
Measuring the Impact of Accessibility Change on Commercial Property Values: The Case of New Jersey Transit's Midtown Direct

**Pierre Vilain, PhD
Talha Muhammad**

*International Transportation and Economic Development
Conference, May 2, 2011*

Introduction

- Transit-Oriented Development (TOD) is seen as conferring various benefits: Encouraging transit use and reduced vehicle emissions, offering alternatives to sprawl, associated pedestrian and bicycle use
- TOD premise: accessibility is valuable, and locations that confer accessibility are more valuable
- TOD literature contains many examples of accessibility benefits being capitalized into real estate values:
- Voith finds 6.4% premium for houses proximate to Lindenwold Line, Landis and Cervero 38% for BART – similar findings in Washington, DC, Miami, Portland

Introduction

- While considerable number of estimates for residential properties, less evidence of transit impacts for commercial properties
- Economic theory proposes that increased accessibility will improve efficiency and productivity:
 - Increased variety of intermediate inputs
 - Increased size of local market
 - Improved worker-firm matches
 - Increased specialization
- Can we identify this benefit being capitalized into local commercial real estate values?

Introduction

- Cervero and Duncan (2001) and Weinberger (2001): Santa Clara commercial property values increased by proximity to light rail
- Cervero and Duncan (2001) find very high benefits of proximity to commuter rail
- Key findings:
 - TOD benefits to commercial properties higher from commuter rail than light rail
 - Benefits higher in dense commercial districts

Issue: Self-Selection and Measurement Bias

- Most TOD estimates based on cross-sectional hedonic studies
- *Self-selection* problem: Locations that receive infrastructure investments could be expected to differ from the average location that does not
- Cross-sectional studies will tend to suffer from omitted variable bias – and to *overstate benefits*
- “Quasi-experimental” tests have become popular tools of analysis
- **Point is to remove the effects of unobserved characteristics that are biasing estimates of TOD**

Quasi-Experimental Study Approach

- We identify specific changes in accessibility – the Midtown Direct and Montclair-Boonton services to Manhattan
- We assess whether the new service affected the *growth* of real estate values in the Pennsylvania Station ¼ mile area
- We compare the outcome for Pennsylvania Station area (the *treatment* area) to other locations in Manhattan (the *control* area)

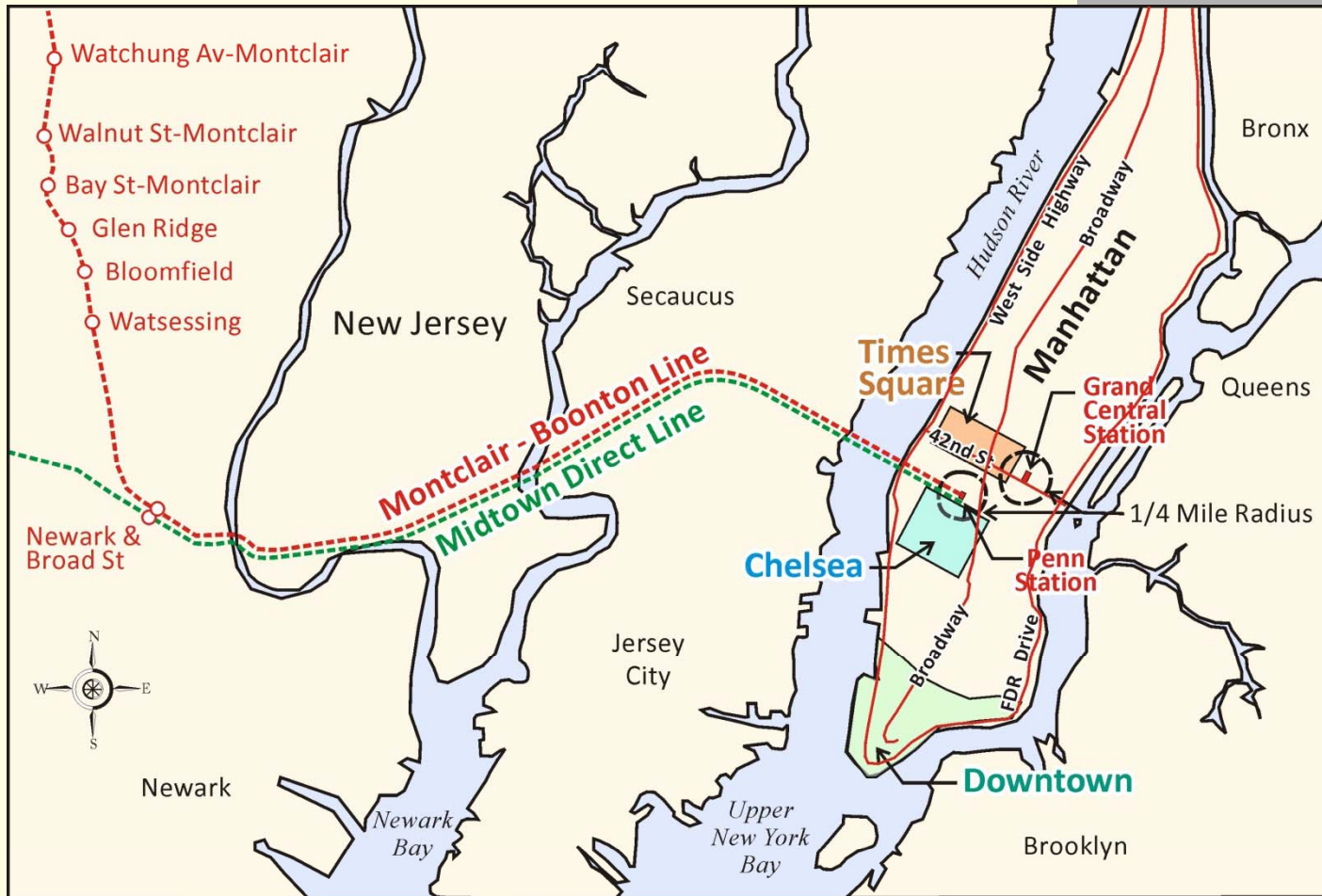
Quasi-Experimental Study Approach

- Key point: Control for the characteristics of each location that affect growth (quality of buildings, access to transit, zoning...)
- Gibbons and Machin (2005) impact on property values of new transit infrastructure in London
- Boes and Nuesch (2011) impact on property values of re-routed aircraft landing patterns at Zurich airport

Quasi-Experimental Study Approach

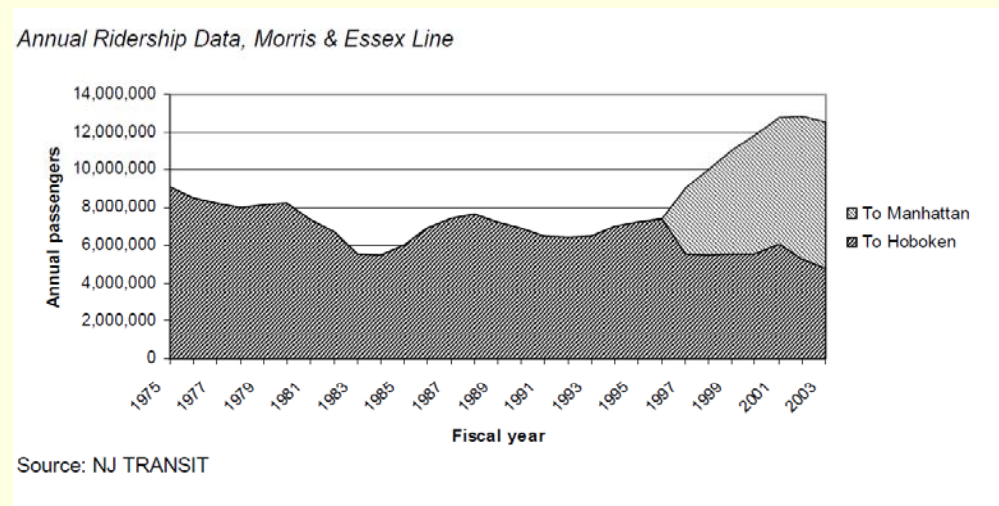
- CoStar data for sample of commercial leases in several Manhattan locations:
 - Penn Station area (n=144)
 - Grand Central Station area (n=213)
 - Downtown (n=328)
 - Times Square (n=169)
 - Chelsea (n=468)
- We follow the *same* properties (and their lease rates) through time
- Data by properties aggregated into location indices
- Quarterly data, 1994 (Q3) to 2005 (Q2) – total of 215 observations

Midtown Direct and Montclair Services



Midtown Direct and Montclair Services

- In June 1996, Midtown Direct service rerouts some trains on the Morris and Essex lines directly from a Hoboken terminus into Manhattan
- The more direct route saves 20 to 40 minutes
- Ridership impact dramatic

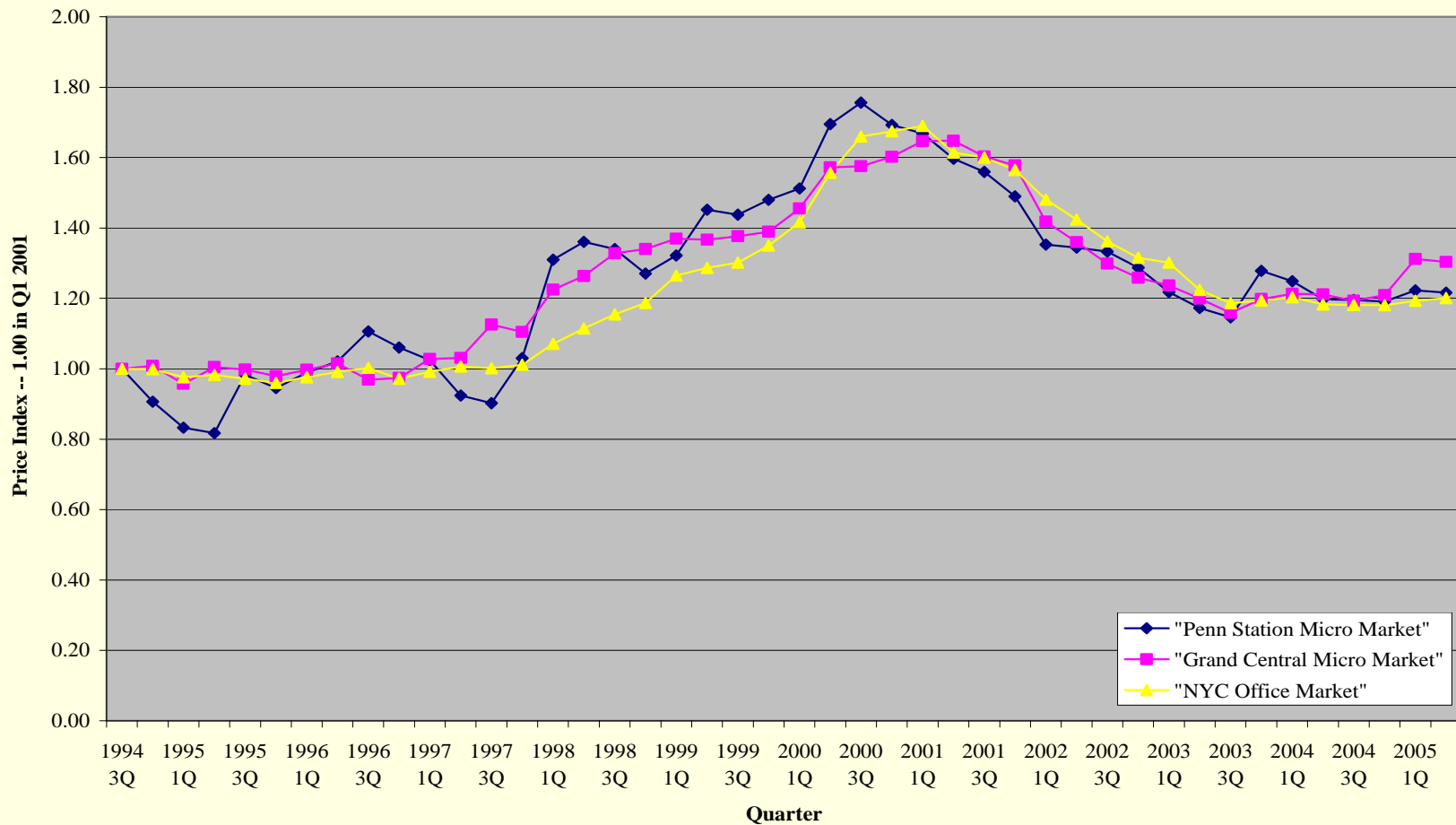


Midtown Direct and Montclair Services

- In September, 2002, the Montclair Branch and Boonton Branch are merged and provide direct service to Pennsylvania Station
- The service provides substantial time savings for a trip to Manhattan that necessitated a two-seat ride

Commercial Real Estate Price Indices for Several Manhattan Locations

Price Indices of Inflation-Adjusted Rents, 1994-2005



A general econometric framework

Measuring the impact on real estate from economic impacts of a transportation investment:

$$(1) \quad Y_{it} = \text{Constant} + X_{it} \beta + \eta * \text{MidtownDirect} + \text{Fixed Effects} + \text{MidtownDirect} + \varepsilon_{it}$$

- Y_{it} is the real average lease rate in location i at time t
- X_{it} is the change in overall economic conditions (proxied by employment)
- η is the coefficient that identifies the effect of the change in accessibility provided by Midtown Direct or the Montclair Boonton service
- Fixed effects control for the location's characteristics that influence the growth rate of real estate values
- Trend is a common trend for all locations
- ε_{it} is the regression error term for that observation

A general econometric framework

- Essentially, the model estimates the *difference* in outcomes by location between treatment versus control areas between periods (call them period t and period $t+1$)
- The accessibility variable for the control group will be equal to 0 – in other words the benefit of accessibility for anyone in the treatment group will be captured by η

Econometric Results

Dependent Variable	Log (Real Average Lease Rate)			
Period	1994Q4 2005Q2			
Frequency	Quarterly			
Model	Midtown Direct Impacts only			
Independent Variables	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-41.670	4.91	-8.48	0.00
Log (Employment 1 Qtr. Lag)	3.210	0.92	3.48	0.00
Log (Employment 2 Qtr. Lag)	2.120	0.82	2.58	0.01
Midtown_Direct	-0.012	0.01	-1.26	0.21
Midtown_Direct*Qtr. Mile Penn Station	0.083	0.04	2.01	0.05
Correction				
AR(1)	0.840	0.04	20.66	0.00
Statistics				
R-Sq	0.980			
Adj R-Sq	0.979			
Std. Error	0.053			
Durbin Watson	1.828			

Dependent Variable	Log (Real Average Lease Rate)			
Period	1994Q4 2005Q2			
Frequency	Quarterly			
Model	Midtown Direct Impacts + Montclair Impacts			
Independent Variables	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-41.67	4.21	-9.89	0.00
Log (Employment 1 Qtr. Lag)	3.33	0.86	3.88	0.00
Log (Employment 2 Qtr. Lag)	2.01	0.74	2.71	0.01
Midtown_Direct	-0.014	0.01	-1.37	0.17
Montclair	-0.039	0.02	-2.42	0.02
Midtown_Direct*Qtr. Mile Penn Station	0.083	0.05	1.80	0.07
Montclair*Qtr. Mile Penn Station	0.013	0.02	0.57	0.57
Correction				
AR(1)	0.815	0.04	19.39	0.00
Statistics				
R-Sq	0.980			
Adj R-Sq	0.979			
Std. Error	0.052			
Durbin Watson	1.834			

Results

- Our model suggests that as a result of Midtown Direct an 8% increase in real lease rates were realized within a quarter-mile radius of Penn Station
- Economic theory suggests improved accessibility will be capitalized into real estate values. Our results corroborate this theory.
- Montclair line impacts while positive were less significant (presumably reflects the much lower ridership carried by the line)

Conclusions

- Great interest in evaluating the real estate impacts of transit investments
- Theory supportive but not specific enough as to magnitude for commercial properties
- Need to evaluate on a case-by-case basis outcomes
- Need to controls for the issue of self-selection and selection bias, a problem that has characterized various studies of this type in the past
- Using a quasi-experimental framework , we find evidence of significant impacts due to Midtown Direct service to Pennsylvania Station