Does Redevelopment Affect Crime Rates? A Case Study St. Louis

Mary Bollinger
Advised by Dr. Peter Freeman

Background

- Crime rates in St. Louis have long been an issue for policymakers
- In recent years, efforts from policymakers as well as citizens of downtown St. Louis bring more business and local tourism has resulted in many revitalization projects that have somewhat changed the urban landscape
- Our research aims to discover if there is any relation between development projects and crime trends

Gentrification and Crime

- Social Scientists have been interested in studying crime trends
  - Especially in cities where the landscape is changing

- Many studies have looked into the effect of gentrification on crime
  - Most of these studies have found that crime increased with gentrification (Covington and Taylor 1989; Lee 2010; Taylor and Covington 1988; Van Wilsem et al. 2006)
  - But others have found that the process of bringing in more socioeconomically advantaged people along with the resources and business they bring with them, improves the safety of neighborhoods (McDonald 1986)
  - These studies largely used housing prices as a measure for gentrification, while others took novel approaches like measuring gentrification by the number of coffee shops in a neighborhood.

Research Question

Does the rate of crime change significantly due to redevelopment in St. Louis, MO?

Methodology

- Crime is data from the St. Louis Metropolitan Police Department's website
  - https://www.slmpd.org/Crimereports.shtml
- Development project data was mainly gathered from ***nextSTL***, a blog about development in St. Louis
- For each of the projects, crime rates from a radius around the location from before and after construction are gathered
- An interrupted time series analysis with autoregressive integrated moving average (ARIMA) models to discover whether crime rates significantly change after redevelopment takes place.

Crime Data

DateOccur: A string variable describing the most accurate time of when the crime occurred. In cases when the victim is unsure of the time the crime occurred, the time when the victim discovered the crime is used

Crime: Five to six digit UCR code categorizing the nature of the crime

Lon: The longitude of the location of the incident, extrapolated from the I/Leads address reported by the officer on the scene

Lat: The latitude of the f the location of the incident, extrapolated from the I/Leads address reported by the officer on the scene

Violent: A string indicating whether the crime is considered "violent" (homicide, rape, aggravated assault, robbery) or "nonviolent" (anything else)

crime : A string giving the category of the crime defined by the five or six digit UCR codes from the Crime variable

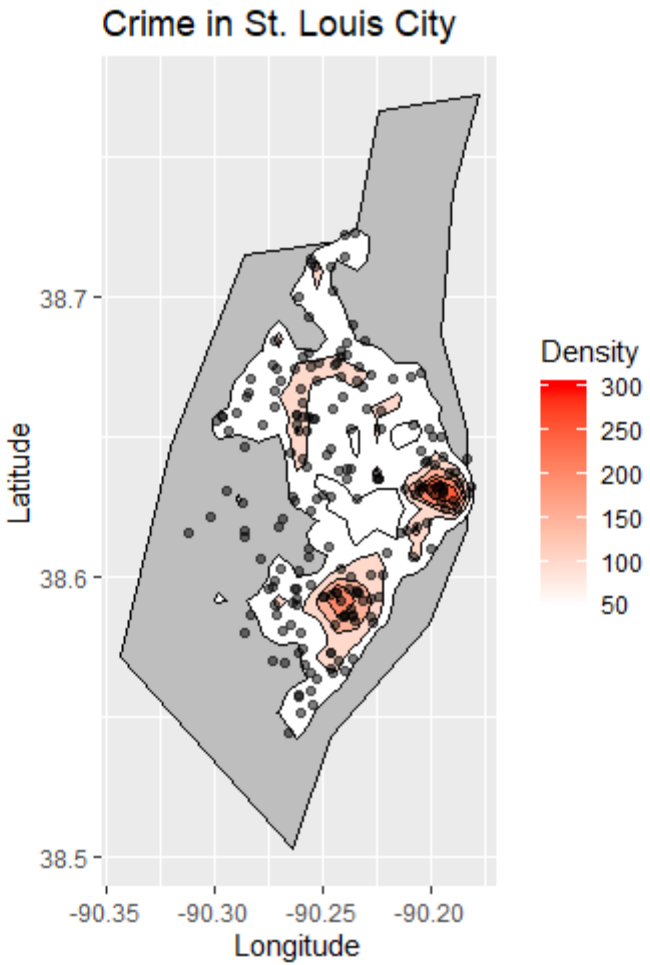
Date: A date variable parsed from the DateOccur variable Time A time variable parsed from the DateOccur variable

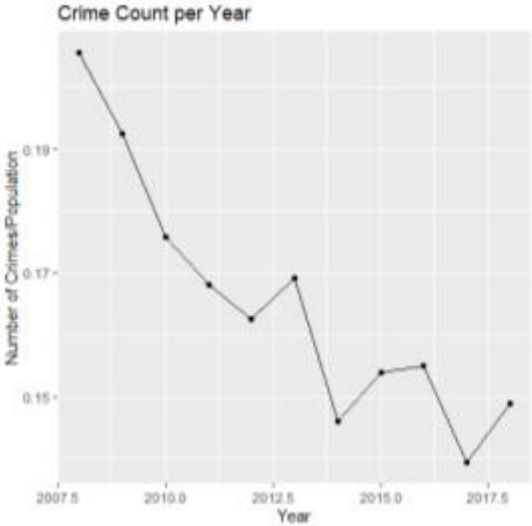
Month: The month the crime occurred Year The year the crime occurred

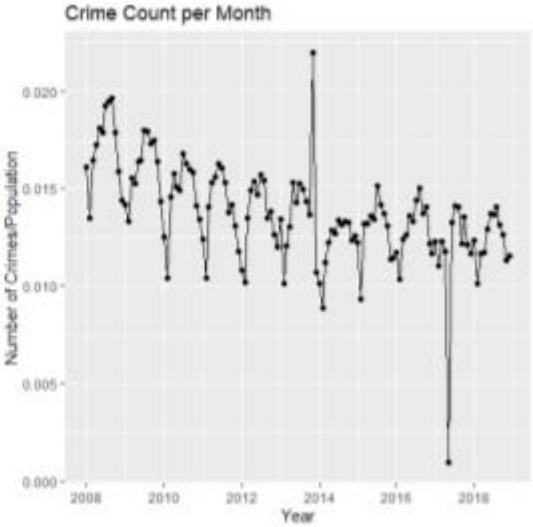
Week: The week the crime occurred, starting with 1 for the week of Jan. 1st, 2008

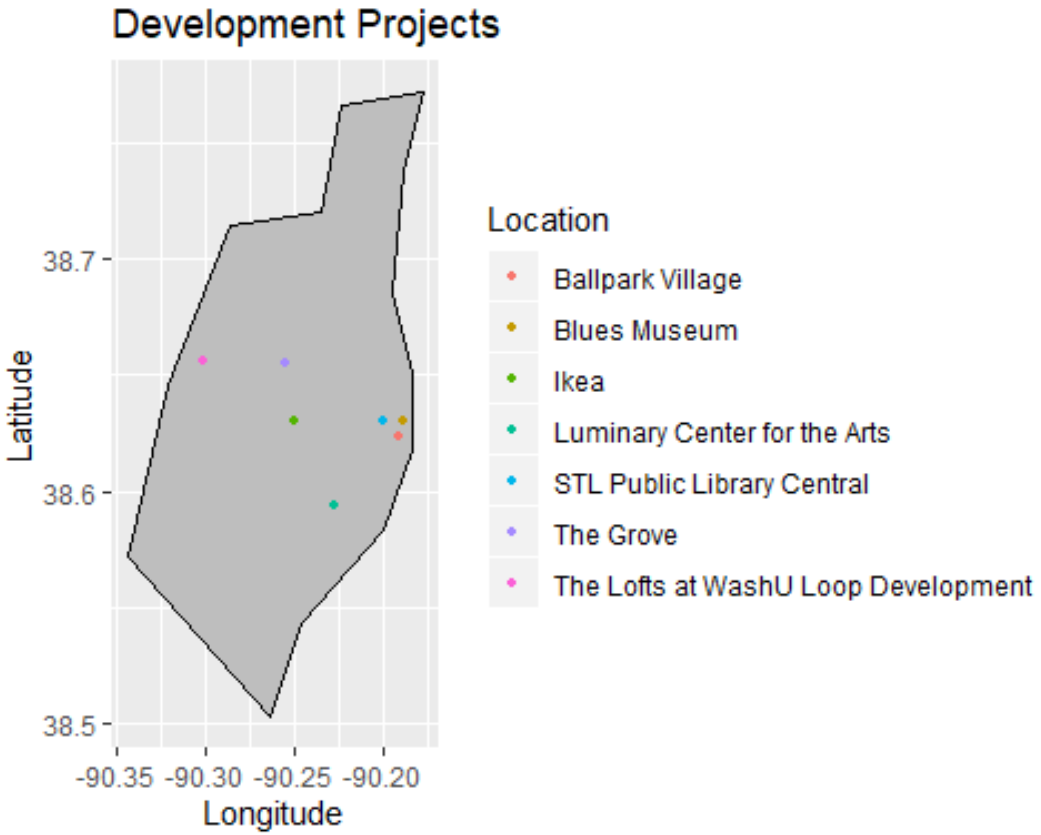
week start date: The date of the first day in the week

week end date: The date of the last day in the week

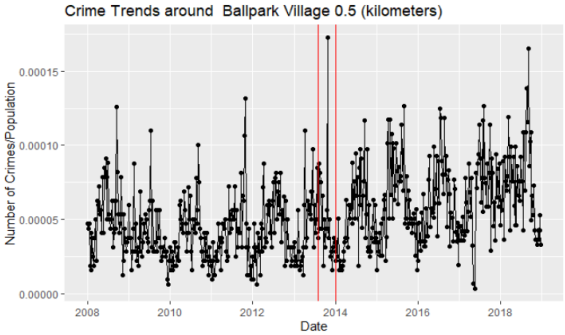

Crime in St. Louis City
Latitude
38.7
38.6
38.5
-90.35
-90.30
-90.25
-90.20
Longitude
Density
300
250
200
150
100
50

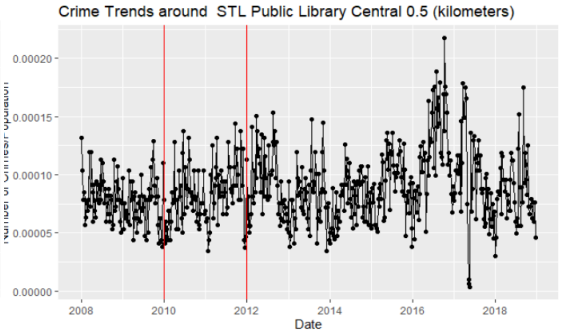

Crime Count per Year
Number of Crimes/Population
0.19
0.17
0.15
2007.5
2010.0
2012.5
2015.0
2017.5
Year

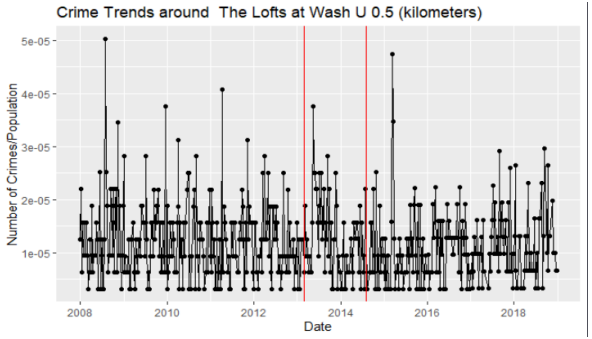

Crime Count per Month
Number of Crimes/Population
0.020
0.015
0.010
0.005
0.000
2008
2010
2012
2014
2016
2018
Year

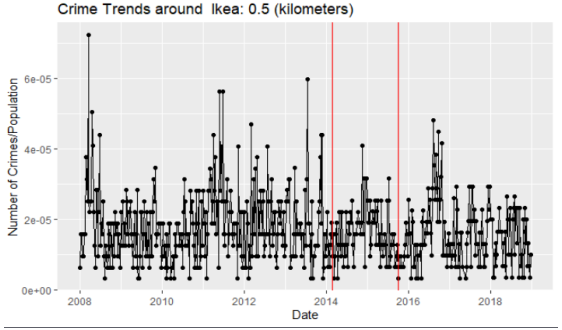

Development Projects
Latitude
38.7
38.6
38.5
-90.35
-90.30
-90.25
-90.20
Longitude
Location
Ballpark Village
Blues Museum
Ikea
Luminary Center for the Arts
STL Public Library Central
The Grove
The Lofts at WashU Loop Development

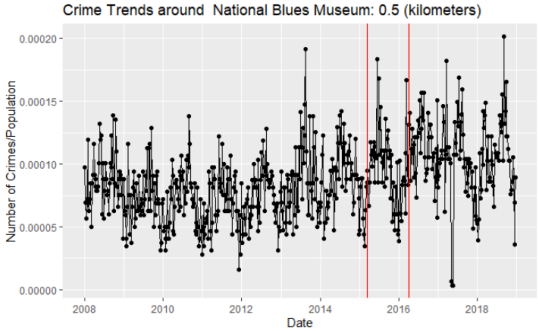
Crime Trends Around Points of Revitalization

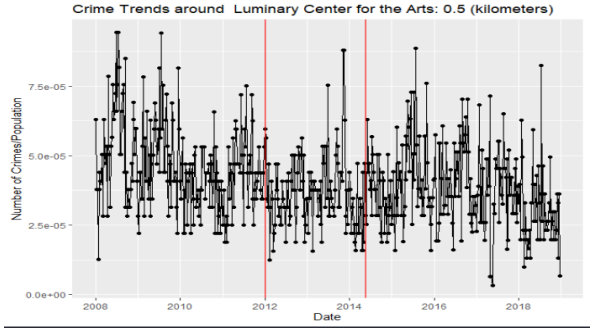


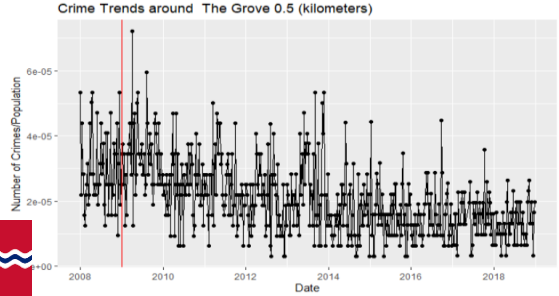












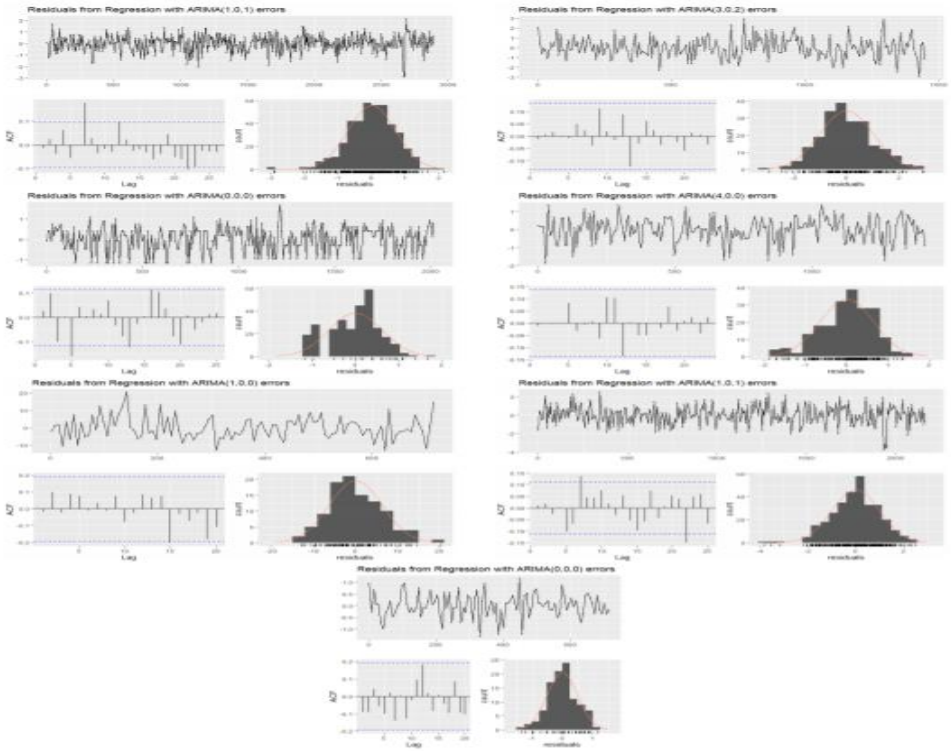
Interrupted Time Series Design

- First we extract crimes that occurred before and after construction
- Then an ARIMA model is fit to the data

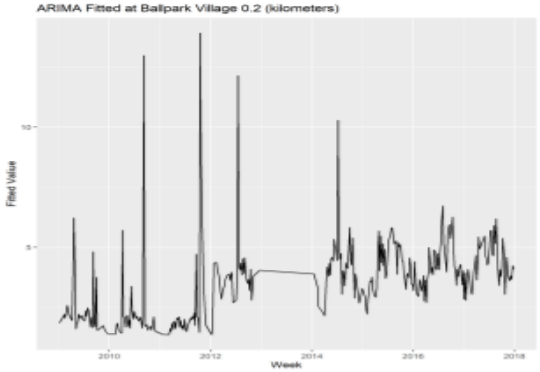
$$Y_t = \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \cdots + \phi_p Y_{t-p} + e_t + \theta_1 e_{t-1} + \theta_2 e_{t-2} + \cdots + \theta_q e_{t-q} + intervention$$

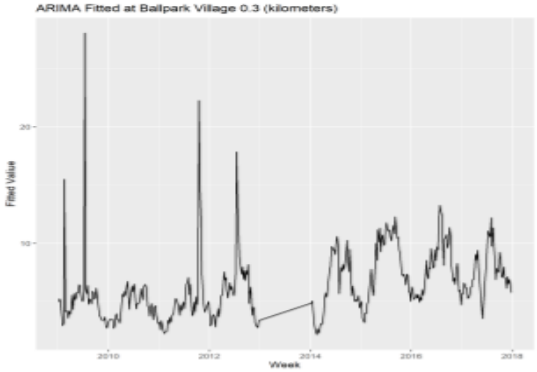
Results

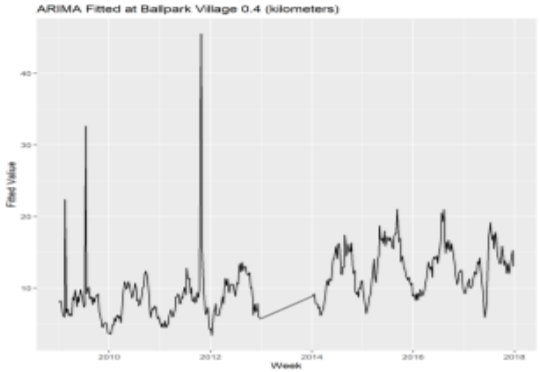
Residual Diagnostics

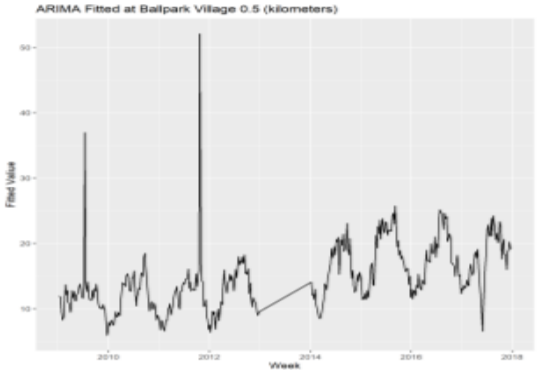


Ballpark Village

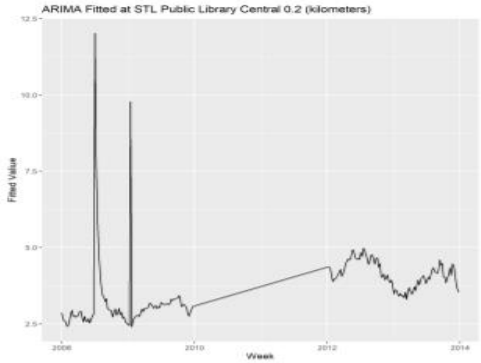


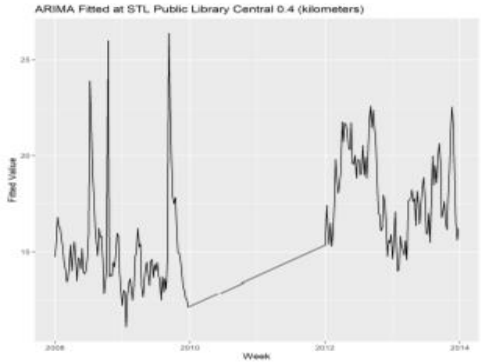




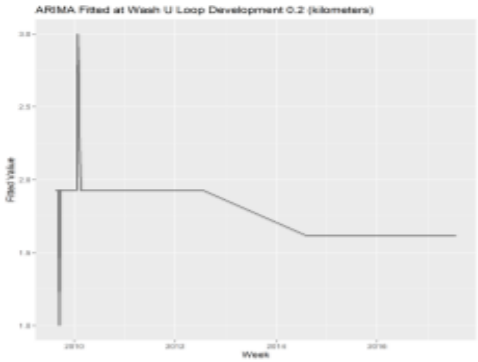


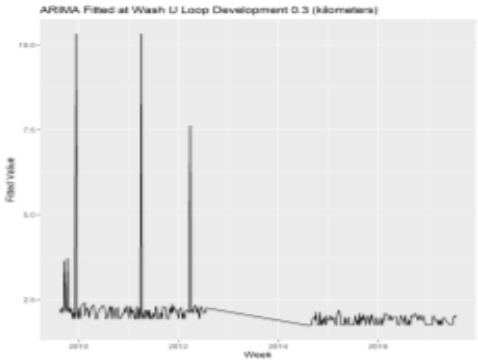
St. Louis Public Library Central

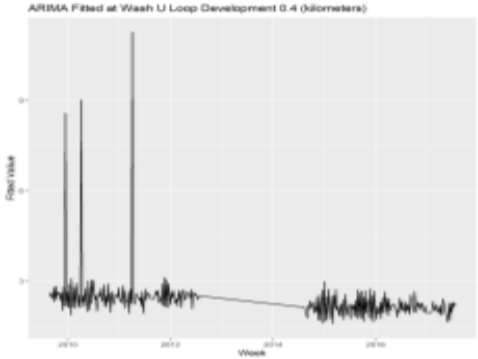


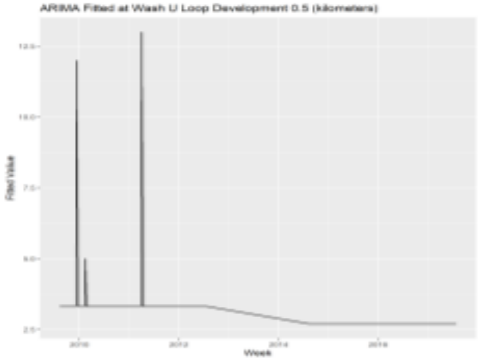


Washington University Loop Development

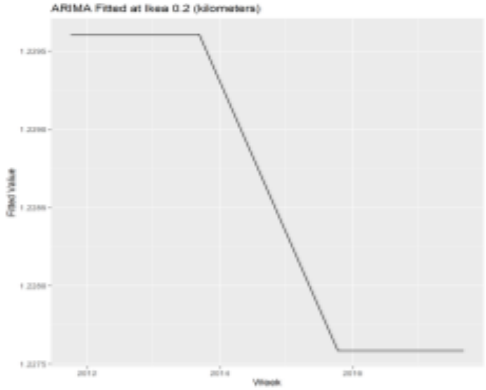


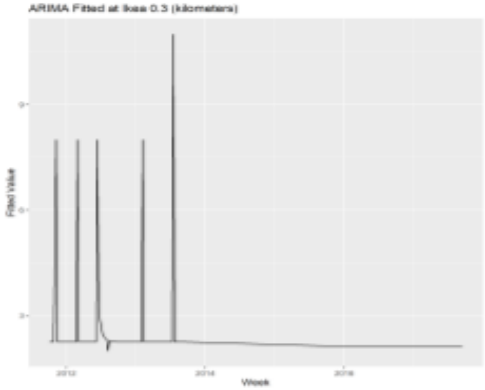


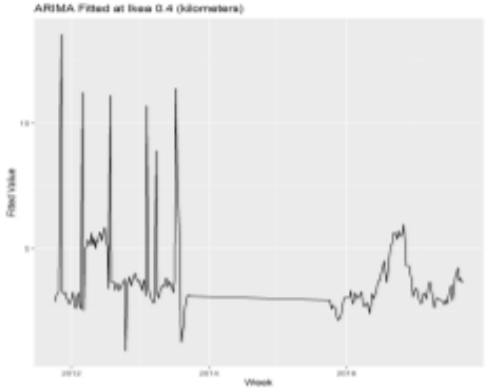


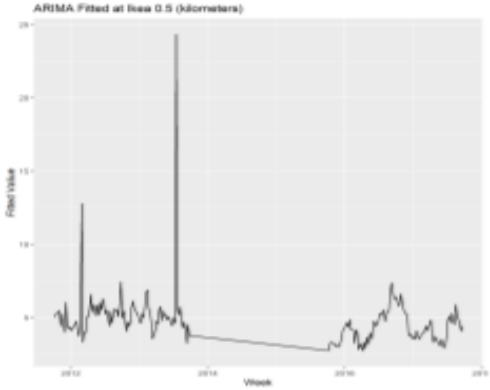


IKEA

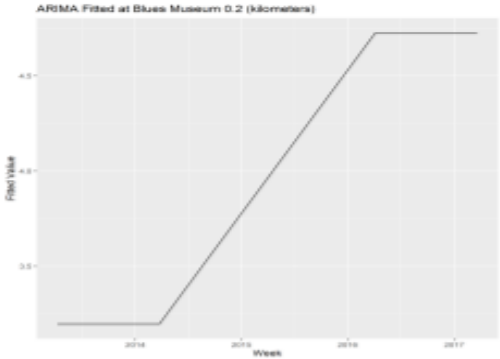

ARIMA Fitted at Ikea 0.2 (kilometers)
Fitted Value
Week

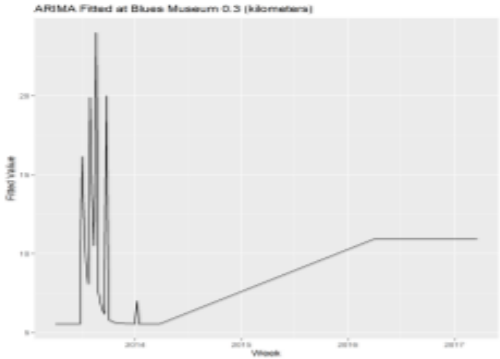

ARIMA Fitted at Ikea 0.3 (kilometers)
Fitted Value
Week

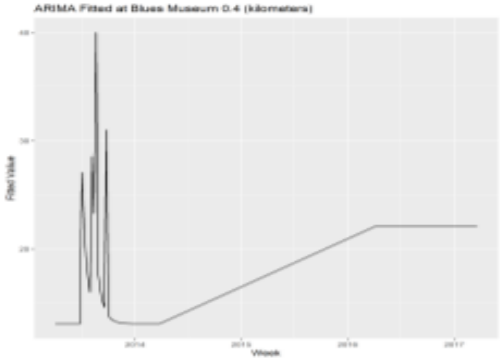

ARIMA Fitted at Ikea 0.4 (kilometers)
Fitted Value
Week

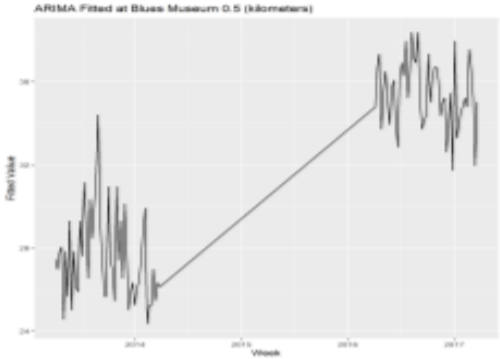

ARIMA Fitted at Ikea 0.5 (kilometers)
Fitted Value
Week

National Blues Museum

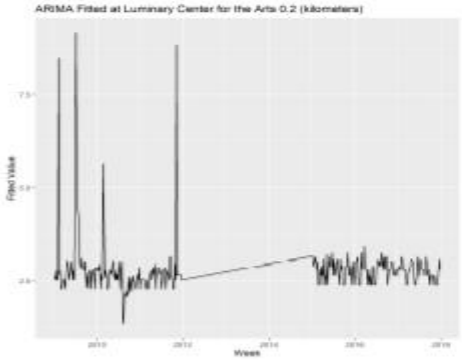


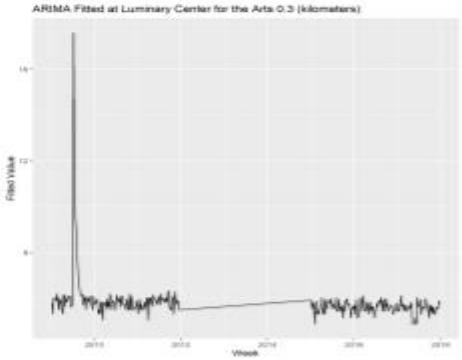


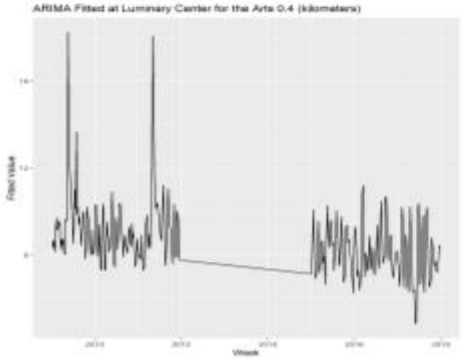


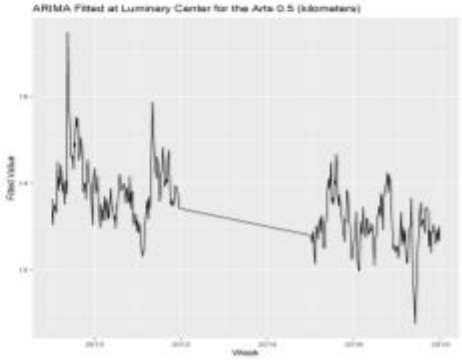


Luminary Center for the Arts

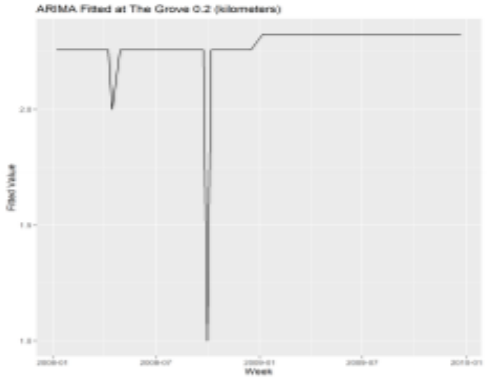


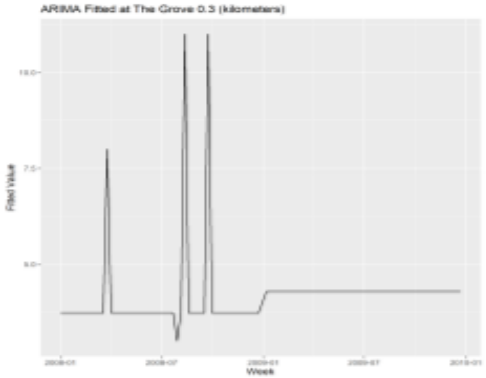


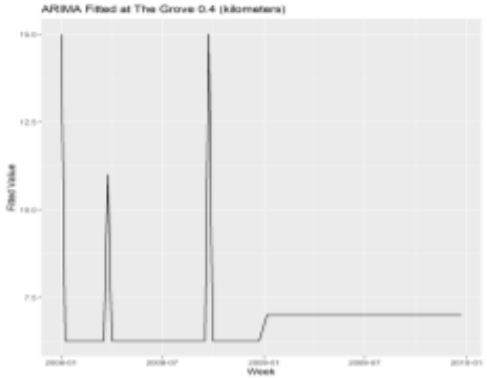


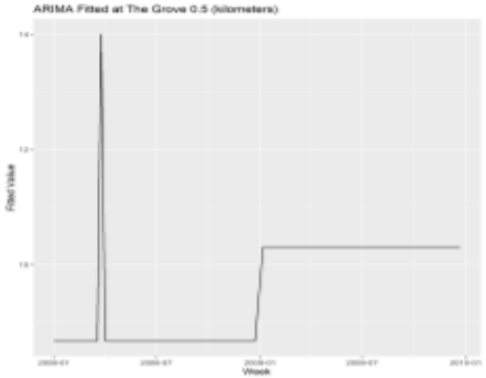


The Grove

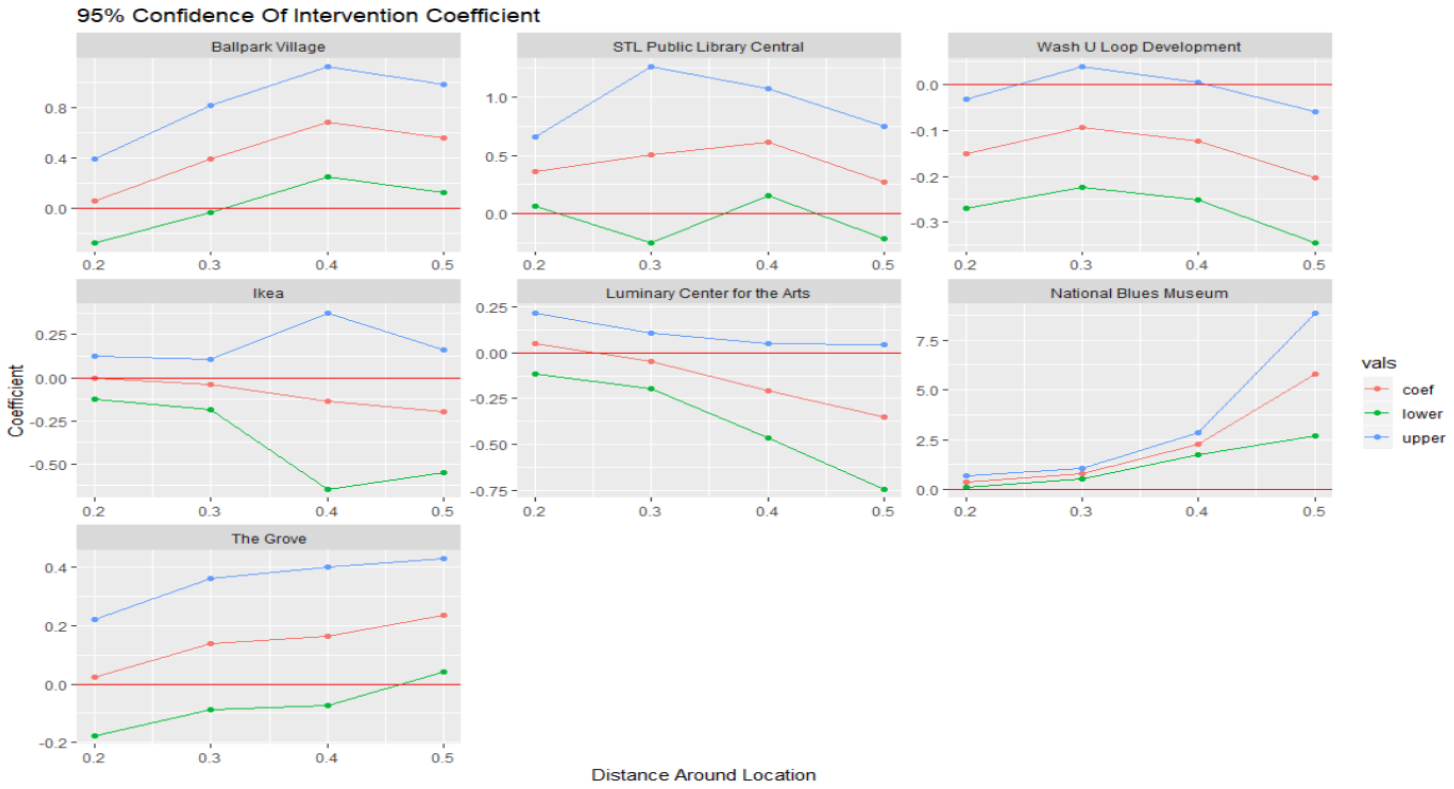

ARIMA Fitted at The Grove 0.2 (kilometers)
Fitted Value
Week


ARIMA Fitted at The Grove 0.3 (kilometers)
Fitted Value
Week


ARIMA Fitted at The Grove 0.4 (kilometers)
Fitted Value
Week


ARIMA Fitted at The Grove 0.5 (kilometers)
Fitted Value
Week

Analysis of Intervention Coefficient



Conclusions

- We find that overall crime rates (normalized for population) in St. Louis has decreased with time from the 2008 to 2018 time period.
- Thorough our analysis of interrupted time series measuring weekly crime rates in the area surrounding revitalization efforts in downtown St. Louis, we find that half of the locations in this research saw significant change at a 95% confidence level in reported crime.
- There are many possible explanations for this increase in crime that may or may not be a direct result of the redevelopment. However, as the city moves forward with plans of continuing redevelopment efforts, it will be important for investors and city leaders to understand these trends and the possible impact they may have on the community.