

# HOW IS THE NEW YORK CITY'S GOVERNMENT USING MONEY?

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## Introduction

Since New York City made its data publically available for every citizen, many data enthusiasts have been studying NYC Open Data to understand how the city is operating. Insights obtained from the data, whether showing positive or negative results, were embraced by government agencies to improve their operation. The NYC legislators' goal is to increase governmental efficiency and transparency, and they are willing to work with the people of the city.

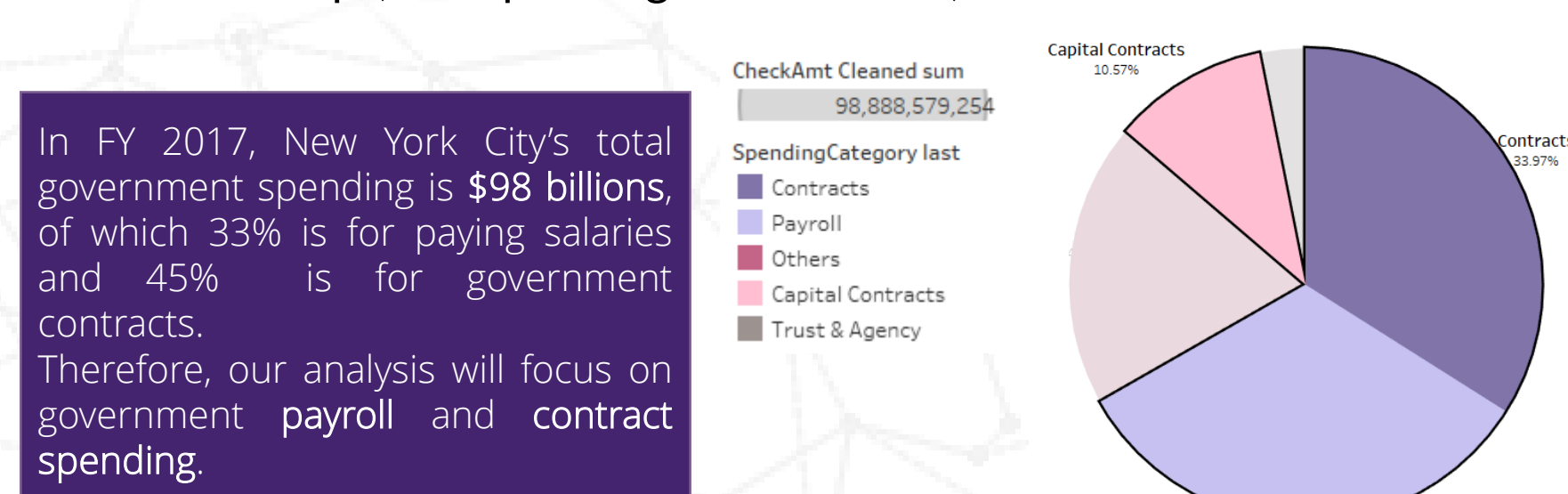
As a current NYC resident, Mr. Digits also wants to find valuable insights from the data to consult his government. Being data enthusiasts, we would like to help Mr. Digits analyze the data to answer the question "How is the NYC's government using money?"

## Data Preparation

We used SPSS to merge 3 contract .csv files and 3 .csv spending files.

The contract data has 2,285,966 cases, with each case representing a government contract, including Contract ID, Prime Vendor, MWBE category, Agency, Contract Amount, Registration Date, and so forth... We cleaned contracts that have a current amount of \$0 and a spend-to-date amount of \$0. Then we aggregated duplicated cases with the same Contract ID and Prime Vendor into a single case by summing contract amount. The final data contains 2,154,093 cases, which were contracts registered from fiscal year 1981 to 2018.

The spending data contains 2,860,322 cases describing government spending in fiscal year 2017. We cleaned cases that have a negative check amount. We also aggregated cases related to government contracts by Contract ID. Cases related to payroll have no Contract ID. After these steps, the spending data has 645,077 cases left.



## Research Questions

- How is NYC's government payroll allocated?
- How do Minority and Women Business Enterprises (MWBE) participate in contracts with the government?
- How does the economy affect NYC's government's spending decisions?
- How does contract spending affect government agencies' performance?

## Conclusions

- Payroll**
  - Payrolls and average salaries by boroughs and agencies can be studied from the spending dataset.
  - Government employees' salary are highest in Manhattan and lowest in Bronx.
  - Agencies relating to public safety pay the highest salary.
- WMBE**
  - NYC's government failed to meet the MWBE participation goals.
  - As the value increases, there are fewer government contracts with MWBEs.
  - The government needs to change policies in order to meet the designed goals for MWBE participation.
- Economy**
  - Amount the government spends on contracts and Gross City Product are statistically related.
- Performance**
  - Statistically, total government contract spending will positively affect changes in percentage of KPIs. However, the relationship between government contract spending and agency performance is not always statistically significant for some specific agencies.

## Tools Used

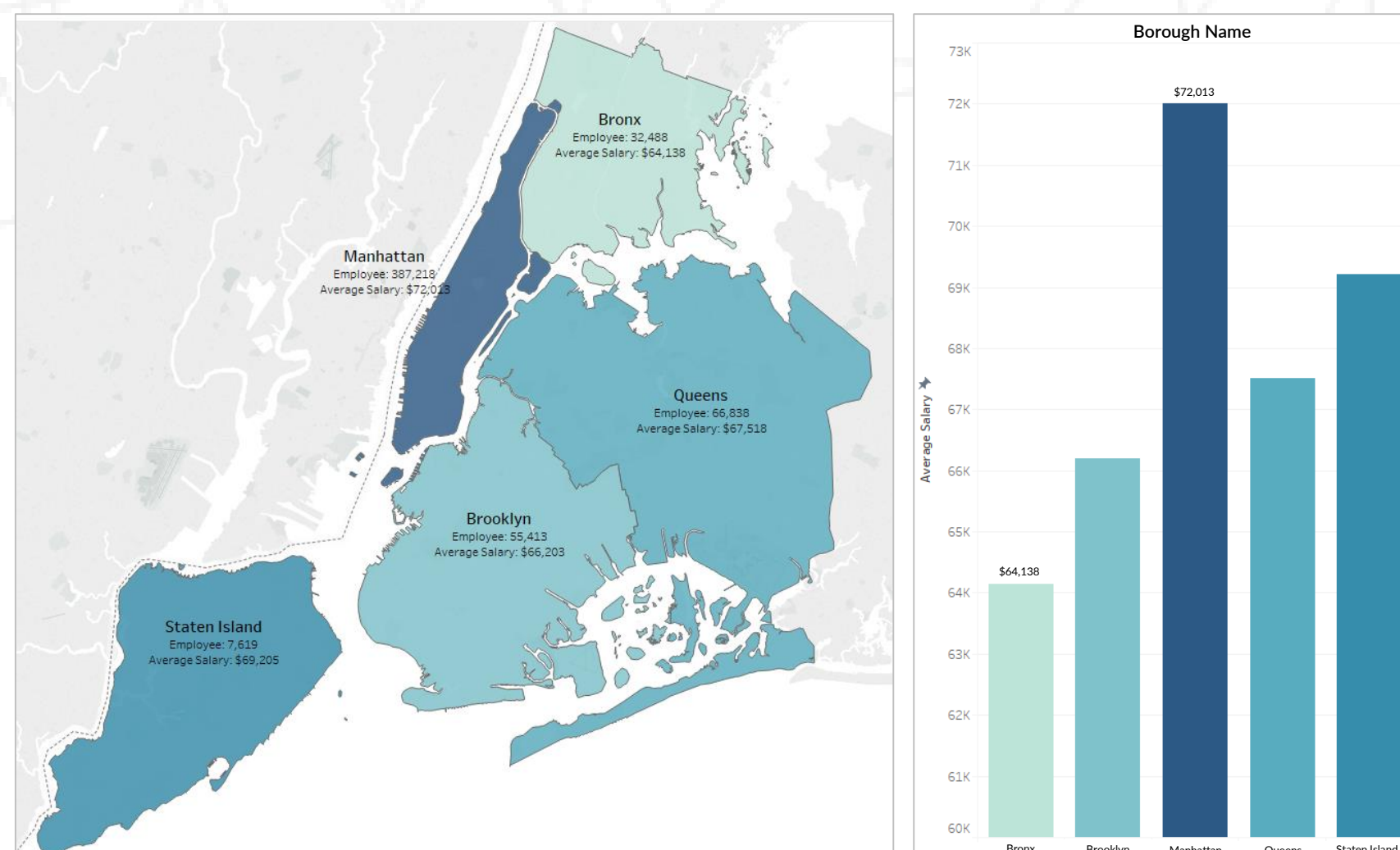


## Data Analysis

### 1 How is NYC's government payroll allocated?

From spending data, we know the total amount each government agency spent on payroll. In addition, we obtain the number of employees of each agency from City Wide Pay Roll data on NYC Open Data website. Based on these statistics, we calculated the average payroll of each agency and borough.

In 2017, average salary by boroughs ranged from \$64K to \$72K. Manhattan had the highest number of employees working for the government, and paid the highest average salary, with \$72K per capita. At the 2nd place was Staten Island, but only 7,619 government employees were working here. Bronx paid the lowest average amount, with \$64K per capita.

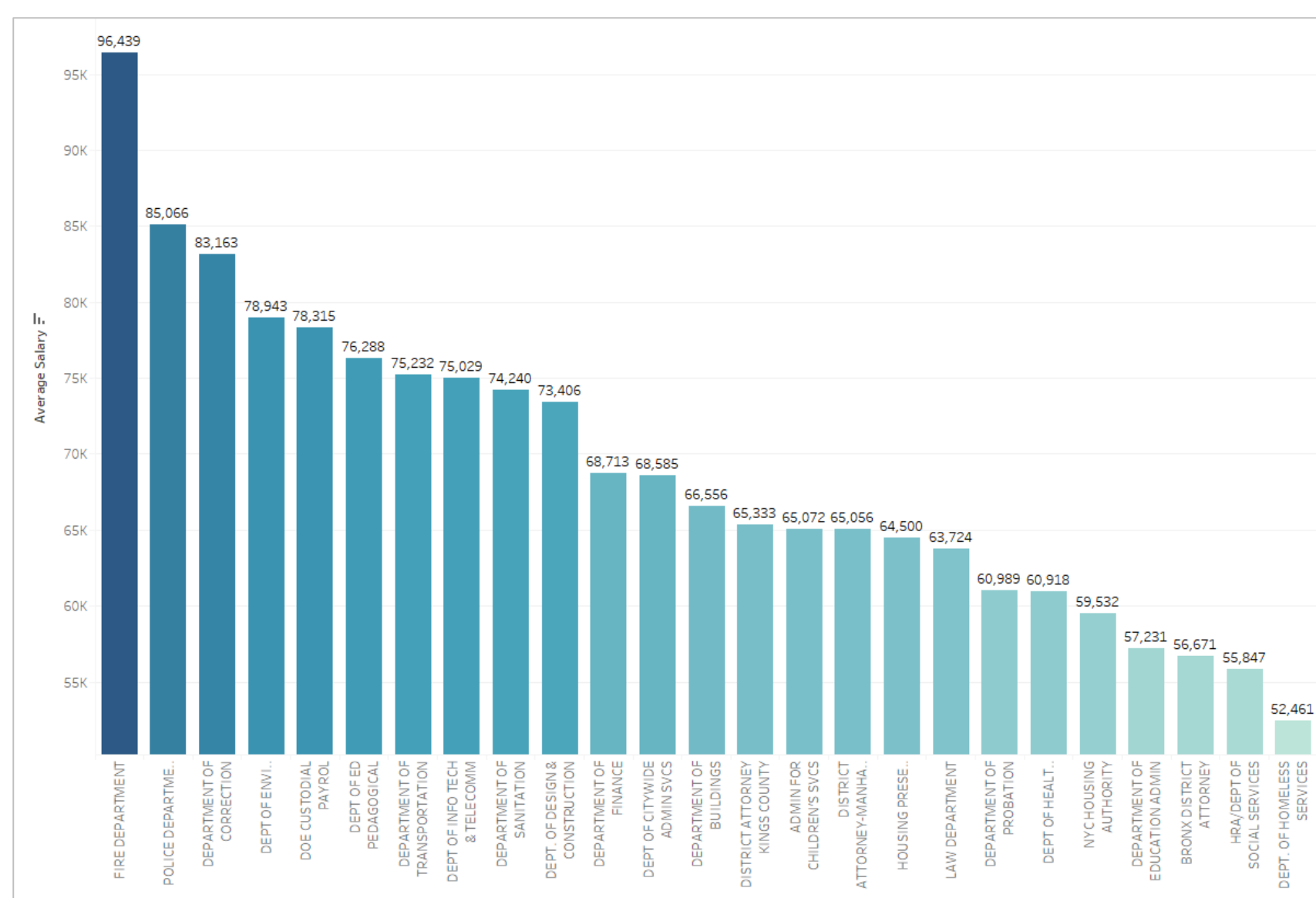


Average Salary by Boroughs (Source: NYC Spending Data, City Wide Pay Roll)

The U.S. Census Bureau's American Community Survey has mapped NYC's three-year estimate incomes ending in 2012 and 2009 by neighborhood, which shows the highest income in Manhattan and the lowest income in Bronx (WNYC, 2016).

The City Wide Payroll data shows details about the salary paid to each employee. There are 155 agencies listed in the data. Department of Education has the most employees, with more than 265 thousands people. Bronx Community Board #3 paid the highest average salary, but it had only two employees. Employees paid on an hourly basis were also included in the data.

To get an objective and accurate result, we only calculated the average annual basis salary of agencies that had more than 1,000 employees.



Top 25 Agencies (with > 1,000 employees) by Average Salary (Source: NYC Spending Data, City Wide Pay Roll)

### 2 How do Minority and Women-owned Business Enterprises (MWBE) participate in contracts with the government?

MWBE participation in government contracts vs. NYC goals

MWBE Category	2015	2016	2017	Goal
Black American	0.29%	0.31%	0.36%	12%
Asian American	2.19%	2.05%	2.52%	3%
Hispanic	0.99%	0.40%	0.66%	6%
Women	1.24%	2.25%	1.40%	10%
Individual	6.93%	6.95%	5.79%	
Non-M/WBE	88.36%	88.04%	89.27%	

(Source: NYC contract data, Citywide M/WBE Goals)

Only the participation of Asian American almost met the goals. The goal for the Black American MBE participation was the highest, and their participation slightly increased in recent years, however, they had the lowest ratio compared to other MWBEs.

The participation of minority-owned business enterprises (MBEs) and women-owned business enterprises (WBEs) in government contracts in 2015, 2016 and 2017 was very low. The government failed to meet the MWBE participation goals.

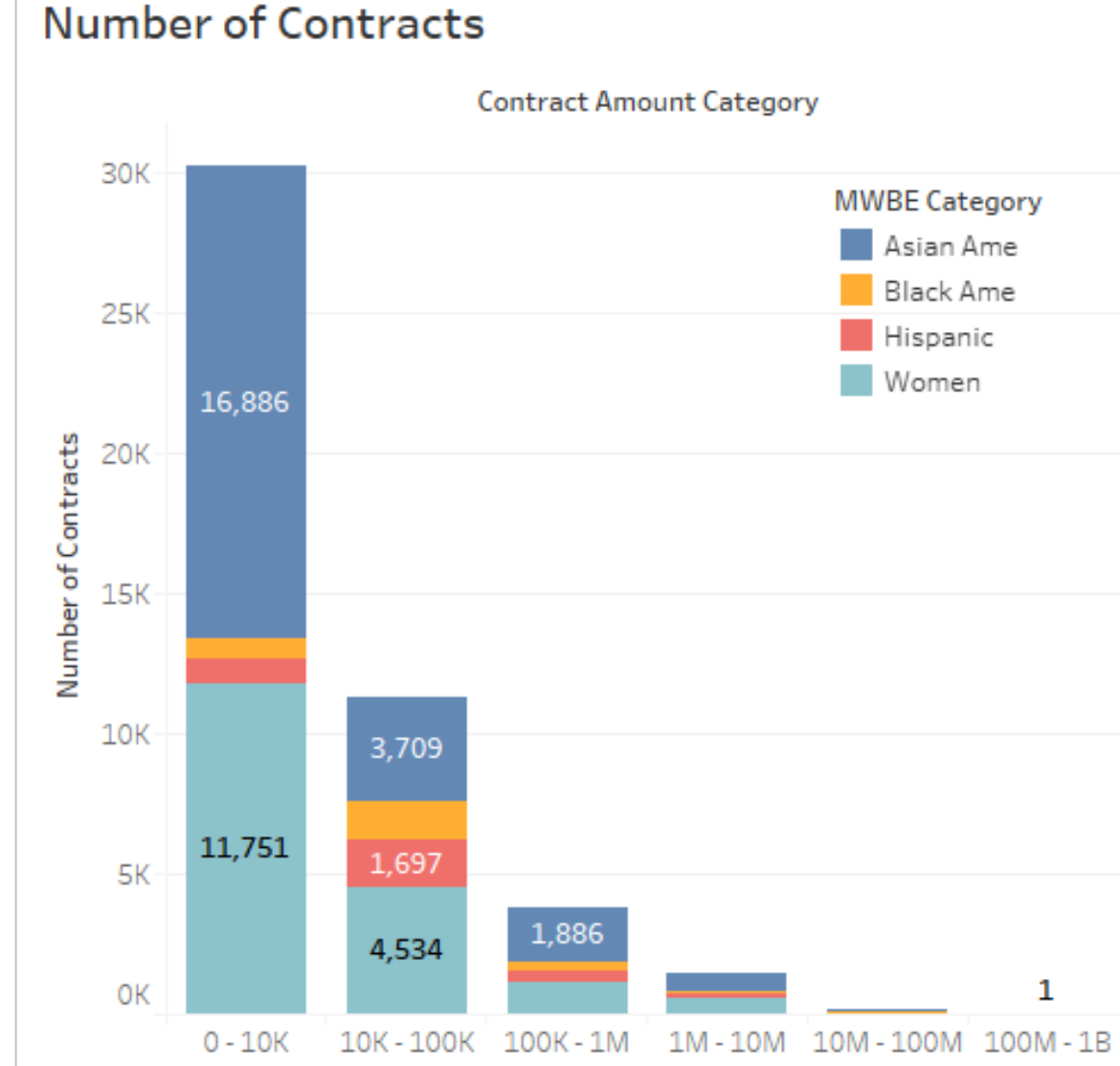
Asian American-owned business enterprises had the most contracts with the NYC government. The value of all of the contracts totaled together was also the highest. From 1981 - 2017, there is only one MWBE contract with a value larger than \$100 million, and it is from an Hispanic vendor.

Most of the MWBE contracts had values less than \$10K, but most of the value came from contracts that had a value between \$1 million and \$10 million. As the value increases, there are fewer government contracts with an WMBE.

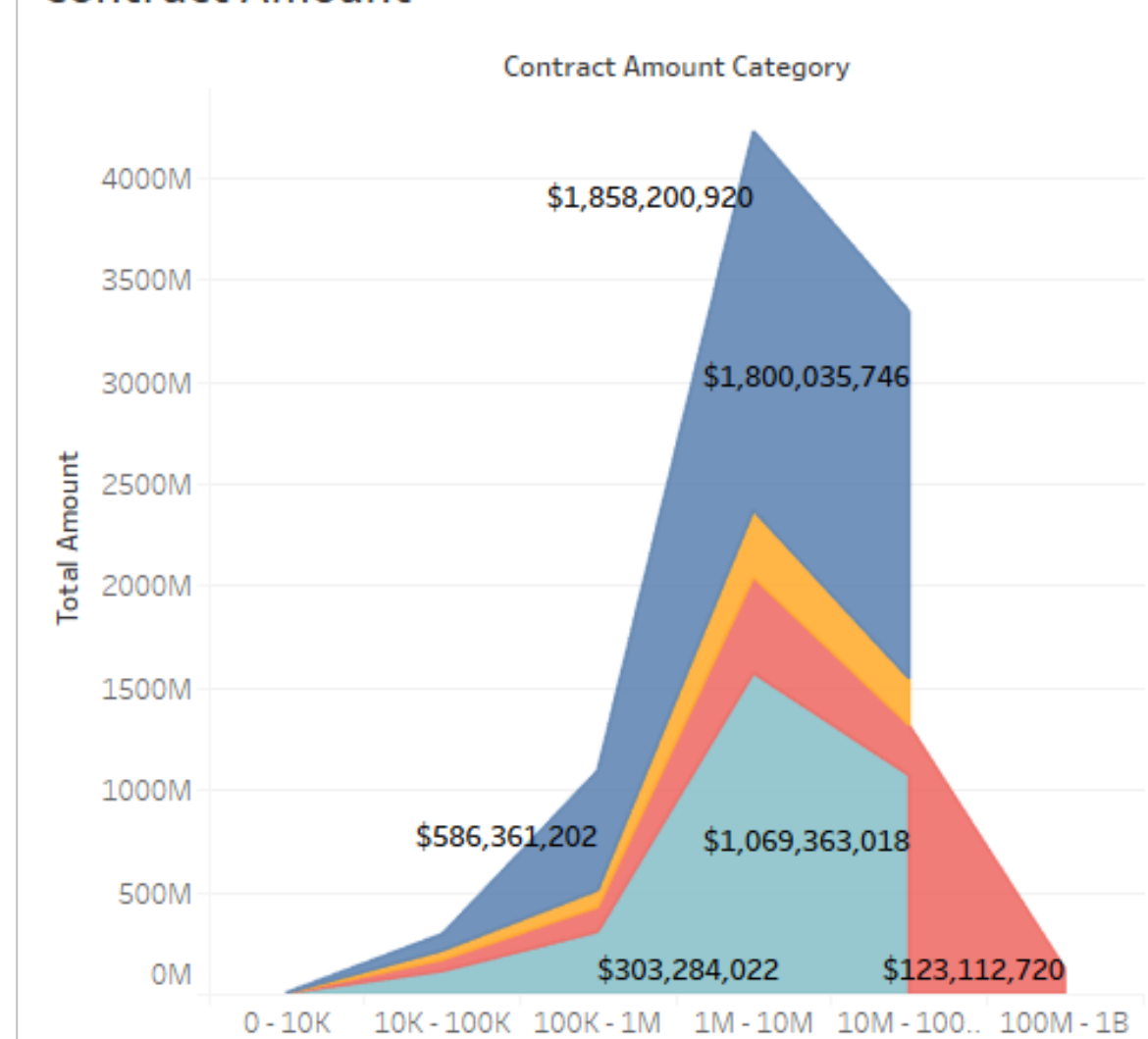
The goals were set corresponding to the availability of MBEs or WBEs, however, the real ratio of MWBE participation is far from meeting these goals. The data analysis conducted by the government might not be accurate, or the government's effort to meet these goals was not enough. In 2018, NYC's government should adjust the goals or change policies so that MWBEs can have a better chance to work with the government.

MWBE were enrolled with majority of small projects due to regulation constraints from the government, which leads to NYC's guardian action toward Albany for legislation change to support minority contracting (Murphy, 2017).

Number of Contracts



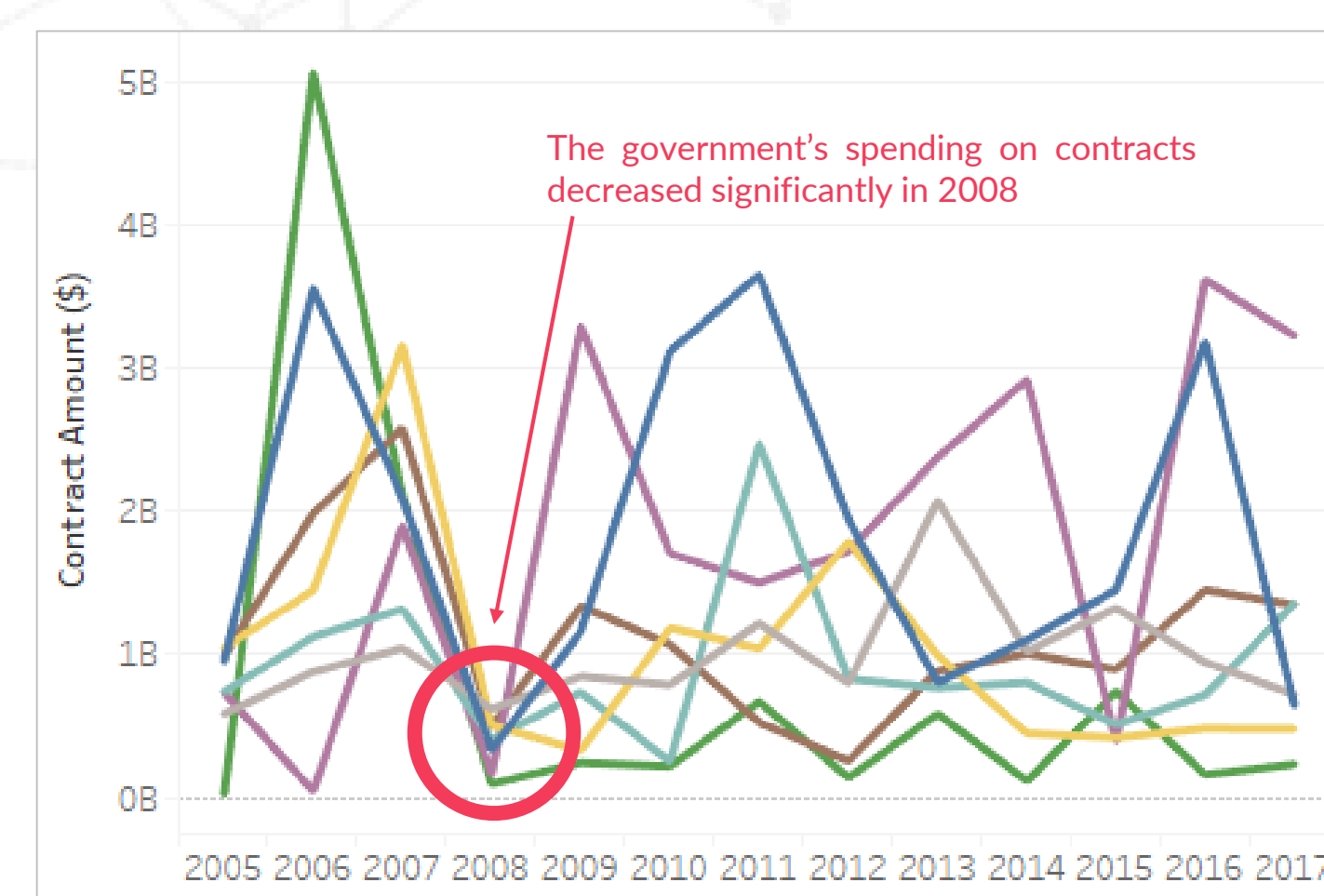
Contract Amount



Contract Amount by MWBE Participation (Source: NYC Contract Data)

### 3 How does the economy affect NYC's government's spending decisions?

After observing the changes in total contract spending by top spending agencies since 2000, we noticed that in 2008, the year of the Great Recession, the amount agencies spent on contracts dropped tremendously. This finding suggested a relationship between NYC's economy and the government's spending on contracts.



Agencies' Contract Spending (2005 - 2017) (Source: NYC Contract Data)



Government Contract Spending and NY GDP (2000 - 2016) (Source: NYC Contract Data, NYC Quarterly Economic Update)

### 4 How does contract spending affect government agencies' performance?

#### Hypothesis

Increases in budget spending of NYC's government agencies will improve their performance.

**Step 1** Analysis on total contract values of agencies from 2013 - 2017

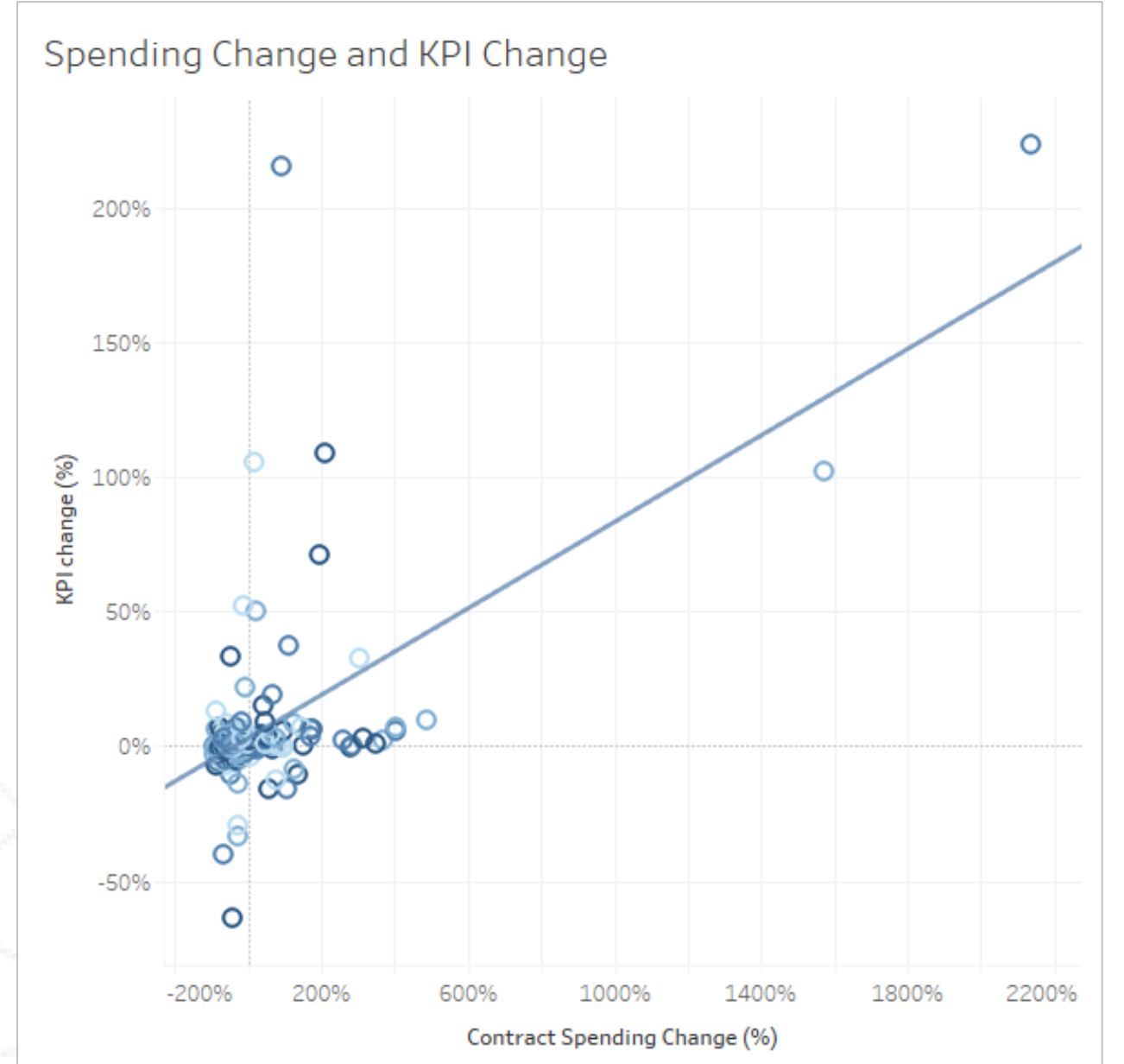
We randomly picked 6 agencies to see the relationship between spending and performance.

**Step 2** Regression

Regression analyses were run with a view to determine whether or not government contract spending has a quantitative effect on government agencies' performance.

Analyses and trends were studied on 40 other agencies to support our hypothesis and gain more insights to the impact.

Coefficients Term	Value	Std Err	t-value	p-value
Contr Spending Change	0.0802716	0.0096165	8.34727	< 0.0001
intercept	0.0291832	0.02592	1.1259	0.262456

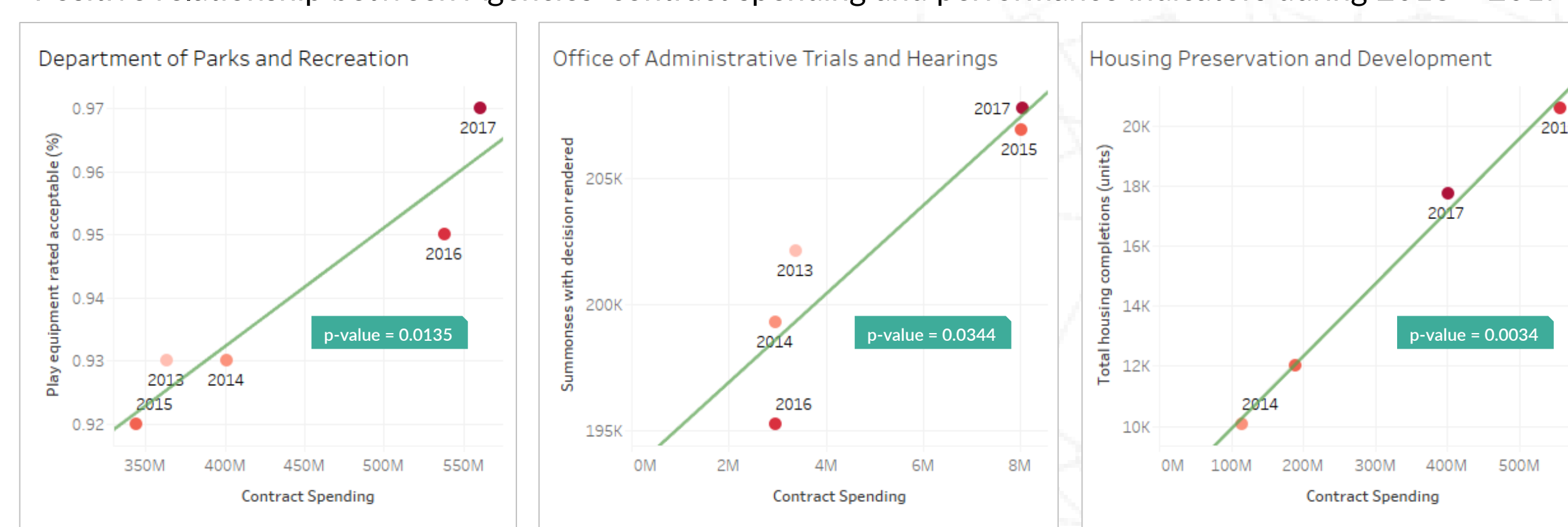


Observations: 122  
DF: 2  
SSE: 9.35805  
MSE: 0.07798  
R-Squared: 0.36735  
P-value: < 0.0001

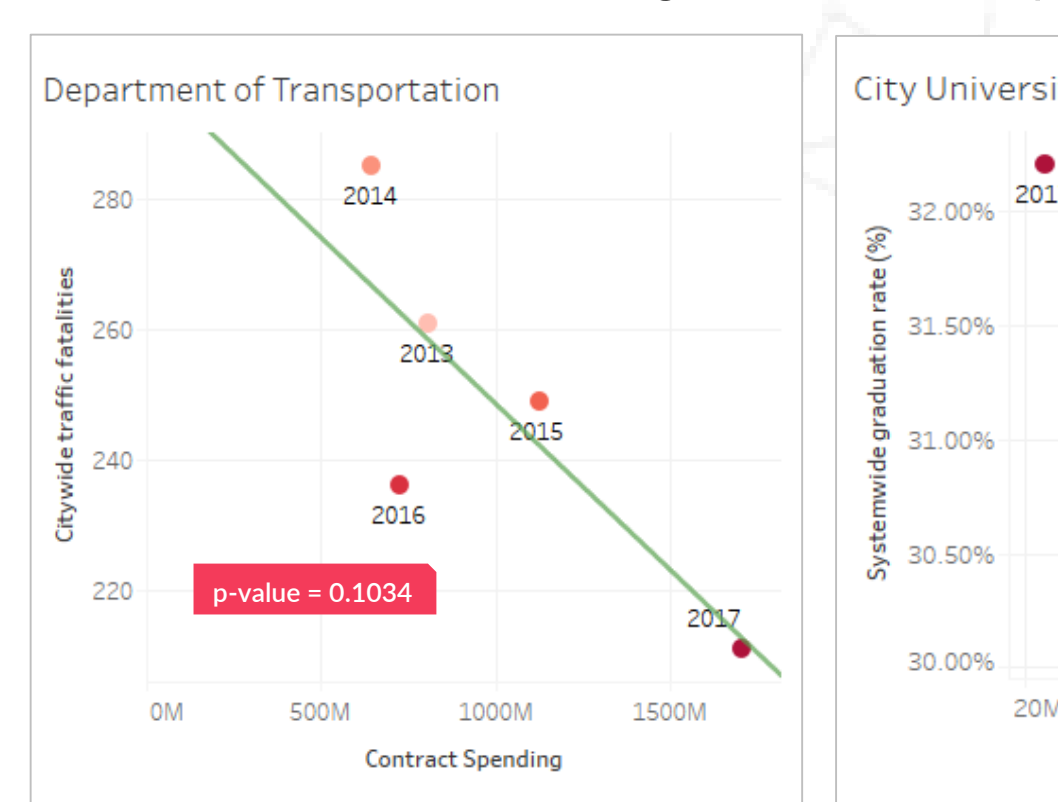
The relationship between government contract spending and agency performance is not always statistically significant for some specific agencies.

However, in an overall perspective, the relationship is statistically significant.

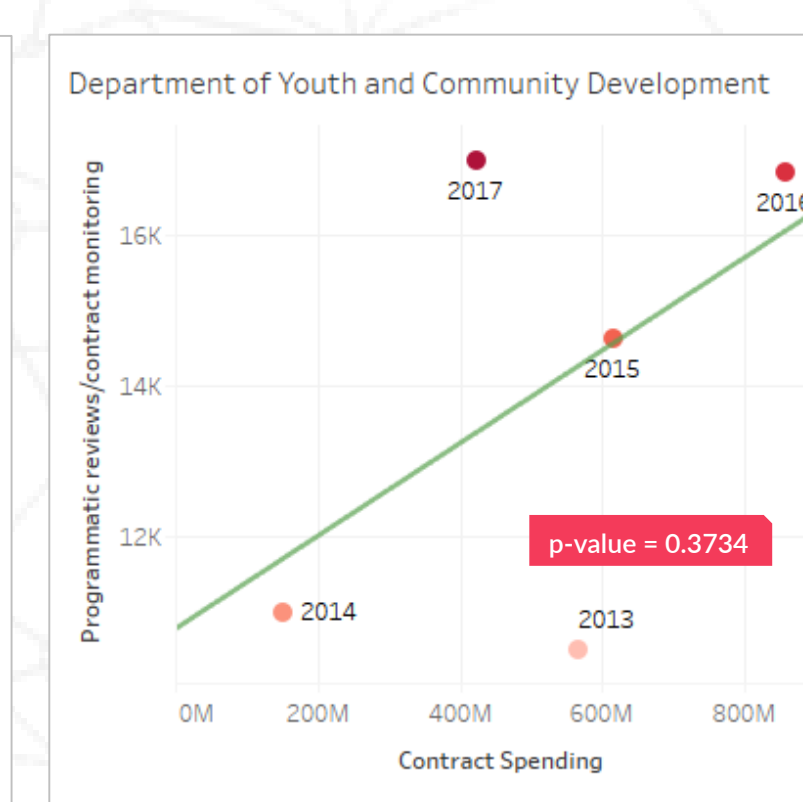
Positive relationship between Agencies' contract spending and performance indicators during 2013 - 2017



Negative relationship



No statistical relationship



(Source: NYC Contract Data, NYC Agency Performance Indicators FY17)

The regression confirmed our hypothesis!

#### Data Sources

- NYC Spending and Contract Data, provided by Manhattan College
- Citywide Payroll Data (Fiscal Year), NYC Open Data
- NYC Quarterly Economic Update, Office of the New York City Comptroller
- NYC Agency Performance Indicators from the FY17 Mayor's Management Report, NYC Open Data

#### References

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