

Analyzing internal rate of capture in New York City

PROJECT INTRODUCTION AND METHOD

ABSTRACT

This study sought to answer questions about internal rate of capture in New York neighborhood tabulation areas (NTAs) though use of multiple regression. As average trip distance increased, internal rate of capture decreased. A similar, but much weaker relationship exists between average auto vehicle miles traveled and internal rate of capture. Across NTAs, there was a significant difference in average trip distance and auto VMT between internal and non-internal trips. Internal trips relied much more heavily on walking trips, while non-internal trips more heavily utilized automobiles and public transit. All proxies for travel affecting factors- individual and household characteristics, system performance, and contextual factors- showed a positive correlation with internal rate of capture.

PROJECT TOPIC/INTRODUCTION

This study seeks to determine the correlation between internal rate of capture, average trip distance, VMT, and modeshare in New York neighborhood tabulation area (NTA). In addition, it looks at how different variables that affect travel behavior influence the above.

REFERENCES

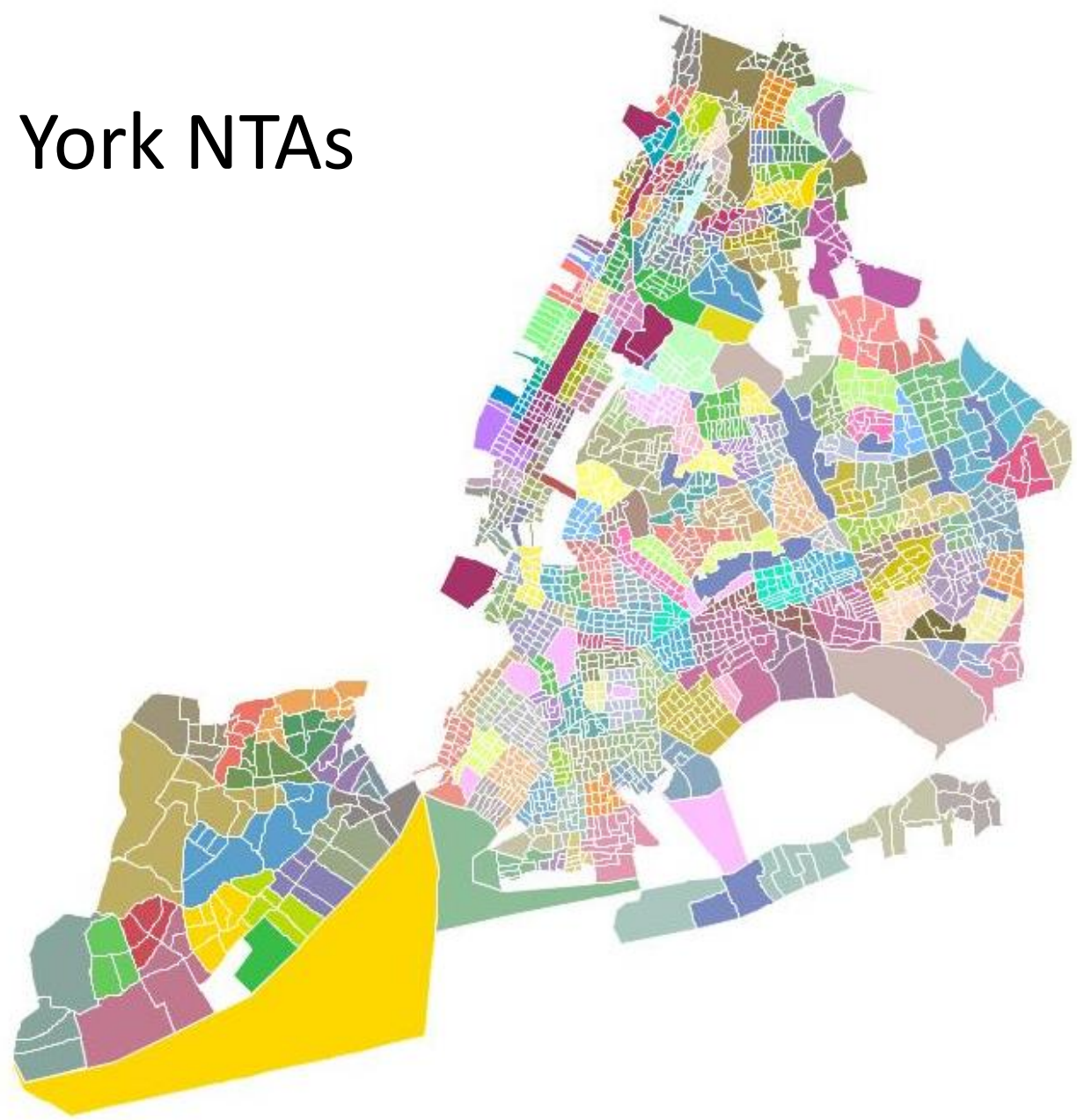
Bochner, B. S., Hooper, K., Sperry, B., & Dunphy, R. (2011). Enhancing Internal Trip Capture Estimation for Mixed-Use Developments. doi:10.17226/14489

Gulden, J., Goates, J. P., & Ewing, R. (2013). Mixed-Use Development Trip Generation Model. *Transportation Research Record: Journal of the Transportation Research Board*,2344(1), 98-106. doi:10.3141/2344-11

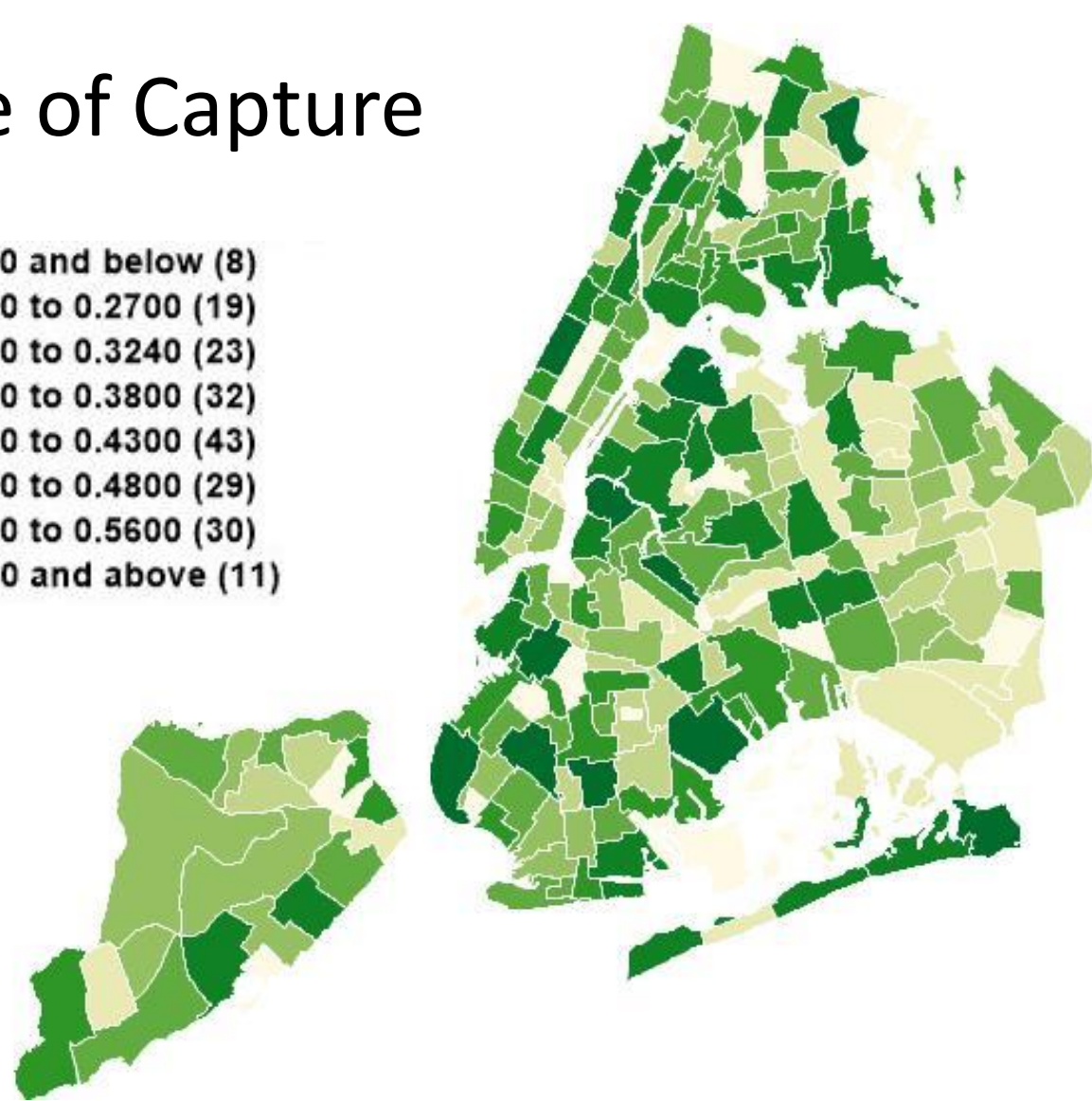
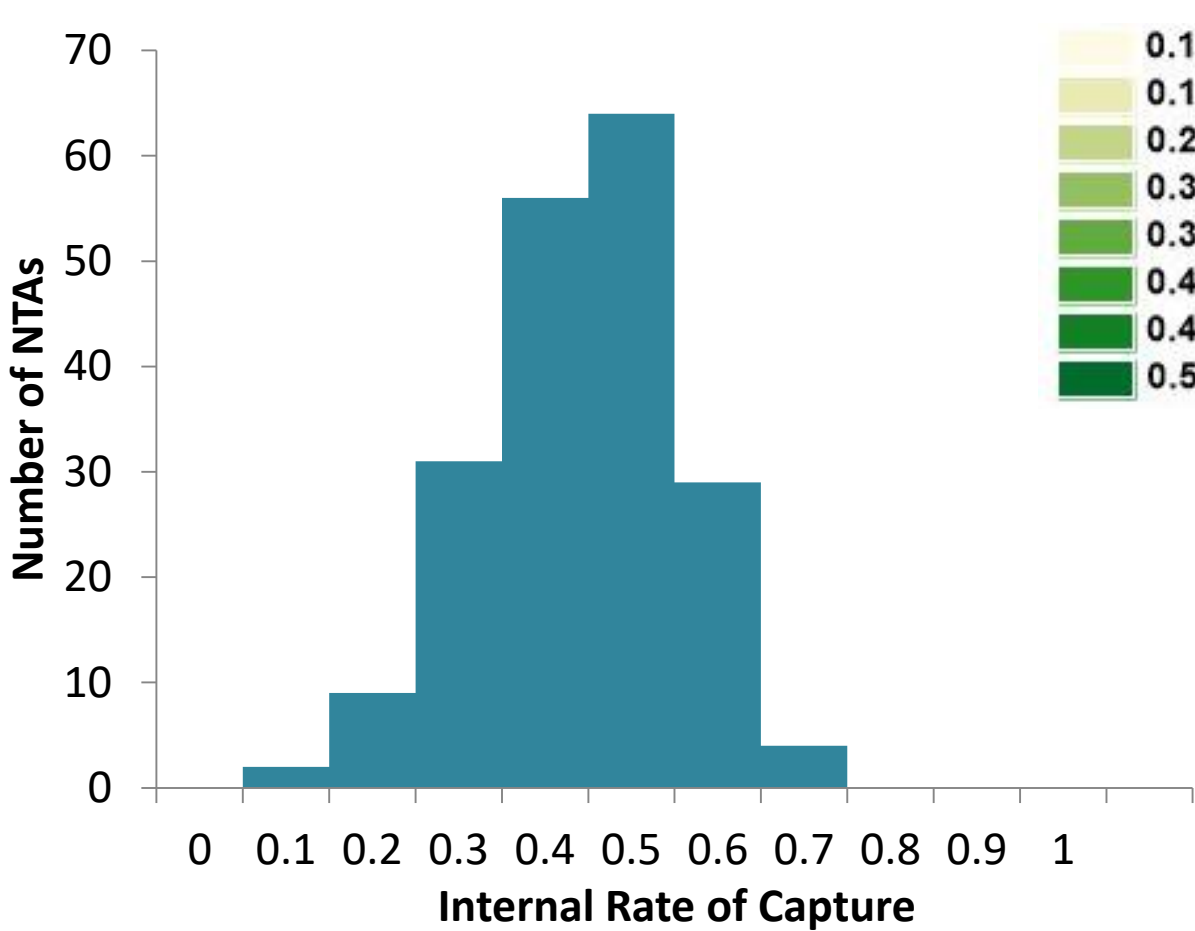
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STUDY RESULTS

New York NTAs

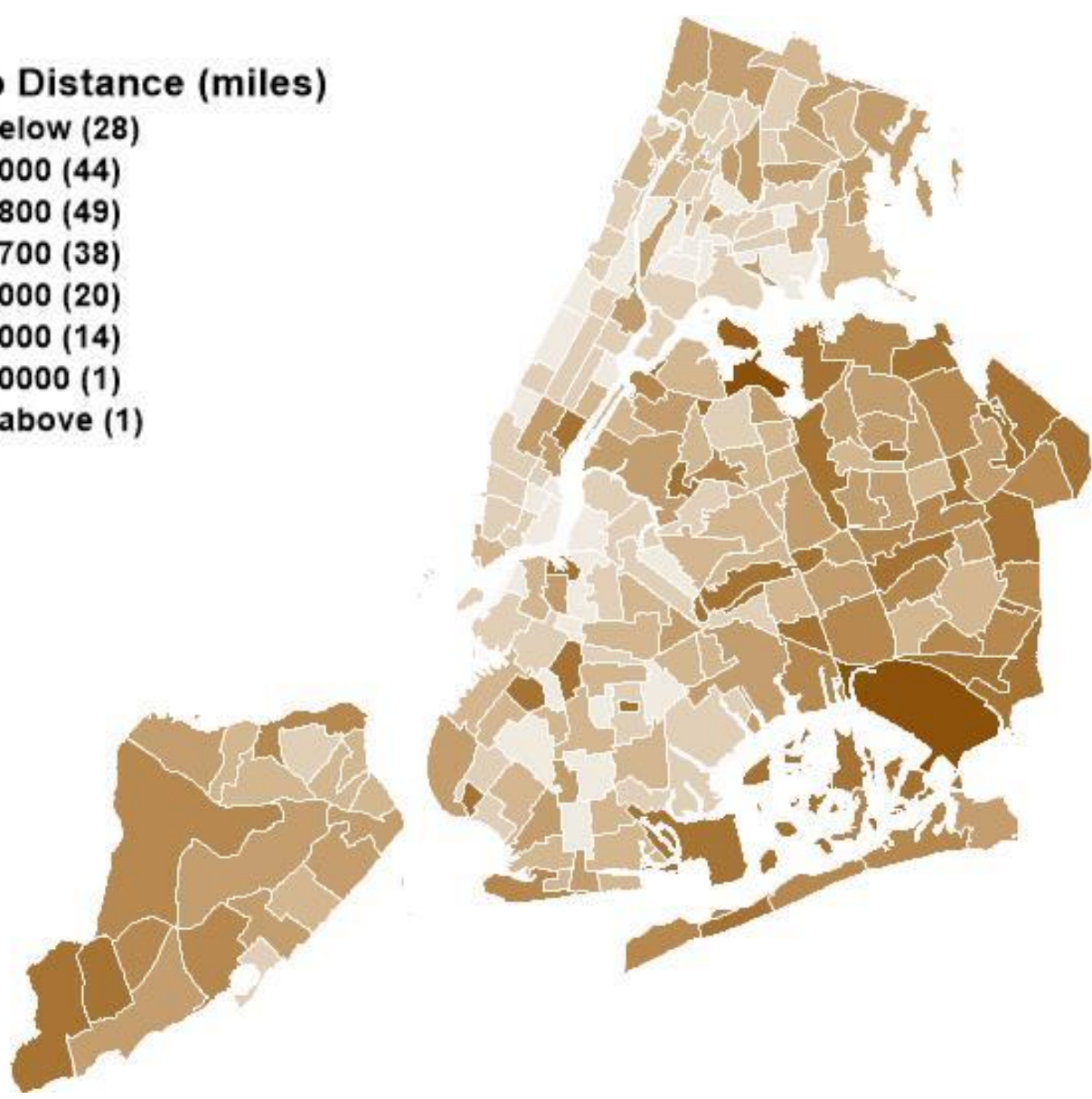


Internal Rate of Capture



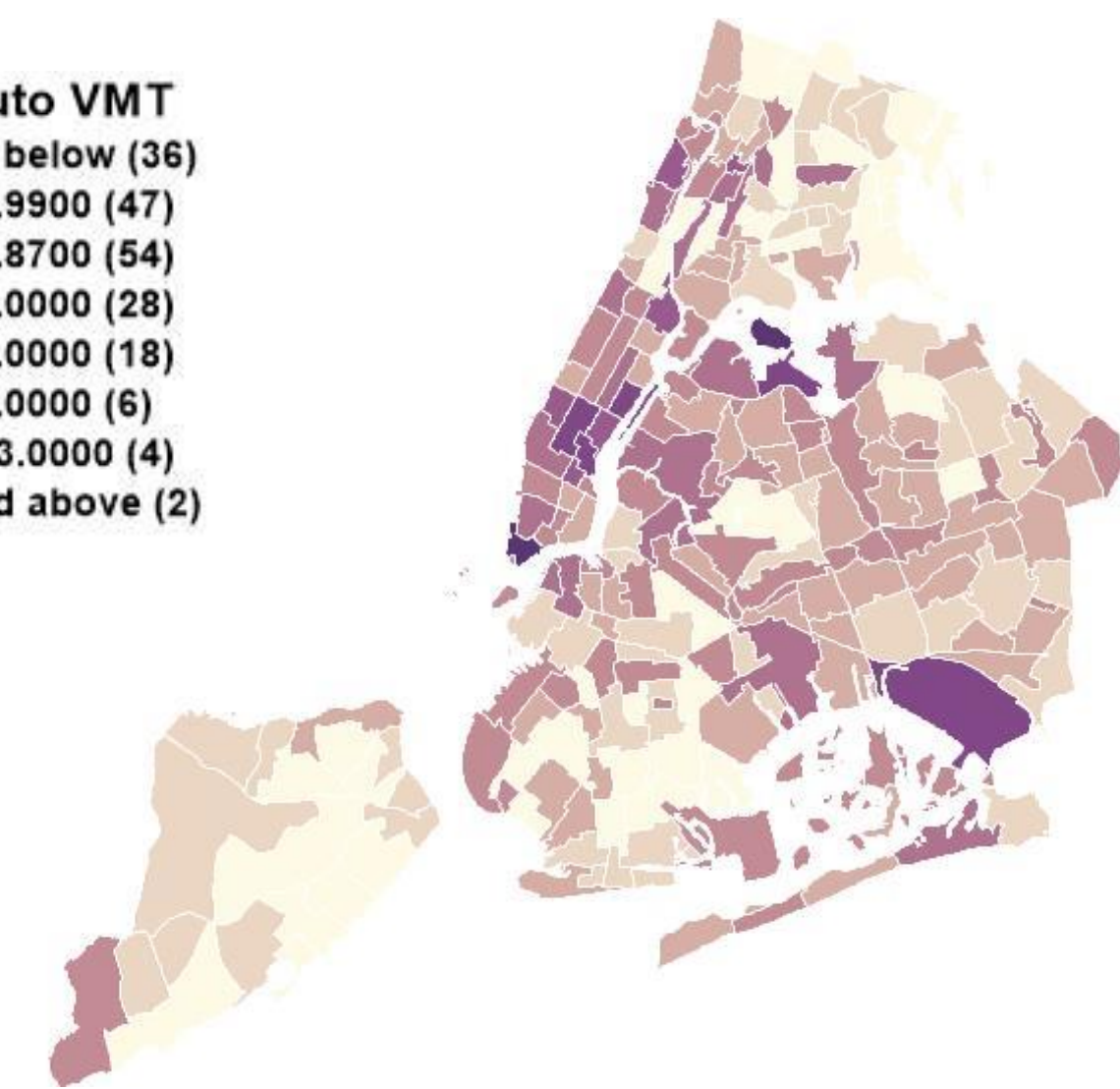
Average Trip Distance (miles)

| | |
|-------------------|------|
| 1.4000 and below | (28) |
| 1.4000 to 1.8000 | (44) |
| 1.8000 to 2.2800 | (49) |
| 2.2800 to 2.7700 | (38) |
| 2.7700 to 3.4000 | (20) |
| 3.4000 to 8.0000 | (14) |
| 8.0000 to 10.0000 | (1) |
| 10.0000 and above | (1) |



Average Auto VMT

| | |
|-------------------|------|
| 2.1200 and below | (36) |
| 2.1200 to 2.9900 | (47) |
| 2.9900 to 3.8700 | (54) |
| 3.8700 to 5.0000 | (28) |
| 5.0000 to 7.0000 | (18) |
| 7.0000 to 9.0000 | (6) |
| 9.0000 to 13.0000 | (4) |
| 13.0000 and above | (2) |



Mode Share

Internal trips utilized much higher rates of walking than non-internal trips and not applicable trips. Automobiles were used at much lower rates (9% vs 26% for non-internal and 83% for not applicable trips. Public transit was also used at a much lower rate for internal trips (6% versus 41%).

| | Walk | Bike | Auto Driver | Auto Passenger | Carpool/ Vanpool | Public Transit | Other |
|-----------------|------|------|-------------|----------------|---------------------|----------------|-------|
| Not internal | 30% | 1% | 19% | 7% | 0% | 41% | 2% |
| Internal | 84% | 0% | 6% | 3% | 0% | 6% | 1% |
| Not applicable* | 12% | 0% | 64% | 17% | 0% | 7% | 1% |

*neither trip origin or destination are within a NTA

Travel behavior

Proxies for the three main factors that affect travel were derived from the Smart Location database and used to explain internal rate of capture. Percent of 0-car households was used as a proxy for individual and household characteristics. Aggregate frequency of transit service per square mile was used as a proxy for system performance. Network density in terms of facility miles of multi-modal links per square mile was used as the contextual proxy. All factors were positively correlated with internal rate of capture. The confidence level for percent of 0-car households was between 99.8 and 99.9% (t=3.34). It was between 95 and 98% for aggregate frequency of transit service per square mile and network density (t=1.95, t= 2.24, n=195).

| Variable | Estimate | Std. Error | T-test |
|---|----------|------------|--------|
| Constant | 0.064933 | 0.060662 | 1.07 |
| Percent of 0-car households | 0.524345 | 0.157184 | 3.34 |
| Aggregate frequency of transit service per square mile | 0.000014 | 0.000007 | 1.95 |
| Network density (facility miles of multi-modal links per square mile) | 0.017411 | 0.007777 | 2.24 |

CONCLUSIONS

There is some evidence that a NTA shapes a household’s activity space. 40.72% of trips whose origin or destination are within a NTA were internal to that NTA. This is further supported by the relation between average trip distance and internal rate of capture (–0.036, r-squared 0.11). Across all NTAs, average trip distance is smaller for internal trips (0.25 vs 4.12 miles). Auto VMT is also smaller for internal trips (0.38 vs 5.00 miles). The use of active transportation is supported by urban design, which should be encapsulated by NTAs. 84% of internal trips were made by walking. In addition, average trip distance and auto VMT for NTAs is positively correlated (0.20, r-squared 0.16), suggesting that trips made by automobiles are longer. Internal rate of capture is positively correlated with the proxies for individual and household characteristics, system performance, and contextual factors. This shows that these factors are greater determinants of rate of capture.