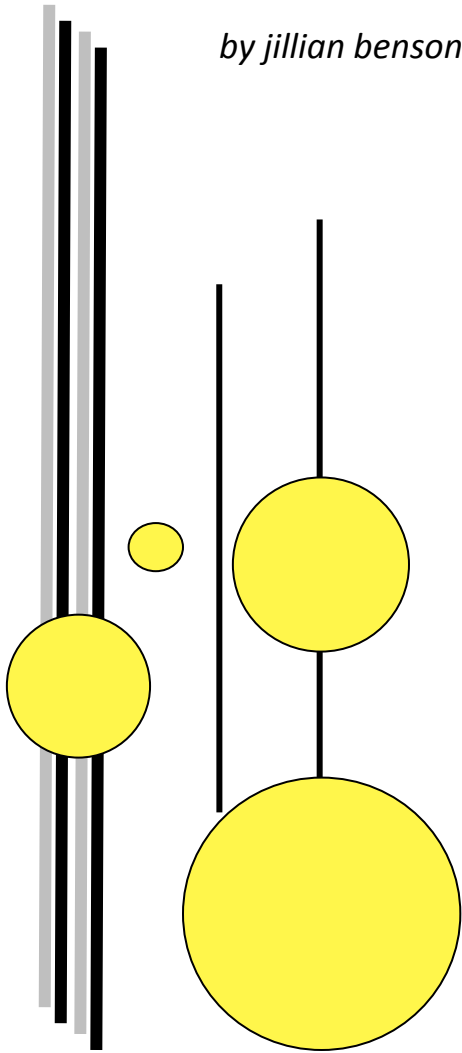# *II.* ECONOMIC IMPACTS OF THE BUILT ENVIRONMENT

ii. AN ECONOMIC HISTORY:

HOW TRANSPORTATION HAS SHAPED THE ECONOMIC HISTORY OF UNIVERSITY AVENUE

by jillian benson

This Chapter's Questions:

1. How was University Avenue's economic history shaped by different modes of transportation?

2. What is the current consumer demand for goods on the avenue?

3. How might historical trends explain future effects of the Central Corridor?

Chapter Outline:

I. Introduction and Overview
II. Industry and Rail
III. Entertainment, Retail, and Autos
IV. Highways and Pornography
V. Today's University
VI. The People's Demands
VII. What the Light Rail Could Change

I. INTRODUCTION AND OVERVIEW

University Avenue is an extremely diverse street that connects the two town centers of the Twin Cities. The Avenue stands out as a mark of diversity in the cities–socially, racially, architecturally, and economically, among other things. University has seen much change over the past century, experiencing extreme growth in the first half of the century, peaking around the 1950s and 60s, after which time its wealth and popularity started to disappear. What was it that made this "grand" avenue grow into such a hotspot in the cities and then proceed to lose its luster and economic power? This chapter seeks to explain how such an era of prosperity came to be and why it was followed by such a drastic downfall by looking at the Avenue's economic history. To understand these trends, I will examine how these shifts in economic prosperity and hardships are linked to the changing modes of transportation on the Avenue itself as well as in its surrounding neighborhoods. After exploring these relationships, I will look at the current economic climate on the Avenue and see what kind of changes have occurred since the 1970s. I will specifically be looking at the current consumer demand using the Nielsen-Claritas data from 2010 to understand what people are buying or "demanding" when they shop on the Avenue. Finally, I will speculate on how the construction of the Central Corridor will affect development on the street based on both historical trends and discuss possible development projects based on what is currently demanded.

II. INDUSTRY AND RAIL

University Avenue was moved to its current location after railroad baron James J. Hill declared that the rail networks entering the cities needed a main terminal to greet and organize the incoming trains.[1] This led to the creation of the Minnesota Transfer Yards, which pushed University Avenue north of its original route to its current path. The Transfer Yards marked the beginning of an era for University Avenue. The building and operating of the transfer yards was a large employment opportunity and brought in many new laborers to the area. Thus, University, like many major commercial city streets, started out as a primarily residential area;[2] with the increases in labor force, the demand for housing rose as well. In 1881 the tracks for horse drawn trolleys were laid on the Avenue in St. Paul as far as Dale Street, making travel up and down the Avenue easier.[3]

In 1890, the tracks were extended to Minneapolis for use with electric trolleys, now connecting the two cities via University Avenue.[4] This new electric streetcar line was so popular and successful that it forced the commuter train companies to stop running their services as often because the midway line was taking half of the business. Soon the University route was dubbed "the Interurban."[5] The rapid growth on the Avenue gave hope to the business community who saw University as an opportunity to build a grand commercial street that would rival the grandeur of the Champs-Elysées in Paris, France.[6]

The first electric streetcars used were built by the Thomson-Houston

Company.[7] These cars were found to be too lightweight and small, and were not sturdy enough to withstand the harsh weather conditions experienced in the winter. When new streetcars were brought in from the Northern Car Company, they also proved useless against the Minnesota winters.[8] This led to the creation of the home-built streetcar industry. The first of these cars were built at the shops at the Nicollet Station and were so well received that the shops produced another 275 cars for the line.[9] Being the first streetcar producers, the Nicollet Station shops were smaller operations, and proved to be inadequate for producing the number of streetcars necessary to meet the high demand. This prompted the development of the Snelling Streetcar Shops in 1906, located on Snelling Avenue between University and St. Anthony avenues.[10] The Snelling Shops built the streetcars that serviced the cities until 1953. This 60-acre industrial center provided many jobs for the citizens of these cities. The yards brought more traffic to University by bringing workers to the area as well as producing the vehicles

that the workers rode for their commute.

The Avenue's commercial development began blooming in 1905, coinciding with the completion of the State Capitol, but mainly due to the success and popularity the streetcars.[11] The businesses sprouting up in the beginning were mostly small grocers, bakeries and butchers that met the needs of the increasing population along the street. [12] As the Avenue continued to grow, larger businesses started moving to the area, creating a stable and growing commercial district.[13]

III. ENTERTAINMENT, RETAIL AND AUTOS

With the introduction of the automobile, University continued to grow, and traffic on the Avenue increased, both from streetcars and automobiles. It was clear, however, that the automobile was the preferred means of travel by the citizens of the cities even before WWII. The streetcars had slowly been losing riders to cars after their ridership peaked in 1922, and the

trams were finally taken off their rails for good in 1953 and replaced with bus lines.[14] The initial loss of ridership did not affect University economically; the Avenue was still as prosperous and crowded as before. In fact, it brought different businesses to the Avenue in the form of car dealerships and automobile servicing.[15]

The cities continued to grow, and not just the inner-city populations, but also the suburban populations. With people further away from the central business districts of the Twin Cities, the convenience of a car became the popular way to get between home and work. University was still the main route between St. Paul and Minneapolis and benefited from this fact. University was becoming the place to not only purchase your car, but to show it off as well.[16] The desire to show off one's car was matched with the development of drive-in restaurants, which were gaining popularity in the 1940s and 50s. The most famous and long-living drive-in and carhop on University was Porky's, which opened up in 1953 and closed on April 3, 2011.[17]

The popularity of the automobile also affected retail

businesses on the area, not just in terms of car dealerships. The Midway Shopping Center was one of the first major developments that catered specifically to the booming car culture. It opened in 1954 on the corner of Snelling and University, and was equipped with ample parking space and large-scale retailers.[18]

At the same time, University was the entertainment destination of the Twin Cities.[19] Aside from drive-in joints, University played host to the Lexington Park, the Prom Ballroom, and the Faust Theater. Lexington Park was the home of the minor league baseball team, the St. Paul Saints, and for 60 years they packed the park located at the corner of University and Lexington.[20] Up until the early 1950s, fans would travel to University to attend games at the park. It wasn't until 1956 that the park closed after the Saints were moved to their new home at Midway Stadium, which was built in an effort to keep the City of St. Paul as a contender to receive a major league baseball team.[21]

The Prom Ballroom was another big entertainment stop on University. On its opening night in 1941, the dance floor was reportedly packed with 6,000 dancers, and half as many were turned away at the door.[22] The Prom often hosted Glenn Miller's orchestra, as well as many other famous bands and artists throughout the years, such as Buddy Holly and Jules Herman.[23]

Another draw to the Avenue was the cinema that opened up in 1912, the Faust Theater.[24] Located at the corner of University and Dale, The Faust was a single-screen movie theater that seated nearly 900, and was often filled with young people.[25] The younger crowds often made for a lively audience, and a movie was usually paired with noise and rowdiness from the viewers.[26] The Faust Theater, along with the Prom Ballroom, Lexington Park, and all the drive-in restaurants, made University a very exciting place to be, and the automobile made it easy for people to get up and down the strip.

IV. HIGHWAYS AND PORNOGRAPHY

By the 1950s, the automobile was king. This was made even more clear when the streetcars stopped running for good in 1953 and the rail areas became paved road. As the metropolitan area continued to grow, and more people were living outside of the city centers, the need for a more rapid route between the two cities grew also. The construction of Interstate 94 finished in the late 1960s, and I-94 became the most efficient route between Minneapolis and St. Paul. The freeway reduced the traffic volume along University considerably.[27] I-94 is the factor that had the most pointedly detrimental effects on University. It took away the masses of people who used to frequent the Avenue by car and who now instead could bypass the strip and cut down on travel time between their work in the cites and their new homes in the suburbs. Without the high volumes of automobile traffic to bring consumers, businesses were forced to close, buildings were left to deteriorate, and people moved away.[28]

Even though many businesses were leaving University, there was a group that was forced to move to the area. The plans for the freeway led to the displacement of the entire Rondo neighborhood and community, leaving many community members to resettle

around the Avenue. Before the interstate, Rondo was a vibrant and thriving African-American neighbor-hood. But when I-94 was being constructed, the community was completely fractured and thousands of people were forced to move into marginal neighborhoods in unfamiliar territory, specifically settling around the east end of University.[29] This was the beginning of a new era for the Avenue, one of lowered consumer activity, increased populations living on the margins and higher rates of illegal happenings.

As the area was left unkempt during the late 1960s and 70s, seedier sorts of businesses emerged. Peep shows and porn shops became commonplace. The Faust Theater was converted from playing Hollywood films to screening X-rated ones. Kitty-corner from the theater was the Belmont, a topless dancing bar. The Avenue became dotted with X-rated stores, and the prostitution that originally plagued Selby Avenue moved over to University.[30] Women who lived near the Avenue at the time often found themselves harassed by men driving around looking for prostitutes.[31] The city of St. Paul did buy up the Faust Theater in 1989, only to shut it down as part of St. Paul's initiatives to rid the neighborhood of its sexually-related businesses, in hopes to revive the area as well as its reputation, and make it a safer place to be.[32]

V. TODAY'S UNIVERSITY

The face of University has changed significantly since the turn of last century. The neighborhoods around the Avenue have become much more racially diverse. Frogtown is the neighborhood surrounding the east end of University, and has always been an immigrant destination. It was originally populated with German, Irish, Polish and Scandinavian immigrants in the 19th second half of the 19th century.[33] The neighborhood remained a predominantly Caucasian area until the Rondo community relocated there after their neighborhood was demolished by the construction of the freeway. In the most recent years, there have been increasing numbers of immigrants from Southeastern Asia settling in the area.

The significant influx of Southeastern Asian residents in the area has led to the development of many family-owned businesses on University, including but not limited to restaurants, delis, and supermarkets. Despite the Avenue's lack of luster, these local, immigrant-owned businesses provide support for those hopeful about economic development there. These businesses exist alongside the Midway Shopping Center, which still harbors large-scale grocers and various other chain stores. The Midway Mall, a similar venture to the Midway Shopping Center, sits on the corner of Hamline and University. It houses a Super Target, and is not far from a Walmart, Cub, Herbergers, and Borders. The Avenue has become a collection of giant chain companies and locally-owned businesses. Although cars remain the main mode of transportation along the Avenue, the bus routes that took over the streetcar lines are still running the length of University and the average wait time is less than 10 minutes.

The Avenue once strewn with car dealerships lost its last one in 2007, ending an era on University.[34] New

zoning laws that aim to limit the number of car-oriented businesses further enforce the decline of the automobile culture on the Avenue. City planners hope for University to be a more pedestrian thoroughfare when the Central Corridor goes in.[35] Currently, the drive-thru fast-food joints, large parking lots, and automotive shops do not portray a pedestrian-friendly image, and walking along the street can be an unpleasant experience.

VI. THE PEOPLE'S DEMANDS

To help understand where and how University Avenue may change it is useful to look at its current state. In order to do this, I will estimate consumer demand using the Nielsen-Claritas data from the year 2010. The purpose of this is to study consumer transactions in each census block group along the Avenue to get a sense of what consumers are buying. For this analysis, I focus on eighteen block groups that border University. I limit the study area to Ramsey County because that is where many of the historical references from the previous sections place us. My study area spans from Rice Street as the eastern boundary to just past Franklin Avenue on the west. This study area and the block groups can be viewed on the map on the bottom of this page. The numbers labeling the block groups are for reference purposes and do not represent Census IDs.

University Avenue Block Groups

Jillian Benson
April 20, 2011
Source: 2010 Census and MetroGIS
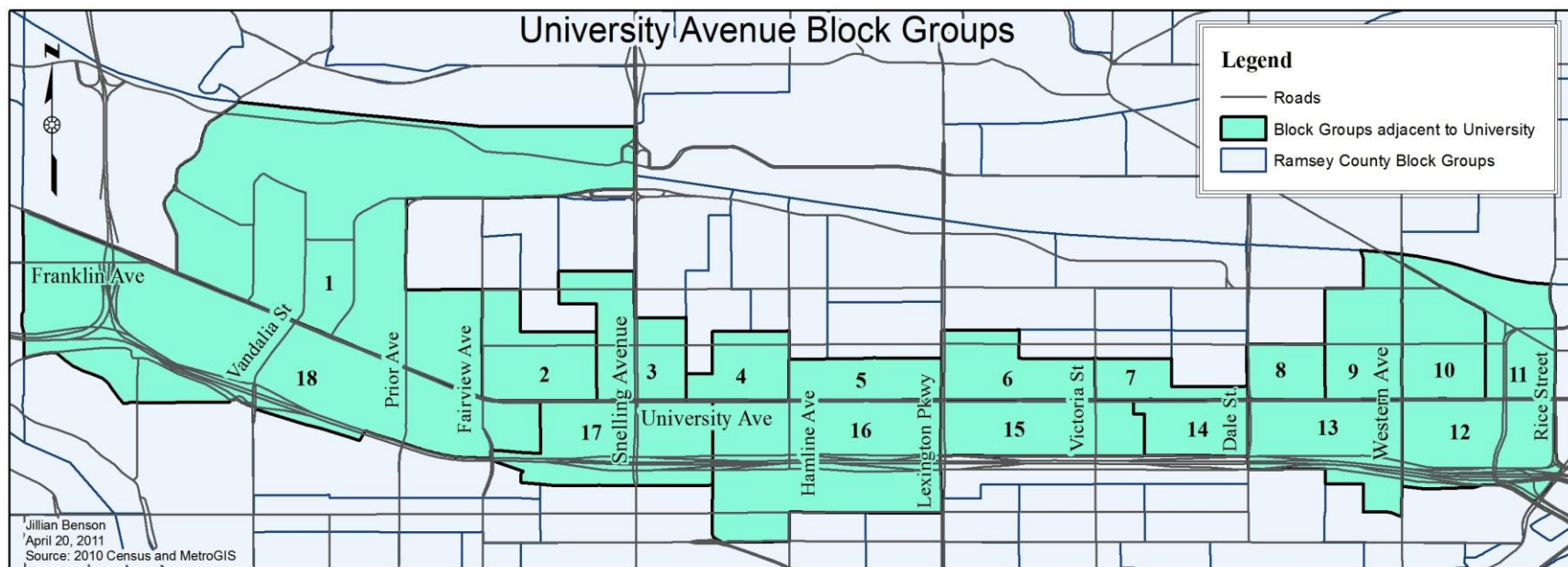
The raw data show the transaction values, or the totals of consumer expenditures on goods, which are reported in dollars. In order to compare these numbers across block groups and to see what kind of goods are being bought on University, I will look at transaction values of goods purchased as a percentage of the total of all goods purchased. Thus, for the purpose of this study, the "consumer demand" for a good refers to the expenditure on a good as a percentage of the total consumer expenditure for the block group area.

The Claritas data included thirty-eight different variables. I found this to be unwieldy, and so I combined variables that represented similar goods. For example, "Groceries and Other Food" and "Meals and Snacks" were two different variables that I combined to make one variable: "Food". Neither variable indicated specifically if one was solely restaurant food and the other was solely grocery store food, which is something I would have been interested in examining. Because

of this imprecision in variable definition, I found that I could extract the same sort of information from these variables whether combined or not. In the end, I went from thirty-eight variables to fifteen. Table 1 identifies

Table 1: List of New Variables with Descriptions[†]	
New Variable	Description of Variable
Food	Groceries and Other Foods + Meals and Snacks
Alcohol/Tobacco	Alcoholic Drinks + Packaged Liquor/Wine/Beer + Cigars, Cigarettes, Tobacco and Accessories
Pharmacy Goods/ Cleaners/Paper Products	Drugs, Health Aids and Beauty Aids +Soaps, Detergents and Household Cleaners + Paper and Related Products
Apparel/ Footwear	Men's Wear + Women's, Juniors' and Misses' Wear + Children's Wear + Footwear
Sewing, Knitting, Drapery	Sewing, Knitting and Needlework Goods + Curtains, Draperies, Blinds, Slipcovers etc.
Major & Small Electric Appliances	Major Household Appliances + Small Electric Appliances
TV, Audio, Computer & Media Equipment	Televisions, Video Recorders, Video Cameras + Audio Equipment, Musical Instruments + Computer Hardware, Software and Supplies
Furniture & Flooring& Kitchen/Home Furnishings	Furniture and Sleep Equipment + Flooring and Floor Coverings + Kitchenware and Home Furnishings
Hobbies and Leisure Activities	Books + Photographic Equipment and Supplies + Toys, Hobby Goods and Games
Optical Goods & Sporting Goods	Optical Goods & Sporting Goods
Hardware, Home Improvement, Lawn/Garden, Paint	Hardware, Tools, Plumbing, Electrical + Lumber and Building Materials + Lawn, Garden, and Farm Equipment & Supplies + Paint and Sundries
Cars/Trucks & Campers, RVs, Trailers	Cars, Trucks, Other Powered Transportation + RVs, Campers, Camping & Travel Trailers
Auto Fuels & Lubricants	Automotive Fuels + Automotive Lubricants
Pets, Pet Food & Supplies	Pets, Pet Foods and Pet Supplies
All Other Merchandise & Jewelry	All Other Merchandise + Jewelry

†*Descriptions refers to the combinations of the original variables that create the new variables*
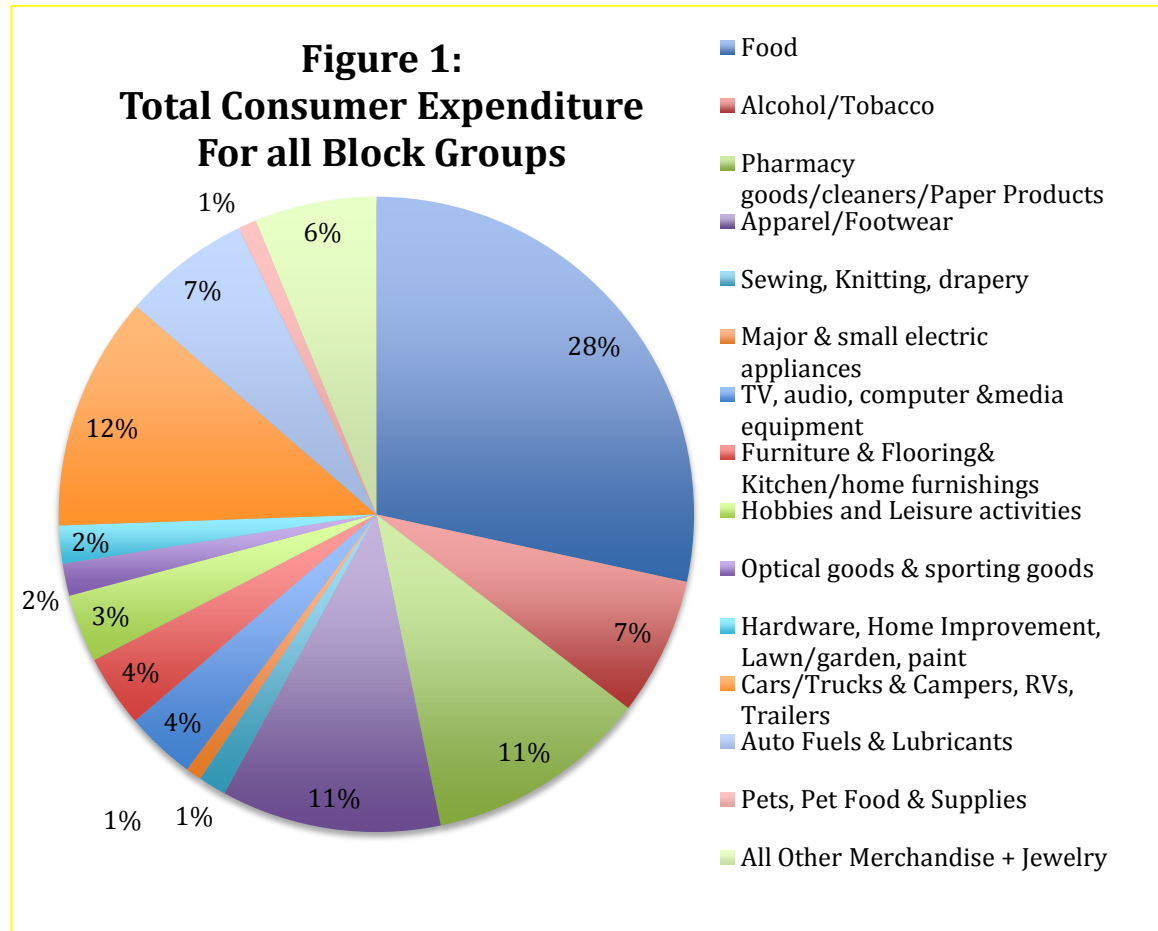
the consolidated variables.

After comparing the percentages of each good's expenditure versus total expenditures, I found that each of the eighteen block groups had very similar percentage distributions of goods purchased. Figure 1 shows the breakdown of percentages of consumer expenditure on goods for all eighteen block groups combined. Food items have the highest demand on the Avenue, ranging from 26-33% of the consumer expenditures in the block groups. This is not surprising considering the grocers and restaurants were some of the first businesses to emerge during the early days of University's development, and food establishments currently are the most common type of business on the strip. Although I cannot distinguish between the different sources of food, I assume that the high expenditures on food are made at both grocers and restaurants, which are either locally-owned or chains.

"Apparel/Footwear," "Cars/ Trucks", and "Pharmacy Goods/ Cleaners" were the three next highest goods in demand, all ranging from 9-14% of the total consumer

expenditures. With used-car dealerships on the Avenue, as well as large-scale grocers that offer both pharmacies and cleaning supplies for sale (e.g. Super Target), it is

understandable that these goods would also have a higher demand. The goods that are least demanded by consumers are "Pets/Pet Food & Supplies" and "Major & Small Electric Appliances",

Figure 1:
Total Consumer Expenditure
For all Block Groups

Legend:
- Food
- Alcohol/Tobacco
- Pharmacy goods/cleaners/Paper Products
- Apparel/Footwear
- Sewing, Knitting, drapery
- Major & small electric appliances
- TV, audio, computer &media equipment
- Furniture & Flooring& Kitchen/home furnishings
- Hobbies and Leisure activities
- Optical goods & sporting goods
- Hardware, Home Improvement, Lawn/garden, paint
- Cars/Trucks & Campers, RVs, Trailers
- Auto Fuels & Lubricants
- Pets, Pet Food & Supplies
- All Other Merchandise + Jewelry

both of which consisted of only 1% of consumer expenditure across all block groups. The full breakdown of the percentages of consumer expenditure for each good within each individual block group can be seen in Table 2 at the end of the chapter.

Understanding what consumers are demanding is important for business owners along the Avenue. Knowing this information can help storeowners with inventory orders. It can also help developers, city planners and entrepreneurs decide what kind of businesses fit into the current economic climate. The data tell us that food is the main good being purchased by residents of University. This suggests that more food establishments could help supply the high demand for food. At the same time, the data showed that there were few goods that had very low percentages of consumer expenditure. These goods include, as mentioned earlier, pet supplies and major appliances, as well as "Optical Goods & Sporting Goods" and "Hardware." One explanation for low demand may be that residents along University do not need or prioritize those goods and thus do not demand them. However,

even if there is no market for these goods among the residents of University, there may be demand for these products from consumers outside of the area that could be serviced by businesses along University.

There are issues with my measurement of demand. For one, it does not consider the supply side. According to the basic principles of supply and demand, if demand is very low, it means supply is too high, and consumers do not want the product because they most likely already have it. Yet, it could also imply that markets on University for appliances or pet supplies could do very well if they were able to draw consumers from outside the immediate area.

Understanding the disparity between the supply and demand of a good or set of goods can help with knowing what sorts of businesses can survive in the future economic climate. Gaps in supply and demand create potential business opportunities. These sorts of opportunities will be discussed in the next chapter.

VII. What the Light Rail Could Change

Based on previous historical trends on how transportation has affected University, there is no doubt that the Central Corridor will also change the face of the Avenue. Before the automobile, the streetcars brought the Avenue to life, and made it a thriving center of economic and social activity. Although I cannot say if the light rail will have the same drastic effect as the streetcars did, I do believe it will help to revive the Avenue. Historically, University was shaped by the available modes of transportation on the Avenue. Bringing the electric trolleys or the automobile to the Avenue meant bringing people to the Avenue. When the interstate was completed, the number of people moving up and down the Avenue decreased greatly and businesses suffered and left. But, with the Central Corridor, a new mode of transportation is once again being introduced to University Avenue, and will hopefully bring with it the numbers of consumers that its transit successors

did before. There is potential for economic development with this project.

Many people have voiced concerns about business survival during the construction phase. Citizens have also questioned how easy it will be for cars to travel the Avenue with limited left turns and parking. One of the biggest barriers to the success of the Central Corridor and the development of the Avenue is the idea that University must remain an avenue that is still heavily trafficked by car. Of course automobiles will not disappear overnight, but if citizens understand that the future of University is not an existence without cars but rather cars and pedestrians together, the project will be much more successful. City planners would like to see University become a more pedestrian-friendly street, which I think will be beneficial to consumers on the Avenue as well as the surrounding communities. It is crucial to the success of the Central Corridor that there be increased pedestrian traffic.

With the Nielsen-Claritas data, I was able to see what kinds of goods are being purchased by current residents of the Avenue. This information may be helpful when developing the area after construction of light rail as well as in encouraging business owners to open shop on University. Based on historical trends, I predict the Central Corridor will have positive effects on the Avenue and create new business opportunities. By examining current consumer data, new business owners can understand what is needed to help shape the Avenue that will cater to their consumer demands. The next chapter will discuss the "opportunity gap" measure that the Nielsen-Claritas data provides, which takes into account both the demand and the supply side and allows us to explore where there is potential for new business along the Avenue.

Table 2: Percentage Breakdown of Each Good's Consumer Expenditure by Block Group

Block Group	Food	Alcohol/Tobacco	Pharmacy Goods/ Cleaners/ Paper Products	Apparel/ Footwear	Sewing, Knitting, Drapery	Major & Small Electric Appliances	TV, Audio, Computer & Media Equip	Furniture Flooring Kitchen/Home Furnishings	Hobbies and Leisure Activities	Optical Goods & Sporting Goods	Hardware, Home Improvement, Lawn/Garden & Paint	Cars/ Trucks & Campers, RVs, Trailers	Auto Fuels & Lubricants	Pets, Pet Food & Supplies	All Other Merchandise[†] & Jewelry
1	29	8	12	10	1	1	4	4	3	1	2	10	7	1	7
2	28	7	12	10	2	1	3	4	3	1	2	12	7	1	7
3	28	8	13	9	2	1	4	4	3	1	2	10	7	1	7
4	26	6	12	10	2	1	4	4	3	2	3	13	6	1	7
5	27	7	11	10	2	1	3	4	3	2	2	13	7	1	7
6	28	7	12	11	2	1	3	4	3	2	2	12	6	1	6
7	29	6	10	14	1	1	3	3	4	2	2	13	6	1	5
8	31	7	12	13	1	1	3	3	3	2	2	10	6	1	5
9	28	6	11	13	1	1	3	4	3	2	2	14	5	1	6
10	30	6	11	13	1	1	3	3	3	2	2	12	6	1	6
11	31	7	11	12	1	1	3	3	3	2	1	12	7	1	5
12	33	8	12	12	1	1	3	3	3	1	1	9	7	1	5
13	28	6	11	13	1	1	4	4	3	2	1	13	7	1	5
14	27	5	11	13	2	1	4	4	3	2	2	13	6	1	6
15	27	5	14	12	2	1	3	4	3	2	3	12	6	1	5
16	30	10	8	11	1	1	5	2	6	2	1	10	6	1	6
17	27	8	10	10	1	1	4	4	3	2	2	13	7	1	7
18	27	8	11	9	2	1	4	4	3	1	2	13	7	1	7
Range	26-33	5–10	8–14	9–14	1–2	1	3–5	2–4	3–6	1–2	1–3	9–14	5–7	1	5–7
All Groups	28	7	11	11	1	1	4	4	3	2	2	12	7	1	6

All of the variable values are percentages
*†It was not given what "All Other Merchandise" might include*

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iii. BUSINESSES AND CONSUMERS:

SALES, EXPENDITURES, AND OPPORTUNITIES FOR THE FUTURE

by nolan levenson
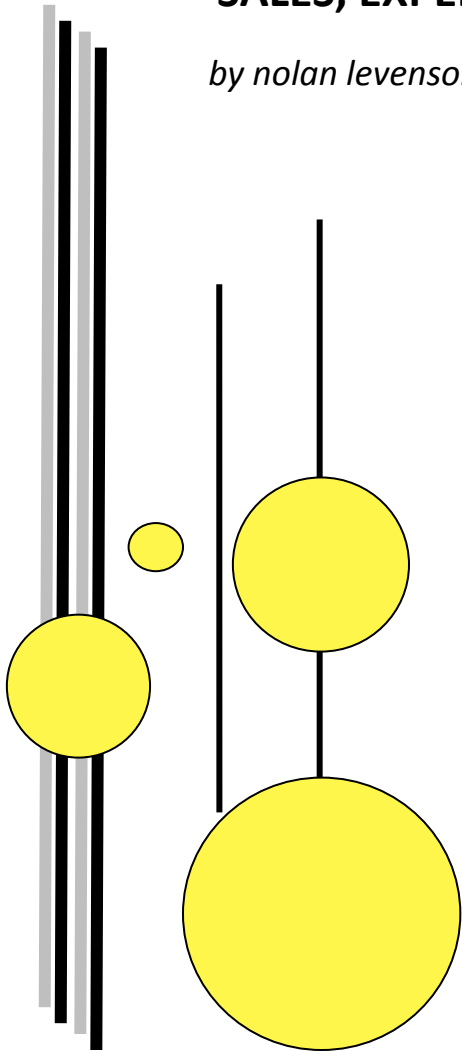
This Chapter's Questions:

1. What is the current business climate on University Avenue?

2. What are Central Corridor residents spending their money on?

3. Where is there potential for new business?

4. What kinds of businesses might open during and post LRT construction?

Chapter Outline:
I. LRT and Businesses
II. Study Design
III. Business Types
IV. Examining Market Orders
V. Examining Station Areas
VI. Conclusion

Many Central Corridor stakeholders are anticipating significant new development and increased revenues for existing business owners along the Corridor after construction of the light rail (LRT). Businesses are concerned about survival during and post-construction and fear displacement due to higher rents and property taxes that may occur because of LRT.

University Avenue is considered a commercial corridor, with a wide variety of shopping options such as car dealerships, antiques, used clothing stores, ethnic markets, and restaurants. The demographics of residents are also quite diverse, but in recent decades the Avenue has acquired an ethnic minority character, which can be seen in many businesses along the Corridor.

In this study I will examine the retail business sales and consumer purchasing trends in areas around the proposed LRT station areas, from Stadium Village to Union Depot. Using this information I will speculate on: What kinds of businesses might open along University Avenue post-LRT construction? Where might they open? This study will depict current business trends occurring along the avenue before LRT construction, considering retail sales and consumer expenditures. The results of the study will be used to make predictions about potential future business development along the Corridor. In the years after LRT construction, this study should be re-evaluated using updated data for comparison in order to determine impacts of LRT.

LRT AND BUSINESSES

Many planners advocate that businesses will benefit greatly from LRT because of newly created pedestrian traffic. However, studies show conflicting evidence about this topic.

There is not much literature directly related to business revenues. Many studies consider commercial property value changes in relation to rail transit and transit stations, but offer differing results. Supporting increased value in relation to LRT, one study in Santa Clara County, California found that as distance from LRT stations increased, commercial property values decreased.[1] Another study found "some indication" that commercial properties benefit more than residential properties due to proximity to rail stations.[2] However, other studies found no impact from proximity to station areas and in some cases there was a negative impact.[3]

There is also limited research on business sector trends.[4] Most business-related LRT studies focus on revenue-loss mitigation strategies. They show what has been successful in keeping business afloat during and post-construction. In Seattle, a community development fund was supplied with $50 million to support local businesses, which helped almost all businesses in the Rainier Valley survive.[5] In Portland, Oregon, along the Yellow Line, there was a net gain in the number of businesses, but many businesses that existed pre-LRT relocated to other places, and a few went out of business. There was also an emergence of a new professional services sector among other new businesses.[4]

These studies, however, do not consider business revenues or consumer expenditures. The sole study that focused on revenue comparison pre- and post-LRT development — a study of the Rainier Valley in Seattle — showed that gross revenues, adjusted for inflation, increased post-LRT construction. The author attributes this, however, to the

registration of unlicensed businesses, not as a result of LRT. This study also noted that there was not a large change in total number of businesses, which is also attributed to the registration of unlicensed businesses that may have offset the turnover of other businesses. The ethnic diversity of businesses also remained unchanged post-LRT construction.[5]

In Phoenix, Arizona, there was a 30-40% drop in revenue for businesses along the LRT corridor during construction, and seven businesses closed. Unfortunately, there was no information about total numbers of businesses available.[4] This indicates that there should be more research done on LRT construction impacts. The study did not indicate what the impacts on businesses were post-construction.

Related to University Avenue, one study focused on "survivability" of business sectors in the Lexington-Rice corridor. Personal care services and automotive repair shops are at the highest risk of displacement in the long-term future, while restaurants and specialty food services have the lowest risk of displacement in the future. One of the reasons these places were at lower risk in the long-term is their proximity to Central Corridor LRT stations, while higher risk sectors were in danger because of increasing rents.[4]

The central focus of this paper is on retail sales and consumer demand in the Corridor, which few, if any, studies have considered. The Central Corridor will provide an excellent opportunity to study LRT station area impacts on businesses, given the diverse character of the Corridor, with a wide variety of small businesses, big-box stores, and large industrial sites.

II. DESIGNING THE STUDY

The primary source of data will be from the Nielsen-Claritas dataset from 2010 for each block group within a mile of the Central Corridor, from Stadium Village on the western end to Union Depot on the eastern end[*]. This study considers the block groups that are included in and are tangential to each LRT station area, defined by a ¼ mile buffer around each station. The Claritas data have information on retail sales and consumer

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[*] Due to data availability, the Corridor is defined only by station areas between Stadium Village and Union Depot.

expenditures for each census block group along the Central Corridor based on credit card information. The data show how much revenue is generated by different kinds of business in each block group, and how many goods of each kind of business are purchased by the residents of each block group. Simply put, retail sales represents supply and consumer expenditures represent demand.

The data will then be categorized into functional orders of goods, from high to low, based on their potential trade market areas as defined in previous studies. High-order goods have the largest trade area, include more expensive goods, and are less frequented on a regular basis by individual customers. In order to earn profit, high-order businesses must attract customers from a larger area than low-order businesses. An example of a store with high-order goods is Menards. Therefore, Menards is considered a high-order business.

Medium-order goods have smaller trade areas and less expensive goods, such as a restaurant or a supermarket. A business with medium-order goods is considered a medium-order business. Low-order goods are found in places such as convenience stores and liquor

stores because they are used most frequently and are the cheapest kinds of goods. A business that sells low-order goods is considered to be a low-order business.

Order	Type of Business
High	Car Dealerships, Auto Repair and Parts, Furniture, Building Material and Garden Supply, Non-Store Retailers[*]
Medium	Electronics, Supermarkets, Specialty Foods, Health and Personal Care, Clothing, Sporting Goods, Music, Hobby, General Merchandise, Misc. Stores
Low	Convenience Stores, Liquor Stores, Gas Stations

Total retail sales of businesses and consumer expenditures of residents for each of these orders will be displayed graphically by census block groups and in tables to demonstrate the character of

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[*] Non-store Retailers include mail-order houses, vending machine operators, home delivery sales, door-to-door sales, party plan sales, electronic shopping, and sales through portable stalls (e.g., street vendors, except food). Non-store retailers were included in high-order goods because they made up a large portion of the total sales in the University corridor (14%), while being extremely spatially concentrated, indicating the high-order service they might provide. It is improbable that street vendors could have such high sales.

different areas along the avenue. Using these data, one can see where there is potential for new business, and what existing sectors might thrive post-LRT construction.

Potential for new businesses can also be explored using the "opportunity gap," which measures discrepancies between expenditures and sales in each block group for each kind of good. A positive opportunity gap indicates opportunity for a start-up business or business expansion to fill the excess demand of consumers. The higher the gap, the more demand there is. High opportunity means that there is good potential for business.

A negative opportunity gap indicates that there is a surplus of goods in comparison to consumer expenditures for those goods, and that there is no room for more business in that sector. A high surplus is indicated by a large negative opportunity gap. If there is surplus, there is no room for new businesses because there is excess supply.

The opportunity gap will be used in this study to determine where new businesses might locate, and what goods they might sell. Broken into sectors and types of goods, a high opportunity gap for different types of businesses indicates a need for specific kinds of goods

locally, whereas a negative opportunity gap indicates a surplus of goods in a sector. This can indicate then, what kinds of businesses might open in different places.

Block groups that intersected with the ¼ mile buffer around each station were aggregated to a station-area level to determine business activity within and around each station area. While some block groups are not tangential to the Corridor, and extend a good distance from the Corridor, they were included in this sum for two reasons. First, the majority of areas that are not tangential to the Corridor, but are contained within the tangential block group, are almost purely residential and consume in their surrounding commercial areas. Second, the station area can impact businesses north and south of the Corridor, particularly along major cross streets because of high transportation access.

DEMOGRAPHICS
In order to compare areas along the Corridor, I will compare results of the study with demographic data about the block groups around each station area including total population, families below poverty, and median household

income, all using 2010 estimates from the Claritas data.

These data were also aggregated to a station area level, including block groups that intersected the ¼ mile buffer of each station area. To determine an aggregate for median household income for station areas, I used the mean value of the median household income of intersecting block groups (which will be referred to as the mean block group median household income in the rest of the paper). While not a perfect measure, this gives a general idea of the wealth of residents in each station area.

Total population was also used to standardize consumer expenditures across areas, since some station areas have more population than others and might explain lower or higher expenditures. However, expenditure numbers that do not account for population are still useful in understanding business potential because a business depends on sales, not on the number of people living around it.

RIDERSHIP AND BUSINESS

2030 Central Corridor LRT ridership projections provided by the Metropolitan Council will be used to additionally inform my projections about the business potential of the Corridor. A quick analysis of ridership projections might indicate some of the pedestrian traffic that will augment business in station areas.[6] In 2030, it is projected that Snelling, Union Depot, Fairview, and Tenth St. are in the top tier of ridership, with 1,860–2,930 boardings per day. This suggests that businesses in these places may increase more in sales and revenue than businesses at other station areas.

Ridership Level	Stations
Low (270-600)	Western, Capitol East, Victoria, Hamline
Low-Medium (710-970)	Dale, Lexington, Prospect Park, Stadium Village
High – Medium (1140-1250)	Westgate, Rice, Fourth, Raymond
High (1860-2930)	Tenth, Fairview, Union Depot, Snelling
*Categories divided by natural breaks in the data	

THE CITY OF ST. PAUL'S STATION AREA PLANS

Lastly, I will examine the City of Saint Paul station area plans, which provide recommendations for land use and growth post-LRT. Each plan has market forecasts for 2030, done in January of 2008, for the station area.[7] These plans will be compared with the findings of this study to see if plans for growth coincide with the business potential measured by opportunity gaps in each station area.[*]

The Hamline, Victoria, and Western station area plans are still under review, therefore the study will consider their draft editions. The market forecasts in those plans were conducted in 2010, and list projections for 2035.

LIMITATIONS OF THE STUDY

There are some limitations to this study. The opportunity gap is not a perfect measure of mismatch areas for potential development because it cannot measure how much money is actually being spent locally by consumers, just how much money consumers from each block group spend. Additionally, we do not know whether businesses are receiving local money if their revenues are based from customers far away.

The aggregate measures for station areas are also inexact. Block groups that are included in each station area vary in size and distance from the LRT line,

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[*] Unfortunately this comparison will not allow for evaluation of the Stadium Village and Prospect Park station areas, which are located in Minneapolis.

which may impact how LRT affects revenue and expenditures. Also, station areas overlap, which means that in some cases, block groups are double counted because they impact two or more station areas.

It should also be noted that the city of St. Paul's station area plans do consider a ¼ mile buffer around each station, but do not include the areas of each surrounding block group as in this study.

My study does not consider opportunities defined by the built environment, which may impact how much new development and business a station area might expect. For example, a vacant lot is more likely to undergo redevelopment than an existing building. Furthermore, new businesses that need to find a location, either to rent or buy, depend on the property owner's willingness to rent or sell to the business. Businesses cannot locate wherever they would like. A consideration of more specific opportunities would also indicate where specific kinds of businesses might locate and succeed.

Graphically, non-standardized data are generally not represented in categories on a map. However, since census block groups are approximately the same size of about 1,000 residents, measures are somewhat standardized across space. Additionally, the data are most easy to interpret in this format, rather than graduated symbols, where it is hard to interpret differences in the variables, especially when overlaid by station area buffers.

III. WHAT KINDS OF BUSINESSES ARE IN THE CENTRAL CORRIDOR?

Overall, University Avenue is a major commercial sales center, earning more than 2 billion dollars in sales in 2010, predominantly in the medium-order sector. The largest earners were north of the Raymond-Fairview section of the Corridor, Midway, and Downtown St. Paul. These areas are characterized by larger and big-box businesses. The lowest sales were around the Victoria station area, between Lexington and Dale. This area is characterized by small businesses, including restaurants, supermarkets, and other services.

Station Name	Retail Sales, 2010
Fourth St	1,009,662,454
Tenth St	778,896,782
Union Depot	692,384,234

Snelling Ave	675,197,617
Hamline	610,247,890
Lexington Pkwy	347,855,396
Stadium Village	216,814,341
Raymond Ave	198,280,447
Fairview Ave	168,404,722
Westgate	158,953,809
Prospect Park	141,406,628
Capitol East	119,128,363
Victoria	87,303,422
Western	78,807,344
Dale St	77,315,891
Rice St	75,325,023

The station area with the most retail sales was Fourth St, with revenues over 1 billion dollars. Rice, Victoria, Western, and Dale were the lowest, with revenues lower than 100 million.
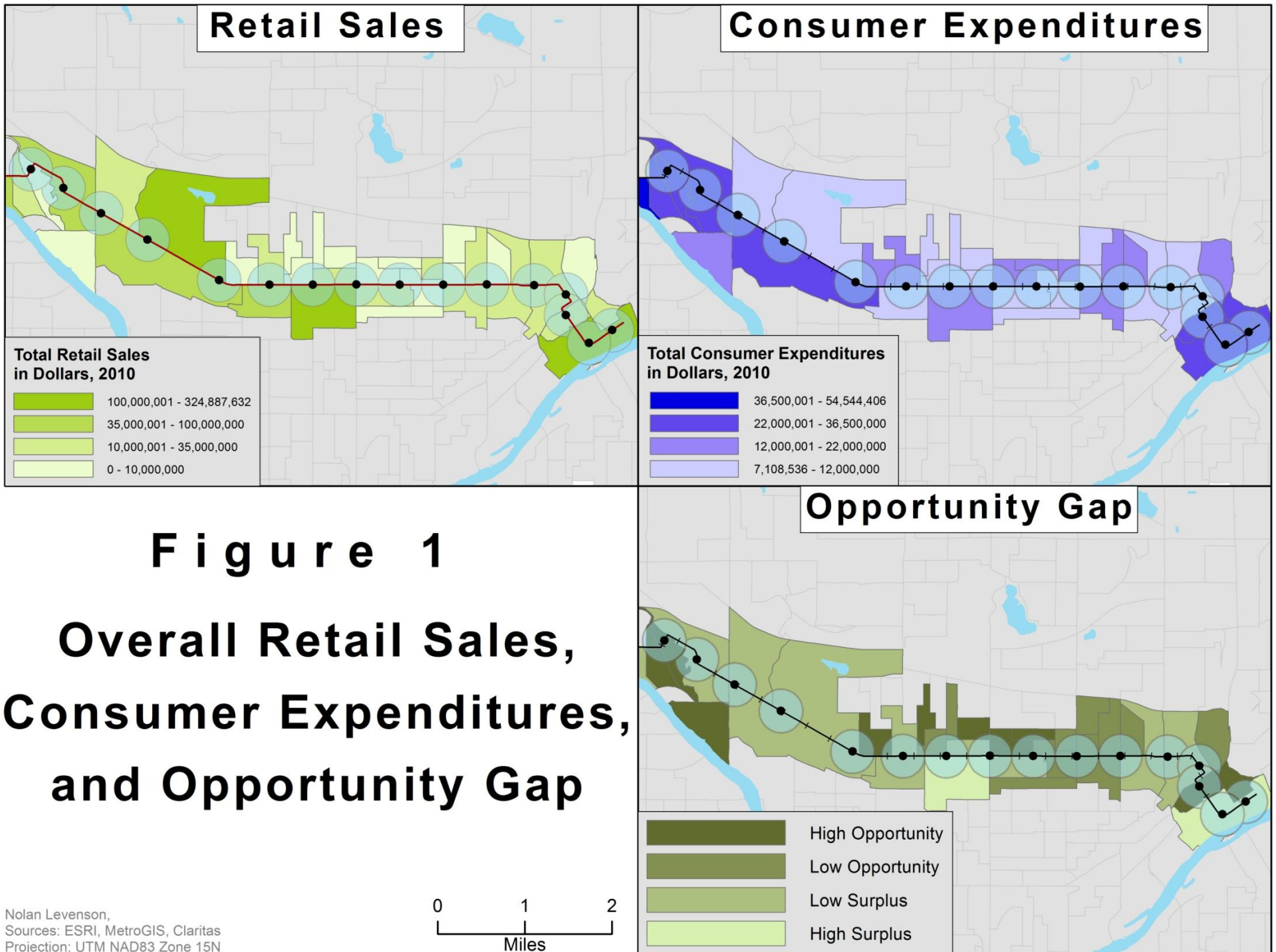
Expenditures show slightly different patterns. The majority of spending occurs in the block groups around the Downtown St. Paul station areas, Western, Stadium Village, and Prospect Park. However, this measure does not account for density, so it is possible that more people live in these areas. The area around the Tenth St. station had the greatest consumer expenditures ($264,276,951), with Rice St. having the least ($48,810,424). However, when

accounting for populations around station areas, Union Depot and Westgate have the largest expenditures per capita (about $15,000 each), while Dale and Western have the lowest (both less than $9,000).

Station Name	Consumer Expenditures	Expenditures per Capita
Tenth St	$264,276,951	$13,000
Stadium Village	176,499,185	13,287
Capitol East	166,206,921	12,655
Fourth St	155,942,341	13,812
Union Depot	132,443,856	15,942
Dale St	126,628,962	8,911
Snelling Ave	117,153,666	11,659
Victoria	109,873,573	9,645
Western	103,970,227	8,583
Prospect Park	95,742,740	13,294
Lexington Pkwy	95,625,050	10,314
Hamline	93,268,514	11,154
Westgate	85,401,504	15,630
Fairview Ave	56,999,392	12,698
Raymond Ave	54,999,315	13,256
Rice St	48,810,424	10,027

The greatest opportunity gap was at Dale ($49,313,071), while Fourth St. had the greatest surplus ($-853,720,113). Only four station areas (Dale, Capitol East, Western, Victoria) had positive opportunity gap measures (see Table 2), indicating the commercial nature of University Avenue, and an excess of goods for its direct local population. This also means that in the future, the Avenue will continue to rely on revenue from residents outside the Corridor, or need to increase population along the Corridor to support new and existing businesses.

Retail Sales

Total Retail Sales in Dollars, 2010

	100,000,001 - 324,887,632
	35,000,001 - 100,000,000
	10,000,001 - 35,000,000
	0 - 10,000,000

Consumer Expenditures

Total Consumer Expenditures in Dollars, 2010

	36,500,001 - 54,544,406
	22,000,001 - 36,500,000
	12,000,001 - 22,000,000
	7,108,536 - 12,000,000

F i g u r e 1

Overall Retail Sales, Consumer Expenditures, and Opportunity Gap

0   1   2

Miles

Opportunity Gap

	High Opportunity
	Low Opportunity
	Low Surplus
	High Surplus

IV. EXAMINING MARKET ORDERS

Retail Sales, 2010

Order of Good	Sales	Percent of Total
Low	179,566,381	7.9
Medium	1,393,756,333	61.36
High	697,997,859	30.73
Total	**2,271,320,573**	

The largest portions of sales on University are from medium-order businesses, which highlights the presence of big box stores, food stores, and food service institutions. There is a very small percentage of low-order retail sales. However, it is important to keep in mind that low-order goods are less expensive than medium- and high-order goods.

CONSUMER DEMAND, 2010

Order of Good	Expenditures	Percent of Total
Low	176,497,087	10.36
Medium	957,171,761	56.20
High	569,421,872	33.43
Total	**1,703,090,720**	

While medium-order purchases predominate in total consumer expenditures, there is a more even distribution of expenditures than retail sales on different order goods, indicating a more diverse need of goods than provided along the Avenue.

In many block groups, there is a discrepancy between consumer demand (expenditures) and retail supply (sales). These block groups show opportunity for new investment. Areas underserved by retail are predominantly north of University Avenue, with concentrations around the Victoria, Dale, and Western station areas. There is also large opportunity along the western section of the Corridor around Stadium Village, and in downtown at the eastern end at Tenth St.

Medium-order sales predominate in 25 of 35 block groups. In no block group do low-order sales predominate. Around the Raymond station, there are more high-order sales. There also appears to be


Figure 2 - Retail Sales by Order

Percent of Retail Sales by Market Order in Dollars, 2010

High-Order
Medium-Order
Low-Order

1/4 Mile Buffer
LRT Station

Nolan Levenson,
Sources: ESRI, MetroGIS, Claritas
Projection: UTM NAD83 Zone 15
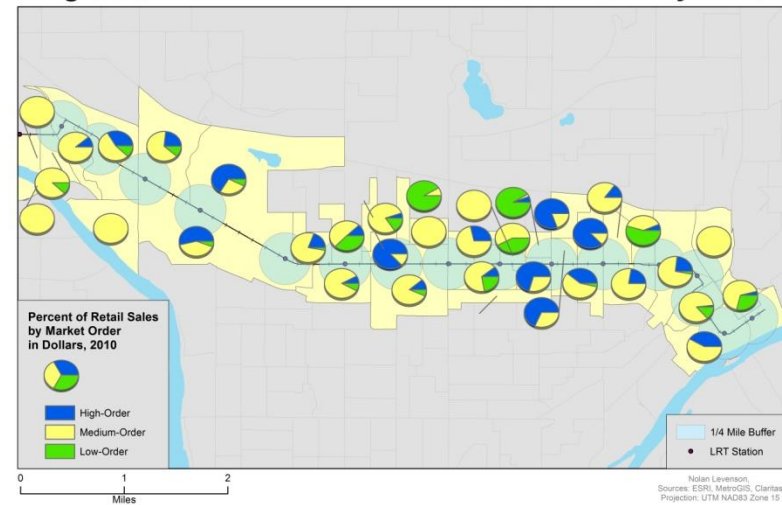
a cluster of high-order sales around the Dale station.

Interestingly, the breakdown of expenditures by market order is consistent across each block group — a bit more than half is spent on medium-order goods, about a third on high-order goods, and the rest (about one tenth) on low-order goods, matching the general overall trend of the Corridor (see Figure 3).

Figure 3 - Consumer Expenditures by Order
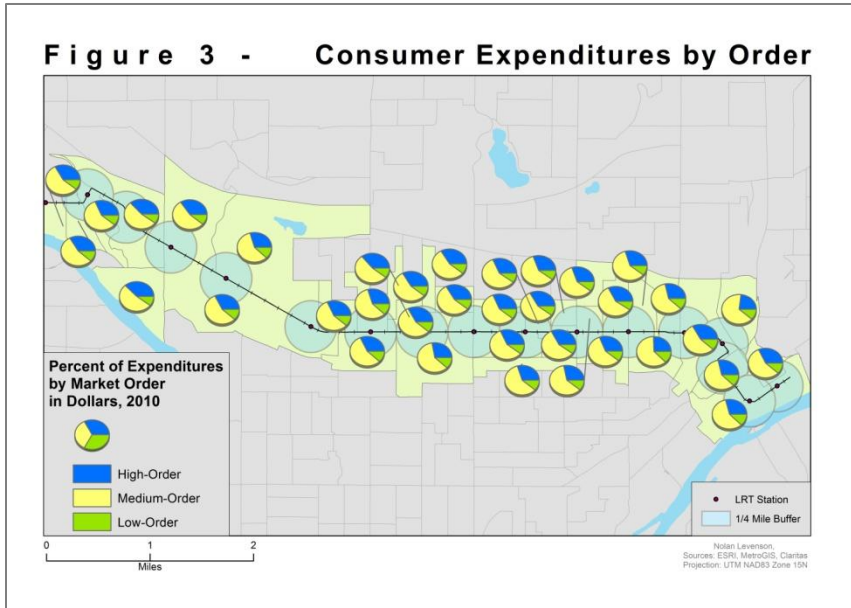
LOW-ORDER GOODS

There is a concentration of low-order retail sales around the Snelling, Hamline, Lexington, Raymond, Westgate, Fairview, Snelling, and Prospect Park station areas (see Figure 4). When aggregated, the three station areas with the highest low-order sales are Snelling (about $51.5 million), Hamline ($39.5 million), and Lexington ($29 million), highlighting the commercial strengths of the Midway area. The low-order good sales were lowest at Western ($890,958).

Low-order expenditures are also concentrated around the Downtown Saint Paul station areas—Tenth St., Capitol East, and Fourth St. station area residents have the three highest consumer expenditures on goods from low-order businesses (at least $18 million), which might be explained by the density of downtown and larger concentration of convenience stores there. Stadium Village has similar consumer expenditures (slightly less than $18 million), which might also be a reflection of density, and also the impact of the University area. There is also a large concentration in the block group south of the Westgate to Fairview section. The Rice St. station area had the least expenditures ($5.5 million), which might be explained by lower economic wealth of the residents in the area in comparison to other areas along the Corridor.

Looking at expenditures per capita (see Figure 7), residents around Union Depot spent the most on goods from low-order businesses ($1,804). Westgate and Fourth were close with about $1,600 each. The area around the Western station had the lowest low-order expenditures per capita of $861. Victoria and Dale had similarly low figures, both less than $1000. This highlights the economic nature of the area, which is generally poorer and where residents may have less money to spend on goods.

These differences in sales and expenditures create large opportunity gaps around numerous station areas. All of the block groups that surround the Western station area have opportunity for new low-order goods. Almost the entirety of downtown St. Paul has opportunity. The block groups north of University between Hamline and Victoria also have small opportunity for new low-order business. The largest excess of low-order goods was in the Raymond and Hamline station areas.

58

Low-Order Opportunity Gaps by Station Area*	
High Opportunity (> $5 million)	Western, Tenth St.
Low Opportunity ($0 > $5 million)	Fourth St., Capitol East, Dale, Stadium
Low Surplus (- $8 mill < $0)	Union Depot, Victoria, Fairview, Prospect Park, Westgate
High Surplus (< -$8 million)	Snelling, Hamline, Lexington, Raymond, Rice
Median: -$3,016,398	
*These breaks are different from those on the map, because this uses aggregated, rather than block group data.	

Station Name	Liquor Store Opportunity Gap
Prospect Park	$1,026,784
Capitol East	1,020,802
Stadium Village	936,505
Lexington Pkwy	887,859
Victoria	864,980
Rice St	457,175
Dale St	83,108
Overall Corridor Liquor Store Opportunity Gap: -$5,932,450	

An example of a low-order business, liquor stores, which generate approximately 13 percent of the low-order sector, shows a concentration of sales in the block groups around Downtown St. Paul, particularly Tenth St. and Fourth St., and Snelling ($9 million), followed by Raymond and Fairview. Victoria, Rice, Lexington, and Prospect Park had no liquor sales (see Figure 8). Looking at station areas, seven have positive opportunity gaps, which means that sales of liquor are concentrated in a few specific areas. For example, the Snelling station area has a -$8 million opportunity gap, the lowest in the Corridor, which can most likely be explained by Big Top Liquors located just south of University on Snelling.

Retail Sales

Total Retail Sales in Dollars, 2010

- 18,000,001 - 129,488,646
- 8,500,001 - 18,000,000
- 1,700,001 - 8,500,000
- 0 - 1,700,000

Consumer Expenditures

Total Consumer Expenditures in Dollars, 2010

- 7,000,001 - 10,833,601
- 4,000,001 - 7,000,000
- 2,300,001 - 4,000,000
- 1,280,521 - 2,300,000

Opportunity Gap

- High Opportunity
- Low Opportunity
- Low Surplus
- High Surplus

F i g u r e   4

L o w - O r d e r

B u s i n e s s   S e c t o r

Nolan Levenson,
Sources: ESRI, MetroGIS, Claritas
Projection: UTM NAD83 Zone 15N

0   1   2
Miles

Retail Sales

Total Retail Sales in Dollars, 2010
- 63,229,357 - 218,435,185
- 35,000,001 - 63,229,356
- 14,000,001 - 35,000,000
- 0 - 14,000,000

Consumer Expenditures

Total Consumer Expenditures in Dollars, 2010
- 20,000,001 - 30,648,702
- 12,000,001 - 20,000,000
- 8,000,001 - 12,000,000
- 4,218,069 - 8,000,000

Opportunity Gap
- High Opportunity
- Low Opportunity
- Low Surplus
- High Surplus
- Extreme Surplus

F i g u r e   5

M e d i u m - O r d e r
B u s i n e s s   S e c t o r

Nolan Levenson,
Sources: ESRI, MetroGIS, Claritas
Projection: UTM NAD83 Zone 15N

0   1   2
Miles

Retail Sales

Total Retail Sales
in Dollars, 2010

- 33,000,001 - 61,400,409
- 15,000,001 - 33,000,000
- 4,000,001 - 15,000,000
- 0 - 4,000,000

Consumer Expenditures

Total Consumer Expenditures
in Dollars, 2010

- 9,100,001 - 13,062,103
- 4,700,001 - 9,100,000
- 2,825,504 - 4,700,000
- 1,507,222 - 2,825,503

Opportunity Gap

- High Opportunity
- Low Opportunity
- Low Surplus
- High Surplus
- Extreme Surplus
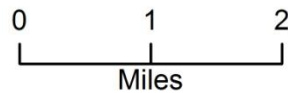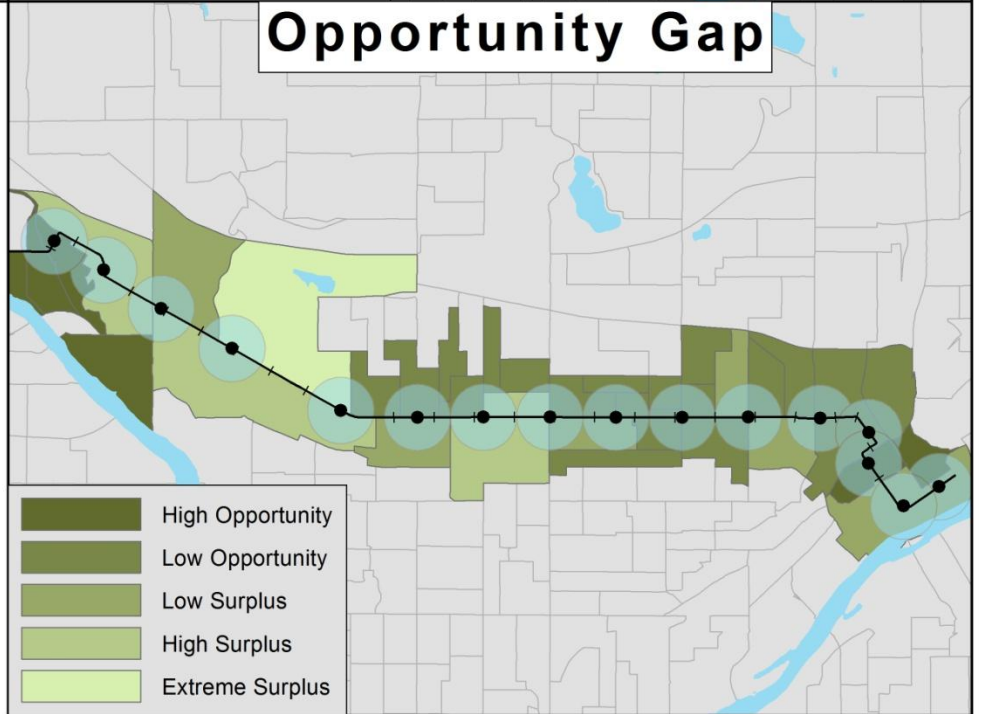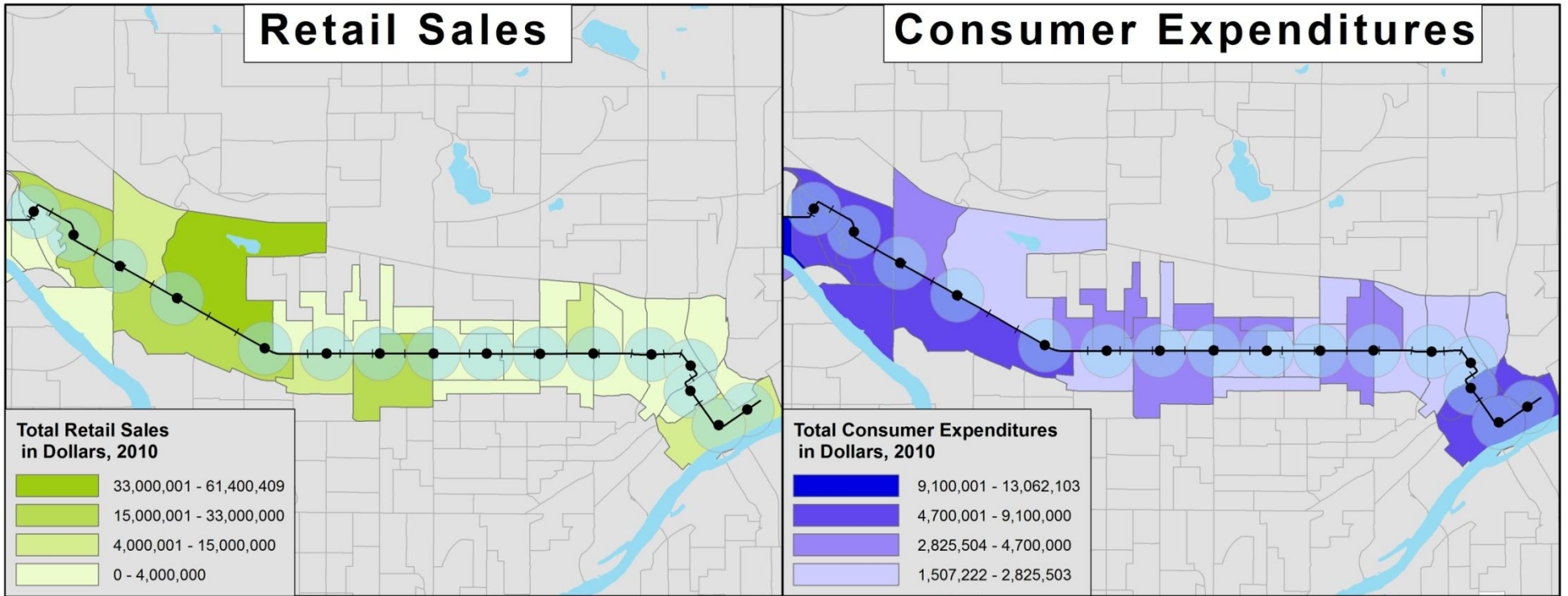
F i g u r e   6

H i g h - O r d e r

B u s i n e s s   S e c t o r

Nolan Levenson,
Sources: ESRI, MetroGIS, Claritas
Projection: UTM NAD83 Zone 15N

0   1   2
Miles
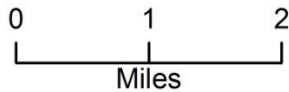
MEDIUM-ORDER GOODS

Medium-order retail sales concentrate in the block groups in and around the Union Depot, Fourth St., and south of University along the Snelling to Lexington corridor. Fourth St. station area had the highest sales ($585 million), followed by Snelling ($556 million) and Hamline ($495 million).

There are few sales of medium-order goods between Lexington and Capitol East, and north of University between Fairview and Lexington (see Figure 5). Dale, Western, and Rice have the lowest medium-order sales compared to the other station areas. This means that medium-order sales are highly concentrated in certain areas along the Corridor, creating large demand in areas that are underserved by these kinds of goods. So, while there is a large concentration of restaurants, food stores, and other small ethnic businesses in the area east of Lexington, the stores in the Midway shopping area are generating significantly more revenue.

Expenditures are highest around Stadium Village, Prospect Park, Western, and downtown St. Paul (see Figure 5). There is also high expenditure south of University between Westgate and Fairview. The Tenth St. station area had the highest medium-order expenditures ($155 million), while the Rice St. area had the least ($28 million). Similar to low-order goods, the station areas with the most expenditures per capita were Union Depot ($9,198) and Westgate ($8,486), while the lowest were Western, Dale, and Victoria (between $5,086 and $5,578).

This creates high positive opportunity gaps in the Western ($26 million) and Dale ($43 million) station areas. There are also specific block groups within Stadium Village, Tenth St. and north of University from Snelling to Lexington with opportunity for medium-order businesses (see Figure 5). The Fourth St. station area had a very large surplus of medium-order goods (-$494 million).

Medium-Order Opportunity Gaps by Station Area	
High Opportunity >$10 million	Dale, Western
Low Opportunity > $0	Capitol East, Victoria
Low Surplus < $0	Rice, Fairview, Prospect Park,
High Surplus < -$30,000,000	Westgate, Raymond, Stadium Village
Extreme Surplus	Lexington, Tenth St.,
< -$200,000,000	Union Depot, Hamline, Snelling, Fourth St.
Median: $-40,180,789	

*These breaks are different from those on the map, because this uses aggregated, rather than block group data.

An examination of an example of a medium-order good, food service, which comprises 32 percent of medium-order sales in the Corridor, indicates a cluster of sales in the Downtown area. The Fourth St. station area had the highest food service sales (about $353 million), which might be explained by the concentration of restaurants around city government buildings and hotels. Surprisingly, given the strong presence of ethnic restaurants, there are not many sales in the Frogtown area compared to other areas, which may indicate that they are generating less revenue. The Dale station areas had the least sales ($8.5 million) (see Figure 8).

Only two station areas have positive opportunity gaps for food service, which means that there is a surplus of Food Service stores throughout the Corridor with the exception of a few places. This indicates that there might be potential for new Food Service business at Dale and Victoria.

Station Name	Food Service Opportunity Gap
Dale St	$4,247,871
Victoria	479,956
Overall Corridor Food Service Opportunity Gap: -$159,903,174.	

HIGH-ORDER GOODS

The majority of high-order sales occurred in the block groups near Raymond, Fairview, Fourth St., and Union Depot stations (see Figure 6). The Fourth St. station area had the most aggregated high-order sales ($410.5 million). Including Fourth St., five station areas had over $100 million in high-order sales (Tenth St., Union Depot, Raymond, and Fairview). Rice, Capitol East, and Victoria had the fewest, all less than $20 million.

Since high-order goods are the most expensive, there are high expenditures all along the Corridor on businesses with high-order goods, with the highest concentrations in downtown St. Paul and Stadium Village, particularly the Tenth St. ($79.5 million) and Stadium Village ($60 million) station areas. The lowest expenditures were Fairview, Raymond, and Rice (all at or below $18 million).

The Westgate station area residents spent $5,533 per capita on goods from high-order businesses, the highest in the Corridor. The figure for Union Depot was second highest, at $4,939. Western had the lowest high-order spending per capita of $2,636, followed by $2,804 at Dale St. These figures vary from total expenditures because of differences in population between station areas (see Table 5).

The largest high-order opportunity gaps are around Capitol East ($36 million), Victoria ($19 million), and Stadium Village ($15 million), with the lowest at Tenth St. (-$205.5 million), Union Depot (-$233.5 million), and Fourth St. (-$364 million). This indicates that the downtown area already has a strong presence of high-order businesses, while other areas, particularly on the eastern end of University Avenue, which is characterized by small business, do not.

High-Order Opportunity Gaps by Station Area	
High Opportunity > $15 million	Capitol East, Victoria, Stadium Village
Low Opportunity > $0	Dale, Rice
Low Surplus < $0	Western, Prospect Park, Lexington
High Surplus < -$30,000,000	Snelling, Westgate, Hamline, Fairview,

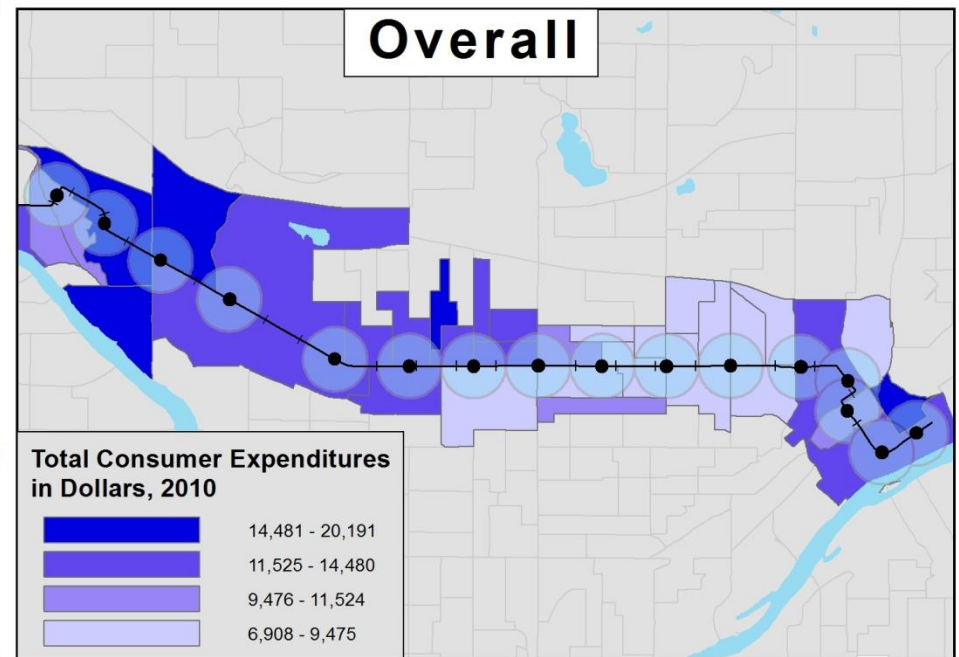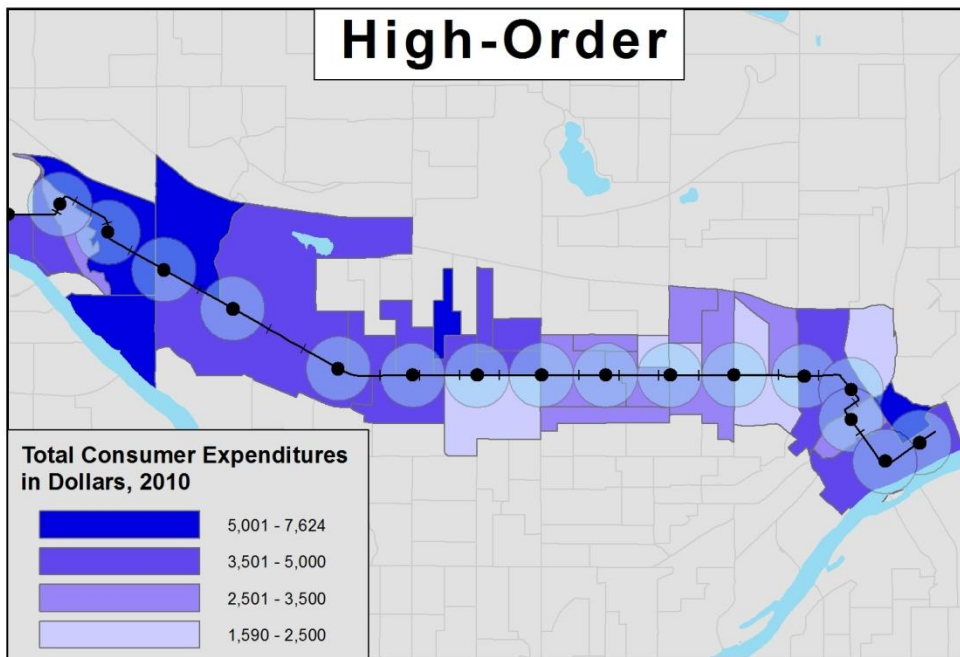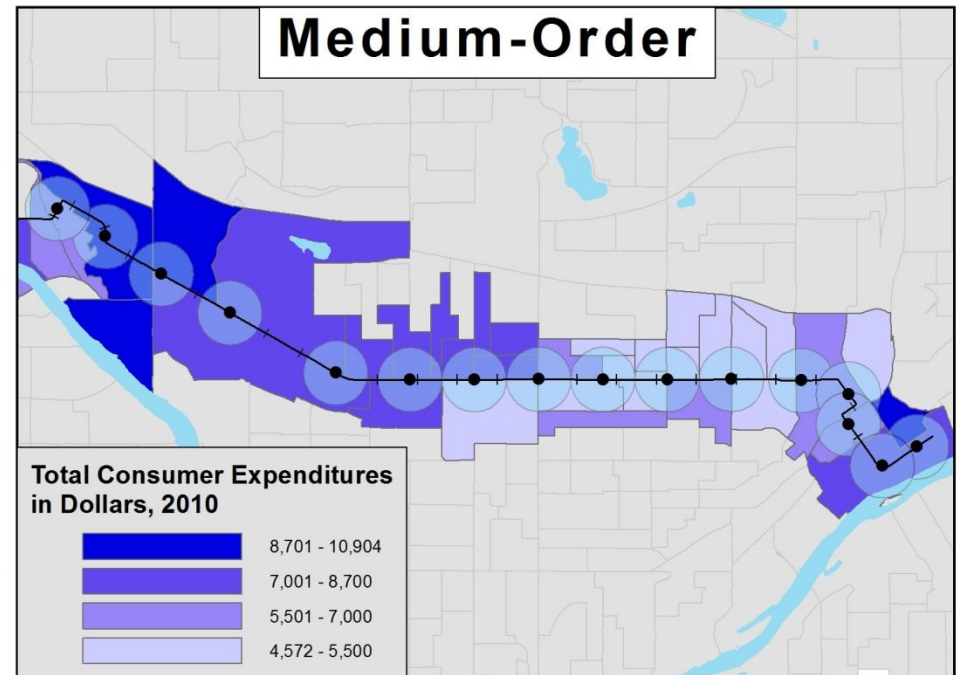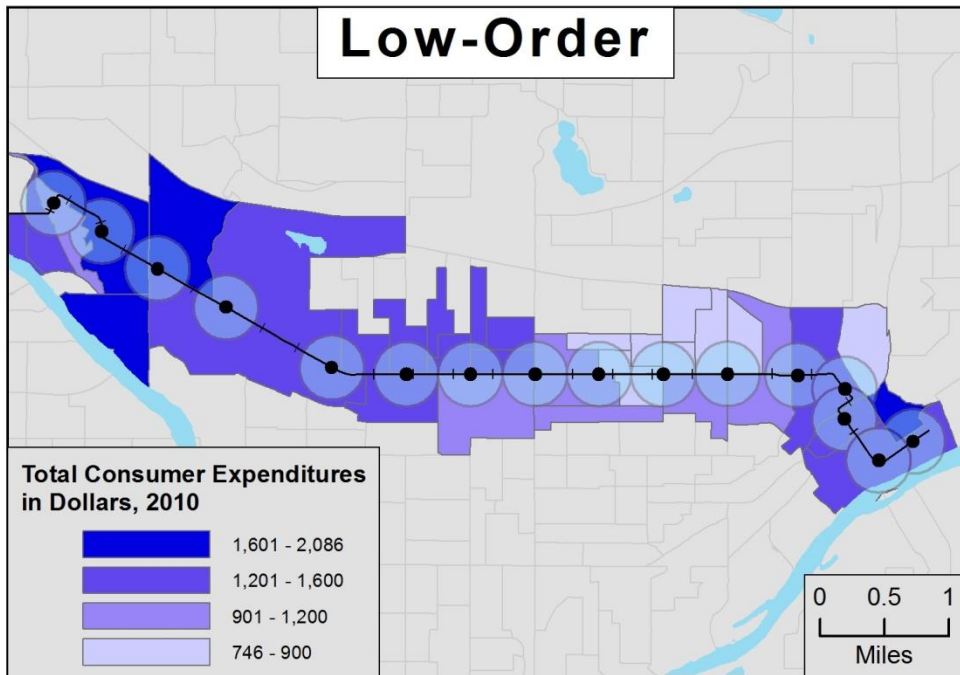|	Raymond
Extreme Surplus < -$200,000,000	Tenth St., Union Depot, Fourth St.
Median: -$26,123,123	
*These breaks are different from those on the map, because this uses aggregated, rather than block group data.	

Examining motor vehicle and parts dealer sales, which generate 16 percent of high-order sales along the Corridor and are one of the stereotypical businesses of University Avenue, the highest concentrations are in block groups around the Raymond, Hamline, and Fairview stations, with high sales around Western and Lexington as well (see Figure 8). The Hamline station area had the highest sales ($42.5 million), while Stadium Village and Prospect Park had no sales.

Looking at opportunity gap, the Corridor has a large surplus of motor vehicle and parts dealer sales. The Raymond station area has the most surplus (-$34 million opportunity gap) compared to the other station areas. However, nine station areas have positive opportunity gaps, which means that there is potential for new business in these areas. Residents in these station areas are traveling elsewhere to purchase goods from these kinds of businesses. This also

indicates that motor vehicle and parts dealer businesses are spatially concentrated in a few areas along the Corridor.

Station Name	Motor Vehicle and Parts Dealer Opportunity Gap
Stadium Village	$28,822,665
10th St	26,768,220
Capitol East	19,983,134
29th Ave	15,383,048
Union Depot	13,733,628
4th & Cedar	13,699,070
Victoria	6,211,594
Rice St	3,429,244
Dale St	501,005
Overall Corridor Motor Vehicle and Parts Dealer Opportunity Gap: -$15,519,796	

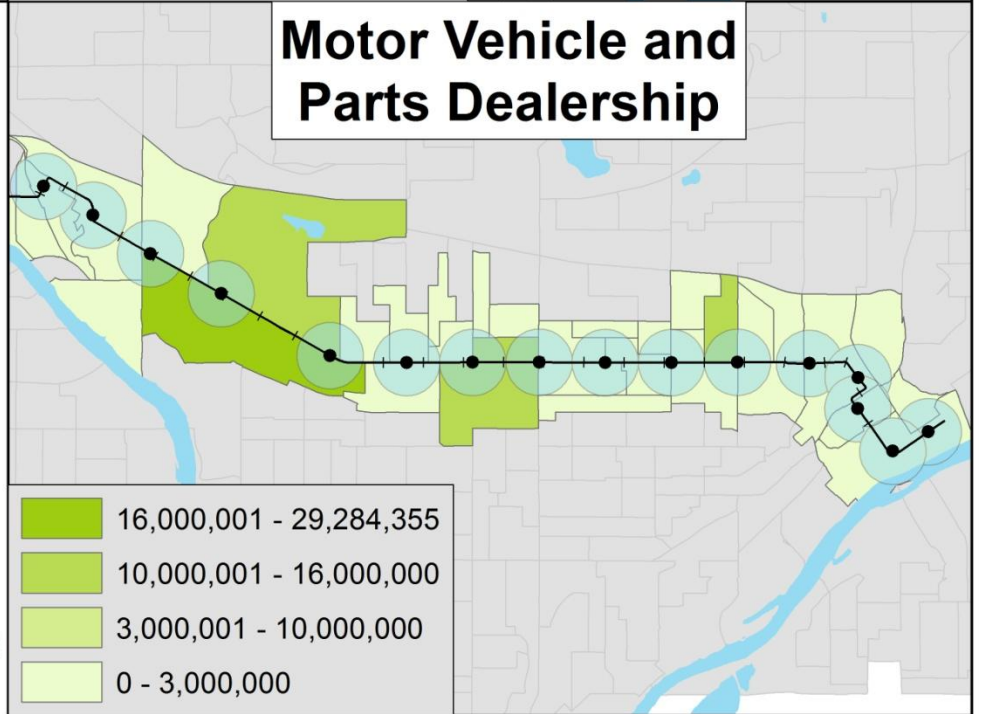# F i g u r e   7   -   Consumer Expenditures Per Capita

Low-Order

Total Consumer Expenditures in Dollars, 2010

- 1,601 - 2,086
- 1,201 - 1,600
- 901 - 1,200
- 746 - 900

0   0.5   1
Miles

Medium-Order

Total Consumer Expenditures in Dollars, 2010

- 8,701 - 10,904
- 7,001 - 8,700
- 5,501 - 7,000
- 4,572 - 5,500

High-Order

Total Consumer Expenditures in Dollars, 2010

- 5,001 - 7,624
- 3,501 - 5,000
- 2,501 - 3,500
- 1,590 - 2,500

Overall

Total Consumer Expenditures in Dollars, 2010

- 14,481 - 20,191
- 11,525 - 14,480
- 9,476 - 11,524
- 6,908 - 9,475

Liquor Store

Legend:
- 2,000,001 - 4,454,796
- 700,001 - 2,000,000
- 0 - 700,000

Food Service

Legend:
- 28,000,001 - 112,814,527
- 9,000,001 - 28,000,000
- 3,000,001 - 9,000,000
- 0 - 3,000,000

Motor Vehicle and Parts Dealership

Legend:
- 16,000,001 - 29,284,355
- 10,000,001 - 16,000,000
- 3,000,001 - 10,000,000
- 0 - 3,000,000

Figure 8

Specific Business Sector Sales

Nolan Levenson,
Sources: ESRI, MetroGIS, Claritas
Projection: UTM NAD83 Zone 15N
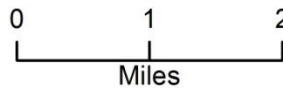
0   1   2
Miles

This section will examine the opportunities at each station area considering sales, expenditures, and opportunity gaps for general and various specific business sector trends. I will also compare City of St. Paul station area plans for each station and Met Council 2030 LRT ridership projections with the opportunity gap measures. Each section speculates on the kinds of businesses that might locate in the station area. Tables summarizing the data discussed in this section can be found after the conclusion section of this chapter.

STADIUM VILLAGE

The Stadium Village station area has high numbers of both sales and expenditures, but an opportunity gap of about -40.3 million, indicating a surplus of sales. The station area had the highest sales on the western end of the Corridor (about $216 million). However, the residents in the block groups in this station area had about $176.5 million in expenditures, the second highest in the Corridor. Per capita, expenditures were $13,287, higher than the average compared to other station areas in the

Corridor, which may indicate the high expenditure of University students and other area residents on the high concentration of retail outlets, particularly chain restaurants.

The station area has large opportunity gaps in numerous retail sectors. It has the highest opportunity for hobby stores (sporting goods, book, and music stores) ($16.9 million), car dealership and parts dealers ($28 million), and non-store retailers ($14.3 million) in the study area of the Corridor. It also has a $23.3 million opportunity gap for general merchandise (such as department stores), the second highest in the Corridor. This means that residents are going elsewhere to purchase these goods, especially high-order goods.

The station area is expecting 970 riders daily by 2030, a low-medium number, which may have little impact on the success of businesses. However, the area does have a relatively large population of about 13,000 that can support a wide array of businesses. The mean block group median household income in the area is $38,686, about average for the Corridor. This may impact what kinds of businesses decide to locate in the area, perhaps focusing more on low- and medium-order goods,

which might help explain the lack of high-order businesses.

PROSPECT PARK

The Prospect Park station area had an overall surplus of about $45.6 million, but had high opportunity gaps in general merchandise ($13.5 million) and non-store retail ($7.3 million) indicating that there might be potential to serve residents with new business in these sectors. Looking at expenditures per capita, the residents in the Prospect Park station area had slightly more consumer expenditures ($13,294) than average compared to other station areas in 2010. This may be representative of the wealthier communities that surround the station area, in which block groups had an average median household income of $45,912.

Ridership levels for 2030 are estimated at around 950 daily, a low-medium measure, which may limit how much new business can occur in this station area. A total population of 7,202 is relatively low compared to other station areas. With these numbers in mind, there might not be much potential for new businesses in this area.

WESTGATE

The City of St. Paul sees Westgate as an area prime for redevelopment, especially since it has already seen much new high-density condominium development. There are many old industrial sites and vacant lots that are good sites for redevelopment. Projections of 1,800-2,500 new residential units by 2030 might support more business in the area.

Projections for 2030 also estimate about 700,000 square feet of new office space and about 60,000 square feet of new retail. However, according to the results of this study, Westgate had a surplus of sales that exceeded expenditures in the area (-$73.5 million opportunity gap).

The Westgate station area did not have the most of any specific type of business opportunity gap along the Corridor. However, there was a $10.3 million opportunity gap for general merchandise and a $6.1 million opportunity gap for non-store retailers, which means that residents are shopping elsewhere for goods from these kinds of stores, so there might be opportunity to expand in these kinds of businesses in the Westgate area.

Ridership projections are medium-high for this station, about 1,140 riders daily, which may help business development in this area. The area currently has a relatively low population of about 5,000. If the area sees residential development as planned, however, the number of residents will increase. Despite its low population, it has high expenditures. Per capita, the Westgate station area spent $15,630. This may be indicative of the wealth of the area with a mean block group median household income of $54,622, much higher than the other station areas.

RAYMOND

The City of St. Paul projects much growth in office space (about 950,000 square feet), but only about 60,000 sq feet of new retail space for the Raymond station area. The City also predicts about 700-1,100 new residential units, which can support more new businesses.

The examination of retail sales and consumer expenditures shows that there is not much potential for new retail business and in fact there is a sizable surplus of about $143 million. This may be due to a strong commercial presence at the intersection of Raymond and University. The station area had the second-lowest expenditures on the Corridor of about $55 million. Per capita, expenditures were $13,256, slightly higher than average for the Corridor. It did have the highest total building and garden supplies sales (about $55 million), which can likely be attributed to the presence of Menard's. This high number may also contribute to the sizable overall retail sales excess in the station area.

The station is predicted to have medium-high ridership, about 1,250 riders daily, which in combination with new residential development might augment expenditures in the area and provide opportunity to new business; however the results from this study show that currently, sales far outweigh expenditures. The Raymond station area has only about 4,000 residents, which may not support much new business. Additionally, the area has only slightly higher than average household income, with a mean block group median household income of $39,578.

FAIRVIEW

The Fairview station area is expecting modest residential and commercial development, according to the City of St. Paul, with 600-800 new

residential units, 300,000 square feet of new office space, and 40,000 square feet of new retail.

There is a large surplus of retail sales in comparison to consumer expenditures in this area (-$111 million opportunity gap). This area has the third-lowest total expenditures on Corridor ($57 million), but $12,698 per capita (about average for the Corridor), which may not allow opportunity for new business. The station area does not have opportunity for any specific type of business either.

The station is expected to have relatively high daily ridership (1,900), which might be able to support increased business, but the results of this study show that may not be enough to support new business. Currently, the area only has about 4,500 residents with a mean block group median household income of $33,541, lower than other station areas. There is also a large portion of elderly residents who live in the Episcopal Homes at the intersection of University and Fairview, which might influence spending trends.

SNELLING

Snelling is an area targeted for much new development in the Corridor by the City of St. Paul, which expects 800-1,000 new residential units, 300,000 square feet of new office space, and 450,000 square feet of new retail by 2030, much of it occurring as redevelopment of existing surface parking in the Midway shopping center and the bus yard located just north of I-94 on Snelling. The City's study area was located about a block east of mine, but is still a comparable area.

Overall, there is a large surplus of about $558 million (the third highest in the Corridor), which shows that the area relies heavily on consumers outside of the station area to support businesses. As a large shopping destination, this station generates the highest retail sales in the study area outside of downtown St. Paul. There are about 10,000 residents who live in the area, slightly more than average for the Corridor. Per capita, consumer expenditures were $11,659, slightly lower than the Corridor station area average. The area has a mean block group median household income of $38,129, about average for the Corridor. Given these economic characteristics, businesses might not have incentives to expand in this area, or cater to the local residents.

This station area has the highest sales in the Corridor in numerous specific sectors—furniture ($9.6 million), food store (not including food service) (more than $200 million), liquor sales ($9 million), gas station sales ($48 million) and clothing sales (about $19 million). This reflects the kinds of stores in the area, such as Rainbow and Cub Foods, which provide many food options. There are also numerous large furniture stores, such as the Furniture Barn. Herberger's and independent clothing stores might explain the high clothing sales.

While there is not much room for growth in most sectors, there is a $7.6 million opportunity gap for non-store retailers, which might indicate some potential in that sector. Snelling is also projected to have relatively high ridership, 2,930 riders daily, which may support increased businesses in addition to new residential units. However, this study shows that the Snelling area is an overwhelmingly regional shopping area and does not sustain itself from local expenditures. Future retail development may continue to draw beyond local expenditures for profits.

HAMLINE

Similar to Snelling, the City of St. Paul sees development potential on the excessive surface parking around the Hamline station area in the Midway

shopping center, building on the existing strong retail character of the area.

The City of St. Paul predicts 400-600 new residential units, 150,000 square feet of new office space, and 150,000 – 200,000 square feet of new retail. The Metropolitan Council projects relatively low ridership (600 daily), so new businesses may still rely on car commuter traffic for customers. Additionally, the area currently has about 8,000 residents, slightly lower than average for the Corridor station areas. Similar to Snelling, the per capita expenditures are $11,154.

Overall, the station area has a high surplus of retail sales (about -$517 million opportunity gap). After Snelling, this area has the highest non-downtown retail sales, with a large focus on motor vehicle and parts dealers sales ($42,408,167), which is the highest in the Corridor. This might be explained by the presence of Discount Tire, Amigo Tires, and Midway Used Car Superstore. It also has the highest general merchandise sales (about $243 million), which might be explained by the presence of the SuperTarget.

In no specific business sector did this station area see a positive opportunity gap, which might indicate that there is not much room for increased business opportunities. However, the station area has a slightly higher than average mean block group median household income of $39,536 compared to the rest of the Corridor station areas, which may incentivize some new businesses to locate in the area.

LEXINGTON

Lexington Parkway has the lowest predicted amount of new residential development in the Corridor according to the City of St. Paul (275-400 new units). However, there is potential for about 250,000 square feet of office space, and 90,000 square feet of retail, the third highest predicted for the Corridor. It is anticipated to have low-medium daily ridership (930) and has a population of around 9,000, which is about average for the station areas of the Corridor.

Overall, the station area has a high surplus of retail sales, with an overall opportunity gap of about -$252 million opportunity, similar to the Snelling and Hamline station areas. It has the third highest sales outside of the downtown area, which can probably be contributed to its connection with the Midway area, the Aldi grocery store, and other chain restaurants at the intersection of Lexington and University. Per capita, the station area has $10,314 of consumer expenditures, slightly lower than the Corridor station area average, which might be attributed to a relatively low mean of block group median household incomes ($34,200).

This station area has the highest opportunity for electronics, with a gap of about $2.2 million, which means that expenditures on electronics by residents in the area are spent outside of the Lexington station area. There is also a $6.6 million opportunity gap for non-store retailers, indicating that residents in the area are purchasing goods from mail order companies, etc. that are based in other places.

VICTORIA

The City of St. Paul is planning to build on the existing small business nature of the Victoria station area. They predict a small number of new residential units (about 300-400), 60,000 square feet of new office space, and 15,000 retail square feet, which is very low in comparison to other station areas. The station area is also predicted to have low ridership, with about 400 daily trips, and therefore is expected to see only modest growth.

The area surrounding the station, however, has a relatively large population of about 11,000. This may help explain the positive opportunity gap measure of about $22 million. There are not many sales in this station area, but a lot of expenditures, which means that residents must venture elsewhere to make many of their purchases. Consumer expenditures per capita, however, are relatively low ($9,645) in comparison to other station areas. This may limit business interest in the area.

The Victoria station area has the highest opportunity for total building and garden supplies sales (about $9.7 million), the third highest opportunity for health and personal care (about $5.2 million), and a $17.1 million opportunity in general merchandise, which includes department stores. The economic character of the residents in the station area, indicated by a $39,062 mean block group median household income, is slightly higher than the average of station areas along the Corridor. Therefore there might be potential for new businesses to open in this station area.

DALE

The City of St. Paul is expecting modest commercial and residential development in the Dale station area. Their model predicts 450-600 new residential units, 50,000 square feet of new office space, and 50,000 square feet of retail. They expect much of the new retail to occur in the ground floor of the new Frogtown Square development, and in the potential redevelopment of the Unidale mall.

According to opportunity gap measures, the Dale station area has the highest opportunity gap on the Corridor of about $49.3 million, indicating that new businesses could fill a void for consumer expenditures that are currently spent outside of the area. Per capita, however, consumer expenditures are quite low in the station area at about $8,911, the second lowest among station areas. This might be explained by its relatively high population of about 14,000, the second most in the Corridor. Additionally the area has a mean block group median household incomes ($38,494), about average compared to other station areas. The Met Council predicts low-medium ridership at this station area, with about 710 daily riders, which may limit business potential for this area.

The station area also has high opportunity gaps in various retail sectors, including the third highest gap for food stores (this does not include food service) of about $11 million, which is quite surprising given the presence of Shuang Hur and Foodsmart supermarkets. This means that residents are still shopping elsewhere for their groceries, and may venture west to the larger grocery outlets. The Dale area also has a variety of food service options, but still shows a $4 million opportunity gap in this sector. Residents are spending money on food service outside of the Dale station area as well.

The station area also has highest opportunity for health and personal care (about $7.8 million), a $17 million general merchandise opportunity gap, and a $2.3 million gap for sporting goods, hobby, book, and music goods. This means that there is potential for a wide array of business to open in the station area that can be supported by expenditures by residents, including more food stores and food service institutions.

WESTERN

The Western station area has some locations that the City of St. Paul has identified as potential redevelopment sites that are currently vacant or

underutilized. They anticipate modest growth, with "new investment focusing primarily on retail and services to meet the daily needs of the surrounding neighborhood." They anticipate 450-600 new residential units, 45,000 square feet of new office space, and 20,000 square feet of new retail. The Met Council predicts very low ridership of 270 daily riders for this station area, however the area houses about 12,000 residents, which is relatively high for the Corridor station areas.

Due to its residential nature, there are many more expenditures than sales in the area, which means that there is relatively high opportunity of about $25 million. It has the highest opportunity for furniture stores, with a gap of about $1.8 million, and the second highest opportunity for both health and personal care (about $6.1 million gap) and gas stations (about $8.9 million gap). There is also a large opportunity for sporting goods, hobby, book, and music goods of about $2.1 million and an $11.8 million gap for general merchandise. This means that for may different goods, residents around the Western station area are shopping elsewhere. There might be potential for a wide array of new businesses to build on the existing small businesses in the area.

Per capita, consumer expenditures were $8,583 in the station area, the lowest in the Corridor, which might be partly explained by the relatively low mean block group median household income of $36,440. Therefore, residents in the area do not have much spending power, which may hinder new business development, especially those that sell more expensive goods.

RICE

The Sears building dominates the business around the Rice station area. The City of St. Paul sees the Sears site as a major redevelopment area, especially on the extensive existing surface parking. Therefore, they predict 1,000 new residential units, 800,000 square feet of new office space, and 100,000 square feet of new retail space. They believe much of the new retail will cater towards the workers at nearby government functions around the state capitol. A medium-high daily ridership of about 1200 might help support new businesses. However, there is a small residential population of about 5,000, significantly lower than the average for other station areas, which may not be able to support much new business unless the increases in residential units come about.

The residents around this station area have very little aggregate expenditure of less than $50 million, which is the lowest on the Corridor. They also have a low expenditure per capita ($10,027). There is therefore an excess of retail sales for the local population, highlighted by the -$26 million opportunity gap. Going by this measure, there is almost no potential for new retail development in this station area that can be supported by local residents. There were also no individual sectors with noteworthy opportunity gaps for potential business. Furthermore, it is one of the poorest station areas in the Corridor, with a mean block group median household income of $31,933. These facts show that new retail development is unlikely.

CAPITOL EAST

The Capitol Area Architectural and Planning Board (CAAPB) does the planning for this station area; therefore there is no station area plan done by the City. The relatively low ridership predictions of 390 riders daily also would support limited economic development. However, there is an above average residential population (about 13,000) compared to the rest of the Corridor.

There is a high positive opportunity gap for the station area of about $47 million, the second highest in the Corridor. It has the highest opportunity for clothing stores (about $7.1 million gap) and general merchandise (about $24 million gap), the second highest opportunity gap for sporting goods, hobby, book, and music goods in the Corridor (about $2.6 million), a $19 million opportunity gap for food stores, and a $7.5 million opportunity gap for non-store retailers. The per capita expenditures are about average for the Corridor ($12,655) and could potentially support new businesses. This is interesting though because the area has a relatively low mean median household income of $32,596, which would make one think that there would not be potential for new business. The opportunity gaps, however, indicate a potential for a wide array of new businesses.

DOWNTOWN STATION AREAS (TENTH ST., FOURTH ST., AND UNION DEPOT)

The downtown station areas have large economic development potential. The City of St. Paul predicts 5,750 – 7,200 new residential units, somewhere between 1.9 and 2.3 million square feet of new office space, and 100,000 – 150,000 square feet of new retail, which will be driven by residential expansion.

The Met Council predicts that these areas will have high ridership, with about 5,180 aggregate riders for all three stations (1,860 at Tenth, 1,200 at Fourth, and 2,120 at Union Depot). Aggregate total population is almost 40,000 with a per capita consumer expenditure of $13,842, higher than average for the Corridor.

Overall, the retail sales far exceed consumer expenditures in these areas. Each station area has about $700 million in retail sales, and an opportunity gap of less than -$500,000,000. Union Depot and Fourth St. have the highest surpluses in the Corridor. This is a result of the fact that many people who shop in downtown do not live there and it serves as a major retail and business center for the city and the metropolitan region.

Therefore, without new residential development, there may not be room for new retail business because there is already a large concentration of retail. However, the area could continue to be a visitor shopping area and support new business.

While these stations do have surplus retail sales, they also have some of the highest expenditures in the Corridor, which can be attributed to the density of downtown. For example, Tenth St. has the highest expenditures in the Corridor of about $264 million, but the second most sales in the Corridor. Due to the high expenditures, the downtown station areas have an overall surplus of sales. Considering population size, Union Depot has the highest per capita consumer expenditures in the Corridor of $15,942, which means that residents in downtown have high expenditures in comparison to other places. Interestingly, all three stations have at or below the average mean block group median household incomes in comparison to the rest of the Corridor (between $31,540 and $37,982), which means that there are high expenditures despite relatively low or average economic resources.

The Tenth St. station area has the highest health and personal care sales in the Corridor of about $54.5 million, which can be explained by the concentration of hospitals in downtown. Tenth St. also has high opportunity for car dealership and part sales—about $26.8 million—the second highest in the Corridor. This station area also has the highest need for food stores, with an opportunity gap of about $20 million.

The downtown area lacks supermarkets and these data indicate that there are sufficient local expenditures on food store goods to support a new business.

The Fourth St. station area has over $1 billion in sales, the highest in the Corridor, but only about $150 million in expenditures, which may indicate a huge opportunity for residential development around retail amenities. However, there is the lowest opportunity gap for businesses in the Corridor. The station area has the highest electronics sales (about $71 million), non-store retail sales ($383 million), and food service sales ($353 million) in the Corridor, maintaining its regional retail importance.

Both Tenth St. and Fourth St. had high opportunity gaps for gas stations (gap of about $10.6 million and $8.2 million, respectively), which can likely be explained by the higher density in downtown, where residents are less likely to need a car. Light rail will further decrease the need for a car, therefore there might not be much actual opportunity for new gas stations.

VI. CONCLUSIONS

Looking at overall opportunity gap along the Corridor, there is room for growth at four station areas: Dale, Capitol East, Western, and Victoria, considering total consumer expenditures and retail sales from 2010. However, these stops have some of the lowest 2030 ridership projections in the Corridor (all under 710), which may limit their economic development potential. Despite this fact, all four stations have relatively high residential populations that might support new businesses. Instead of consuming elsewhere, residents may spend locally if there are amenities that meet their needs.

Considering the different market orders for businesses, there is high opportunity for businesses with low-order goods at the Western and Tenth St station areas. Dale and Western have the most potential for business opportunities for medium-order goods. New high-order business have the highest opportunities at the Capitol East, Victoria, and Stadium Village station areas.

FUTURE RESEARCH CONSIDERATIONS

There are a wide variety of factors that need to be considered in determining business potential, and this study examines just some of the ways to predict changes in businesses in the Central Corridor around station areas. It will be important to review these data in the future both during and post-LRT construction to see what the impacts are on businesses and consumer expenditures. We then will be able to see if areas with high opportunity gaps saw more development to increase supply of the various orders of goods.

Unfortunately the data did not include all stations of the Central Corridor, which was a limitation for comparison across all parts of the LRT line. It would be interesting to see comparisons with the area around the University of Minnesota and Downtown Minneapolis. It might also be interesting to divide the Corridor up into sections based on character of areas, since many station areas overlap. For example, business activities are very similar around the Snelling and Hamline station areas, connected by the Midway shopping center, while the Victoria to Western section is characterized by small businesses.

TABLES

TABLE 1- GUIDE TO OPPORTUNITY GAP MEASURES

Low-Order Goods

High Opportunity	$2,500,000 – 5,132,962
Low Opportunity	0 – 2,500,000
Low Surplus	-6,000,000 – 0
High Surplus	-14,765,071 - -6,000,000

Medium-Order Goods

High Opportunity	$3,000,000 – 9,650,937
Low Opportunity	0 – 3,000,000
Low Surplus	-25,000,000 - 0
High Surplus	-165,000,000 – -25,000,000
Extreme Surplus	-204,121,003 – -165,000,,000

High-Order Goods

High Opportunity	$6,000,000 – 16,302,501
Low Opportunity	0 – 6,000,000
Low Surplus	-65,000,000 - 0
High Surplus	-127,783,249 – -65,000,000
Extreme Surplus	-127,783,249

Overall

High Opportunity	$9,000,000 – 18,872,851
Low Opportunity	0 – 9,000,000
Low Surplus	-95,000,000 - 0
High Surplus	-295,135,261 – -95,000,000

*All amounts in 2010 dollars

TABLE 2 - STATION AREA SALES, EXPENDITURES, AND OPPORTUNITY GAP

Station	Retail Sales	Consumer Expenditures	Opportunity Gap
Stadium Village	216,814,341	176,499,185	-40,315,156
Prospect Park	141,406,628	95,742,740	-45,663,888
Westgate	158,953,809	85,401,504	-73,552,305
Raymond Ave	198,280,447	54,999,315	-143,281,132
Fairview Ave	168,404,722	56,999,392	-111,405,330
Snelling Ave	675,197,617	117,153,666	-558,043,951
Hamline	610,247,890	93,268,514	-516,979,376
Lexington Pkwy	347,855,396	95,625,050	-252,230,346
Victoria	87,303,422	109,873,573	22,570,151
Dale	77,315,891	126,628,962	49,313,071
Western	78,807,344	103,970,227	25,162,883
Rice St	75,325,023	48,810,424	-26,514,599
Capitol East	119,128,363	166,206,921	47,078,558
Tenth St	778,896,782	264,276,951	-514,619,831
Fourth St	1,009,662,454	155,942,341	-853,720,113
Union Depot	692,384,234	132,443,856	-559,940,378
Median	183,342,585	106,921,900	-92,478,818
Median	339,749,023	117,740,164	-222,008,859

*All amounts in 2010 dollars

TABLE 3 - OPPORTUNITY GAP BY ORDER

Station	High-Order	Medium-Order	Low-Order
Stadium Village	15,190,970	-56,676,365	1,170,239
Prospect Park	-12,044,804	-28,140,506	-5,478,578
Westgate	-32,135,453	-35,803,571	-5,613,281
Raymond Ave	-90,650,142	-44,558,007	-8,072,983
Fairview Ave	-83,218,549	-23,893,070	-4,293,711
Snelling Ave	-30,638,045	-488,860,009	-38,545,897
Hamline	-45,833,431	-441,740,194	-29,405,751
Lexington Pkwy	-21,608,200	-211,692,467	-18,929,679
Victoria	19,221,982	5,087,254	-1,739,085
Dale St	4,505,942	43,082,118	1,725,011
Western	-11,275,830	26,904,465	9,534,248
Rice St	1,431,738	-20,470,843	-7,475,494
Capitol East	35,957,004	8,455,215	2,666,339
Tenth	-205,573,105	-316,506,879	7,460,153
Fourth	-363,937,274	-494,211,672	4,428,833
Union Depot	-233,569,424	-325,173,718	-1,197,236
Median	-65,886,039	-150,262,391	-5,860,430
Mean	-26,123,123	-40,180,789	-3,016,398
*All amounts in 2010 dollars			

TABLE 4 - EXPENDITURES PER CAPITA BY ORDER

Station	Low-Order	Medium-Order	High-Order
Stadium Village	1,350	7,411	4,525
Prospect Park	1,315	7,415	4,565
Westgate	1,611	8,486	5,533
Raymond Ave	1,470	7,442	4,344
Fairview Ave	1,419	7,196	4,083
Snelling Ave	1,282	6,705	3,672
Hamline	1,197	6,412	3,545
Lexington Pkwy	1,073	5,982	3,260
Victoria	951	5,578	3,115
Dale St	873	5,234	2,804
Western	861	5,086	2,636
Rice St	1,144	5,787	3,096
Capitol East	1,401	7,378	3,875
Tenth St	1,484	7,604	3,911
Fourth St	1,604	8,085	4,123
Union Depot	1,804	9,198	4,939
Median	1,333	7,287	3,893
Mean	1,302	6,937	3,877
*All amounts in 2010 dollars			

TABLE 5 – DEMOGRAPHICS

Station	Total Population	Mean Median Household Income*	Families Below Poverty
Stadium Village	13,284	$38,686	283
Prospect Park	7,202	45,912	280
Westgate	5,464	54,622	81
Raymond Ave	4,149	39,578	136
Fairview Ave	4,489	33,541	165
Snelling Ave	10,048	38,129	622
Hamline	8,362	39,536	550
Lexington Pkwy	9,271	34,200	595
Victoria	11,392	39,062	608
Dale St	14,210	38,494	876
Western	12,114	36,440	763
Rice St	4,868	31,933	287
Capitol East	13,134	32,596	598
Tenth St	20,329	31,540	568
Fourth St	11,290	33,083	123
Union Depot	8,308	37,982	38
Median	9,660	38,056	419
Mean	9,870	37,833	411

*Since block group median household income levels were aggregated to a station level, an average of the medians was taken to gain a sense of overall household income for the station area. Value is 2010 dollars.

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iv. NIGHTTIME:

Informal Economies and Street Prostitution

by corey koscielniak & sarah ziegenhorn
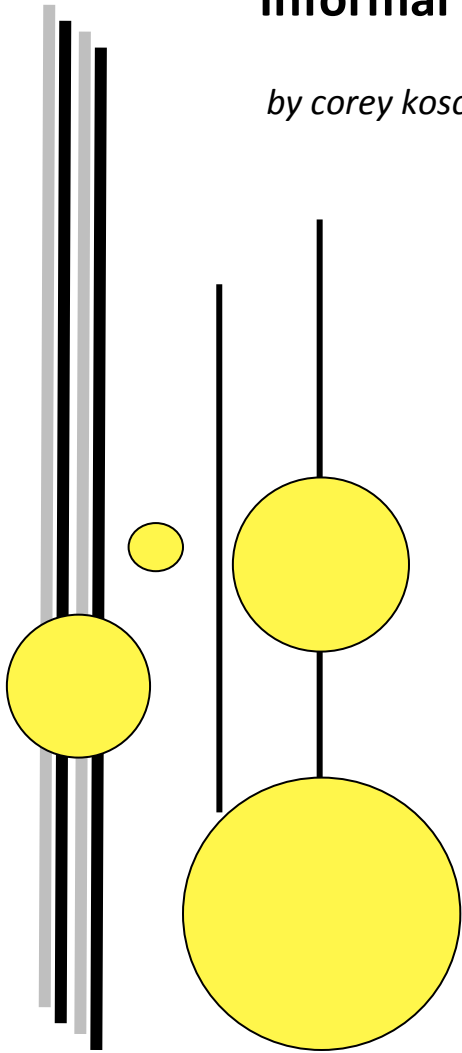
This Chapter's Questions:

1. What is the current state of University's nightlife economy and street-based prostitution?

2. How do informal economic transactions inform the nighttime economy of University?

3. How has the Avenue been constructed as a place of prostitution? How will the development of LRT affect prostitution?

Chapter Outline:
I.   The Formal & Informal Economy
II. Prostitution
III. Potential Effects of LRT on Informal Economies
IV. Conclusion

I. The Formal & Informal Economy

When studying a nighttime economy, there are many variables to consider. First, to procure resources is difficult, since academia does not often engage the topic. The nighttime economy, encompassing the specific economic transactions that occur at night, become secondary considerations as studies focus on the topic of daytime activities and other, considerably more crucial subjects. Clubs, bars and restaurants usually come to mind as possible sites of research for the nighttime economy, yet often informal markets remain unstudied or disconnected to the literature. This chapter will examine the presence of nighttime economic sectors on the current site in University Ave.

In the occidental world, nighttime has operated under the guise of a socially-imposed stigma– that humans search for fear or pleasure as a primary characterization of this period. Nighttime operates as the setting where crime and vice emerge. Prostitution, drug use and theft occur at night as well as lewd, violent acts brought about as a result of intoxication.

In order to fully understand how an economy functions at night, it is important to consider these social stereotypes. However, scholars Marion Roberts and Adam Eldrige posit that "there is no singular night-time or evening economy, but rather a number of different economies running side-by-side, in support or opposition to each other[38]. They suggest that there is more to the nighttime than purely vice and crime. There is not one particular type of night-time economy. The economic and commercial functions of the city are fundamental to the development of the contemporary late-night city, but the ways it is inhabited, what it means and what people 'do' is far more than just a simple economic relation. Therefore, we encourage our readers to expand their preconceived notions of such topics and to consider the economic and social utilities of nighttime behavior.

Night-time economies can range from bustling club, theater and restaurant districts to stand alone diners, 24-hour convenience stores or even the absence of any commercial movement at all. It is important to realize that the degree of nightlife varies among streets, neighborhoods and cities in general.

Moreover, although the economic utility of nightlife is the primary way in which it is studied, late-night work involves various occupations and can revolve around functions like cashiers, late-night gym attendants, bartending, call-centers, and store packers. In addition, it includes informal forms of work. Drug-dealing, stealing, and soliciting occur in this time-space activity. However, the full socio-economic impact of the latter has yet to be studied as it relates to the overall nighttime economy.

This chapter intends to analyze night-time economic utilities as they affect the nighttime landscape. Due to the limitations of data on informal economic transactions at night, we will focus on the association between the formal alcohol-related economy and the informal one of crime and vice. Prostitution, drug use, theft and drunkenness involve a certain degree of economic utility; therefore, we argue that they contribute to the nighttime economy. One can measure some

components of these interactions through statistical analysis, but other aspects remain immeasurable – such as their socio-economic and geographic impacts on surrounding communities.

We will investigate the assumption that informal nighttime activities affect the nighttime economy. To commence, we posit the following research question: how do informal economic activities contribute to the nighttime economy of University Ave?

METHODS

To investigate our research question, we will analyze crime statistics supplied by the Police Department of Saint Paul. Crime data are based on street blocks on University Ave. Only crimes that occurred between nine o'clock PM and six o'clock AM will be considered. Four crime categories have been chosen to represent four informal economic transactions. First, crimes of drunkenness represent reports of such drunkenness, lewd behavior (urinating in public), and liquor law violations (including minor possession, drinking in public, and open containers in automobiles). Second, narcotic drugs deals with all drug-related charges: selling cocaine, marijuana, methamphetamine, and/or Demerol or possession of such drugs or narcotic paraphernalia. The third category is comprised of reports of prostitution, commercial vice, promoting or soliciting such acts, and loitering with intent to solicit. Finally, the fourth category examines theft-related occurrences to the respect of burglary with forced entry, highway robbery, automobile theft (under $500 and over $1000), theft under $500, theft over $1000, pickpocketing under $500, and theft from automobile.

Using the Nielsen-Claritas data from the year 2010, the above categories are spatially analyzed to uncover a causal correlation with business establishments that sell alcoholic drinks or packaged liquor, beer and wine. These data are aggregated on a Census block group level and are categorized by the 2010 gross market demand. In other words, the data illustrate the 2010 gross sales attributed to the purchase of alcohol from establishments in those particular Census block groups. Upon examining the data supplied by the St. Paul Police Department, we matched the crimes to an aggregate "neighborhood" scale based on Census block groups. These block groups are divided into five areas: Downtown North/Capitol, Rice to Western, Lexington, Midway/Snelling and Fairview. We believe using such a neighborhood scale minimizes the degree of locational fallacy, because the location of a crime and the location where it was reported are not necessarily the same location. However, we assume that such crimes do happen near the vicinity of each other, especially at intersections, near or outside alcohol establishments, taxi stands or other public transit stations.

After observing the number of recorded crimes in the four economic crime categories, we conducted a correlation analysis to show simple correlation between total volume of sales of alcohol and crime for the five neighborhoods. Our findings show that a spatial correlation between the gross sales of alcohol and the presence of three of the four crime categories exists to a statistically significant degree (with a 95% confidence level).

RESULTS

This measure illustrates the degree of relationship between the presence of crime and total alcohol sales per neighborhood.

Correlation w/Volume of Alcohol Sales	
Drunkenness	0.646
Narcotic Drugs	0.339
Prostitution	-0.201
Theft	0.655
Total	0.583

Crimes of drunkenness are positively correlated with the volume of alcohol sales, meaning that where there are more drunkenness crimes, there are also higher volumes of alcohol sales. For narcotic drugs, the correlation is positive, but slightly weaker. Theft stands out as the strongest positive correlation. Prostitution appears to have a negative correlation, meaning that where there is a significant presence of this crime, there is not much in the area for alcohol-related establishments.

Because these particular variables showed some surprising results, especially the prostitution category, further research should illustrate the correlation among variables – meaning if there is a strong presence of one type of crime, is there a strong presence of other crimes as well?

According to our results, crimes of drunkenness, drugs and theft are all related to each other. More importantly, prostitution shows almost no correlation with the other variables, meaning that this informal economic transaction does not spatially operate in the same manner that the other three crimes do. As a result of this analysis, we can theorize that prostitution on University Avenue is bound by a set of spatial characteristics that significantly

Correlation Among Variables		
Drunkenness & Drugs	0.87199	strong positive correlation
Drunkenness & Theft	0.93607	strong positive correlation
Drunkenness & Prostitution	-0.1212	weak negative correlation
Drugs & Prostitution	0.1681	weak positive correlation
Drugs & Theft	0.93063	strong positive correlation
Prostitution & Theft	0.02954	weak positive correlation

differ from the ones pertaining to drunkenness, drugs and theft.

Therefore, it is necessary to interrogate the spatial aspects of prostitution in order to understand how this informal sector of University's nighttime economy operates. Drawing from extensive qualitative research, we will explore the details of this sector later in this chapter.

As a result of prostitution's lack of correlation with alcohol sales and with the other criminal categories, we have excluded this variable from the remainder of our quantitative analysis.

Our correlation results signify that if you were to identify the location of one of these crimes, there is a high probability that the other two crimes will both have occurred in the same vicinity. In other words, these three informal economic activities are close substitutes along the University Central Corridor.

UNDERSTANDING AND ASSESSING VALUE TO INFORMAL ECONOMIES

There are many ways of assessing the value of a good, service or real property that do not require complex

mathematical equations nor elaborate understandings of price variances at each level in a good's commodity chain. As a final step to our statistical approach to University's nightlife economy, we will illustrate the possible economic utility of the narcotic drugs market and the theft market. This measure is based on our previous correlation data and uses the principle of substitution: whereby entities that possess a high correlation to each other can be easily substituted for each other. This analysis is often used as a valuation tool in real property analysis – where a value of property is attained by the value of other close substitutes[42].

In our understanding of the correlations among variables, we can deduce that crimes of prostitution have little to no relationship with crimes of drugs, drunkenness and theft. However, we can say the latter three possess high correlations with each other. Through the principle of substitution, we can appraise a rough estimate of their gross value on University Avenue.

By correlating the occurrence of crimes to the total sales of alcohol, we attempt to capture an economic understanding of the total utility of these crimes. This rough assessment of consumer demand in the area for alcohol has a correlation with drugs and theft – meaning we can estimate a measure of drug and theft transactions on University. To do this, we will take the degree of correlation between each variable and volume of alcohol sales and multiply by the total worth of alcohol sales:

Drugs: .34 x $9,531,712 = $3,240,539
Theft: .65 x $9,531,712 = $6,246,580

These numbers give us a rough estimate of the market utility (in dollars) of drugs and theft on University based on the value of the total sales of alcohol for 2010, and they offer the reader a way of thinking about informal nightlife activity as a source of income and consumer demand.
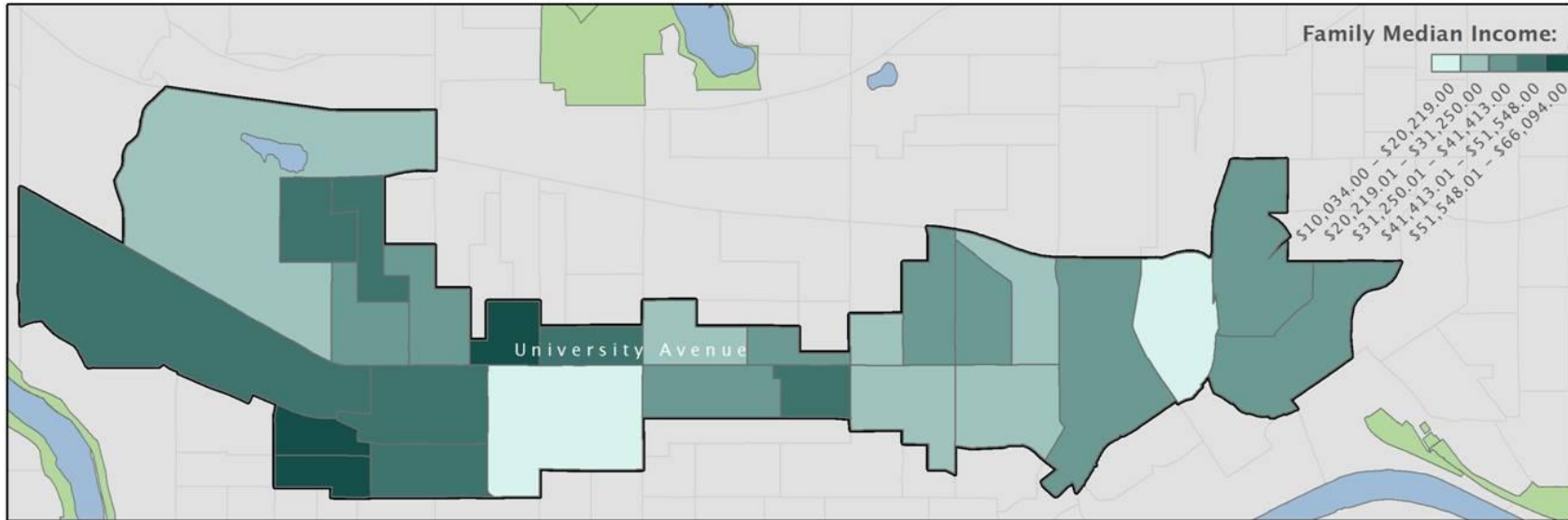
There are several problems with this style of assessing value; it ignores price variances among items as well as social and geographic differences. It is also based in the value of total sales of alcohol, and does not measure the variances found within the drug and theft markets. However, it is useful in estimating the total economic utility of these crimes.

University at night, with respect to activities that informally occur. Furthermore, if we could attain information on how many of these actions do get reported, we would have a better estimate of the total volume of utility.
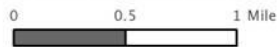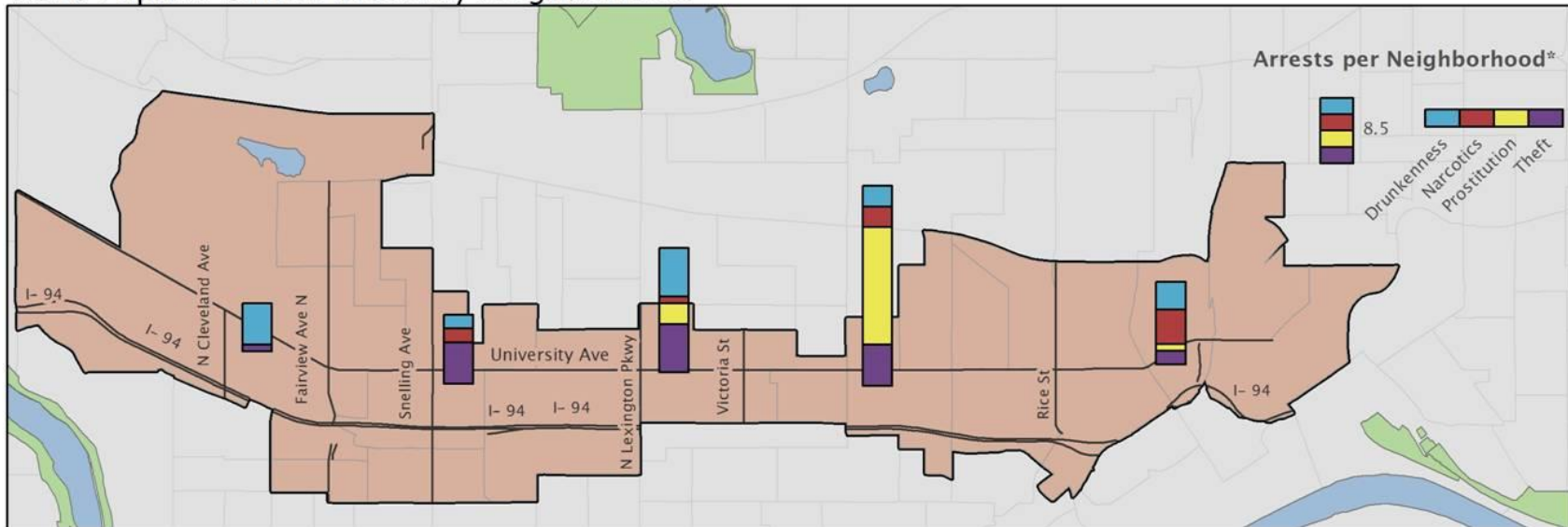
For instance, if narcotic drugs transactions reported as crimes comprise 20% of the total volume of this market, then the above number represents only 20% of the total volume of the drug market on University. However, this type of information would necessitate recording every drug transaction that occurs on University. As these transactions are informal in nature and illegal in law, this kind of information is not attainable.

Our statistical analysis does not address the impact of prostitution on the nighttime economy. As researchers, we observe and believe there is a significant presence of prostitution on the Avenue. Therefore, we further interrogate this issue through qualitative measures of this crime as it occurs on University

1999 Income by Census Block Group on University Avenue

Family Median Income:
$10,034.00 - $20,219.00
$20,219.01 - $31,250.00
$31,250.01 - $41,413.00
$41,413.01 - $51,548.00
$51,548.01 - $66,094.00

University Avenue

2010 Popular Crime Arrests by Neighborhood

Arrests per Neighborhood*

8.5

Drunkenness
Narcotics
Prostitution
Theft

I- 94
N Cleveland Ave
Fairview Ave N
Snelling Ave
University Ave
I- 94   I- 94
N Lexington Pkwy
Victoria St
Rice St
I- 94

0   0.5   1 Mile

Tess Carley April 11 2011/Data: ESRI, 2000 US Census & St. Paul Police Dept. Classification: Natural Breaks
Projection: NAD 83 UTM 15N. * Neighborhoods Divisions Are Indicated by Labeled Cross Streets

85

II. PROSTITUTION

Prostitution is an informal economic activity that is present in Saint Paul, yet it remains invisible, unknown, and ultimately shocking to many community members. From the quantitative analysis above, we have seen that prostitution cannot necessarily be understood from a statistical approach. This study seeks to describe this poorly understood economic sector, ultimately reducing invisibility and improving public understanding. From this point, we pose the question, how has University Avenue emerged as a space in which prostitution can occur? To address this question, we consider economic and transportation developments in the second half of the 20th century along University. We then discuss current intra-spatial and inter-spatial patterns of street prostitution. Finally, we consider prostitution as a larger feature of the nighttime economy and examine its unique relationship to other features of the informal economy.

It is important to recognize that prostitution, especially as a feature of the informal economy, has not been extensively studied. Existing research focuses on the health and sociological experience of individual prostitutes. Little research has considered prostitution at a larger, community scale. While a very small body of research has focused on the way in which red-light landscapes are created[1], very few have examined the way in which these landscapes are impacted by urban development and neighborhood-level change. Furthermore, to the best of our knowledge, there have been no academic studies of sex work and prostitution in Saint Paul, and studies of Minneapolis prostitution have been fairly limited. Finally, it is important to note that researching prostitution is inherently difficult given issues of illegality, and the hidden and stigmatized nature of sex work[3].

FEMALE STREET PROSTITUTION

This study focuses specifically on female street prostitution. This type of sex work is inherently more visible than indoor sex work and thus potentially plays a greater role in shaping the perceptions of places. However, this definition is somewhat arbitrary – it is meant to apply to sex workers who solicit customers or are solicited on the street, but not exclusively. This chapter focuses specifically on female prostitutes because these women are more likely to work in street prostitution in St. Paul than men. In order to study street prostitution, it is necessary first to understand trends in this type of sex work. Patterns in female street prostitution found in the literature can then help to contextualize street prostitution along University Ave.

Academics have suggested that street prostitution is often best characterized by the oppression paradigm, and that this form of sex work is inherently more violent than other forms[2]. Street prostitution is strongly linked to drug dependency and poverty. Many women engaging in this type of work do it for survival, financial independence, and upward mobility[2]. Women may enter sex work to support a drug addiction, but women are also more likely to enter this type of work if they come from a family or neighborhood environment where prostitution and drug use are

normalized[2]. Street workers are also more likely to be victims of rape, assault, and robbery[2]. Violence is a key feature of this type of work, and street prostitutes often take measures to reduce their risk and to control the space in which they work[1]. One method to exercise this type of control is to perform the sex act in public. Further, women prefer to stay within the neighborhood (or red-light district), in part to limit the amount of time each sex act takes and increase their profits. While women seek places to take their clients that are out of sight of the public and the police, these places are not so secluded that assistance could not be obtained if necessary[1]. Finally, the literature suggests that prostitutes frequently do not work in the neighborhoods in which they live in order to protect their privacy and keep their stigmatized work secret[1].

PROSTITUTION IN MINNESOTA

In recent years, prostitution in Minnesota has been brought to public attention by a small body of news articles focusing on "trafficking" and sexual slavery. This has included an emphasis on trafficking networks, child prostitution, Native American women, and communities of recent immigrants (particularly the Somali community)[4,5]. However, street prostitution has received relatively little attention from the news media, as well as academics. This is due in part to the connotation and definition of the words *prostitution* and *trafficking*. While trafficking implies victimization and force, prostitution implies that a woman chooses to be involved in sex work[6]. This chapter chooses to use the word *prostitution* simply because the legal definition of *trafficking* means to have been moved across state or national borders. This chapter is more concerned with prostitution as a form of work, and sex as a sector of the informal economy.

Academic research into street prostitution in the Twin Cities is limited and has focused primarily on North Minneapolis. In North Minneapolis, the majority of street prostitution and solicitation occurs at bus stops and abandoned houses[7]. Studies have suggested that women engaged in street prostitution come from North Minneapolis neighborhoods, but men who solicit women come from other neighborhoods, suburbs, and out of state[7]. Key to note is that prostitution is gradually moving away from the street level and is increasingly based online[8]. Through the Internet, women are able to create more business in a safer manner.

METHODS

This chapter intends to apply a polymorphous framework to its examination of prostitution. This theoretical approach is relatively moderate in that it does not see prostitution as inherently violent or inherently empowering. Instead, it attempts to resist generalization of sex work and prostitution experiences. It also intends to resist making value judgments regarding sex work[2]. This theoretical perspective can be expanded upon and applied to our general study of informal, illegal economic transactions. We do not assume these economies to be inherently negative

because of their illegality, nor do we assume these activities to be positive.

Qualitative data were gathered through three expert interviews with individuals representing three different organizations. These interviews lasted between one hour and three hours. An initial interview was conducted with a Saint Paul Police Department Vice Sergeant who directs the prostitution and trafficking task force and formerly worked for ten years as a street supervisor patrolling University Avenue. A second interview was conducted with an intake specialist at Breaking Free. Breaking Free is an organization located on University Avenue that "Educates and provide services to women and girls who have been victims of commercial sexual exploitation (prostitution/sex-trafficking) and need assistance escaping the violence in their lives[9]." Finally, a program director from the Aurora-Saint Anthony Neighborhood Development Corporation (ASANDC) was interviewed. ASANDC is a community organization that does work related to crime prevention and affordable housing[10]. The interview participant had formerly worked for

Breaking Free, was a life-long community member, and could speak on informal and illegal economic activity from personal experience.

CREATING SPACES OF PROSTITUTION: HISTORY OF SEX WORK ON UNIVERSITY

"Red-light landscapes as emerging from (and produced by) an ongoing and recursive relationship between the 'everyday' spatial behavior of sex workers and the spatial strategies enacted by the state, law, and latterly, community protest groups[1]."

University has the greatest concentration of street-based prostitution in Saint Paul and is clearly recognized as a place where sex can be bought and sold.[6,11,12] It possesses a high supply and demand for sex. It is necessary to examine the history of the street since 1960 in order to understand how this current landscape emerged.

Until 1960, the formal economic sector on the Avenue was profitable and successful. By 1960, car ownership had increased significantly and traffic congestion was problematic along University Avenue. Looking for an alternative to this congestion and a

way to move cars between downtown Minneapolis and Saint Paul more efficiently, Interstate-94 was constructed along St. Anthony Avenue to run parallel to University Ave[15].

I-94 led to a decreased amount of automobile traffic along University, which led to a dramatic decline in business during the 1960s and 1970s. As drivers traveled along I-94 to travel between St. Paul, Minneapolis, and the growing suburbs, University Avenue's traffic volume decreased. With that decrease, fewer people frequented businesses along the Avenue, and the economy along the street began to decline[15].

As a strategy to combat economic decline, University Avenue businesses became involved in the sex industry. When discussing the creation of University as a place of prostitution, two experts cited the Faust Theater as a key turning point in the street's history. The Vice Sergeant discussed the Faust, Belmont, and Flick – the latter two being strip clubs – and attributed these places as the reason for University's reputation as a place of sex and as the reason prostitutes were drawn to the Avenue[11]. An expert from ASANDC

remembers these businesses from his childhood, and remembers University being home to a large number of "sex clubs, bars, and pornographic stores" in the 1980s[12]. This expert described the business of sex as being operated by and for suburban, heterosexual male communities to engage in these clandestine activities. Furthermore, this activity did not involve the residents of University Ave communities[12].

In the late 1980s, University had secured a reputation as a sex destination. During these years, the businesses were closed due to pressure from community organizations, such as ASANDC[12] and the actions of the city government[15]. Yet even after these businesses were closed, University's reputation as a place of sex remained.[11]

Throughout its history on University Ave, prostitution was not related to other businesses on the Avenue nor other informal and illegal economic activity. According to our experts individuals who came to the street from outside the neighborhood to purchase sex were not necessarily involved with other sectors of the informal economy and were uninvolved

in other types of crime.[11,12] The sex industry was unrelated to violent crime along the Avenue. Our earlier quantitative analysis suggests that there is currently no spatial relationship between prostitution and other types of vice. In the past, we see that this relationship has been observed qualitatively as well.

CURRENT STATE OF STREET PROSTITUTION ON UNIVERSITY AVENUE

University Avenue has the greatest concentration of street prostitution in St. Paul and one of the highest concentrations in the Twin Cities metro area[11]. According to arrest data from the Saint Paul police, there were 60 prostitution-related arrests in 2010 along University Ave. In St. Paul, Payne Ave. has the second highest concentration of prostitution, followed by Rice Street[11]. Depending on season and weather conditions, there may be six to eight women working on University each day, while other days no women may be present[11]. In the past, prostitution has been much easier to find. Ten years ago, one interviewee

stated that two to three women could be seen on every street corner along the Avenue on any given day, at any time. However, it is now considerably harder to find women selling sex. While it is still a noticeable occurrence on a daily basis, the amount is much more scarce than in the past[12].

Street prostitution on University Avenue displays spatial patterns and is concentrated heavily in specific places. All interview participants stated that prostitution was concentrated along the Avenue between the state capitol and Lexington Ave, with some prostitutes working as far west as Snelling Ave[6, 11, 12]. In Figure 3, prostitution arrests are mapped along University Avenue. Several arrests extend to the east of Snelling Avenue, but the majority are concentrated between Snelling and the Capitol, with the highest concentration seen between Dale Street and the Capitol. Arrest data indicate that prostitution occurs primarily at major intersections and stoplights. However, police officers indicate that women usually walk up and down several blocks and attempt not to stand in one spot for too long in order to avoid police attention. While past research

has suggested that women congregate at bus stops, this appears to be a strategy for avoiding police interaction and not related to increased traffic and opportunity for soliciting[11].

Spatial patterns exist in University Avenue-based street prostitution as women move to seek out customers and places for transactions to occur. Intra-spatial and inter-spatial patterns can be observed. We posit that an intra-spatial network occurs when sex workers interact with other sex workers. The inter-spatial network occurs when sex workers engage non-sex workers such as members of their community, police, and the clients they solicit / who solicit them.

INTRA-SPATIAL NETWORK OF SEX WORKERS

Female prostitutes working along University Avenue are well connected to one another. Two experts discussed the high level of social connectivity between sex workers on University, stating, "They all know each other's business[6]." One interview participant conveyed this connectivity as a protective mechanism, allowing women to establish methods of communication regarding safety from potential Johns and police[11].

Women working in prostitution along University are typically between the ages of 17 and 50[6, 11, 12]. These women often enter prostitution between ages 12-14, are frequently runaways, and have experienced intense childhood sexual abuse[6]. These characteristics fit into larger studies of prostitution and street-based sex workers[2]. Prostitutes along University are primarily white or African American; police suggest a 2:1 ratio respectively. This reflects the current racial composition of University Avenue as well as the neighborhoods east of Lexington Avenue[6, 11, 12]. During the 1990s and early 2000s, the majority of prostitutes working in this neighborhood were African American, but the number of white women has increased in recent years[11, 12].

Although University Avenue is also home to a large Southeast Asian community, women from this demographic are not involved in street prostitution[6, 11, 12]. The Police Vice Sergeant stated that in ten years of working as a patrol officer along the Avenue, he had not once seen or arrested an Asian woman[11, 12]. This finding does not correspond with sex work literature, which has found that neighborhoods of Southeast Asian immigrants in the U.K. and U.S. often display high concentrations of sex workers[1,2,14]. Other experts stated that a lack of Asian women arrested for prostitution does not mean that women from these communities are not involved in prostitution[6,12]. They suggest that University Avenue and St. Paul's Hmong and Southeast Asian communities are more insular, meaning they are more protective of this informal market than other communities. As such, these women do not engage in street prostitution, however still exhibit high levels of prostitution and trafficking[6,11]. This is true for the Twin Cities East African Community as well[6,4]. As such, we shift the focus to inter-spatial networks where these influences of community affect the work of prostitutes.

2010 Prostitution Arrests on University

Number of Arrests
- 1
- 2.5
- 5
- 10

0   0.25 0.5   1 Mile

Tess Carley April 11 2011
Data: ESRI, 2000 US Census
& St. Paul Police Dept.
Projection: NAD 83 UTM 15N
Classification: Natural Breaks

University Ave

University Ave E

N Aldine St
N Asbury St
N Simpson St
N Pascal St
N Oxford St
N Chatsworth St
N Milton St
N Victoria St
Avon St
Grotto St

N Kent St
N Mackubin St
N Arundel St
Western Ave
Virginia Ave
North Virginia St
N Farrington St
Elfelt St
Galtier St
N Marion St
Rice St

INTER-SPATIAL NETWORK OF SEX WORKERS

Past research suggests that street prostitutes do not live in the neighborhoods where they work, in order to avoid shame of being seen by their neighbors and stigma associated with their work[13]. Contrary to such research, our three experts stated that the vast majority of women working on University live in the surrounding neighborhoods and within walking distance of the Avenue[6, 11, 12]. One interview participant stated that because University is well associated with a demand for sex workers, women may also come from Minneapolis, East Saint Paul, West Saint Paul, or from buses from throughout the region[12].

The inter-spatial relationship between clients and sex workers is complicated because these men soliciting prostitutes (Johns) are not from surrounding neighborhoods[6, 11]. Johns come from a range of neighborhoods and suburbs in the metro, as well as out of state, including truck drivers[11]. Men arrested for soliciting women are frequently ordered to attend *Breaking Free's* John School in order to receive sex rehabilitation. Such Johns typically come from suburbs of St. Paul and are predominantly white and middle class[6].

Inter-spatial patterns can also be observed in prices for and locations of sex acts with Johns. Street prostitutes typically charge $40 for oral sex, and attempt to make transactions quickly, in order to increase their number of customers in an evening. After negotiating the transaction on the street, prostitutes direct Johns to a location. They may drive to a nearby industrial area, often near Minnehaha and Arundel, the ice arena, Minnehaha and Western, or north of University to the railroad tracks. Often the transaction takes place within the neighborhood. Depending on weather conditions, the sex act may take place in an alley north of University or in the parking lot of a closed business. Because many women live within several blocks of the Avenue, some transactions take place at their homes[11].

Sex workers also interact with the automobile traffic and must maintain spatial visibility in order to market their services. Although traffic volume has decreased since University's 1950s peak, the Avenue still has a high rate of traffic flow, which helps to drive the sex work industry. University Avenue is able to maintain its higher concentration of sex workers because the Avenue provides a travel route for many Twin Cities residents between the two cities. Women congregate along this street because of the greater automobile traffic presence, and thus the greater business opportunity[11,12]. Women are more visible and better advertise their business along the street. Increased traffic presence allows for an increased supply and demand. Furthermore, this high traffic density reinforces University's role as a prostitution destination, and thus, this inter-spatial network is sustained.

Our final inter-spatial network involves the relationship between prostitutes and the police. Because prostitution does not involve tangible, physical evidence, police officers must take precaution in making an arrest, cover strict protocol, and often record their interactions electronically. Protocol is difficult to maintain and as a result, police officers working outside

of the vice unit rarely make arrests for soliciting[6].

The police's stated priority is to help women to "get out of this line of work," and to connect women with appropriate community resources and services[11]. Street prostitutes are thus not often incarcerated, and occasionally are not arrested for soliciting. Sgt. Pierce described that when women interact with the police, they often state that they will be physically assaulted later on if they get arrested, or if they are arrested they will not be able to earn enough money for various obligations. In these cases, the police sometimes do not arrest women[11]. However, one expert from Breaking Free was skeptical about the validity of this statement[6]. Furthermore, threat of arrest and incarceration of street prostitutes is often used as a tool to encourage women to disclose names of pimps. Street prostitutes working on University have regular interactions with police (i.e. the same women are continually working on the Avenue), and instead of focusing on the incarceration of these women, the police emphasize arresting and incarcerating Johns and pimps[11].

However, women rarely disclose the names of those they work with in order to protect themselves from physical abuse[6].

As stated above, there were sixty arrests for prostitution along University Avenue in 2010. However, it is unlikely that this number accurately reflects the extent of prostitution on the Avenue. One expert felt that data on such convictions of solicitation do not accurately reflect the nature of prostitution, or general crime and vice on University. He expressed that police seldom view crime as holistic, nor do they see interconnectivity between different types of vice and illegal activity. He asserted that police were seldom likely to question a prostitute (and receive answers) regarding drug use, violence, and theft[11] when such an arrest occurs. General police strategy then isolates types of crime. This disregard for the intersectionality of crimes can be seen in the quantitative data analyzed above, where prostitution demonstrated no statistical correlation with other variables. Other studies suggest that arrest data do not represent true levels of prostitution because many women

are able to evade arrest due to the hidden nature of prostitution and varying levels of law enforcement tolerance described earlier[3].

FACTORS FOR PRACTICING PROSTITUTION: DRUGS AND ECONOMIC STABILITY

Connecting prostitution with other variables of the nighttime economy, we see a cyclic and interdependent relationship among drugs, money, and prostitution. The interconnectivity between prostitution and drug abuse was focused upon heavily by all literature reviewed for this chapter and all interviews conducted. Our experts estimated that over 95% of women involved in prostitution along University Avenue are addicted to crack cocaine[6, 11, 12]. Drug abuse often follows prostitution. Women who sell sex are surrounded by drugs in their immediate environment and often start using crack because it is a means of dealing with the emotions and stress of rape, sexual assault and the nature of their work. Another expert described the inverse relationship between prostitution and drug abuse, suggesting

that women sell sex in order to earn money for drugs – implying a correlation between drugs and prostitution that our statistical analysis could not proffer. While prostitution is an economically driven transaction, an understanding of economics cannot allow us to fully see the motivations of women involved in this work. The cycle is also feeding and helping to meet an emotional need[12]. Furthermore, the cycle of addiction leads women to maintain their function as a supplier of sex based on internal and external demands.

The economic motivations to engage sex work extend beyond drug use. Many women sell sex as a way to pay for necessities, such as food and housing, not solely for drugs[11]. One expert discussed the women she worked with and their justification of sex work as the sole way in which they could earn an income: "you make your money between your legs" or "just doing what they gotta do to get by[6]." In academic literature, it is suggested that for women with reduced economic opportunity and difficulty finding employment, prostitution becomes a

necessary activity as it is a sole way of earning an income.[2]

In Figure 3, we see prostitution arrests mapped with neighborhood income at the block group level. In neighborhoods along University Avenue, we see that the highest numbers of prostitution arrests occur in block groups with the lowest household incomes. This leads us to suggest that lower incomes may be a driver of street prostitution along University Avenue, although further research is needed to support such a statement.

NORMALIZATION OF PROSTITUTION

The motivations behind prostitution necessitate a normalization of this type of work. Spaces of prostitution are maintained through its cyclical nature, and eventually this cycle becomes the standard in which the space operates. Academic literature suggests that the children of sex workers are much more likely to engage in sex work in their lifetime than the children of non-sex workers[19] because they see it as a legitimate form of work[2,6]. Even if youth did not grow up to engage in this

type of work, it is work that they would view as normative, acceptable, and a natural part of their environment[11]. Thus, sex work becomes cyclic: prostitution begets prostitution.

In sum of this qualitative approach to the market of prostitution on University Avenue, we have shown that prostitution is characterized by inter-spatial and intra-spatial networks. These networks shape sex workers' interactions with other space users, the street, the state (in the form of police), and affect the economic climate of informal activities. Although our statistical analysis revealed no significant relationship between prostitution and other types of vice or informal economic activity, the qualitative approach we have taken has allowed us to better understand this relationship. Prostitution is directly involved with drug use and violent crime. Arrest data fail to illustrate these important patterns.

III. POTENTIAL EFFECTS OF LRT ON THE UNIVERSITY AVENUE NIGHTTIME ECONOMY

"In North America, where processes of gentrification are arguably more entrenched, it has been repeatedly demonstrated not only that gentrifiers are active in opposing sex work, but that the removal of commercial sex work from neighborhoods is regarded by authorities as a necessary precursor to gentrification (205).[14]"

The construction of the light rail is likely to spur economic development and create an influx of new businesses and residents along University Avenue. Such community change is likely to affect the nighttime economy and illegal activity.

Street prostitution, drug dealing, and other crimes are often long entrenched in neighborhoods, but newer residents have little tolerance for such behaviors. Residents express opposition to these economic activities based on fears of crime and vice as well as present value increases in real property utilities[14]. However, it appears unclear if gentrification and an influx of new residents are strong enough forces to do more than create community tension and to actually displace these activities, nor is it projected that University will develop such social conditions. Rather, neighborhood economic development has the capability to alter patterns of these nighttime economies or displace these activities from the neighborhood completely.

The construction of the light rail and subsequent development of University Avenue will inevitably change the street significantly. We suggest that by altering neighborhood-scale characteristics that are linked to the nighttime economy, it is likely that LRT will lead to a decrease in the amount of street prostitution and other vice activity in the nighttime economy. Here we discuss such implications.

It is possible that the construction of LRT may lead to an increase in street-based nightlife activities such as increases in consumer demands for bars, clubs and restaurants. The LRT is likely to draw an increased amount of traffic to the neighborhood, potentially bringing an increase in pedestrian density and drawing a larger number of individuals into the neighborhood. Sex workers and drug dealers could benefit from this influx, as it could mean a net increase in potential consumer base. Given the street's current reputation as a place of vice, it is possible that the LRT could help to transport more individuals to the destination more easily.

It is also possible that existing neighborhood levels of crime and prostitution will deter potential new businesses and residents from moving into this neighborhood. This deterrent factor may cause the nighttime economy to be unaffected by LRT.

Crime also has the potential to increase after construction of LRT. If the LRT is built without addressing existing poverty in the neighborhoods along University, then crime would likely increase when LRT brings outsiders into the neighborhood. One expert posited that "making the neighborhood look better physically won't make it better… community members will still feel angry… and this is what will lead to an increase in crime[12]."

On the contrary, it is also likely that the LRT and resulting development will lead to a decrease in informal economic activities. One must

recognize that the informal activities of crime and vice will persist in the economic landscape of cities; however the most effective approaches stem from minimizing its greater community effects.[11]"   Police in St. Paul have considered "moving" prostitution from University Avenue to Payne Avenue or Minneapolis. This interest stems from a desire to shift prostitution to spaces that are not residential or family neighborhoods,   or places where commercial uses are more common. Police officers wish to keep outsiders from entering these neighborhoods in order to improve quality of life and reduce childhood exposure to neighborhood-level informal activities. Combined with LRT, this police strategy is likely to lead to a decline in prostitution along University Avenue.

During construction of LRT, a reduction in pedestrian and auto traffic will occur along University. As the Avenue is closed and traffic volume drops, the demand for prostitution will decrease significantly.   During this time, prostitutes will likely move elsewhere in order to find business. This occurrence, combined with police strategy, is likely to bring a dramatic

reduction to the number of prostitutes working along University. It is further likely that prostitutes will relocate to other neighborhoods given the transient nature of these women's lives. Prostitutes were described as a transient population by two interview participants[6,11], as homeownership is low among these women. As most rent their homes, and the cost of rent is lower along Payne Avenue, many may relocate to neighborhoods where the demand for prostitution is growing (like Payne Ave)[11].

Further, LRT and development plans for the Avenue hope to alter the street so that its orientation is no longer towards the automobile. This will lead to a removal of parking lots (see the chapter by Christenson and Perkins), which removes a key location where these informal economic transactions occur. Prostitution also takes place in cars and relies on high automobile traffic along the Avenue. However, with a decreased number of cars along the Avenue, fewer opportunities for soliciting and fewer locations for other economic transactions to occur will result.

IV. CONCLUSION

The process of normalization has a significant hold on the population that becomes accustomed to activities that are aberrant in nature. In this case, informal activities of drug use, theft and prostitution have become normalized in the communities in and around University Avenue. With the emergence of LRT, this normalization will inevitably be disrupted because new space users will change how University operates, especially with regards to sex work, drug use and crime. However, we cannot assume that the breakdown of the normalized crime and vice economy of University will result in a positive nor negative change. We must assert that the people most affected by these changes will understand their effects either as negative or positive externalities and have the agency to interact with such changes in their desired ways. In other words, University will change, but the degree of such change and its effects will remain ambiguous.

As nighttime economies gain more recognition by city and regional

governments as possible nodes of growth, it is important to consider how the informal activities of crime and vice will be affected. As we have demonstrated, LRT can have a significant impact on decreasing crime in an area and the value of these activities can be in decline. Given this probable decline, the construction phase of LRT, the interests of St. Paul police, and neighborhood changes brought by LRT, it is most likely that displacement of informal nighttime activities will occur on the street. What will remain could be a destination site for nighttime and entertainment.

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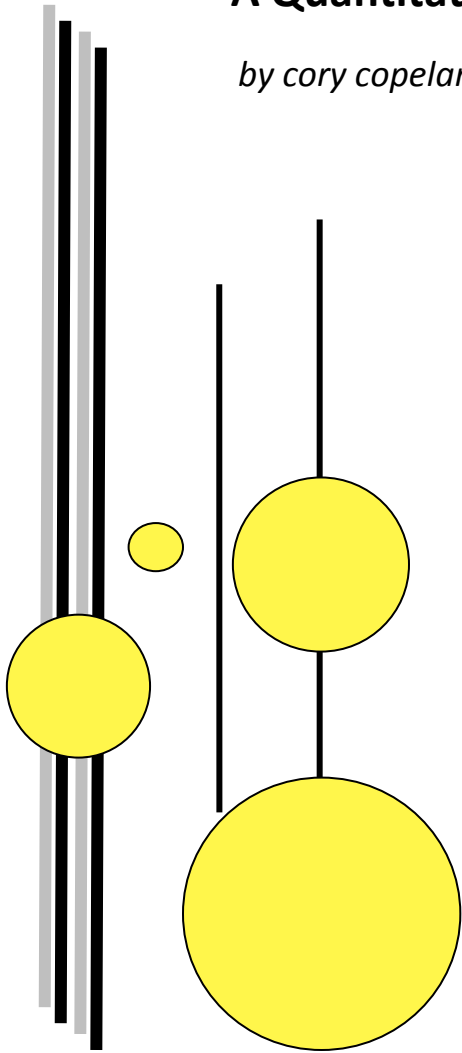
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V. DALLAS TO THE TWIN CITIES:

A Quantitative Analysis of Land Value Change from Light Rail Construction

by cory copeland

This Chapter's Question:

1. What connection, if any, is there between light rail transit locations and property values?

Chapter Outline:
I. The Issue
II. Methods
III. Results and Interpretation
IV. Impact on the Central Corridor
V. Conclusion

Public transit is a major source of public debate. The proponents of public transit argue that rising gasoline prices, concerns about the environment and growing traffic congestion make investments into new transit infrastructure desirable. Critics argue that transit is not tenable in areas that are not dense and metropolitan and that significant capital costs could be better spent elsewhere. One benefit often associated with large transportation infrastructure projects is an increase in land value which can help offset the cost of projects through increased property tax revenue. This increase in property value is a force driving the popularity of rail transit. Planners point out that increased property values can benefit urban neighborhoods.

Attempts to build transit networks to revitalize urban neighborhoods have been a popular development strategy in the early 21st century.[1] This has led to the growth of new rail transit lines in recent years.[2] In 2010, the cities of Saint Paul and Minneapolis along with the Metropolitan Council and federal government assistance began construction of a light rail through the central corridor of the cities.

The Central Corridor light rail project in Minneapolis/Saint Paul is one of the largest infrastructural projects in the recent history of the cities. The project has a nine hundred and fifty-seven million dollar budget.[3] The project is anticipated to have significant effects on the central corridor of the Twin Cities. The city of Saint Paul's Central Corridor plan anticipates that the construction of the light rail will increase the value and density of the property along the corridor.[4] Saint Paul city planners have put programs into place anticipating that property value could increase significantly. One such program is intended to prevent gentrification resulting from community members being 'priced-out' of the neighborhoods surrounding the Central Corridor.[5]

The common conception that there is a clear relationship between property values and the location of light rail stops has informed both the political and planning process in the development of the Central Corridor light rail transit plan. Politically, the increase in property values makes developing light rail transit more appealing. From a city planner's perspective it presents opportunities to enhance neighborhoods and attract investment. As well, increased revenue from property taxes is considered an important method of offsetting the operational and capital costs of a light rail transit system. Land value increase does present many benefits to communities, but it also carries some risks. The primary risk is that increased property values can lead to the loss of communities to gentrification. Because of this, communities and planners should carefully manage land value increases that might occur from a light rail transit system so that they benefit existing communities.

Research on the connection between land-use/land value and light rail transit is not entirely conclusive that there is positive correlation between proximity to light rail and land value. Susan Handy, from the University of California, Davis, points out that light rail systems may not lead to greater property value and higher

density land-use: "Transit systems potentially impact development [...], just as highways do: by reducing transportation costs and by changing relative accessibilities. [...], if a transit system reduces travel times, it may enable residents to live farther out, thereby increasing rather than decreasing sprawl."[6] Despite the possibility that light rail transit projects could lead to sprawl, the majority of empirical research discussed in this chapter has not shown increased sprawl.

One recent study of the impact of light rail on Buffalo, New York showed that there was a generally positive effect on property values
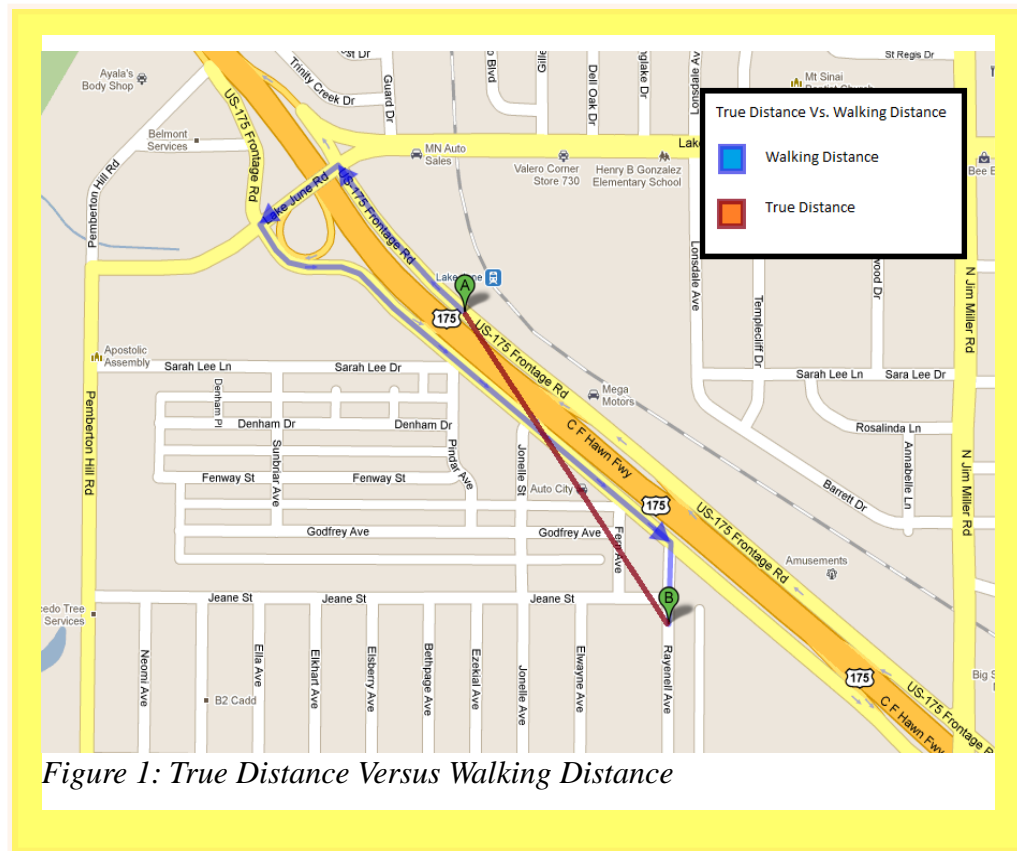
Figure 1: True Distance Versus Walking Distance

resulting from light-rail transit. The research used a hedonic model (i.e. model that isolates an individual component of a phenomenon by controlling for other variables that affect the phenomenon). The model found that proximity to rail in Buffalo

had a minor positive influence on property values, but that other factors were more significant in the pricing of property.[7]

A case study from Naples, Italy showed that property values had increased in catchment areas of light rail stations. However, the study found that the effects are inconsistent. Local factors affected which stations gained benefits from the light rail. The study also found that the increased property values in some areas had resulted in gentrification. [8]

Other research has focused on short-term effects that light rail might have on property value. A case study from Sunderland, UK used residential property price data from newspapers to see how the new light rail had affected property value. The study found that the short term effect on property value was not significant. The article speculates that the home-buying situation will likely see property value increases as the market adjusts to the effects of improved accessibility. [9]
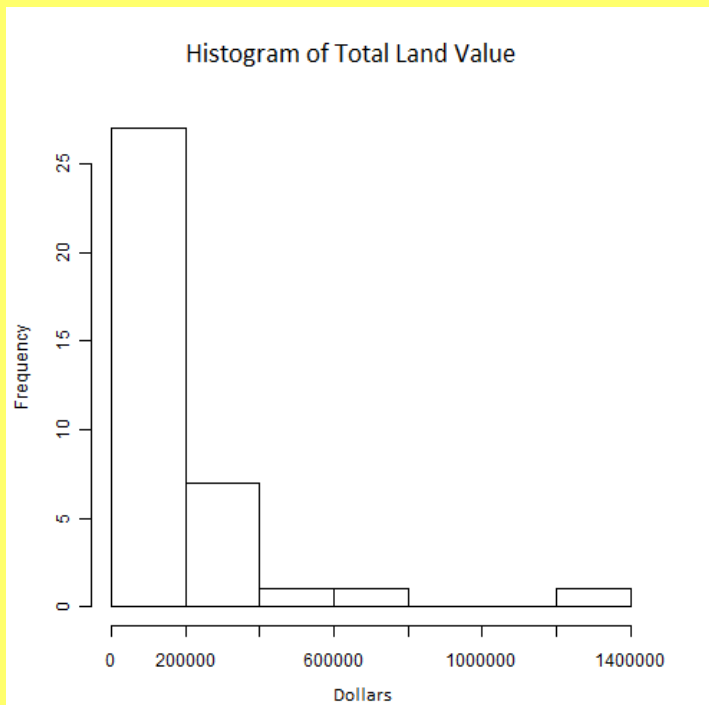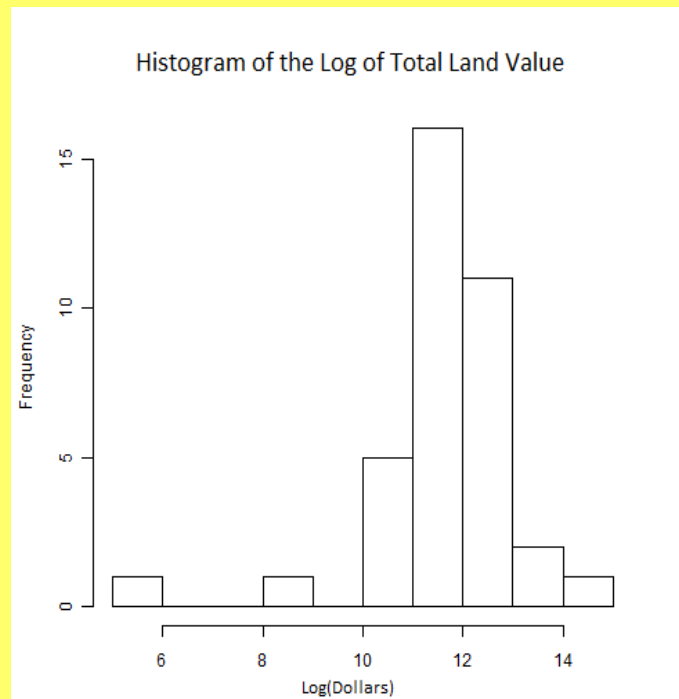
Figure 2: Land Value Histogram

Figure 3: Log of Land Value Histogram

argues this is because distance rather than travel time is frequently used as an independent variable, and because of problematically-defined study areas.[11]

Still, planners in Saint Paul are preparing for an increase in property values along the Central Corridor. In many ways, the success of the Central Corridor light rail plan will be dependent on the effects that the new light rail line has on property value. Therefore, the question this chapter will addresses is: What connection, if any, is there between light rail transit locations and property values?

Sherry Ryan, from San Diego State University, conducted a study on the effects of light rail as opposed to highway accessibility on industrial and office firms in San Diego, California. She found that freeways significantly impacted office space location while the effects of light rail were less significant. The study also found that local factors were more critical to industrial locations than transportation access.[10]

The results in the literature have been somewhat inconsistent at showing connections between light rail transit and property value. Sherry Ryan

II. METHODS

The primary research question of this chapter is whether there is a relationship between the location of light rail transit stops and land value. In order to address this question, this chapter will focus on the empirical results of one case study. The chosen case study is the DART (Dallas Area Rapid Transit) rail system in Dallas, Texas. Dallas shares some similarities to the Minneapolis-Saint Paul urban area that make it suitable. First, the Dallas metroplex contains two large cities (Dallas and Ft. Worth) similar to Minneapolis and Saint Paul. As well, Dallas has a somewhat weak central business district[12] which is similar to the Twin Cities. The DART system in Dallas is similar to the anticipated transit system in the Twin Cities because it combines commuter lines (similar to the Twin Cities' Hiawatha line), a central line connecting the Dallas/Ft Worth area (similar to the new Central Corridor line), and a bus system. Therefore, results from the light rail system in Dallas should be useful predictors of the form that land value change will take as a result of the development of the Central Corridor light rail in Minneapolis-Saint Paul.

The data set derives from multiple sources. First, I systematically sampled properties from the Dallas assessors' catalog. These data contained the type of property (e.g. residential), location, assessed property value, area of the property, and if the property was owner-occupied (defined as the owner having the same address as the property). Using the locations of the property, the DART website yielded
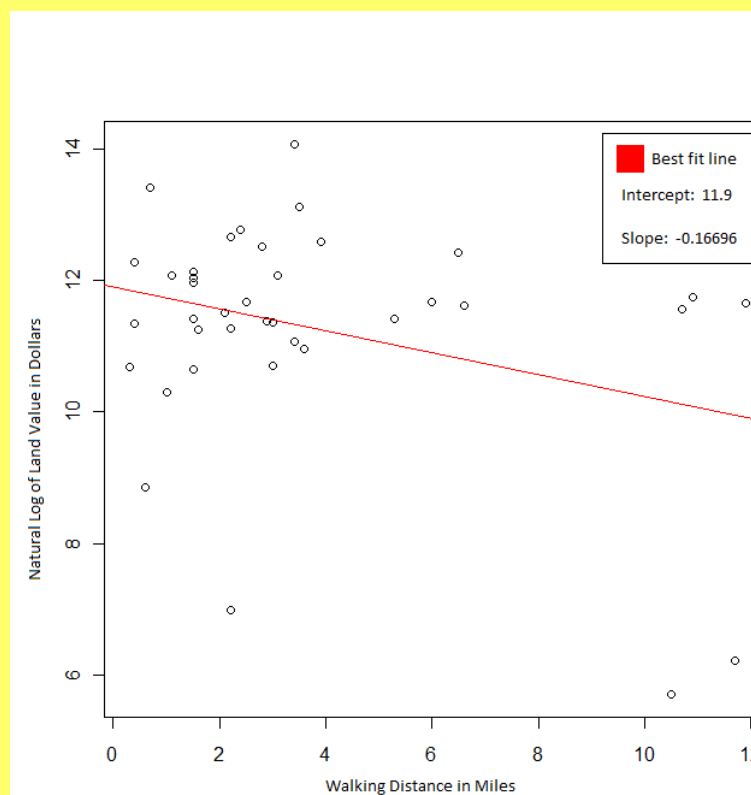

Figure 4: Best Fit Line

the nearest station to the sampled properties. From there, I used Google maps to estimate the walking distance (Figure 1) to the nearest rail station. Walking distance was used rather than true distance because it is a better

approximation of the normal rail transit user's experience than true distance. As well, it is likely that perceptions of light rail as an amenity are based on one's ability to easily walk to a rail station.

The dependent variable in the regression model is the Dallas Assessor's office assessed total value for a property (measured in dollars). The distribution of the sample (figure 2) shows that total land value is not normally distributed. However, figure 3 shows that the data are log-normal. In order to run regression analysis, the dependent variable (total assessed land value) had to be represented as the natural log of total land value. Therefore, the model will be built with the dependent variable as the natural log of the total assessed value of a property.

The model (Table 1) controls for the significant variables (defined as variable with a p-value below .05) of area, and the categorical variable of owner-occupation (if the owner of a property is the resident of the property). The area independent variable showed a significant linear relationship with property value. Therefore, the area independent variable being used is the

natural logarithm of area because it maintains the linear relationship in the model. What this means is that each square foot of land added to a piece of property ought to add a similar amount of value to the property as every other square foot of land in the property. This choice also has a statistical justification; using the log of area shows a greater significance. The p-value (a measure of significance in the model) for the natural log of the square feet is 0.000351, but 0.00484 for square feet.

A best-fit line estimate shows the relationship between walking distance to a rail transit station and the natural log of total value (Figure 4). However, it does not seem to fit the distribution of the data. It looks as though the data has curve to it which could indicate that there is a stronger relationship with parabolic curve. To test the parabolic relationship, I ran a p-test (without controls) using squared walking distance rather than total walking distance. The test yielded a p-value of 0.0865 which is more significant than the 0.181 p-value from a non-squared walking distance. This result is consistent with research on the

gravity model.   The gravity model indicates that the market area's draw on customers for a location is a function of distance squared. In practical terms it means that for each mile of distance added to the walking distance, the draw of a station is even more diminished than for the previous mile of distance. In theoretical terms it means that locations near each other affect one another much more than locations that are far apart. As locations get farther apart, the effects they have on one another diminish at an accelerating pace. This explains why the model using walking distance squared as an independent variable is more significant.

I created a single-variable model for the relationship between the natural log of total land value and squared land value, yielding the following coefficients:

(Intercept)   square_walk
11.80922   -0.01051

Pvalue: 0.0865

These results can be represented as the function:

Log(Total Land Value) = 11.80922 – 0.01051(Squared Walking Distance)

When represented as a function that produces the output of land value rather than the log of land value, the function becomes:

Total Land Value = e^(11.80922 - 0.01051x^2)
*Where e is Euler's number and x is walking distance.

Figure 5 shows a graph of this equation. We can see that the model indicates being close to a light rail stop helps predict a higher land value, but that as property moves away from the stops the effects diminish swiftly. Within five miles of walking distance the land value has diminished by tens of thousands of dollars and by ten miles of walking distance the model predicts that land value has diminished by almost $75,000.

There are a number of limitations to the model. The application of the model from Dallas to the Twin Cities cannot be taken as an absolute prediction. This is because there are a number of local and political factors that cannot be taken into account when creating a model of a very complex phenomena. As well, current research on light rail has shown there to be inconsistencies in the effects of light rail locations and land value. This makes certainty in the application of the model impossible. However, the results section of this chapter will discuss how the model is consistent with the literature on the light rail-land value connection which lends credibility to the application of the model.
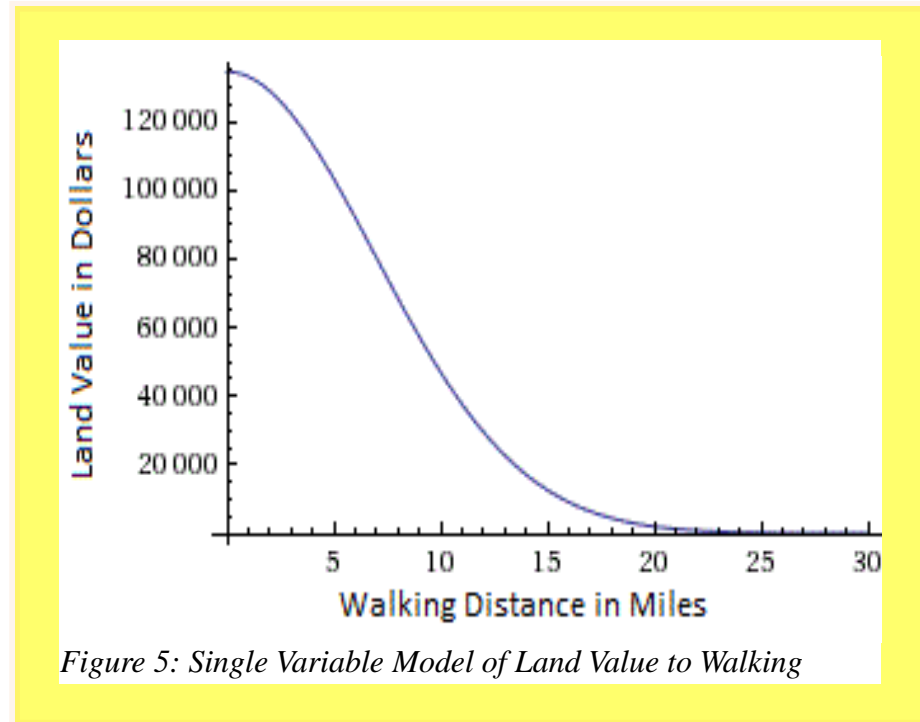

Figure 5: Single Variable Model of Land Value to Walking

Another limitation of the model is that it does not include as many control variables as there are factors informing land value. Specifically, neighborhood characteristics often have a large effect on land value. Controlling for crime and neighborhood demographics would likely improve the model. Despite the lack of these control variables, the model has an adjusted R-squared of 0.3981. That

means that the model has reduced least squared differences between a model without independent variables (i.e. a model that is simply the mean land value) and our current model by about 40%. The R-squared value has been adjusted for a natural inflation that occurs when adding any independent variable into the model. Despite the lack of independent control variables the model still provides significant explanatory value.

III. RESULTS & INTERPRETATION

The findings indicate that owner-occupation, land area, and squared walking distance all have significant relationships with land value. Land area's relationship with land value is intuitive. A lager plot of land is more valuable than a small plot of land. As well, owner-occupied property is likely to increase land value over time because a resident is more likely to invest in improving a piece of property if he or she is the owner of that property. This occurs because he or she gains the benefit of any increase in land value by improved equity on the land;

while a business or renter is less likely to invest in improvements that would drive up the land value because they do not directly benefit from the increased property value. These relationships represent important factors in establishing land value. However, the primary question of this chapter is the relationship between light rail station locations and land value.

The relationship between land value and light rail station locations is not a normal linear relationship. It is both logarithmic and parabolic. I will now discuss the implications and reasoning behind both the logarithmic and parabolic elements of the model
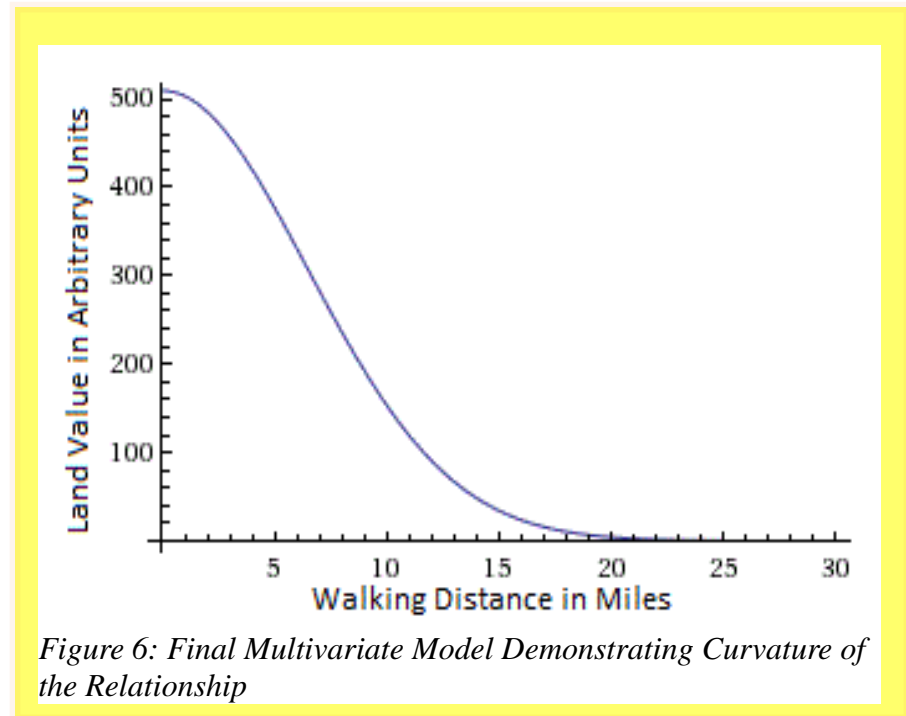

Figure 6: Final Multivariate Model Demonstrating Curvature of the Relationship

and demonstrate their consistency with previous research and models in the field of transportation geography.

A significant debate in the literature on light rail transit is whether or not light rail can be considered a regional development strategy or if the impacts it has are localized. Proponents of light rail transit often argue that it can be a piece of a regional development strategy because land

value and land use change can spur an urban renewal which benefits the entire region. However, research has struggled to show how light rail transit positively affects regional growth. Susan Handy points out that past research has shown "transit systems do not generate "interregional transfers," thereby increasing the overall development within the region, [...] In other words, there was no evidence that regions that invest in new transit systems grow faster than they would have had they not invested in the transit system."[13] Other research has indicated "urban rail transit investments rarely 'create' new growth, but more typically redistribute growth that would have taken place without the investment"[14] The case study from Naples, Italy (discussed in 'The Issue' section of this chapter) found that the impacts on investment around light rail stations was positive, though some areas experienced gentrification as existing communities were pushed out of these areas.[15] Naples experienced increased land value in central city areas, but not in periphery or suburban areas (even ones with rail transit stations),

indicating that rail transit's effects are not felt across a region.

The logarithmic form of the relationship between land value and distance from light rail stations is consistent with the conclusion in the literature that rail transit is not a sufficient condition for regional development, but that it does spur investment along the rail. The logarithmic relationship indicates the station's effect on land value decays quickly as walking distance from a rail station increases. This means that the empirical example of Dallas supports the idea that the impacts of rail stations are localized rather than region-wide. Figure 6 shows the shape of the curve of the relationship between station location and land value in the final model (with the natural log of area and owner-occupancy held constant). Figure 6 only demonstrates the shape of curve, not the actual values, because the intercept of the graph is determined in part by the observed value of the other independent variables in the model. The figure demonstrates that as one moves away from a station the effects diminish quickly; in fact, after several miles, the effects become

essentially non-existent. Therefore, the logarithmic relationship and exponential relationship both indicate the effects of transit on land value are contained primarily to the stations' immediate areas.

Furthermore, the relationship is related to the concept of distance decay. Distance decay means that the pull-factors of a location decrease as the distance between two locations increases. This concept is formalized in the gravity model. The gravity model shows how one population's pull on another is affected by the square of distance rather than distance. The formulaic representation of the gravity model is:

$$\frac{population_1 \times population_2}{distance^2}$$

```
lm(formula = log(total_val) ~ square_walk + owner_occupied +
    log(Area))

Residuals:
    Min      1Q  Median      3Q     Max
-2.9620 -0.4691  0.1149  0.7642  1.5418

Coefficients:
                 Estimate Std. Error t value Pr(>|t|)
(Intercept)      6.232278   1.359968   4.583 6.27e-05 ***
square_walk     -0.012030   0.004865  -2.473 0.018723 *
owner_occupiedY  1.118834   0.361152   3.098 0.003964 **
log(Area)        0.527259   0.138325   3.812 0.000572 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.061 on 33 degrees of freedom
Multiple R-squared: 0.4483,     Adjusted R-squared: 0.3981
F-statistic: 8.937 on 3 and 33 DF,  p-value: 0.0001777
```

Table 1: Model with squared walking distance variable

```
lm(formula = log(total_val) ~ walk_distance + owner_occupied +
    log(Area))

Residuals:
    Min      1Q  Median      3Q     Max
-2.9729 -0.5043  0.1240  0.7486  1.5869

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)      6.19127    1.36779   4.526 7.39e-05 ***
walk_distance   -0.13949    0.05894  -2.367 0.023966 *
owner_occupiedY  1.14626    0.36655   3.127 0.003673 **
log(Area)        0.55394    0.13901   3.985 0.000351 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.068 on 33 degrees of freedom
Multiple R-squared: 0.4409,     Adjusted R-squared: 0.3901
F-statistic: 8.675 on 3 and 33 DF,  p-value: 0.0002194
```

Table 2: Model with walking distance variable

This gravity model has been utilized in explaining retail locations. It argues that the draw of a particular retail market area is inversely related to the square of distance. Customers require a greater service to compensate for traveling the distance between their location and a retail location as that distance grows. We can easily conceptualize a light rail station as a retail location (selling rides). Then, the gravitational model would indicate that there should be an inverse relationship between distance squared and the location of customers. Therefore, it is not surprising that the inverse relationship between land value and walking distance would be more strongly correlated when distance is squared. Table 1 and Table 2 give information on the model with squared distance and non-squared distance, respectively. We can see that the model p-value, R-squared, and variable p-value demonstrate a greater relationship when walking distance is squared.

The connection between the literature on regional growth from transit as well as the gravitational model and the logarithmic and parabolic relationship between land value and walking distance indicate that the model provides empirical support for theories in the literature. The model supports that idea that transit does not spur region-wide growth of land value, but that it does spur land value increases around station areas. As well, it establishes the decay of distance relationship between land value and the location of rail stations as being the inverse of squared distance. Therefore, it provides empirical support for the gravity model.

Further research on the connection between light rail and land value should explore the relationship between land value and rail station location using not just linear models. This study indicates that in the Dallas metroplex, the DART system exhibited

stronger non-linear relationships to land value. Further research might also explore what the implications of the non-linear relationship might be. This chapter gives an overview of the implications that the model has on discussions in the literature about regional development strategies and the gravity model. However, these discussions are not exhaustive. The possible implications of land value and walking distance to a station having a logarithmic and parabolic relationship could have other implications in urban and transportation geography literature.

IV. IMPACT ON THE CENTRAL CORRIDOR

The model's results have a number of possible implications when applied to the Minneapolis-Saint Paul Central Corridor light rail plan. This section will discuss three possibilities: the impacts the Central Corridor light rail might have on downtown Saint Paul, housing along the Central Corridor, and the existing Hiawatha line.

The most general impact that the model indicates about the effects of the Central Corridor light rail is that it will lead to increased property values (and as a result density) in the areas immediately around the light rail line. However, this impact will swiftly decrease as walking distance from the stops grows. Therefore, it is likely that the effects of the light rail will be felt along University Avenue, where the line is being put in, but not as strongly in the neighborhoods surrounding University Avenue along the Central Corridor. As well, the model indicates that the new Central Corridor light rail will not be sufficient to spur regional growth in the Twin Cities area.
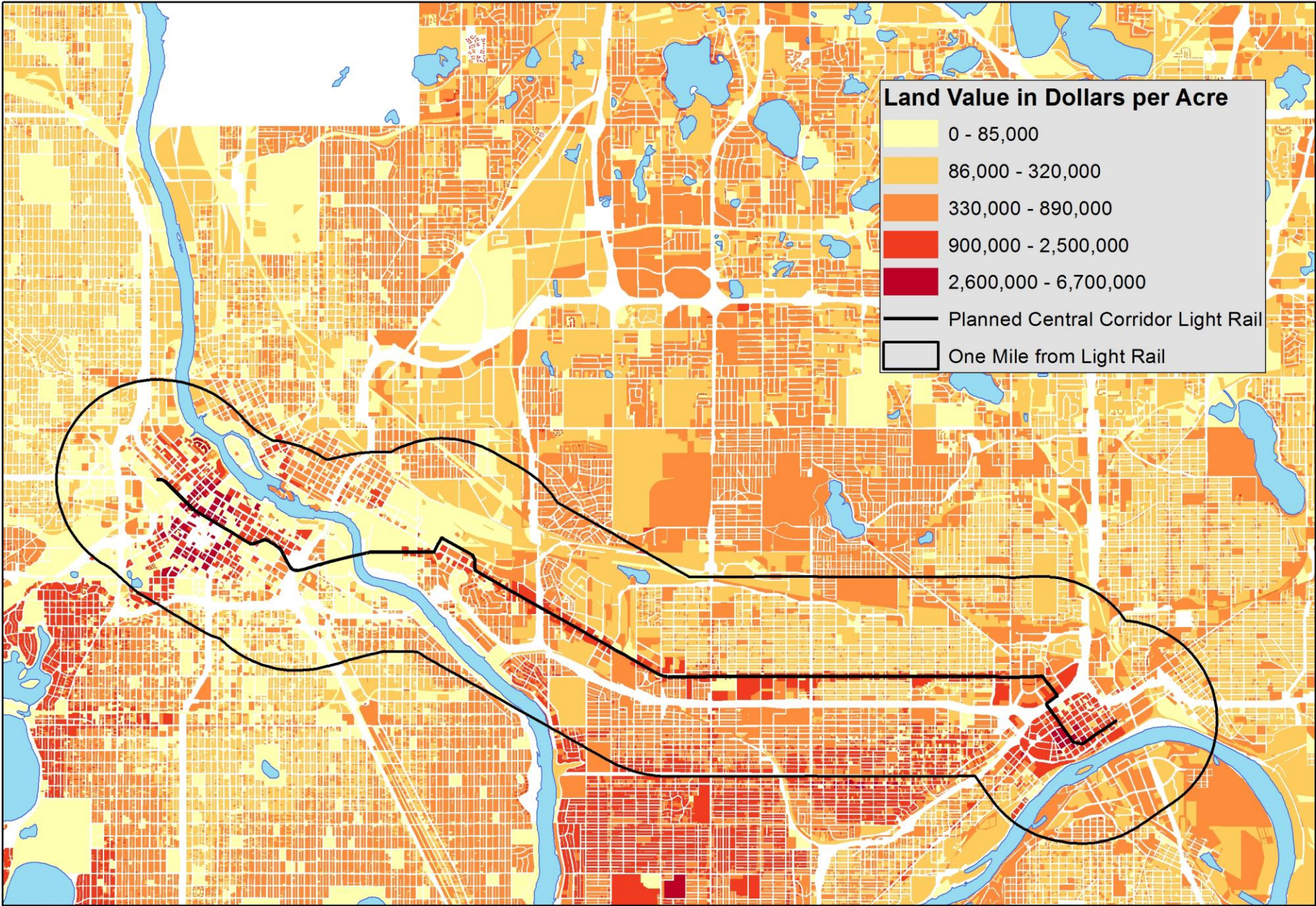
The land value map of the Central Corridor of the Twin Cities shows the light rail line with a one mile buffer. The map shows that the land value at the eastern- and western-most ends of the light rail have the highest land value. These areas are the downtowns of Saint Paul and Minneapolis respectively. As well, the land directly along the Central Corridor line shows higher land value than the general land value trends in the buffer zone.

The model produced from the Dallas data indicates that land value increases sharply diminish as distance from the light rail stations increase. It is probable that within the buffer region some land value change could be anticipated. Currently, there is a noticeable difference in land value between the land directly adjacent to University Avenue where the line will locate and the buffer zone around the line. This difference could become even more drastic after the new light rail is in place.

One specific area along the line that may experience land value change is downtown Saint Paul. Saint Paul's downtown has benefited from its proximity to the State Capitol and because of this proximity will likely have development potential for the foreseeable future. However, the current state of the downtown shows little of this potential. Downtown Saint Paul has struggled to attract and keep retail. It has to compete with downtown Minneapolis, the Mall of America, and retail districts (like Grand

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Land Value in the Minneapolis-Saint Paul Central Corridor in 2010

Land Value in Dollars per Acre

- 0 - 85,000
- 86,000 - 320,000
- 330,000 - 890,000
- 900,000 - 2,500,000
- 2,600,000 - 6,700,000

— Planned Central Corridor Light Rail

☐ One Mile from Light Rail

Source: Metropolitan-Council Parcel Data 2010, Designed by Cory Copeland on April 18, 2011, Projection: UTM 15N

Avenue) within Saint Paul. Making prospects worse for the downtown, the business, wealth and population centers of the Twin Cities have been moving westward away from Saint Paul. However, the Central Corridor light rail is intended to help change this trend and spur new investment in the city center. The plan includes creating more pedestrian-friendly park streets, improving public spaces, and fostering new investment into the downtown.[16] The plan is intended to create ease of use for pedestrians getting off the light rail line at downtown and hopes the new foot traffic through the area will generate investment.

The model for Dallas shows that the light rail stations should impact land value and successful planning could expand the impacts of the light rail. The case study of Naples showed that the light rail spurred significant redevelopment in the old city center.[17] The example of case studies in the literature and the model presented in this chapter indicate that there is reason to be optimistic about the success of Saint Paul's Central Corridor downtown plan. Still, case studies about local light rails connecting two

center cities like those of Minneapolis and Saint Paul do not exist. It is difficult to predict how the benefits would be shared between the two cities' downtowns. The land value map shows that both areas have higher land values than surrounding areas; both areas are also large employment centers and so contain the 'weight' needed to benefit from light rail connections.

Increased land value from the new light rail is not completely welcomed by everyone in the community. Some worry that one impact of the light rail will be neighborhood and business gentrification. This concern is most predominately expressed by small business owners in the Central Corridor and community members of ethnic or working-class neighborhoods. Many residents of the Central Corridor are to some degree still experiencing the effects of the displacement of the Rondo neighborhood by the construction of Interstate 94. The evidence from this study indicates that concerns of housing gentrification are largely unfounded, but that business gentrification along University Avenue may present a greater problem.

The construction along the Avenue presents a problem to businesses because it diminishes customer access and traffic. As a result, many businesses will likely struggle through the construction. As well, the benefits of the light rail on businesses such as ethnic businesses that cater to the needs of the local community may not benefit from new light rail traffic. However, every business along the Avenue is likely to have increased leases matching the increase in property value. As a result, some businesses serving the neighborhood communities could be displaced by the light rail.

Housing is less likely to suffer the displacement risks that businesses face. Most housing is located off the Avenue in neighborhoods surrounding the Central Corridor. The Dallas model indicates that land value changes in these areas are likely to be limited. It is therefore hard to imagine gentrification occurring as a result of the existing populations being priced out of the neighborhoods surrounding the Central Corridor.

It is difficult to judge what effects the light rail might have on the

communities such as continuing care communities that are located directly on University Avenue. These communities are the most at risk. There will most likely be housing growth directly on the line as it serves the employment centers of the downtowns and the University of Minnesota. The Avenue will become an appealing housing location for students because it connects to the university. Most of this housing development will probably occur within walking distance from the stations and will be a factor in driving up land value. The demand to be within walking distance will make housing density increase directly around the stations, but the model indicates that outside of reasonable walking distance this effect will diminish. Therefore, the new housing that develops will be unlikely to displace current communities.

The new line increases the connectivity of the Hiawatha line. However, it likely will not significantly increase land value along it. The Naples case study indicates that adding rail to suburban lines often spurs a shift toward center city.[18] In Naples, as the growth occurred in the center city some residents were pushed out along suburban lines. However, the amount of growth was relatively limited. As such, it can be anticipated the effects of the Central Corridor light rail will be largely seen in the corridor directly along the new line.

Research on light rail development stresses the importance of planning and political support after creation of lines to succeed in increasing land value and density. While the Dallas model indicates that the impacts of the light rail will likely not be felt throughout the region, the impacts on the Central Corridor could be large. However, getting the light rail plan in place is only the beginning of the process. The planning decisions made following the construction will do much to determine the success of the Central Corridor light rail.

V. CONCLUSION

The literature on the effects of light rail on land value does not conclusively support the hypothesis that light rail stations always increase land value in the surrounding area. However, this chapter adds to the growing amount of literature empirically supporting the relationship between land value and light rail station locations. A model I generated based on the Dallas DART system indicates that the area immediately around stations benefits from land value increases.

If the Central Corridor light rail produces similar results to the DART, many of Saint Paul's planning goals can be met and gentrification can be largely avoided. However, the success of the Central Corridor development will be defined by the decisions made in the aftermath of the construction of the light rail. Therefore, careful planning and community engagement will be critical to Minneapolis and Saint Paul achieving successful Central Corridor development.

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