

Introduction

Property investment sometimes is the reflection of a city's economy over the years. Usually, with the growth of economy, there will be more property investment because of more capital in the market. However, the pattern varies across cities since the investment activity also follows city's policy on revitalizing downtown area or developing certain proposed districts. Therefore, it is meaningful to study property investment pattern on the city level across time.



This study focuses on Houston, TX from 2005 to 2014 by using building permits data in order to explore the spatial feature in a time span. Particularly, two research questions are involved:

- What is Houston's general property investment pattern from 2005 to 2014?
- Does the pattern influence the land value, housing value and demographic feature of Houston?

Methodology

Four steps have been adopted to approach the property investment pattern.

The first step:

- I chose to focus on the time period from 2005 to 2014 as it is representative: the time period includes housing bubble, financial crisis and economic recovery. Building Permits data was used as a method of showing the property investment. I selected out daily building permits data from the overall data pool year by year from 01/01/2005 to 12/31/2014 and created point data layer for each year.

The second step:

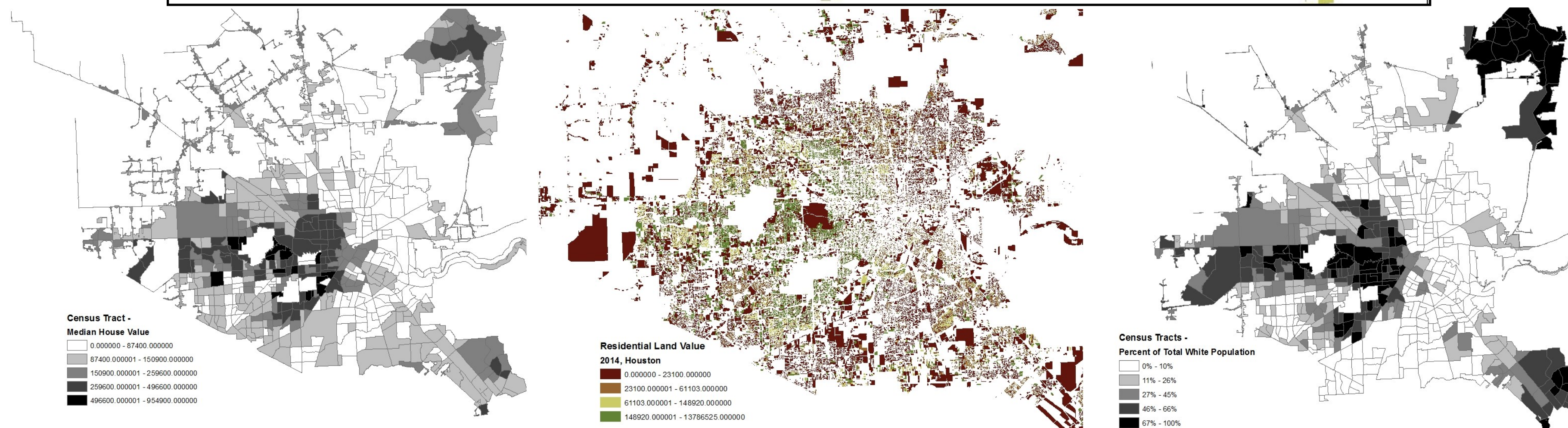
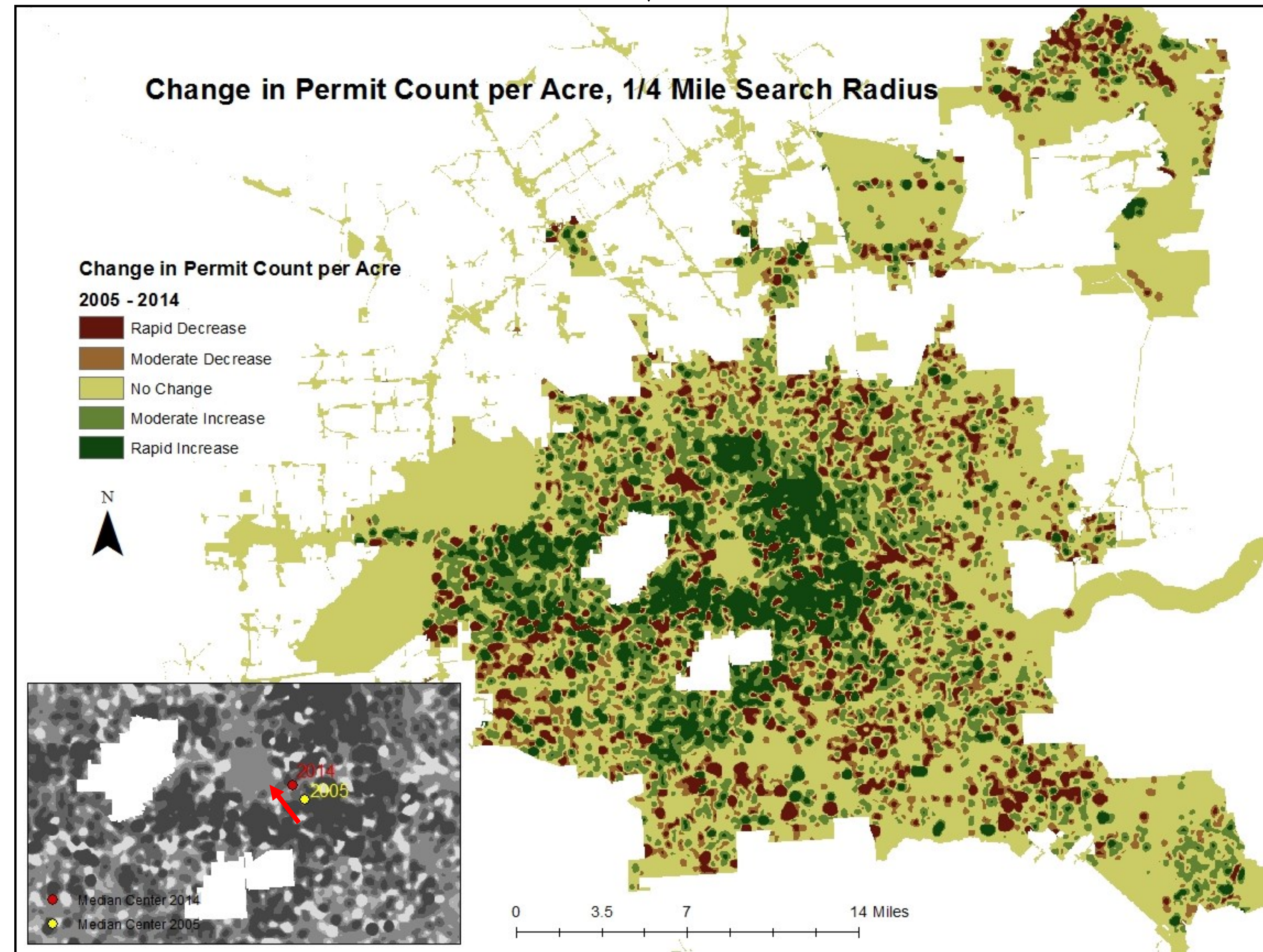
- Two spatial analysis tools were used in this step. "Median Center" was employed to show each year's median center of construction as a way of displaying the trend of building permits. "Kernel Density" was used to show the density of building permits for each year.

The third step:

- "Raster Calculator" was utilized in this step to calculate the change of density between year 2005 and year 2014, 2005 and 2008, 2008 and 2011, 2011 and 2014. Also, estimated land use map (2014) were clipped and selected to only residential areas to show land use pattern in 2014. Census map on demographic feature and median housing value in 2014 were created for analysis.

The fourth step:

- "Reclassify Tool" was used to show the degrees of decrease and increase of building permits density from 2005 to 2014. Data from change of density from 2005 to 2014 was joined to clipped land use map table for spatial econometrics analysis.



Discussion

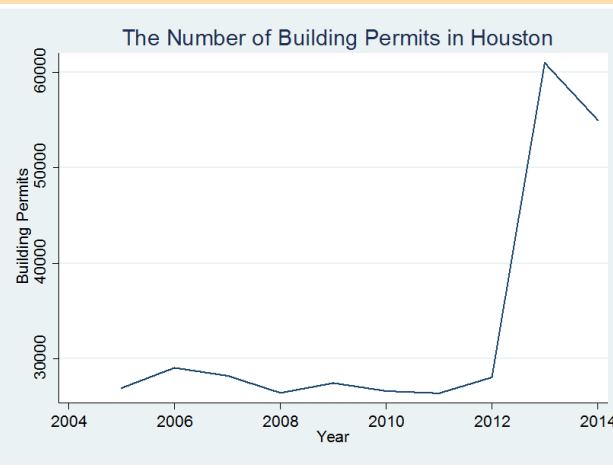
The three maps on the tops show the changes of density from 2005 to 2008, 2008 to 2011, and 2011 to 2014 respectively. The increase pattern of building permits is not obvious from 2005 to 2008 and from 2008 to 2011. The areas of increased and decreased places are almost the same. However, from 2011 to 2014, it shows an increase of building permits in downtown Houston, the western part of Houston, the north-west part of Houston and the south-west part of Houston. Overall, the building permits change pattern from 2005 to 2014 shares the same pattern with the period from 2011 to 2014. Also, Median Centers in 2005 and 2014 shows that the overall direction for construction is northwest, which indicates that property investment focuses more on the northern and western parts of Houston.

Conclusion

1. Property investment shows a northwestern pattern in Houston from 2005 to 2014.

- Overall, economic growth has a positive impact on the number of Building Permits over the year. It is statistically significant at $p < 0.15$.

- Housing Bubble (2005-2007) and Financial Crisis have little impact on Houston's property investment.



	InBP
House_Income	-0.0000812631 (0.0000938812)
Population	2.3233930531 (2.574450689)
lnGDP	1.1273613856 (0.0066139963)**
_cons	9.3052133622 (4.298932346)
R2	0.55985
N	10



2. Property investment generally has a positive impact on land value.

- From the regression above, there exists positive correlation between the mean of change of building permits' density and the coefficient is fairly large. It is statistically significant at $p < 0.1$.

- From the "Residential Land Value" map, the most valuable land is located in the places where the number of building permits has a rapid increase.

3. Property investment happens more in places where there are more white population and where the value of house is high

- Shown by census maps

Limitation

First, Building Permits data in Houston does not have estimated value of each permits. So it is possible that some less dense area might have more values. Second, as Houston does not have zoning, land use map is only estimated. There might be some errors. Third, because of the lack of data on land use and census over the time, the correlation between land value and property investment can only be achieved by using the mean of change of density from 2005 to 2014.

Cartographer: Yuji Dai

May 10, 2016

Projection: NAD_1983_StatePlane_Texas_South_Central_FIPS_4204_Feet

Geographic Coordinate System: GCS_North_American_1983

Data Source: City of Houston, GIS Open Data; 2014 American Community Survey; Tiger 2014; U.S. Census Bureau