SGC PSM Writeup

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Contents

Data Cleaning and PSM summary

The following visualizations and regressions rely on matched pairs of neighborhoods with investments and those without investments. Matched pairs are generated using Propensity Score Matching (PSM) - with `psm_test.Rmd` and its source code `psm_functions.R`. In order to create the matched pairs, investments must be first matched to 2010 boundary Census tracts using `invest_neighborhood_match.Rmd`. Next, investment-flagged Census tracts must be joined with 2009 and 2018 ACS data with `invest_nbr_traits.Rmd` (ACS data is converted from .dta to .csv in `tract_characteristics_convert.Rmd`, and 2009 ACS data is crosswalked to 2010 boundaries in `acs_crosswalk.Rmd`). The final result of this process is the .csv file `master_investments_09.csv`.

`master_investments_09.csv` is used by `psm_test.Rmd` to generate matched pairs. In order to determine the most suitable set of covariates to match on, a covariate table with multiple different combinations is created. Each combination goes through the PSM process and generates an average absolute standardized difference (AASD) as a measure of covariate balance. The mean AASD across study region is then determined, and the set of variables with lowest mean AASD is chosen as the final set of covariates. The set chosen includes the 2009 baseline proportions for the nonwhite population, college-educated population, and renter-occupied housing units, as well as 2009 baseline measurements of median income and median rent.

Finally, based on the aforementioned covariates, PSM is carried out based on investment flags by study area (LA, SF Bay Area, and Fresno) and tables of matched pairs are generated (`psm_matched_la.csv`, `psm_matched_sf.csv`, and `psm_matched_fresno.csv`, respectively). From these tables, descriptive statistics are then developed - as well as accompanying plots and regressions (shown below).

Descriptive Statistics Summary

In `sgc_psm_writeup.Rmd`, which uses the source code `psm_desc_funcs.R`, descriptive statistics and visualizations are generated (code used to create this document). Each study area's matched pairs table is joined into a single table with a study area flag. Next, the .dta NOAH files are converted to .csv format (`NOAH_SGC_2009_CHAS_PSH_ACS.dta` to `NOAH_SGC_2009.csv` and `NOAH_SGC_2016_CHAS_PSH_ACS.dta` to `NOAH_SGC_2016.csv`). Then, the 2009 NOAH data must be crosswalked to 2010 Census boundaries. Next, outmigration block group level data from the InfoGroup dataset is read in - using the "all", "low income", "renters", and "low income renters" data. This data must be cleaned and summarized at the tract level for comparison.

As will be seen below, each level of study generates descriptive statistics, visualizations from a NOAH investigation, and visualizations from an outmigration investigation. Analyses are broken into `TOTAL`, `INVESTMENT TYPE` (which is TOTAL summarized by investment type flags), `LOS ANGELES`, `FRESNO`, and `SF BAY AREA` levels. The implications of the findings for each analysis will be summarized at the beginning of each study level. See the separate `SGC Full Regressions` report for the full regression models.

TOTAL

Summary

- **NOAH**: When considering total NOAH units, the investigation shows that neighborhoods with investments saw a slightly slower increase in the quantity of NOAH units between 2009 and 2016 than did neighborhoods without. This trend is largely maintained when only considering non-LIHTC NOAH units. Conducting a linear regression shows that the presence of investments indicates a negative relationship with NOAH units (although this is not statistically significant). However, this trend is reversed to slightly positive when considering only non-LIHTC units (this is not statistically significant).
- **Outmigration**
  - `Outmigration All`: The time series plot shows that generally higher outmigration rates are associated with investments, which the bar plot confirms. A linear regression maintains this observation

- demonstrating about a 0.9% increase in outmigration with the presence of an investment (this result is statistically significant at p<0.01).

– `Outmigration Low Income`: The time series plot shows a variable relationship between outmigration rates and investments, while the bar plot shows a slightly negative relationship. A linear regression demonstrates about a 0.6% increase in outmigration with the presence of an investment (this result is statistically significant at p<0.1).

– `Outmigration Renters`: The time series plot shows a variable relationship between outmigration rates and investments, while the bar plot shows a slightly positive relationship. A linear regression demonstrates about a 0.2% increase in outmigration with the presence of an investment (this result is not statistically significant).

– `Outmigration Low Income Renters`: The time series plot shows a variable relationship between outmigration rates and investments, while the bar plot indicates that slightly lower outmigration rates are associated with investments. A linear regression shows about a 0.1% decrease in outmigration with the presence of an investment (this result is not statistically significant).

Summary Tables

	Overall NOAH % Change by Investment Type (2009 - 2016)	
	Total NOAH Units	No LIHTC NOAH Units
No Investment	***13.91%***	***15.71%***
Any Investment	10.43%	14.59%
Greening	51.94%	43.27%
Transit	11.05%	16.19%
Urban Infill	-1.20%	5.17%
Active Transportation	7.66%	10.15%

	Overall Average Outmigration Rate by Investment Type (2007 - 2018)			
	Total	Low Income	Renters	Low Income Renters
No Investment	***28.43%***	***33.09%***	***37.06%***	***38.08%***
Any Investment	30.22%	32.54%	37.56%	36.91%
Greening	31.51%	33.03%	38.55%	37.51%
Transit	31.35%	34.39%	39.98%	39.82%
Urban Infill	27.82%	31.02%	33.85%	33.45%
Active Transportation	27.23%	28.63%	32.57%	31.78%

NOAH Investigation

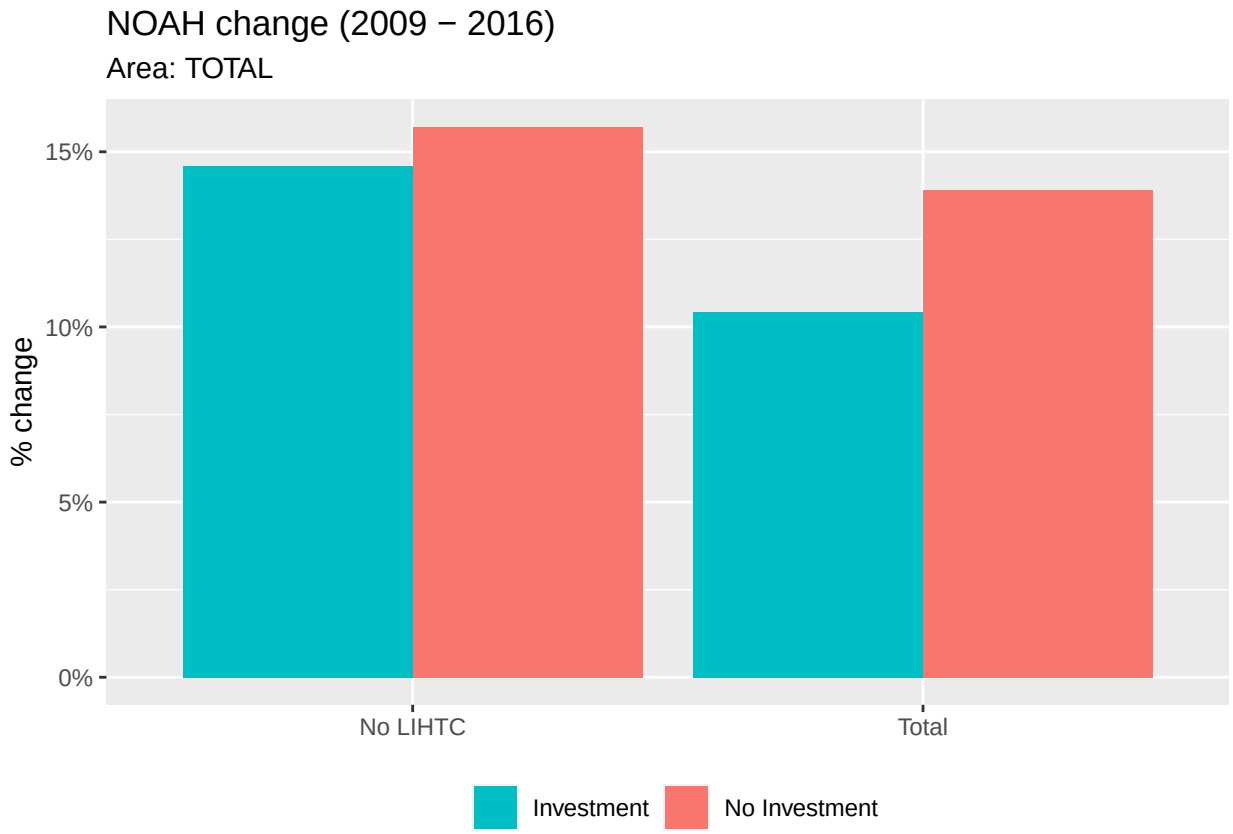

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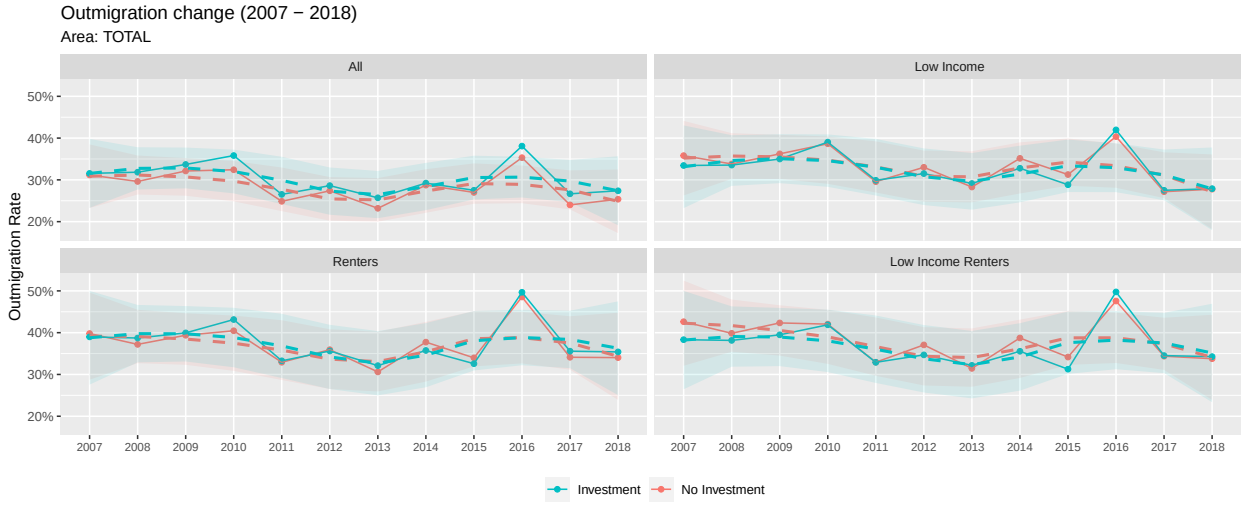
Table 1: NOAH by Investment in Area: TOTAL

	Dependent variable:	
	noah_tot_change	noah_nolihtc_change
	(1)	(2)
investment1	−13.457	1.219
	(19.511)	(19.891)
Constant	64.753***	77.446***
	(13.796)	(14.065)
Observations	220	220
R^2	0.002	0.00002
Adjusted R^2	−0.002	−0.005
Residual Std. Error (df = 218)	144.696	147.514
F Statistic (df = 1; 218)	0.476	0.004
Note:		*p<0.1; **p<0.05; ***p<0.01

Outmigration Investigation



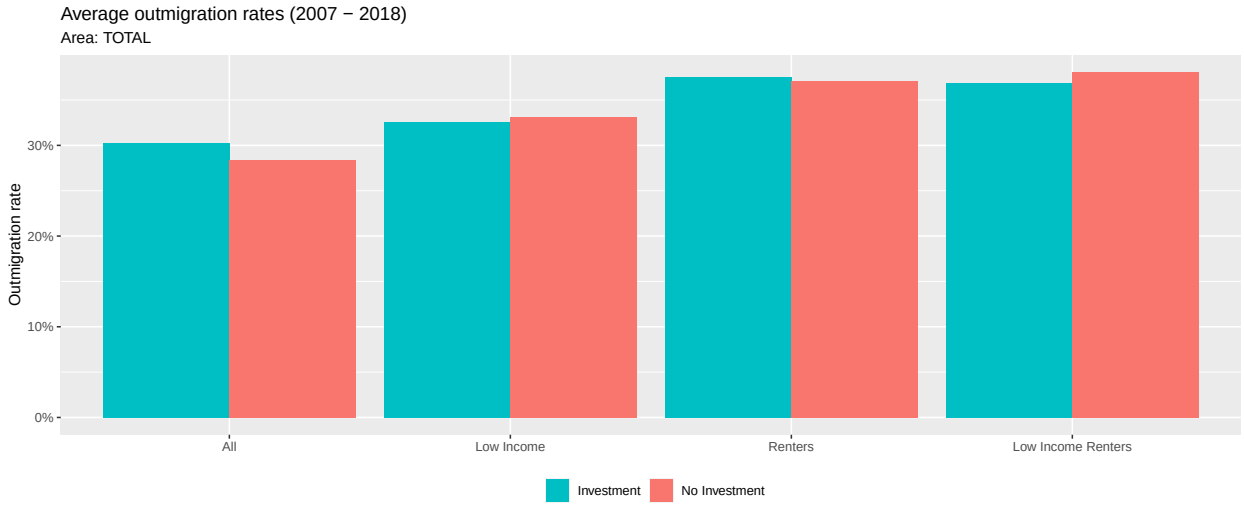


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Table 2: Outmigration Rates by Investment in Area: TOTAL

	Dependent variable:			
	migration_rate			
	ALL	LOW INCOME	RENTER	LOW INCOME RENTER
	(1)	(2)	(3)	(4)
investment1	0.009***	0.006*	0.002	−0.001
	(0.003)	(0.004)	(0.003)	(0.004)
Constant	0.293***	0.330***	0.389***	0.395***
	(0.002)	(0.003)	(0.002)	(0.003)
Observations	2,639	2,625	2,638	2,601
R^2	0.003	0.001	0.0001	0.00002
Adjusted R^2	0.002	0.001	−0.0003	−0.0004
Residual Std. Error	0.089 (df = 2637)	0.098 (df = 2623)	0.090 (df = 2636)	0.099 (df = 2599)
F Statistic	7.027*** (df = 1; 2637)	2.742* (df = 1; 2623)	0.327 (df = 1; 2636)	0.042 (df = 1; 2599)
Note:				*p<0.1; **p<0.05; ***p<0.01

INVESTMENT TYPE

Summary

- `Greening`
  - **NOAH**: The NOAH investigation shows that neighborhoods with greening investments saw a much faster increase in the quantity of NOAH units between 2009 and 2016 than did neighborhoods without. This trend is maintained when only considering non-LIHTC NOAH units. Conducting a linear regression shows that the presence of investments indicates a positive relationship with NOAH units (this is statistically significant at $p<0.05$). Again, this trend is maintained when considering only non-LIHTC units (this is statistically significant at $p<0.05$).
  - **Outmigration**
    - `Outmigration All`: The time series plot shows a generally positive relationship, and the bar plot indicates that higher outmigration rates are associated with greening investments. A linear regression confirms this observation - demonstrating about 1.7% increase in outmigration with the presence of an investment (this result is statistically significant at $p<0.1$).
    - `Outmigration Low Income`: The time series plot indicates a mixed relationship, which the bar plot confirms. A linear regression also confirms this observation, producing about a 0.002% decrease in outmigration with the presence of an investment (this result is not statistically significant).
    - `Outmigration Renters`: The time series plot indicates a variable relationship between greening investments and outmigration, while the bar plot indicates a slight trend towards decreased outmigration in greening investment neighborhoods. A linear regression confirms this observation - demonstrating about 1.4% decrease in outmigration with the presence of an investment (this result is not statistically significant).
    - `Outmigration Low Income Renters`: The time series plot indicates a variable relationship between greening investments and outmigration, while the bar plot indicates a slightly positive trend. A linear regression demonstrates about 1.9% decrease in outmigration with the presence of an investment (this result is statistically significant at $p<0.1$).
- `Transit`
  - **NOAH**: The NOAH investigation shows that neighborhoods with transit investments saw a slower increase in the quantity of NOAH units between 2009 and 2016 than did neighborhoods without. This trend is reversed to a slightly faster increase when only considering non-LIHTC NOAH units. Conducting a linear regression shows that the presence of investments indicates a negative relationship with NOAH units (this is not statistically significant). This trend is maintained when considering only non-LIHTC units (this is not statistically significant).
  - **Outmigration**
    - `Outmigration All`: The time series plot shows that generally higher outmigration rates are associated with transit investments, and the bar plot confirms this. A linear regression also confirms this observation - demonstrating about 1.7% increase in outmigration with the presence of an investment (this result is statistically significant at $p<0.01$).
    - `Outmigration Low Income`: The time series plot shows that slightly higher outmigration rates are associated with transit investments, and the bar plot shows a slightly positive relationship. A linear regression also confirms this observation - demonstrating about 1.8% increase in outmigration with the presence of an investment (this result is statistically significant at $p<0.01$).
    - `Outmigration Renters`: The time series plot shows that slightly higher outmigration rates are associated with transit investments, and the bar plot confirms this. A linear regression also confirms this observation - demonstrating about 1.5% increase in outmigration with the presence of an investment (this result is statistically significant at $p<0.01$).

    * `Outmigration Low Income Renters`: The time series plot shows that slightly higher outmigration rates are associated with transit investments, and the bar plot confirms this. A linear regression also confirms this observation - demonstrating about 1.3% increase in outmigration with the presence of an investment (this result is statistically significant at $p<0.01$).

- `Urban Infill`
  - **NOAH**: The NOAH investigation shows that neighborhoods with urban infill investments saw a decrease in the quantity of NOAH units between 2009 and 2016, while those without saw an increase. This trend is reversed (although the increase for investment neighborhoods is slower than those without) when only considering non-LIHTC NOAH units. Conducting a linear regression shows that the presence of investments indicates a negative relationship with NOAH units (this is statistically significant at $p<0.05$). This trend is maintained when considering only non-LIHTC units (this is statistically significant at $p<0.1$).
  - **Outmigration**
    * `Outmigration All`: The time series plot shows a mixed relationship between urban infill investments and outmigration, while the bar plot confirms shows a slight trend towards lower rates. A linear regression also demonstrates about a 1.9% decrease in outmigration with the presence of an investment (this result is statistically significant at $p<0.01$).
    * `Outmigration Low Income`: The time series plot shows that generally lower outmigration rates associated with urban infill investments, and the bar plot confirms this. A linear regression also confirms this observation - demonstrating about 0.8% decrease in outmigration with the presence of an investment (this result is not statistically significant).
    * `Outmigration Renters`: The time series plot shows that generally lower outmigration rates associated with urban infill investments, and the bar plot confirms this. A linear regression also confirms this observation - demonstrating about 1.8% decrease in outmigration with the presence of an investment (this result is statistically significant at $p<0.01$).
    * `Outmigration Low Income Renters`: The time series plot shows that generally lower outmigration rates associated with urban infill investments, and the bar plot confirms this. A linear regression also confirms this observation - demonstrating about 2.4% decrease in outmigration with the presence of an investment (this result is statistically significant at $p<0.01$).

- `Active Transportation`
  - **NOAH**: The NOAH investigation shows that neighborhoods with active transportation investments saw a slower increase in the quantity of NOAH units between 2009 and 2016 than did neighborhoods without. This trend is maintained when only considering non-LIHTC NOAH units. Conducting a linear regression shows that the presence of investments indicates a negative relationship with NOAH units (this is not statistically significant). This trend is maintained when considering only non-LIHTC units (this is not statistically significant).
  - **Outmigration**
    * `Outmigration All`: The time series plot shows a mixed relationship between lower outmigration rates and active transportation investments, while the bar plot shows a slight negative trend between them. A linear regression confirms this observation - demonstrating about 1.1% decrease in outmigration with the presence of an investment (this result is statistically significant at $p<0.05$).
    * `Outmigration Low Income`: The time series plot shows that lower outmigration rates associated with active transportation investments, and the bar plot confirms this. A linear regression also confirms this observation - demonstrating about 2.8% decrease in outmigration with the presence of an investment (this result is statistically significant at $p<0.01$).
    * `Outmigration Renters`: The time series plot shows that lower outmigration rates associated with active transportation investments, and the bar plot confirms this. A linear regression also confirms this observation - demonstrating about 2.8% decrease in outmigration with the presence of an investment (this result is statistically significant at $p<0.01$).

* `Outmigration Low Income Renters`: The time series plot shows that lower outmigration rates associated with active transportation investments, and the bar plot confirms this. A linear regression also confirms this observation - demonstrating about 3.5% decrease in outmigration with the presence of an investment (this result is statistically significant at p<0.01).

Greening

NOAH Investigation (GREENING)

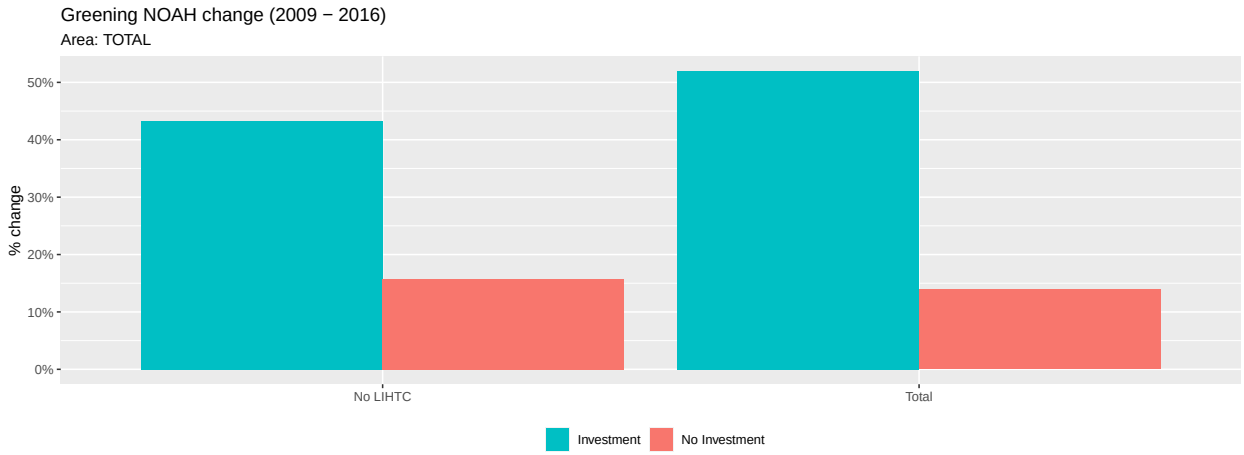

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Table 3: NOAH by Greening in Area: TOTAL

	Dependent variable:	
	noah_tot_change TOTAL	noah_nolihtc_change NO LIHTC
	(1)	(2)
greening1	115.694**	98.515**
	(48.677)	(49.764)
Constant	53.291***	74.025***
	(9.845)	(10.065)
Observations	220	220
R^2	0.025	0.018
Adjusted R^2	0.021	0.013
Residual Std. Error (df = 218)	143.013	146.207
F Statistic (df = 1; 218)	5.649**	3.919**
Note:		*p<0.1; **p<0.05; ***p<0.01

Outmigration Investigation (GREENING)

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Table 4: Outmigration Rates by Greening in Area: TOTAL

	Dependent variable:			
	migration_rate			
	ALL	LOW INCOME	RENTER	LOW INCOME RENTER
	(1)	(2)	(3)	(4)
greening1	0.017*	−0.00002	−0.014	−0.019*
	(0.009)	(0.010)	(0.009)	(0.010)
Constant	0.293***	0.330***	0.389***	0.395***
	(0.002)	(0.003)	(0.003)	(0.003)
Observations	1,427	1,413	1,426	1,389
R^2	0.003	0.000	0.002	0.002
Adjusted R^2	0.002	−0.001	0.001	0.002
Residual Std. Error	0.089 (df = 1425)	0.098 (df = 1411)	0.091 (df = 1424)	0.100 (df = 1387)
F Statistic	3.725* (df = 1; 1425)	0.00001 (df = 1; 1411)	2.301 (df = 1; 1424)	3.392* (df = 1; 1387)
Note:				*p<0.1; **p<0.05; ***p<0.01

Transit

NOAH Investigation (TRANSIT)

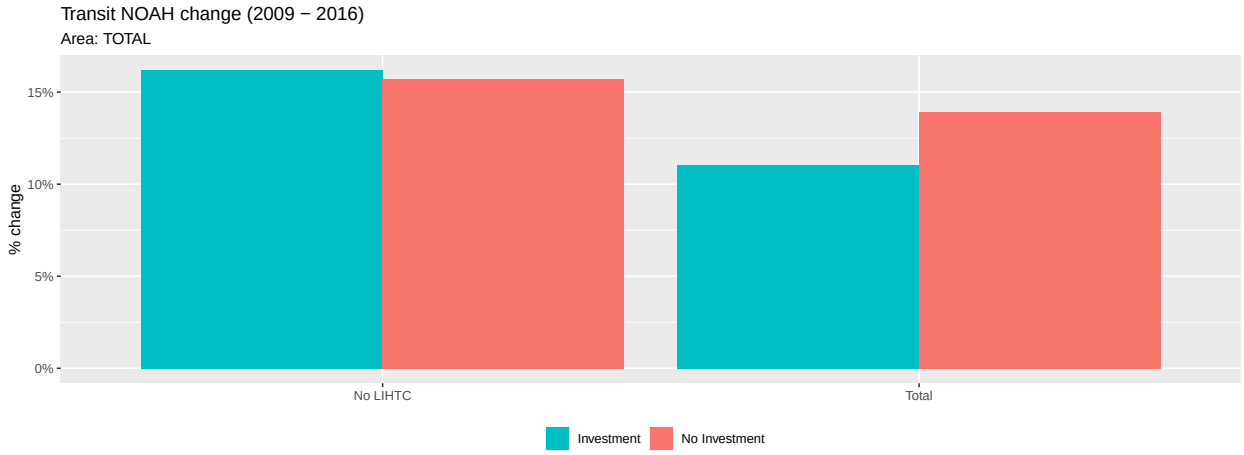

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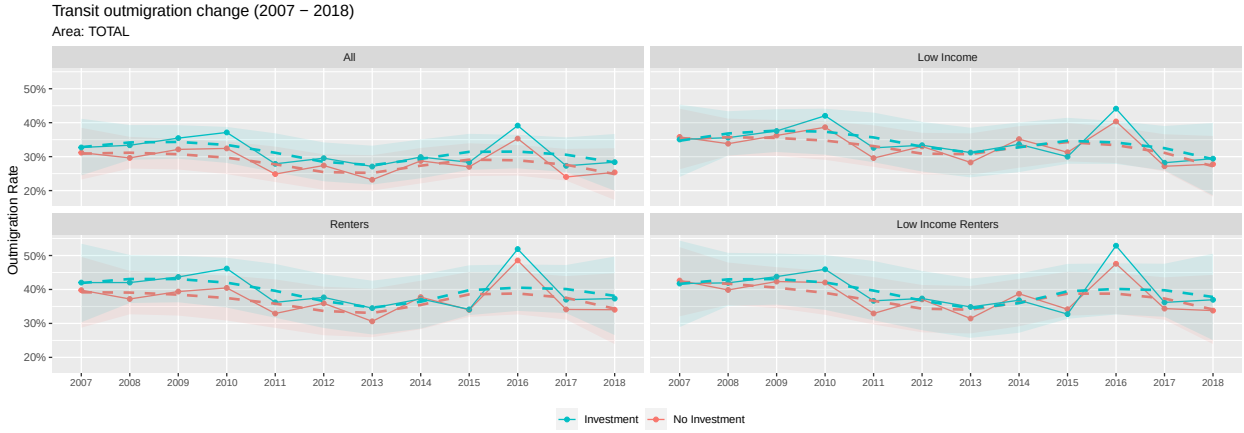
Table 5: NOAH by Transit in Area: TOTAL

	Dependent variable:	
	noah_tot_change TOTAL	noah_nolihtc_change NO LIHTC
	(1)	(2)
transit1	−18.061	−3.016
	(20.160)	(20.567)
Constant	64.756***	79.179***
	(12.308)	(12.557)
Observations	220	220
R^2	0.004	0.0001
Adjusted R^2	−0.001	−0.004
Residual Std. Error (df = 218)	144.588	147.508
F Statistic (df = 1; 218)	0.803	0.022
Note:		*p<0.1; **p<0.05; ***p<0.01

Outmigration Investigation (TRANSIT)



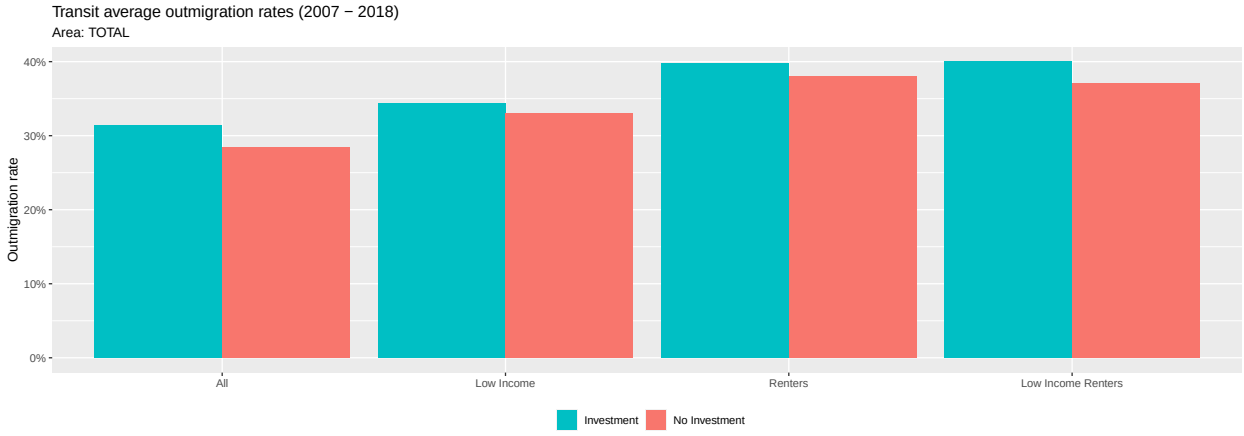


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Table 6: Outmigration Rates by Transit in Area: TOTAL

	Dependent variable:			
	migration_rate			
	ALL	LOW INCOME	RENTER	LOW INCOME RENTER
	(1)	(2)	(3)	(4)
transit1	0.017***	0.018***	0.015***	0.013***
	(0.004)	(0.004)	(0.004)	(0.004)
Constant	0.293***	0.330***	0.389***	0.395***
	(0.003)	(0.003)	(0.002)	(0.003)
Observations	2,303	2,289	2,302	2,265
R^2	0.009	0.008	0.007	0.004
Adjusted R^2	0.008	0.008	0.006	0.004
Residual Std. Error	0.091 (df = 2301)	0.100 (df = 2287)	0.090 (df = 2300)	0.100 (df = 2263)
F Statistic	19.928*** (df = 1; 2301)	18.717*** (df = 1; 2287)	15.709*** (df = 1; 2300)	9.909*** (df = 1; 2263)
Note:				*p<0.1; **p<0.05; ***p<0.01

Urban Infill

NOAH Investigation (URBAN INFILL)

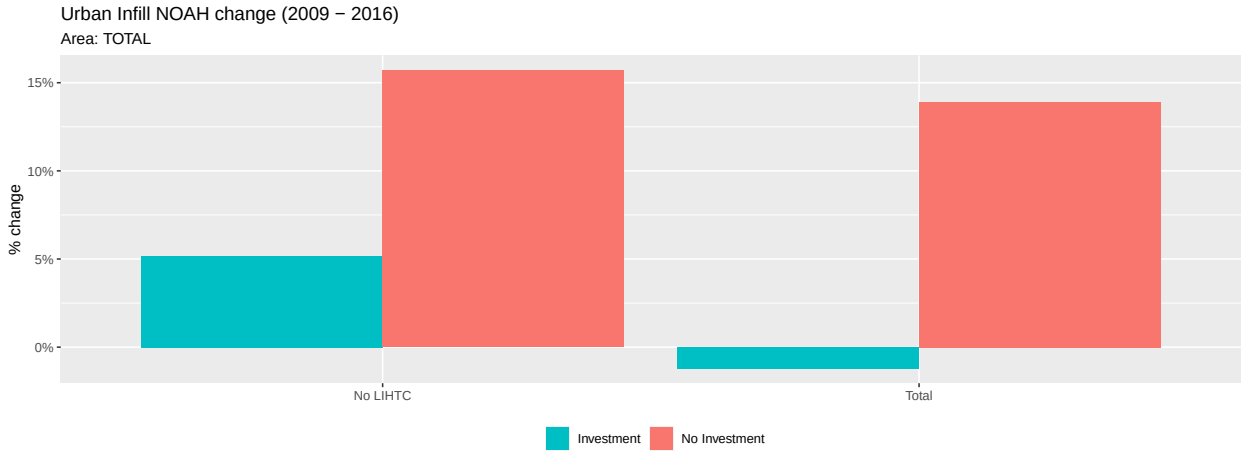

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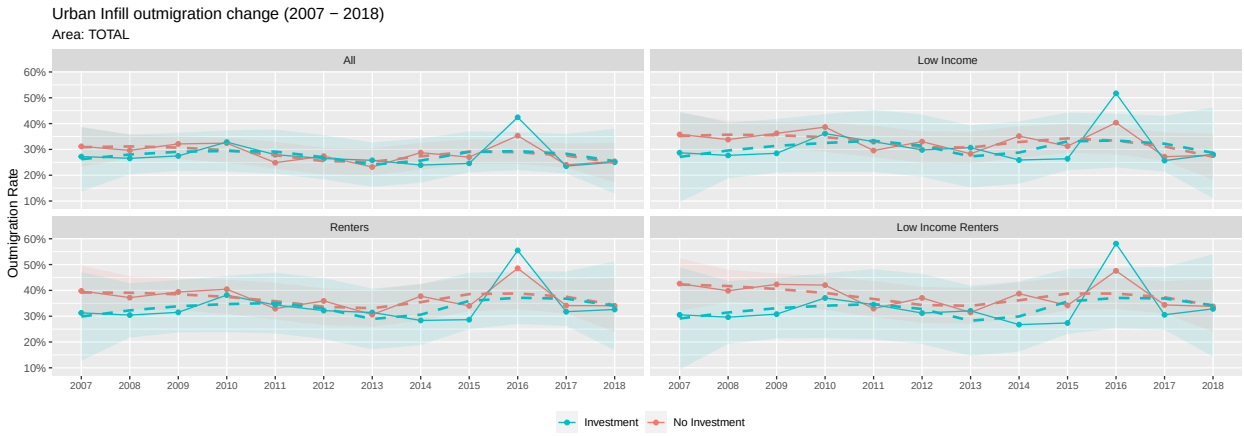
Table 7: NOAH by Urban Infill in Area: TOTAL

	Dependent variable:	
	noah_tot_change TOTAL	noah_nolihtc_change NO LIHTC
	(1)	(2)
urban_infill1	−70.809**	−58.175*
	(32.198)	(32.917)
Constant	65.105***	83.873***
	(10.182)	(10.409)
Observations	220	220
R^2	0.022	0.014
Adjusted R^2	0.017	0.010
Residual Std. Error (df = 218)	143.273	146.469
F Statistic (df = 1; 218)	4.836**	3.124*
Note:		*p<0.1; **p<0.05; ***p<0.01

Outmigration Investigation (URBAN INFILL)



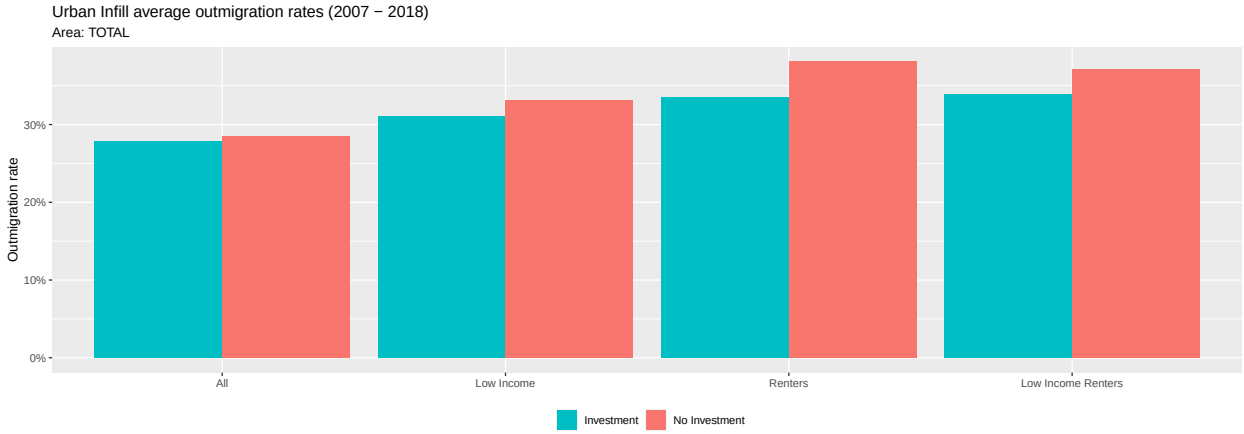


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Table 8: Outmigration Rates by Urban Infill in Area: TOTAL

	Dependent variable:			
	migration_rate			
	ALL	LOW INCOME	RENTER	LOW INCOME RENTER
	(1)	(2)	(3)	(4)
urban_infill1	−0.019***	−0.008	−0.018***	−0.024***
	(0.006)	(0.007)	(0.006)	(0.007)
Constant	0.293***	0.330***	0.389***	0.395***
	(0.002)	(0.003)	(0.002)	(0.003)
Observations	1,583	1,569	1,582	1,545
R^2	0.006	0.001	0.005	0.008
Adjusted R^2	0.006	0.0002	0.005	0.007
Residual Std. Error	0.087 (df = 1581)	0.097 (df = 1567)	0.090 (df = 1580)	0.100 (df = 1543)
F Statistic	10.199*** (df = 1; 1581)	1.346 (df = 1; 1567)	8.347*** (df = 1; 1580)	12.652*** (df = 1; 1543)
Note:				*p<0.1; **p<0.05; ***p<0.01

Active Transportation

NOAH Investigation (ACTIVE TRANSPORTATION)

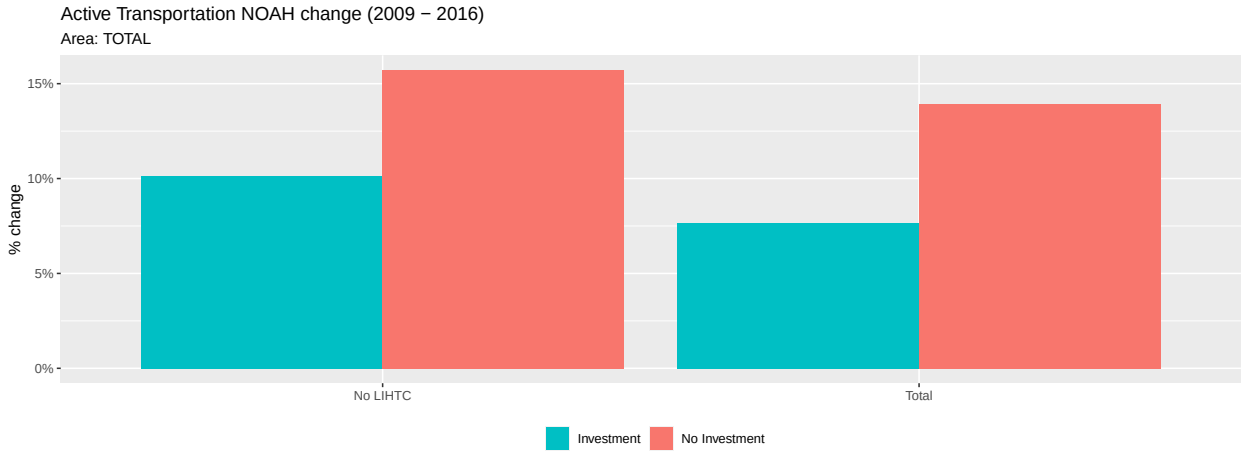

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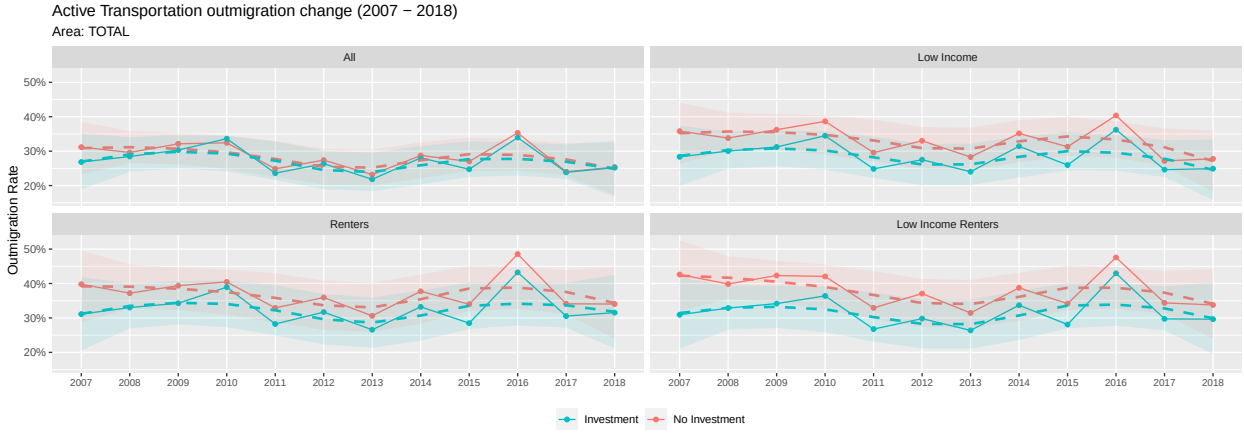
Table 9: NOAH by Active Transportation in Area: TOTAL

	Dependent variable:	
	noah_tot_change TOTAL	noah_nolihtc_change NO LIHTC
	(1)	(2)
active_transportation1	−13.135	−13.833
	(28.444)	(28.966)
Constant	59.816***	79.942***
	(10.504)	(10.696)
Observations	220	220
R^2	0.001	0.001
Adjusted R^2	−0.004	−0.004
Residual Std. Error (df = 218)	144.783	147.438
F Statistic (df = 1; 218)	0.213	0.228
Note:		*p<0.1; **p<0.05; ***p<0.01

Outmigration Investigation (ACTIVE TRANSPORTATION)



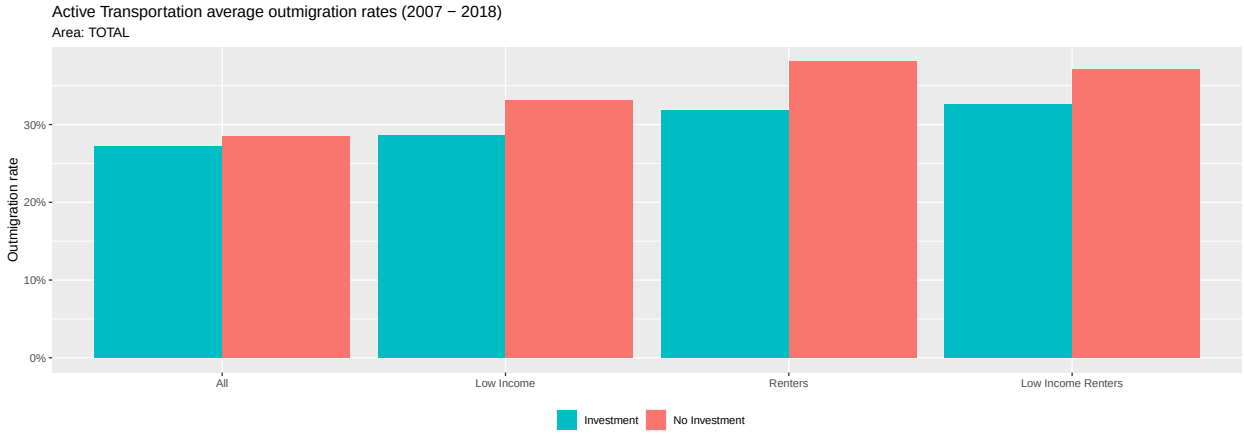


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Table 10: Outmigration Rates by Active Transportation in Area: TOTAL

	Dependent variable:			
	migration_rate			
	ALL	LOW INCOME	RENTER	LOW INCOME RENTER
	(1)	(2)	(3)	(4)
active_transportation1	−0.011**	−0.028***	−0.028***	−0.035***
	(0.005)	(0.006)	(0.005)	(0.006)
Constant	0.293***	0.330***	0.389***	0.395***
	(0.002)	(0.003)	(0.002)	(0.003)
Observations	1,679	1,665	1,678	1,641
R^2	0.003	0.015	0.017	0.022
Adjusted R^2	0.002	0.014	0.016	0.022
Residual Std. Error	0.086 (df = 1677)	0.094 (df = 1663)	0.088 (df = 1676)	0.096 (df = 1639)
F Statistic	4.630** (df = 1; 1677)	25.189*** (df = 1; 1663)	29.070*** (df = 1; 1676)	37.534*** (df = 1; 1639)
Note:				*p<0.1; **p<0.05; ***p<0.01

LOS ANGELES

Summary

- **NOAH**: The LA NOAH investigation shows that neighborhoods with investments saw a slower increase in the quantity NOAH units between 2009 and 2016 than did neighborhoods without. This trend is maintained when only considering non-LIHTC NOAH units. Conducting a linear regression shows that

the presence of investments indicates a negative relationship with NOAH units (this is not statistically significant at $p<0.1$). Again, this trend is maintained when considering only non-LIHTC units (this is not statistically significant). The NOAH summary tables break down this relationship by investment type, and then by the specific investment cases.

- **Outmigration**
  - `Overall Patterns`: See the summary tables for LA outmigration rates, including by investment type and by specific investment. Both tables show neighborhood trends based on the presence of the investment/investment type.
  - `Outmigration All`: Both time series and bar plots indicate a mixed relationship between outmigration and investments, while a linear regression demonstrates about a 0.1% decrease (this result is not statistically significant).
  - `Outmigration Low Income`: Both time series and bar plots indicate that slightly lower outmigration rates are associated with the presence of investments, and a linear regression confirms this relationship with a 0.4% decrease (this result is not statistically significant).
  - `Outmigration Renters`: Both time series and bar plots indicate a mixed relationship between outmigration rates and investments. A linear regression demonstrates about a 0.2% decrease (this result is not statistically significant).
  - `Outmigration Low Income Renters`: Both time series and bar plots indicate that lower outmigration rates are generally associated with the presence of investments, and a linear regression confirms this relationship with a 0.2% decrease (this result is not statistically significant).

Summary Tables (LA)

	LA Area NOAH % Change by Investment Type (2009 - 2016)	
	Total NOAH Units	No LIHTC NOAH Units
No Investment	***11.83%***	***13.99%***
Any Investment	4.28%	7.65%
Greening	22.86%	25.28%
Transit	3.06%	7.16%
Urban Infill	6.63%	13.10%
Active Transportation	4.39%	6.41%

	LA Area Overall Average Outmigration Rate by Investment Type (2007 - 2018)			
	Total	Low Income	Renters	Low Income Renters
No Investment	***27.54%***	***31.54%***	***34.57%***	***35.61%***
Any Investment	27.65%	30.24%	34.69%	34.24%
Greening	29.12%	30.69%	33.92%	33.89%
Transit	28.23%	31.38%	36.20%	35.93%
Urban Infill	25.75%	29.84%	34.45%	33.95%
Active Transportation	26.36%	28.39%	32.80%	32.39%

	LA Area NOAH % Change by Investment (2009 - 2016)	
	Total NOAH Units	No LIHTC NOAH Units
No Investment	***11.83%***	***13.99%***
Any Investment	4.28%	7.65%
Albion Riverside Park	16.70%	16.70%
Crenshaw Blvd Streetscape Plan	4.03%	5.12%
El Monte Transit Village	43.45%	43.65%
Exposition Line	-0.14%	3.60%
Gold Line Extension Line	5.80%	9.51%
Salud Park	13.77%	13.77%
Taylor Yard Transit Village	-31.77%	-1.15%
The Exchange At El Monte Gateway	13.94%	42.48%
Willowbrook Rosa Parks Station	6.99%	14.31%

	LA Area Overall Average Outmigration Rate by Investment (2007 - 2018)			
	Total	Low Income	Renters	Low Income Renters
No Investment	***27.54%***	***31.54%***	***34.57%***	***35.61%***
Any Investment	27.65%	30.24%	34.69%	34.24%
Albion Riverside Park	28.59%	29.53%	31.00%	31.77%
Crenshaw Blvd Streetscape Plan	25.62%	27.87%	32.17%	31.58%
El Monte Transit Village	26.40%	28.56%	33.67%	33.58%
Exposition Line	31.54%	33.59%	38.66%	38.47%
Gold Line Extension Line	25.70%	30.12%	34.59%	34.11%
Salud Park	30.84%	32.24%	35.03%	34.80%
Taylor Yard Transit Village	25.75%	29.36%	34.35%	34.71%
The Exchange At El Monte Gateway	26.49%	29.38%	35.90%	35.92%
Willowbrook Rosa Parks Station	28.89%	29.80%	34.97%	34.96%

NOAH Investigation (LA)

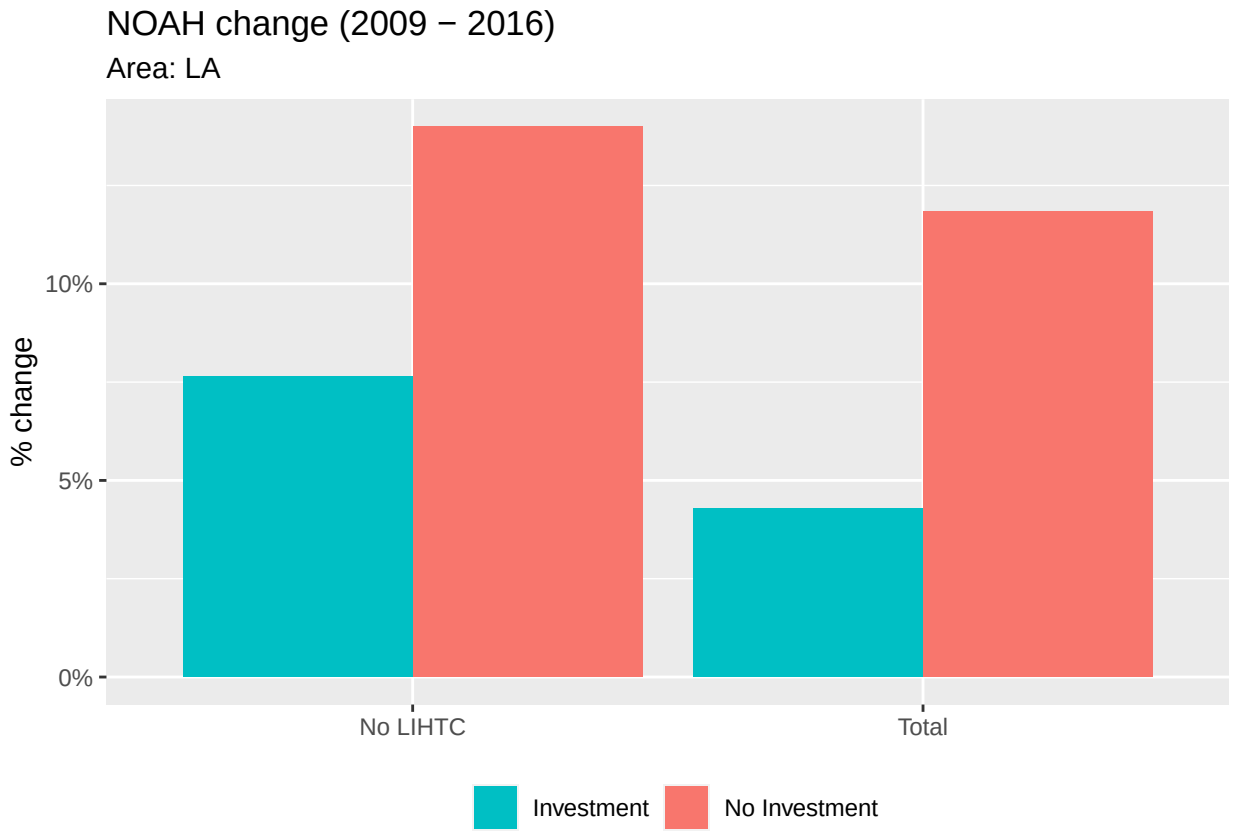

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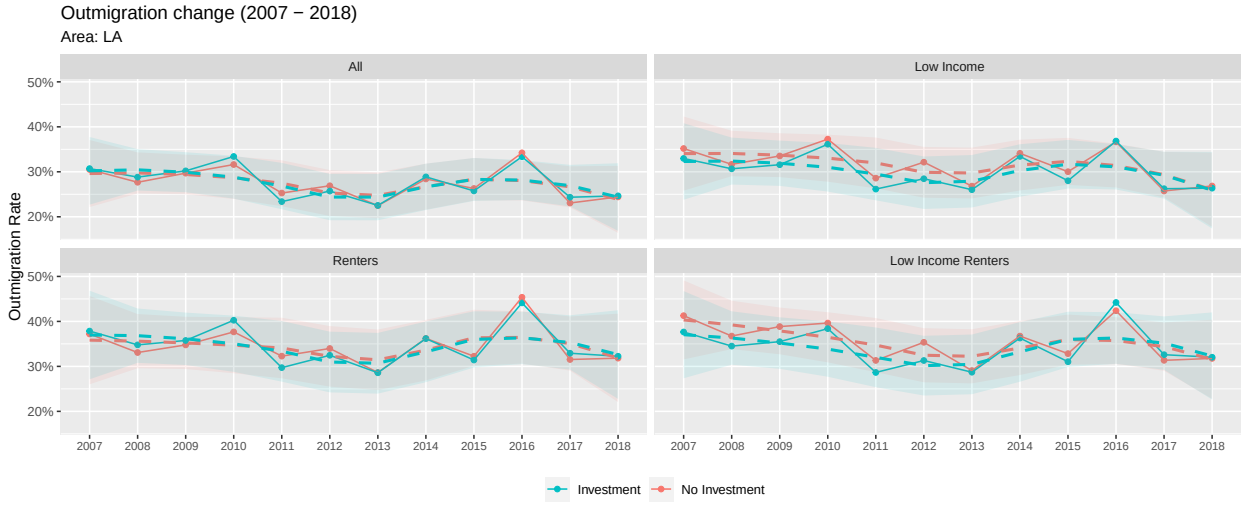
Table 11: NOAH by Investment in Area: LA

	Dependent variable:	
	noah_tot_change	noah_nolihtc_change
	(1)	(2)
investment1	−37.258	−30.090
	(22.574)	(22.105)
Constant	58.871***	71.395***
	(15.962)	(15.631)
Observations	116	116
R^2	0.023	0.016
Adjusted R^2	0.015	0.007
Residual Std. Error (df = 114)	121.562	119.039
F Statistic (df = 1; 114)	2.724	1.853
Note:		*p<0.1; **p<0.05; ***p<0.01

Outmigration Investigation (LA)



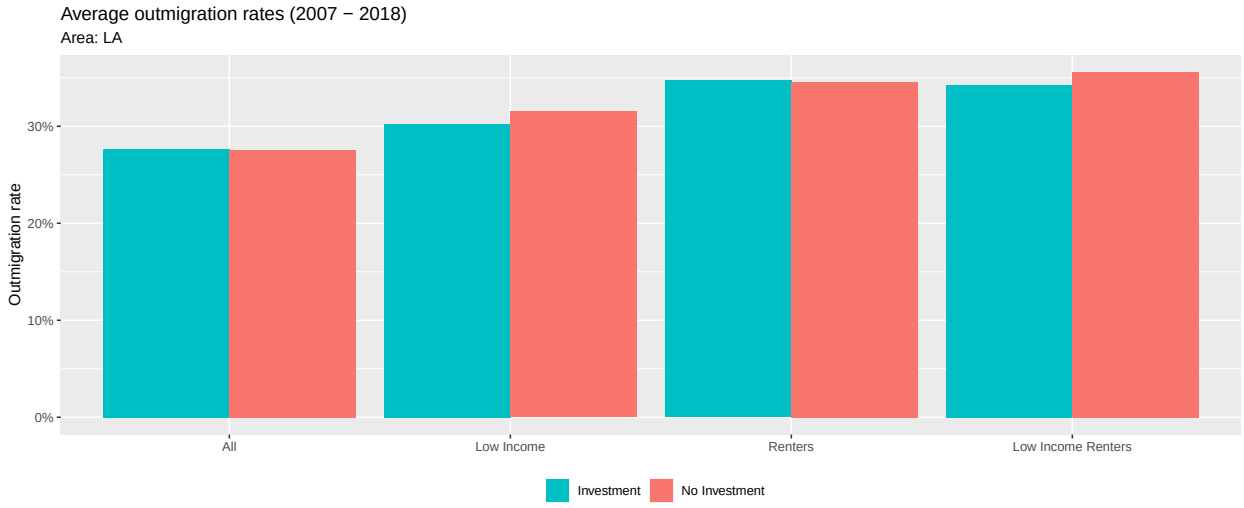


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Table 12: Outmigration Rates by Investment in Area: LA

	Dependent variable:			
	migration_rate			
	ALL	LOW INCOME	RENTER	LOW INCOME RENTER
	(1)	(2)	(3)	(4)
investment1	−0.001	−0.004	0.002	−0.002
	(0.005)	(0.005)	(0.005)	(0.005)
Constant	0.288***	0.318***	0.365***	0.367***
	(0.003)	(0.004)	(0.003)	(0.004)
Observations	1,391	1,382	1,391	1,375
R^2	0.00004	0.0004	0.0002	0.0001
Adjusted R^2	−0.001	−0.0004	−0.001	−0.001
Residual Std. Error	0.092 (df = 1389)	0.093 (df = 1380)	0.089 (df = 1389)	0.092 (df = 1373)
F Statistic	0.049 (df = 1; 1389)	0.505 (df = 1; 1380)	0.266 (df = 1; 1389)	0.134 (df = 1; 1373)
Note:				*p<0.1; **p<0.05; ***p<0.01

FRESNO

Summary

- **NOAH**: The Fresno NOAH investigation shows that neighborhoods with investments saw a slower increase in the quantity of NOAH units between 2009 and 2016 than those without. This trend is mostly maintained when considering only non-LIHTC NOAH units. A linear regression demonstrates that the presence of investments indicates a negative change in NOAH units (this is not statistically significant). This trend is reversed when considering only non-LIHTC units (this is not statistically significant). The NOAH summary tables break down this relationship by investment type, and then by the specific investment cases.

- **Outmigration**

  - `Overall Patterns`: See the summary tables for Fresno outmigration rates, including by investment type and by specific investment. Both tables show neighborhood trends based on the presence of the investment/investment type.
  - `Outmigration All`: Both time series and bar plots indicate that slightly higher outmigration rates are generally associated with the presence of investments, and a linear regression confirms this relationship with a 2.9% increase (this result is statistically significant at $p<0.01$).
  - `Outmigration Low Income`: Both time series and bar plots indicate that slightly higher outmigration rates are generally associated with the presence of investments, and a linear regression confirms this relationship with a 3.2% increase (this result is statistically significant at $p<0.01$).
  - `Outmigration Renters`: Both time series and bar plots indicate that slightly higher outmigration rates are generally associated with the presence of investments, and a linear regression confirms this relationship with a 1.4% increase (this result is statistically significant at $p<0.01$).
  - `Outmigration Low Income Renters`: Both time series and bar plots indicate that slightly higher outmigration rates are generally associated with the presence of investments, and a linear regression confirms this relationship with a 1.4% increase (this result is statistically significant at $p<0.01$).

Summary Tables (FRESNO)

	Fresno Area NOAH % Change by Investment Type (2009 - 2016)	
	Total NOAH Units	No LIHTC NOAH Units
No Investment	***11.19%***	***13.21%***
Any Investment	8.92%	12.31%
Greening	NA	NA
Transit	8.92%	12.31%
Urban Infill	-3.73%	1.73%
Active Transportation	NA	NA

	Fresno Area Overall Average Outmigration Rate by Investment Type (2007 - 2018)			
	Total	Low Income	Renters	Low Income Renters
No Investment	***30.54%***	***37.50%***	***41.48%***	***44.16%***
Any Investment	34.13%	39.36%	43.78%	44.79%
Greening	46.19%	46.35%	46.40%	46.38%
Transit	34.13%	39.36%	43.78%	44.79%
Urban Infill	42.93%	43.62%	44.12%	44.83%
Active Transportation	46.19%	46.35%	46.40%	46.38%

	Fresno Area NOAH % Change by Investment (2009 - 2016)	
	Total NOAH Units	No LIHTC NOAH Units
No Investment	***11.19%***	***13.21%***
Any Investment	8.92%	12.31%
1612 Fulton St (Granville Properties)	NA	NA
Brio On Broadway (Granville Properties)	NA	NA
Bungalow Court (Granville Properties)	-3.73%	1.73%
Crichton Place (Granville Properties)	-3.73%	1.73%
Cultural Arts District Park	NA	NA
Fresno BRT Route	8.92%	12.31%
Fulton Mall Reconstruction Project	NA	NA
Fulton Village (Granville Properties)	NA	NA
The Lede (Granville Properties)	NA	NA
Van Ness Cottages (Granville Properties)	-3.73%	1.73%

	Fresno Area Overall Average Outmigration Rate by Investment (2007 - 2018)			
	Total	Low Income	Renters	Low Income Renters
No Investment	***30.54%***	***37.50%***	***41.48%***	***44.16%***
Any Investment	34.13%	39.36%	43.78%	44.79%
1612 Fulton St (Granville Properties)	46.19%	46.35%	46.40%	46.38%
Brio On Broadway (Granville Properties)	46.19%	46.35%	46.40%	46.38%
Bungalow Court (Granville Properties)	42.71%	43.42%	43.96%	44.71%
Crichton Place (Granville Properties)	42.71%	43.42%	43.96%	44.71%
Cultural Arts District Park	46.19%	46.35%	46.40%	46.38%
Fresno BRT Route	34.13%	39.36%	43.78%	44.79%
Fulton Mall Reconstruction Project	46.19%	46.35%	46.40%	46.38%
Fulton Village (Granville Properties)	46.19%	46.35%	46.40%	46.38%
The Lede (Granville Properties)	46.19%	46.35%	46.40%	46.38%
Van Ness Cottages (Granville Properties)	42.71%	43.42%	43.96%	44.71%

NOAH Investigation (FRESNO)

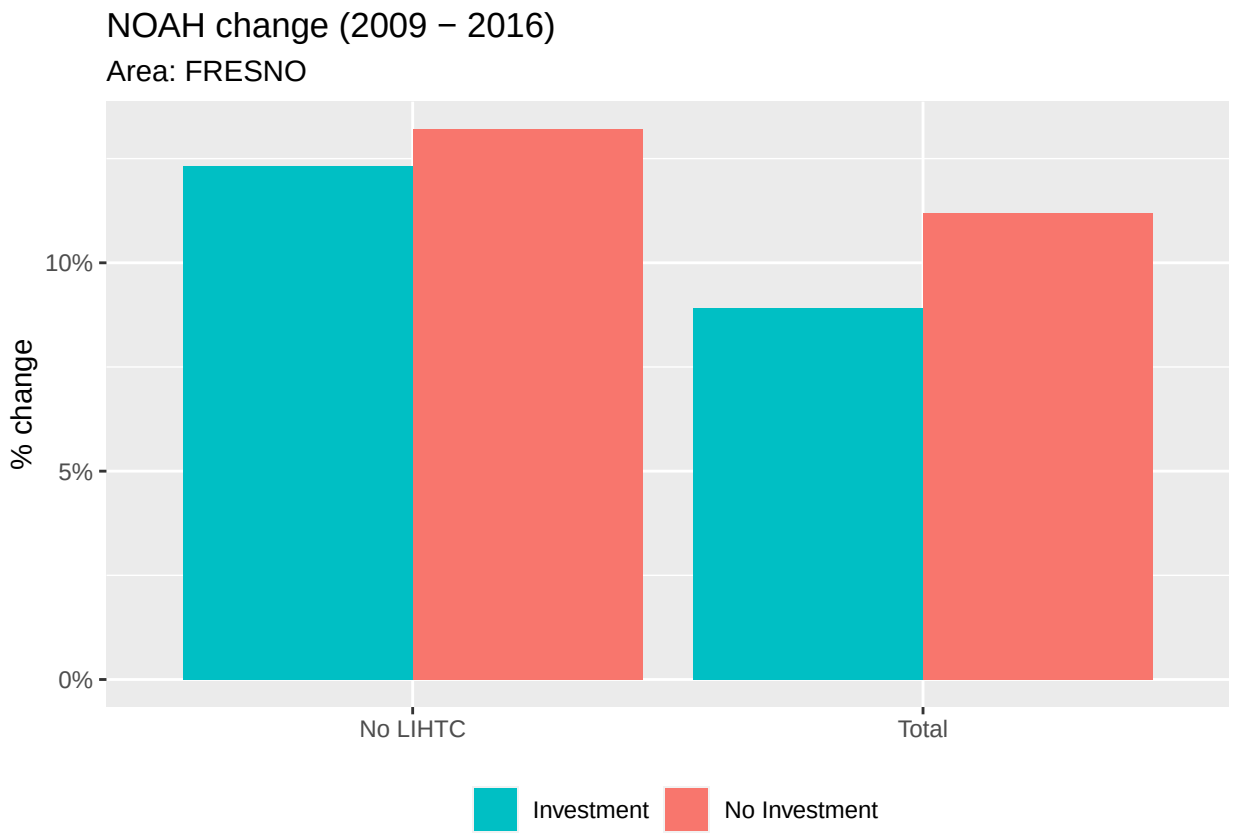

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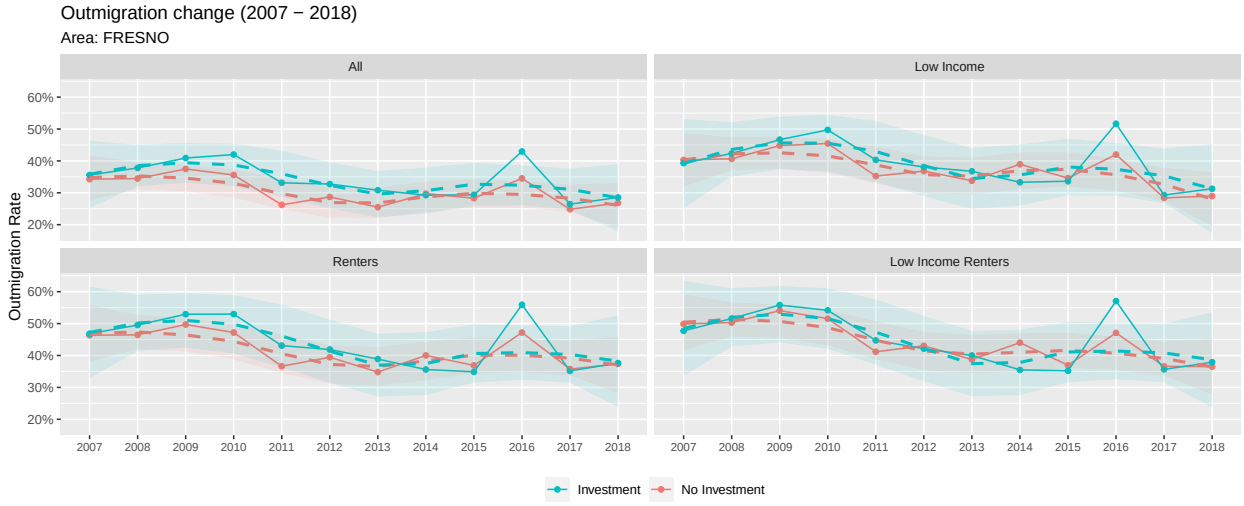
Table 13: NOAH by Investment in Area: FRESNO

	Dependent variable:	
	noah_tot_change	noah_nolihtc_change
	(1)	(2)
investment1	−4.908	0.913
	(42.715)	(42.650)
Constant	58.476*	76.203**
	(30.204)	(30.158)
Observations	52	52
R^2	0.0003	0.00001
Adjusted R^2	−0.020	−0.020
Residual Std. Error (df = 50)	154.011	153.778
F Statistic (df = 1; 50)	0.013	0.0005
Note:		*p<0.1; **p<0.05; ***p<0.01

Outmigration Investigation (FRESNO)



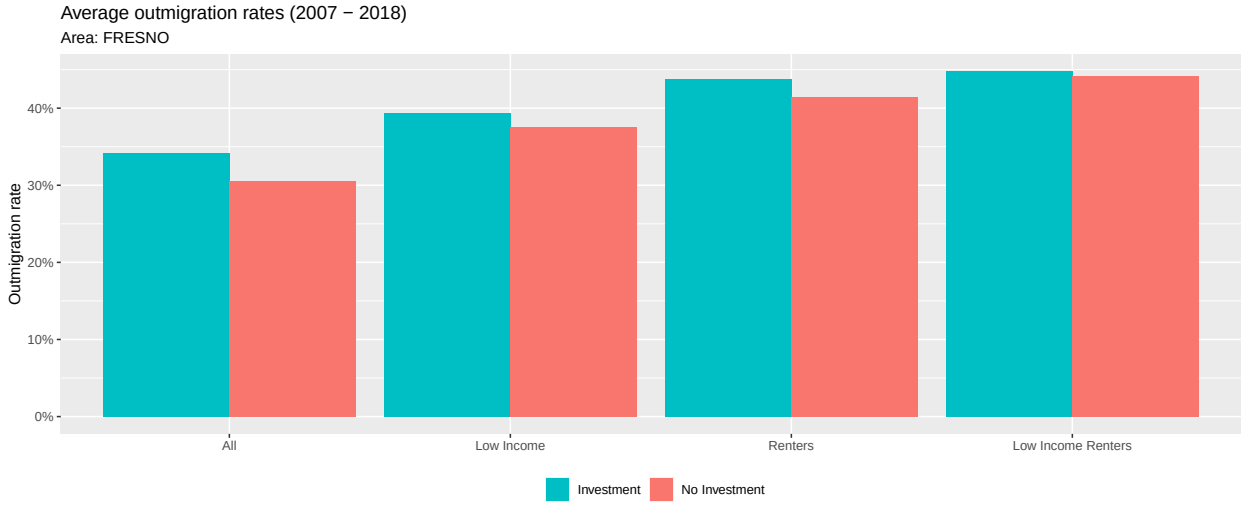


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Table 14: Outmigration Rates by Investment in Area: FRESNO

	Dependent variable:			
	migration_rate			
	ALL	LOW INCOME	RENTER	LOW INCOME RENTER
	(1)	(2)	(3)	(4)
investment1	0.029***	0.032***	0.014**	0.014*
	(0.006)	(0.008)	(0.006)	(0.008)
Constant	0.308***	0.359***	0.422***	0.437***
	(0.005)	(0.006)	(0.005)	(0.006)
Observations	624	624	624	616
R^2	0.031	0.025	0.008	0.005
Adjusted R^2	0.030	0.024	0.006	0.004
Residual Std. Error	0.080 (df = 622)	0.100 (df = 622)	0.080 (df = 622)	0.098 (df = 614)
F Statistic	20.034*** (df = 1; 622)	16.092*** (df = 1; 622)	4.833** (df = 1; 622)	3.366* (df = 1; 614)
Note:				*p<0.1; **p<0.05; ***p<0.01

SF BAY AREA

Summary

- **NOAH**: The SF Bay Area NOAH investigation shows that neighborhoods with investments saw a faster increase in the quantity of NOAH units between 2009 and 2016 than did neighborhoods without. This trend is maintained when only considering non-LIHTC NOAH units. This is a reversal of the general trend and trend seen in the other study areas. Conducting a linear regression shows that the presence of investments indicates a positive change in NOAH units (although this is not statistically significant). Again, this trend is maintained when considering only non-LIHTC units (this is not statistically significant). The NOAH summary tables break down this relationship by investment type, and then by the specific investment cases.

- **Outmigration**

  - `Overall Patterns`: See the summary tables for SF Bay Area outmigration rates, including by investment type and by specific investment. Both tables show neighborhood trends based on the presence of the investment/investment type.
  - `Outmigration All`: Both time series and bar plots indicate that higher outmigration rates are generally associated with the presence of investments, and a linear regression confirms this relationship with a 1.2% increase (this result is statistically significant at p<0.1).
  - `Outmigration Low Income`: The time series plot indicates a mixed relationship between investments and outmigration, while the bar plot indicates a slight trend towards decreased outmigration in investment neighborhoods. A linear regression demonstrates about a 0.3% increase in outmigration with the presence of an investment (this result is not statistically significant).
  - `Outmigration Renters`: The time series plot indicates a slightly negative relationship between investments and outmigration, and the bar plot indicates a slight trend towards decreased outmigration in investment neighborhoods. A linear regression confirms this, demonstrating about 1.1% decrease in outmigration with the presence of an investment (this result is statistically significant at p<0.1).
  - `Outmigration Low Income Renters`: The time series plot indicates a slightly negative relationship between investments and outmigration, and the bar plot indicates a slight trend towards decreased outmigration in investment neighborhoods. A linear regression confirms this, demonstrating about 1.4% decrease in outmigration with the presence of an investment (this result is statistically significant at p<0.1).

Summary Tables (SF BAY)

	SF Bay Area NOAH % Change by Investment Type (2009 - 2016)	
	Total NOAH Units	No LIHTC NOAH Units
No Investment	***25.01%***	***24.87%***
Any Investment	32.47%	36.29%
Greening	159.71%	90.72%
Transit	46.44%	50.72%
Urban Infill	-29.26%	-24.26%
Active Transportation	17.67%	20.74%

	SF Bay Area Overall Average Outmigration Rate by Investment Type (2007 - 2018)			
	Total	Low Income	Renters	Low Income Renters
No Investment	***28.19%***	***32.38%***	***38.77%***	***38.18%***
Any Investment	31.21%	31.33%	37.43%	35.66%
Greening	32.87%	35.33%	43.20%	42.39%
Transit	32.63%	32.96%	41.07%	39.95%
Urban Infill	23.35%	23.30%	24.09%	23.73%
Active Transportation	28.72%	29.04%	32.24%	30.79%

	SF Bay Area NOAH % Change by Investment (2009 - 2016)	
	Total NOAH Units	No LIHTC NOAH Units
No Investment	***25.01%***	***24.87%***
Any Investment	32.47%	36.29%
Concord Monument Blvd. Pedestrian Infrastructure Improvement Project	67.18%	68.00%
Ed Roberts Campus	-4.60%	-4.42%
Midtown Transportation and Streetscape Improvements	460.36%	179.26%
MacArthur Transit Village	-34.98%	-29.05%
South Sacramento Corridor Light Rail Extension Phase 2	62.96%	44.85%
Rumrill Sports Park	47.61%	21.14%
San Leandro Downtown BART Interface	-1.04%	-1.00%
SFMTA Third Street Light Rail	33.05%	55.38%

	SF Bay Area Overall Average Outmigration Rate by Investment (2007 - 2018)			
	Total	Low Income	Renters	Low Income Renters
No Investment	***28.19%***	***32.38%***	***38.77%***	***38.18%***
Any Investment	31.21%	31.33%	37.43%	35.66%
Concord Monument Blvd. Pedestrian Infrastructure Improvement Project	31.85%	34.50%	39.08%	39.17%
Ed Roberts Campus	30.63%	34.56%	39.95%	40.30%
Midtown Transportation and Streetscape Improvements	33.45%	37.03%	43.61%	42.88%
MacArthur Transit Village	22.58%	22.50%	22.94%	22.71%
South Sacramento Corridor Light Rail Extension Phase 2	30.49%	33.87%	43.62%	43.70%
Rumrill Sports Park	29.99%	30.92%	41.11%	41.18%
San Leandro Downtown BART Interface	31.11%	33.18%	37.36%	37.71%
SFMTA Third Street Light Rail	33.60%	32.69%	40.43%	38.95%

NOAH Investigation (SF)

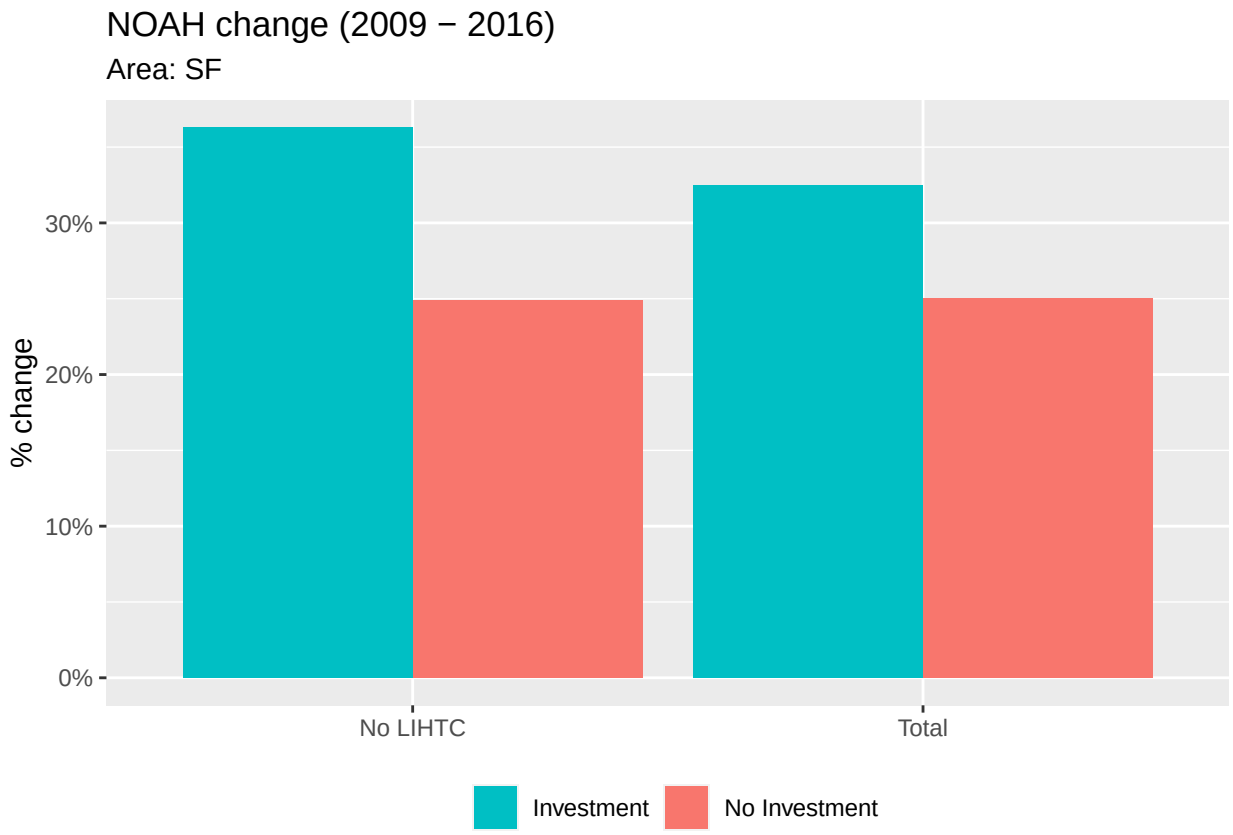

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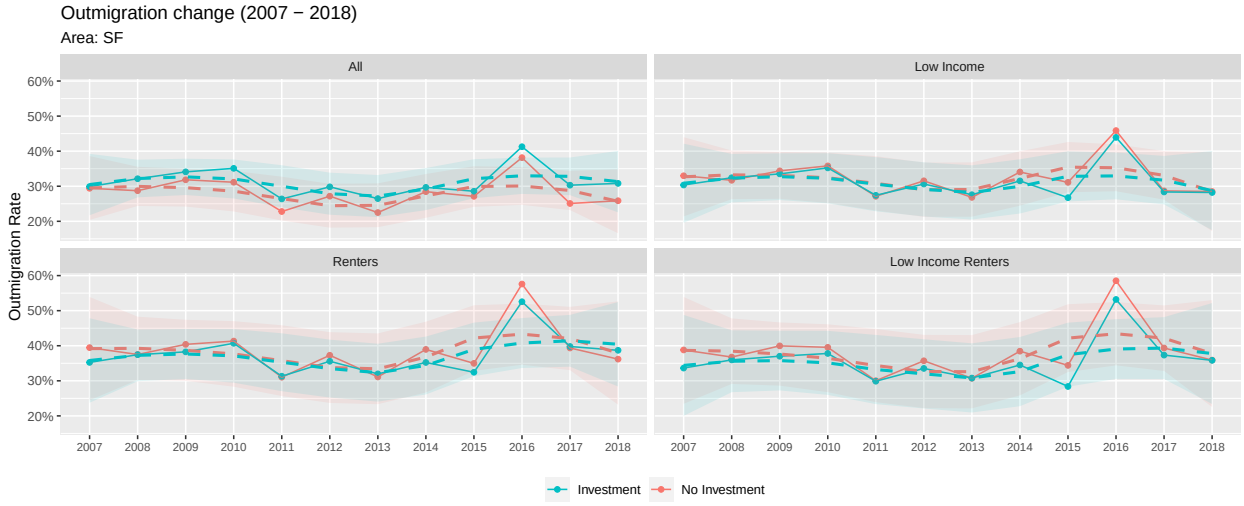
Table 15: NOAH by Investment in Area: SF

	Dependent variable:	
	noah_tot_change	noah_nolihtc_change
	(1)	(2)
investment1	31.087	71.367
	(48.410)	(50.684)
Constant	84.152**	92.186**
	(34.231)	(35.839)
Observations	52	52
R^2	0.008	0.038
Adjusted R^2	−0.012	0.019
Residual Std. Error (df = 50)	174.544	182.744
F Statistic (df = 1; 50)	0.412	1.983
Note:		*p<0.1; **p<0.05; ***p<0.01

Outmigration Investigation (SF)



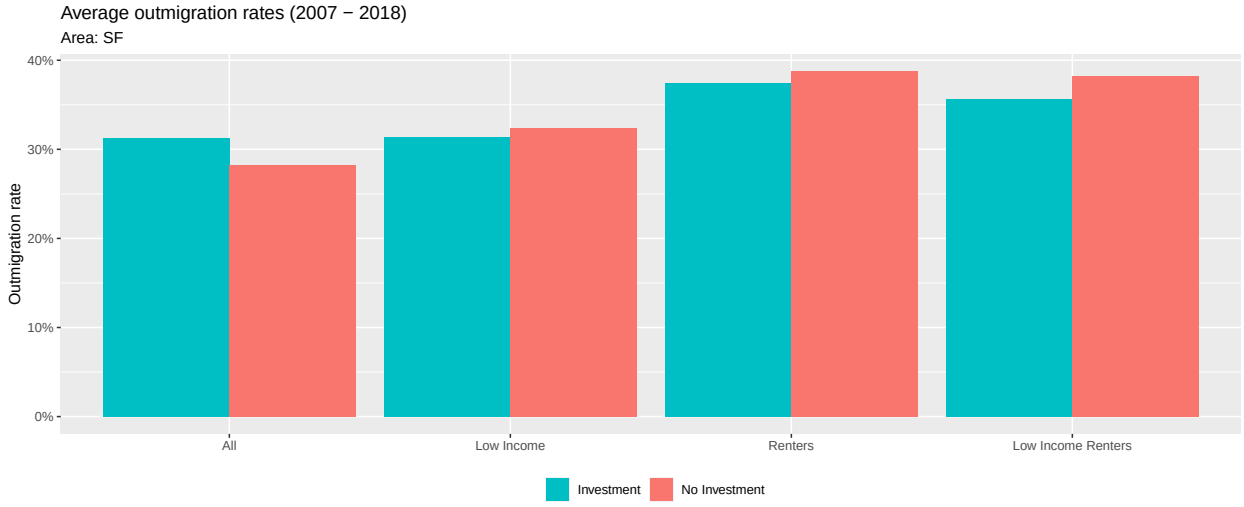


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Table 16: Outmigration Rates by Investment in Area: SF

	Dependent variable:			
	migration_rate			
	ALL	LOW INCOME	RENTER	LOW INCOME RENTER
	(1)	(2)	(3)	(4)
investment1	0.012^{*}	0.003	-0.011^{*}	-0.014^{*}
	(0.007)	(0.007)	(0.007)	(0.008)
Constant	0.288^{***}	0.326^{***}	0.410^{***}	0.414^{***}
	(0.005)	(0.005)	(0.005)	(0.005)
Observations	624	619	623	610
R^2	0.005	0.0002	0.004	0.006
Adjusted R^2	0.004	−0.001	0.003	0.004
Residual Std. Error	0.085 (df = 622)	0.091 (df = 617)	0.083 (df = 621)	0.093 (df = 608)
F Statistic	3.392^{*} (df = 1; 622)	0.143 (df = 1; 617)	2.790^{*} (df = 1; 621)	3.596^{*} (df = 1; 608)
Note:				*p<0.1; **p<0.05; ***p<0.01