Tracking Federal Investments in Detroit, 1983-2006

FINAL PROJECT REPORT

In partnership with:

Data Driven Detroit
and
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Executive Summary

Federal investments are one of the most important inputs into a city's infrastructure and physical plant. How has federal funding changed over time across Detroit? How have these funding patterns shaped, and been shaped by, changes in Detroit's population and socioeconomic profile? We propose to collect, map, and analyze data on federal spending across Detroit over the last four decades. To analyze public investment patterns, we draw upon geographically detailed federal line-item spending data released under the Federal Assistance Award Data System (FAADS).

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This project collected, mapped, and analyzed data on federal spending across Detroit over the last four decades. To analyze public investment patterns, our data draw upon geographically detailed federal line-item spending data released under the Federal Assistance Award Data System (FAADS). The FAADS data, dating back to 1970, tracks all types of financial assistance awards made by Federal agencies, and reports the street address of each funded project.

We acquired, merged, and processed a vast set of project records from the FAADS system and compiled the data into a more user-friendly database in both comma separated value (CSV) text format and SQLite format. The database includes records of 8.1 million grants issued by the U.S. federal government totaling $13.6 trillion from 1983-2006. The database identifies the funding agency, purpose of the grant, and name and address of all recipients. The address information enables geographic mapping and trend analysis both within Detroit (down to the zip code level) and against other comparable regions and cities. Overall, we find stagnant levels of federal funds flowing into Detroit since the early 1990s. By contrast, federal funding has been steadily increasing in a set of comparison cities we examined, including Pittsburgh, Cleveland, Milwaukee, and Buffalo.

Overview

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This data enable us to study patterns of federal investment into Detroit, evaluate changes over time and by neighborhood, and also contrast Detroit's experience against trends in other comparable cities. For example, in the 1970s, the Small Business Administration (SBA) awarded several targeted grants to businesses within Detroit to fund ongoing infrastructure development. By 2009, the FAADS data reveal virtually no Detroit-based recipients of such SBA grants, reflecting the relative dearth of Detroit applicants for such federal funds.

Methods, Analysis, and Findings

Since the 1970s, all Federal agencies have been required to report all grants with details on the recipient identity and purpose of the grant. Systematic collection and digitization of these data reports began in the early 1980s. These data are now archived in the U.S. National Archives. However, the data are stored in a large series of separate files in an antiquated fixed-width data format that is not readily usable by researchers. Thus there is no easy way to compare temporal trends in federal grants using the data in its current form.

To overcome these limitations, our team acquired from the National Archives the complete record of all FAADS data from 1982 to 2006. The data were provided to us in 96 separate quarterly files. We reformatted the data, inserting variable fields and delimiters, and merged records across all data files to create a single master data file in comma-separated value (csv) format that can be read by all modern systems. To enable more sophisticated and efficient data extraction and linkage, we also created a SQLite version of the data (SQlite is a widely used open-source relational database management system.)

We encountered some significant issues as we worked with the data. We summarize some key cautions necessary for use of the data.

Substantive issues:

- FAADS data report the geographic location of the initial recipient. This may differ from the actual location of the funded project and of the primary beneficiaries.

- In some cases, the initial recipient listed in the data may be a pass-through entity that makes sub-awards to other local organizations. In these cases, we do not have the addresses of the final recipients of such awards. Instead, such awards are listed in the data as given to the pass-through entity.
- Many federal programs provide large block grants to states who then manage the allocation and selection of funded initiatives. When these block grants are targeted to state-level agencies, it is not possible to observe their final allocation or geographic incidence with the existing data. This is particularly evident with transportation and road construction grants which, for example, are received by the Michigan Department of Transportation in Lansing, MI and not by the individual local and regional agencies undertaking the work.
- Since FAADS is not an accounting system, caution must be exercised when summing funding totals across a large number of records or periods. For example, some grant records appear in duplicate in the source data. This is partly a result of differences in agency reporting practices, as well as differences in effective reporting dates or agency interpretations of definitions and requirements. Duplicate amounts may also appear when multiple agencies have shared responsibility for a grant and report the total amounts separately.
- Not all federal grants may be of relevance and interest to policy makers. For example, the FAADS data include records of all Pell Grant recipients. In some cases, each individual Pell Grant is reported separately, and in other cases, the records are aggregated totals. We have found that it is useful to exclude grants based on the "assistance_type" variable. Most Pell Grants fall under category 6. Most funding of interest for policy-makers is likely to be found in categories 2,3,4, and 5. Here is the coding scheme for the "assistance_type" variable:
    - 02 = block grant (A)
    - 03 = formula grant (A)
    - 04 = project grant (B)
    - 05 = cooperative agreement (B)
    - 06 = direct payment for specified use, as a subsidy or other non-reimbursable direct financial aid (C)
    - 07 = direct loan (E)
    - 08 = guaranteed/insured loan (F)
    - 09 = insurance (G)
    - 10 = direct payment with unrestricted use (retirement, pension, veterans benefits, etc.) (D)
    - 11 = other reimbursable, contingent, intangible, or indirect financial assistance
- Dollar amounts in the FAADS data are kept in their original format in current dollars and are **not inflation-adjusted**. Converting the values to constant (inflation-adjusted) dollars is simple by multiplying the current value by the preferred GDP deflator for that year. We used deflator values to convert to 2005 dollars from here: http://www.ers.usda.gov/data-products/international-macroeconomic-data-set.aspx

Technical issues:

- We have received reports that the spacing and delimiters in the text data are problematic. We believe this is because text encoding of large files are not consistently interpreted by different applications and different operating systems. In our internal testing on Mac and Windows using R, we did not encounter any issues.

Findings Regarding Detroit Trends:

On page 12, we plot the annualized federal funding trends in Detroit during 1983-2006, compared to four other Rust Belt cities: Buffalo, Cleveland, Milwaukee, and Pittsburgh. The dollar amounts shown on page 12 are expressed in constant 2005 US dollars.

We find that from the mid-1990s until 2006, the amount of grant federal funding received in Detroit remained fairly stagnant, generally fluctuating between $350 million to $500 million. This stagnant trend stands in sharp contrast to other Rust Belt cities, most of which experienced sharp increases during the same period. For example, Pittsburgh, which received approximately the same aggregate level of federal funding as Detroit during the mid-1990s, had risen to over $1 billion annually by the mid-2000s, exhibiting an increase of over 100% in federal funding. Buffalo, Cleveland, and Milwaukee generally exhibited smaller but significant increases during the same time period as well.

In the aggregate, our data illustrate the extent to which Detroit has fallen behind other comparable cities in terms of federal fiscal support during the past two decades. Moreover, our data can be used to identify the specific neighborhoods and recipients within Detroit that have experienced this decline most sharply. For example, page 10 breaks down the across-time trends in federal funding across various Detroit zip codes. These across-time trends show that zip code 48202, which contains midtown Detroit's Cultural Center Historic District, experienced some of the largest declines in federal funding in the city during the 2000-2006 period.

Recommendations for Data Use

The FAADS.csv file is 10.3 gigabytes (GB) and the FAADS.sqlite file is 11.0 GB and include all individual project records from the FAADS system from 1983-2006. Project records are organized to match the FAADS system variable list. A full codebook of the FAADS system is available online: http://www.census.gov/govs/faads/usrguide.txt

The FAADS.sqlite database file includes a single large table called "master". The 1982 files appear to be saved in a different fixed-width format and are not included in the SQLite database.

Our preferred application for working with the FAADS data is R, an open-source, freely available statistical package (http://cran.us.r-project.org). The example script below illustrates how to use R to easily extract project records matching specific conditions (in this case, all projects received in the 48226 zip code), summing the funding totals, and plotting the totals by year.

```
### EXAMPLE R CODE
```

```
### QUERY SQLITE FILE TO EXTRACT RECORDS FROM ONE ZIPCODE IN DETROIT
### Requires the following R libraries: sqldf, plyr, ggplot2

rm(list = ls(all = TRUE))
# Set working directory
setwd("~/FAADS_data/")


#Function to create date variables identifying year and quarter of data
gen_date = function(dat){
    dat$date = dat$filename
    dat$date = gsub('FAAY80', '1980', dat$date)
    dat$date = gsub('FAAY81', '1981', dat$date)
    dat$date = gsub('FAAY82', '1982', dat$date)
    dat$date = gsub('FAAY83', '1983', dat$date)
    dat$date = gsub('FAAY84', '1984', dat$date)
    dat$date = gsub('FAAY85', '1985', dat$date)
    dat$date = gsub('FAAY86', '1986', dat$date)
    dat$date = gsub('FAAY87', '1987', dat$date)
    dat$date = gsub('FAAY88', '1988', dat$date)
    dat$date = gsub('FAAY89', '1989', dat$date)
    dat$date = gsub('FAAY90', '1990', dat$date)
    dat$date = gsub('FAAY91', '1991', dat$date)
    dat$date = gsub('FAAY92', '1992', dat$date)
    dat$date = gsub('FAAY93', '1993', dat$date)
    dat$date = gsub('FAAY94', '1994', dat$date)
    dat$date = gsub('FAAY95', '1995', dat$date)
    dat$date = gsub('FAAY96', '1996', dat$date)
    dat$date = gsub('FAAY97', '1997', dat$date)
    dat$date = gsub('FAAY98', '1998', dat$date)
    dat$date = gsub('FAAY99', '1999', dat$date)
    dat$date = gsub('FAAY00', '2000', dat$date)
    dat$date = gsub('FAAY01', '2001', dat$date)
    dat$date = gsub('FAAY02', '2002', dat$date)
    dat$date = gsub('FAAY03', '2003', dat$date)
    dat$date = gsub('FAAY04', '2004', dat$date)
    dat$date = gsub('FAAY05', '2005', dat$date)
    dat$date = gsub('FAAY06', '2006', dat$date)
    dat$date = gsub('Q1', '-01-01', dat$date)
    dat$date = gsub('Q2', '-04-01', dat$date)
    dat$date = gsub('Q3', '-07-01', dat$date)
    dat$date = gsub('Q4', '-10-01', dat$date)
    dat$date = gsub('\\.ASC', '', dat$date)
    dat$quarter = gsub('.*Q1', '1', dat$filename)
    dat$quarter = gsub('.*Q2', '2', dat$quarter)
    dat$quarter = gsub('.*Q3', '3', dat$quarter)
    dat$quarter = gsub('.*Q4', '4', dat$quarter)
    dat$quarter = gsub('\\.ASC', '', dat$quarter)
    return(dat)
}

# Extract data and generate date variable
library(sqldf)

## EXAMPLE OF HOW TO EXTRACT ALL DATA RECORDS FROM ONE ZIPCODE
extract = sqldf("SELECT * FROM master WHERE recipient_zipcode==48226",
dbname='FAADS.sqlite')

# Generate date variable from filename (see gen_date function above)
dat = gen_date(extract)

# Sum of quarterly total_funding_amount for each project in a given zipcode
library(plyr)
library(ggplot2)
dat_plot = ddply(dat, 'date', function(i) sum(i$total_funding_amount))
dat_plot$date = as.Date(dat_plot$date)

# Plot results
p = ggplot(dat_plot, aes(date, V1)) + geom_line() +
    xlab('') + ylab('Sum of Total funding amount across all projects')
```

```
ggsave(p = file='48226.jpg', width=12, height=6)

### END OF CODE
```

If you do a lot of similar queries (e.g. subsample by zipcode), it will be much faster if you build an index on the variable of interest in the sqlite database. The code below provides an example of how to create an index on the recipient_zipcode variable.

```
### COMPILE QUARTERLY DATA FILES INTO A SINGLE LARGE DATABASE AND THEN CREATE INDEX
library(sqldf)
unlink('FAADS.sqlite')

# Create a new SQLite database
sqldf("attach 'FAADS.sqlite' as new")

# Insert data from RData files into master SQLite table
fl = list.files('.')
fl = fl[!fl %in% c('FAAY82Q1.RData', 'FAAY82Q2.RData', 'FAAY82Q3.RData',
'FAAY82Q4.RData', 'FAAY83Q1', 'FAADS.sqlite')]
load('FAAY83Q1.RData')
sqldf("CREATE TABLE master AS SELECT * FROM faad", dbname = "FAADS.sqlite")
for(i in fl){
    print(paste('Read: ', i))
    load(i)
    print(paste('Write: ', i))
    sqldf(paste("INSERT INTO master SELECT * FROM faad"), dbname = "FAADS.sqlite")
}

sqldf("CREATE INDEX idx_zipcode ON master (recipient_zipcode)", dbname="FAADS.sqlite")

### END OF CODE
```

Policy Options for Decision Makers

The FAADS data enable powerful visualizations of federal investments into Detroit.

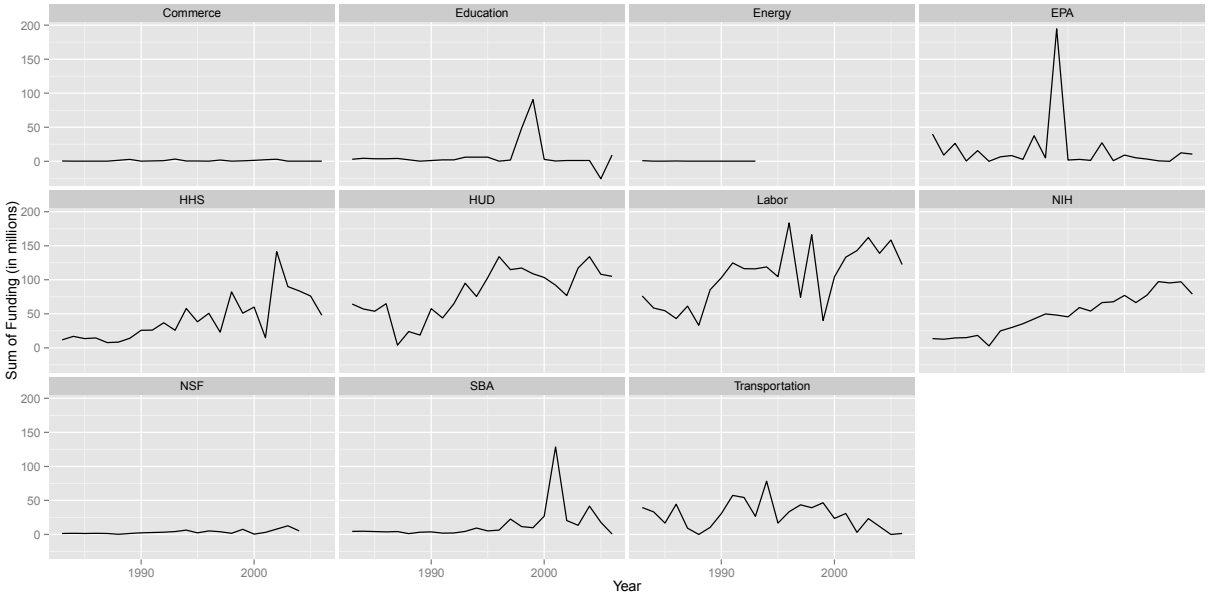
For example, aggregating project records by zip code and funding agency, we can create annual maps of spending on public works (transportation and infrastructure) projects down to the zip code level. These maps will reveal the geography of federal funding across Detroit and show how funding levels have changed across its neighborhoods over time. These trends can be studied and disaggregated by zipcode, by recipient, by project type. In addition, comparisons can be made with other cities to see how Detroit has fared relative to other regions.

The figures below provide summary plots of several comparisons from the data. Several questions emerge and provide grist for future study by decision makers and policy analysts.

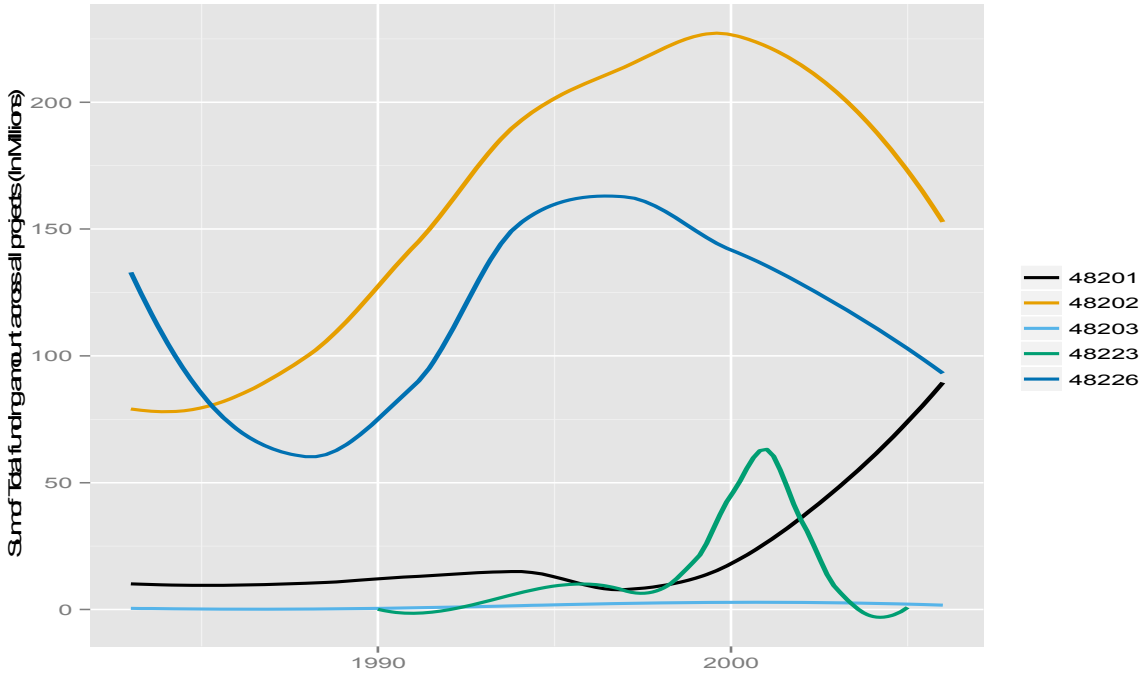
- Why have some cities similar to Detroit and struggling with similar economic and demographic changes to Detroit nevertheless been able to maintain high levels of federal investments? For example, Pittsburgh and Cleveland have both succeeded in attracting growing levels of federal projects in recent years, while Detroit has stayed at a similar level for much of the last two decades.
- One promising opportunity for analysis would be to overlay the zip-code level federal funding data against other geographic information, including demographic, housing, and business indicators. For example, do declines in a neighborhood's economic base generally precede declines in federal public investment or are demographic changes accelerated by declines in federal funding? When does increasing neighborhood poverty stimulate public investment and when does it deter public investment?
- Another future avenue for analysis is to track the specific local organizations that lost federal funding during the past two decades. Did these recipients find alternative sources of funding for their operations, or did they simply decrease or cease operations? Moreover, it would be equally worthwhile to analyze the organizations that succeeded in procuring new funding during the same time period. Did such organizations succeed in obtaining federal funding with the assistance of local or state-level political efforts in their behalf?

In the figures below, all values are in 2005 constant dollars and exclude assistance_type=6 grants (direct payments to individuals for specified uses like Pell Grants, Perkins Loans, Federal Work Study grants, Lower Income housing assistance grants, etc).

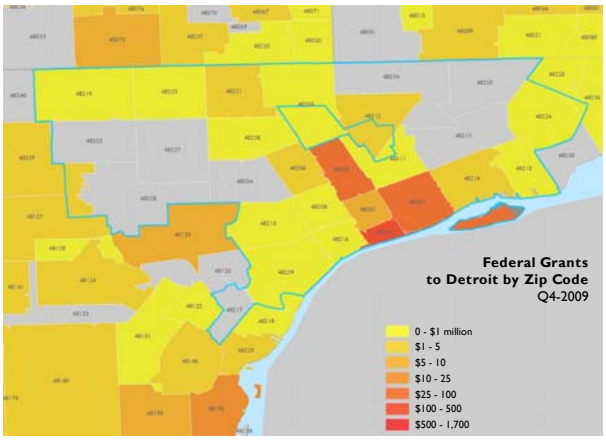
All Grants by Funding Agency into Detroit-area zip codes, 1983-2006

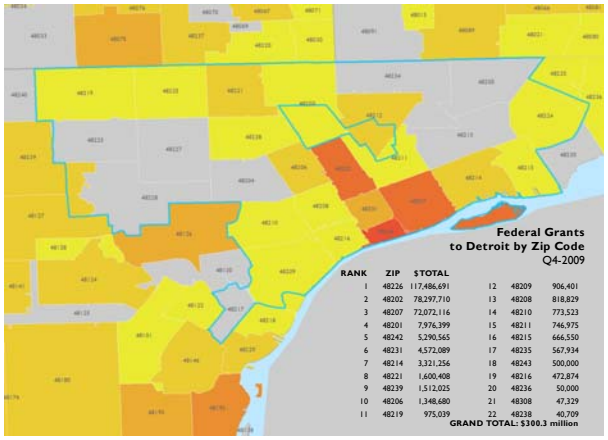


Total Federal Funding to Selected Detroit Zip Codes, 1983-2006 (constant 2005 dollars)

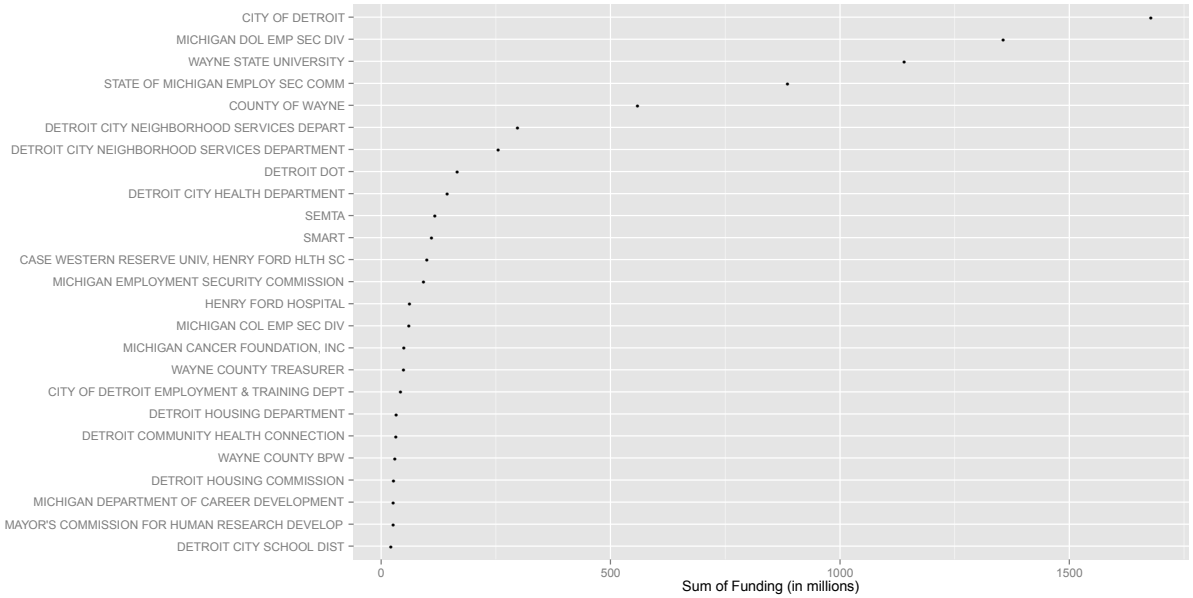


Mapping Federal Funds to Detroit Zip Codes, 4th Quarter 2009

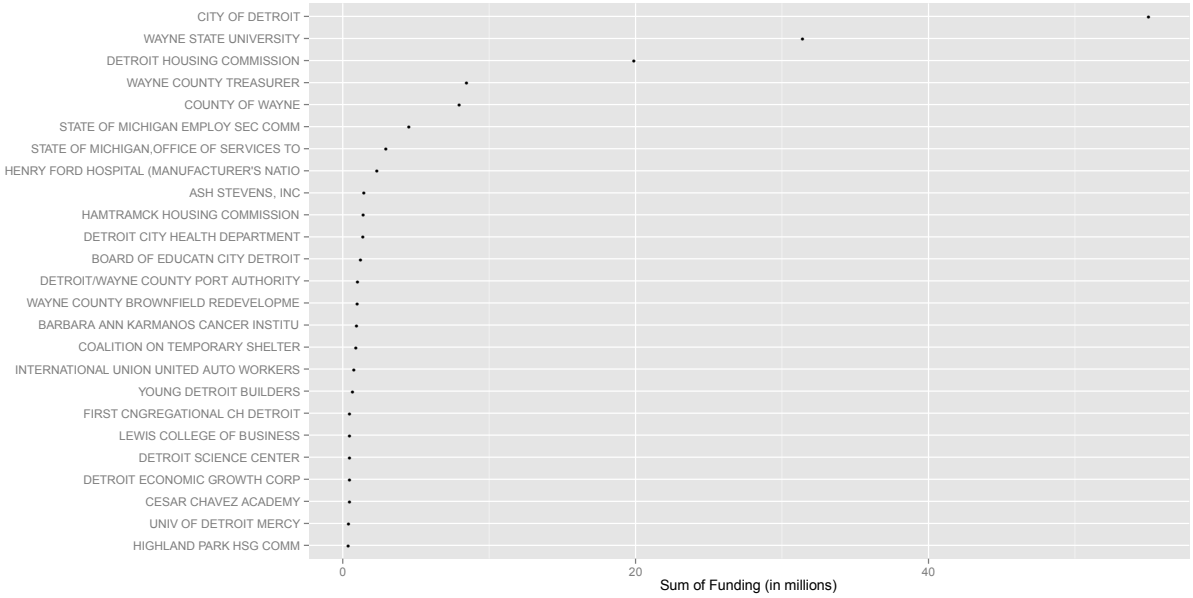




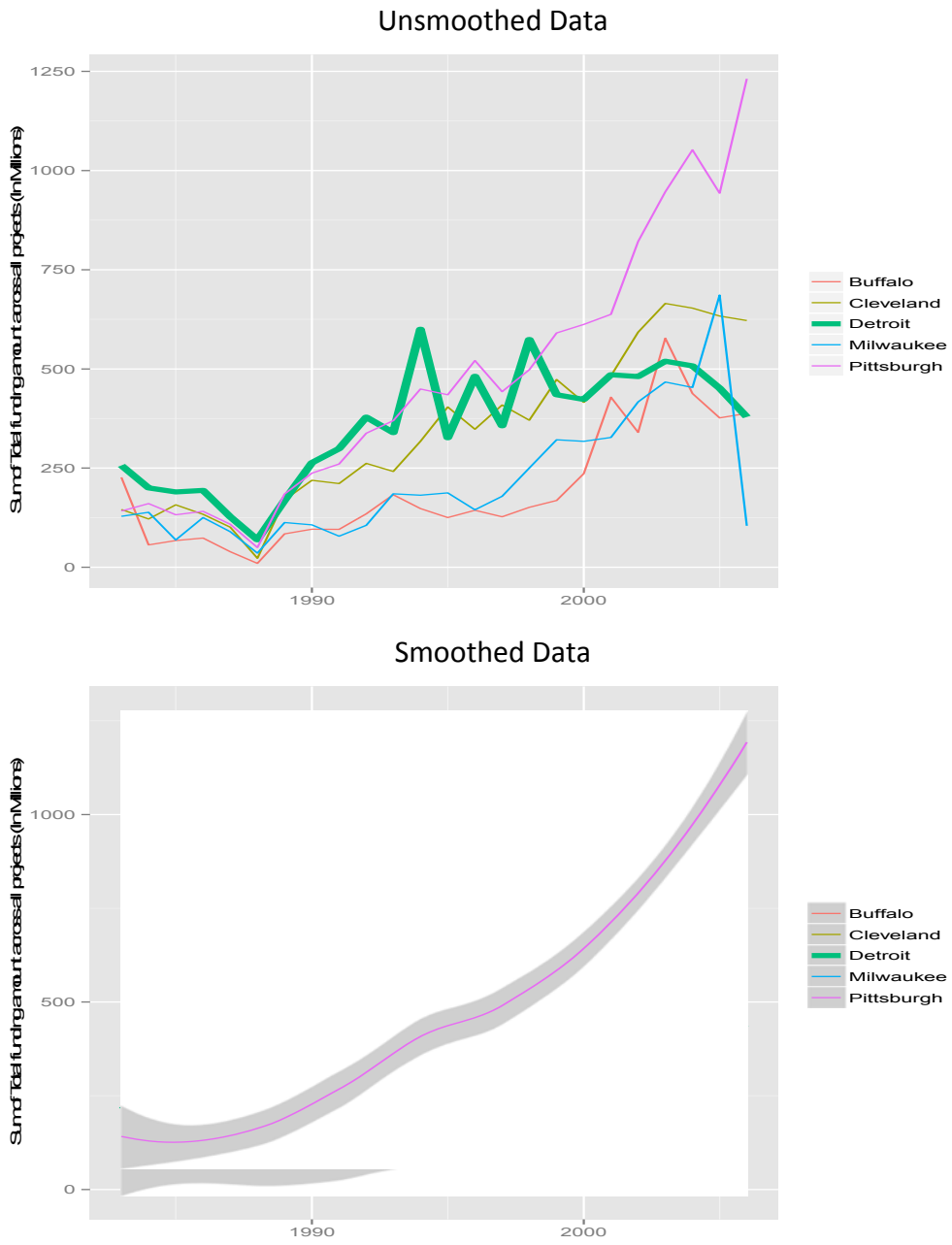
Top 25 Federal Funding Recipients in Detroit, Cumulative Total 1983-2006 (2005 dollars)



Top 25 Federal Funding Recipients in Detroit, 4th Quarter-2006 (2005 dollars)



Total Federal Funding to Detroit and Comparison Cities, 1983-2006 (constant 2005 dollars)



Trends in NIH and DoT Funding to Detroit and Comparison Cities,
1983-2006 (constant 2005 dollars)