

The impact of highway bypasses on small towns

By

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Abstract

Small towns thrive on the performance of local businesses, and when the economy is doing well other parts of the town start to do well such as population growth and housing values. However, driving through small towns can really slow down travelers passing through. To fix this, highway bypasses were constructed to lead traffic around the town and speed up their travel time. The question asked is, by leading traffic away from the town, how will housing values, businesses and population be affected. The cities of Whitewater, WI and Burlington, WI will be studied from before and after bypass construction. The variable that will be compared are population, housing value, and number of businesses.

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How the expansion of highways effects small towns

Introduction

Problem Statement

When a highway is rerouted to bypass a town, housing values, number of businesses, and population will decrease. Residents have easier access to bigger towns where there is more job opportunities. People will want to live closer to their job and will move out of the small town. Highways are very big and loud and people will not enjoy living next to a highway. In small towns there are small local stores. In bigger towns they have big chain stores with more to offer, so people will be more likely to shop in bigger towns. With easier access to bigger towns, smaller towns will become less attractive and their economy will be affected negatively.

Importance of highways

The very first roads were just simply dirt roads and only about 12% were only paved (Blas 2010). Cars could not go very fast, at most 25 mph. When the US went to war, manufacturing mainly focused on producing weapons and supplies. There was no

time for building roads. The present highways were very unsafe and badly damaged. In 1956 Eisenhower signed the Nation Interstate and Defense Highway Act. Highways became a standard in the US and were very safe to drive on. After the introduction of highways, the economy starting to rise. Speed limits became faster, up to 50 mph. Suburbs were affected in a positive way. Goods were able to be transported to farther distances, for example, New York to California.

There are three different ways of how highways contribute to economic growth. “1. The contribution of highway investment to growth in GDP”. “2. The contribution of highway capital input to growth in adjusted GDP”. “3. The contribution of highway gross output to growth in adjusted U.S. gross output” (Fraumeni 2009). Estimates show that the contribution of highways to economic growth is actually small.

Background

Life before highways

Before Super Highways, there were roads like route 66. Roads like route 66 were major highways in the 1950's, they would connect major cities but also run right through smaller towns. A lot of businesses would also be along the highways. Many roads were also made of just dirt or gravel. More people lived in smaller towns. Many highways were just two lanes. However, when you drive through a small town your speed slows down from 55 to about 25. There are traffic lights and stop signs that you need to stop at. Traffic simply just gets congested. Although because of congestion, businesses tend

to get more customers and the town's economy greatly improves. Before interstates highways were also very dangerous. President Eisenhower had reported that on average 36,000 people are killed every year and one million travelers are hurt (Weingroff 1996). It was clear that a new highway system was needed.

Introduction of highway system

There were early talks in the 1930's. This led to the Federal Highway act of 1938. However, since America was going into war, the idea of a super highway system was pushed aside. Eisenhower thought that after the war, building a new highway system would be good for creating new jobs. The Clay Committee proposed a way to finance the interstates by creating a federal highway corporation that would hand out bonds worth \$25 billion. (Weingroff, 1996). The first three states to be apart of the interstate system were Kansas, Missouri, and Pennsylvania. Kansas and Missouri's highways system were built in 1956 and Pennsylvania turnpike was built in 1940. Many highways started being built in the 1950's and were finished in the 1980's.

Throughout the years highway bypasses started being built, some have even been built in the last 6 years. Bypasses are helpful in cutting down on traffic. Three experiments have done to analyze how much time is saved with bypasses, the economic impact of bypasses, and long term effects of bypasses. Researchers discovered that bypasses were beneficial in saving time. The long term effects of bypasses have not had much of an effect on the town's economies (Burress 19 Feb. 1998). Some researches believe that if a town was failing before the bypass was installed, then the bypass does add the the town's failure. The government views

bypasses as a necessity, but many residents a bypassed town are strongly against bypasses.

Highway Improvements

Highway systems across the country have improved from 1980 to 1990. Total cost per mile has increased from \$39,646 to \$59,653 (Hartgen and Krauss 1993). In 2007 it was reported that \$146 billion was spent on highway construction. A lot of money was spent in other ways with road construction. However, with all of this money being spent; the highway system actually were able to improve. These improvements include road pavement in rural and urban areas, congestion on highways, bridges were fixed, and even the amount of car accidents had improved. Another study tried to find the same correlation between highway improvements and businesses. What they found is that there is no clear relationship between road improvements and the economy (Chi 2006).

How bypasses affect population

Many government officials support highway expansion because it lower traffic congestion. There are many theories as to how highways affect the economy and population. The effects have been studied through geography, sociology, economics, and planning. All highway plans have been completed. Any current projects are to expand and improve current roads. Chi talks about the reports that were found by Voss and Chi. Voss and Chi studied the effects of highway expansion from 1970 to 1990.

Their hypothesis was “highway expansion has positive effects on population change”. Their hypothesis ended up being proven wrong. They found that highway expansion that affects population change depends on the overall state population. (Chi, Guangqing. 2010). Another theory on how a highway affects population is on the infrastructure itself. A highway can affect the population because it takes up land that could have been used for residential housing. It is interesting to see that the state population is the cause for population change, because one might think that if travelers are being directed to drive around a town then less people will know about the town. However, a town with less traffic is more attractive than a congested town.

How bypasses help businesses

Major Highways and Businesses have an important relationship. Many businesses like to be near a highway for easy access. It was reported that 7% of business owner relocated their business to be closer to the highway for transportation reasons (Chi 2004). The more money that is spent on a section of a highway, businesses will tend to go to that area. About 32% of business live about a mile away from interstates in Missouri (Forckenbrock and Foster 1996). Research shows that proper care of highways can improve an area’s economy. If you look at a town like Pleasant Prairie, WI, they have many businesses along Interstate 94. This is very beneficial for Pleasant Prairie. Unlike Kenosha that is almost 8 miles from the interstate, travelers would rather drive one mile to go to a store than drive 8 miles. Highways also

help businesses because over their ability to make travel time more convenient. A town's employment rate can go up because businesses are more accessible.

Economic effects of a highway bypass

In the beginning there was no relationship found between bypasses on the business's performance. After doing some research, it was found that businesses in growing cities and a high population benefit well from bypasses. Business in small towns, however do not benefit well from bypasses. The Population of the town has a large impact on how well businesses do (Helaakoski, R., H. S. Mahmassan, C. M. Walton, M. A. Walton, C. R. Harrison, and S. J. Anderson, 23 Aug. 2001). The results showed that the farther away the traffic is transported from the city, the greater effect that the bypass has on the city.

One place of study is in Yass, Australia. A bypass was built around the town and after a year, researchers studied the area. "48.3% of retail businesses had a decrease in gross annual sales. 14% of jobs were lost." (Srinivasan *et al.* 2002). Another study by the same people was done in Austin, TX. The results were a 15% decrease in gas sales, and a 10%-15% decrease in food sales. Another researcher looked at small towns in Kansas and look at how retail sales were impacted by a bypass. He asked many different store owners and 55% said that there was a decrease in sales, 26% said there was an increase in sales and 19% said that there was no change (Babcock, Michael W. 2004). When asked if they thought their sales would be better if the bypass had never been built, 76% thought their sales would be better if there was no bypass,

only 11% thought their sales would be worse without the bypass. The researchers did a statistical analysis and found that the bypass did not affect the businesses significantly enough, however the businesses owners said that they had changed their business plan and adapted to the new bypass (Babcock 2004).

A study in Oklahoma found that bypasses did not have a large influence on the economy. However, the researchers also found that their study sites were too small in population to actually retrieve credible data. This is good to know when trying to find a study site to focus on. A small with too small of a population will not have enough data and a town that is too big may not necessarily be affected by a bypass.

The university of Kentucky found that bypasses had no effect on retail sales. They found that no more than 2-3% decline in sales. However they did find a 15% decrease in gasoline sales in small cities. Also there was a 10-15% decrease in restaurant sales. A study that the University of Kentucky found done by Srinivasan and Kockleman showed a 15-20% decrease in restaurant sales and a 25-55% decrease in gasoline sales (Thompson et al 2001). A theme in these studies is that gas stations and restaurant rely on traffic. Restaurants do not need traffic as much since they get customers from in town.

A researcher did a study on how a highway bypass effects small town businesses. She focused on small towns in Oklahoma based on the availability of the information. In Stonewall, OK, evidence showed that there was no significant impact on the town due to the construction of the bypass. Local gas pumps were going out of business due to the larger competitive retailers. Restaurants reported no significant

change except for a decrease in truck driver customers. Stonewall had witnessed a decrease in population prior to the introduction of the bypass. Even though the analysis says that the businesses were not affected they still had to change to business strategy which means they were affected and without adapting things would have gotten worse.

The Oklahoma Department of Transportation did research of how bypasses affect small towns in Oklahoma. The study area were towns along highway 70. One of the aspects they looked at was how bypasses affect local businesses. They had trouble recording population change because Oklahoma did not record populations until the 1990's. It is difficult analyzing how a bypass affects a town's economy because the results are never consistent. Another problem they ran into was that most of the potential towns for a bypass were too small of a study area. The towns consisted of about 2,500 people. Only two towns had a sizeable study site. The information will be important to know when doing research. A good study site should be a town of about 15,000 to 20,000 residents. When they looked at businesses, they studied businesses that relied on traffic: gas stations, hotels, restaurants, auto shops. These businesses were then compared to non traffic related businesses. A very surprising result that was found was that bypasses did not have huge impact on the town. In fact, having less traffic in the town was found as an improvement and even business owners were able to adapt with the change from the bypass. (Comer, Jonathon C. 2000).

Highway Noise and Housing Values

Highway designers see bypasses as a positive idea, they cut down on traffic running through towns. Towns are also safer and have less noise coming from traffic. While residents of small towns worry about the effects of bypasses. (Srinivasan, *et al.* 2002). But if there is less traffic driving through the town, then would that mean that stores and restaurants would receive less customers?

Many people are annoyed by the noise that comes from highways. People lost their backyards due to exit ramps being constructed. Having more traffic actually helped cities that were close to the highway, but cities and towns that were farther away became more neglected. One town name Starke is used as an example. Starke is along scenic highway 301. The government thought drivers would still enjoy driving on that road, but people realized that taking the interstate was much faster. Business in Starke started to go under, and many people began to move out (Blas 2010).

One effect that a bypass can have on a small town is the changing of housing values. One study looked at the relationship between highway noise and housing values. It was found that a house's value when near a highway actually drops about 8-10%. Also another statistic found is that houses that are 1000 feet or closer to the highway will drop in value by 7.5% (Nelson 1982). After reading some articles it appears that housing values can be affected by highways because of all the noise. However, it is not a significant decrease in value.

Summary

Highways have been a very important advancement in the history of the United States. They make traveling longer distances easier, which helps make trade easier and in turn helps improve the economy. Bypasses are also very helpful, they reduce unwanted traffic in bypassed town and they also they reduce travel times for travelers so they do not have to drive through towns. Now there is still some confusion with the research on small towns. Some researchers found that small town's economy was affected by highway bypasses and others found that bypasses did not affect small towns very much. However, a lot of residents within the towns feel that the bypass does affect their business greatly. One constant statistic found is that businesses that rely on travelers did have a decrease in sales after the bypass was constructed. One study that would be interesting to continue is the study that the further away a bypass is from the town, the more impact it has on the town. The majority of the articles that were found focus mainly on the economy and businesses are affected by bypasses. Some of the articles showed that population change in the town depends on population of the state. While another source said that highways affect population by taking up space from future housing space. It seems that highways do have an effect on housing values. Highways can be very loud and unattractive. Housing values seem to lower the closer the house is to the highway due to the noise. After reading through all the articles, the question is still up in the air. Some researches says there is an impact and others say there is no significant impact. So does a highway bypass affect a small town and if yes, how?

Hypotheses

Null 1:

When you put an interstate bypass next to a small town, the number of businesses in that small town will increase or stay the same.

Alternate 1:

When you put an interstate bypass next to a small town, the number of businesses in that small town will decrease.

Null 2:

When you put an interstate bypass next to a small town, the housing values in that small town will go up or stay the same.

Alternate 2:

When you put an interstate bypass next to a small town, the housing values in that small town will go down.

Null 3:

When you put an interstate bypass next to a small town, the population in that small town will increase or stay the same.

Alternate 3:

When you put an interstate bypass next to a small town, the population in that small town will decrease.

Methods

The study areas were specific towns that have a highway bypass around them. A town with a bypass around it will have a highway that leads to the town, but instead of going through it; the bypass directs the traffic around the town. Some bypasses lead the traffic further away from the town than others do. The sites that were studied were towns of about 15,000-20,000 people. The cities were Whitewater, WI and Burlington, WI. Both of these cities have about 15,000 residents and have a solid bypass around the city. The characteristics of the towns that were be examined were housing values, number of businesses, and population change. It will also be helpful to find towns with bypasses that have different distances from the town. A study shows that bypasses that take drivers farther away from the town effect the town more than a bypass that is closer to the town (Helaakoski, R., H. S. Mahmassan, C. M. Walton, M. A. Walton, C. R. Harrison, and S. J. Anderson, 23 Aug. 201). The towns were examined before the bypass was introduced, and after the bypass was introduced.

For population data and housing data, that data was accesible from the ACS on Censusbearu.gov and ArcGIS Business analyst which is also ACS data. Also the data will be from before and after the road construction.

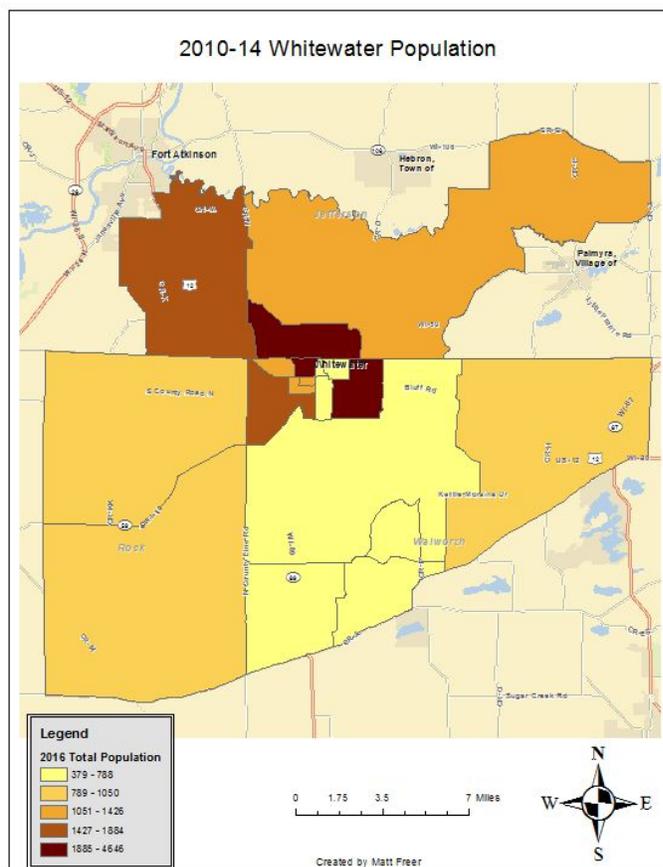
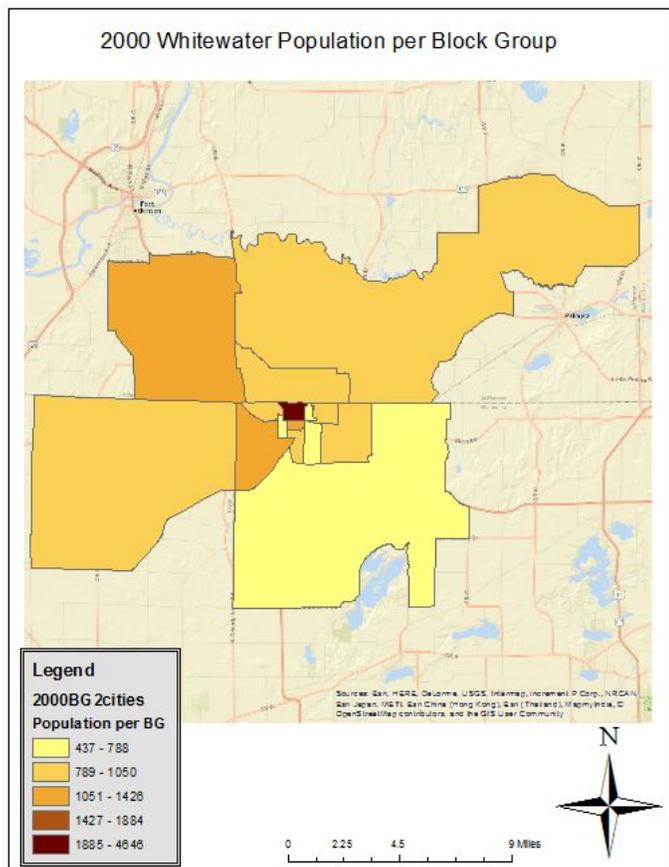
ArcGIS was used to create graduated color maps to show the change over the years. A population density map will be made of Whitewater, WI before the bypass was introduced. A population density map of Whitewater just after the bypass was completed was created, and a population density map of Whitewater several years after the bypass was constructed was made. Then for Burlington, WI a population density

map was made of before the bypass was built. A population density map of Burlington a year after the bypass was completed was created, and a population density map of Burlington a few years after the bypass was constructed will be created. The next type of map that will be created will be a housing value map. A housing value map for Whitewater will be created before the bypass, a year after the bypass, and several years after the bypass was built. A housing value map of Burlington will be made before the bypass, during the bypass, and after the bypass was created. A point layer map of businesses in Whitewater before and after the bypass was completed. A point layer map of Burlington before and after the bypass was completed.

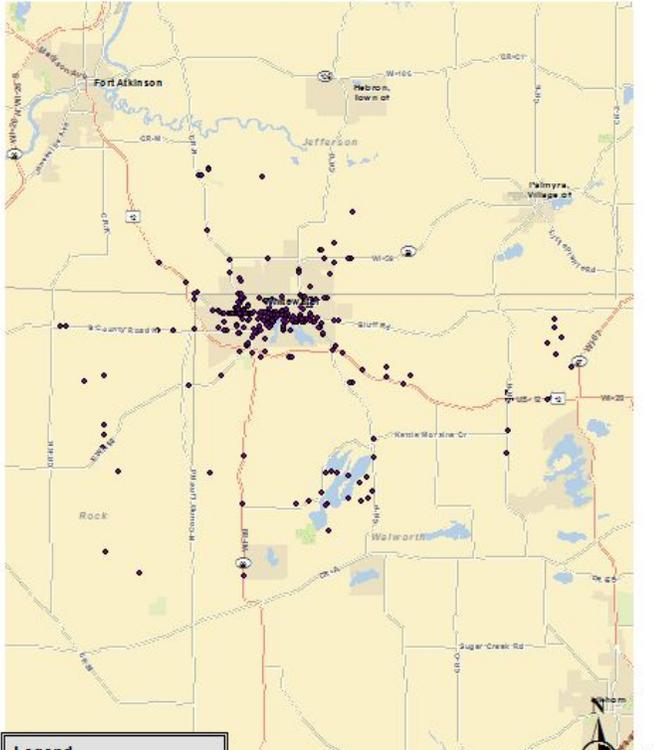
The data that was collected was used to look for patterns that prove or reject the hypothesis. When reading the statistics it will have to be decided what percentage of change is considered drastic enough to be considered a negative or positive effect. A t-test with a 95% confidence level was done to analyze the difference of means before and after the bypass was completed. After looking at the tests, it is clear that there was not a significant change in population and number of businesses, but for housing value there was a significant increase.

Results

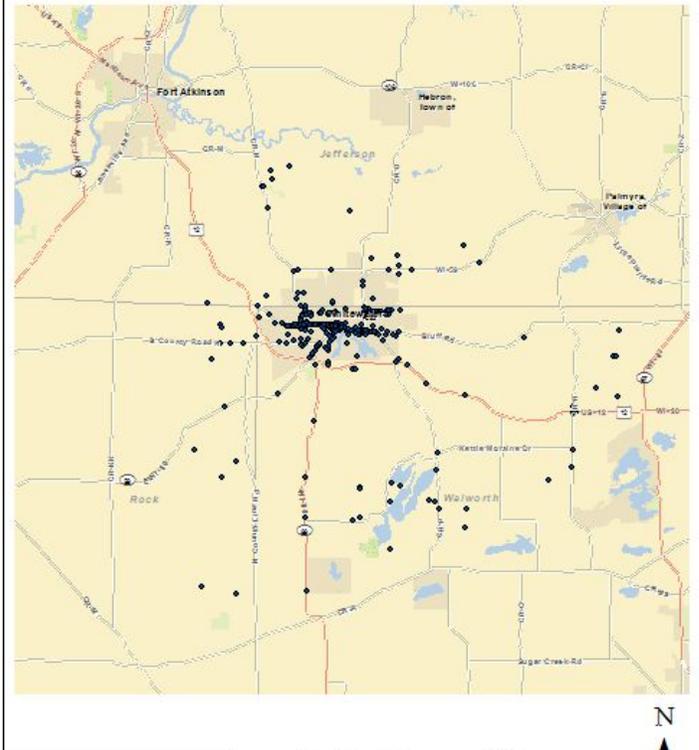
In Whitewater, WI the average population per block group is 1,186.67 people in 2000. In 2016 the average population per block group is 1,338.83 people. So the population increased by 1,266 people, that's a change of 9.4%. The housing values increased by \$80,787, that's an increase of 69%. The housing value data, in 2000 the average value was \$116,213.67, and in 2016 the average value was \$197,000.20. The number of businesses in 2003 was 560 and in 2016 that number increased to 574. Per block group Whitewater had 36.53 businesses, and in 2016 that number is 34.57. That's an increase of 2.5%.



Whitewater, WI 2003 Businesses

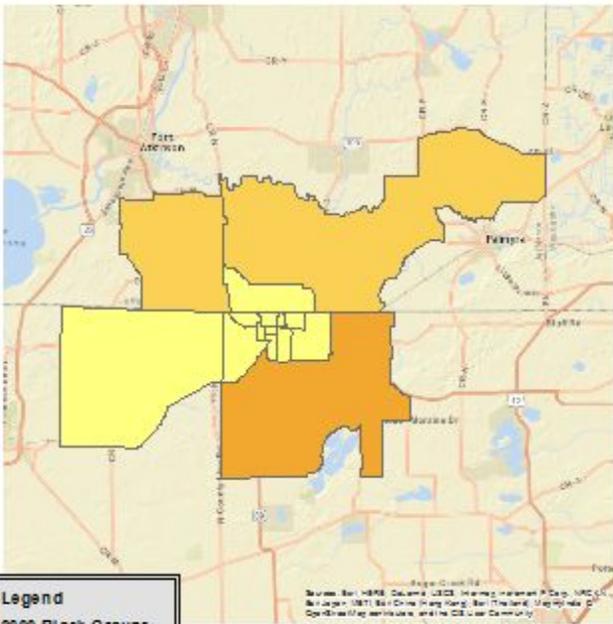


2016 Whitewater Businesses



Created by Matt Freer

2000 White water Housing Value per Block Group

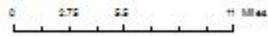


Legend

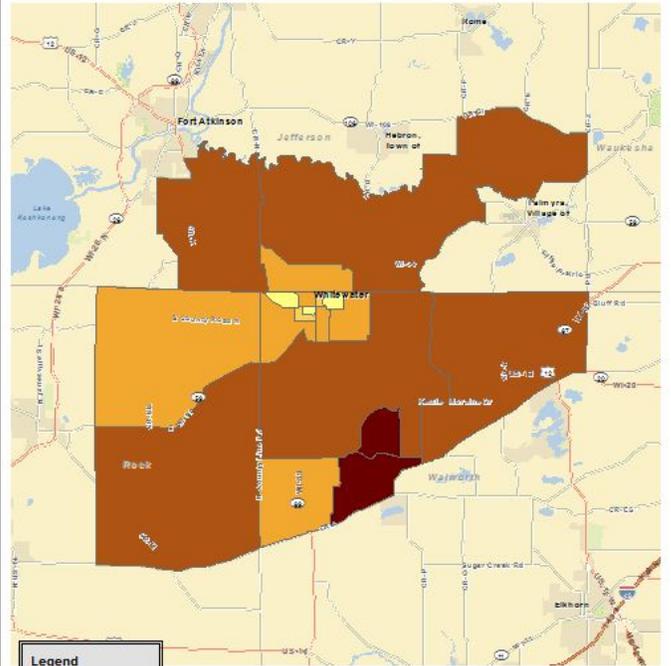
2000 Block Groups

Median Housing Value

12,100 - 144,450
144,451 - 164,655
164,656 - 195,390
195,391 - 299,432
299,433 - 346,667



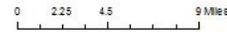
Whitewater, WI 2010-14 Home Value



Legend

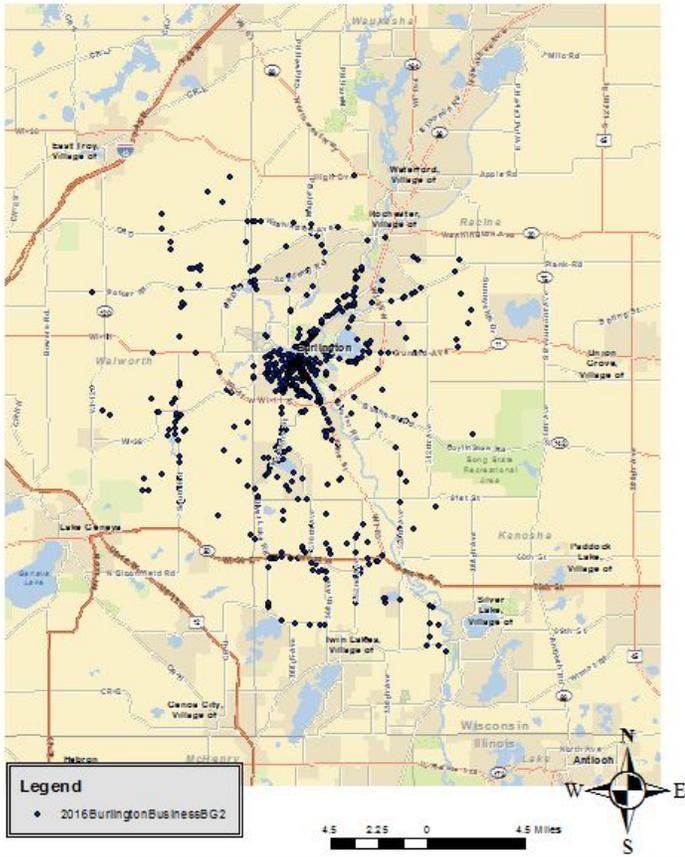
2010-14 Home Value

12,100 - 144,450
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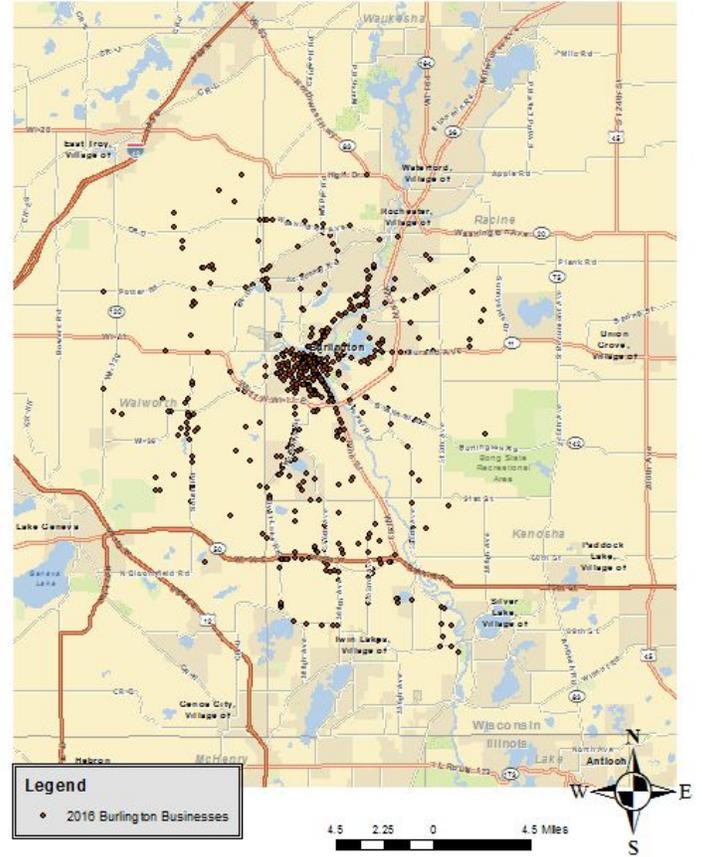


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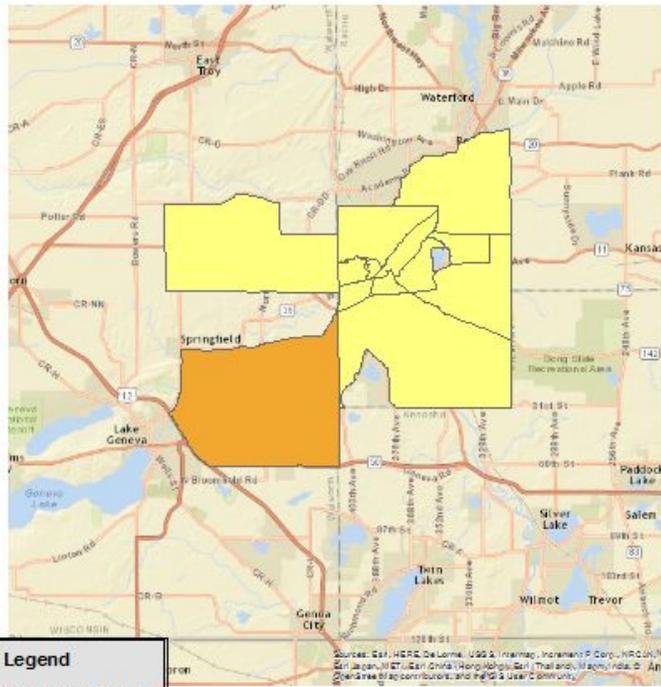
Burlington, WI 2003 Businesses



Burlington, WI 2016 Businesses



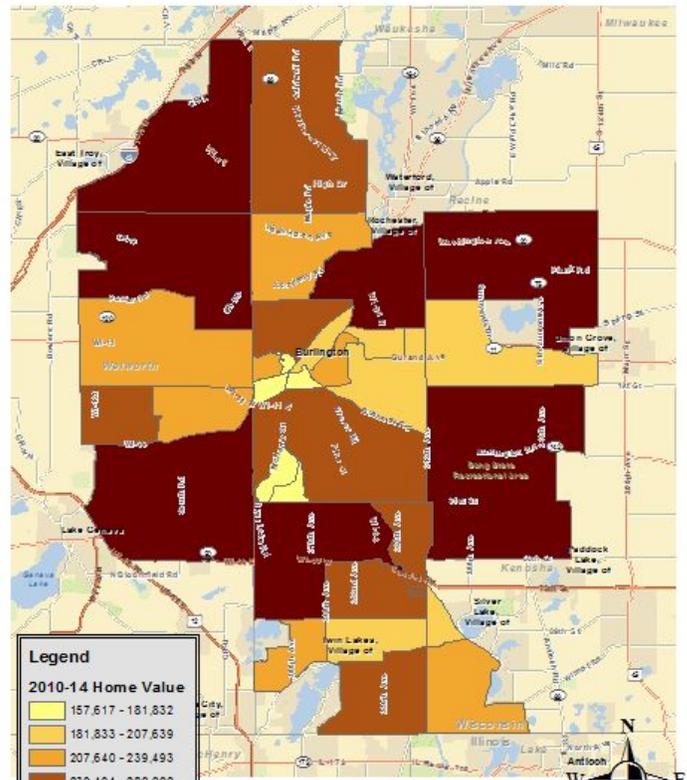
2000 Burlington Median Housing Value per Block Group



Legend	
2000 Home Value	
[Light Yellow]	12100 - 181832
[Yellow-Orange]	181833 - 207639
[Orange]	207640 - 239493
[Dark Orange]	239494 - 280000
[Dark Red]	280001 - 368548



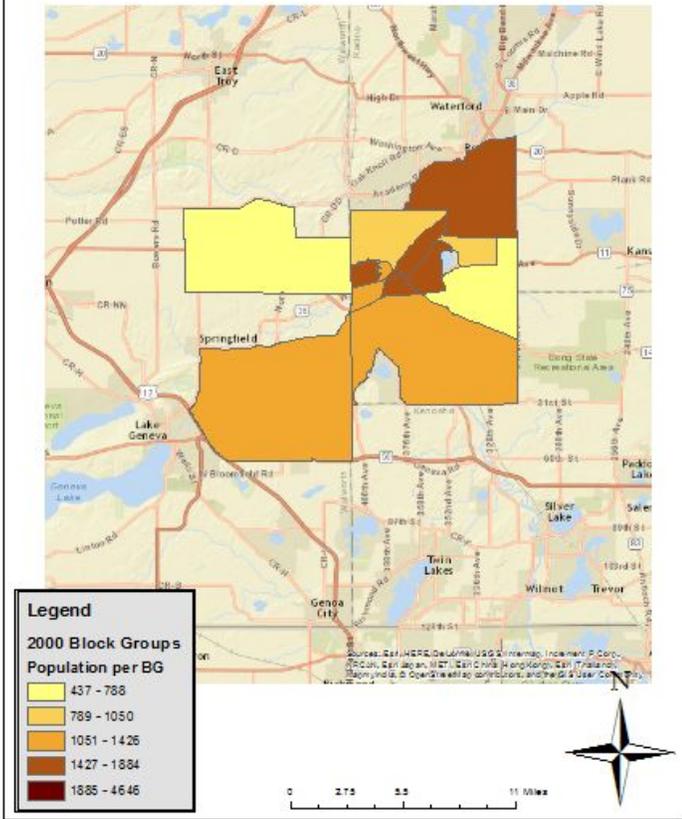
2010-14 Burlington Median Home Value per Block Group



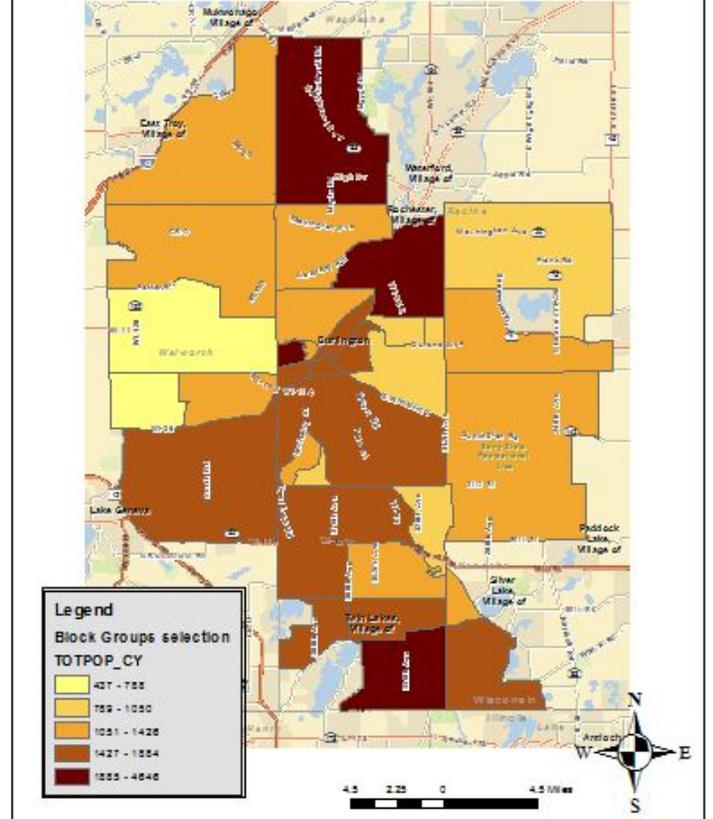
Legend	
2010-14 Home Value	
[Light Yellow]	157,617 - 181,832
[Yellow-Orange]	181,833 - 207,639
[Orange]	207,640 - 239,493
[Dark Orange]	239,494 - 280,000
[Dark Red]	280,001 - 368,548



2000 Burlington Population per Block Group



2010-14 Burlington Total Population per Block Group



In Burlington, the average population per block group in 2000 was 1239.65 people with a total of 9,995 people, and in 2016 that number was 1282.2 people with a total of 10,523. That's an increase of 5.3%. The average housing value per block group in 2000 was \$142,550.00 and in 2016 \$256,657.60. That's an increase of 80%. In 2003, there were 588 businesses in Burlington and in 2016 there were 881. In 2003 Burlington had 29.05 businesses per block group and in 2016 they had 55.8 businesses per block group. The number of businesses increased by 293 companies, a change of 49.8%.

Burlington Businesses Per BG		
	2003	2016
	2	2
	2	8
	22	58
	13	15
	1	5
	1	2
	3	5
	1	3
	24	3
	54	6
	13	79
	13	97
	62	29
	173	31
	23	220
	13	368
	4	42
	7	21
	65	11
	11	5
	17	3
	19	3
	3	7
	2	10
	6	19
	13	22
	8	20
	6	22
Avg.	29.05	55.8

Burlington Population		
	2003	2016
	1,215.00	1,256.00
	1,643.00	1,131.00
	1,367.00	1,992.00
	1,863.00	1,535.00
	1,595.00	1,880.00
	1,884.00	1,476.00
	1,426.00	1,692.00
	437.00	832.00
	1,710.00	1,008.00
	1,025.00	1,773.00
	1,046.00	2,347.00
	1,219.00	754.00
	747.00	1,526.00
Avg.	1,321.77	1,477.08

Burlington Median Home Value		
Year	2003	2016
	\$ 110,600.00	\$ 272,449.00
	\$ 117,700.00	\$ 157,617.00
	\$ 125,900.00	\$ 228,676.00
	\$ 134,200.00	\$ 181,832.00
	\$ 133,800.00	\$ 181,027.00
	\$ 155,400.00	\$ 192,284.00
	\$ 160,900.00	\$ 223,232.00
	\$ 29,500.00	\$ 206,522.00
	\$ 162,300.00	\$ 192,500.00
	\$ 123,900.00	\$ 267,778.00
	\$ 139,900.00	\$ 198,674.00
	\$ 214,400.00	\$ 226,582.00
	\$ 148,900.00	\$ 175,450.00
	\$ 135,184.62	\$ 174,336.00
Avg.	\$ 145,583.43	\$ 221,458.38

Whitewater Businesses Per BG		
	2003	2016
	3	6
	16	9
	22	23
	10	11
	5	4
	22	20
	2	1
	2	5
	31	83
	7	14
	12	18
	108	103
	12	11
	170	163
	47	30
	41	42
	69	62
	34	31
	21	21
Avg.	36.526	34.578947

Whitewater Population		
	2003	2016
	994.00	1,550.00
	1,354.00	3,252.00
	1,023.00	1,070.00
	788.00	1,005.00
	880.00	761.00
	511.00	561.00
	1,318.00	702.00
	840.00	2,021.00
	698.00	666.00
	4,646.00	715.00
	1,286.00	2,893.00
	844.00	1,135.00
	865.00	1,495.00
	703.00	1,075.00
	1,050.00	1,190.00
Avg.	1,186.67	1,338.73

Whitewater Median Home Value		
	2003	2016
	\$ 12,100.00	\$ 258,424.00
	\$ 158,100.00	\$ 175,195.00
	\$109,300.00	\$ 267,164.00
	\$123,500.00	\$ 188,953.00
	\$ 97,100.00	\$ 250,625.00
	\$109,800.00	\$ 280,729.00
	\$ 141,800.00	\$ 130,078.00
	\$109,500.00	\$ 194,518.00
	\$ 116,900.00	\$ 164,655.00
	\$127,700.00	\$ 174,107.00
	\$124,500.00	\$ 184,211.00
	\$ 88,300.00	\$ 193,750.00
	\$ 88,000.00	\$ 195,390.00
	\$177,900.00	\$ 156,579.00
	\$158,700.00	\$ 140,625.00
Avg.	\$ 116,213.33	\$ 197,000.20

Discussion

After analyzing the data there are a few questions that need to be asked. The first statistic is the Whitewater housing value numbers. Based on the data the value nearly doubles from 2000 to 2016. The reason this statistic does not make any sense is because of the housing market crash in 2008. One possible reason for such an increase in home value is that maybe there was a giant housing development sometime after the recession. The 2000 data was downloaded from the American Community Survey (ACS) and the 2016 data is straight from Business Analyst. The home values for Burlington also look questionable since 2016 data is twice as much as the 2000 data. After comparing the two years of data, it is clear that there is a lot more data available in 2016 than there was back in 2000. However, the population data comes from the same sources as the housing value does, and the population data makes a lot more sense than the housing value data does. The number of businesses for both towns also leaves some questions. The data for Whitewater looks fine, but the data for Burlington is concerning. In 2000 there were 588 businesses and in 2016 there are 881 businesses. When comparing the 2000 map to the 2016 map it appears that more businesses had moved closer to the bypass. Both cities seemed to have done better since the bypasses were expanded, however there is one statistic that is unlike the rest of the data. That statistic is the business per block group in whitewater. The number actually fell from 36.5 to 34.5. Now this doesn't necessarily mean that Whitewater lost businesses, it could just mean that some businesses changed to a different location. Both Whitewater and Burlington seem to have improved in all variables since the highway expansion.

However, this does not mean that the bypass is the cause of effect. Perhaps there are other reasons for the increase. In Whitewater, a big employer is the University of Wisconsin-Whitewater. In 2015, UWW had a total of 898 staff. This large number of employment could lead to a population growth in Whitewater, which can help the housing values and the number of businesses. Another thought to consider is the effect of less traffic in a town. With less traffic driving through a town, that might actually make a town more attractive to live in; which would help population, housing values, and number of businesses.

Conclusion

Highway bypasses do make traveling much more easier, but how do they affect the town that is being bypassed? After going through many articles about highways, it appeared that many people had mixed feelings about highways. On a large scale highways are very important, but many people in small towns beg to differ. Citizens feared the amount of noise and traffic that highways brought with them. Others feared about what a bypass would do to their town's economy. After looking at population, housing value, and number of business from 2000 to 2016 some questions were answered. Both Whitewater and Burlington had an increase in population, housing value, and in number of businesses. Now this doesn't mean that the bypass was the cause for the cities improvements. The success of the cities could be because natural development of the cities. So that means that the data does not show or prove a negative effect on housing value, population, and number of businesses. Now that data

shows that bypasses do not have a negative effect of small towns, in future highway developers can use this data to alleviate concerns about the effects a bypass has on towns. So after looking at the data and analyzing the statistics, there is a growth in all three variables. With those results, therefore i cannot reject the null.

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