The Impact of One-Way to Two-Way Street Traffic Conversions on Commercial Property Values: Evidence from Charleston, South Carolina

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Abstract

In the first half of the twentieth century, street patterns in many urban areas in older American cities were modified to better accommodate automobile traffic. In Charleston, South Carolina, several streets in the city's commercial district were converted to one-way streets to increase vehicle capacity and speed. In 1994, a portion of one such street was reconverted to two-way traffic in an effort to stimulate economic revitalization in an area that seems to have been harmed by the one-way conversion that was implemented in 1956. This study analyses changes in property values along the reconverted portion of King Street to determine the effect of restoring two-way traffic. From casual observation, the area has regained its status as a cultural and retail hub in the City of Charleston. Statistical analysis confirms that the one-way to two-way reconversion was significant in contributing to the enhancement of the property values of properties along the city's most recognizable street.

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Introduction

The twentieth century was a time for great change in American cities. The first half was a period of growth that brought with it tremendous increased congestion from automobile traffic in many urban areas. As suburb residential growth exploded, commuter traffic flow into downtowns further increased traffic congestion. Perhaps in shortsightedness, traffic engineers promoted the concept of one-way streets as a way to increase capacity of existing streets and to allow cars to move at faster speeds. But, following the pattern of residential suburbanization, commercial businesses soon began their own exodus from the urban core and many central business districts suffered severe economic decline. Over time, traffic volumes in the urban core decreased substantially and no longer required the increased vehicle capacity and speed provided by one-way streets.

Today, interest in downtown living is increasing and many urban areas are again experiencing significant growth and renewal. To decrease the negative effects of automobile traffic, some American cities have embraced the concept of "traffic calming" to further foster the renewal process. A common method for calming the traffic on urban streets is the reconversion of one-way streets to two-way streets. The decreased traffic capacity and traffic speed, along with streetscape improvements, are important components for the success of revitalization in many cities.

Charleston, South Carolina's business district along King Street has generally followed the national trend of the twentieth century. As a primary street through the central business district, it was converted to one-way traffic in 1956 to reduce traffic congestion and its role almost immediately changed from a typical city street to a commuter thoroughfare (see Exhibits 1 and 2 for maps of the area). The city's central business district was in a stage of noticeable decline until the 1980s when several publicly funded projects aided the revitalization of Lower King Street, south of Calhoun Street.

Exhibit 1: Overview Map of the Charleston Area

Exhibit 2: Street Map of the Charleston Peninsula

The benefits of these projects, however, did not reach Upper King Street (north of Calhoun Street). It was not until 1992 that this area caught the attention of local government, investors, preservationists, and shoppers and a full redevelopment strategy study was conducted for the area.[1] Upper King Street was reconverted to two-way traffic in 1994, following general recommendations of the study. The one-way to two-way reconversion appears to have served as a catalyst for revitalization and Upper King Street now resembles the busy and diverse commercial corridor it was before the conversion from two-way to one-way traffic in 1956. The reconversion is generally regarded as successful by city officials, merchants and shoppers, but there has been no detailed analysis of the effects of the reconversion on real estate values in the area.

Prompted by a comment in an article by Edwards (2002) that appeared in *Main Street News*, the purpose of this study is to statistically evaluate the impact of the one-way to two-way traffic conversion on commercial property values along Charleston's Upper King Street.[2] While some qualitative studies are available that describe the decision making process of past one-way to two-way reconversion in other cities, no previously published study goes beyond anecdotal evaluations and none of these studies specifically considers Charleston. The trend of reconversions has continued in many American cities because of their apparent success, but rigorous analytical research may help justify similar reconversions as a viable method for revitalization of urban areas. The results of this analysis indicate that the reconversion of the traffic pattern on Upper King Street is related to increased property values in the surrounding area.

INTENDED EFFECTS OF TWO-WAY TO ONE-WAY STREET CONVERSIONS

The two primary arguments posited during the mid-twentieth century in favor of two-way to one-way traffic patterns were (1) traffic efficiency and (2) pedestrian safety.[3] Traffic efficiency is a measure of the speed and success of transporting people and freight along roadways to their destinations. Traffic efficiency is a broad term that collectively refers to traffic capacity, traffic speed, and total travel time. Capacity is a measure given to a street or road that indicates the traffic volume that it can accommodate over a defined period. The measure of traffic capacity is related to the determined or estimated traffic volume which represents the vehicles per hour, day, month, or any determined period. Vehicular speed of traffic is determined by the posted speed

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[1] Wilber-Smith Associates. *King Street Two-Way Operation Analysis, Calhoun Street to Cannon Street.* Charleston, SC: 1993. Available through City of Charleston, Department of Traffic and Transportation, Charleston, South Carolina.

[2] Edwards writes "While a growing number of communities are opting for two-way traffic in their business districts and there is significant anecdotal evidence that positive changes occur after most street conversions, there has been limited research on actual retail sales and property value increases. More economic data is needed to support the economic benefits of these conversions." John D. Edwards, *Converting One-Way Streets to Two-Way: Managing Traffic on Main Street,* (Washington, D.C.: The National Trust's Main Street Center, 2002).

[3] Eno, William Phelps. *The Story of Highway Traffic Control.* The Eno Foundation of Highway Traffic Control, Inc., 1939.

limit and the ability of a vehicle to reach and maintain that speed. Beyond speed limits, placement of regulatory systems such as stop signs and traffic lights, as well as the design of the street itself can affect traffic efficiency. Traffic capacity, traffic volume and rate of vehicular speed determine the total travel time needed to reach a destination.

From a traffic engineering viewpoint, one-way streets increase traffic capacity when implemented in pairs. These "couplets" separate the cars that previously traveled in both directions on two streets. The net increase in capacity gained by converting a two-way street to a pair of one-way streets can be as great as 50 percent.[4] In a time when urban streets were severely congested with traffic, this increase in capacity was greatly desired.

Another benefit of one-way streets, as seen by traffic engineers, is increased vehicular speed. Because one-way streets segregate directional traffic each one-way couplet can have wider travel lanes. Wider travel lanes encourage an increase of vehicular speed because of the decreased perception of friction. The appearance of friction created by a narrow street, on-street parking, and/or on-coming traffic affects the driver's perception and therefore his or her calculation of safe speed. In fact, some traffic theorists in the 1930s promoted one-way streets specifically because they required the driver to pay less attention to driving![5]

Also affecting vehicular speed is the placement and frequency of uniform traffic control devices, such as stop signs and traffic signals. On the commercial streets of medium sized cities, traffic lights are used more than stop signs. Traffic lights stop vehicles at their immediate location and decrease their speed while approaching and leaving an intersection. Traffic lights on one-way streets can be synchronized to reduce the number of stops. By creating a traffic pattern that reduces stopping, automobiles can proceed indefinitely at a fixed rate of speed. Furthermore, because of the design of one-way streets, this fixed speed is increased.

Perhaps the greatest consideration promoted by traffic engineers for one-way to two-way conversions during the early part of the twentieth century was that of pedestrian safety. The speed and pattern of vehicular traffic on a street was thought to greatly impact the level of safety afforded to non-vehicular street users such as pedestrians and bicyclists. Pedestrian safety in downtown commercial streets is paramount because pedestrians are shoppers. Even shoppers that arrive at a commercial street by automobile are, at some point, pedestrians. In most cases, a downtown motorist's destination is some place to park the car, namely a garage, lot or on-street parking space; upon parking, the motorist leaves the vehicle as a pedestrian to access the final destination.

Several studies quantitatively support the notion of benefits of both one-way and two-way streets on pedestrian safety.[6] At the time of many two-way to one-way conversions, engineers believed that one-way streets offered several advantages to pedestrians. The then prevailing thought on

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[4] *Traffic Engineering Handbook,* ed. James L. Pline, Fourth ed. (Englewood Cliffs, New Jersey: Prentice Hall, 1992), 330.

[5] Richard W. Lyles, Chessa D. Faulkner, and Ali Muazzam Syed, *Conversions of Streets from One-Way to Two-Way Operation,* (East Lansing, MI: Michigan Department of Transportation, 2000), 5.

[6] John J. Stemley, "One-way streets provide superior safety and convenience," *Journal of Institute of Transportation Engineers* (1998).

this issue relates to the needs of both drivers and pedestrian to only be aware of traffic traveling in one direction. Because vehicles only travel in one direction, both head-on and left-turn accidents were thought to be dramatically decreased. Some theorists of that time suggested that traffic accidents involving both vehicle/vehicle and vehicle/pedestrian conflicts could decrease between 10 to 50 percent if one-way streets are employed.[7]

ONE-WAY TO TWO-WAY RECONVERSIONS AS A TRAFFIC CALMING STRATEGY

The arguments in favor of two-way to one-way street conversions have largely dissolved over time as many new urbanites seek to re-enter the sense of place created by cities. As urban areas suffered economic decline, the need for one-way streets diminished and their continued existence is sometimes accused of bringing further decline to city centers by creating hostile environments to non-motorists. With this new perspective on downtown traffic, many one-way streets were converted back to two-way streets. In essence, cities began to recognize that decreased vehicle speed, even with higher traffic density, was more desirable than having commuter thoroughfares running through the central business district. Pedestrian safety, ease of orientation, business recognition and visibility, and economic redevelopment in urban areas argue in favor of one-way to two-way street reconversions.

PEDESTRIAN SAFETY

Pedestrian safety is a quality of life issue in urban areas. The ability of non-motorists to utilize public space, specifically in the form of commercial corridors, is essential for downtown vitality. Recent research by traffic engineers and those in other fields has competently analyzed the safety of both one-way and two-way streets. The results of these studies reveal, for example, that the single most dangerous vehicle/pedestrian conflict, a left turn from a one-way street, only occurs in a one-way street network. There is also evidence that two-way streets are better for pedestrian safety based on the decreased traffic speed. Pedestrian safety is cited as a major factor in the conversion of one-way streets to two-way streets in Denver, Colorado, Milwaukee, Wisconsin, and Toledo, Ohio.[8]

The *Traffic Engineers Handbook* published by the Institute of Transportation Engineers indicates "vehicles turning left out of one-way streets appear to hit pedestrians significantly more frequently than do all other turning vehicles." Furthermore, in an article published in the *Journal of the Institute of Transportation Engineers* in 2004, a computer model was used to compare one-way and two-way networks and concluded that on one-way streets, vehicles travel at higher speeds, have a lesser average delay, and stop less often, and because of these attribute are not

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[7] University of North Carolina Highway Safety Research Center, "One-way streets," in *Florida Pedestrian Planning and Design Handbook* (1999), 89.

[8] Robert F. Dorroh and Robert A. Kochevar, *One-Way Conversions for Calming Denver's Streets*, 1996), 110.; A. Nelessen Associates, *Milwaukee Downtown: Catalytic Projects* (Milwaukee, WI: City of Milwaukee, 1999), 43.; Development Consulting Group and Typlan Consulting Ltd, *One Way Couplets Impact Analysis* (Kelowna, British Columbia, Canada: City of Kelowna; Downtown Kelowna Association, 2003), 20.

safe for pedestrians.[9] Superficially, it might seem that crossing a one-way street is preferable to crossing a two-way street but in fact, crossing a one-way street presents greater difficulties to the pedestrians than crossing a two-way street. Two-way city streets, regardless of posted speed limit tend to have slower vehicular speeds. A decrease in vehicular speed decreases both the total number of collisions and because of lower speeds can decrease the seriousness of those collisions.

EASE OF ORIENTATION

The success of urban transportation is dependent on the ability of a motorist to reach his or her destination. Traffic capacity, speed, and street design affect this ability, so too does the availability of routes within the greater street network. Well-planned placement of one-way and two-way streets affects the number of routes available to reach a destination, but may increase or decrease total travel distance. Knowledge of the street network can greatly influence the ease with which a driver can find suitable routes. Drivers that traverse an area more frequently are better able to evaluate the best route. Infrequent users of a street network do not have the knowledge needed to choose alternative routes and are therefore more greatly affected by the street network. If the street network cannot be assessed and understood by infrequent users, such as visitors to a new city, motorists will often be forced to travel out of their way to reach a destination. Furthermore, even frequent users are forced to make out-of-direction travel to reach a destination. An easily understood road network is necessary to decrease total travel distance and ensure ease of orientation for drivers and therefore the ability to access their final destination.

By limiting travel in one direction, one-way streets restrict access to certain destinations in the street network and increase total travel distance. The need of street users to make extra turns was and is known by traffic engineers. It seems that a decrease in congestion and an increase in travel speed were more desirable in the mid-twentieth century than the most efficient travel distance. Today there is evidence that some traffic engineers are still unconcerned with total travel distance because it does not always affect total travel time. Because total travel time is dependent on a number of other factors, travel distance is not the most important variable. However, in requiring additional turns and out-of-direction travel, the street network may become confusing to infrequent street users.

During the revitalization of many American downtowns in the 1990s, two-way streets became recognized as being more “user friendly” for local, regional and out-of-town shoppers. The desire to improve the ease of orientation by infrequent visitors is demonstrated by one-way to two-way street conversions in Milwaukee, Wisconsin; Lubbock, Texas; Lansing, Michigan; Lafayette, Indiana; Dubuque, Iowa; New Haven, Connecticut and Great Falls, Montana.[10]

BUSINESS RECOGNITION AND VISIBILITY

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[9] Lum Kit Meng and Soe Thu, "A Microscopic Simulation Study of Two-Way Street Network Versus One-Way Street Network," *Journal of The Institution of Engineers, Singapore.* 44, no. 2 (2004): 114.

[10] A. Nelessen Associates, *Milwaukee Downtown: Catalytic Projects,* 43.; Lyles, Faulkner, and Syed, *Conversions of Streets from One-Way to Two-Way Operation,* 13.; ibid., 13.; Development Consulting Group and Typlan Consulting, *One Way Couplets Impact Analysis,* 20.; ibid., 20.; ibid., 20.; Planning Department, City of Great Falls, Montana, *The Conversion of Downtown One-Way Streets Back to Two-Way Streets* , 2007), 5.

Business visibility and storefront exposure are also important factors in implementing one-way to two-way street conversions. Business visibility is the ability of a driver to see and identify a storefront or sign. Storefront exposure is the ability of a driver to see a specific storefront based on its location within the street network and within the block. These factors are essential to understanding the pros and cons of one-way and two-way traffic on commercial streets.
The assertion that one-way streets are good for business is verified for only certain types of business. Supermarkets and other high-volume, low-margin stores that have their own parking lots probably do better on a one-way couplet that gives a large number of motorists quick access to those stores. This type of business typically sells convenience items needed regularly by a large number of people, such as household supplies, food and other regularly purchased items. While urban environments, specifically small historic commercial districts, do sell this type of items, they are not sold in a supermarket setting, but in small groceries. Many storefronts in downtown commercial corridors are locally owned and sell unique items.[11]
Research has considered the appropriate traffic speed for smaller commercial streets to maximize business visibility. A traffic engineer of more than forty years, John D. Edwards, has determined that "operating speeds of 20 to 25 mph are necessary so that the shopper does not feel hurried and so that a leisurely pace is present. Furthermore, at operating speeds in excess of 30 mph it is difficult for the motorist or a researcher to even observe the types of retail outlets present."[12] The posted speed of a street can reflect this appropriate speed, but because users of one-way streets are more likely to accelerate beyond the posted limit, storefronts and signs will be even less visible. Because the shopper does not typically plan purchases from small businesses on commercial streets, they can be considered "impulse" purchases. For this type of sale, storefront visibility from a moving automobile is essential, even if the shopper intends to return to the store on foot.

Increased vehicular speed decreases business visibility, so too does the direction of travel. If direction of travel is restricted to one direction, as it is on a one-way street, storefront eclipsing occurs. Storefront eclipsing is the loss of exposure to first floor commercial property caused by one-way streets. A methodology to determine storefront eclipsing was developed by Glatting, Jackson, Kercher, Anglin, Lopez, and Rinehart Inc., a national community planning firm specializing in urban design, transportation planning and engineering. "The quantity of eclipsed store frontage is a function of the quantity of one-way street approaches in the intersection, block perimeter size, building setback and street width."[13]
Two-way streets may provide better visibility based on the type of business. "Specialty stores that rely on impulse sales and depend on high margins per sale do better on two-way streets,

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[11] Walker, Kulash, and McHugh, *Downtown Streets: Are We Strangling Ourselves on One-Way Networks,* 5.

[12] Edwards, John D. "Traffic Issues for Smaller Communities." *Journal of the Institute of Transportation Engineers* (1998).

[13] G. Wade Walker, Walter M. Kulash, and Brian T. McHugh, *Downtown Streets: Are We Strangling Ourselves on One-Way Networks,* 13.

since only half their potential customers would see them on a one-way couplet."[14] The stores along most small historic commercial streets are exactly the type of businesses that do better on two-way streets. Furthermore, there is evidence that successful, nationally-known chain retailers of coffee and books choose locations on two-way streets because of increased exposure and accessibility.

ECONOMIC REDEVELOPMENT

The goal of downtown revitalization often includes the decrease or mitigation of automobile presence. The National Trust for Historic Preservation's Main Street program, dedicated to the preservation and revitalization of downtowns, has supported the use of one-way to two-way conversions. The Main Street approach was developed in the 1970s to prevent the continued decline of traditional commercial streets in American cities. By combining preservation values with economic development strategies, the approach has been successfully applied in 1,200 cities, towns and neighborhoods. Because of its mixed mission, the Main Street program must promote development methods appropriate for historic districts. In 2002, the Main Street's monthly periodical was devoted to new ways to manage downtown traffic, specifically converting one-way streets to two-way streets. In the lead article John D. Edwards, "Managing Traffic on Main Street," the benefits of two-way traffic, as seen by Main Street, include making the area more "customer friendly" by increasing pedestrian activity, increasing traffic density, and making downtown street networks more easily navigated by visitors. Revitalizing a commercial district by improving pedestrian traffic flow, even with accompanying traffic congestion, increases the level and quality of use of the buildings along the street.

One of the most recent and comprehensive surveys of one-way to two-way conversions in downtowns was completed for the Hyannis Main Street Business Improvement District (HMSBID) in Cape Cod, Massachusetts in 2000.[15] HMSBID was considering converting their downtown street, Main Street, to two-way traffic. Dissatisfied with relying on previous conversion case studies that focused on traffic flow, this study was implemented to evaluate business development and downtown livability. Of the 22 cities identified as having converted their main downtown streets from one-way to two-way, all but one showed positive impacts on business development. One community showed no impact, neither positive nor negative. It is important to note that many of the conversions were part of a greater revitalization program that included myriad streetscape improvements.

It is worth noting that some stakeholders in commercials districts may in fact desire increased traffic density. An appropriate amount of density can give the appearance of vitality to an area and allows drivers to see signs and storefronts. The number of cars that can travel along a commercial street represents a large number of potential sales and slower speed is an important factor in storefront visibility. Slow speed also decreases the severity of collisions, increases pedestrian safety, and ensures the visibility of storefronts and signage. Because of these benefits, revitalization strategies are often centered on the conversion of one-way streets to two-way operations.

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[14] Thoreau Institute, *Should Cities Convert One-Way Streets to Two Way?*, 29 October 2008.

[15] Ted Brovitz, "Converting Downtown Streets from One-Way to Two-Way Yields Positive Results," *The Urban Transportation Monitor* (2000).

The Department of Civil and Environmental Engineering at Michigan State University conducted a detailed literature review of one-way to two-way conversions in 2000.[16] Interestingly, the majority of the sources cited concerning one-way streets written before 1990 tended to be about conversion of two-way streets to one-way operation, while those published after 1990 were more frequently focused on conversion from one-way street to two-way streets. This observation illustrates the radical shift in perspective of the purpose of urban streets and indicates that recent research has informed the decision to correct the auto-centric travel systems of the early to mid-twentieth century.

One-way to two-way street conversions in residential neighborhoods are employed with the same goals as other traffic calming measures. One-way residential streets in urban areas often become major routes for commuters into and out of downtown. Because drivers on one-way streets tend to drive faster than on two-way streets, the street is not only used for a high capacity of vehicles but at higher speeds. The fight for one-way to two-way street conversions has been said to have been started by the baby boom generation which started returning to urban residential neighborhood in the 1980s and 1990s. In Denver, Colorado this demographic was so desirous of "quiet residential streets like those on which they had lived during their youth" that they demanded one-way to two-way conversions. Because of the persistent urging of concerned residents, one-way streets in residential neighborhoods were the first type of street to be converted to two-way operation. A study of eighteen residential traffic calming programs considered the opinions of people living in and adjacent to neighborhoods that underwent one-way to two-way street conversions and reports high levels of success and popularity for such conversions across the nation.[17] The most support for the method came from those living on or near the converted streets while the most opposition came from those that use the street for automobile travel. Because many residential street conversions are conceptualized and supported by residents of the area, there is likely to be more positive acceptance of the conversions by residents. Furthermore, a negative opinion of the conversion can be expected from non-resident drivers who use the one-way streets as thoroughfares in their commuting route. This dichotomy of opinion clearly illustrates to whom one-way streets are a convenience and to whom they are detrimental.

STATISTICAL EVALUATION OF THE 1994 ONE-WAY TO TWO-WAY STREET CONVERSION OF UPPER KING STREET

Previous studies of the impact of traffic conversions primarily rely on anecdotal evidence. The present study employs statistical analysis to investigate the impact on commercial property values of the one-way to two-way traffic conversion on Upper King Street. The research question examined in this study is whether or not the conversion of Upper King Street from one-way to two-way traffic, in November 1994, is statistically related to the transaction prices of commercial properties in the area, and if so in what direction. Regression analysis is

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[16] Richard W. Lyles, Chessa D. Faulkner, and Ali Muazzam Syed, *Conversions of Streets from One-Way to Two-Way Operation,* (East Lansing, MI: Michigan Department of Transportation, 2000), 8.

[17] Robert F. Dorroh and Robert A. Kochevar, *One-Way Conversions for Calming Denver's Streets,* 1996), 109.

used to investigate this hypothesis based on the premise that commercial property and location characteristics determine the property's usefulness to tenants, which is directly related to the property's ability to generate rental income and thus to the property's value in the market.

DATA

The data used in this study consists of 121 commercial properties located on Upper King Street (41 properties) and on cross streets located within two blocks of Upper King Street (80 properties) that were sold between 1990 and 1998: four years on each side of the conversion date of 1994. Continuous variables used in the analysis include:

sale price (adjusted by the Consumer Price Index to 1994 dollars to control for general changes in price levels over the study period),

sale date (used to control for property value trends during the study period),

square footage,

Binary variables used in the analysis include identifiers for:

street type (one-way or two-way),

location of a property on King Street,

location of a property north of Calhoun Street,

location of a property on a corner lot,

location of a property on a high-traffic street, and

sales that occurred after the one-way to two-way reconversion in 1994.

Two regression models are estimated: the first considers the full sample of 121 properties and the second considers only the 41 properties directly located on Upper King Street.

SAMPLE DESCRIPTION AND REGRESSION MODEL #1

As shown in Exhibit 2, the mean sale price of the full sample of properties is $391,013 and the mean price per square foot is $94.14. Of the 121 properties, 33 percent are located on King Street and 37 percent are located north of Calhoun Street. Furthermore, 58 percent are located on two-way streets, 30 percent are on corner lots and 67 percent were determined by the Assessor's Office to be located on high traffic streets.

EXHIBIT 2
DESCRIPTIVE STATISTICS FOR COMMERCIAL PROPERTIES ON OR NEAR UPPER KING STREET SOLD BETWEEN 1990 AND 1998

Variable	Mean	Std. Dev	Min	Max
Sale Price (1994 dollars)	$391,013	$350,517	$15,000	$1,650,000
Natural Log of Sale Price (1994 dollars)	12.42	0.95	9.73	14.23
Total Building Square Footage	5,374	4,621	314	36,953
Location on King Street	0.33			
Location North of Calhoun Street	0.37			
Location on a Two-way Street	0.58			
Location on a Corner Lot	0.30			
Location on a High-Traffic Street	0.67			

The following regression model is proposed to test the significance of the variables described earlier as determinants of property value for the full sample of 121 commercial properties:
$LN(CPI\text{-}ADJUSTED\ SALE\ PRICE) = \beta_0 + \beta_1 (TOTAL\ SQUARE\ FOOTAGE) + \beta_2 (TRANSACTION\ DATE) + \beta_3 (CORNER\ LOT) + \beta_4 (TWO\text{-}WAY\ STREET) + \beta_5 (LOCATION\ NORTH\ OF\ CALHOUN\ STREET) + \varepsilon.$ (Equation 1)

The equation parameters in Equation 1 are estimated using Ordinary Least Squares (OLS) regression.
The OLS regression results shown in Exhibit 3 indicate that location, size and year sold are significantly related to sale price for this sample. The property characteristic that has the most significant impact is location north of Calhoun Street. The significant and negative coefficient indicates that a location north of Calhoun Street is associated with a lower property value. Next, the size of the building is significantly related to sale price, with larger buildings having a greater value. Lastly, the transaction month variable (a control variable for property value trends over the study period) indicates that property values were generally increasing. Location of the parcel, as either an interior or corner lots and its location on a one-way or two-way street, are not statistically significant determinants of property value in this sample when evaluated at the 95% confidence level.

EXHIBIT 3
OLS REGRESSION RESULTS FOR COMMERCIAL PROPERTY VALUE DETERMINANTS ON OR NEAR UPPER KING STREET SOLD BETWEEN 1990 AND 1998

Dependent Variable: Natural Log of Sale Price (1994 dollars)	**Estimated Coefficient**	**Standard Error**	***t*-statistic**	**Level of Statistical Significance**
North of Calhoun Street	-1.101599	0.1287651	-8.56	>99%
Total Building Square Footage	0.0000826	0.0000134	6.16	>99%
Month of Transaction	0.0128763	0.0026866	4.79	>99%
Location on a Corner Lot	0.0512144	0.1386922	0.37	>67%
Location on a Two-way Street	0.028061	0.1281018	0.22	>72%
Number of Observations: 121		R^2 = .5476; *F*-statistic = 29.84		

SAMPLE DESCRIPTION AND REGRESSION MODEL #2
Reducing the sample to properties located directly on Upper King Street provides a more focused analysis of the changes in property value before and after the one-way to two-way traffic reconversion. The mean sale price of properties located directly on Upper King Street is $362,945 and the average price per square foot is $62.82. Of these properties, 75 percent were determined by the County Assessor's Office to be on a high traffic portion of King Street and 53 percent were located above Calhoun Street. Because the block position (corner or interior) was determined to be statistically insignificant in the full sample analysis, this variable is omitted from the remaining analysis.

EXHIBIT 4
DESCRIPTIVE STATISTICS FOR COMMERCIAL PROPERTIES LOCATED

DIRECTLY ON UPPER KING STREET SOLD BETWEEN 1990 AND 1998				
Variable	**Mean**	**Std. Dev**	**Min**	**Max**
Sale Price (1994 dollars)	$362,945	$298,405	$45,000	$1,150,000
Total Building Square Footage	6,407	4,257	1,066	2,071
Location North of Calhoun Street	0.53			
Location on a High-Traffic Street	0.75			

The dependent variable for the regression model is the natural log of the 1994 inflation-adjusted sale price. The independent variables are the total square footage of the building, location of the property north of Calhoun Street, and the transaction period (1990 through November 17, 1994 or November 17, 1994 through 1998). The regression model to be estimated for the 41 properties located directly on Upper King Street is expressed in Equation 2:

$$LN(\text{CPI-ADJUSTED SALE PRICE}) = \beta_0 + \beta_1 (\text{TOTAL SQUARE FOOTAGE}) + \beta_2 (\text{LOCATION NORTH OF CALHOUN STREET}) + \beta_3 (\text{AFTER THE 1994 CONVERSION}) + \varepsilon.$$

(Equation 2)

The OLS regression results presented in Exhibit 5 indicate that location and size are statistically significant and positive determinants of sale price. The most significant property characteristic is the location of a King Street north of Calhoun Street, resulting in a reduced transaction price. Building size is the second most significant characteristic affecting King Street parcels, with larger buildings associated with greater sale prices. After controlling for location and size characteristics, the affect of the one-way to two-way conversion is also a significant and positive determinant of sale price. Overall, these results support the hypothesis that the 1994 one-way to two-way conversion is significantly associated with higher property sale prices of properties located directly on Upper King Street (99 percent confidence level).

EXHIBIT 5
OLS REGRESSION RESULTS OF DETERMINANTS OF VALUE OF COMMERCIAL PROPERTIES LOCATED DIRECTLY ON UPPER KING STREET SOLD BETWEEN 1990 AND 1998

Dependent Variable: Natural Log of Sale Price (1994 dollars)	**Coefficient**	**Standard Error**	***t*-statistic**	**Level of Statistical Significance**
Location North of Calhoun Street	-0.9841235	0.1649539	-5.97	>99%
Total Building Square Footage	0.0000868	0.0000192	4.52	>99%
Post-Reconversion Sale	0.7204999	0.2079599	3.46	>99%
Number of Observations: 41		**R^2 = .7025, *F*-statistic =29.13**		

CONCLUSION

Efforts to relieve traffic congestion in downtown areas during the early to mid-twentieth century by converting two-way streets to one-way streets proved to be effective in increasing traffic flow

through urban areas, but, combined with commercial suburbanization, ultimately contributed to the decline of many cities' central business districts. Proponents of downtown renewal began to reconsider the impact of such conversions and many cities around the country have reconverted one-way streets to two-way travel with the goal of bringing people back to city centers. Substantial anecdotal evidence has been reported that indicates these reconversions have been a successful tool in stimulating urban renewal, but no previous study has provided a quantitative analysis documenting this effect. The purpose of this study is to fill that void by statistically evaluating the impact of two-way to one-way reconversions on commercial property values using data from the Upper King Street area of Charleston, South Carolina. Using regression analysis, the results of this study support the contention that the reconversion of this street is significantly related to increased commercial property values. This finding may provide qualitative justification for additional reconversions in other urban areas to stimulate renewal and redevelopment.