NATIONAL STREET IMPROVEMENT STUDY

peopleforbikes | BENNETT MIDLAND | Portland State UNIVERSITY | THE SUMMIT FOUNDATION
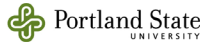
FINDINGS FROM SEATTLE

OVERVIEW[1]

Across the country, policymakers and planning departments are making cities more livable by better accommodating people who walk and bike. Improving streets and upgrading transportation infrastructure often requires reducing on-street parking or traffic lanes. While studies have shown how such upgrades improve traffic safety and mobility for city residents, the question remains how such infrastructure improvements affect economic outcomes.

This study will attempt to answer to what extent these types of corridor-level street improvements impact economic activity and business vitality in the immediate vicinity. In particular, how do street improvements impact retail sales and employment?

Seattle has conducted many street improvement projects in past years, such as bike lane installations and road diets. This report explores three recent street improvement corridors—Second Avenue, Broadway and Roosevelt Way—to understand the economic and business impact of these active transportation infrastructure investments. While the bike lane installed on Roosevelt Way in 2016 is a good candidate for this type of analysis, it is excluded from this round of corridor analysis due to insufficient data for post-construction evaluation at this time.

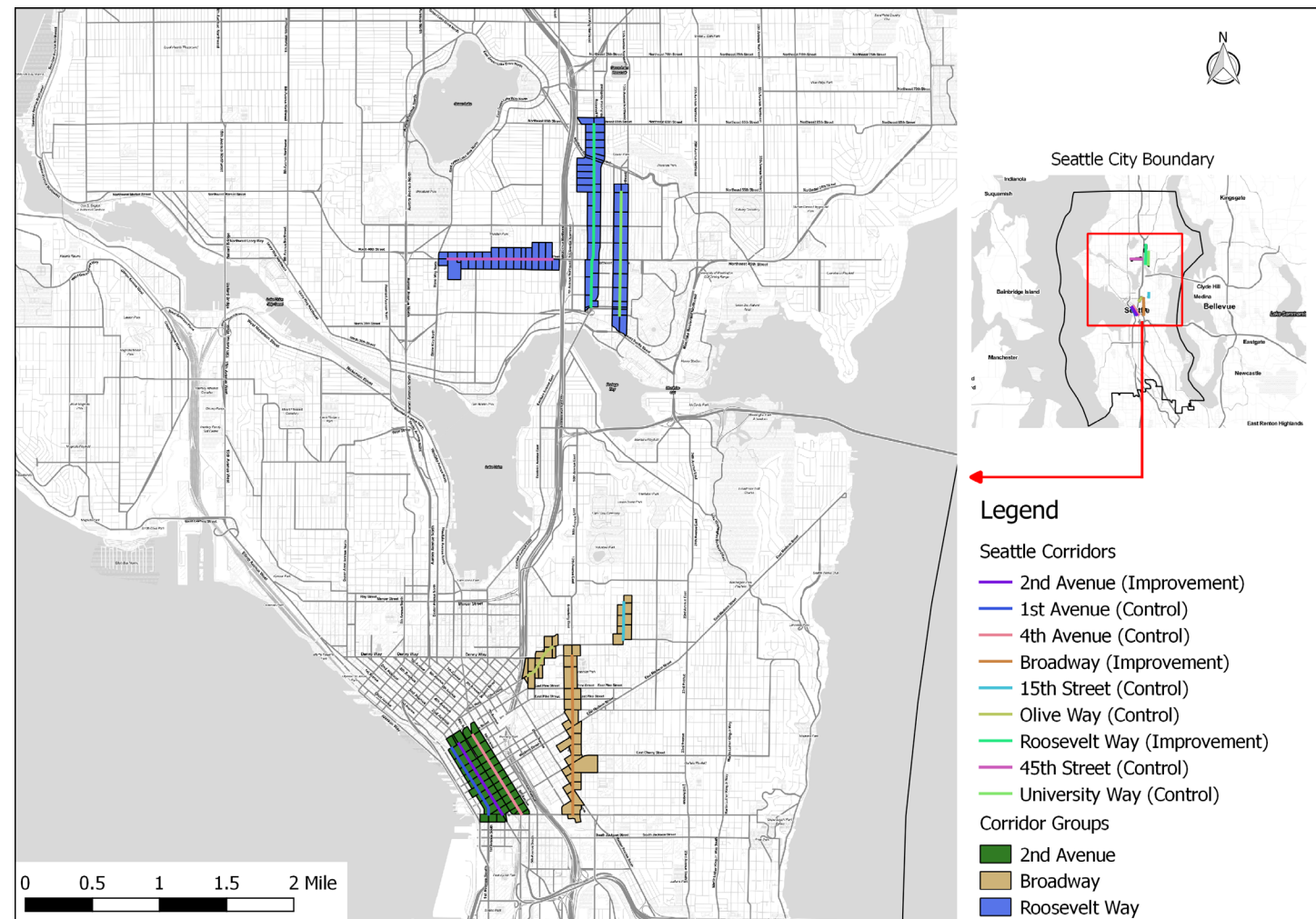Assessing the impact of street improvements and the accompanying reduction of on-street parking or travel lanes

on a neighborhood's economic activity and vibrancy is a new field of research. In 2013, the New York City Department of Transportation commissioned a first-of-its-kind study, using sales tax data to evaluate how businesses on improved corridors have been affected. This current study builds on past work by examining additional cities and incorporating new research methods and data sources.

KEY FINDINGS

Based on our analysis, we found the street improvement projects in Seattle improved economic outcomes in some industries. In particular, we can conclude that:

1 ON THE SECOND AVENUE CORRIDOR, THE PROTECTED TWO-WAY BIKE LANE CONTRIBUTED TO HIGHER EMPLOYMENT AND IMPROVED BUSINESS VITALITY IN THE RETAIL SECTOR.

2 ON BROADWAY AVENUE, WE FIND THAT THE PROTECTED BIKE LANE TRIGGERED A SIGNIFICANT POSITIVE IMPACT ON FOOD SERVICES EMPLOYMENT AFTER INSTALLATION, INDICATING AN IMPROVEMENT IN BUSINESS VITALITY AS A RESULT.

In the other analyzed corridors and industry sectors, we found either mixed results or insignificant results.[2] However, the insignificant results may be significant in this context. Importantly, there is no evidence of a negative economic impact from right-of-way or parking lane removal.

Legend

Seattle Corridors
— 2nd Avenue (Improvement)
— 1st Avenue (Control)
— 4th Avenue (Control)
— Broadway (Improvement)
— 15th Street (Control)
— Olive Way (Control)
— Roosevelt Way (Improvement)
— 45th Street (Control)
— University Way (Control)

Corridor Groups
■ 2nd Avenue
■ Broadway
■ Roosevelt Way

DATA SOURCES

For this study we used multiple data sources to estimate the effect of new bike lane infrastructure investment, each with its pros and cons.[3] As such, the analysis results using the three data sources should be viewed as complementary to each other.

LEHD

First, we used the Longitudinal Origin-Destination Employment Statistics (LODES) data set from the **Longitudinal Employer-Household Dynamics Dataset** (LEHD). LEHD provides geographically granular detail about jobs, workers and local economies, allowing us to examine employment by broad industry sector, wage and educational attainment. One major disadvantage of the LEHD data set is that in order to guarantee confidentiality, block level data is "fuzzed" so the numbers do not reflect the exact number of jobs at this geographical level. Additionally, though employment is disaggregated by industry, it is only provided at the most general level (the equivalent of two digit NAICS[4] codes) so we are unable to isolate restaurant workers from hotel service workers, for example. That being said, the LEHD data set is comprehensive, offers unprecedented geographic detail, and is longitudinal, allowing for consistent comparisons over time.

SALES TAX DATA

Sales tax data is collected as the primary data source to allow us to estimate a more sensitive measure of economic activity than employment (as the decision to hire or fire employees for a firm is often an expensive one, and thus we would expect employment to be a delayed response to changes in economic activities). Some drawbacks of sales tax data are that some states do not have a sales tax or, in states or cities that do have one, the sales tax data is not broken down by specific industry and it is difficult to accurately parse out figures. But the benefits of sales tax data largely outweigh these issues and do offer a more sensitive metric than employment. Washington has a general 6.5% sales tax for all businesses with a

variety of additional taxes dependent upon use and the city/county where a particular establishment is located. For example, Seattle has an additional 3.6% retail sales tax. However, certain food categories, prescription drugs, and other goods are exempted from tax collection, which may hamper the ability of sales tax data to accurately reflect all retail business vitality. The aggregated sales tax data by corridors are provided by Department of Revenue. However, we cannot distinguish particular industry sectors and separated control corridors using the data. The report below only shows the findings from LEHD and QCEW data.

QCEW

This report also takes advantage of establishment level **Quarterly Census of Employment and Wages (QCEW)** data. The QCEW gives us address-level data on individual establishments as well as detailed employment information, allowing for more accurate pinpointing of the geographic location of businesses and industrial classifications. However, individual establishment-level QCEW data is confidential and requires special permission from the state, and is subject to additional data use restrictions. Due to confidentiality restrictions, we were only able to obtain the corridor-level retail and food and accommodation employment data aggregated by Puget Sound Regional

Council. In particular, employment figures were suppressed if there were fewer than three employers in certain NAICS codes or years in the corridors. These aggregated numbers correspond closely to the LEHD data used elsewhere in the report, but with the advantage that the numbers are not "fuzzed" for confidentiality concerns.

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1. The National Street Improvements Study is a research project by Portland State University, Bennett Midland, and PeopleForBikes. An accompanying report with more detailed information on methodology can be accessed at https://peopleforbikes.org/placesforbikes/resources/

2. This is typically due to either an insufficient number of data points after the completion of the street improvement (for ITS analysis) or control corridors that may not be fully comparable (for DID analysis), methods explained further in Section 3 ("Methodology").

3. Because this project makes use of a variety of different data sources, it required collaboration between the research team and representatives from multiple agencies/departments. Our principle contact was with the City of Memphis, sales tax data was provided and aggregated by State of Tennessee Department of Revenue; QCEW data was provided by Tennessee Department of Labor and Workforce Development; and LEHD data was publicly available at United State Census Bureau.

4. For the North American Industry Classification System (NAICS), please visit https://www.census.gov/eos/www/naics/.

Three analytical methods were applied in order to isolate the impact of street improvements while controlling for other economic and regional factors. The methods are an aggregated trend analysis (following the NYC DOT study), a difference-in-difference approach, and an interrupted time series analysis. The time frame used in the analysis for LEHD data is 2004-2015 and 2008-2017 for QCEW data.

In order to properly isolate the effect of the street improvements we must identify treatment corridors (corridors that actually were improved) and control corridors (corridors that are similar to the treatment corridors except they remain unimproved). Treatment corridors are corridors where new bike or pedestrian related improvements were installed, made up of a minimum of 10 adjacent, or intersecting, census blocks with a minimal number of retail and food service-related jobs. Ideally, we wanted to choose street improvement corridors that have sufficient data (at least 3 data points pre- and post-treatment) to track pre- and post-treatment economic trends. However, due to the late construction year of the corridors and delayed LEHD data update, the corridors we analyzed don't have enough post-treatment data points to show comprehensive trend after street improvement, especially using LEHD data. Once corridors are selected based on these criteria, further testing is conducted to discern the level of similarity between treatment and control corridors. The tests include quintile comparisons of corridor-level employment to city-wide employment, and statistical tests of average block level employment that compare control corridors to the treatment corridors.

AGGREGATED TREND ANALYSIS

This first analytical method, aggregated trend analysis, follows a previous NYC Department of Transportation study (NYCDOT, 2013), examining whether the treatment corridors tend to have better business performance than comparison corridors after street improvements. The approach compares the trends of treatment and control corridors in addition to city-wide trends over the full time period covered by the data. If treatment corridors show greater increases in employment or sales tax receipts, then that would represent a positive impact of street improvement on business activities. This method is easy to follow and represents the aggregated trend of business activities. However, it lacks the rigor of econometric estimates and statistical tests that explicitly test whether the street improvement caused the change.

DIFFERENCE-IN-DIFFERENCE APPROACH

The second method aims to estimate the difference in business vitality of pre- and post-improvement periods between treatment and control corridors within the same time period. This is known as a difference-in-difference (DID) approach. The approach looks at the change in the variable of interest—employment levels or sales revenues in our case—in the treatment corridor before and after the street improvement. Meanwhile, the control group has not been treated in either time period. The difference in growth trajectories between the two periods should provide us with an unbiased estimate of the effect of the street improvement.

INTERRUPTED TIME SERIES

The third method, interrupted time series (ITS), is an econometric technique that estimates how street improvements impact corridor economic vitality from a longitudinal perspective. This approach treats the street improvement as the "interruption" and estimates the change in the level and the growth trend of business activities in the corridor after the street improvement. If the street improvement treatment has a causal impact, the post-intervention sales revenue or employment should show a different level or slope compared to the pre-intervention data.

CONCLUSION

In conclusion, aggregated trend analysis and DID analysis both utilize control corridors to determine the impacts of the street improvement corridor, while the ITS analysis uses multiple time points on the street improvement corridor itself to pinpoint economic outcomes. In general, the ITS analysis provides more robust results than the other two methods, since it is less likely to be affected by the selection of control corridors. However, this method generally requires more data points post-intervention to achieve meaningful and valid impact estimations. The DID approach is heavily dependent on finding comparable control corridors (which may not always exist), so the analytical results may be weakened when appropriate corridors cannot be identified.

Additional data points after the completion of street improvements may help to provide further validity and rigor to the analysis of resulting economic outcomes. Moreover, further contextual information about the street improvement corridor, such as quality or level of the improvement, number of parking spots eliminated, and subsequent bicycle ridership or pedestrian increases, would help to better understand the linkages between the improvements and potential economic impacts. Extending this research to more closely examine the changes and shifts in industrial patterns will be valuable as well.

5. The aggregated trend analysis is a visual and growth trend comparison approach where statistical significance cannot be assigned. However, for the two econometric approaches, DID and ITS analysis, we refer to statistically significant impacts whenever positive or negative impacts are stated in this report.

Second Avenue installed a protected two-way bike lane in 2014. The neighboring corridors Fourth Avenue and First Avenue were selected as the control corridors.

Legend
Seattle Corridors
— 2nd Avenue (Improvement)
— 1st Avenue (Control)
— 4th Avenue (Control)

KEY TAKEAWAYS

We can conclude that the protected two-way bike lane contributed to higher employment and improved business vitality in the retail sector on the Second Avenue corridor, but cannot make the same conclusion for the food services sector

» Both the trend analysis and DID analysis show that the protected bike lane on Second Avenue corridor positively impacted employment, especially in the retail sector, when compared to the Fourth Avenue control corridor.

» The ITS analyses indicate that the protected bike lane did not have a statistically significantly impact on employment, and the increasing employment in the retail and food sectors is likely the result of the continuous pattern of growth along Second Avenue.

» The LEHD employment data is only available one year after the street improvement on Second Avenue; therefore, the LEHD trend post-treatment is less comprehensive and less reliable compared to the QCEW data, which shows a three-year post-treatment trend.

CORRIDOR ANALYSIS

Data	Area	Retail			Food		
		Baseline	Pre-Growth	Post-Growth	Baseline	Pre-Growth	Post-Growth
LEHD [Employment]	Treatment	300	4.12%	14.33%	991	-0.86%	0.20%
	Control: Fourth Ave	399	-9.78%	-28.82%	1,436	16.79%	25.42%
	Control: First Ave	396	15.23%	34.60%	1,227	2.74%	26.89%
QCEW [Employment]	Treatment	231	78.15%	12.21%	628	8.57%	7.99%
	Control: Fourth Ave	298	-4.56%	-11.88%	1,566	12.95%	4.08%
	Control: First Ave	225	3.06%	7.33%	753	-0.96%	11.25%

Broadway started its installation of a protected bike lane in 2013, and completed the installation in spring of 2014. Fifteenth Street and Olive Way in the Pike and Capitol Hill neighborhoods are the control corridors.

Legend
Seattle Corridors
— Broadway (Improvement)
— 15th Street (Control)
— Olive Way (Control)

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KEY TAKEAWAYS

The protected bike lane on Broadway triggered a significant employment increase in the food services industry after installation, indicating an improvement in business vitality as a result

» Both data sources indicate food services employment increased considerably after street improvement on Roosevelt Way, compared to the two control corridors.

» DID models show a positive causal effect of bike lane installation for food services employment on Broadway when compared to the two control corridors, and a significant positive effect on retail employment when compared to the Olive Way control corridor.

» LEHD data shows that retail employment growth slows down after street improvement, but remains positive, while QCEW data indicates greater retail employment growth rates after street improvement.

» ITS analyses indicate there is no statistically significant impact of the protected bike lane on employment, and the increasing retail and food services employment is likely the result of the continuous pattern of growth along Broadway.

Data	Area	Retail			Food		
		Baseline	Pre-Growth	Post-Growth	Baseline	Pre-Growth	Post-Growth
LEHD [Employment]	Treatment	349	37.95%	12.83%	403	10.27%	30.78%
	Control: Olive Way	32	-13.16%	-9.82%	162	1.61%	2.49%
	Control: Fifteenth Ave	212	23.26%	15.59%	216	-2.54%	16.17%
QCEW [Employment]	Treatment	234	8.61%	16.70%	308	21.18%	29.42%
	Control: Olive Way	37	-1.35%	-	149	24.56%	11.33%
	Control: Fifteenth Ave	192	-2.52%	5.16%	268	0.19%	5.93%

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