Lesmerises, director of community development, Cooper University Hospital, said she believes the revitalization of this area began with the hospital and moved outward from there (Lesmerises). An ongoing streetscape improvement program is intended to make people feel safe while walking in the area. RiverLINE stations are considered to have increased developer interest in residential and mixed use development nearby, which should, in turn, increase ridership at currently underused stations (Fox).

In speaking about the impact of the RiverLINE on development in Trenton, a number of respondents also spoke about the impact that Route 129, which was built in the mid-1990s, had on development in the city. The respondents' comments about the economic development impacts of Route 129 and the RiverLINE suggest at least some degree of synergy. Initial interest generated by the construction of Route 129 near where the Cass Street and Hamilton Avenue stations are now located focused on light industrial and warehouse uses, but has since diversified (Carten). Developer interest in certain properties near RiverLINE stations was strong (Miller). Mixed-use development near the Trenton Station (now Transit Center) and Sovereign Bank Arena (now Sun National Bank Center) would have taken place without the RiverLINE, but the new service is seen as useful for attracting additional developer interest. It has also played a positive role in the New Jersey Housing Mortgage Finance Agency's decision to finance affordable units near the Arena (Brenna, Burbage, Murray). While the developer of the project near Sovereign Bank Arena believes that the RiverLINE will prompt increased interest in the area, Jeffrey Halpern, a member of the Trenton Planning Board, expects

only a marginal effect, especially in areas that already had reasonable access to Trenton Transit Center (Burbage, Halpern).

Respondents in other municipalities spoke about the role the RiverLINE has played in the gradual improvement of their communities' downtown commercial corridors (Smyth, Elmes, Martin). Others spoke about their use of the RiverLINE in marketing local business opportunities and helping to receive grants that have paid for streetscape improvements (Elmes). Several communities report fewer vacant stores and increased business in their downtown commercial districts since the RiverLINE began service (Martin, Remsa). This perspective is not universal as the RiverLINE does not appear to have brought a significant interest in the downtown area of Palmyra (Elmes). Most respondents agreed that the areas that have benefited the most from the RiverLINE are those within walking distance of the various stations. Most respondents felt that restaurant and bar owners have benefited more than other business types near RiverLINE stations in recent years (Dunn, Howell-Ikeda, Collom).

For the township of Florence the RiverLINE has helped attract businesses by ensuring employees have a reliable way of getting to and from work (Brook). Some companies use shuttle buses to pick their employees up at the rail line. Burlington County also runs a shuttle service, known as the Burlink, from the RiverLINE to businesses (Brook).

Individuals involved in building and marketing retail space along the RiverLINE were not as optimistic about the impact of the RiverLINE on their businesses. Tony Sarbando, property manager of the Riverline Business Plaza in Cinnaminson, said he has been unable to attract tenants to the building. He said this is not dissimilar to the experiences of other marketing efforts of retail space along the RiverLINE (Sarbando). Sarbando said the building was built across the street from Cinnaminson's RiverLINE station because of the vast number of homes being built nearby and said the building's owners believed the building's proximity to the RiverLINE would make the space more desirable.

Business response

Most of the business owners interviewed who opened their businesses after the light rail system started operating said the RiverLINE was not a factor in their decision to open (Calloway, Pate, Wesley, Martiniano). Still others, such as Mack Kieffer, owner of a specialty shop in Bordentown City, said the RiverLINE weighed heavily into her decision to open her business downtown. Yet few felt that a significant number of their customers use the RiverLINE even when travelling from out-of-town (Kieffer, Pate, and Mariniano). One respondent felt that the RiverLINE had hurt her business because of passengers using her restroom (Wesley). At least one restaurant, however, has seen a significant increase in its lunchtime crowd (Fisher). Business owners whose businesses are not within walking distance of the RiverLINE said they did not believe the RiverLINE had any impact on their business (Davis).

Although unconvinced that local business owners decided to renovate or expand as a direct result of the RiverLINE, some interviewees said they believe owners' decisions to do so was the result of an expectation that new residential projects will bring an influx of new residents (Maley). Yet others suggested that the impact the RiverLINE has had on area businesses is related to how prepared the individual municipalities' were before the RiverLINE became operational (Howell-Ikeda). Kristi Howell-Ikeda, president of the Burlington County Chamber of Commerce, specifically said that businesses in municipalities with downtown districts ready to cater to tourists and other out-of-town visitors have done better than those with few restaurants and little or no commercial establishments. Respondents in municipalities that have marketed themselves as tourist destinations reported that the RiverLINE had helped boost tourism in their municipality (Calloway, Fisher, Ford, Wesley, Dragos). A few business owners reported using the RiverLINE to increase business by offering discounts to customers who present their light rail ticket (Fisher, Wesley). Some business owners also said they have advertised on the train itself (Fisher, Wesley, Boone), although at least one said she stopped because she does not believe it helped improve business (Wesley).

Despite the general feeling by individual business owners that the RiverLINE has not had a significant impact on their businesses, several of the downtown districts with RiverLINE stations have experienced transformations since the light rail system began operations (Kieffer, Boone). In Burlington City, Donna Boone, executive director of Main Street Burlington, said she believes the relationship between the RiverLINE and Main Street is symbiotic. Main Street would not be what it is today without the RiverLINE and the RiverLINE would not be as utilized in Burlington City without Main Street (Boone).

Some RiverLINE riders use the light rail system to travel to work, even when their work is not within walking distance of a RiverLINE station. In some municipalities including Edgewater Park, employees take the RiverLINE and then transfer to the BurLink, a shuttle service run by Burlington County, which drives them to county facilities or to Lords Hospital in Willingsboro. The service also stops at several major employers (Dougherty).

Hope for the future

In addition to the projects that have already occurred or have been proposed, several respondents spoke about their hopes for the future. Municipal interest in redevelopment is strong in both Beverly City and Edgewater Park. Local and county officials are focusing on areas near RiverLINE stations for potential mixed-use redevelopment projects on currently underutilized sites (Wetherill, Remsa). There is a significant amount of developer interest in Edgewater Park (Remsa).

Respondents in other municipalities spoke about specific projects. In Bordentown Township, where there is currently no RiverLINE station, township officials and developers spoke openly about their hope that a RiverLINE station will be built there and about their belief that a new station would add value to the surrounding land.

Jeffrey Albert, principle of Princewood Properties, which owns a 97-acre site near where a new RiverLINE station would likely be built, and Robert Dale, managing partner of Buckingham Partners, which owns a 130-acre site that is divided by the RiverLINE, both said they believe the site's proximity to Route 130 would make it a widely used light rail station (Albert, Dale). Although committed to building on their sites even if a RiverLINE station is not built in Bordentown Township, both developers said they believe what will eventually be built depends on whether or not there is a RiverLINE station. Township officials are eager about the project, as well as about the prospect of a RiverLINE station being built in their town and have facilitated redevelopment projects by declaring areas "in need of redevelopment" and offering a payment in lieu of taxes (PILOT) program (Klepner). Florence Township has seen increased interest in development along Route 130, which may have been spurred by the RiverLINE station (Brook). Interest in redeveloping an underutilized parcel in Palmyra has increased since the borough's station opened (Gural).

However, not all municipalities have experienced a boom in interest since the RiverLINE opened. Despite the availability of land near both RiverLINE stations in Pennsauken, the assistant township administrator there said there are no projects planned near either of the stations (Grochowski). This is also the case in Beverly (Wetherill), although developers have recently introduced a concept plan for a residential development there. Interviewees in both Pennsauken and Beverly said they hope mixed-use developments will eventually be built on unused and underused properties in their respective municipalities (Grochowski and Wetherill). Plans for a "major redevelopment project" that will have shuttle service to the RiverLINE station in Palmyra cannot continue until remediation of the brownfield site is complete (Gural, Remsa).

Due to the uncertain economic future brought about by the softening of the housing market, many plans for future development have changed. Construction has slowed and expected prices have dropped for some projects (Kaplan) and the commercial component of some mixed-use development has been dropped in favor of higher-density residential projects that trouble local officials (Oullette, Lavenia, Maley).

Accommodating development

With only a few exceptions, developers and municipal officials interviewed reported having positive working relationships with each other. In addition, Burlington County has helped encourage development around the RiverLINE stations by giving grants for feasibility studies to numerous municipalities (Dougherty). Several respondents spoke specifically about zoning changes that were made to accommodate developers interested in building on parcels along the RiverLINE (Wetherill, Grochowski, Smyth, Dougherty, Maley, Lavenia, Brandenberger, D'Anastasio, Martin). Several municipalities also designated one or more large parcels as areas "in need of redevelopment," which helped the various developers. Officials in several municipalities, including Riverside and Beverly City, also spoke about offering Payments in Lieu of Taxes (PILOTs) to developers interested in either underutilized or contaminated properties along the RiverLINE (Lavenia, Albert, D'Anastasio). In explaining why officials in Riverside have

been so accommodating, one interviewee said the municipality does not feel like it will be losing money because so many of these properties are severely blighted and therefore do not generate significant revenue for the borough (Lavenia). Officials in towns where development had not yet occurred around the RiverLINE station, such as Pennsauken, also spoke about their willingness to make changes that would attract a developer to build in their town (Grochowski).

In Riverton, plans for redevelopment that began in the early 1990s had not seen much progress until recently. The existence of the light rail seems to have played a role in the developer's decision to buy the properties (Smyth). In 2005, the Riverside Borough Council adopted a redevelopment plan, which made zoning changes to accommodate development on a number of sites within the borough, including the site of what is known as the Golden Triangle (Maley). James Brandenburger, who developed the Shoppes at Riverton which had received several zoning variances, reported having a positive working relationship with officials in Riverton. Burlington City also adopted a redevelopment plan based on D'Anastasio Corporation's proposal (D'Anastasio). Florence Township welcomed the construction of a station on its former Roebling Steel Plant site as a way of attracting people to the community. However, environmental concerns on the former Superfund site caused negotiations with a developer that wanted to build a significant number of residential units to fall through (Brook). Palmyra Mayor John Gural said he believes the RiverLINE station has made the borough more attractive in the grant process, and has helped it obtain two streetscape grants from NJ DOT which have helped increase traffic downtown (Gural).

Ridership

Most respondents were positive in speaking about their own experiences on the RiverLINE, although for a large majority of them, their experiences were confined to a single or small number of trips. Respondents also spoke positively when asked how they believe others who take the RiverLINE feel about the system. When asked who rode the RiverLINE, respondents reported a mix of business people, who take the light rail system to work on a regular or semi-regular basis, and local residents, who take day trips to Camden or Philadelphia. Many reported that the commuters who take the RiverLINE on a regular basis often transfer in Camden, on their way to Philadelphia, or in Trenton, on their way to Princeton, Newark, or New York (Collom, Brandenberger, Wetherill, Brook, Martin, Remsa).

Burlington County residents who work at Rutgers, Cooper Hospital, the University of Medicine and Dentistry of New Jersey or for the Camden city or county government use the RiverLINE to get to work (Harris). Area residents also use the RiverLINE to get to work and to tourist destinations such as the baseball stadium, the aquarium, and the Tweeter Center in Camden (Fox). The RiverLINE may also make it easier for visitors to come to local festivals and events (Collom).

Questions about how riders got to the stations elicited a wide variety of responses. Many of the Beverly City and Riverton residents who use the RiverLINE to get to work walk (Wetherill, Martin). In Palmyra, most of the people who take the RiverLINE drive which has caused a problem for some area businesses (Elmes). A few respondents also spoke about the system's younger riders, which some viewed as a negative (Elmes). Responses about ridership were less positive in Cinnaminson and Pennsauken, where interviewees described the RiverLINE as being largely unused because the respective stations are out of the way (Minniti, Grochowski). One respondent said that although used by Mercer and Burlington county residents to commute to work, the RiverLINE is not widely used by Camden residents traversing the city. This is because both PATCO and the city's bus system are faster (Fox). Several respondents also spoke about the use of the RiverLINE to get to tourist locations in Camden (Harveson, Brook).

Criticisms

Criticism of the RiverLINE, which included complaints about the noise, traffic, lack of parking, and attractiveness to people with a propensity to commit crime, focused on the impact the RiverLINE has had on either their quality of life or on the quality of life of other residents in their town.

Although parking was mentioned by a number of respondents, the most frequent criticisms were about the noise created by the train, as well as the frequency of the bells and whistles. Some residential housing brokers and developers have reported that the properties closest to the RiverLINE may have become less valuable as a result of the noise (Elmes, Brandenburger, Dougherty, Martin), while others have said they feel these properties have become more valuable because they offer residents the opportunity to commute more easily and that the noise does not detract from that (Lucas). Noise was also a concern for restaurants with outdoor seating (Martin). Respondents, especially those in elected or appointed positions where they have direct contact with area residents, in several municipalities spoke about their ongoing efforts to get a quiet zone designation in their towns (Smyth).

In addition to the noise, perhaps the greatest quality of life concern resulting from the opening of the RiverLINE is the perception of an increase in the incidence of crime (Boone, Sarbando), although most respondents believe that the crime rate had not actually increased. Even municipal officials who said the incidence of crime had not risen since the RiverLINE opened reported a definite perception that the line had brought crime to the area (Minnitti). Another business owner said she believes the perception of crime at some of the RiverLINE stops is a problem and one of the main reasons her business has not benefited as a result of its proximity to Roebling's RiverLINE station (Wesley). Although the opening of the system initially caused a quality of life concerns for residents living adjacent to the train station in Bordentown City, increased police presence and lighting has helped the problem (Collom).

In speaking about the limitations of the RiverLINE, a number of interviewees said they believe a major problem with the system is that it does not have a clear destination and felt that transfers between the RiverLINE and other modes of transportation needs to be improved (Harris, Reed). This could be done by extending the line south of Camden (Harris) and improving bus service and greater walk-ability from the Trenton Transit Center downtown (Reed). Two respondents also spoke about the need to redesign the Trenton Rail Station (Reed, Foglio). At least three others reported that the RiverLINE's limited operating hours prevent the system from increasing attendance and/or limiting traffic congestion at the Sovereign Bank Arena (Sun National Bank Center), near the Hamilton Street station (Schumacher, Potts, Sherman). The current hours are also a problem for visitors to Mercer County Waterfront Park in Trenton (Taylor).

HOUSEHOLD SURVEY

In spring 2008 we conducted a telephone survey of households living near RiverLINE stations with a control group of households living in Mercer, Burlington, Camden, and Gloucester counties. This part of the study was intended to help determine the potential economic and land development impacts of the line by estimating the share of nearby households who ride the line, and the extent to which the line has resulted in relocations of households to take advantage of the new access.

Respondents were asked a series of questions concerning housing and neighborhood choice, work and non-work travel, and their opinion of the impacts of the RiverLINE. (See Appendix II for the survey questionnaire and a memorandum describing the data set construction and fielding statistics.) The survey was pretested in April 2008 and the final version was fielded in May and June of 2008. There were 800 respondents, of whom 500 (63 percent) resided within a half-mile of a RiverLINE station.

Proximity plays a role in whether someone rides the RiverLINE. Most RiverLINE riders live within a half-mile of a station (88 percent) and all frequent RiverLINE riders, defined as those who rode on three out of the past 30 days, live within a half-mile of a station.

Workers were asked about their commute mode. We found that 4.7 percent of work trips were via the RiverLINE. All of these trips were made by respondents living within a half-mile of a station. Very few non-work trips were reported to be by the RiverLINE. Note that non-work travel questions were only asked of non-workers in order to keep the survey of reasonable duration.

Respondents who had moved to their current residence in the past 20 years were asked about the factors they considered when selection a new neighborhood. The top four factors cited were short commute to work or school, housing type or quality, low crime and public school quality. A small number, slightly more than four percent, named the RiverLINE as a reason for selecting their current neighborhood. Among respondents who moved in 2004 or later, more than seven percent named the RiverLINE as a neighborhood location factor.

Public opinion of the light rail line is largely positive. About 72 percent of household respondents stated that the RiverLINE had improved quality of life in their community. When asked about three possible disamenities, noise, crime or pollution, the majority of respondents did not believe that the RiverLINE had increased these. Specifically, 80 percent of respondents disagreed or strongly disagreed that pollution had increased, 70 percent disagreed or strongly disagreed that crime had increased and 55 percent disagreed or strongly disagreed that noise had increased.

Finally we found that frequent RiverLINE riders (those who rode three or more times in 30 days) were twice as likely to rent as own their homes

RiverLINE ridership

About 17 percent of the sample rode on the RiverLINE during the 30 days prior to completing the survey. About nine percent of the sample rode on only one or two days, about five percent rode on three to 19 days, and 2.5 percent rode on 20 or more days. This last group was comprised of twenty individuals who may have been using the light rail line for their daily work commute.

Table 1. RiverLINE ridership

	Frequency	Valid Percent	Percent workers	Percent non-workers
Non-RiverLINE rider	662	82.8	55%	45%
One or two days	74	9.3	66%	34%
Three to 19 days	42	5.3	55%	45%
20 to 30 days	20	2.5	95%	5%
No answer	2	0.3		
Total	800	100	57%	43%

Those respondents who lived within a half-mile of a station were four and a half times as likely to have traveled on the RiverLINE during the previous 30 days as those who live further away (24 vs. 5 percent).

Table 2. RiverLINE rider and walking distance

	Within half-mile		Outside half-mile		Total	
	Number	%	Number	%	Number	%
Not a RiverLINE rider	380	76%	284	95%	664	83%
RiverLINE rider	120	24%	16	5%	136	17%
Total	500	100%	300	100%	800	100%

χ^2=.233

Frequent riders of the RiverLINE were more likely to live within a half-mile of a station than those respondents who rode the line occasionally. All of the respondents who traveled on the RiverLINE on 20 or more of the previous 30 days lived within walking distance of a station.

Table 3. Riding frequency vs. walking distance

	Within half-mile		Outside half-mile		Total	
	Number	%	Number	%	Number	%
One or two days	62	52%	12	75%	74	54%
Three to 19 days	38	32%	4	25%	42	31%
20 to 30 days	20	17%	0	0%	20	15%
Total	120	100%	16	100%	136	100%

χ^2=.118

When accessing or egressing the RiverLINE stations, 61 percent of RiverLINE riders reported walking (all of whom live within a half-mile of a station) and 30 percent reported traveling by car, truck or van. A small number accessed the RiverLINE by bus (7 percent), PATCO (one percent) or bicycle (two percent). These results differ from those found in the 2004 Origins and Destinations survey conducted by NJ TRANSIT, but the data are not directly comparable because this survey oversamples households living within a half-mile of stations and does not include transfer riders who live outside the four-county region. That being said, it is instructive to compare these results to the 2004 NJ TRANSIT survey. In 2004, 26 percent of RiverLINE riders reported walking to the station while 52 percent said that they arrived by car (drive and park, or drop off), 18 percent reached the station by other transit (bus, PATCO, etc.), and four percent traveled by some other means.[1]

Table 4.Travel mode to station (RiverLINE riders only)

	Within half-mile		Outside half-mile		Total	
	Number	%	Number	%	Number	%
Car, truck, or van	30	25%	11	69%	41	30%
Bus	6	5%	3	19%	9	7%
PATCO	0	0%	1	6%	1	1%
Bicycle	1	1%	1	6%	2	1%
Walk	83	69%	0	0%	83	61%
Total	120	100%	16	100%	136	100%

χ^2=.000

Neighborhood factors

One aim of this research was to investigate whether the RiverLINE may attract households by offering better accessibility, possibly in turn leading to economic growth. The 542 respondents (68 percent of the sample) who reported they had moved to their current residence in the past 20 years (1988-2008) were asked to offer up to four factors they considered when selecting the neighborhood location of their new house or

[1] 2004 RiverLINE Corridor Study Survey Results, Market Research Presentation. May 2005, p. 15.

apartment. Because housing cost or rent is the predominant factor when deciding on a new home, this factor was explicitly excluded from possible answers.

The top five factors named were commute distance (29 percent), housing quality or type (24.5 percent), low crime (24 percent), public school quality (17 percent) and visual attractiveness of neighborhood (16 percent). Just 10 percent of households listed transit access as a factor, and only five percent of households named the RiverLINE specifically as a factor. It should be said however that respondents were asked to offer their own reasons for choosing a neighborhood and were not explicitly asked if the RiverLINE was a factor in their decision. Whether the RiverLINE was considered in the decision making process may be reflected in several of the answers offered, including commute distance and access to public transit generally.

Respondents were also asked to rank factors from most to least important. Again short commute (18 percent), housing quality or type (13 percent), low crime (11 percent) and public school quality (9 percent) were named as the top four primary criteria considered when choosing a new neighborhood. Only four percent of households named public transit generally and only 0.7 percent of households named the RiverLINE specifically as their top reason.

Table 5. Neighborhood factors (Cumulative & Primary Reason)

	All Reasons		Primary Reason	
Reasons named for selecting neighborhood	Frequency	Percent of respondents	Frequency	Valid Percent
Short commute to work or school	156	28.8	97	17.9
Type or quality of housing	133	24.5	69	12.7
Low crime	130	24.0	58	10.7
Quality of public schools	93	17.2	49	9.0
Visual attractiveness of neighborhood	88	16.2	23	4.2
Access to shops & services	85	15.7	23	4.2
Near family or friends	80	14.8	35	6.5
Short commute to work or school other member of HH	73	13.5	39	7.2
Access to highways	66	12.2	22	4.1
Familiarity with neighborhood	61	11.3	22	4.1
Wanted to live near certain kinds of people or HHs	60	11.1	22	4.1
Access to public transit	56	10.3	20	3.7
Access to recreational opportunities	32	5.9	10	1.8
Moved in with someone already living in neighborhood	25	4.6	10	1.8
Access to RL	23	4.2	4	0.7
Short trip to school or daycare for children	19	3.5	18	3.3
Total number of respondents answering neighborhood factor questions	542	n/a	542	100.0

Among the 209 households who had moved in 2004 or later (26 percent of the sample), two factors—access to the RiverLINE and short commutes—were found to be statistically significant. More than seven percent of these recently relocated households named the RiverLINE as one of their top four factors; nearly three times as many as those who moved before 2004 (χ^2=.007). Nearly 35 percent of recently relocated households cited short commutes as a factor; households who moved in 2004 or later were 1.4 times as likely to name short commutes as those who moved earlier (χ^2=.012).

Though not statistically significant, it is also worth noting that 12 percent of households named public transit as one of their top four factors. Households, who relocated in 2004 or later, were 1.4 times as likely to cite transit as a factor than households who moved before 2004 (χ^2=.201).

Table 6. RiverLINE access vs. Move year

	Move year before 2004		Move year 2004 or later		Total	
	Number	%	Number	%	Number	%
No	325	98%	194	93%	519	96%
Yes	8	2%	15	7%	23	4%
Total	333	100%	209	100%	542	100%

χ^2=.007

Table 7. Short commute vs. Move year

	Move year before 2004		Move year 2004 or later		Total	
	Number	%	Number		Number	%
No	250	75%	136	65%	386	71%
Yes	83	25%	73	35%	156	29%
Total	333	100%	209	100%	542	100%

χ^2=.012

Table 8. Public transit vs. Move year

	Move year before 2004		Move year 2004 or later		Total	
	Number	%	Number		Number	%
No	303	91%	183	88%	486	90%
Yes	30	9%	26	12%	56	10%
Total	333	100%	209	100%	542	100%

χ^2=.201

The top five factors—short commute, housing type or quality, low crime, public school quality and visual attractiveness of neighborhood, as well as public transit and

RiverLINE access—were crosstabulated with walking distance and with recent household relocation. Public transit and RiverLINE access as well as low crime and public school quality were all found to be statistically significant neighborhood factors (χ^2<.100). Commute distance, housing type or quality and visual attractiveness were not.

Respondents living within a half-mile of stations were more likely to name public transit generally and the RiverLINE specifically as one of the factors considered when selecting their current neighborhood than households located further from a station. Twelve percent of such households named access to public transit as a factor (χ^2=.062) and six percent named RiverLINE access (χ^2=.018); households near a station were 1.7 times more likely to cite public transit and nearly four times as likely to cite RiverLINE access than those living further from a station.

Table 9. Public transit vs. Walking distance (half-mile)

	Within half-mile		Outside half-mile		Total	
	Number	%	Number	%	Number	%
No	303	88%	183	93%	486	90%
Yes	42	12%	14	7%	56	10%
Total	345	100%	197	100%	542	100%

χ^2=.062

Table 10. RiverLINE access vs. Walking distance (half-mile)

	Within half-mile		Outside half-mile		Total	
	Number	%	Number	%	Number	%
No	325	94%	194	98%	519	96%
Yes	20	6%	3	2%	23	4%
Total	345	100%	197	100%	542	100%

χ^2=.018

Households within a half-mile of a station were also more likely to look for a low crime neighborhood when selecting a new home, while those living more than a half-mile from a station were more concerned with school quality. Specifically 26 percent of households near stations cited low crime and these households were 1.3 times as likely to do so as households located further from a station (χ^2=.084). Nearly 25 percent of households located more than a half-mile from a station cited school quality (χ^2=.000); these households were nearly twice as likely to name school quality as a factor as households located within a half-mile of a station.

Table 11. Low crime vs. Walking distance (half-mile)

	Within half-mile		Outside half-mile		Total	
	Number	%	Number	%	Number	%
No	254	74%	158	80%	412	76%
Yes	91	26%	39	20%	130	24%
Total	345	100%	197	100%	542	100%
χ^2=.084						

Table 12. School quality vs. Walking distance (half-mile)

	Within half-mile		Outside half-mile		Total	
	Number	%	Number	%	Number	%
No	301	87%	148	75%	449	83%
Yes	44	13%	49	25%	93	17%
Total	345	100%	197	100%	542	100%
χ^2=.000						

Satisfaction with the RiverLINE

Respondents living within half-mile of a station were asked their opinions on a series of statements concerning their impressions of and satisfaction with the RiverLINE. They were asked if they strongly agreed, agreed, neither agreed nor disagreed, disagreed or strongly disagreed with the following statements:

- The RiverLINE has improved the quality of life in my town
- The RiverLINE has increased noise in my neighborhood
- The RiverLINE has increased crime in my neighborhood
- The RiverLINE has increased pollution in my neighborhood

Of these four statements, respondents were in greatest agreement when asked if the RiverLINE had improved the quality of life in town; 72 percent of households agreed or strongly agreed with the statement. The strongest disagreement was in reaction to whether the RiverLINE had increased pollution; 80 percent of respondents disagreed or strongly disagreed with this statement.

One criticism of the RiverLINE that has been made (and been picked up by the popular press) is the issue of whistle blowing. RiverLINE trains are required by federal regulation to audibly signal at each grade crossing. About 55 percent of those surveyed disagreed or strongly disagreed with the statement that “the RiverLINE has increased noise in my neighborhood,” while 34 percent agreed or strongly agreed to the statement.

Table 13. Satisfaction with RiverLINE

	Strongly agree or agree		Neither agree or disagree		Strongly disagree or disagree		Total	
	Number	%	Number	%	Number	%	Number	%
Quality of life	332	72%	72	16%	60	13%	464	100%
Increased noise	162	34%	52	11%	264	55%	478	100%
Increased crime	73	16%	63	14%	317	70%	453	100%
Increased pollution	40	9%	55	12%	363	79%	458	100%

Both low and high wage households reported that they felt the RiverLINE has had a positive effect on quality of life. Those respondents living in households earning less than $60,000 are 1.5 times as likely to agree or strongly agree that the RiverLINE has improved quality of life than those earning more than $60,000, although the difference is not statistically significant.

Riders of the RiverLINE were 1.2 times as likely to agree or strongly agree that the line had improved quality of life as those who had not ridden it in the previous 30 days. Non-RiverLINE riders were 1.4 times as likely to offer a neutral opinion on the quality of life question and were 2.8 times as likely to disagree or strongly disagree that the line had offered an improvement to their community's quality of life.

Another issue raised by opponents to the RiverLINE has been a belief that the service would bring about an increase in crime. When asked about the statement "the RiverLINE has increased crime in my neighborhood," only 16 percent of respondents agreed or strongly agreed with this statement. A large majority of respondents, a total of 70 percent disagreed or strongly disagreed.

Travel to work

Respondents who reported working for pay during the previous week were asked how they had traveled to work. The predominant mode of travel to work was by car, truck, van or motorcycle (83 percent), followed by public transit generally (12 percent) and walking (5 percent). Workers were also asked to recall their commute trips from five years earlier, in 2003. Personal vehicle share was higher and transit use lower for workers five years previous, as 89 percent of respondents reported commuting by car, truck, van or motorcycle, eight percent reported using public transit, and three percent reported walking to work.

Table 14. Travel to work mode, 2003 & 2008

	2003		2008	
	Number	%	Number	%
Car, truck, van or motorcycle	461	89%	370	83%
Public transit (all forms)	41	8%	53	12%
RiverLINE only	*n/a*	*n/a*	*21*	*5%*
Other transit	*41*	*8%*	*32*	*7%*
Walk	16	3%	24	5%
Bike	3	0.6%	1	0.2%
Total	521	100%	448	100%

Looking only at respondents who reported riding the RiverLINE in the previous 30 days, we find that while nearly 80 percent of riders commuted by car, truck or van in 2003, only slightly more than 50 percent reported doing so in 2008. While traveling by transit to work only accounted for 14 percent of trips in 2003, more than a third of these trips are made by transit in 2008, and nearly a quarter on the RiverLINE.

Table 15. RiverLINE riders travel to work mode, 2003 & 2008

	2003		2008	
	Number	%	Number	%
Car, truck, van or motorcycle	74	80%	47	53%
Public transit (all forms)	13	14%	31	35%
RiverLINE only	*n/a*	*n/a*	*21*	*24%*
Other transit	*13*	*14%*	*10*	*11%*
Walk	5	5%	10	11%
Bike	1	1%	1	1%
Total	93	100.0%	89	100%

Twenty-one workers, all of whom live within a half-mile of a station (8 percent) stated that they traveled to work specifically on the RiverLINE.

Table 16. Travel to Work vs. Walking Distance

	Within half-mile		Outside half-mile		Total	
	Number	%	Number	%	Number	%
Car, truck, van or motorcycle	222	79%	148	88%	370	83%
Transit	37	13%	16	10%	53	12%
RiverLINE only	*21*	*8%*	*0*	*0%*	*21*	*5%*
Other Transit	*16*	*6%*	*16*	*10%*	*32*	*7%*
Bike	1	0.4%	0	0%	1	0.2%
Walk	20	7%	4	2%	24	5%
Total	280	100%	168	100%	448	100%

χ^2=.065

The relatively large changes in commute travel may have been caused by relocation. To investigate this we tabulated changes in commute habits for those who relocated in the last five years and compare those to households who have not relocated in that period.

Table 17. Changes in auto & transit users' mode choice vs. Move year

Auto and transit changes only	Move year before 2004		Move year 2004 or later		Total	
	Number	%	Number	%	Number	%
Auto to transit	14	6%	6	6%	20	6%
Auto to auto	218	90%	77	79%	295	87%
Transit to auto	3	1%	8	8%	11	3%
Transit to transit	7	3%	6	6%	13	4%
Total	242	100%	97	100%	339	100%

χ^2=.008

Looking at RiverLINE riders only, we find that more than half of workers (54 percent) traveled by RiverLINE on only one or two days during those 30 days. Another 25 percent traveled on the light rail line during the period in question and the remaining 21 percent rode on the line on 20 or more days.

Table 18. RiverLINE travel days vs. Workers

	Workers		Non-workers		Total	
	Number	%	Number	%	Number	%
One or two days	49	54%	25	56%	74	54%
Three to 19 days	23	25%	19	42%	42	31%
20 to 30 days	19	21%	1	2%	20	15%
Total	91	100%	45	100%	136	100%

χ^2=.013

As a group, workers reported an average travel time of 23 minutes.

Table 19. Average travel time by mode (minutes)

Mode	Minutes
Car, truck, or van	21.6
Bus	36.9
RiverLINE	36.5
Other transit	39.4
Bicycle	30.0
Walk	9.9

Non-work travel

Non-work travel questions were asked only of those who reported that they did not work the previous week (344 respondents, 43 percent of the sample). These respondents were then asked when, how and where they traveled for grocery shopping, entertainment/dining, and personal business for the three most recent trips.

As expected, the vast majority of non-work trips were made by personal vehicle—90 percent. Walking trips comprised five percent and bus trips three percent. The RiverLINE is rarely used for non-work trips by non-workers. (Workers who commute on the RiverLINE may use also use the line for non-work travel, but workers were not asked about their non-work travel.) No one reported traveling on the RiverLINE in order to shop for groceries. Only two trips for entertainment and four for personal business were reported on the line.

Table 20. Non-work trip purpose & mode

	All non-work trips		Groceries		Entertainment		Personal Business	
	Number	%	Number	%	Number	%	Number	%
Car, truck, van or motorcycle	1954	90.0	777	92.7	551	92.8	626	84.7
RiverLINE	6	0.3	0	.0	2	0.3	4	0.5
Walk	103	4.7	18	2.1	21	3.5	64	8.7
Bus	62	2.9	26	3.1	8	1.3	28	3.8
All other transit	13	0.7	0	.0	8	1.4	5	0.7
Taxicab	14	0.6	7	0.8	1	.2	6	0.8
Bicycle	14	0.6	8	1.0	1	.2	5	0.7
Other (SPECIFY)	5	0.2	2	0.2	2	.3	1	0.1
Total	2171	100.0	838	100.0	594	100.0	739	100.0

While all trips, regardless of purpose, were primarily by personal vehicle, there was some variation among the trip purposes. Personal business trips were less likely to have been made by car than trips for groceries or entertainment. The personal vehicle is used for 85 percent of trips made for personal business, 90 percent for grocery trips, and 93 percent for dining/entertainment trips. Respondents were more than twice as likely to walk to satisfy personal business needs as when traveling to entertainment and more than four times as likely to walk as when shopping for groceries.

We also investigated whether there were differences in non-work travel mode for those living within a half-mile of RiverLINE stations. We found few statistically significant differences, in large part because of the relatively small numbers of respondents reporting any non-work travel occurring by modes other than the auto. Therefore the following differences are merely suggestive, not conclusive. All of the six non-work trips via the RiverLINE were taken by respondents living within a half-mile. In addition, those living within a half mile were more than twice as likely to ride a bicycle [14 responses] or use rail [19 responses], and nearly twice as likely to travel by bus [62 responses]. They were only 20 percent more likely to have walked to non-work destinations.

We also cross-tabulated respondents who identified themselves as RiverLINE riders and examined how they traveled for non-work purposes. (RiverLINE riders are defined as anyone who rode the line in the past 30 days.) RiverLINE riders were less likely to travel by personal vehicle for non-work trips. They traveled by personal vehicle for 79 percent of their non-work trips, while non-RiverLINE riders used a personal vehicle for 92 percent of these trips, a statistically significant difference.

Table 21. Non-work trips, RiverLINE vs. Non-RiverLINE riders

	RiverLINE rider		Not a RiverLINE rider		Total	
	Number	%	Number	%	Number	%
Car, truck, van or motorcycle	259	79%	1695	92%	1954	90%
RiverLINE	5	2%	1	0%	6	0%
Walk	21	6%	82	4%	103	5%
Bus	29	9%	33	2%	62	3%
All other transit	4	1%	9	1%	13	1%
Taxicab	2	1%	12	1%	14	1%
Bicycle	9	3%	5	0%	14	1%
Other (SPECIFY)	0	0%	5	0%	5	0%
Total	329	100%	1842	100%	2171	100%

χ^2=.000

Looking at personal business trips only, we find that RiverLINE riders were 4.5 times as likely to travel by bus [28 responses], 4.2 times as likely to travel by other public transit [9 responses], and more than 20 times as likely to ride a bicycle [5 responses] than non-RiverLINE riders (Table 22). Interestingly, non-RiverLINE riders reported slightly higher rates of walking for personal business than RiverLINE riders and were about 1.2 times as likely to walk for personal business as RiverLINE riders.

Table 22. Personal business trips, RiverLINE vs. Non-RiverLINE riders

	RiverLINE rider		Not a RiverLINE rider		Total	
	Number	%	Number	%	Number	%
Car, truck, van or motorcycle	87	74%	539	87%	626	85%
RiverLINE	3	3%	1	0.2%	4	1%
Walk	9	8%	55	9%	64	9%
Bus	13	11%	15	2%	28	4%
All other transit	1	1%	4	1%	5	1%
Taxicab	1	1%	5	1%	6	1%
Bicycle	4	3%	1	0.2%	5	1%
Other (SPECIFY)	0	0%	1	0.2%	1	0.1%
Total	118	100%	621	100%	739	100%

x2=.000

Looking only at grocery trips, we find that RiverLINE riders were 10 times as likely to ride a bike for grocery trips [8 responses], more than four times as likely to take the bus [26 responses], and nearly three times as likely as to walk for grocery trips as non-RiverLINE riders [18 responses] (Table 23).

Table 23. Grocery trips, RiverLINE vs. Non-RiverLINE riders

	RiverLINE rider		Not a RiverLINE rider		Total	
	Number	%	Number	%	Number	%
Car, truck, or van	100	81%	677	95%	777	93%
Bus	11	9%	15	2%	26	3%
Taxicab	1	1%	6	1%	7	1%
Bicycle	5	4%	3	0.4%	8	1%
Walk	6	5%	12	2%	18	2%
Other (SPECIFY)	0	0%	2	0.3%	2	0.2%
Total	123	100%	715	100%	838	100%
x2=.000						

Finally, looking just at entertainment trips, we find that RiverLINE riders were more than five times as likely to use rail or other non-bus public transit [10 responses], 3.7 times as likely to use bus [8 responses], and about three times as likely to walk [21 responses] than non-RiverLINE riders (Table 24).

Table 24. Entertainment trips, RiverLINE vs. Non-RiverLINE riders

	RiverLINE rider		Not a RiverLINE rider		Total	
	Number	%	Number	%	Number	%
Car, truck, or van	69	83%	482	94%	551	93%
River Line	2	2%	0	0%	2	0.3%
Walk	7	8%	14	3%	21	4%
Bus	3	4%	5	1%	8	1%
All other transit	2	2%	6	1%	8	1%
Taxicab	0	0%	1	0.2%	1	0.2%
Bicycle	0	0%	1	0.2%	1	0.2%
Other (SPECIFY)	0	0%	2	0.4%	2	0.3%
Total	83	100%	511	100%	594	100%
x2=.001						

Housing tenure

Respondents were asked to provide information about whether they lived in an owner-occupied home or a rental unit. Overall 76 percent of respondents reported that they lived in a home owned by a member of the household, while 23 percent reported renting. We cross-tabulated this information with several variables including whether the

respondent rode the RiverLINE during the past 30 days, lived within walking distance of a station, or moved to their current home since 2001 or since 2003.

Frequent riders of the RiverLINE were more than twice as likely to rent as non-riders or infrequent riders, those who rode only once or twice (χ^2=.002).

Table 25. RiverLINE ridership vs. Housing tenure

	Own		Rent		Total	
	Number	%	Number	%	Number	%
Non- or infrequent RL rider (2x or fewer)	557	94%	159	87%	716	92%
Frequent RL rider (3x or more)	37	6%	24	13%	61	8%
Total	594	100%	183	100%	777	100%
X^2=.002						

Table 26. Housing tenure vs. distance to RiverLINE station (frequent riders only)

	Within half-mile		Outside half-mile		Total	
	Number	%	Number	%	Number	%
Own	33	58%	4	100%	37	61%
Rent	24	42%	0	.0%	24	39%
Total	57	100%	4	100%	61	100%
X^2=.096						

Table 27. Housing tenure vs. Move Year (frequent riders only)

	Move year before 2004		Move year 2004 or later		Total	
	Number	%	Number	%	Number	%
Own	26	77%	9	41%	35	63%
Rent	8	24%	13	59%	21	38%
Total	34	100%	22	100%	56	100%
χ^2=.007						

Home ownership was higher among those living further from a RiverLINE station (85 percent) than that of respondents living within walking distance of a station (70 percent). About two-thirds of RiverLINE riders reported owning the home in which they lived compared to 78 percent of non-RiverLINE riders.

Respondents who moved to their current residence in 2001 or later are more likely to be renters than those who moved earlier. About 40 percent of those who moved in 2001 or later characterized themselves as renters compared to only 12 percent of those who moved in 2000 or earlier. Respondents who moved to their current residence since the opening of the RiverLINE in 2004 or later are more likely to be renters than those who

moved earlier. About 45 percent of those who moved in 2004 or later characterized themselves as renters, compared to only 15 percent of those who moved in 2003 or earlier.

FIRM SURVEY

Firms were asked about various factors they may have considered when deciding to open a business, perceptions of business since 2004 (when the RiverLINE opened), expected changes in the next few years, travel behaviors of their employees and customers, the provision of parking and employee and customer parking behavior, and perceptions of crime and safety around the RiverLINE. The survey included 25 questions.

We used a database from Dun and Bradstreet, Inc. to sample firms in Burlington, Mercer and Camden counties. We oversampled firms within a half-mile of RiverLINE stations. The survey was originally designed with mail recruitment to a web survey. After a poor initial response rate, we re-tooled the survey as a mail-based questionnaire with an internet option. We then conducted extensive in-person follow-up to increase the response rate. The final response rate was 24 percent. (See Appendix III for the survey questionnaire.)

In total, 519 firms responded: 305 firms (59 percent) within a half-mile network distance of stations, and 214 firms (41 percent) outside this area. Retail establishments comprise 156 firms (30 percent), and 363 firms (70 percent) are non-retail establishments.

Factors for opening a new business

One question on the firm survey asked the individual firms to rank several factors they may have considered when deciding where to locate their business or establishment. The list of factors included taxes, government incentives, proximity to the RiverLINE, proximity to highways, proximity to workforce, proximity to freight pick-up points, energy costs, availability of land, and proximity to customers. Respondents were asked to rank the importance of each of these factors from 1-5, one meaning “very important” and five meaning “least important”. Within this question, response rate varied from 63 percent to 87 percent for individual factors. Summaries of four of these factors, as stratified by business location (within or outside half-mile radius of a RiverLINE station), business type (retail or non-retail firms), and business size (greater than or less than 20 employees), are presented below.

Table 28. Factors for opening business: near RiverLINE

Factors for Opening Business: Near RiverLINE											
	Very Important								Least Important		
	1		2		3		4		5		
Firm Type	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Total
In 1/2 Mile											
Retail											
All	7	13.73%	7	13.73%	16	31.37%	6	11.76%	15	29.41%	51
Non-retail											
>20 Employees	5	21.74%	3	13.04%	9	39.13%	0	0.00%	6	26.09%	23
<20 Employees	22	14.29%	29	18.83%	34	22.08%	24	15.58%	45	29.22%	154
Outside 1/2 Mile											
Retail											
>20 Employees	3	11.11%	3	11.11%	4	14.81%	4	14.81%	13	48.15%	27
<20 Employees	2	6.06%	3	9.09%	5	15.15%	6	18.18%	17	51.52%	33
Non-retail											
>20 Employees	3	4.84%	3	4.84%	12	19.35%	9	14.52%	35	56.45%	62
<20 Employees	2	5.41%	3	8.11%	4	10.81%	6	16.22%	22	59.46%	37
Total	44	11.37%	51	13.18%	84	21.71%	55	14.21%	153	39.53%	387

One of the main factors of interest is the importance of proximity to the RiverLINE in the decision for firms to open a business (Table 28). The response rate for this individual element of the question was 75 percent. Firms outside of the half-mile radius naturally report placing little value in being near the RiverLINE when choosing a location. Of those firms located within the half-mile radius, a greater percentage of small, non-retail firms placed greater importance on being near the RiverLINE than other firms did: about 22 percent of these firms thought being near the RiverLINE was very important. However, between 28 and 35 percent of all firms in inner-ring strata (aside from large retail firms, of which there was only one sampled) selected one of the two greater values representing the importance of being near the RiverLINE.

Firms were also asked to rate the importance of proximity to highways played in their decision-making process (Table 29). Eighty-four percent of surveyed firms responded to this subset of the question. In contrast to Table 28, many large firms considered proximity to highways a very important factor in choosing a firm location. The stratum with the highest percentage of firms considering highway proximity to be very important is large retail firms outside the half-mile radius of stations, with nearly 63 percent of firms in that stratum making that selection. Even those firms within the half-mile of a station considered highway proximity to be an important factor. Eleven large, non-retail firms (44 percent of the total) and about 30 percent each of small retail and non-retail firms considered highways to be very important. About 8.7 percent of all firms found highway proximity to be of the least importance, the highest contributing stratum being small retail firms and containing about 18 percent of firms selecting this option.

Table 29. Factors for opening business: near highways

Factors for Opening Business: Near Highways											
	Very Important								Least Important		
	1		2		3		4		5		
Firm Type	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Total
In 1/2 Mile											
Retail											
All	17	30.36%	14	25.00%	13	23.21%	2	3.57%	10	17.86%	56
Non-retail											
>20 Employees	11	44.00%	6	24.00%	7	28.00%	1	4.00%	0	0.00%	25
<20 Employees	47	27.81%	62	36.69%	35	20.71%	9	5.33%	16	9.47%	169
Outside 1/2 Mile											
Retail											
>20 Employees	20	62.50%	7	21.88%	3	9.38%	0	0.00%	2	6.25%	32
<20 Employees	18	51.43%	10	28.57%	4	11.43%	1	2.86%	2	5.71%	35
Non-retail											
>20 Employees	24	30.77%	29	37.18%	17	21.79%	2	2.56%	6	7.69%	78
<20 Employees	15	35.71%	16	38.10%	3	7.14%	6	14.29%	2	4.76%	42
Total	152	34.78%	144	32.95%	82	18.76%	21	4.81%	38	8.70%	437

The subset of the question which asked firms to indicate the importance of being near their customers returned the most response from firms with an 87 percent response rate (Table 30). Although all firms seemed to consider being near their customers “very important” (as this category held the highest share of surveyed firms in all strata), a higher percentage of retail firms, overall, placed more importance on this factor (69 percent versus 48 percent for non-retail firms).

Table 30. Factors for opening business: near customers

Factors for Opening Business: Near Customers											
	Very Important								Least Important		
	1		2		3		4		5		
Firm Type	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Total
In 1/2 Mile											
Retail											
All	42	66.67%	12	19.05%	3	4.76%	1	1.59%	5	7.94%	63
Non-retail											
>20 Employees	10	38.46%	4	15.38%	6	23.08%	1	3.85%	5	19.23%	26
<20 Employees	89	52.66%	42	24.85%	16	9.47%	2	1.18%	20	11.83%	169
Outside 1/2 Mile											
Retail											
>20 Employees	25	73.53%	6	17.65%	0	0.00%	0	0.00%	3	8.82%	34
<20 Employees	25	67.57%	5	13.51%	4	10.81%	2	5.41%	1	2.70%	37
Non-retail											
>20 Employees	32	41.03%	29	37.18%	17	21.79%	2	2.56%	6	7.69%	78
<20 Employees	20	46.51%	6	13.95%	9	20.93%	0	0.00%	8	18.60%	43
Total	243	54.00%	87	19.33%	55	12.22%	10	2.22%	55	12.22%	450

Table 31. Factors for opening business: near employees

Factors for Opening Business: Near Employees											
	Very Important								Least Important		
	1		2		3		4		5		
Firm Type	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Total
In 1/2 Mile											
Retail											
All	26	43.33%	11	18.33%	9	15.00%	8	13.33%	6	10.00%	60
Non-retail											
>20 Employees	11	44.00%	6	24.00%	5	20.00%	0	0.00%	3	12.00%	25
<20 employees	48	29.63%	37	22.84%	42	25.93%	20	12.35%	15	9.26%	162
Outside 1/2 Mile											
Retail											
>20 Employees	12	35.29%	11	32.35%	7	20.59%	1	2.94%	3	8.82%	34
<20 Employees	10	27.78%	6	16.67%	10	27.78%	5	13.89%	5	13.89%	36
Non-retail											
>20 Employees	21	27.27%	24	31.17%	20	25.97%	2	2.60%	10	12.99%	77
<20 Employees	6	14.29%	18	42.86%	10	23.81%	2	4.76%	6	14.29%	42
Total	134	30.73%	113	25.92%	103	23.62%	38	8.72%	48	11.01%	436

Closely related to customer proximity is employee proximity as a factor for opening a business (Table 31). Eighty-four percent of respondents answered this subset of the question, and the plurality of all firms thought that being close to their employees was very important. Small non-retail firms farther than a half-mile away from the line did not place as much importance on this factor as other firms did. More large non-retail firms, percentage-wise, in the half-mile thought this factor to be very important than in other categories. This difference in responses does not seem to be too significant; around 60 percent of all firms thought being close to employees was either very important to the highest or next highest degree.

One question asked firms to respond as to their business plans had the RiverLINE not opened (Table 32). Only firms within a half-mile of stations were asked this question. Very few firms (0.8 percent) responded that their business would not have opened without the RiverLINE. Nearly five percent of firms surveyed said that they would have opened at a different location had the RiverLINE not opened. None of the large, non-retail firms within the half-mile radius answered with this option.

Table 32. Business decisions had RiverLINE not been built

Business Decisions if the RiverLINE Had Not Been Built									
	No Change		Not Have Opened		Opened at Different Location		Opened at Same Location		
Firm Type	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Total
In 1/2 Mile									
Retail									
All	42	76.36%	1	1.82%	2	3.64%	10	18.18%	55
Non-retail									
>20 Employees	22	84.62%	0	0.00%	0	0.00%	4	15.38%	26
<20 employees	129	71.27%	1	0.55%	10	5.52%	41	22.65%	181
Outside 1/2 Mile									
Non-retail									
>20 Employees	2	100.00%	0	0.00%	0	0.00%	0	0.00%	2
Total	183	73.49%	2	0.80%	12	4.82%	52	20.88%	249

Changes since the opening of the RiverLINE

Several questions on the survey attempted to understand any changes since the opening of the RiverLINE in 2004 that firms may have perceived. One question asked respondents to describe changes in the number of customers since 2004 (Table 33). Forty-six percent of firms surveyed responded to this particular question. Firms were asked whether or not the number of customers had "increased", "remained the same", "decreased", or if they "didn't know". For the purpose of analysis, responses were reclassified as "increased" or "didn't increase". Proximity to the RiverLINE did not seem to be a significant influence on customer numbers, as the differences among firms inside and outside of the half-mile are small and statistically insignificant (χ^2=.07).

Table 33. Changes in numbers of customers visiting since 2004

Change in the Number of Customers Visiting the Establishment Since 2004					
	Increased		Didn't Increase		
Firm Type	Number	% of Total	Number	% of Total	Total
In 1/2 Mile	26	30.59%	59	69.41%	85
Outside 1/2 Mile	50	32.26%	105	67.74%	155
Total	76	31.67%	164	68.33%	240

Firms were also asked to describe changes in revenue from in-store sales since 2004 (Table 34). Slightly fewer firms surveyed (44 percent) responded to this question than to the previous one. Once again, for the purpose of determining statistical significance, responses of "remained the same", "decreased", and "don't know" were recoded as "didn't increase". Once again, differences between firms within a half-mile and those outside of that area are insignificant (χ^2=.29). Overall, nearly 30 percent of all firms experienced an increase in revenues since 2004.

Table 34. Change in in-store sales revenue since 2004

Change in the Revenue from In-store Sales Since 2004					
	Increased		Didn't Increase		
Firm Type	Number	% of Total	Number	% of Total	Total
In 1/2 Mile	26	30.59%	58	68.24%	85
Outside 1/2 Mile	40	27.59%	105	72.41%	145
Total	66	28.82%	163	71.18%	229

Table 35. Business better, worse or same since 2004?

How the Establishment is Doing Compared to 2004									
	Better		About the Same		Worse		Don't Know		
Firm Type	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Total
In 1/2 Mile	**66**	**36.67%**	**63**	**35.00%**	**40**	**22.22%**	**11**	**6.11%**	**180**
In 1/4 Mile	76	32.34%	115	48.94%	40	17.02%	4	1.70%	235
In 1/8 Mile	29	25.22%	61	53.04%	22	19.13%	3	2.61%	115
Outside 1/2 Mile	**7**	**21.88%**	**16**	**50.00%**	**8**	**25.00%**	**1**	**3.13%**	**32**
Total	*142*	*34.22%*	*178*	*42.89%*	*80*	*19.28%*	*15*	*3.61%*	*415*

The survey also included a question asking firms to describe how their business is doing compared to 2004, the year the RiverLINE opened. Eighty percent of firms surveyed responded to this question. The most common response (nearly 43 percent) was that the firm was doing about the same as in 2004. Once again, for further analysis, survey responses were recoded to determine statistical significance. Responses of "about the same", "worse", or "don't know" were reclassified as "not better". Overall, most firms reported that they were not doing better than they were in 2004 (66 percent), and differences between firms within a half-mile of the RiverLINE and those outside were insignificant (χ^2=.85).

Expected changes for business

Firms were asked whether or not they expected to make changes to services, merchandise, equipment, or facilities in the coming one to two years (Table 36). Most firms (96 percent) responded to this question. Out of the 434 firms who answered either "yes" or "no", 53 percent said they intended to make changes. There is no statistical difference in responses between firms located within the half-mile and those outside (χ^2=1.88). Subsequent questions in the survey asked respondents to specify the types of changes they intended to make in the following one to two years. The responses indicate expected changes in services (Table 37), merchandise (Table 38), equipment (Table 39), and facilities (Table 40).

Table 36. Expected changes in next one or two years

Expected Changes in 1-2 Years?					
	Yes		No		
Firm Type	Number	% of Total	Number	% of Total	Total
In 1/2 Mile	127	50.00%	127	50.00%	254
Outside 1/2 Mile	102	56.67%	78	43.33%	180
Total	229	52.76%	205	47.24%	434

Table 37. Expected changes in services

Expected Changes in Services					
	Expansion		Reduction		
Firm Type	Number	% of Total	Number	% of Total	Total
In 1/2 Mile	54	90.00%	6	10.00%	60
Outside 1/2 Mile	44	86.27%	7	13.73%	51
Total	98	88.29%	13	11.71%	111

Most firms expecting to make changes in services expect to see an expansion of services (88 percent overall). Differences among firms nearby the RiverLINE and farther out are insignificant (χ^2=.37). Out of the 229 firms expecting to make changes, 58 (25 percent) of them plan to make changes to merchandise, 81 percent of which plan to expand merchandise offered. Once again, differences among different firm types (those located in the half-mile of the line and those outside) are insignificant (χ^2=.35).

Table 38. Expected changes in merchandise

Expected Changes in Merchandise					
	Expansion		Reduction		
Firm Type	Number	% of Total	Number	% of Total	Total
In 1/2 Mile	21	77.78%	6	22.22%	27
Outside 1/2 Mile	26	83.87%	5	16.13%	31
Total	47	81.03%	11	18.97%	58

Table 39. Expected changes in equipment

Expected Changes in Equipment					
	Expansion		Reduction		
Firm Type	Number	% of Total	Number	% of Total	Total
In 1/2 Mile	55	94.83%	3	5.17%	58
Outside 1/2 Mile	49	96.08%	2	3.92%	51
Total	104	95.41%	5	4.59%	109

Nearly half (48 percent) of those firms planning to make changes in the following one to two years, plan to make changes in equipment (Table 39). Ninety-five percent of those firms making changes in equipment plan to expand on existing equipment. Differences between firms within the half-mile and those outside are slight and insignificant (χ^2=.10). Only 21 percent of firms intending to make changes expect to make changes in facilities (Table 40). Of those firms, 81 percent overall expect to expand facilities. Yet again, expected changes in facilities do not vary for firms closer to the RiverLINE (χ^2=.11).

Table 40. Expected changes in facilities

Expected Changes in Facilities					
	Expansion		Reduction		
Firm Type	Number	% of Total	Number	% of Total	Total
In 1/2 Mile	24	82.76%	5	17.24%	29
Outside 1/2 Mile	15	78.95%	4	21.05%	19
Total	39	81.25%	9	18.75%	48

Overall, the intended changes by firms are mostly changes that will expand services, merchandise, equipment and facilities, rather than reduce them. The expected changes, when broken up by stratum, are almost identical across firms.

Employee and customer modes of travel

One of the aims of the survey was to determine if the RiverLINE has had any impact on the travel behaviors both of employees and customers. Firms were asked in the survey to provide information about the modes of transportation that their employees take to work. They were also asked to estimate the percentage of customers they have arriving by various modes of travel. Overall, employees and customers of firms close to the RiverLINE are more likely to take the line to the firm, but many still arrive on foot, bicycle, or bus.

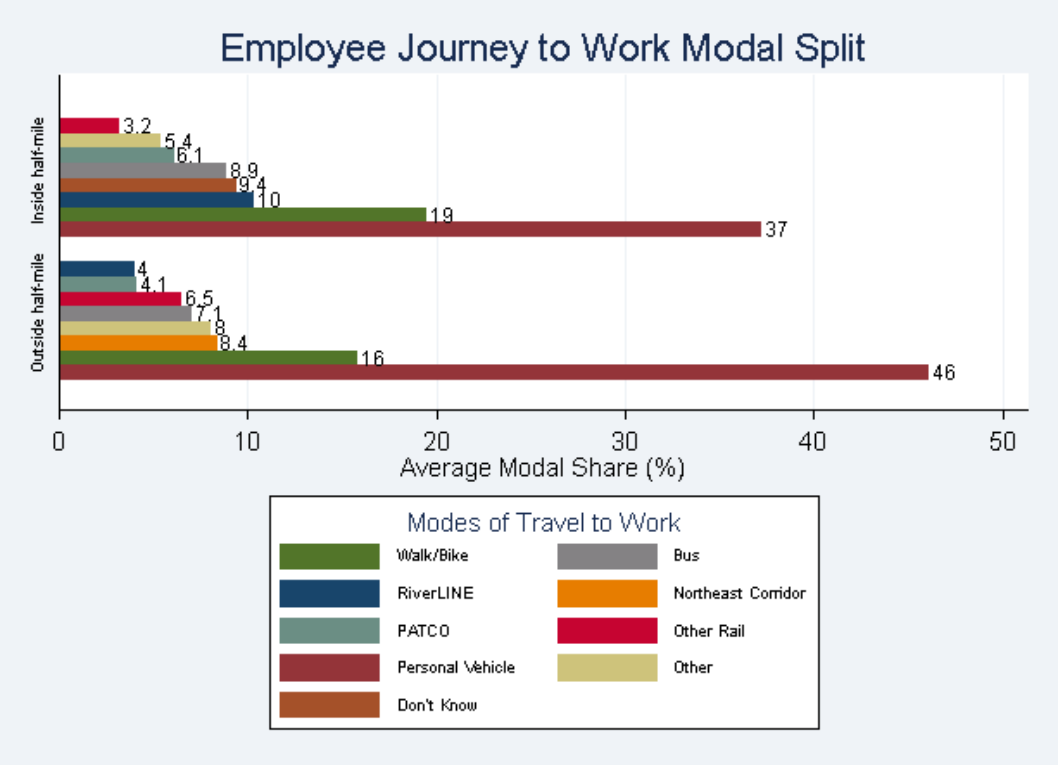

Figure 2. Employee journey to work modal split

Seventy-four percent of firms responded to the question asking them to list how their employees travel to work (Figure 2). As expected, the vast majority of employees travel to work by personal vehicle. Walking and cycling make up a significant share of employee travel for firms both inside and outside of the half-mile, but are more prevalent for firms closer to the RiverLINE. The RiverLINE is not commonly used for commuting, but is significantly more common among those working within a half-mile of stations.

As expected, workers at firms within a half-mile of RiverLINE stops are substantially more likely to use the RiverLINE than those outside the half-mile radius. About 10 percent of workers in nearby firms versus four percent of employees outside that radius use the RiverLINE to get to work, according to their employers. Note that the increase in RiverLINE usage from the outer ring to the inner ring does not result in a one-to-one decrease in trips made by personal vehicle. Most likely, trips to work for firms outside of the half-mile are made by bus or other public transport where the share of RiverLINE trips is lower.

We looked at personal vehicle and RiverLINE mode shares more closely to determine how differences in firm type affect modal choices (Figure 3). Looking only firms located within a half-mile of a station, we find that personal vehicle shares are highest and RiverLINE shares lowest for large non-retail firms. The RiverLINE is used for about three percent of trips made by employees of these firms. Over four percent of employees in small non-retail firms use the RiverLINE to travel to work. For all retail

firms within the half-mile (regardless of size), the RiverLINE is used by more than six percent of employees, for the average firm.

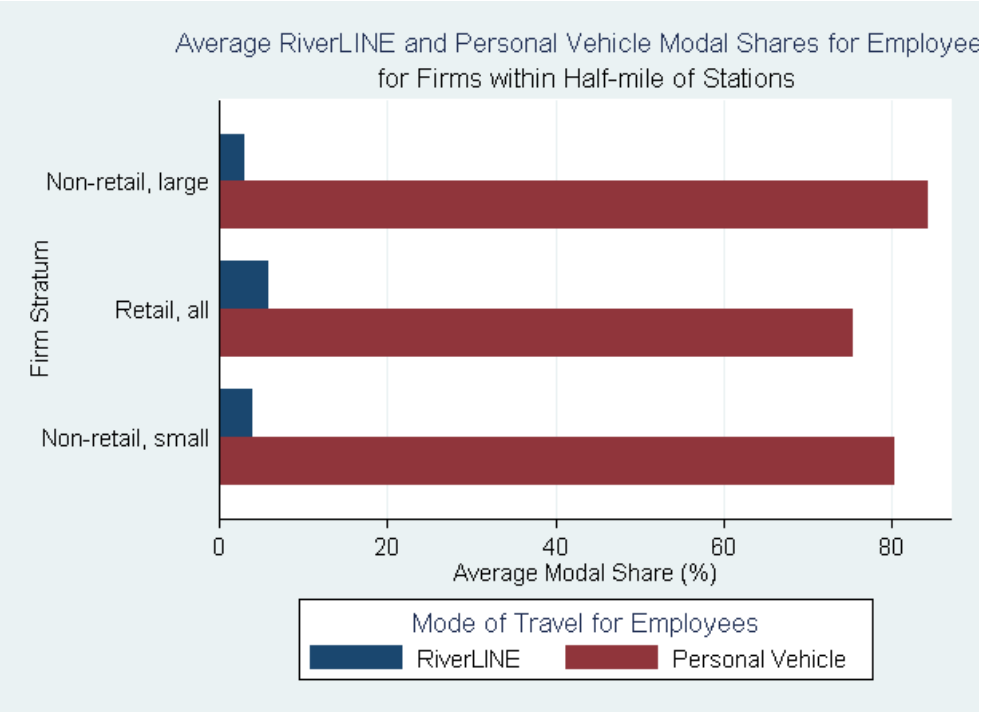

Figure 3. Average RiverLINE and auto employee modal shares (firms within half-mile of stations)

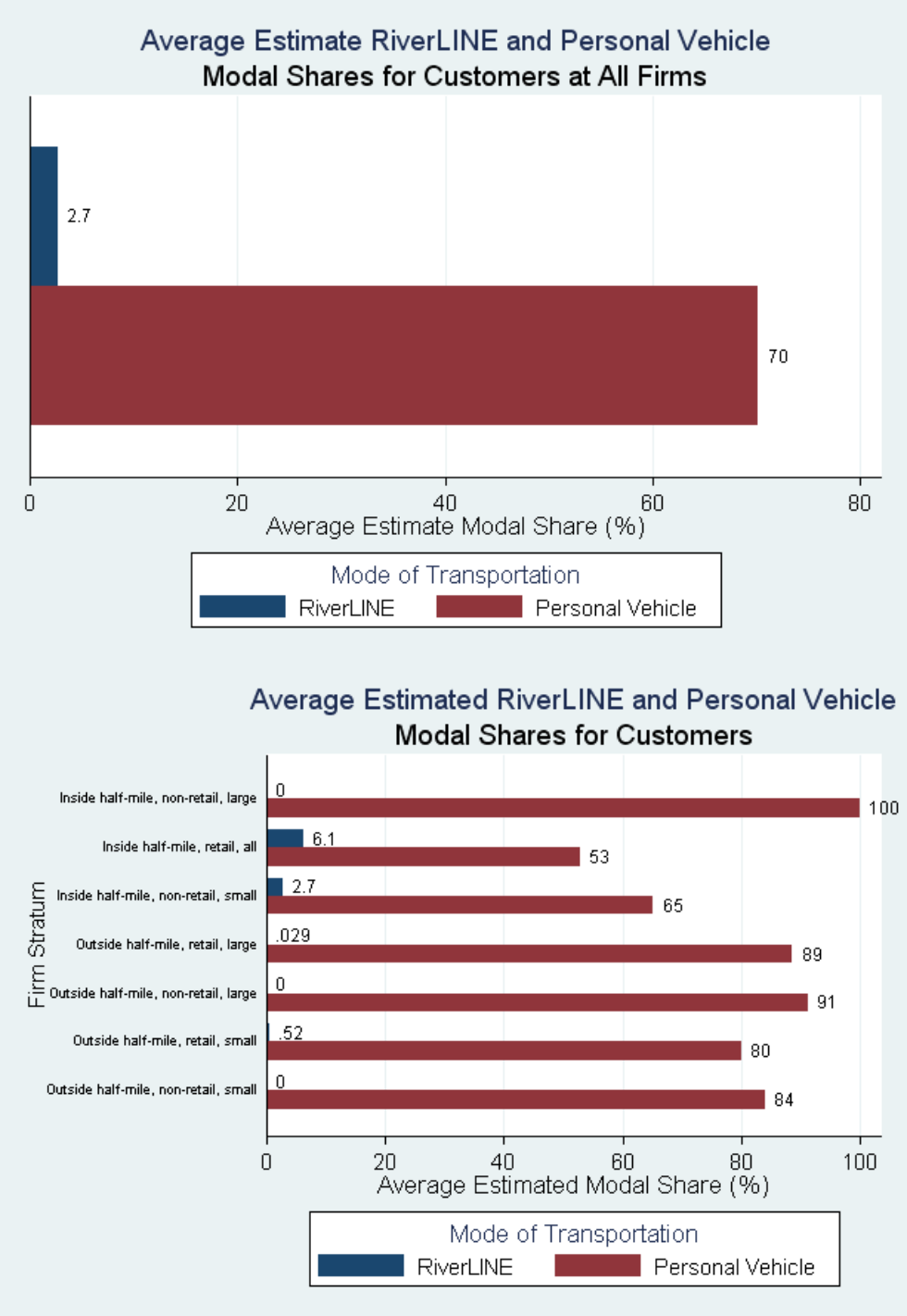

Figure 4. Average estimated RiverLINE and personal vehicle modal shares for customers

Among all firms, the mean estimated modal share for customers taking the RiverLINE is less than three percent and about 70 percent for customers arriving by personal vehicle. We investigated differences in modal share by location, firm size and whether firms were considered retail or non-retail. Retail firms located within a half-mile of a station

yielded the largest percentage of RiverLINE riders. More than six percent of customers traveling to these locations do so by RiverLINE while 53 percent traveled by personal vehicle. For small non-retail firms located within a half-mile, slightly less than three percent of customers traveled by RiverLINE and about 65 percent traveled by personal vehicle. Both small and large retail firms located beyond the half-mile reported that less than a half percent of customers traveled by RiverLINE. Large non-retail firms (regardless of location) and small non-retail firms outside the half-mile reported no customers traveling via the RiverLINE. Among these firms there was some variation in the percent of personal vehicle use as large non-retail firms within the half-mile reported that all of their customers traveled by personal vehicle.

Summary

In summary, the RiverLINE played a less important role in business location decisions than other factors, even for firms that are very near to RiverLINE stations. RiverLINE proximity was the second least-cited reason for relocating or staying in the current location. Substantially more important are highway access, availability of land, proximity to customers, proximity to workers, and a number of other reasons. Firms within a half-mile of RiverLINE stations are more than twice as likely to indicate that the RiverLINE was a “very important” or “important” factor in opening their businesses (32 versus 14 percent of firms), but similar to firms elsewhere, they are still much more likely to cite the other reasons. Only among firms within an eighth of a mile of RiverLINE stations is access to the RiverLINE a slightly higher priority, at 47 percent: less important than highway access (71 percent), proximity to customers (70 percent), availability of land (68 percent), energy costs (56 percent), or low taxes (48 percent), but higher than proximity to employees (46 percent), government incentives (41 percent), or freight access (13 percent) (Table 41).

Table 41. Summary of “very important” or “important” business factors

Number of Firms Citing Factor as "Very Important" or "Important"																				
	Near Highways		Near RiverLINE		Near Freight		Taxes		Gov't Incentives		Availability of Land		Energy Costs		Near Customers		Near Employees	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Outside 1/2 Mile	139	74.3%	22	13.8%	40	23.0%	89	53.0%	58	40.8%	119	66.9%	82	47.1%	131	68.2%	108	57.1%
Inside 1/2 Mile																		
0-1/8 Mile	27	71.1%	17	47.2%	4	12.9%	17	48.6%	10	41.7%	24	68.6%	19	55.9%	28	70.0%	17	45.9%
1/8-1/4 Mile	52	62.7%	16	21.1%	8	10.8%	38	54.3%	27	42.9%	58	66.7%	36	46.8%	71	80.7%	48	57.8%
1/4-1/2 Mile	78	60.5%	40	34.5%	24	20.0%	50	43.9%	33	34.4%	70	54.7%	45	39.1%	100	76.9%	74	58.3%
Total	296	67.7%	95	24.5%	76	19.0%	194	67.6%	128	39.4%	271	63.3%	182	45.5%	330	73.3%	247	56.7%

Firms within a half-mile of the line are also around twice as likely to have employees and customers arriving at the firm by rail, and the average commute share[2] of the RiverLINE for firms within the half-mile distance is around 20 percent, as compared to less than five percent for firms farther away.

Respondents were asked several questions that addressed whether proximity to the RiverLINE improved firm performance. One question was about self-reported firm performance since the RiverLINE opened. Firms within a half-mile of the RiverLINE were more likely than firms farther away to report that their business was performing about the same now as in 2004 (a statistically significant difference). They were less likely to say that they were doing either better or worse than in 2004, but these differences were not statistically significant.

We also asked questions about plans to expand the business. Around half of all firms surveyed indicate that they intend to make changes to their business in the coming two years, but there was no statistically significant difference between intended changes for firms inside and outside of the RiverLINE half-mile area.

[2] Mode share refers to the percentage of a population taking a particular mode.

LOCAL REGULATION

In order to better understand the development climate that existed in the river towns, as well as developer interest, an investigation was undertaken to examine planning, zoning and other land use regulations in place for parcels located within a half-mile of a station. To this end, we posited several theories as to municipal and developer action with regard to the RiverLINE. These include:

- Municipalities relaxed development constraints near rail stops so as to encourage development, either due to the hope that additional development would occur or due to pressure received from developers;
- Municipalities tightened or imposed additional development constraints near rail stops in order to head off development pressures anticipated to arrive with the opening of the RiverLINE;
- Development has occurred near rail stops not because of the RiverLINE but because zoning has been relaxed there and not elsewhere;[3]
- Municipalities relaxed development constraints but developers have not expressed an interest in building;
- Development occurred but it would have occurred without changes in zoning; or
- Municipalities have largely ignored opportunities for development near rail stops.

Municipal action in response to light rail improvements varies widely. In evidence to the first theory, that municipalities have relaxed constraints in an effort to encourage development, we see that Trenton, Beverly and Riverside have all enacted such changes. Redevelopment plans in Trenton, for example, expressly encourage intensification of housing and other land uses near RiverLINE stations. However, the presence of the Trenton Transit Center may have spurred these changes more than the RiverLINE stations themselves. Beverly, in contrast, explicitly adopted “transit development” zoning in the area near its RiverLINE station. Riverside also has made changes specifically in response to the new RiverLINE station and to developer interest.

Other municipalities have recognized that the new transit amenity offers opportunities for redevelopment but have not adjusted zoning accordingly. In Bordentown for example, the land use element of the 2004 Master Plan recommended both increasing land available for residential development and increasing residential development through infill housing. Neither of these changes has been made. Florence Township has acknowledged development pressures near its Roebling Station, but has made no changes to either accommodate or constrain development. Part of the area within a half-mile of the station allows up to 12 units per acre near the station. Burlington City’s application and designation as a Transit Village indicates municipal interest in development, but the city has made no changes to its zoning. Current zoning permits residential over commercial uses and multifamily near its station.

[3] Note that testing theory three requires knowing something about current zoning, and changes in zoning, elsewhere in the region.

Several communities have made no changes to their zoning and we found no evidence that change was likely in the near future. These communities include Edgewater Park, Palmyra (which has made no changes to its zoning since 1992) and Delanco. Delanco allows higher density development along its Delaware River waterfront, an area within a half-mile of the RiverLINE station, but has made no zoning changes to encourage development near the station. Finally, historic overlay zoning in Riverton may act as a deterrent to development in the entire area surrounding the station,

What follows is an accounting of that zoning which specifically allows residential development within a half-mile of the 20 RiverLINE stations. In some cases, these development constraints changed since the RiverLINE was announced and opened. In others, restrictions regarding development have remained unchanged.

Trenton[4]

There are three RiverLINE stations in Trenton, all in the southeastern portion of the city. Each of the stations is located less than two-thirds of a mile than the one before it. The same four zones—Business (BB), Industrial (IA), Mixed Use (MU), and Residence (RB)—are located within a one half-mile radius of all three stations. In the MU zone, single-family detached and semi-detached dwellings, two-family detached dwellings, row houses and multifamily dwellings and residential units over permitted nonresidential uses are allowed. In the RB zone, detached and semidetached single-family dwelling units and row houses are permitted uses. Detached homes in this zone must be built on lots that are at least 4,000 square feet. Semi-detached homes in the RB zone must be built on lots that are at least 2,500 square feet. Row houses must be built on lots that are at least 1,500 square feet (up to 29 units per acre). Residential development is not allowed in the BB zone or the IA zone. The only exception to this is when a single residential dwelling unit is incidental to the existing industrial use of a building in the IA zone.

In addition, to these regulations, the city has adopted more than 40 redevelopment plans, a number of which apply to land located within a half-mile of the three RiverLINE stations. In all cases, the zoning regulation designated in the respective redevelopment plans supersedes any delineated on the zoning map. Although a majority of the redevelopment plans were adopted before plans for the RiverLINE were announced, a number have been amended since the 1999 announcement.

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[4] The information in this section comes from the following sources: City of Trenton Zoning, adopted May 1989; the City of Trenton Redevelopment Areas by the Division of Planning and last revised on July 2, 2007. It can be retrieved from http://www.trentonnj.org/documents/housing-economic/redevplans-pdfs%20of%20maps%20and%20docs/redevelopment_areas_citywide_archdl.pdf. The various redevelopment area plans and maps can be found at http://www.trentonnj.org/Cit-e-Access/webpage.cfm?TID=55&TPID=6071.

Trenton Rail Station

The RiverLINE originates at the Trenton Transit Center. There are approximately 14 redevelopment areas within one-half-mile of this station. The largest are the Trenton Station Redevelopment Area (9)[5] and the Canal Banks Redevelopment Area (33). The Trenton Station Redevelopment Area plan was first adopted in February 1984 and has since been amended 10 times, most recently in July 2006. The zoning map for this redevelopment area was most recently changed in January 1995. The plan emphasizes the proximity of the redevelopment area to the Trenton Train Station, which is used by NJ TRANSIT, Amtrak, and the Southeastern Pennsylvania Transportation Authority (SEPTA), and the RiverLINE station and encourages high-density mixed-use development in the area. Most of the land in this redevelopment area is zoned Business A—Transit District (BA). Single-family detached units built on lots that are at least 4,000 square feet, semidetached units and two-family structures built on lots that are at least 2,500 square feet (17.4 units per acre), multi-family swelling structures built on lots that are at least 2,000 square feet (21.8 units per acre), and row houses built on lots that are at least 1,500 square feet are allowed in the BA zone. A portion of the Trenton Station Redevelopment Area is also zoned RB. In this area, detached and semidetached single-family dwelling units and row houses are permitted. Detached single family units must be on lots that are at least 4,000 square feet. The minimum size for a semi-detached single-family unit and row house in the RB zone is 2,500 and 1,500 square feet, respectively.

The plan for the Canal Banks Redevelopment Area was adopted in March 1994. It has been amended four times, most recently in September 2005. This plan speaks about promoting new homeownership and rental housing opportunities throughout the Canal Banks Redevelopment Area, the rehabilitation of existing housing stock on portions of West Hanover Street, North Warren Street, and in the Hanover Academy Historic District, and the development of infill housing on various sites in the redevelopment area. The plan also specifically mentions the development of a proposed mixed-use complex on East State Street.

The Canal Banks Redevelopment Area is specifically zoned Residential (R), Business A (BA), and Residential Commercial (RC). The plan states that the Mixed-Use zoning classification should be used for new and rehabilitated housing in the Canal Banks Redevelopment Area and that buildings in the RC zone can be developed entirely as residential units, entirely for a commercial use, or with commercial on the first floor and housing on upper floors. Buildings fronting East State and North Montgomery streets can be as high as 20 stories, or 280 feet. Buildings that front East Hanover Street can be no more than 6 stories high, or 70 feet.

[5] These numbers refer to areas denoted on the Trenton Redevelopment Map.

There are also parcels of land in this area that are zoned Open Space (OS), Public Facility (PF) and Canal Zone (CZ). No residential development is allowed in any of those zones.

Other redevelopment areas within one half-mile of the RiverLINE's Trenton Transit Cenetr include the Mercer-Jackson 1 Redevelopment Area (1), the Mercer-Jackson 1A Redevelopment Area (1.1), the Centre City South Redevelopment Area (2), the John Fitch Way 1 Redevelopment Area (3), the Ewing-Carroll-Southard Redevelopment Area (16), the Capital Center Redevelopment Area (21), the Central East Redevelopment Area (24), the Roebling Gateway Redevelopment Area (34), the Coalport Redevelopment Area (36), the East State Street Redevelopment Area (37), the County Courthouse Redevelopment Area (40), and the Lower Assunpink Redevelopment Area (41). Some of these redevelopment areas allow residential development; others do not.

In terms of encouraging residential development around the RiverLINE station, the Roebling Gateway Redevelopment Area (34) and the Lower Assunpink Redevelopment Areas (41) offer perhaps the best examples of that. The Roebling Gateway Redevelopment Area was adopted in July 1997 and amended in September 2006. The area is zoned BB and RB. The plan strives to create "a formal vehicular and pedestrian link between the downtown business district, the Trenton Transit Center and Routes 1 and 129 to the retail, educational & cultural center of the Roebling Redevelopment Area." The plan encourages the development of new housing, both through new construction and rehabilitation. The Lower Assunpink Redevelopment Area was adopted in May 2005. The entire area is zoned for mixed use. The plan specifically encourages a mix of residential, office, entertainment uses, and new open spaces, as well alternative modes of transportation.

Hamilton Avenue Station

Trenton's Hamilton Avenue Station is about one quarter-mile from the Trenton Transit Center. There are 13 redevelopment areas within one half a-mile of the Hamilton Avenue station, only a handful of which are not also within one half a-mile of the Trenton Transit Center. The two redevelopment areas that are the closest to the Hamilton Avenue Station are the Roebling Gateway Redevelopment Area (34), discussed above, and the Roebling Complex Redevelopment Area Plan (23), which is zoned for mixed-use development. Although the Roebling Complex Redevelopment Plan has been amended twice since it was adopted in March 1991, the most recent amendments were made in November 1997, before plans for the RiverLINE were announced.

Other redevelopment areas within one half-mile of the Hamilton Avenue Station are the Mercer-Jackson 1 Redevelopment Area (1), the Mercer-Jackson 1A Redevelopment Area (1.1), the Centre City South Redevelopment Area (2), the John Fitch Way 3 Redevelopment Area (4), the Trenton Station Redevelopment Area (9), the Central East

Redevelopment Area (24), the Lamberton Street Redevelopment Area (32), and the County Courthouse Redevelopment Area (40).

Cass Street Station

The Cass Street Station is the third and final RiverLINE station stop in Trenton. It is about two-thirds of a mile from the Hamilton Avenue Station and less than one mile from the Trenton Transit Center. There are seven redevelopment areas within a half-mile of the Cass Street Station. This includes the Cass Street Redevelopment Area (5), which is closest to the RiverLINE station. The Cass Street Redevelopment Area Plan was adopted in January 1992 and was amended in February 2002. The entire area in this redevelopment area is zoned BB. Residential development is not allowed in the BB zone.

Also within one half-mile of the Cass Street Station is the Roebling Complex Redevelopment Area (23), the Lamberton Street Redevelopment Area (32), the Grand Street Redevelopment Area (14), the South Trenton Redevelopment Area (17), the American Bridge Redevelopment Area (18), and the Mott School Redevelopment Area (22), which includes only a single property. With the exception of the Lamberton Street Redevelopment Area, which was adopted in April 2006, all of the redevelopment areas within a half-mile of the Cass Street station were adopted before plans for the RiverLINE were announced in 1999. In addition, although residential development is allowed in some of the redevelopment areas, its use is not as ubiquitous as the redevelopment areas closest to Trenton's other two RiverLINE stations.

Bordentown[6]

The Bordentown zoning map indicates that the densest development allowed is near the center of the city, close to where the RiverLINE station is located. With the exception of land zoned Highway Commercial (HC)—which is along Routes 130 and 206, closest to the city's border with the Township of Bordentown, and does not allow for residential development—all of Bordentown's zoning districts are within a half-mile of the RiverLINE station. There are three residential zones in the City of Bordentown. They are Residential: Low Density (R1), Residential: Medium Density (R2), and Residential: Medium/High Density (R3). As its name implies, R1 is the most restrictive residential zone, with single-family detached residential units the only permitted use. Homes in this zone must be built on lots that are at least 12,000 square feet (3.6 units per acre). Generally, property designated R1 framed the outer ring of Bordentown and borders the city's waterways, including Crosswicks Creek, Black Creek, and Love Bridge Run. Single-family detached homes are the only permitted use in the R2 zone, as well. Here,

[6] Information in this section comes from two sources. The first is the Zoning Map for the City of Bordentown. The zoning map was adopted in 1983 by ordinance 1983-12. The second source is the Master Plan Land Use Plan Element for the City of Bordentown. This plan was prepared by the City of Bordentown Planning Board and Burlington County Department of Economic Development and Regional Planning and was adopted on Aug. 4, 2004.

homes must be built on lots that are at least 7,500 square feet (5.8 units per acre). The densest residential development is allowed in the R3 zone. Single-family detached dwellings on lots that are at least 5,000 square feet (8.7 units per acre) are allowed in the R3 zone, as are single-family semi-detached dwellings of no more than two units on lots that are at least 6,000 square feet (14.5 units per acre), and single-family attached dwellings of no more than six units on lots that are at least 3,000 square feet (also 14.5 units per acre).

The land use element of the city's most recent master plan, which was adopted on August 4, 2004, proposes increasing the amount of residential development in the city by 40 acres, the amount of commercial development by 13.6 acres, the amount of industrial development in the city by 118 acres, and the amount of open space/parks by 7.8 acres. It recommends this be accomplished through the conversion of 133.4 vacant acres in the city. The plan specifically recommends that the increase in residential development be accomplished through the construction of infill housing on residential blocks. The plan also states that the existing boundaries for the R3 zone should be reduced to more accurately reflect existing housing types, lot sizes, and future intended uses.

Although mixed-use is not a zoning designation in Bordentown, mixed-use residential and commercial areas exist throughout the city, with the highest concentration of mixed-use development in the downtown historic local commercial area. In many buildings in this area, the ground floor is used for a commercial use and apartments are located on the upper floors. In other cases, entire buildings are either used for commercial uses or for residential apartments. The master plan recommended that apartments over a first floor commercial establishment be a permitted use downtown. The number of bedrooms in each unit should dictate the minimum gross area requirements for the units.

The land use element of the master plan also recommended changing the area along the bottom of the bluffs beginning near the Bordentown City boat launch and extending to the area where the railroad trestle spans Crosswicks Creek from R1 to Waterfront Commercial (WC). This area is relatively close to the Bordentown Station. Residential units are not a primary permitted use in the WC zone. It does not appear that this change was made, however. The master plan specifically recommended that accessory apartments over first-floor commercial establishments be allowed in the WC zone as a conditional use. The plan also recommended that apartments over first-floor commercial uses be a permitted principal use in the Office Commercial (OC) zone, near the center of the city. Other recommendations included in the 2004 master plan that do not appear to have been enacted were the adoption of three conservation restricted districts, which would have acted as overlay districts near the city's environmentally sensitive areas, and a historic preservation district in the existing Local Commercial (LC) zone.

The city has only one primary industry, Ocean Spray Cranberry, which occupies nearly 50 acres in its Commercial/Industrial zone (C/I) as is within a half-mile of the city's RiverLINE station.

Florence Township

There are two RiverLINE stations in Florence Township, located at opposite ends of the township. The northern station is in known as the Roebling Station; the southern station as the Florence Station.

In 1999, the Township Planning Board said its goal was to “restore the imbalance in land uses” that resulted from housing development outstripping commercial development by “promoting commercial development in the Township.” With the exception of “very low density residential development,” the land use plan element of the Florence Township Master Plan, which was amended in September 1999, also said that further residential development should be limited to the portion of the township north of the New Jersey Turnpike extension (located about 1.5 miles south of the Roebling Station and a half-mile north of the Florence Station). The 1999 land use plan element also said that the highest density housing should be reserved for the area of the township closest to the Delaware River. Amendments to the master plan that were made in April 1999 recommended the addition of a Medium to High Density Residential Zone (RB) to the township’s land use ordinance. The plan said the RB zone should allow developers to provide 20 percent of their development as affordable housing in exchange for an increased density of six units per acre.

The re-examination reports of Florence Township dated June 19, 2000 and February 24, 2003 both mention an “increasing pressure to develop land zoned for residential uses.” The reports specifically mention interest in a new subdivision development for single-family homes and in developing age-restricted housing. The report completed in 2000 also speaks about the Planning Board’s desire to preserve the township’s existing open space.

Roebling Station

There are nine different zoning districts within a half-mile of the Roebling Station, many of which allow some residential development. This includes the Low-Density Residential zone (R), which is the most restrictive residential zone in the township. Single-family residential detached dwellings are the only permitted residential use in the R zone. In September 2001, the Township Council agreed to make senior housing a conditional use in the R zone, so long as no more than 500 senior units were built in the township. Non-cluster single-family residential detached dwellings with public sewer and water must be built on lots that are at least 20,000 square feet and no more than two homes are permitted per acre. In addition, the building can cover no more than 20 percent of the lot in this zone. Non-clustered single-family residential detached dwellings with on-site septic and well must be built on lots that are at least one acre. Clustered, single-family residential detached dwellings with public sewer and water, which were approved before May 25, 1999, must be built on lots that are at least 10,000 square feet.

Single-family residential detached dwellings are also the only permitted use in the township’s second Low-Density Residential zone (RA). Like in the R zone, single-family,

detached homes are the only permitted residential use in the RA zone. Here, homes with public water and sewer must be built on lots that are at least 10,000 square feet. Those with on-site septic must be built on lots that are at least one acre. In this zone, up to four units are allowed per acre.

Single-family residential detached dwellings, single-family residential attached dwellings (atrium or patio and townhouses and duplexes), and multifamily residential units are allowed in the Medium-to-High-Density Residential District (RB). All residential units in the RB zone are required to have public water and sewer. The township's zoning ordinance stipulates that no more than six homes can be built per acre in the RB zone and that at least 20 percent of all homes built here must be set aside for low- and moderate-income housing. It also requires that 35 percent of those low- and moderate-income units have two bedrooms, that 15 percent of the units have three bedrooms, and that no more than 20 percent of the units be efficiencies. The ordinance also states that efficiency units must be at least 500 square feet, one-bedroom units must be at least 600 square feet, two-bedroom units must be at least 750 square feet, three-bedroom units must be at least 950 square feet, and four-bedroom units must be at least 1,150 square feet. Single-family detached homes in the RB zone must be built on lots that are at least 6,000 square feet. The ordinance also prohibits more than eight townhouses or 16 multifamily units from being built in a single structure. One-bedroom townhouses must be at least 1,500 square feet and two-bedroom townhouses must be at least 1,700 square feet. Three- and 4-bedroom townhouses must be at least 1,900 and 2,000 square feet, respectively. One-bedroom multifamily units must be at least 1,000 square feet, while two- and three-bedroom units must be at least 1,200 square feet each.

In addition to the single-family residential detached dwellings, single-family residential attached dwellings (atrium or patio and townhouses and duplexes), and multifamily residential units allowed in the RB zone, groups of apartments and townhouses are also allowed in the High Density Residential District (RC) zone. No more than 12 units are allowed per acre here.

There are also two small areas zoned High Density Residential Municipal Affordable Housing zone (RD) within a half-mile of the Roebling Station. The only permitted residential use in the RD zone is multifamily affordable homes with public water and sewer. Homes in this zone must have no more than 20.3 units per acre. In addition, township ordinance requires that at least 20 percent of the land in each tract be set aside for open space.

In the Agriculture zone (A), single-family, detached homes are the only permitted residential use. Here, the maximum gross density is one home per three acres.

Single-family detached homes built on lots that are at least 20,000 square feet are allowed in the Neighborhood Commercial (NC) zone. In addition, housing units that share a building with a commercial use, so long as the residential area is at least 850 square feet, are allowed in the NC zone.

Florence Station

The second RiverLINE station in Florence Township is located near Route 130, in the Haines Industrial Center. Only two zones allow residential development within a half-mile of this station. They are the Low-Density Residential zone (RA) and the Agriculture zone (A). In both zones, single-family, detached homes are the only permitted residential use. In the RA zone, homes with public water and sewer must be built on lots that are at least 10,000 square feet. Those with on-site septic must be built on lots that are at least one acre. In the A zone, the maximum gross density is one home per three acres.

Burlington City

There are two RiverLINE stations in the City of Burlington. The first, known as the Burlington Town Centre Station, is at the intersection of Broad and High streets, at the commercial heart of the city. The second station is also on Broad Street, approximately nine-tenths of a mile south of the Burlington Town Centre Station. That station is known as the Burlington South Station. It is at the intersection of Broad Street and Kiem Boulevard.

Burlington Town Centre Station

The Burlington Town Centre RiverLINE station is in the center of the township's Urban Commercial District (C-1). Although not allowed on the first floor, residential units, with the exception of rooming and boarding houses, are permitted on upper floors in C-1 zone.

The township's two other commercial zones, the Limited Highway Commercial District (C-2) and the Highway Commercial District (C-3), are also within a half-mile of the Burlington Town Centre Station. There is no permitted residential use in the C-2 zone. In the C-3 zone, multifamily attached dwelling are a permitted use. These units must be at least 2,500 square feet and must be built on lots that are at least five acres.

Although slightly farther from the Burlington Town Centre Station, there are two residential zones located within a half-mile. They are Residential District (R-1), the most restrictive residential zone in the township, and Residential District (R-3), the least restrictive residential zone in the township. The R-1 zone only allows single-family detached homes that are built on lots that are at least 9,000 square feet. The following are allowed in the R-3 district: single-family detached homes on lots that are at least 5,000 square feet; single-family semi-detached homes on lots that are at least 3,500 square feet; interior, single-family attached homes on lots that are at least 2,000 square feet; end units, single-family attached homes on lots that are at least 2,700 square feet; and two-family detached homes on lots that are at least 7,000 square feet.

Directly east of the station is a large area zoned Waterfront District (W-1). Only a portion of this area is within a half-mile of the Burlington Town Centre Station. Here, attached, semi-detached and multifamily housing units on lots that are at least 15,000 square feet are permitted, as are residential units above first-floor businesses. Rooming and boarding houses are not allowed in the W-1 zone.

Also located within a half-mile of the Burlington Town Centre Station, the Light Industrial District (I-1) or in the Open Space District (OS-1) do not permit residential uses.

Burlington South Station

The Burlington South Station is about nine-tenths of a mile south of the Burlington Town Centre Station. Whereas the Burlington Town Centre Station is surrounded by land zoned for commercial development, the Burlington South Station is located in an area dominated by industrial uses. The station is on the border of land zoned Industrial Park District (IP) and land zoned Open Space (OS-1). Residential development is not permitted in either of these zones. There is also an I-1 zone within a half-mile of the Burlington South Station. Residential development is also not permitted here.

All three of the township's residential zones are located within a half-mile of the Burlington South Station. The Residential District (R-3) is the closest to this station and also the least restrictive. As mentioned above, the following are allowed in the R-3 zone: single-family detached homes on lots that are at least 5,000 square feet; single-family semi-detached homes on lots that are at least 3,500 square feet; interior, single-family attached homes on lots that are at least 2,000 square feet; end units, single-family attached homes on lots that are at least 2,700 square feet; and two-family detached homes on lots that are at least 7,000 square feet.

Single-family detached homes are the only permitted use in the R-1 and R-2 zones. In the R-1 zone, homes must be built on lots that are at least 9,000 square feet. In the R-2 zone, they must be built on lots that are at least 7,000 square feet.

Beverly City

Located in Beverly, the Beverly/Edgewater Park Station is situated close to the border of Edgewater Park Township, and both municipalities are affected by the RiverLINE station. Beverly/Edgewater Park Station is located on Railroad Avenue, at the intersection of Cooper Street, at Beverly-Edgewater Park border. Zoning for the area immediately surrounding the station is Transit Development District (T-I). The T-1 designation is new in Beverly and stretches along the existing rail lines, which is also the city's southern border. The zone was established to allow mixed-use, higher residential density and ground floor retail uses. The zone specifically allows townhouses. However, unlike the Waterfront Development District (C-3) where there are identical regulations regarding residential development, only one parking space per unit is required in the T-1 zone. In addition, mixed-use development, with commercial on the

ground floor and condominiums above, is allowed in the T-1 zone, as decided by the Planning Board. Before the adoption of the Redevelopment Plan in the fall of 2007, the area now designated as T-1 was zoned General Industrial (I) in the western half of the city and mostly Single Family Residential (R-2) and Residential (R-3) in the eastern half of the city. There was also a small area on the east side, not far from the Beverly/Edgewater Park Station, that was zoned Neighborhood Commercial (C-1).

All three of the city's residential zones, Single-Family Residential (R-1 and R-2) and Residential (R-3) are also within a half-mile of the Beverly/Edgewater Park Station. Single-family detached dwellings are the only permitted residential use in the R-1 and R-2 zones. In the R-1 zone, homes must be built on lots that are at least 15,000 square feet (about 3 units per acre). In the R-2 zone, they must be built on lots that are at least 6,000 square feet (7.26 units per acre). In addition to single-family detached dwellings on lots that are at least 4,000 square feet (nearly 11 units per acre), single-family attached dwellings on lots that are at least 2,000 square feet, two-family detached dwellings on lots that are at least 5,000 square feet, and row houses with no more than four units attached are permitted uses. Interior row houses must be built on lots that are at least 2,000 square feet. End units must be built on lots that are at least 2,500 square feet.

Two of the city's commercial zones, the Neighborhood Commercial zone (C-1) and Downtown Commercial zone (C-2) are within a half-mile of the Beverly/Edgewater Park Station. In the C-1 zone, single-family attached and detached units on lots that are at least 2,000 and 4,000 square feet respectively are permitted, as are two-family detached units on lots that are a minimum of 5,000 square feet. Apartments over first-floor commercial uses are allowed in the C-1 zone as a conditional use. There are no permitted primary residential uses in the C-2 zone. Apartments over first-floor commercial uses are allowed in the C-2 zone as a conditional use.

Edgewater Park Township[7]

The Beverly/Edgewater Park Station, located in Beverly, is situated close to the border of Edgewater Park Township. There are several residential zones within a half-mile of the Beverly/Edgewater Park Station, located in neighboring community of Beverly. Although there are several zones within a half-mile of the station, most of the zones permit Single Family Residential, with differing minimum lot sizes and percentages of allowable land coverage. The area closest to the station is zoned R-5. Homes built in this area must be built on lots that are at least 12,500 square feet (3.5 units per acre) and can cover no more than 40 percent of the lot. Homes in the R-5 zone must be at least 1,000 square feet. The R-2 zone is the most restrictive residential zone within a half-mile of the Beverly/Edgewater Park Station. Homes in the R-2 zone must be built

[7] The information in this section comes from the following sources: the Zoning Map of the Township of Edgewater Park, http://edgewaterpark-nj.com/zoning_map_04.07.pdf (revised April 2007); and the Township of Edgewater Park Ordinance 17-2006, http://edgewaterpark-nj.com/ordianance__17_2006_zoning_ordinance.pdf (adopted by the Township Committee Nov. 9, 2006).

on lots that are at least 40,000 square feet (about 1 unit per acre) and can cover no more than 20 percent of the lot. Homes in the R-4 zone must be built on lots that are at least 7,500 square feet (5.8 units per acre) and can cover no more than 50 percent of the lot. In addition, assisted living facilities are considered conditional uses in the R-2 and R-4 zones.

Residential development is not permitted in the zone closest to the RiverLINE station, which is zoned Light Industrial (LI) or in the General Industrial (I) or in the Cemetery zone (C), where the Beverly National Cemetery is located.

Delanco Township

Due to the municipality's small size and its centrally located RiverLINE station, most of Delanco Township lies within a half-mile of the station. A total of 14 different zoning areas govern land development near the station. All but two zones—the Light Industrial zone (I-1) and the General Industrial zone (I-2)—allow some form of residential development. With the exception of the R-6 zone, which is the least restrictive residential zone in the township, single-family detached homes are the only permitted residential use in these areas. In the R-6 zone, single-family detached dwellings on lots that are at least 5,000 square feet are allowed (8.7 units per acre), as are attached single-family dwellings, as known as duplexes. Duplexes must be built on lots that are at least 8,500 square feet (10.25 units per acre). Apartments above first floor commercial are a conditional use in the R-6 zone. The township's zoning ordinance requires that these apartments be "affordable" and "have affordability controls."

In the other four residential zones (R-1, R-1-30, R-3, and R-4) that are within a half-mile of the RiverLINE station, residential development is constrained by requirements regulating minimum lot sizes. Homes built in the R-1 zone must be built on lots that are at least one acre. Homes in the R-1-30 zone must be built on lots that are at least 30,000 square feet (1.45 units per acre). Those in the R-3 and R-4 zones must be built on lots that are at least 10,000 (4.36 units per acre) and 7,500 square feet (5.8 units per acre), respectively.

Residential development is also a permitted use in the Low Density Residential/Open Space (LDR/OS-3 and LDR/OS-5) zones found nearly a half-mile west and south of the station. Single-family homes in the LDR/OS-3 zone have a minimum density of no more than one home per three acres. Homes in this zone must be clustered so that at least 30 percent of the parcel is developed as permanent open space. The minimum density for single-family homes built in the LDR/OS-5 zone must be no more than one home per five acres. Homes here must be clustered so that at least 50 percent of the parcel is developed as permanent open space.

Residential development is allowed in both commercial zones that are within a half-mile of the Delanco Station. In both the Neighborhood Commercial zone (C-1) and the Downtown Commercial zone (C-2), single-family detached dwellings are permitted, as

are apartments over commercial uses, so long as the apartments are “affordable.” In the C-1 zone, homes must be built on lots that are at least 10,000 square feet. In the C-2 zone, the lots must be at least 7,500 square feet.

Several types of single-family detached homes are permitted in the Waterfront Development/Affordable Housing zone (WFD-AH). A small portion of that zone is within a half-mile of the Delanco RiverLINE station. Here, single-family detached units built on lots that are at least 8,000 square feet; single-family detached homes that have a zero lot line and that are built on lots that are at least 6,000 square feet; single-family patio homes built on lots that are at least 4,000 square feet; and single-family atrium homes built on lots that are at least 2,150 square feet are allowed. As many as 320 more dense residential units are also allowed in the WFD-AH zone. These include duplexes built on lots that are at least 8,500 square feet, four-plexes built on lots that are at least 4,500 square feet, townhouses built on lots that are at least 2,200 square feet, multiplexes built on lots that are at least 2,500 square feet, garden flats and low-rise, multifamily structures. The ordinance also states there can be no more than six multiplexes per structure, 16 garden flats per building and no more than three buildings of garden flats, 60 low-rise multifamily structures per building and no more than three buildings of low-rise multifamily units, and no more than a total of 120 of these units. In addition, one-bedroom units in the WFD-AH zone must be at least 480 square feet; two-bedroom units must be at least 660 square feet, three-bedroom units must be at least 800 square feet, and four-bedroom units must be at least 850 square feet. In May 2005, the Township Committee amended the township’s zoning ordinance to make townhouses a conditional use in this zone. According to the ordinance, townhouses that share a common lot or before being divided into lots for individual units must be built on lots that are at least 20,000 square feet. The ordinance also states that no more than eight townhouses should be allowed per building.

The final zones within a half-mile of the Delanco Station are the Planned Residential Development/Affordable Housing District (PRD/AH) and the Planned Residential Development/Village District (PRD/V).

In the PRD/AH zone, no more than 250 age-restricted single-family market rate homes that are either single-family detached homes or twins (two homes per structure) are permitted. Detached single-family age-restricted homes must be built on lots that are at least 5,000 square feet. Twins must be built on lots that are at least 4,000 square feet. No more than three people, one of which must meet the minimum federal age restriction for “housing for older persons” and none of which can be under 18, may live in the single-family homes. In addition, in September 2003, the Township Committee amended the zoning ordinance to allow service-based seniors housing buildings that provide multifamily living arrangements with a full living unit, including a separate cooking area and bathroom, in this zone. The 2003 amendment also made age-restricted single-family attached communities a permitted use in the PRD/AH zone, so long as there are no more than three residents per unit and the residents meet the age requirements mentioned above.

Single-family detached units are the only permitted residential use in the PRD/V zone. Here, the base gross density for residential development is 2.75 residential units per acre. There is, however, an opportunity for developers to build more densely in this zone. By meeting certain aesthetic requirements and/or increasing the amount on open space from 30 to 40 percent of the total tract area, developers in the PRD/V zone can increase the maximum number of units allowed be acre to 4 units per acre.

Like they are in the WFD-AH zone, townhouses are a conditional use in the PRD/AH and PRD/V zones. The amendment, which was passed in May 2005, stipulates that townhouses that share a common lot or before being divided into lots for individual units must be built on lots that are at least 20,000 square feet and that no more than eight townhouses are permitted per building.

Riverside Station[8]

Most of Riverside Township lies within a half-mile of the RiverLINE station, which is located at the intersection of Franklin Street and Pavilion Avenue. All of the township's zones are within a half-mile of the station.

Riverside has two commercial zones. The area south of the station is zoned Downtown Commercial (C-2). Although there are no primary residential uses in the C-2 zone, apartments over first-floor commercial uses and offices are conditional uses. The other commercial zone is Neighborhood Commercial (C-1). The township's only C-1 zone is east of the RiverLINE station. Single-family attached units built on lots that are at least 5,000 square feet (8.7 units per acre), single-family detached units built on lots that are at least 6,000 square feet (7.3 units per acre), and two-family detached units built on lots that are at least 10,000 square feet are permitted uses in the C-1 zone. Apartments over first-floor businesses and offices are a conditional use here.

The township has three residential zones, including two Single-Family Residential zones (R-1 and R-2) and a Single-Family Residential and Two-Family Residential zones (R-3). Other than the minimum lot requirement, the R-1 and R-2 zones are identical; both allow single-family detached units. R-1 is more restrictive with the zoning ordinance requiring that homes be built on lots that are at least 9,000 square feet (4.8 units per acre); those built in the R-2 zone must be built on lots that are at least 6,000 square feet (7.3 units per acre). The R-3 zone, the residential zone closest to the station, is the least restrictive residential zone in Riverside. Here, single-family detached and attached dwellings and two-family detached dwellings are permitted. Detached units must be built on lots that are at least 6,000 square feet (7.3 units per acre), while attached units must be built on lots that are at least 5,000 square feet (8.7 units per

[8] Information for this section came from three sources. The first is the Township of Riverside's Zoning Map, which was prepared by Burlington County on April 20, 1999. The second is the Land Development Ordinance of the Township of Riverside. It was adopted on February 23, 2005. The third source is the Township of Riverside Redevelopment Plan. This plan was adopted by the Township Committee of the Township of Riverside in August 2000. None of these sources are available online.

acre). Two-family units must be built on lots that are at least 10,000 square feet (8.7 units per acre).

North of the RiverLINE station is an area zoned Special Development (SD). Here, single-family attached and detached dwellings, two-family detached dwellings, and townhouses are permitted uses. In the entire SD zone, single-family and two-family detached dwellings must be built on lots that are at least 6,000 square feet and attached units must be built on lots that are at least 5,000 square feet. Townhouses built in this zone must be built on a lot that is at least 20,000 square feet. No more than eight units are allowed to be built in a single building (17.4 units per acre).

The SD zone is divided into three areas, each with different regulations regarding conditional uses for residential development. The largest and most significant area is the 32-acre property known as the Golden Triangle, notable for the Keystone Watchcase Building. The Golden Triangle property is bounded by Pavilion Avenue, the light rail right-of-way, and the Rancocas Creek. Also in this area, apartments and flats are conditional uses. The township's zoning ordinance stipulates that no more than 150 apartments and flats can be created from the conversion of the Keystone Watch Case building. It also states that no more than 25 percent of the apartments and flats created in this area be non age-restricted and that 20 percent of the age-restricted units be set aside for affordable housing.

The construction of as many as 200 age-restricted assisted living bedrooms is also a conditional use on the Golden Triangle property. Twenty percent of these units must also be set aside for affordable housing, according to the ordinance. Another conditional use allowed in this area is apartments over first floor commercial establishments, offices, and facilities. An additional conditional use in the SD zone is apartments over first floor commercial establishments on land located northwest of Pavilion Avenue, from the intersection of Lafayette Street to the Rancocas Creek. The third and final section of the SD zone is southeast of the light rail right-of-way, from Pavilion Avenue to the vicinity of Harrison Street. Here, age-restricted assisted living residences are a conditional use in the building known as the former Zurbrugg Memorial Hospital. The ordinance states that no more than 200 of these bedrooms can be created and that at least 20 percent of the bedrooms must be set aside for affordable housing.

The second section of the SD zone also fronts the Rancocas Creek. It is defined as the lands northwest of Pavilion Avenue, from the intersection of Lafayette Street to the creek. In this area, single-family detached and attached dwellings and two-family detached dwellings, and townhouses are allowed. The same residential uses are allowed in the area of the SD zone that is southeast of the railroad station, from Pavilion Avenue to the vicinity of Harrison Street.

Other than the roughly half square mile area along the Rancocas Creek that is zoned for SD, the remainder of the township's waterfront is zoned Flood Hazard/Conservation (FH-C). Single-family detached homes are allowed in this zone. This district is the most

restrictive in terms of development and requires that homes be built on lots that are at least an acre.

The township's most recent redevelopment plan, adopted by the Township in August 2000, speaks about the renaming of the area delineated by the Rancocas Creek, the light rail right-of-way, and Pavilion Avenue as the Golden Triangle as a result of the township's "vision of rebirth for this deteriorated former industrialized area." It specifically states that "the redevelopment capitalized on the new light rail station stop built next to the Golden Triangle." The redevelopment area is about 60 acres, or about 60 percent of the township's land area.

Cinnaminson Station[9]

The Cinnaminson Station is situated between Bannard and Broad Streets at Harbor Boulevard and Industry Highway and near the township's border with Riverton. There are two distinctly residential zones within a half-mile of the station—the Residential (R-4) zone and the Residents District Cluster (R2CL) zone. In the R-4 zone, single-family detached dwellings built on lots that are at least 5,000 square feet are the only permitted use (8.7 units per acre). The zoning ordinance permits no more than 35 percent of the lot be covered by buildings. Residential development is also permitted in the R2CL zone. Specifically, detached single-family residential units built on lots of at least 8,000 square feet (5.4 units per acre) and single-family duplexes built on lots that are at least 4,000 square feet per unit are permitted (10.9 units per acre). Multifamily housing is also considered a conditional use in the R2CL zone. Township ordinance specifically states that multifamily duplexes built on lots that are at least 3,000 square feet per unit, multifamily townhouses and multiplexes must be built on lots that are at least 2,200 square feet per unit, and garden apartments are conditional uses here. No more than eight townhouses, five multiplexes in a group, or 16 garden apartments in a single structure should be allowed. One-bedroom garden apartments must be an average of 655 square feet. Two- and three-bedroom apartments must be an average of 950 and 1,125 square feet, respectively.

Several small parcels within a half-mile of the light rail station are zoned Light Industrial (LI). Single-family detached dwellings and apartments in connection to a business use are permitted uses in this zone. There are also several Industrial (IND) zones on the periphery of the half-mile radius of the Cinnaminson Station. In the IND zone, single-family detached homes are permitted uses, as are assisted living as well as rest and convalescent homes. An area of property near the township's border with the Delaware River is zoned Marine Commercial (MC). There are no permitted residential uses in this zone.

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[9] The information in this section comes from the following sources: the Zone Map of the Township of Cinnaminson and from chapter 525 of the township's general code. The general code can be found at http://www.e-codes.generalcode.com/codebook_frameset.asp?ep=fs&t=ws&cb=0302_A.

Riverton Station[10]

Due to its small size, most of Riverton Borough is located within a half-mile of the RiverLINE station. The station is situated on Main Street, near the intersection of Broad Street, at the borough's center. Zoning for the area immediately surrounding the station stop is Neighborhood Business (NB). The NB zone can also be found along Broad Street. Upper-level apartments and affordable accessory apartments are conditional uses in the NB zone. Accessory apartments were added as a conditional use here in December 2000.

Moving outward from the RiverLINE station are the borough's residential districts. In all three of these districts, single-family detached dwellings are the only permitted residential use. The most restrictive of these districts (R-15) requires homes be built on lots that are at least 15,000 square feet (2.9 units per acre). Although within a half-mile of the station, the R-15 zones are toward the outskirts of the borough. The borough also has an R-8 zone, requiring homes be built on lots a minimum of 8,000 square feet (5.4 units per acre) and an R-4 zone requiring homes be built on lots a minimum of 4,000 square feet (10.9 units per acre). The borough has zoned much of the area along the Delaware River for residential development. Most of this area is governed by a historical overlay designation.

The only residential district where other than single-family detached dwellings is permitted is in the Affordable Housing Zone (AH), found on a small parcel in the northeast section of the town, near the Cinnaminson border. Both detached, single-family housing units and attached, side-by-side twin residential housing units are permitted in this location. The borough also has an Affordable Housing Overlay Zone, which has been applied to the southwest-most portion of the borough, along the borough's border with Cinnaminson. (This area's primary zoning designation is Park Zone.) Only single-family detached units are allowed in this overlay zone. Twenty percent of the homes built in this area must be made available to low- and moderate-income households, as defined by the state. Homes built in this zone must be built on lots that are at least 6,000 square feet (7.3 units per acre). Both the AH district and the Affordable Housing Overlay Zone were added in December 2000.

In addition to the traditional zoning ordinance, much of the borough is covered by a historic overlay designation. This area comprises the entire NB district and properties surrounding the RiverLINE station, as well as much of the property designated for residential development, including much of the borough's waterfront property. All buildings built before 1941 are also included in the historic district. Building permits for

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[10] The information in this section comes from two sources. The first is the zoning map of Riverton Borough. The map was most recently revised on Nov. 9, 2000. It can be found at http://www.riverton-nj.com/pdfs/miscellaneous/zoning-map.pdf. The other source is the Chapter 128 of Riverton's general code. The entire code was adopted by the Mayor and Borough Council on Dec. 9, 1999 by Ordinance 9-99. The code was last updated on Jan. 15, 2007. Chapter 128 can be found at http://www.e-codes.generalcode.com/codebook_frameset.asp?ep=fs&t=ws&cb=0487_A.

new construction or changes to properties in the historic district must be reviewed by the borough's zoning officer, making development here more difficult. The borough's code specifically discourages the demolition of historically or architecturally significant buildings in the borough.

Finally, the borough has a Parks/Golf Course district (P). In addition to the P district where the previously mentioned affordable housing overlay zone is located, there are nine small P zones along the Delaware River and one large P district along the borough's eastern border with Cinnaminson Township. The following uses are permitted in the park district: nature and hiking trails, bicycling, wildlife observation and sitting areas, nature interpretation kiosks, educational museums, and environmental studies center. In December 2000, the general zoning code was amended to allow an affordable housing overlay to be a conditional use in the Parks/Golf Course district (P), which can be found on the outskirts of the borough, though still within a half-mile of the Riverton Station.

Palmyra Station[11]

The Palmyra Station is located at the intersection of Cinnaminson and East Broad streets. A significant portion of the land within a half-mile of the station is zoned Residential (R-1). The borough's zoning ordinance allows single-family homes at a density of approximately 5.8 units per acre to be built in this zone. The ordinance specifically allows single-family detached and attached dwellings in the R-1 zone. Lot size in this zone must be a minimum of 7,500 square feet. Homes must be at least 1,200 square feet and are permitted to cover no more than 35 percent of the lot.

Also within a half-mile of the Palmyra Station are the Town Center Commercial (TC) and Neighborhood Commercial (NC) zones. In both the TC and the NC zones, apartments built above a permitted use, such as a retail store, restaurant, or professional office, are the only residential development that is allowed. Single-family homes built on lots that are at least 5,000 square feet are also allowed in the NC zone. Buildings here can cover no more than half of the lot.

There is also a small piece of property south of the station that is zoned Office Commercial (OC) and several areas that are zoned Public and Institutional District (P). Residential development is not a permitted use in either the OC or the P zones.

A land use map included in the borough's 1992 master plan shows that zoning within the half-mile radius of the RiverLINE station has not changed since that time. In

[11] The information in this section comes from the following sources: the Zoning Map of the Borough of Palmyra last revised on Sept. 17, 2003; the Borough of Palmyra Land Development Ordinance (adopted on Aug. 11, 2003); the Borough of Palmyra Master Plan (dated May 1992); and the Re-examination of the Master Plan of the Borough of Palmyra (adopted by the Borough of Palmyra Planning Board on March 19, 2001).

addition, a review of the borough's re-examination report, adopted by the Palmyra Planning Board in March 2001, recommended no significant zoning changes in the borough. In 1992, less than 5 percent of the borough's 2,600 tax lots were vacant. At that time, most of the vacant lots were located west of Route 73, more than a half-mile from the light rail station. In 1992, there were 2,866 housing units in the borough. Less than 10 percent of the units were vacant, according to the master plan. At the time, most of the housing was more than 10 years old, with the only substantial new housing occurring in the Palmyra Harbour-Willow Shores project. Because of this, the plan predicted a low likelihood of new housing projects in the borough.

Route 73/Pennsauken Station[12]

With a land area of 10.5 square miles, Pennsauken is larger than many of the other municipalities with RiverLINE stations. The Pennsauken Station is near the intersection of Route 73 and River Road, where most of the land is zoned for industrial use. There are only four zones within a half-mile of the station. Residential development is a permitted use in only one of those districts, the Commercial zone (C-1). Single-family detached dwellings built on lots that are at least 5,000 square feet are allowed (8.7 units per acre), as are second-floor apartments.

Camden

The remaining five RiverLINE stations are all located in the City of Camden. These include the 36th Street Station, the Walter Rand Transportation Center, the Cooper St/Rutgers Station, the Aquarium Station and the Entertainment Center Station. Despite multiple efforts to attain zoning information applicable to the areas proximate to these stations, it was not made available by the city.

[12] The information in this section comes from two sources. The first is the Pennsauken Township Zoning Map, which was adopted by the township in January 2003. Most of this map can be found online at http://65.211.48.180/penns-gov_zoning-maps.cfm. The second source is the Code of the Township of Pennsauken, which was last updated on November 15, 2007. The code can be found at http://www.e-codes.generalcode.com/codebook_frameset.asp?t=ws&cb=0635_A.

CONSTRUCTION ACTIVITY[13]

Introduction

This section provides an analysis of building permit and certificate of occupancy data which looks at both residential and non-residential (commercial) development in communities located near the RiverLINE, in the three relevant counties and Gloucester County, as well as in the state. This analysis provides a measure of development activity in the years before and after announcement of the RiverLINE in 2001, and before and after opening in 2004, as well as context for the subsequent property value investigation. It also provides a measure of commercial development that is not provided in the residential property value analysis.

Building permit and certificate of occupancy analysis

Our analysis of building permit and certificate of occupancy data compares the growth patterns of development in the RiverLINE corridor with the patterns in (1) the neighboring communities parallel and just east of the RiverLINE, (2) the other communities in the Burlington, Camden and Mercer counties further removed from the RiverLINE, (3) the four counties of Burlington, Camden, Gloucester and Mercer (excluding the communities in the RiverLINE corridor, and (4) the State of New Jersey (also excluding the RiverLINE communities). For communities defined as “corridor” “near-corridor”, and “non-corridor”, see Table 42. The objective of this analysis was to determine if there is a discernible and higher growth pattern in the RiverLINE communities since the opening of the RiverLINE compared to other communities near the corridor and beyond and compared to the growth patterns prior to the opening of the RiverLINE.

[13] This analysis—originally entitled “The RiverLINE Corridor: Is It Meeting Development Hopes and Expectations?”—was conducted by Jeffrey M. Zupan in November 2007.

Table 42. Corridor Definitions

RiverLINE Corridor Communities

Burlington	Beverly City, Bordentown City, Burlington City, Cinnaminson Township, Delanco Township, Edgewater Park Township, Florence Township, Palmyra Borough, Riverton Borough, Riverside Township
Camden	Camden City, Pennsauken Township
Mercer	Trenton City

"Near" Communities

Burlington	Bordentown Township, Burlington Township, Delran Township, Fieldsboro Borough, Mansfield Township, Willingboro Township
Mercer	Hamilton Township

Non Corridor Communities

Burlington	Bass River Township, Chesterfield Township, Eastampton Township, Evesham Township, Hainesport Township, Lumberton Township, Maple Shade Borough, Medford Lakes Borough, Medford Township, Moorestown Township, Mount Holly Township, Mount Laurel Township, New Hanover Township, North Hanover Township, Pemberton Borough, Pemberton Township, Shamong Township, Southampton Township, Springfield Township, Tabernacle Township, Washington Township, Westampton Township, Woodland Township, Wrightstown Borough
Camden	Audubon Borough, Audubon Park Borough, Barrington Borough, Bellmawr Borough, Berlin Borough, Berlin Township, Brooklawn Borough, Cherry Hill Township, Chesilhurst Borough, Clementon Borough, Collingswood Borough, Gibbsboro Borough, Gloucester City, Gloucester Township, Haddon Heights Borough, Haddon Township, Haddonfield Borough, Hi-nella Borough, Laurel Springs Borough, Lawnside Borough, Lindenwold Borough, Magnolia Borough, Merchantville Borough, Mount Ephraim Borough, Oaklyn Borough, Pine Hill Borough, Pine Valley Borough, Runnemede Borough, Somerdale Borough, Stratford Borough, Tavistock Borough, Voorhees Township, Waterford Township, Winslow Township, Woodlynne Borough
Mercer	East Windsor Township, Ewing Township, Hightstown Borough, Hopewell Borough, Hopewell Township, Lawrence Township, Pennington Borough, Princeton Borough, Princeton Township, Washington Township, West Windsor Township

The New Jersey Department of Communities Affairs (DCA) collects a variety of data relevant to this task. The DCA data used for this analysis includes the following:

- Certificate of occupancy – number of housing units
- Housing authorizations – number of housing units
- Housing authorizations of new construction – number of housing units
- Estimated cost of new construction of authorized housing units
- Estimated cost of residential construction authorized building permits
- Estimated cost of non-residential construction authorized building permits
- Non-residential floor space with certificates of occupancy
- Office space building permits
- Retail space building permits

Each is available by municipality and by year. For this analysis, annual data from 1996 through 2006 was used, although in some cases the 2006 data was not complete and the analysis extends only through 2005.

For each year and for every development indicator, the ratios of development in the corridor are compared to the adjacent "near" corridor, to the non-corridor, to the four counties and to the State of New Jersey. Because of concern that the two large cities of Trenton and Camden at each end of the line were larger and fundamental different from RiverLINE residential communities between them, the ratios are also defined so as to exclude these urban centers. One would expect that the extent that the RiverLINE communities grew more or faster than its immediate neighbors to the east to be the most telling. Consequently, the first analysis presented here is the "corridor to near" ratio analysis. It begins with a look at the residential indicators: housing authorizations, housing authorizations for new construction, cost of residential construction and certificates of occupancy.

The RiverLINE opened on March 14, 2004 so it might be expected that the strongest indication of disproportionate development activity would occur in 2004. In fact, at first glance that appears to be the case with four indicators comparing corridor to "near" corridor: (1) housing authorizations; (2) housing authorizations for new construction; (3) estimated cost of residential construction, authorized building permits; and (4) certificates of occupancy (Figure 5 to Figure 8).

For each, the pattern was largely static, at least until 2001. After that there is a pronounced turn upward, especially from 2004 and beyond. With Trenton and Camden removed from the analysis (the dashed lines)—combined they added about 900 of the 2,000 housing units authorized in 2004-2006—the upward post-2003 trend becomes much less pronounced, suggesting the added housing activity in those two cities exceeded that in the residential communities along the RiverLINE between them. Still, there was some growth there. For example, Florence Township had 286 units

authorized in 2004-2006 while only 96 in the previous three years. Similarly, Pennsauken added 170 in the latter period and only 73 in the former. Housing authorizations are an indication of intent which may or may not be spurred by the rail line, so certificates of occupancy (CO) may be a more tangible indicator. Here the growth in the ratio was most pronounced in 2003 through 2005, with 2006 data not yet available. But most of the growth as shown in Figure 8 occurs with Trenton and Camden included. In fact, the growth can almost entirely be attributed to 516 units receiving their CO in 2003. The “without Camden /Trenton” growth in 2005 is attributed largely to additions in Cinnaminson, Delanco and Florence. It is important to note that the findings are observational and not causal with regard to the potential effect of the RiverLINE. In all cases, it would require more specific investigation as to whether these increases were generated all or in part by the anticipated or actual opening of the RiverLINE.

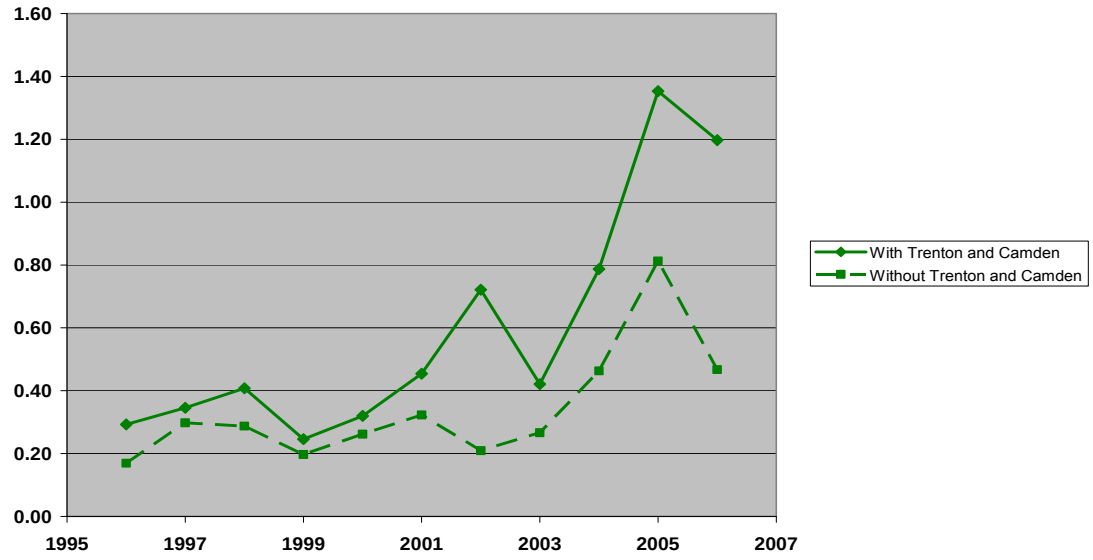

Figure 5. Housing Authorization, Corridor to Near Corridor

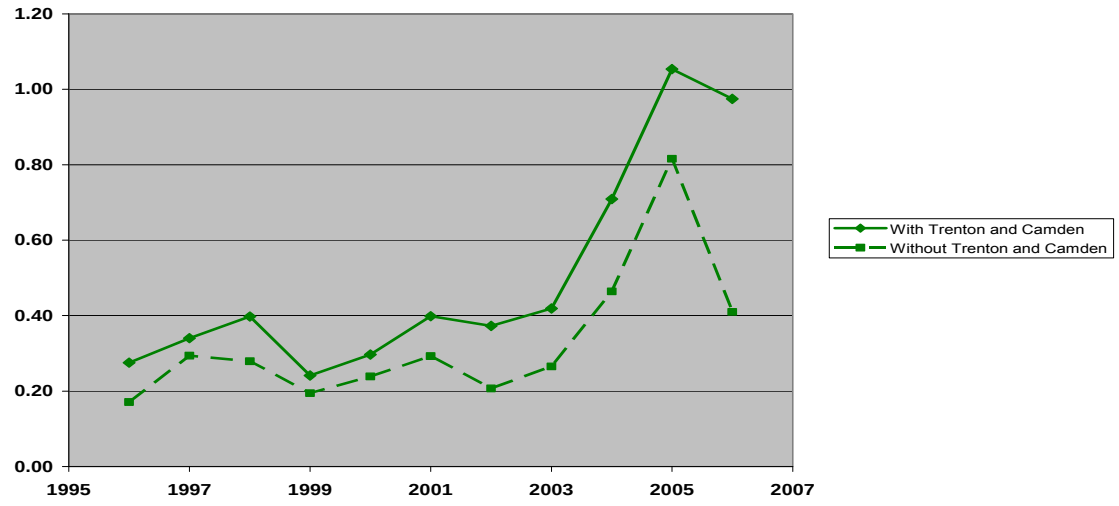

Figure 6. Housing Authorizations for New Construction, Corridor to Near Corridor

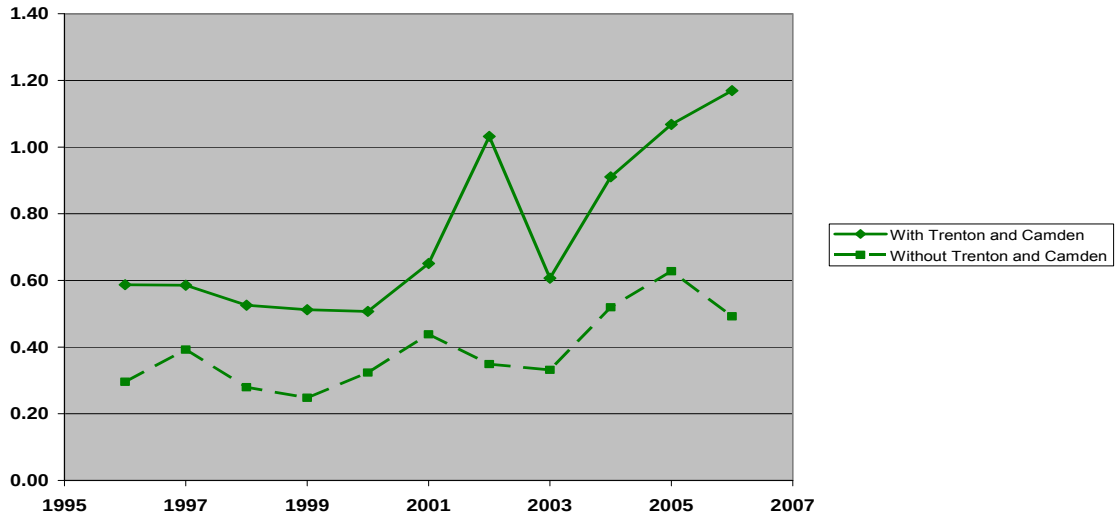

Figure 7. Estimated Cost of Residential Construction, Authorized Building Permits, Corridor to Near Corridor

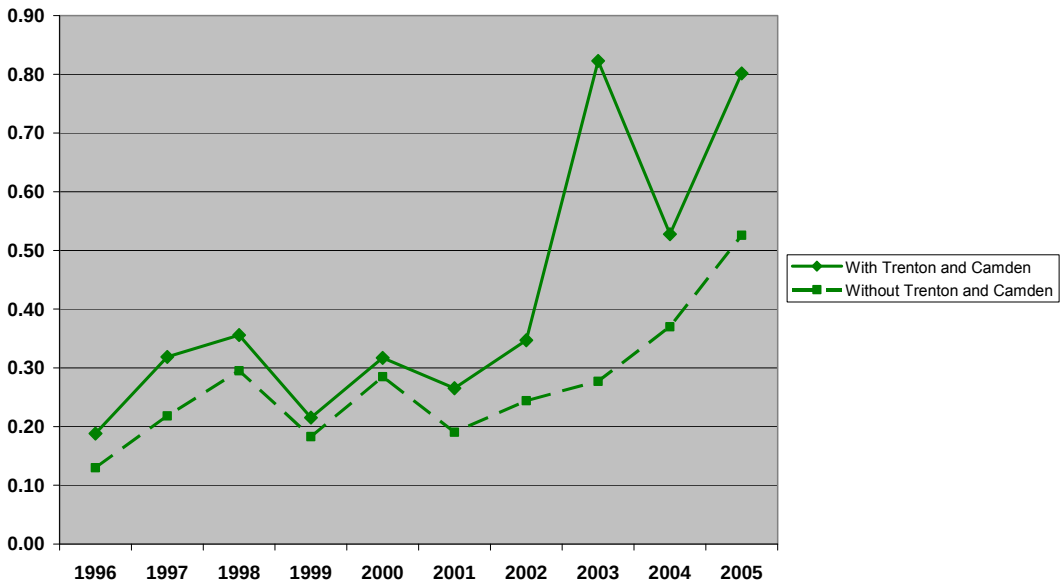

Figure 8. Certificates of Occupancy, Corridor to Near Corridor

Source: New Jersey Department of Community Affairs

A look at the ratios of housing growth in the corridor compared to areas farther from the corridor—the non-corridor communities and the four relevant counties overall is presented in Figure 9 to Figure 11. Here the pattern prevails as it did in the figures shown above. Again, the patterns of modest recent growth are similar.

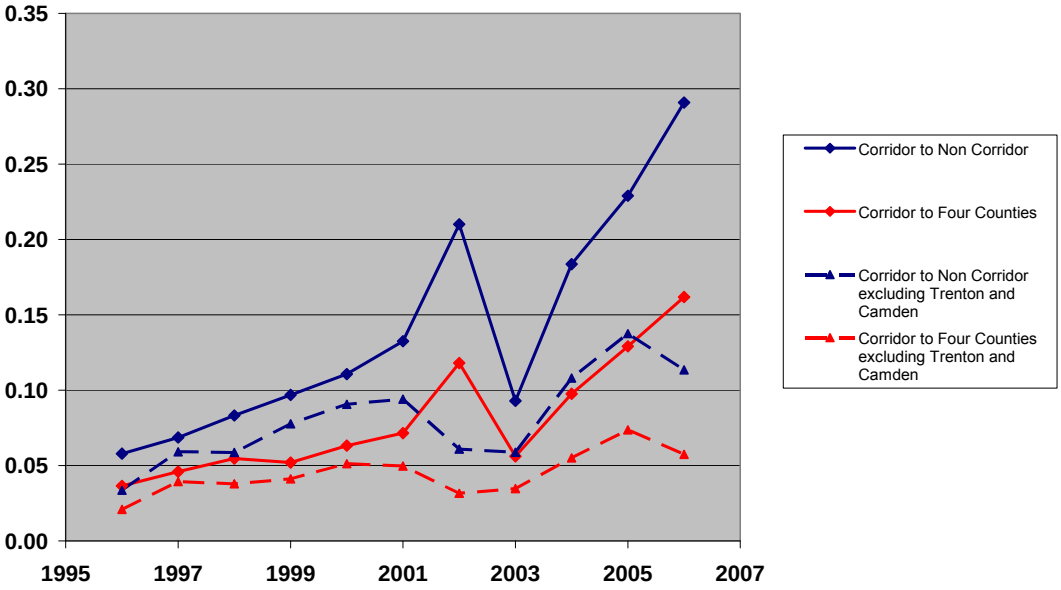

Figure 9. Housing Authorizations,
Corridor to Non-Corridor and Corridor to Four Counties

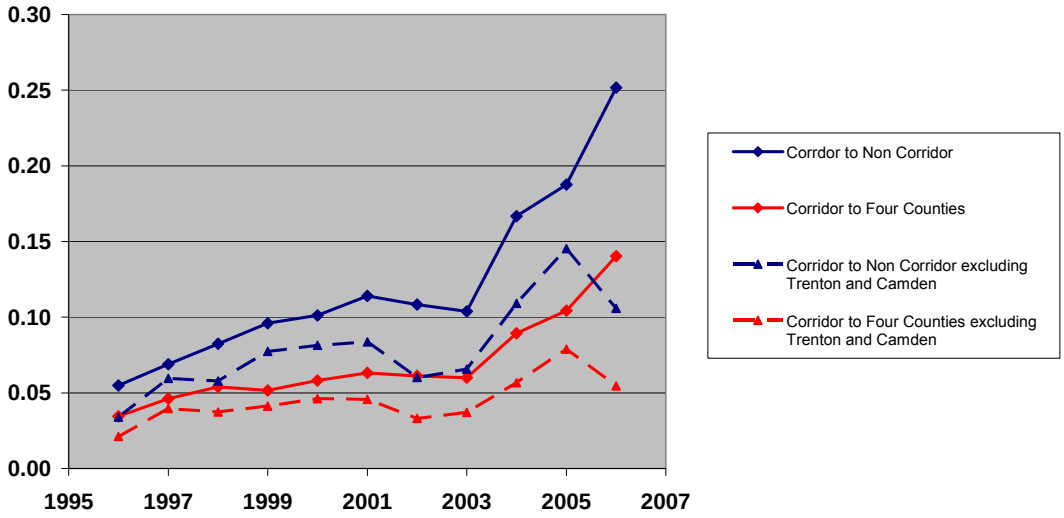

Figure 10. Housing Authorizations for New Construction,
Corridor to Non-Corridor and Corridor to Four Counties

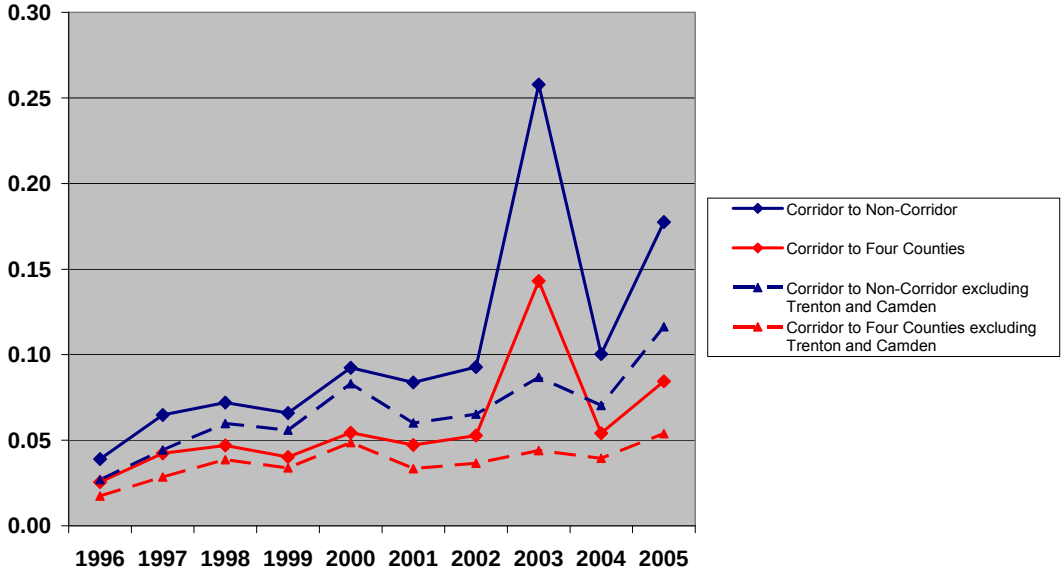

Figure 11. Certificates of Occupancy,
Corridor to Non-Corridor and Corridor to Four Counties

Source: New Jersey Department of Community Affairs

The previous analysis was based on the absolute growth in housing activity. To show the *relative* growth before and after the start of RiverLINE service, the percent increase in housing authorizations (or certificates of occupancy) is compared to the number of housing units in place as of the 2000 US Census. Figure 12 to Figure 14 show these percent gains before (2001-2003) and after (2004-2006) initial operations for the corridor, the "near" corridor, the four counties and all of New Jersey.

Both the housing units authorized (Figure 12) and housing units authorized for new construction (Figure 13) show that the growth in the corridor increased by a higher percentage after the opening than before. Moreover, the “near-corridor”, “non-corridor,” four-county and statewide growth after the opening was lower than it was before the opening. Still, the growth in the corridor remained lower after the opening than the growth after the opening in the other geographical areas. We conclude that the corridor began to grow some after the opening, but that its rate of growth remains below the rate of other places—a modest support for the argument that the RiverLINE, at least through 2006, has stimulated residential growth. The certificates of occupancy show that the post-opening growth rate was lower for the corridor as well, but that can be traced to the fact that the post-opening data represents two years of growth, not three, since the 2006 CO data was unavailable (Figure 14).

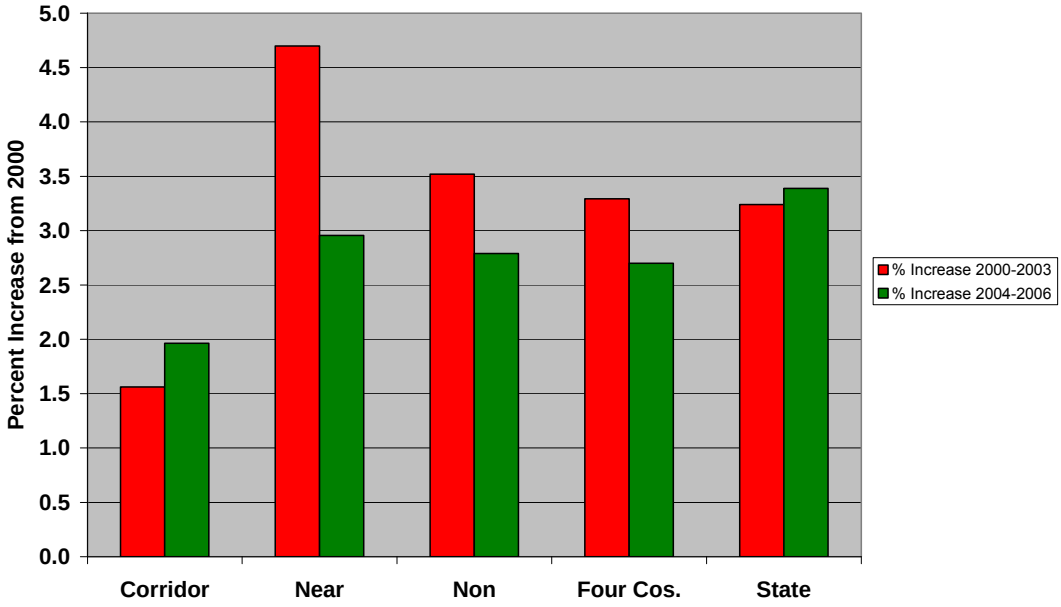

Figure 12. Comparison Before and After RiverLINE Opening, Housing Units Authorized by Building Permits

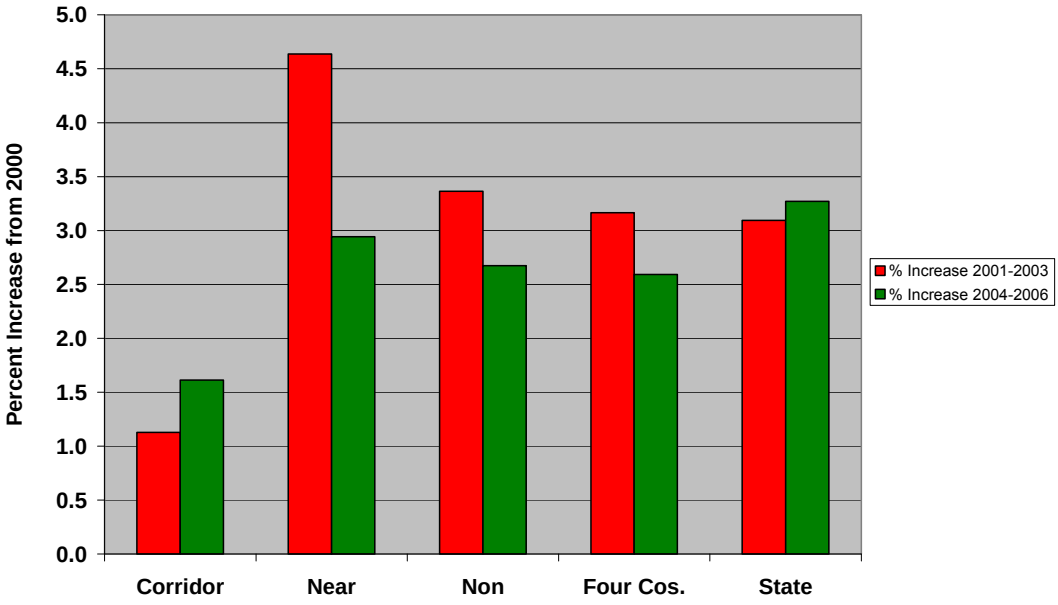

Figure 13. Comparison Before and After RiverLINE Opening, Housing Units Authorized by Building Permits for New Construction

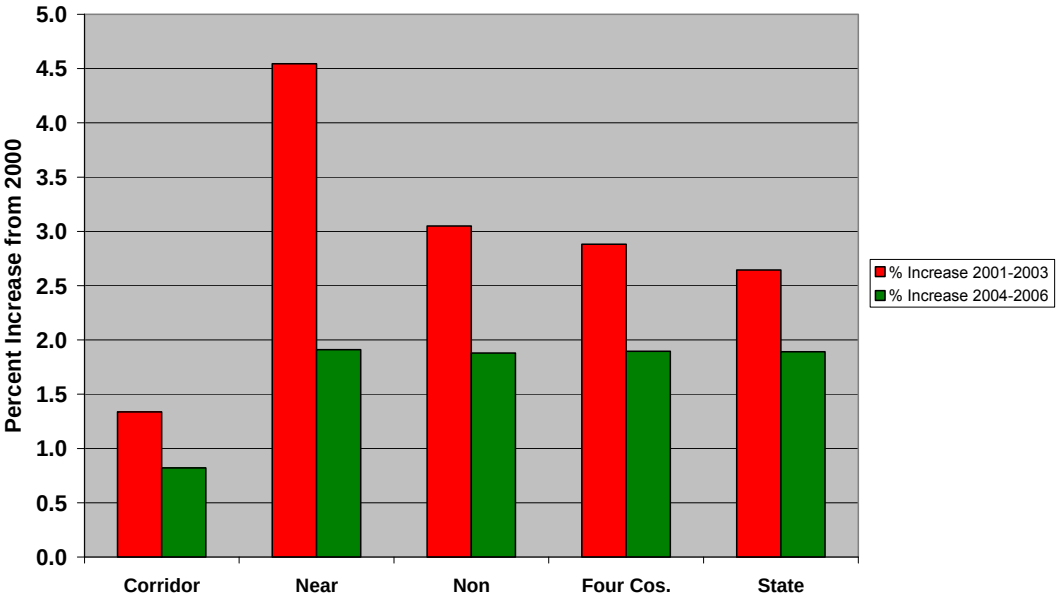

Figure 14. Comparison Before and After RiverLINE Opening, Certificate of Occupancy

Source: New Jersey Department of Community Affairs

The next series of figures show the non-residential activity changes in the corridor as ratios to the changes in the "near" corridor. In the authorized building permits for non-

residential construction, we find that the ratio rises after 2003 but only with a strong contribution from Trenton and Camden; when they are removed (dashed line) the cost of construction ratio of the corridor to the nearby corridor flattens out (Figure 15). Certificates of occupancy show a different pattern with the post-2003 growth remaining high even when Trenton and Camden are discounted (Figure 16). The addition of substantial amount of growth in Delanco, and to a lesser degree Cinnaminson and Pennsauken, account for this.

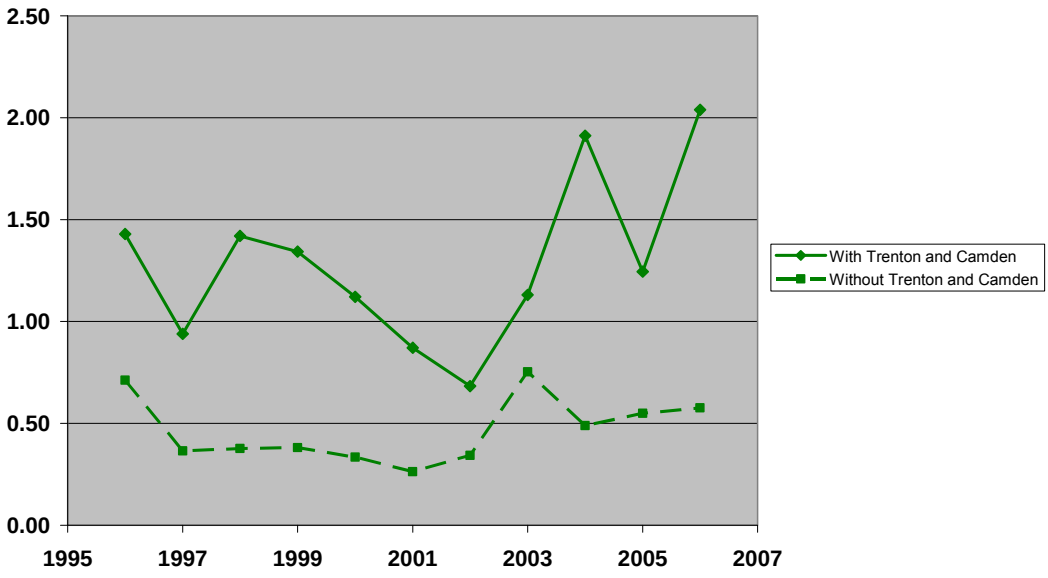

Figure 15. Estimated Cost of Non-residential Construction, Authorized Building Permits, Corridor to Near Corridor

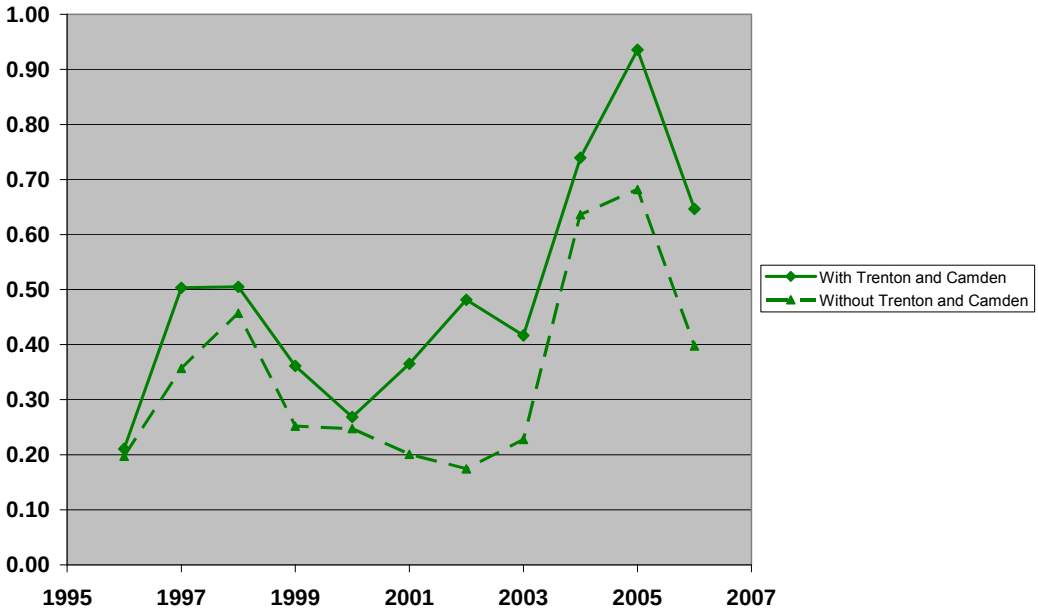

Figure 16. Non-residential Floor Space with
Certificates of Occupancy, Corridor to Near Corridor

The two figures showing authorizations of office and retail space are more problematic as there are wide swings from year to year (Figure 17 and 18). Office space is dominated by the permitting of a large amount of floor space in Delanco in 2002. The ebbs and flows of the retail chart are created by a combination of large amounts of floor space permitted in the “near” corridor in Burlington (1997) and Hamilton (1999, 2001, 2002, 2003) and by Cinnaminson in the corridor in (2002) before the RiverLINE opened. The only jump in post-2003 RiverLINE territory is in 2005 when a substantial amount of retail space was added in Cinnaminson. Again, whether any of these changes, particularly in the retail sector, can be attributed to the coming of the RiverLINE is questionable.

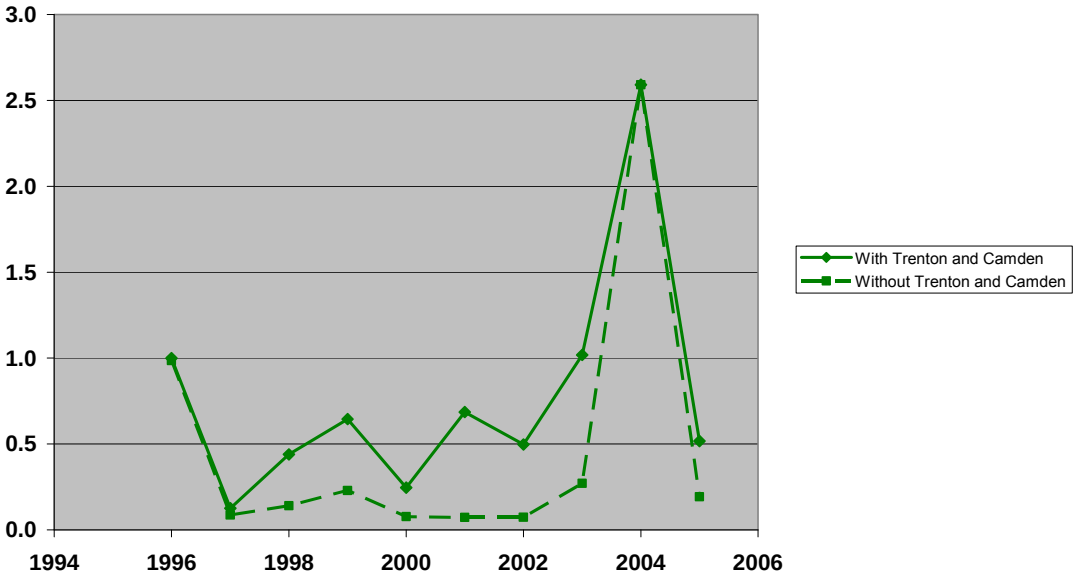

Figure 17. Office Space Building Permits,
Corridor to Near Corridor

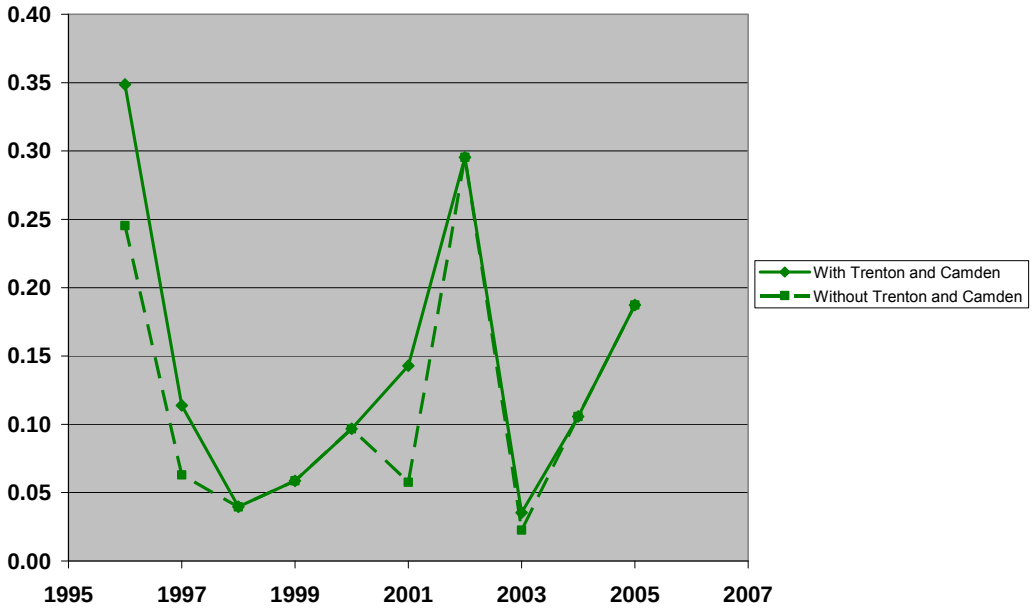

Figure 18. Retail Space Building Permits,
Corridor to Near Corridor

Source: New Jersey Department of Community Affairs

The comparison of the corridor to the rest of New Jersey is of greater interest since some of the local "noise" of the other indicators is not a factor. We examined the

estimated cost of non-residential new construction (Figure 19) and the certificates of occupancy (Figure 20). With Trenton and Camden, the post-2003 cost of construction activity increases by about 1½ times from about two percent of statewide activity before 2003 to about three percent afterward. Without those two cities, the percent—steady at about ½ before—climbs to one percent or more in each post-RiverLINE year. Certificates of occupancy data climb similarly, with the post-2003 ratios about double those in the pre-RiverLINE period.

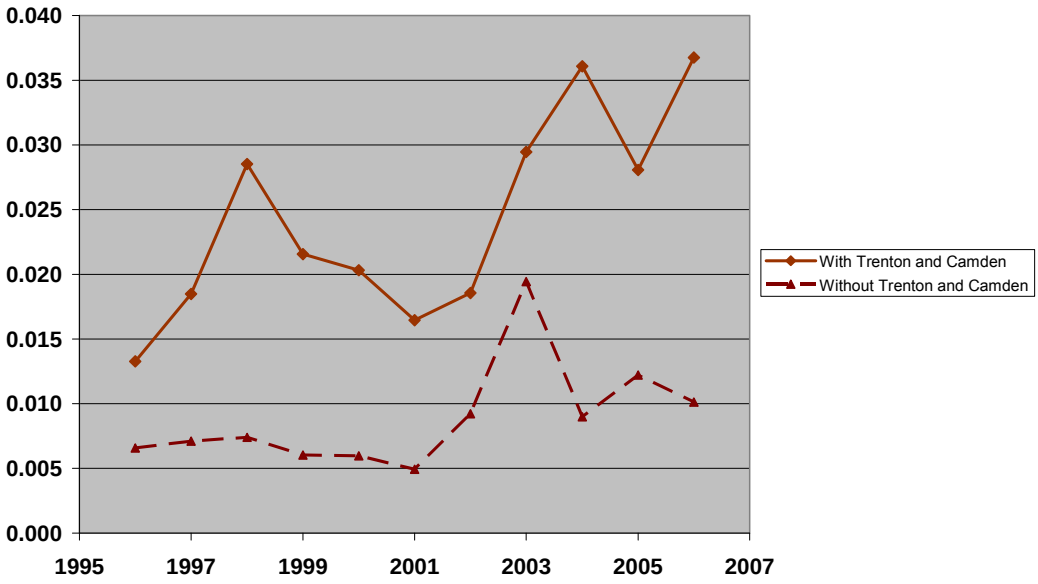

Figure 19. Estimated Cost of Non-residential Construction, Authorized Building Permits, Corridor to Rest of State

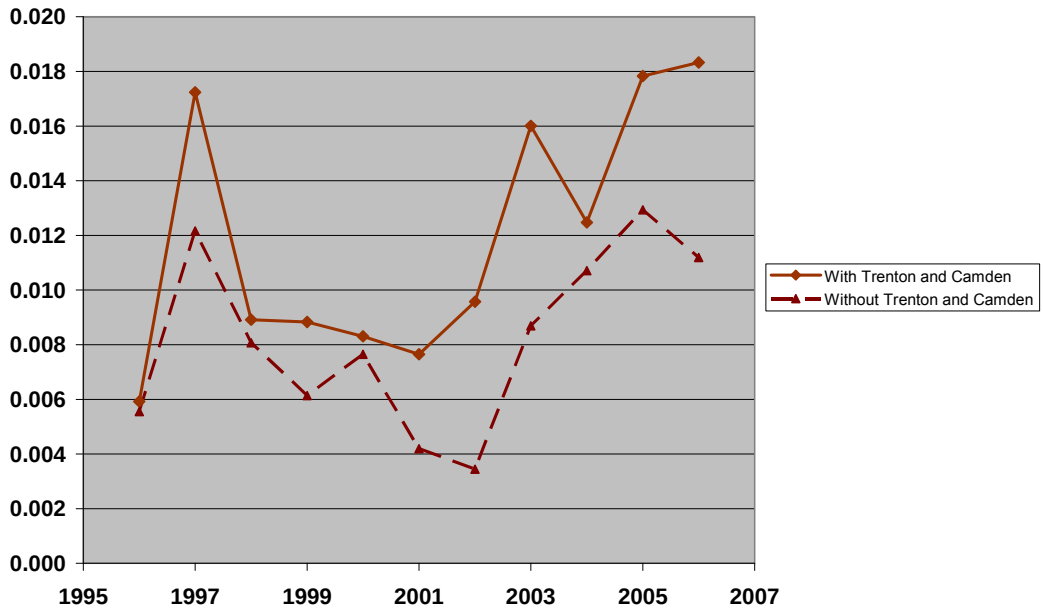

Figure 20. Non-residential Floor Space with Certificates of Occupancy, Corridor to Rest of State

Source: New Jersey Department of Community Affairs

Perhaps the most important indicators demonstrating the patterns of change and development are the estimated cost of residential and non-residential construction authorized by building permits, as shown in the ratio history of corridor to near corridor (Figure 21), the ratio history of corridor to non-corridor and to the four counties (Figure 22); and the ratio of the corridor to the rest of New Jersey (Figure 23). Each of these figures shows discernible growth in the corridor even before 2004, with a greater growth thereafter. But when Trenton and Camden are removed, the growth before 2004 is absent. After the opening in 2004 the RiverLINE corridor appears to grow—not by much, but nevertheless it is growing. Whether this can be attributed to the presence of the RiverLINE requires a more targeted investigation of the specific areas where growth occurred, and perhaps by amassing data over a longer time period to determine if the corridor grows and matures with its new transit asset. The property value analysis that follows is one type of analysis that attempts to resolve these questions.

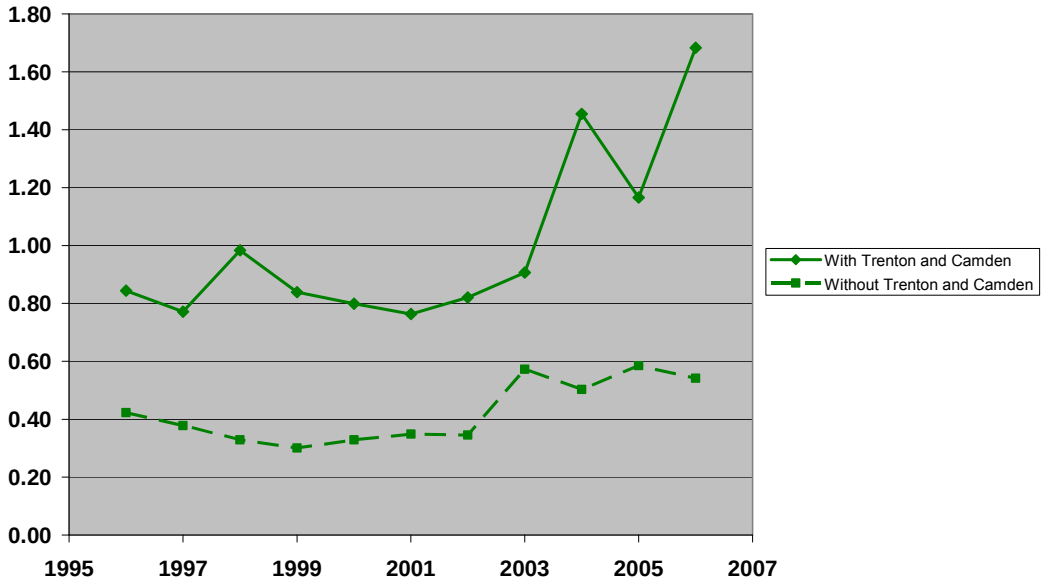

Figure 21. Estimated Cost of Residential and Non-residential Construction, Authorized Building Permits, Corridor to Near Corridor

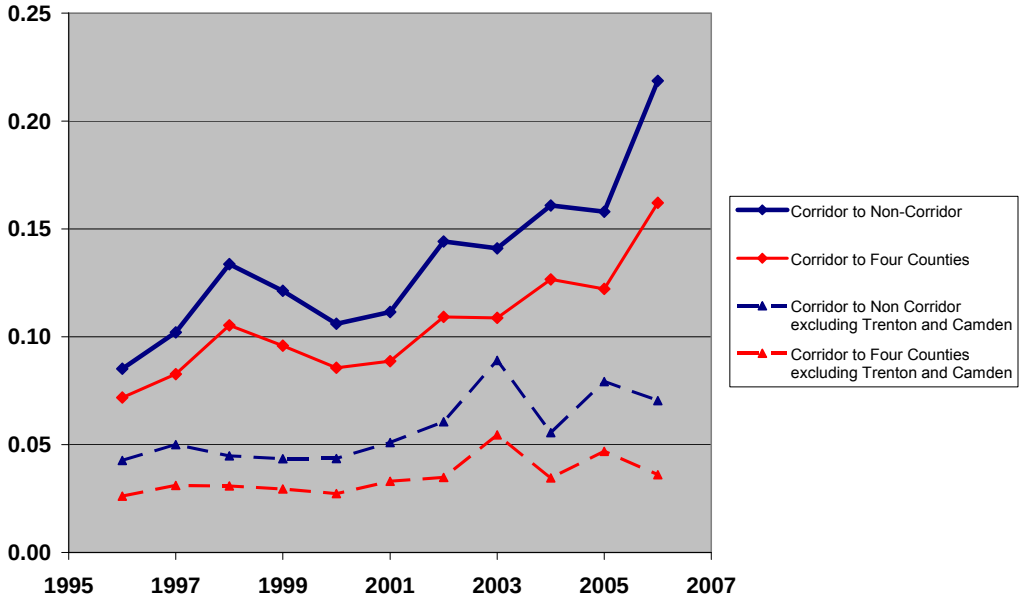

Figure 22. Estimated Cost of Residential and Non-residential Construction, Authorized by Building Permits

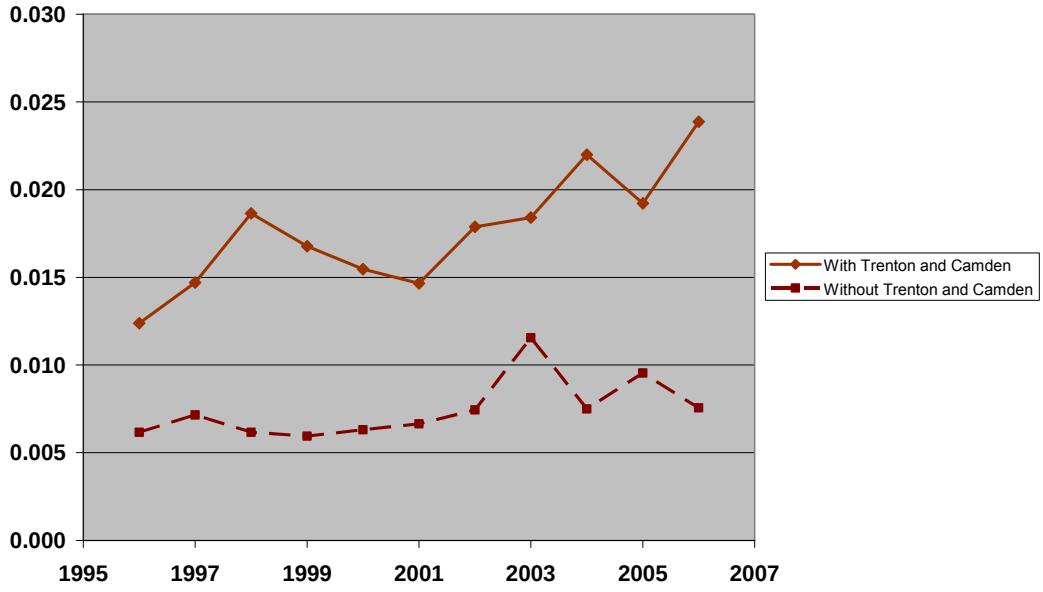

Figure 23. Estimated Cost of Residential and Non-residential Construction, Authorized Building Permits, Corridor to Rest of State

Source: New Jersey Department of Community Affairs

PROPERTY VALUE ANALYSIS

Introduction

This section analyzes the impacts of the RiverLINE's opening on single family home values, perhaps the best available quantitative empirical measure of economic impact for controlled analysis. Single family home values are a limited way of measuring such impacts in part because we would expect that other markets—rental housing and nonresidential office buildings, in particular—might be more likely to benefit from rail access. Unfortunately data on rents are not readily available for this region. We instead carry out some tests of submarkets within the owned housing market—attached housing, smaller homes, homes in lower-income Census tracts—that might be thought to respond more readily to transit access.

There have been a large number of studies of the land value or development impacts of rail service. This analysis adds to this existing literature, with several incremental improvements, particularly the use of repeat sales data to control for unobserved property and neighborhood characteristics, and the investigation of whether the effects of the light rail line vary by housing submarket and by station characteristics. We also use a larger disaggregate data set and a larger set of spatial and property variables than previous studies; and we include properties from a much larger area than is typical (almost all studies restrict the dataset to properties within one mile or so of stations).

Theory

Transportation investments have economic benefits primarily when they significantly improve transportation access in places where transportation constraints exist.[3] But impacts of such investments can be positive, negative, or both, to different people and in different places. Such effects include increases or decreases in agglomeration economies (particularly external economies of scale in industrial production); travel externalities (such as road congestion and vehicle pollution); and network externalities (e.g., increasing returns to scale in bus networks).

A network improvement or addition may decrease the distance and increase the speed and convenience of travel from some places to certain other places. These benefits tend to be highest near network access points such as freeway on- and off-ramps or rail stations, although properties near access points may also experience negative impacts such as noise, congestion, pollution, and accidents, because of a concentration of traffic.

Economic benefits may also occur from land use changes directly attributable due to the construction of the transportation infrastructure (e.g., removal of existing land uses), marketing effects that a major transportation investment can have in promoting development, and, of course, the spending on construction with multiplier effects in the local economy. These latter kinds of benefit are not the focus of most research, nor of this study.

One measure of economic benefit is the extent to which land values increase due to the greater accessibility offered by the transportation improvement. Developers, property owners, and tenants are willing to pay more to purchase or rent real estate that is more accessible to their labor force, employers, commercial opportunities, and other spatially-dependent resources. Observed rents and sales prices can thus reflect the value of this accessibility (i.e., the benefit is capitalized in land prices) if the land market is working properly (e.g., is not significantly constrained by regulation).

Changes in property value may reflect decreases in the cost of travel that lead to faster or cheaper commutes, and thus lower labor costs for firms; faster or cheaper non-work personal trips, which may facilitate greater economies of scale in retail; and cheaper freight movement costs. These cost reductions may lead to a competitive advantage for the entire region served by the transportation improvement.

Mohring showed that under classic restrictive urban model assumptions (e.g., a single city center, a closed city with no population or economic growth), transportation improvements result not only in land value increases for previously less-accessible parts of the metropolitan area, but also land values decreasing in places that were formerly among the most accessible, as their relative importance declines.[5] The net result under these assumptions is a decrease in aggregate land value in the metropolitan area, because proximity has on average less value when travel is cheaper (i.e., faster). Even in the polycentric context, transportation improvements can cause an increase in the value of some parcels of land while decreasing that of parcels highly valued for their accessibility, and this may even result in a net aggregate decline in land values region-wide. In the case of the Chicago metropolitan area, however, McDonald and Osuji, citing evidence from the region-wide simulation models of Alex Anas and co-authors, assert that effects of a local transportation improvement on real estate values may be negligible in a large metropolitan area, therefore allowing a study only of values near a transportation improvement (i.e., a “partial” rather than “general equilibrium” approach).[14] We test that assumption here.

Another option in this literature would be to investigate development responses more closely, particularly permit data, rather than the prices of existing structures. But built development to date has been limited, so permit data do not necessarily indicate what will eventually be built. Even if permit data were a good measure, they are reported in aggregate and so do not allow us to carry out good tests. Property values, on the other hand, can react quickly to, and even anticipate, heavily publicized transportation investments such as rail lines.

Why not merely quantify ridership instead, and infer the relative value of the investment from this measure? There are several reasons to look particularly at land values, possibly in addition to information about current ridership. First, there is an option value to having transit nearby (e.g., if a car breaks down), even if this rarely translates into ridership. Second, buyers may anticipate the value of being near the line in the future if they believe that attractive destinations may develop near stops, the transit network

may become denser, and so on. Thus investigating development right after a system is developed is seen as an inferior measure to price measures, which can anticipate such changes before they occur (see, e.g., Cervero and Landis 1997).[32] Third, the economic benefits of transit can only be partly estimated by riders' willingness to pay transit fares; there is a consumer surplus associated with transit consumption just as with other goods and this may be capitalized into home prices. Fourth, estimating the value of time savings relies on assumptions that aren't generally explicitly tested. Property prices are empirical evidence, if imperfect.

Methods

Few previous studies have carried out analysis of property appreciation before and after the opening of a rail line, relying instead on a cross-sectional comparison. Repeat sales models are more convincing empirically but present greater challenges. Repeat sales analysis is more typically used to construct price indexes than to estimate the economic impacts of spatially distributed investments such as transportation improvements.[33] Such data are potentially very good indicators of economic impacts, better than the more typically relied upon data source of a cross-sectional sample of property prices in which unobservable variables can potentially play a strong role in biasing coefficient estimates.

There are some disadvantages to using repeat sales as well. Sources of bias or estimation difficulties in repeat sales analysis (compared to hedonic or hybrid models) include selection bias, small sample size, and unobserved changes.[34] The selection bias arises if properties that sell more frequently are also systematically different (and unobservably so) from properties that sell less frequently. For example, some have found in various kinds of analysis that homes with more repeat sales appreciate faster (e.g., Case, Pollakowski, and Wachter 1997) though others suggest that we know little about how unobserved properties differ from observed.[35, 36] Confining estimation to repeat sales substantially reduces sample size, making estimates of impact less precise. Finally, properties may significantly change between transactions; they may be improved, structurally modified, or degrade due to poor maintenance.[37] Since the repeat sales method is used precisely under the assumption that by observing multiple observations of the "same" unit, characteristics of homes are implicitly controlled, this potential wrinkle is problematic.

But this assumption is also the great advantage to using repeat sales: it enables us to control for unobserved characteristics of homes and their neighborhoods that do not change over the study period, or, to be more precise, that at least do not systematically change as a function of the variables being investigated. Although we do not observe whether significant improvements have been made, this creates a potential bias in our estimates only if properties near the RiverLINE are more or less likely than properties elsewhere to have been significantly improved or better maintained.

Data

The study relies upon actual sales data rather than assessor's valuations of property. Single family home values and characteristics at sale are from the state of New Jersey via a private vendor, Econsult, Inc, for 1982 to 2002; and from realtor listings via Trend MLS, Inc of Philadelphia, for 2001 to 2006. The data used for this analysis are for four New Jersey counties (Burlington, Camden, Gloucester, and Mercer; see Figure 24) for a 12 year period from 1996 to 2007.[14] Unlike most studies of this kind we include properties from a wide area to control for changes in the land market occurring in the market generally. Three of the counties contain RiverLINE stations; the exception, Gloucester County, is included in order to distinguish views of and access to the Delaware River from RiverLINE access.

[14] Defining relevant metropolitan region for analysis is in this case complex as the RiverLINE spans two metropolitan areas as defined by the Census. Metropolitan statistical areas (MSAs) are made up of counties and are defined using criteria relating to population density, employment centers and commute flows. MSAs commonly cross state lines. As of 2005, eight MSAs claimed counties within the State of New Jersey, with every county accounted for. The largest MSA is the New York-Northern New Jersey-Long Island, NY-NJ-PA MSA, which includes the New York cities of New York and White Plains and the New Jersey cities of Newark, Edison, Union, and Wayne. The second largest, the Philadelphia-Camden-Wilmington, PA-NJ-DE-MD MSA, includes two of the three RiverLINE counties, Camden and Burlington, as well as several other counties in New Jersey. The major cities in this MSA are Philadelphia, Camden, and Wilmington, MD. Meanwhile, on its own, Mercer County comprises the Trenton-Ewing, NJ MSA. In turn, four of the eight New Jersey MSAs are contained within two combined statistical areas (CSAs; formerly called consolidated metropolitan statistical areas, or CMSAs), centered on New York and Philadelphia respectively. Here the split of the study area is replicated, as Mercer County is included within the New York-Newark-Bridgeport, NY-NJ-CT-PA Combined Statistical Area (CSA), while the counties of Burlington and Camden are counted as part of the Philadelphia-Camden-Vineland, PA-NJ-DE-MD CSA.

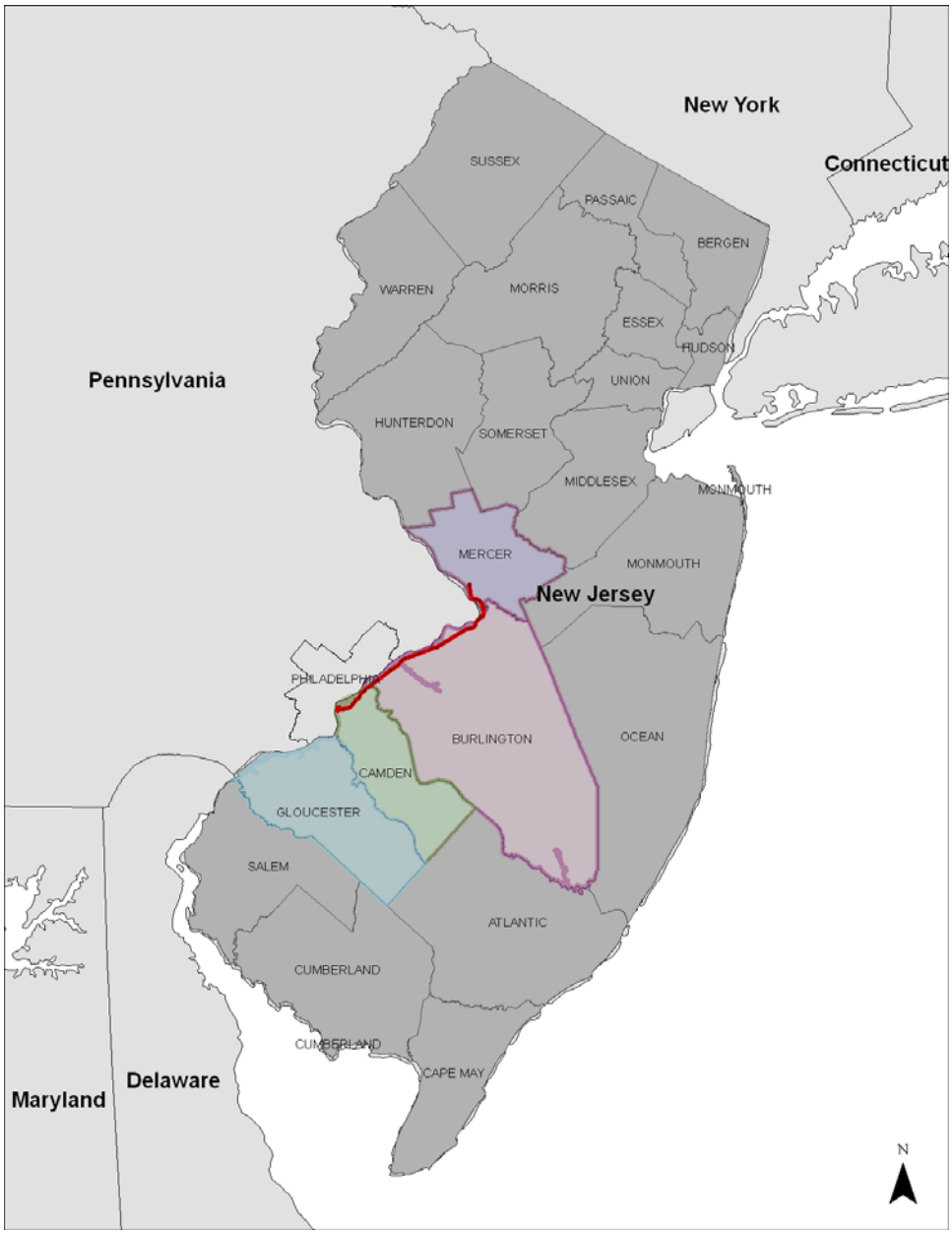

Figure 24. New Jersey, four-county study area and RiverLINE

The first dataset, from Econsult, contains transactions of all sales properties in New Jersey from roughly 1982 through 2002 but has little information about characteristics of properties, making hedonic analysis impossible (although allowing for repeat sales analysis as described below). The Econsult data are public property sales transaction data packaged by a private vendor. These data included individual records per property with related sales values for up to seven past transactions. They also included some property characteristics and address information, but the quality was poor and many records were missing values. These data initially had 352,106 records. After cleaning, we were able to use 191,086 properties with at least one transaction per property.

The second source, enabling a hedonic model as well as a richer repeat-sales model, is a dataset of brokered single family home sales transactions purchased from TREND Multiple Listing Service (MLS) of Philadelphia, from 2001 to 2007. These data include characteristics of the housing stock such as number of bedrooms, number of bathrooms, building size, and lot size. These data were provided with clean addresses ready for geocoding and more detailed housing characteristics. Each record contained a single transaction, unlike Econsult which had one record (with multiple sales) per property. The MLS data had included 153,360 records, of which 18,010 were duplicate transactions. When merged to mimic the format of the Econsult data, we have 115,872 records from TREND making a total of 306,958 records, including TREND and Econsult. Each of these records represents a single property with two or more sales.

A number of property transactions recorded in the county ledgers are made below market value for various reasons. We selected a cutoff point of $10,000 as a reasonable estimate for Econsult transactions. The MLS dataset includes only market transactions. We removed 106,259 records with values below $10,000 from the Econsult dataset. Some of these were apparently vacant land classified as residential.

To join the Econsult and MLS data we created a unique identifier (UID) for each property concatenating the state municipality code, block number, block suffix, lot number, lot suffix, qualifier, street number and unit number. Municipality code is a state standard four digit number. Street number is the numerical component of the address up to four digits. For example, "801 31st St" would have a street number of "801". Unit number is used for multi-family dwellings. Block and lot numbers are standard representations of parcels based on their alignment within the municipality. (Econsult data splits the block and lot numbers into two fields, number (5 digits) and suffix (4 digits). When combined, these two fields correspond to the MLS block and lot number (9 digits).) A total of 1,339 records without block and lot numbers were discarded—a total of 1,339. This process resulted in 191,086 property records with at least one transaction from the Econsult dataset and 115,872 records in the MLS dataset.

Once the UIDs were created (and the MLS data reshaped and merged to create property-based records allowing more than one transaction per record), joining the data was simply a matter of matching UIDs and appending transactions from Econsult and MLS together into a single record per property.

Finally, in order to enable the repeat sales analysis we deleted properties that were present in only one of the datasets. (The MLS data were complete from 2001 onwards, corresponding exactly with the year that the RiverLINE alignment and stations were announced, and construction began.) Of the 306,958 unique properties, 48,968 (about 19 percent of the total) existed in both datasets. Discarding duplicate transaction records left us with 40,161 properties with complete attributes from both datasets and at least two transactions.

Geocoding was completed in several steps to account for a lack of zip code information. Twelve passes were made using alternate zip codes in total to account for the large number of zip codes in the cities of Camden and Trenton. Some properties geocoded in more than one zipcode; in this case, we chose the geocode with the higher score. This resulted in 38,265 out of 40,161 records with geocoded addresses, a match rate of 95.3 percent. Finally, we removed some properties that fell outside of the boundaries of the four county area. This left us with 31,740 distinct, geocoded properties with multiple transactions from 1996-2007 (and with at least one transaction before 2001 and one transaction in or after 2001).

Using network analysis software from ESRI, we calculated road distances from each property to the nearest RiverLINE station, transit bus stop, highway on-ramp or off-ramp, to each of four local and regional job centers (Camden, New York City, Philadelphia, and Trenton), as well as to other rail stations in the study area on the Northeast Corridor line, the PATCO line and the Atlantic City line. Road-based distances are the best estimate of actual walking or driving distance to access these destinations. We also calculated the straight-line (aerial) distance to the nearest RiverLINE whistle blowing point, RiverLINE track, and nearest highway, to represent the noise impacts of RiverLINE whistle blowing, RiverLINE vehicle operation, and highway traffic, respectively. Finally, to control for the demand for riverfront property, we calculated the aerial straight-line distance to the Delaware River.

The properties for the repeat sales model (black dots), and their distribution with respect to the RiverLINE, are shown in Figure 25 along with median household income, as of 2000, of the Census block group (purple thematic shading). Block group median income tends to be lower nearer to the RiverLINE and higher east of the Line and also north of the Line (not visible on this map).

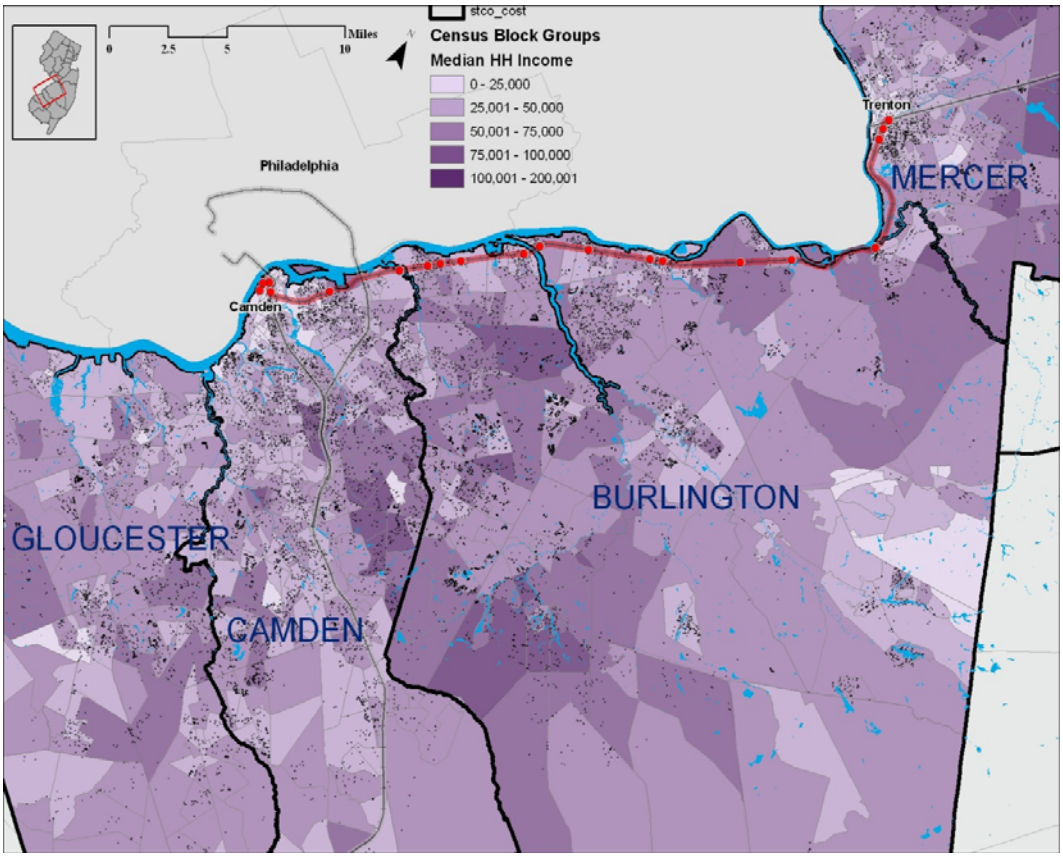

Figure 25. Repeat sales locations and median household income for Census 2000, RiverLINE area and environs

Analysis methods

For this analysis, the dependent variable is the increase or decrease in value of a property selling before and after 2001 or before and after 2004, the dates of the official announcement and of the line's opening, respectively. Unlike other models of this kind we measure the effects of both announcement and of operation. Other studies of this type have most commonly used the project announcement as the significant date of effect.[14] Our models allow comparison of changes in price associated with announcement versus opening.

Figure 26 shows the logged ratio of last and next-to-last sales values, removing the properties with sales values of less than $10,000 or more than $2 million in either year, as well as those that lost more than 50 percent of their value or gained more than three times their value. The truncation of the dataset is to maintain relative normality of the dependent variable and to remove outliers that may not have been subject to arms-length transactions. The remaining estimation dataset includes 31,740 properties, two-thirds of which are single family detached homes, the remainder of which are owner-occupied units in attached units (townhomes and condominiums).

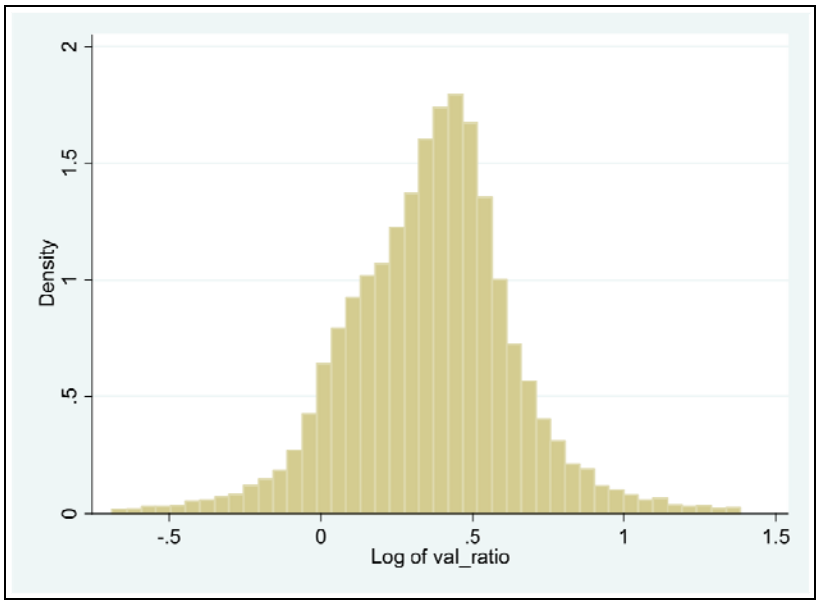

Figure 26. Logged ratio of last and second-to-last sale

While the model is well-grounded in standard hedonic theory, we use an exploratory method to choose among multiple highly correlated spatial measures, based on which of the measures seem most influential on property values or property appreciation. For example, whistle blowing might have effects within an eighth-mile, a quarter-mile, a half-mile, and so on.

The models include a number of independent variables (described in Table 43). The first are a set of distances calculated in GIS to stations and other amenities or disamenities (Table 44). In addition to the independent variables of most interest, we also include variables to control for pre-existing characteristics of the properties, neighborhoods and communities surrounding the properties (Table 45). Table 46 shows the full regression model with all properties.

Table 43. Variable descriptions

Dependent variable	
log_valratio	Log of ratio of second and first sales prices
Independent variables of interest	
dist2sta, dist2sta_gb, dist2sta_op	Network distance to the nearest River Line station
dsq2sta_net, dsq2sta_net_gb, dsq2sta_net_op	Squared network distance to nearest River Line station
RLqmi_gb, RL1mi_gb_rg , ... , RL5mi_gb_rg ; RLqmi_op, RL1mi_op_rg , ..., RL5mi_op_rg	Indicator variables for network distance rings to 1/4, 1/2, 1, 2, 3, 4 and 5 miles from a River Line station
WHemi_gb...WH1mi_gb_rg , WHemi_op... WH1mi_op_rg	Indicator variables for airline distance rings to 1/8, 1/4, 1/2, and 1 mile from a River Line whistle blowing point
TRemi_gb...TR1mi_gb_rg ; TRemi_op... TR1mi_op_rg	Indicator variables for airline distance rings to 1/8, 1/4, 1/2 and 1 mile from River Line track right-of-way
parkstn_qmi...parkstn_1mi_rg, boardings_qmi... boardings_1mi_rg	Parking spaces and daily boardings at nearest station within a 1/4 mi, 1/2 mi, or 1 mi ring (post-operation only)
Spatial control variables	
ORemi, ORqmi_rg, ORhmi_rg, OR1mi_rg	Dummy airline distance thresholds of 1/8, 1/4, 1/2 and 1 mile from Atlantic Ocean, Delaware River or Delaware Bay
dist2exit	Network distance to freeway or highway entrance/exit
dist2hwy, dist2fwy	Airline distance to nearest highway/freeway right-of-way
dist2bstop	Network distance to nearest bus stop
dist2phi, dist2nyc, dist2trent, dist2camd	Highway network distance to Philadelphia, Manhattan, Trenton and Camden CBDs
dist2NEC, dist2PATCO, dist2ACL	Network distance to Northeast Corridor, Port Authority Transit Corporation, or Atlantic City Line rail station
dist2river	Airline distance to coastline (generalized spatial trend)
X, Y	Latitude, longitude (generalized spatial trend)
Property and neighborhood characteristics	
bedrooms, fullbaths, halfbaths, totrooms, lotsize, design_2...11, AC, age, age2	Characteristics of home at second sale (AC=air conditioning; age2=squared age of home; design_2..11=set of design variable dummies—e.g., 2-story)
medhhinc, rentsh, vacsh, afamsh	Median household income, share of housing that was vacant, share of housing that was renter-occupied, percent African American in the property's 2000 Census tract or block group
TP0506	Average district elementary test score for 2005-06 school year
SAT	Average SAT score of high school district (2005-06)
colleg4	Share of HS graduates attending 4-year college (2005-06)
Time controls and fixed effects	
elapsed	Years elapsed since the most recent sale
y2002...y2007	Dummies for fixed appreciation effects of varying market conditions from year to year (year of second sale)
ppgb, ppop	Dummy variables indicating if the property sold before/after groundbreaking or before/after operation of the River Line
Mercer, Camden, Gloucester, Burlington	Fixed county effects (3 dummies, Burlington omitted)
Princeton, Trenton, Burlington_City, ... , … , …	Fixed municipality effects (111 dummies)
Note: "missing value" dummies included for totrooms, lot size, AC, age, medhhinc, afamsh, TP0506, SAT, colleg4, Note: '_op' and '_gb' affixes denote variables with non-zero values for properties that sold either before and after groundbreaking or before and after the line started operating (see text).	

Table 44. Distance Variables

Variable	Mean	Units	SD	Min	Max
log_valratio	0.36	n/a	0.28	-0.69	1.39
dist2sta	91.81	0.1 mi	57.69	0.05	461
dist2sta_gb	92.10	"	57.68	0.23	461
dist2sta_op	91.87	"	57.65	0.05	461
dist2exit	16.83	0.1 mi	4.84	0.44	20
dist2hwy	2.38	0.1 mi	2.63	0.00	19.4
dist2fwy	13.80	0.1 mi	6.59	0.00	20
dist2bstop	7.33	0.1 mi	6.68	0.00	20
dist2phi	229.87	0.1 mi	103.25	30.41	813
dist2nyc	873.63	0.1 mi	150.73	512.93	1,227
dist2trent	274.38	0.1 mi	122.23	2.31	543
dist2camd	171.93	0.1 mi	106.45	2.04	497
dist2NEC	19.75	0.1 mi	1.50	1.05	20
dist2PATCO	19.16	0.1 mi	2.92	0.02	20
dist2ACL	19.76	0.1 mi	1.36	2.55	20
dist2river	17.52	0.1 mi	5.15	0.07	20
X	374344	m	47169	246520	521125
Y	405503	m	63447	253898	576599
boardings_qmi	2.72	100s	1.08	0.82	4.8
parkstn_qmi	1.24	100s	1.25	0	3.67
boardings_hmi_rg	2.99	"	1.93	0.33	14.2
parkstn_hm_rg	1.28	"	1.26	0	3.67
boardings_1mi_rg	3.08	"	2.09	0.33	14.5
parkstn_1mi_rg	1.62	"	1.57	0	5.89

Dummy variable	Mean	SD
RLqmi_gb	0.003	0.058
RLqmi_op	0.003	0.057
RLhmi_gb_rg	0.01	0.11
RLhmi_op_rg	0.01	0.12
RL1mi_gb_rg	0.03	0.16
RL1mi_op_rg	0.03	0.16
RL2mi_gb_rg	0.04	0.19
RL2mi_op_rg	0.04	0.20
RL3mi_gb_rg	0.04	0.19
RL3mi_op_rg	0.04	0.20
RL4mi_gb_rg	0.05	0.22
RL4mi_op_rg	0.05	0.22
RL5mi_gb_rg	0.04	0.20
RL5mi_op_rg	0.04	0.20
WHemi_gb	0.00	0.07
WHemi_op	0.00	0.07
WHqmi_gb_rg	0.01	0.10
WHqmi_op_rg	0.01	0.09
WHhmi_gb_rg	0.02	0.14
WHhmi_op_rg	0.02	0.14
WH1mi_gb_rg	0.03	0.17
WH1mi_op_rg	0.03	0.18
TRemi_gb	0.01	0.09
TRemi_op	0.01	0.09
TRqmi_gb_rg	0.01	0.11
TRqmi_op_rg	0.01	0.10
TRhmi_gb_rg	0.02	0.14
TRhmi_op_rg	0.02	0.14
TR1mi_gb_rg	0.03	0.16
TR1mi_op_rg	0.03	0.17
ORemi	0.01	0.09
ORqmi_rg	0.02	0.13
ORhmi_rg	0.03	0.18
OR1mi_rg	0.07	0.25

Note: Summary statistics for dist2sta_gb, dist2sta_op, boardings and parkstn variables are for relevant observations only.

Table 45. Control Variables

Variable	Mean	Units or Var Type	Std Dev	Missing	Min	Max
bedrooms	3.12		0.83		1	11
fullbaths	1.56		0.61		0	8
halfbaths	0.54		0.53		0	5
totrooms	7.18		1.80	7,881	3	15
lotsize	10,037	sq ft	15,365	7,178	100.00	751,875
AC	0.77	[ind]	0.42	449	0.00	1
age	36.8	years	27.4	2,710	0	350
age2	2,101	years	3,621	2,710	0	122,500
medhhinc	$61,387	$	$22,466	3	2,499	200,001
rentsh	0.19	proportion	0.17		0	1
vacsh	0.04	proportion	0.04		0	0.594
afamsh	0.15	proportion	0.18	3,767	0.001	0.964
TP0506	60.32	score	5.94	3,440	43.0	77.8
SAT	1470	score	157	23,103	1136	1774
colleg4	52.89	percent	12.91	5,416	19.8	91
elapsed	6.68	years	3.06		0.75	16
ppgb	0.28	[dummy]	0.45			
ppop	0.29	[dummy]	0.45			
y2002	0.13	[dummy]	0.34			
y2003	0.05	[dummy]	0.22			
y2004	0.14	[dummy]	0.35			
y2005	0.26	[dummy]	0.44			
y2006	0.19	[dummy]	0.39			
y2007	0.13	[dummy]	0.34			
Mercer	0.17	[dummy]	0.37			
Camden	0.34	[dummy]	0.48			
Gloucester	0.15	[dummy]	0.36			

We use regression models to estimate the effects of the RiverLINE on property appreciation for the entire dataset (Table 46) and then present results for different sizes of home and for homes in lower-income and higher-income Census tracts (Table 47). Below we summarize the main results.

Analysis Results

In the “full models” (Table 46) we use all properties in the dataset and in subsequent models (Table 47) we investigate subsets split by Census tract median income and housing unit size. The base model (not shown) includes property characteristics, Census tract and school district characteristics, and fixed effects for municipality, county and year, as described above. Alternative model forms were tested and the log-linear form performed better than alternative forms such as log-log.

Full model results

We begin with a model that tests the network distance to the nearest RiverLINE station, as well as network distance squared (Table 46, model 1). The linear distance variable is statistically significant at the 95 percent confidence level and represents a negative property appreciation gradient of 0.05 percent for each tenth of a mile farther from a RiverLINE station, implying that each mile closer to a station results in a half-percent increase in appreciation. The squared term is statistically significant at the highest level, but is weak, indicating a concave price function that does not deviate strongly from a straight line. This result conforms with the theory that rail station access has a positive effect on property appreciation, although the magnitude is quite low.

In the next model we test whether the correlation of property values with groundbreaking of the RiverLINE are different from that with operation of the line (Table 46, model 2). We replace the two distance variables with four distance variables that distinguish the effects of station access to RiverLINE stations after groundbreaking from the effects of station access after line operation commenced. In model 2 there is a statistically significant positive coefficient on variable dist2sta_gb, of about 0.1 percent per tenth of a mile, implying that after groundbreaking but prior to operation, the effect of RiverLINE station is negative. Meanwhile, there is a larger negative coefficient on dist2sta_op of about two-tenths of percent (0.188 percent) per tenth of a mile distance from a rail station, a larger negative gradient in accordance with expectation but twice as large. The net effect can be inferred by adding the coefficients for the distance variables together and testing whether the sum is significant. This yield is a statistically significant negative tenth of a percent appreciation gradient per tenth of a mile (99 percent confidence; not shown in the table), consistent with model 1.

Table 46. Logged sales ratio regressed on River Line distance variables and controls (all properties)

	Model 1 Base Model + Distance to RL station	Model 2 Distinguish Pre and Post Distance	Model 3 Distance Thresholds to River Line + Model 2	Model 4 Boardings and Parking for Nearby Stations + Model 3	Model 5 Track, Whistle, & River + Model 4	Model 6 Other Measures of Accessibility + Model 5
dist2sta	-0.000497**					
dist2sta^2	2.86e-06***					
dist2sta_gb		0.00113***	-0.000680**	-0.000673***	-0.000632***	-0.000489***
dist2sta_op		-0.00188***	-0.000649**	-0.000648***	-0.000628***	-0.000496***
dsq2sta_gb^2		-6.02e-06***	1.92e-07	1.49e-07	-2.37e-08	-7.86e-07***
dsq2sta_op^2		8.05e-06***	3.69e-06***	3.67e-06***	3.58e-06***	2.88e-06***
RLqmi_gb			-0.147***	-0.142***	-0.133***	-0.126***
RLqmi_op			0.126***	0.229*	0.275**	0.287**
RLhmi_gb_rg			-0.133***	-0.133***	-0.162***	-0.156***
RLhmi_op_rg			0.126***	0.0676*	0.0913**	0.0976**
RL1mi_gb_rg			-0.121***	-0.122***	-0.155***	-0.149***
RL1mi_op_rg			0.102***	0.0395*	0.0401*	0.0450**
RL2mi_gb_rg			-0.106***	-0.105***	-0.121***	-0.116***
RL2mi_op_rg			0.0529***	0.0542***	0.0564***	0.0617***
RL3mi_gb_rg			-0.0818***	-0.0813***	-0.0802***	-0.0764***
RL3mi_op_rg			0.0344**	0.0349***	0.0356***	0.0390***
RL4mi_gb_rg			-0.0812***	-0.0807***	-0.0788***	-0.0771***
RL4mi_op_rg			0.0498***	0.0501***	0.0512***	0.0533***
RL5mi_gb_rg			-0.0221**	-0.0219***	-0.0213***	-0.0221***
RL5mi_op_rg			0.00754	0.00771***	0.00769***	0.00737***
boardings_qmi				-0.0494	-0.0580*	-0.0601*
parkstn_qmi				0.0235	0.0166	0.0160
boardings_hmi_rg				0.0125	0.0112	0.0112
parkstn_hmi_rg				0.0157	0.0139	0.0133
boardings_1mi_rg				0.0164***	0.0172***	0.0175***
parkstn_1mi_rg				0.00722	0.00812	0.00770
WHemi_gb					-0.0648	-0.0658
WHemi_op					0.0254	0.0265
WHqmi_gb_rg					-0.0336	-0.0337
WHqmi_op_rg					0.0430	0.0431
WHhmi_gb_rg					0.0143	0.0146
WHhmi_op_rg					-0.0343	-0.0341
WH1mi_gb_rg					0.0335***	0.0332***
WH1mi_op_rg					0.00947	0.00965
TRemi_gb					0.0390	0.0404
TRemi_op					-0.0456	-0.0445
TRqmi_gb_rg					0.0466*	0.0479*
TRqmi_op_rg					-0.0340	-0.0331
TRhmi_gb_rg					0.0318*	0.0324**
TRhmi_op_rg					0.0145	0.0161
TR1mi_gb_rg					-0.00348	-0.00344
TR1mi_op_rg					-0.000310	0.000500
ORemi					0.00356	-0.000760
ORqmi					0.0426***	0.0381***
OR1mi					-0.0127*	-0.0157*
dist2ACL						-0.000656***
dist2PATCO						0.000290***
dist2NEC						0.000225**
dist2river						-0.000272**
dist2bstop						-0.000182***
dist2camd						0.000330***
dist2trent						0.000351*
Constant	0.306	0.357	0.459*	0.477***	0.519***	-0.0116
Observations	31470	31470	31470	31470	31470	31470
R-squared	0.348	0.353	0.355	0.356	0.357	0.358

*** p<0.01, ** p<0.05, * p<0.1. Shaded rows: Post-groundbreaking coefficients. Unshaded rows: Post-operation coefficients.

Note: Corrected for clustering on station by year for boardings and parking variables. Insignificant and not shown: Distance to nearest highway exit or state highway, Philadelphia and Manhattan CBDs, Delaware River and tributaries. Control variables not reported here: All variables in Table 2A; 105+ municipality dummy variables.

In model 3, we add more distance threshold variables to see whether the relationship is nonlinear or restricted to shorter distances. We would expect that property value increases might be felt primarily within walking distance of rail and perhaps not outside that distance; and that the bid-rent gradient might have a different slope within particular distances, with perhaps a flatter gradient as one moves beyond walking distance and relies on vehicle access to the station. Furthermore, we expected any negative effects of station proximity to be fairly local. We also sought to find any substitution of value between near accessible properties and properties in the same general market that are not favored with transit access. The threshold variables may reflect this value transfer. The results of model 3 are consistent with model 2 but more highly statistically significant. There are large differences between groundbreaking and announcement within five miles of stations. Properties selling after groundbreaking depreciated between 15 percent (within a quarter mile) and 8 percent (in the three-to-four mile band) compared to properties elsewhere, with a smaller negative effect of 2.2 percent in the four to five mile band. Meanwhile, properties that sold first after groundbreaking and again after operation had a relative increase in value ranging from 13 to 14 percent within a half mile of stations, to about 10 percent between a half mile and a mile, to between 3 and 5 percent for properties in the one to four mile bands, with no statistically significant effect in the four to five mile band. Note also that in this model, the coefficients on dist2sta_op and dist2sta_gb are small, negative, statistically significant, and very similar. They are statistically indistinguishable from each other. This suggests that these variables are picking up a more generalized regional property appreciation trend. Note that the median distance to RiverLINE stations is 8.7 miles.

Staying with model 3 (Table 46), the net correlation of property appreciation with the RiverLINE station threshold variables can be inferred by adding coefficients for the variables and testing for statistical significance. For properties right near the station out to one mile away, there is no net effect (the sums are small and statistically indistinguishable from zero). For properties between one and three miles away, the net effect is negative: between -5.3 and -4.7 percent (99 percent confidence level). And for properties in the three to four mile band, the net effect is also negative: about -3.1 percent (95 percent confidence level).

Could these apparent net neutral or negative effects of the RiverLINE be affected by local nuisances due to ridership and parking—crime, foot traffic, and automobile traffic? We add variables for the number of parking places and number of passenger boardings, distinguishing the quarter mile, half mile and mile rings (model 4). While the parking variables are not statistically significant, two of the boardings variables are. Within a quarter mile there is a strong negative correlation of property appreciation for stations with a high number of users. The coefficients on the distance threshold variables for post-operation sales do change significantly, becoming larger and more positive, although less statistically significant. (The lower statistical significance is partly caused by correcting standard errors for clustering by station, as the boardings and parking variables do not vary for properties nearby.) The net effect for many properties is neutral or negative. There are 104 properties within a quarter mile of stations that sold after line operation began, and stations near those properties ranged from 82 to 480 boardings

per day. Ignoring boardings, the net correlation of property appreciation with RiverLINE station proximity for properties within a quarter mile is the negative 14 percent post-groundbreaking plus the positive 22.9 percent increase post operation, or an 8.7 percent property value increase. But the disbenefit associated with busier stations usually offsets this. Since the mean boardings at stations within a quarter mile is 272, the average disbenefit associated with boardings is 2.72*4.94 percent, or 13.9 percent, and the net impact for the average property sold prior to groundbreaking and then after opening is about a negative 5 percent (8.7 percent minus 13.9 percent).

In the same model, the boardings variables for stations farther away from a half mile to a mile away are positively correlated with property appreciation. This could be because high-ridership stations have on average more accessibility value, or better amenities that are valuable to properties that are not close enough to suffer the localized nuisance effects of high ridership. However, in a series of sensitivity tests not shown here, we omitted properties near the three stations on the RiveLINE lacking any surface parking and found a small and insignificant coefficient on the boardings variable. (The three stations without parking also happen to have higher-than-average boardings.) Perhaps there is something particular about properties near these three stations that results in lower-than-average property appreciation rates: these zero-parking stations may have more foot traffic and less auto traffic, and perhaps foot traffic is viewed negatively by nearby property owners. To be conservative, we retain the boardings variables in subsequent models because omitting properties near zero-parking stations means omitting half of properties within a quarter mile.

Are these models mis-specified because of track noise or whistleblowing impacts of RiverLINE vehicles? In the next regression (model 5) we add several additional spatial variables: distance to whistle points, distance to RiverLINE track, and distance to the Delaware River. These variables are meant to distinguish the possible negative effects of whistles and operation noise and the positive effect of river access and views from any measured effects of access to RiverLINE stations. We include measures both before and after operation commenced, to account for the possibility that home buyers might anticipate such impacts. We do not find negative impacts of whistleblowing or of track. Interestingly and unexpectedly, we find that the variables are positive and significant for some of the whistleblowing and track distance variables, but only prior to operation and only for properties farther than one-eighth mile away. This is an anomalous result for which we have no explanation, although it does not affect the negative coefficients on the threshold distance variables much at all. We do find that the measured effect of RiverLINE station access within a quarter mile, post-operation, becomes larger and more statistically significant when the other characteristics are controlled. The other post-operation RiverLINE accessibility coefficients are not much affected. The coefficients for river or ocean nearby are positive and significant, as expected.

Finally, in model 6 we add a number of additional accessibility measures: distance to other rail stations, to major central business districts (Manhattan, Philadelphia, Camden and Trenton), and to highway entrances, transit stops, and highway right-of-way.

Including these variables only marginally changes coefficients on the main variables of interest (insignificant variables are not shown, to save space).

These results with the entire dataset do not distinguish between different kinds of property that might be thought more likely to benefit from RiverLINE access. The apparent net effects of the line, neutral or modestly negative on average, may conceal larger variations. We turn next to models on data subsets to investigate this possibility.

Subset model results

We compared the relative effects of the RiverLINE within two ways of defining "submarkets:" household income (below median or above median); and home size (1-2 bedrooms, 3 bedrooms, 4+ bedrooms). We do not observe characteristics of households, only characteristics of housing units or of Census tracts; from these we indirectly infer household characteristics. First, we ran regressions separately for lower-income and higher-income Census tracts (Table 47, models 1 and 2). Households of lower income are more likely to use transit than to drive, all else equal. It is also possible that the RiverLINE's operation has an amenity effect for poorer neighborhoods but is not seen as an improvement by higher-income neighborhoods. The median household income of Census tracts represented in the dataset was $56,833 in the 2000 Census and the sample is split roughly in two around that point.

The vast majority, 90 percent, of properties within a mile of stations are in low-income Census tracts. For these properties (Table 47, model 1), within a quarter mile of stations there is a large and significant positive property appreciation estimate of net positive 30.6 percent (37.6 percent minus 7.04 percent). However, for properties farther than quarter mile away the net effect is neutral or negative with little positive bounce-back after operation to compensate for the negative groundbreaking effect. The results for lower-income Census tracts are consistent with the idea that, for households likely to value rail access, the line may redistribute property appreciation gains from properties farther away from stations to those near stations.[5] As in the full model, the number of station boardings within a quarter mile is associated with a reduction in property value, but the net effect remains positive and statistically significant for all but eight of the 86 properties selling after operation within a quarter mile of stations in lower-income Census tracts (and is neutral for those eight).

Table 47. Model subsets

VARIABLES	Model 1 Lower-income tracts	Model 2 Higher-income tracts	Model 3 1-2 bedroom houses	Model 4 3 bedroom houses	Model 5 4+ bedroom houses
dist2sta_gb	-0.000489***	-8.53e-05**	-0.000940***	-0.000228***	-0.000557***
dist2sta_op	-0.000282***	-0.00158***	-0.000732***	-0.000369***	-0.00134***
dsq2sta_gb	8.58e-07***	-3.14e-06***	1.63e-06***	-1.56e-06***	-3.11e-07*
dsq2sta_op	1.76e-06***	6.75e-06***	4.42e-06***	2.62e-06***	5.84e-06***
RLqmi_gb	-0.0704*	-0.170*	-0.0835	-0.165***	-0.0540
RLqmi_op	0.376***	-0.464*	0.451	0.398***	0.00445
RLhmi_gb_rg	-0.0781**	-0.159***	-0.0569	-0.161***	-0.147**
RLhmi_op_rg	0.0784*	0.0142	0.0225	0.233***	-0.0163
RL1mi_gb_rg	-0.0667***	-0.164***	-0.0889***	-0.150***	-0.147***
RL1mi_op_rg	0.0252	-0.156	-0.0371	0.106**	-0.00923
RL2mi_gb_rg	-0.0485***	-0.107***	-0.0855***	-0.105***	-0.122***
RL2mi_op_rg	0.0183***	0.0225***	0.0227***	0.0840***	0.0198***
RL3mi_gb_rg	-0.0476***	-0.0524***	-0.0784***	-0.0421***	-0.118***
RL3mi_op_rg	0.0133***	0.00392***	0.00570*	0.0263***	0.0799***
RL4mi_gb_rg	-0.0310***	-0.0667***	-0.0735***	-0.0578***	-0.0946***
RL4mi_op_rg	0.0194***	0.0255***	0.0411***	0.0518***	0.0712***
RL5mi_gb_rg	0.0331***	-0.0403***	0.0116***	-0.0220***	-0.0358***
RL5mi_op_rg	-0.0401***	0.00813***	-0.0506***	0.0165***	0.0248***
boardings_qmi	-0.0783**	0.0977*	-0.150**	-0.0747**	0.0125
parkstn_qmi	0.00151	0.106*	0.0430	-0.0164	0.0985
boardings_hmi_rg	0.00745	0.0508	0.0132	-0.0180	0.0215***
parkstn_hmi_rg	0.0114	-0.0579**	0.0128	-0.000620	0.0458*
boardings_1mi_rg	0.0138***	0.0688**	0.0176*	0.0137	0.0196*
parkstn_1mi_rg	0.00208	0.0167	0.0213	-0.00192	0.00537
WHemi_gb	-0.0958	0.122	0.271**	-0.118**	-0.240*
WHemi_op	0.0329	-0.00406	-0.136	0.0560	0.141
WHqmi_gb_rg	-0.0683*	0.241***	0.174**	-0.0637*	-0.224***
WHqmi_op_rg	0.0713	-0.145**	-0.250**	0.138*	0.186**
WHhmi_gb_rg	-0.00583	0.182***	0.174**	0.0567*	-0.273***
WHhmi_op_rg	-0.00962	-0.190***	-0.218***	-0.0401	0.183***
WH1mi_gb_rg	0.0226	0.0926***	0.208***	0.0418**	-0.149***
WH1mi_op_rg	0.0192	-0.0581***	-0.0948***	-0.00540	0.138***
TRemi_gb	0.0712	-0.0837	-0.301***	0.138***	0.139
TRemi_op	-0.0730	0.150	0.158*	-0.113	-0.140
TRqmi_gb_rg	0.0722**	-0.144**	-0.277***	0.0880**	0.237***
TRqmi_op_rg	-0.0617	0.116**	0.255***	-0.0842	-0.232***
TRhmi_gb_rg	0.0490**	-0.145***	-0.203***	0.0243	0.267***
TRhmi_op_rg	-0.00992	0.163***	0.173***	0.0101	-0.137***
TR1mi_gb_rg	0.00484	-0.0324***	-0.246***	0.0143	0.168***
TR1mi_op_rg	-0.00724	0.0233***	0.0976***	0.00675	-0.121***
Constant	-1.238***	0.886***	0.617**	-0.122	0.625***
Observations	15469	16001	6425	15900	9140
R-squared	0.364	0.406	0.411	0.378	0.363

Shaded rows: Post-groundbreaking coefficients. Unshaded rows: Post-operation coefficients.

*** p<0.01, ** p<0.05, * p<0.1. Corrected for clustering on station by

Note: identical set of variables included as in Table 3, final model. Only selected coefficients shown.

For properties in higher-income Census tracts (Table 47, model 2), results are generally not as statistically significant and trickier to interpret. Having a RiverLINE station within a quarter mile is associated with a net negative 63 percent effect for properties (the net effect is statistically significant at the 99 percent level), but there are only 17 such properties near only four stations. Higher income Census tracts near busier stations have smaller relative depreciation, unlike the lower-income subsample. But in no cases does the net effect exceed zero because the busiest nearby station has 397 boardings per day in this subsample.

Nearby station parking is correlated with higher appreciation for properties in higher income Census tracts and not for properties in lower income tracts. Those living in higher income tracts are more likely to own and use autos, so this is an intuitive result. Whistleblowing points are associated with property value increases prior to operation and with roughly offsetting decreases after operation; these are anomalous results, but the net effects of whistleblowing are neutral. More striking is the fact that distance to the track is positive for lower-income Census tracts prior to operation, for which we do not have a ready explanation. Note that this additional impact increases the net positive "effect" of the RiverLINE's operation for homes in lower income Census tracts.

Next are regressions run separately for different sizes of house (models 3, 4 and 5). We measure size with the number of bedrooms, because square footage and lot size are inconsistently available in the dataset. About 20 percent of the full sample is homes of one to two bedrooms; 51 percent has three bedrooms; and 29 percent has four or more. The smallest class of home within a quarter mile of the RiverLINE (Table 47, model 3) has a net appreciation rate 38 percent higher (45.1 percent minus 8.35 percent) than comparable properties. But the difference is not statistically significant, as there are just 18 houses with sales post-operation in this radius. The net correlation is smaller or non-existent for high-ridership stations, similar to the model with the full sample (Table 46, model 3). In the quarter mile to half mile ring we find no effect, while for distances from a half mile to five miles away the post-groundbreaking effects are mostly negative, with lesser positive post-operation effects leaving a net negative effect. Whistleblowing effects in this small sample are unexpectedly positive post-groundbreaking and negative post-operation, with a net positive effect for the eighth mile radius, a net slightly negative effect between an eighth and a half mile, and a net positive effect in the half to one mile radius.

For three bedroom houses (Table 47, model 4), with a significantly larger sample size of 87 homes within a quarter mile, we find similar but slightly smaller effects. For three-bedroom houses with stations from a quarter mile to half mile away, there is a net positive 23 percent appreciation (39.8 percent minus 16.5 percent), though only at the 90 percent confidence level. This is dampened for properties near busier stations so that for most properties the net effect is neutral or negative. The net effect for three bedroom homes remains positive out a half mile away, but is not statistically significant. Beyond that distance the effect is slightly negative, but statistically significant only when the two mile radius is reached, where a larger number of properties increase the sample size. Again, this pattern could reflect a market premium for smaller houses near to

stations that reduces the bidding market for houses farther away from stations, consistent with Mohring.[5] Whistleblowing proximity is statistically significant and negative for properties selling after groundbreaking prior to operation, and positive for those selling after operation, but again the net effect is statistically indistinguishable from zero for all cases. The same is true for distance to the track.

Finally, houses of four bedrooms located near the RiverLINE apparently experience no effect of the line's groundbreaking or operation; those within a quarter and one mile have statistically significant net depreciation, all occurring after groundbreaking and prior to operation (Table 47, model 5). As with the high-income subsample, there are relatively few four-bedroom properties near stations.

Summary of analysis results

The overall pattern of property appreciation near rail stops can be described as follows. First, properties near rail stops on average depreciated after groundbreaking and before operation—presumably due to construction impacts, possibly in combination with some skepticism about the success or value of the line by those buying homes nearby. Second, properties near rail stops appreciated after the RiverLINE began operations, but in most cases not enough to result in a net positive after taking groundbreaking effects into account. Third, properties near high ridership stations depreciated more (or appreciated less) than properties elsewhere, presumably because of localized nuisance effects of more foot traffic. Fourth, smaller units of one to three bedrooms in size near RiverLINE stations appreciated substantially more than large units of four or more bedrooms. Fifth, units in lower income Census tracts (90 percent of units) appreciated substantially more than those located in higher income Census tracts. Among this group, effects were generally positive although there is evidence of redistribution of property appreciation away from homes located further from the RiverLINE to those near stations.

Proximity to the track and to whistle blowing points does not have net negative effects. In some cases we find positive effects of whistle-blowing, which are unexplained. Between a half and one mile away, parking has a modest positive association with property appreciation, but this appears to be driven by large homes.

Negative impacts on prices may be partly driven by speculation and expectation of crime from RiverLINE patrons, based on elite interviews (see Structured Interviews). For this reason a future study of repeat sales might be helpful once sufficient data are available after the line has been in operation for more time and speculation is replaced by actual information about such problems.

We have accounted for many alternative explanations for observed increases in development activity near the RiverLINE that might also increase property values: access to Route 130, distance to job centers as the regional economy matures, and views of and access to the Delaware River. Measures of all of these amenities are

included. While access to highway exits and entrances, and being within a half mile of the Delaware River, is indeed highly significant, the remaining characteristics are generally not.

The economic development impacts of transit investments are difficult to estimate using owner-occupied unit values, since households who own housing may not be the primary beneficiary of such investments. Instead renters and commercial property owners may be. Therefore, with this study as with many previous studies also relying on owned property data, a caveat is in order: our finding of relatively modest impacts, and only in certain model specifications, may be driven mostly by the submarket consisting of those who own their homes.

CONCLUSION

Perceptions of the RiverLINE are for the most part positive and there are some indications that the line has had at least minor positive economic impacts. For example, construction permit data provides anecdotal evidence that the RiverLINE corridor grew more than nearby areas and the State overall between 2004 and 2007 after the RiverLINE began operations. But the short term effect of the line on property values has been mixed. Certain subgroups of the population appear to benefit: in particular, owners of smaller homes and attached housing, owners of housing in lower-income Census tracts, households living near the line who use it, and retail firms. Other subgroups do not appear to have benefited. These results are generally consistent with findings from other documented studies for similar rail systems with relatively low ridership.

Though this study is one of the most comprehensive of its kind, some significant caveats are in order. The firm survey looked at private sector and nonprofit firms only and excluded governmental agencies. The property value study looked at single family owned homes only, and did not investigate potential impacts on rental housing or on commercial developments. These exclusions likely understate the positive economic impacts of the RiverLINE. Furthermore, given the relatively low ridership on the RiverLINE, the localized property value impacts are actually fairly large in comparison, and the perceptions are surprisingly positive. This is in notable contrast to early publicity about the line.

It is important to note that local land use plans and regulations suggest that communities along the RiverLINE have not aggressively pursued supportive development policies to encourage transit-oriented development and redevelopment. As documented in the literature, transit investment alone is likely not sufficient to spur economic development.

Although we find little evidence that the RiverLINE has had a positive economic impact, is too early to be conclusive. This is especially true in light of the fact that the State and nation are still in the midst of the longest recession since the great depression and the timeline for recovery is not at all clear.

If residential development densification and additional commercial development were to occur over time near RiverLINE stops, economic benefits would most likely increase. Also, further study of broader economic impacts would provide improved evidence on the economic benefits of the line. Such study could include more complete analysis of Department of Labor data on firm wages and employment, and a study of whether improvements to the RiverLINE rail bed and alignment have had ancillary benefits to freight firms.

The data collection and analyses undertaken as part of this study provide an important baseline of information to help with future assessments of the RiverLINE's impacts. Without supportive land use policies in place and improved market conditions, economic

benefits from the RiverLINE investment may be slow to materialize or may ultimately prove elusive.

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