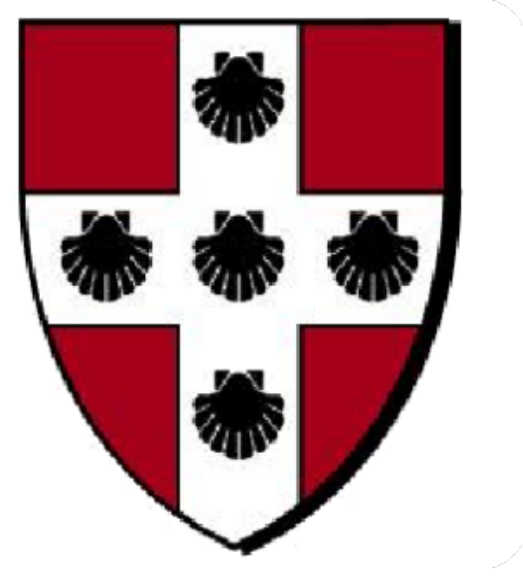# The effects of college population on rent and home-owning cost across US Metro Areas

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Introduction

The presence of colleges has long been hypothesized to have significant impacts on local economies, and particularly on local housing markets. One little-studied aspect related to this is the correlation between college population and the relative cost of renting compared to buying a house. Using R, this project aims to examine the correlation between the proportion of college students in the total population and the difference between average rent and average monthly cost of home-owning across US Metro Areas.

Visualization

Figures 1. shows the average rent/own difference across all 50 states. It suggests that there is variance in rent/own difference independent of states' sizes and levels of income.

Figure 2. shows the average time trend of rent/own difference across three groups of Metro Areas defined by level of college population percentage. In the data set, we defined below 5% as "Low" and above 7.5% as "High." Although the trends are similar, the gaps between the High CollegePopLevel group of Metros and the other two seem to have widen over time.

Figure 3. is a density plot which exhibits the distribution of rent/own difference across three groups of Metro Areas defined by level of college population percentage. The non-overlapping areas suggest that there are differences in rent/own difference not driven by the aggregation of data as in Figure 2.

Figure 4. table summarizing the results of 6 fixed effects regression models own cost on percent of college population with state and time fixed effects. The control variables included are log of median income, population's demographic (percent of total), and measures of units per building (percent of total units.)

Figure 5. is a scatter plot with each dot representing a Metro with its rent/own difference and percent of college population. It also included a regression line from the fixed effects model that includes all control variables (Figure 4. Column 2) While the model is partly driven outliers in the right-hand side of the graph, there is still a general downward trend on the left-hand side.

Method

- Calculates actual monthly expense of a homeowner by summing the monthly mortgage payment (principal + interest) assuming 20% down payment, monthly property tax, and 1% for maintenance expenses.

- Calculates the rent/own difference (rent – own cost) as a percent of the average rent/own cost to make Metro Areas with varying rent/own cost average comparable.

- Runs fixed effects regressions of rent/own difference, rent, and own cost on percent of college population with state and time fixed effects.

- Include control variables for income, population's demographic, and measures of units per building in the regression models.
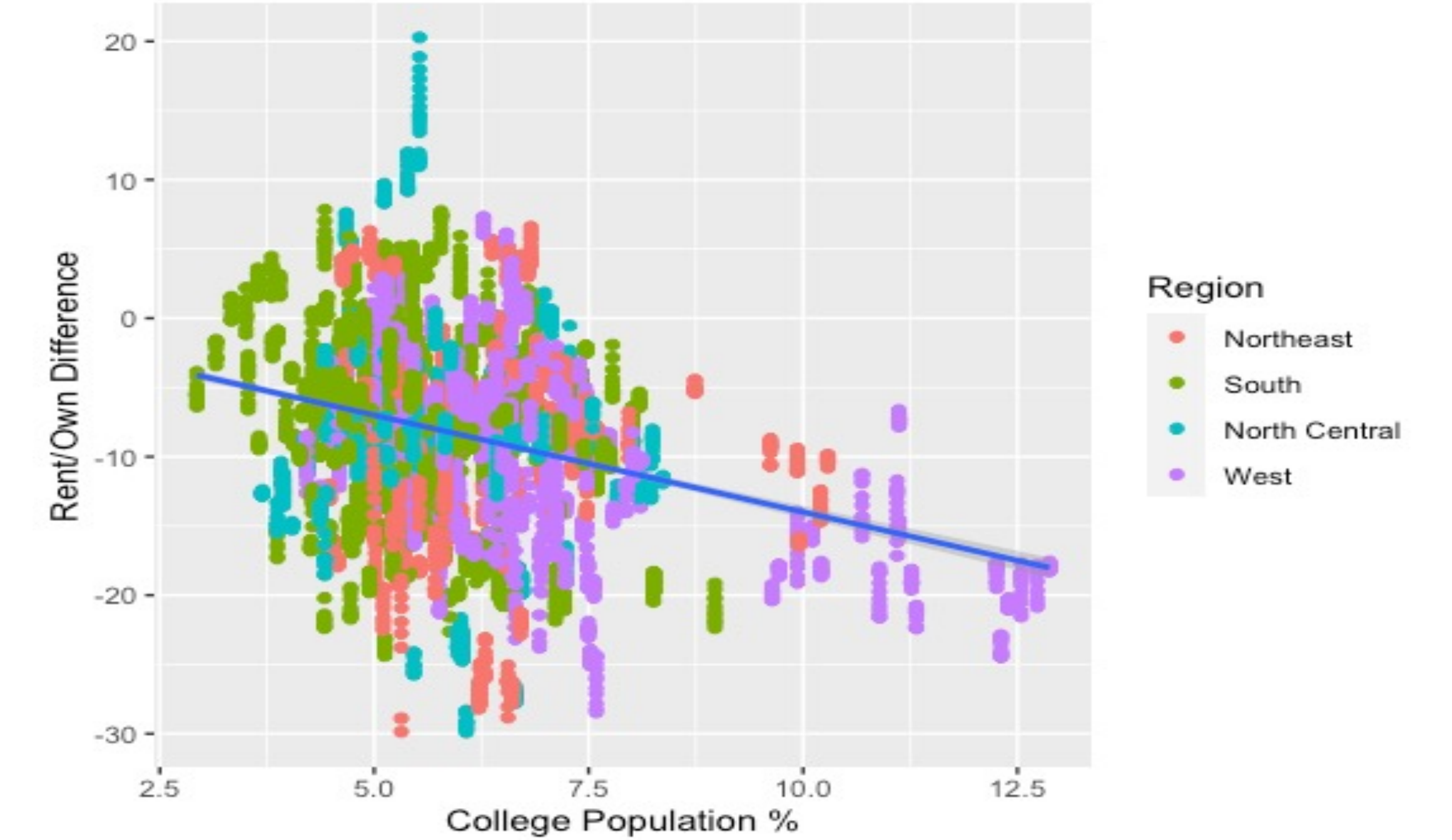

Figure 5. Scatter plot.
Each dot represents a Metro with its rent/own difference and percent of college population,

Discussion

Based on the regression table in Figure 4., we can conclude that college population has a statistically significant negative effect on rent/own difference even when we added controls for income, demographic, and housing units per structure. This means it is relatively cheaper to rent than to pay off mortgage monthly. After adding control variables, the model indicates that college population has a significant positive effect on rent but an even larger positive effect on home-owning cost. This result is consistent with the expectation that a higher college population would both increases demand for rentals and correlates with higher home value.

	Dependent variable:					
	ROD1		Rent		OwnCost1	
	(1)	(2)	(3)	(4)	(5)	(6)
CollegePopPct	-0.796***	-1.400***	-18.939***	6.145***	-1.938	71.956***
	(0.132)	(0.106)	(3.009)	(2.013)	(6.033)	(4.033)
lincome		-62.234***		1,520.236***		3,295.702***
		(0.944)		(17.881)		(35.822)
`Age 20-34 Pct`		-3.732***		-54.489***		1.692
		(0.127)		(2.401)		(4.809)
`Age 35-49 Pct`		-5.728***		-65.120***		67.530***
		(0.173)		(3.270)		(6.551)
`Age 50-64 Pct`		-0.634***		-23.669***		48.174***
		(0.118)		(2.243)		(4.493)
`Age Above 65 Pct`		-3.510***		-16.490***		55.597***
		(0.088)		(1.673)		(3.351)
`1 Unit Structure Pct`		-0.106**		-21.816***		-43.845***
		(0.051)		(0.963)		(1.929)
`2-9 Units Structure Pct`		-0.085		-1.705*		-1.829
		(0.052)		(0.993)		(1.988)
`Over 9 Units Structure Pct`		0.308***		17.741***		-11.707***
		(0.045)		(0.846)		(1.695)
Observations	7,547	7,547	7,547	7,547	7,547	7,547
R^2	0.731	0.923	0.545	0.910	0.552	0.911
Adjusted R^2	0.727	0.922	0.538	0.909	0.545	0.910
Residual Std. Error	12.248 (df = 7435)	6.540 (df = 7427)	278.323 (df = 7435)	123.922 (df = 7427)	557.987 (df = 7435)	248.258 (df = 7427)
Note:					*$p<0.1$; **$p<0.05$; ***$p<0.01$

Figure 4. Fixed Effects Regression Linear Model
This model shows the fixed effects regression results of regressing rent/own difference, rent, and own cost on college population percentage with and without controls

Data Source

1. Zillow research data
2. FRED Economic data
3. Tax Foundation
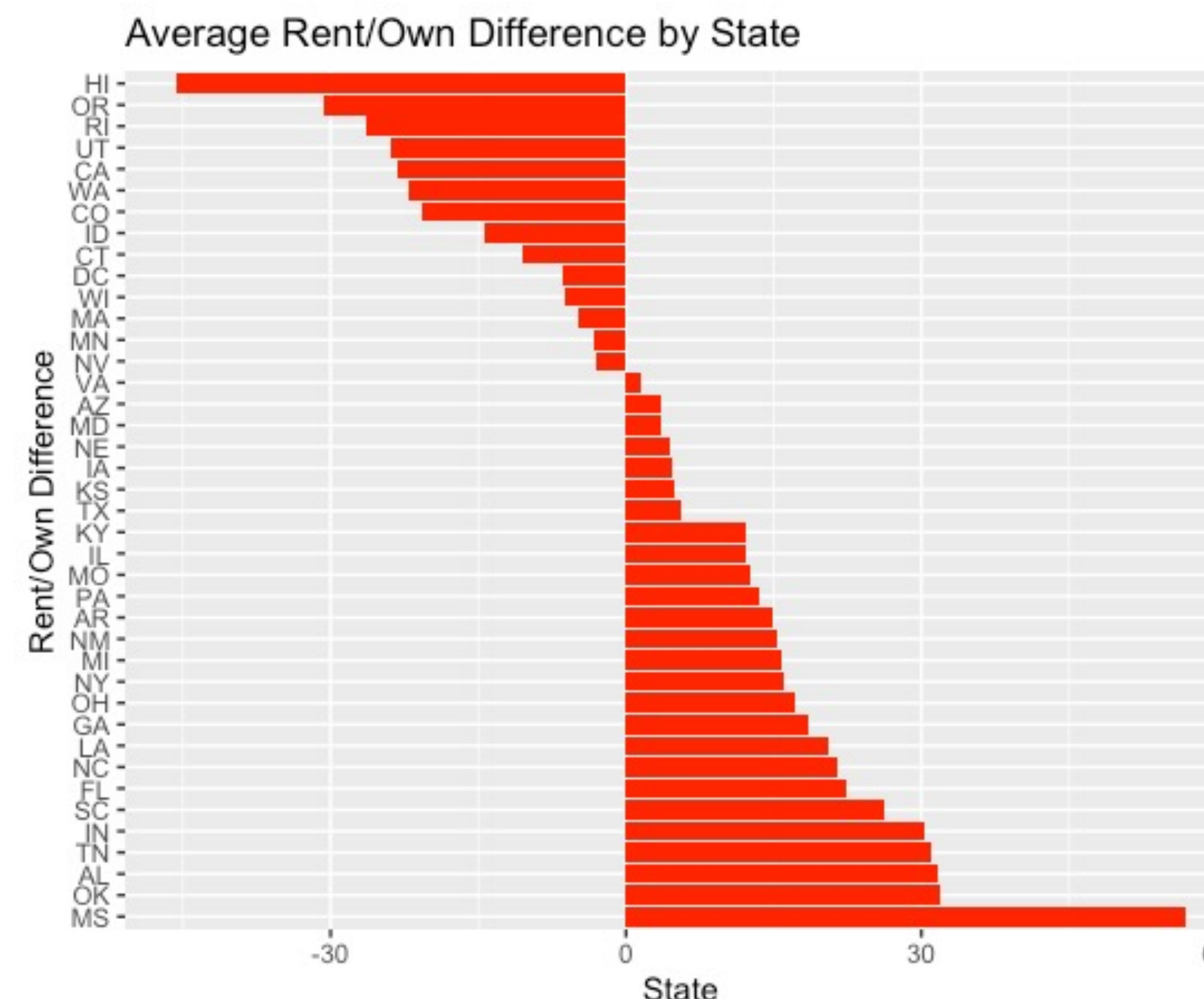4. ACS– 1 year Estimate, US Census Bureau

Figure 1. Bar chart.
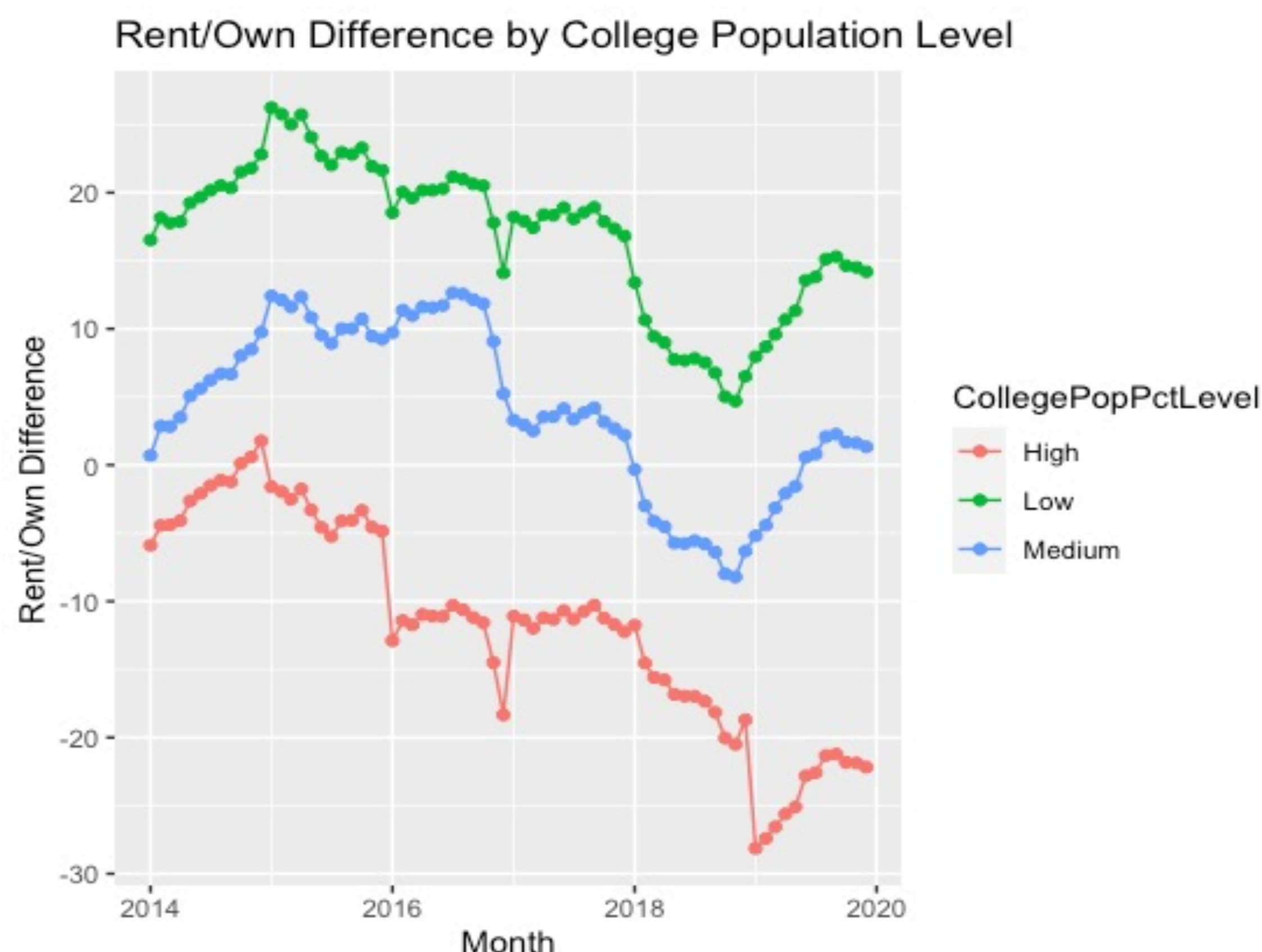This chart shows the average rent/own differences across 50 states.

Figure 2. Line graph.
This line graph tracks the time trends of rent/own difference across three groups of Metros defined by level of college population.
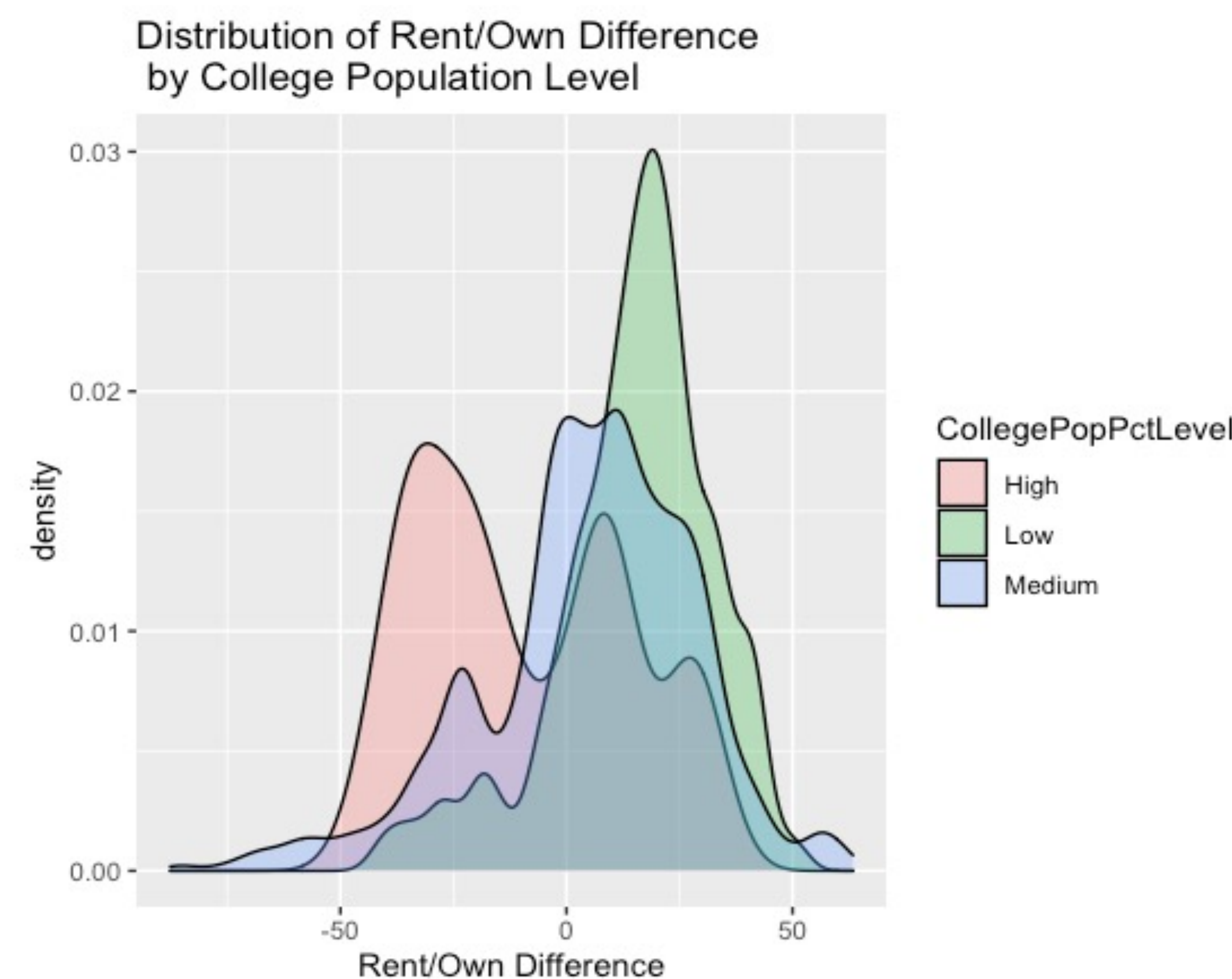

Figure 3. Density plot.
This graph exhibits the distribution of rent/own difference across three groups of Metros defined by level of college population.