Transit Stations and Commercial Property Values: A Case Study with Policy and Land-Use Implications

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Abstract

There is little research about the association between rail transit station proximity and commercial property values. There is even less research on the role of public policy in influencing commercial property markets near transit stations without resorting to supply-side constraints. The research reported in this article helps close these gaps in research.

This article develops a theory on commercial property value with respect to both transit station proximity and the role of policies that encourage commercial development around transit stations without discouraging commercial development elsewhere. The theory is applied to the universe of commercial property sales in the area of Atlanta known as "Midtown," which is located about 1 kilometer north of the downtown edge. Midtown is served by three heavy rail transit stations operated by the Metropolitan Atlanta Rapid Transit Authority (MARTA). To encourage development around MARTA stations, Atlanta waives parking and floor area ratio requirements in Special Public Interest Districts (SPIDs) located around rail stations. Research shows
that commercial property values are influenced positively by both access to rail stations and policies that encourage more intensive development around those stations. This article explores both theoretical and policy implications.

Introduction

For the better part of a century, rail transportation systems have influenced urban land-use patterns. Shortly after the Civil War, streetcar networks were laid out in many northeastern and midwestern industrial cities, enabling affluent households to live away from cities along rail lines (Muller 1975; Newton 1971). Later in the 19th century, subterranean rail systems were installed in the largest northeastern cities, having the effect of dispersing both residential and employment activity from downtowns or their nearby neighborhoods. The 20th century through the end of the second world war saw the maturing of streetcar and subway systems, and, despite the introduction of mass produced automobiles, urban development patterns were aligned closely with rail networks (Hoyt 1939). Urban property markets reflected the role of rail transit in establishing value. The earliest studies of property values show that property value rises the closer it is to rail transportation stations (Spengler 1930). To analysts of the early twentieth century, rail facilities decreased the “friction” of distance, thereby allowing more efficient economic interactions (Hurd 1903).

The postwar period gave rise to new suburbs that became inhabited by millions of families whose chief mode of transportation was the automobile. Since then rail transit patronage as a share of all modes has fallen steadily (although total ridership has changed little in the past few decades). The movement of families to suburbs initially called into question whether property markets continued to value accessibility to rail systems. Even more dramatic has been the rise in the past two decades of polycentric urban patterns such as edge cities, many of which rival or exceed traditional downtowns in terms of employment and shopping space. Indeed, vacancy rates of many downtowns with rail transit access have risen in recent years while those of suburban centers dependent on only highways have dropped or remain lower than for downtowns. Very few suburban activity centers owe their existence to rail, and newer ones certainly do not. The logical question is: Does rail still matter for commercial property?
In particular, does the commercial property market value proximity to rail facilities?

**Theory**

Two theoretical dimensions—improvements in accessibility and policy intervention—address whether and to what extent commercial property values may be influenced by proximity to rail stations.

**Improved Accessibility Effects**

If transit stations improve the accessibility of property to all parts of an urban area, there will be a positive association between transit station location and property value. Thus, the closer property is to transit stations, the more valuable it is. If this relationship is not found, it could lead to the conclusion that rail transportation facilities have little or no influence on urban development patterns. Studies into the association between property values and rail facility accessibility fall cleanly into residential and office commercial categories.

Much of the literature on the association between residential property values and rail transit accessibility dates from the 1970s, a time during which several new rail systems were being planned or under construction (e.g., Washington’s Metro, the Bay Area’s Bay Area Rapid Transit Authority, and Atlanta’s MARTA). Research by Boyce et al. (1972), for example, found that the largest gains in residential property value accrued to those properties located farthest from downtown Philadelphia along the Philadelphia-Lindenwood high-speed line, presumably indicating that when rail enters a new area, property values escalate higher than the regional mean. (They also found that residential property adjoining highway exits increased as much as that of property adjoining transit stations.) Allen et al. (1986) also showed that residential property values in the Philadelphia region rose about 7 percent higher than the regional mean for similar property. Voith (1991) found that residential properties in Philadelphia census tracts (between 1979 and 1988) accessed by commuter rail rose from 4 to 10 percent over property not served by rail. Similar findings have been made in other metropolitan areas such as Boston (Armstrong 1994), Portland (Al-Mosaind et al. 1993), Washington, D.C.
(Rybeck 1981), San Francisco (Landis et al. 1995), and Atlanta (Nelson and McClesky 1992).

The evidence on office commercial price effects is considerably more sketchy. Dyett et al. (1979) and Fejarang (1994) found that commercial property values near the planned rail systems of BART and Los Angeles appreciated faster than similar property away from the systems, indicating only speculative effects but not long-term market effects. Washington, D.C.—area commercial brokers interviewed by Damm et al. (1980) and the Rice Center (1987) indicated that rents ranged about $30 to $50 (in 1994 dollars) higher per square meter for commercial property adjacent to station entries rather than a few blocks away, a phenomenon found also by Cervero et al. (1994) during interviews of commercial brokers in the upscale Buckhead area of Atlanta. Those studies are not statistically rigorous, however, and other factors may explain differences in values. Landis et al. (1995) did not find conclusive evidence showing that rail system accessibility improved commercial property value significantly. It seems that the evidence on whether and the extent commercial property markets value proximity to transit stations is surprisingly sketchy.

**Policy Intervention Effects**

More sketchy is the association of commercial property prices with respect to policy levers that attempt to focus commercial development around transit stations. There is certainly no limit to policy approaches, ranging from increasing densities around transit stations while decreasing densities elsewhere, to subsidizing development around stations, to stimulating urban renewal policies through tax increment financing and public partnerships with private redevelopment. In many cases these efforts can be considered supply side; that is, the ability of the commercial property market to operate near transit stations is made considerably more attractive than development away from those stations. Although the literature does not clearly show this, one would expect that commercial property values will be influenced positively when these kinds of policies are present. On the other hand, if those policies have the effect of shifting commercial development from centralized urban locations to decentralized suburban locations, perhaps there may be perverse outcomes.
Another kind of policy approach is much less benign by simply encouraging commercial development near transit stations. Such policies may relax certain development constraints but do not dramatically change development regulations affecting other land nearby or public subsidies to private development. Because they encourage development around transit stations but do not discourage such development elsewhere, these policies may not distort commercial property markets to the extent that supply-side policies might.

There is another consideration. If parking requirements are eliminated near transit stations, decked parking spaces may be reduced in number, if not eliminated altogether. In current market conditions, tilt-up parking can cost $15,000 per space. Offering to delete this requirement may affect the decision of where to build.

Can public policy make a difference in how rail systems affect commercial property values? Parsons Brinckerhoff (1996) speculates but does not necessarily conclude that “rail transit investments must be accompanied by careful planning and supportive public policies to maximize benefits” (p. 28). The question comes down to the extent that the market places a premium on accessibility. Measuring capitalization effects helps to quantify the benefits conferred by transit. If there are such benefits, policy tools may be used to encourage a shift in commercial development toward transit stations. If capitalization effects are not seen, policy tools intended to shape urban form, in part by shifting commercial development location, may be seen as essentially futile and a waste of scarce public resources.

Study Area

Proper evaluation of the research question requires that several criteria be met. First, the study area must be large enough to supply sufficient variation in price effects across space. This is needed so that influences may be detectable with some degree of certainty. Second, the study area must be reasonably homogeneous in terrain, accessibility, and land-use patterns to assure that variation in price effects is not attributable to differences in elevation, major highways, and different land uses that can have either positive or negative influences on nearby properties (e.g., a downtown high-rise jail facility on nearby
residential property values). Third, the rail system must have been in place during the entire study period, and the study period must be sufficiently long to generate an adequate number of commercial property sales for statistical evaluation. These criteria were met for the speculative influences observed by Dyett et al. (1979) and Fejarang (1994), and for the unscientifically demonstrated influences reported by Damm et al. (1980), the Rice Center (1987), and Cervero et al. (1994).

A fourth criterion concerns policy intervention in the form of supply-side constraints, which make location around transit stations more attractive than elsewhere by simply preventing development elsewhere or offering considerable subsidies or inducements that merely encourage development around stations without necessarily subsidizing such development or discouraging it elsewhere.

The Midtown area of Atlanta, Georgia, meets all criteria. Midtown, located about 1 kilometer from the edge of Atlanta’s historic downtown, is about 4.0 kilometers north to south and about 1.0 kilometer east to west. The area is not only sufficiently large but has three similarly-sized MARTA stations placed roughly equidistant from each other. The terrain is flat; has uniform access to Interstate 75/85 along its northern, western, and southern borders; and is not beset by blight or noxious land uses. It is buffered on the east by a major urban park (Piedmont Park) and by high-density, urban residential neighborhoods located generally north and south of the park. MARTA’s rail stations opened in Midtown during the early 1980s and, with sales of approximately 30 commercial buildings between then and 1994, there are reasonably sufficient data with which to conduct statistical analysis.

One policy dimension is also met. The City of Atlanta encourages development near MARTA stations in the Midtown area but does not use supply-side constraints to do so. It promotes development within SPIDs but does not discourage development outside SPIDs. Buildings located inside SPIDs need not provide parking facilities and can be developed more intensively than buildings located outside SPIDs. Buildings constructed outside SPIDs must meet pre-SPID policies that require at least two parking stalls for about every 100 square meters of gross leasable area, and limit development to about 30 floors in height.
SPIDs measure about 0.64 kilometer on a side, resulting in an approximate radius from SPID edges to the station center of about 0.32 kilometer. Some research indicates that most people are willing to walk this distance to access transit (Untermann 1984; Stringham 1982; Cervera 1993b), although many are willing to walk farther.

To appreciate the subtlety of this effort, one must understand that MARTA operates in the nation's most sprawled metropolitan area (Nelson 1999). The metropolitan area includes 20 counties stretching between the South Carolina and Alabama borders. It is the nation's second fastest growing metropolitan area in population, after Phoenix, but it leads the nation in land absorbed for development (Nelson 1999). It will grow from 3 million in 1990 to more than 5 million in 2010, or about 1 million people per decade.

This study provides the opportunity to gain insights in two important ways. First, if transit stations influence property values, then values must rise the closer property is to stations. This finding could confirm what others have not. Second, if price effects can be detected with regard to SPIDs all other factors considered, this finding could confirm the effectiveness of policies that are not supply-side oriented.

**Model and Data**

The general form model used to evaluate the research question is:

\[
\text{PRICE}_i = a_0 + \Sigma b_1 E_{ji} + b_2 \text{TRANSIT-ACCESS}_i + w; \quad (1)
\]

where:

\[
\text{PRICE}_i = \text{the sales price per square meter of commercial building, } i, \text{ sold since SPID policies were adopted};
\]

\[
\Sigma b_1 E_{ji} = \text{the sum vector of control variables, } j, \text{ characterizing each parcel } i;
\]

\[
\text{TRANSIT-ACCESS}_i = \text{the categorical experimental variable operationalized as either the distance of a building, } i, \text{ to the nearest transit station or its location inside (1) or outside (0) a special public interest district;}
\]

\[
w = \text{the stochastic disturbance}.
\]
The model is applied to all sales of commercial buildings during the study period. Rents were considered but found to be problematic for several reasons. First, access to tenant leases is confidential. Second, advertised rents do not reflect rents actually contracted. Third, rent concessions for initial lease-up followed by rent escalation makes valuing of advertised rents essentially impossible. Fourth, advertised rents are almost always a range reflecting the range in amount of space and amenities available (such as elevation above street level). It is perhaps for these and other reasons that studies on the relationship between transit station accessibility and rents are often hearsay based on local commercial broker accounts (see, for example, Damm et al. 1980; Rice Center 1987; and Cervero et al. 1994). Sale prices are based on the capitalized value of leases plus assumptions of future market conditions made by the purchaser.

The dependent variable is the sales price adjusted for inflation using 1994 constant dollars based on the consumer price index deflator as published in the *Statistical Abstract of the United States*. The experimental variables are defined as location inside or outside SPIDs (1 or 0) or Euclidian distance from the centroid of a subject building to the centroid of the nearest station using census Tiger line files in Atlas-GIS.

Control variables customarily used in analyses of commercial building value may include building area, land area, age, amenities, construction quality, and number and type of parking spaces (surface or deck, underground or aboveground). Because of renovations to older buildings and uniform construction (based on tax assessor records), the influences of building age, amenities, and apparent uniform construction quality are considered negligible. In intensely developed areas such as Midtown Atlanta, land area is capitalized into building area, with the exception that land devoted to parking may have an incremental value. The parking ratio (the ratio of parking stalls per unit of building area) does a better job of capturing surplus land area influences. Because some buildings have insufficient land for surface parking, decked or covered parking is used. The combination of parking ratio and covered parking is a better proxy for land area than the land area itself. To control for economies of scale in building value, the remaining extraneous variable is building area.
In sum, the variables used in this evaluation are defined below.

\( PRICE = \) price per square meter.

\( BUILDING-AREA = \) the enclosed floor space in square meters. Because of economies of scale that relate to price per unit of space, a negative association may be expected between price and building area.

\( FLOORS = \) the number of floors of a subject building. This variable helps to account for the higher price per unit of construction, especially along tall buildings and that tall buildings receive a premium in the market especially for offices on the higher levels. A positive association is expected between number of floors and the price per square meter.

\( FLOOR-AREA-RATIO (FAR) = \) the total building area divided by total land area. It is a measure of land-use intensity and also accounts for economies of scale inherent in more intense use of land. FAR is not the same as number of floors, although both are measures of building features. A high FAR may be associated with a low-rise building that trades off horizontal over vertical configuration (e.g., buildings in downtown Washington, D.C., which face height limits). A low FAR may be associated with a high-rise building that trades off vertical space over horizontal space (e.g., buildings in downtown Dallas and Houston, many of which are surrounded by large plazas). A positive association is expected between FAR and price per square meter.

\( PARKING-RATIO = \) the number of parking stalls per 100 square meters. Because commercial buildings usually need parking to satisfy customer and employee needs, price should be positively associated with parking ratio.

\( COVERED-PARKING = \) a binary variable indicating the presence of covered parking. Covered parking is the most expensive of all parking types. Yet because fees charged rarely cover costs, a negative association is expected between price and covered parking.
CITY-CENTER-DISTANCE = the distance in meters from a subject building to the center of downtown Atlanta. Although one would normally expect building prices to fall away from the downtown center, during much of the study period it was Midtown that blossomed, with the downtown witnessing rising vacancy rates. A negative association is expected between price per meter and distance to the city center.

MARTA-STATION-DISTANCE = the distance in meters from the nearest MARTA station. If the market for office commercial space views proximity to rail transit stations as an improvement in accessibility for its employees and customers, it should capitalize this value. Distance from transit stations should be negatively associated with price.

SPID-LOCATION = a binary variable indicating whether a subject building is inside a SPID. If policies aimed at encouraging development around SPIDs work as intended, price should be positively associated with location inside SPIDs.

Data for the evaluation are arms-length sales¹ of all office commercial property with buildings sold in the study area during the 1980s through 1994. There were 30 such sales; they comprise the universe. Sales and building attribute data come from the Fulton County Assessor’s office. Distance of the property centroid to the centroid of the nearest MARTA transit station was computed using the census Tiger line file in Atlas-GIS. Other variables were considered and rejected. Age of building was rejected because old buildings are renovated periodically and, in this study area, no high-rise buildings (more than 10 floors) were constructed in the study area before the study period. Building floors is thus a proxy for recently constructed buildings. Building class, such as Class A and Class B (using Class C as a potential referent), was rejected because it is associated with building floors (higher buildings are the most recently constructed and most prestigious in the market). There is always the danger that with a small \(n\), more variables than absolutely necessary to
reveal central tendencies with experimental variables may confound analysis, not improve it. The danger essentially comes down to underspecification. Over time, as this and other study areas build a history of sales, large numbers of sales can allow one to expand the number of variables used.

**Results and Interpretation**

Table 1 presents results of ordinary least squares regression for all cases \(n = 30\), in the first column showing the association of price with respect to transit station distance and in the second column with respect to SPID location. The third column reports results only for sales located outside SPIIDs showing price with respect to transit station distance. The coefficient of determination \((R^2)\) is .561, which seems reassuring given the relatively small sample size. The \(F\)-ratio is reasonable. The correlation matrix (not reported for brevity) reveals no problematic colinearities, while the casewise plots of standardized residuals against the dependent variable do not reveal systematic bias (also not reported for brevity).

The coefficients of all control variables (BUILDING-AREA, FLOORS, FLOOR-AREA-RATIO, PARKING-RATIO, COVERED-PARKING, and CITY-CENTER-DISTANCE) possess the expected signs, have reasonable magnitudes, and are mostly significant around the .10 level of the one-tailed \(t\)-test\(^2\) (because directions of association are predicted).\(^3\) The experimental variables, MARTA-STATION-DISTANCE and SPID-LOCATION, possess the signs expected from theory, have reasonable magnitudes, and are significant at the .01 level of the one-tailed \(t\)-test. In particular, the price per square meter falls by $75 for each meter away from the center of transit stations and rises by $443 for location within SPIIDs. The increment in building value with respect to SPID location is roughly equivalent in annualized rent to $44 per square meter, which is within the range commercial brokers in Washington, D.C., and elsewhere in Atlanta reported to interviewers (Damm et al. 1980; Rice Center 1987; Cervera et al. 1994).

**Implications for Theory and Policy**

The evaluation poses interesting theoretical and policy implications.
Table 1
Regression Results
Price Effects of Transit Station and SPID Policy on Midtown Atlanta Commercial Property Sales, 1980–1994

<table>
<thead>
<tr>
<th>Variable</th>
<th>Regression Coefficient</th>
<th>Statistical Indicator</th>
<th>Standard Error (one-tailed p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUILDING-AREA</td>
<td>-0.305</td>
<td></td>
<td>[0.017] p&lt;0.05</td>
</tr>
<tr>
<td>FLOORS</td>
<td>62.062</td>
<td></td>
<td>[41.132] p&lt;0.10</td>
</tr>
<tr>
<td>FLOOR-AREA-RATIO</td>
<td>0.449</td>
<td></td>
<td>[0.392] p&lt;0.15</td>
</tr>
<tr>
<td>PARKING-RATIO</td>
<td>91.044</td>
<td></td>
<td>[61.460] p&lt;0.10</td>
</tr>
<tr>
<td>PARKING-COVERED PARKING</td>
<td>-889.542</td>
<td></td>
<td>[307.975] p&lt;0.05</td>
</tr>
<tr>
<td>CITY-CENTER-DISTANCE</td>
<td>0.228</td>
<td></td>
<td>[0.182] p&lt;0.15</td>
</tr>
<tr>
<td>MARTA-STATION-DISTANCE</td>
<td>-0.748</td>
<td></td>
<td>[0.484] p&lt;0.10</td>
</tr>
<tr>
<td>SPID-LOCATION</td>
<td>443.205</td>
<td></td>
<td>[299.278] p&lt;0.10</td>
</tr>
<tr>
<td>CONSTANT</td>
<td>40.075</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ R^2 = 0.561 \]
\[ \text{Standard Error} = 450.010 \]
\[ F\text{-ratio} = 3.357 \quad \text{p}<0.01 \]
\[ \text{Number of cases} = 30 \]

Theoretical Implications

For the present and given contemporary technology, theory on the association between transit station access and building value seems to hold. This is especially interesting since theory seems to hold where policies do not discourage development away from transit stations. What is not known and cannot be derived from this or other studies, because there are no baselines by which to compare price effects longitudinally, is whether the magnitude of association is falling over time because of employment deconcentration and/or technological advances that reduce the advantages of central location.

Perhaps theory holds for only the more centralized locations such as Midtown Atlanta but not for more suburban locations. This alternative theoretical consideration is based on work by Landis et al. (1995) who found limited evidence of some price effects for commercial properties located near BART stations in urbanized Alameda County (Oakland area) but not for suburban...
Contra Costa County (Walnut Creek and Concord). This alternative should be the subject of future research.

**Policy Implications**

Atlanta has attempted to influence development patterns to increase transit ridership especially in the Midtown area. Its SPID policy waives parking requirements for development around rail transit stations while also relaxing FAR requirements, thereby allowing for taller, more intensively developed buildings. Outside SPIDs, new buildings must meet minimum parking ratios and are restricted to less intensively developed buildings—both conditions pre-dating the SPID policy. Atlanta’s approach to influencing parking supply and increasing transit ridership is solely based on incentives; there are no disincentives or mandatory conditions imposed on new development inside or outside SPIDs.

Atlanta’s policy to encourage commercial development within SPIDs seems effective, at least to some degree. MARTA’s investment in its rail system and transit stations appears to attract commercial development. The regression equation shows that distance from transit stations is associated with declining value per square meter of office space. Policies to stimulate commercial clustering around transit stations also appear somewhat effective, principally by reducing parking facility requirements within SPIDs. The price per square meter of office space rises with location inside SPIDs; in addition, the presence of decked parking is associated with lower value per square meter of office space, further signaling market response to the costs of parking.

Given the favorable response by the office market, is Atlanta’s SPID policy enough? Atlanta can probably do little more than it already is doing with its SPID policy. If the City unilaterally engaged in supply-side measures, it would either heavily subsidize commercial development around transit stations or prohibit commercial development elsewhere, but its policies would apply to only its incorporated city limits. Atlanta accounts for only 10 percent of the entire region’s population. Suburban locations enjoy lower land prices, accessibility to larger pools of more highly educated labor, lower congestion (at least until recent years), and willingness by suburban governments to diversify their
tax base. Given this, how can central cities such as Atlanta attract development, direct such development to areas served by rail transit, and encourage commuters if not customers to use transit? Mandatory requirements such as restricting new high-density development to areas near transit stations and restricting parking may seem reasonable but could have the effect of discouraging commercial development, causing even more commercial development in the suburbs.

In the present political climate, metropolitan Atlanta may be better advised to expand the city's SPID approach to encompass transit stations recently built or under construction in suburban areas. Indeed, SPID policies may be more effective in suburban communities than in places such as Midtown, because although local governments covet the diversification to local tax bases that commercial development offers, citizens are opposing more effectively commercial encroachments into established residential neighborhoods. SPIDs drawn around suburban stations may be even more effective in influencing development if they are combined with land-use policies restricting commercial and high-density housing outside SPIDs. Suburban governments would have their commercial development while mollifying citizen groups, too.

To accommodate the growing demand for commercial space, especially in suburban activity centers, the design of Atlanta's SPIDs could be reconsidered. The Midtown SPIDs are only about 0.64 kilometer on a side with an approximate radius half that distance and thus contain land area averaging about 0.41 square kilometer. This area is probably insufficient to accommodate more than a small share of total commercial and high-density housing demand in suburban areas. Although research suggests that most people are willing to access transit within this distance (Untermann 1984; Stringham 1982), other literature suggests that people are willing to walk a radius of up to 1.25 kilometers especially at the work-trip end (Parsons Brinckerhoff 1996). Suburban SPIDs designed with longer radii can be as large as 2.4 kilometers on a side or 5.8 square kilometers—an area more than 10 times larger than Atlanta's Midtown SPIDs. With a localized trolley system, the SPID area may be expanded somewhat more but probably only if density warrants.
Generalizability

Atlanta's experience with SPIDs may be generalizable to other metropolitan areas that are constructing or plan to construct new or expanded rail systems. Even in the absence of regional planning that directs commercial development to areas such as SPIDs, this research indicates that the commercial market in centralized locations, such as Midtown, will be attracted to locations near transit stations. Although SPID-like inducements may increase development, the mere presence of transit stations apparently influences location behavior. Will these outcomes hold for suburban locations? In growing suburban areas that have or will soon have rail transit access, SPID-like policies can be used to accommodate commercial development needs while also protecting nearby residential neighborhoods from commercial encroachment. Whether such policies will be effective in suburban locations is an open question, however, and one deserving of rigorous research.

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Endnotes

1. Arm's-length sales are those not between people related by kin or business.
2. Significance for some coefficients is at the .15 level. The reader may decide whether to accept or reject those outcomes. Because (1) of the small sample size, (2) directions were as predicted, and (3) the affected coefficients are merely control, whether the reader accepts or rejects those outcomes is immaterial to statistical interpretation.
3. Those associations indicate generally that sales price per square meter falls by about $0.03 per square meter above the mean ($674/square meter), rises by $62 for each floor above the mean (5 floors), rises $0.44 for each point increase in FAR above the
mean (266), rises $91 for each point increase in the parking ratio mean (1.75 per 100 square meters), falls by $889 for the presence of a parking garage, and rises by $23 for every kilometer away from the city center mean (3.78 kilometers).

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Boyce, David, Bruce Allen, Richard Mudge, Paul B. Slater, and Andrew M. Isserman. 1972. The impact of rapid rail on suburban residential property values and land development analysis of the Philadelphia high-speed line. Philadelphia: Regional Science Department, Wharton School, University of Pennsylvania.


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