

# Do Choice Schools Break the Link Between Public Schools and Property Values: Evidence from House Prices in New York City

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# Motivation

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- Growing policy interest in increasing school choices available to students within their school district.
- Very little attention has been paid to how these 'choice' schools are shaping the housing market, which is a key indicator of how this policy is changing residential demand in a neighborhood.
- Large body of literature documenting zoned school quality is capitalized into housing values (Black and Machin, 2010; Nguyen-Hoang and Yinger, 2011).
- Little exploration on how incorporation of school choice in a school district distorts this relationship.

# Research Questions

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- How does the opening of a choice school affect housing values?
  - Does the opening of a choice school dampen the relationship between zoned school quality and housing values?
  - What is the direct effect on housing values of the opening choice school?

*Three supplemental questions:*

- Is there a parallel effect for closures of choice schools?
- Do characteristics other than test scores matter?
- Does the quality of the choice school matter?

# Preview of Findings

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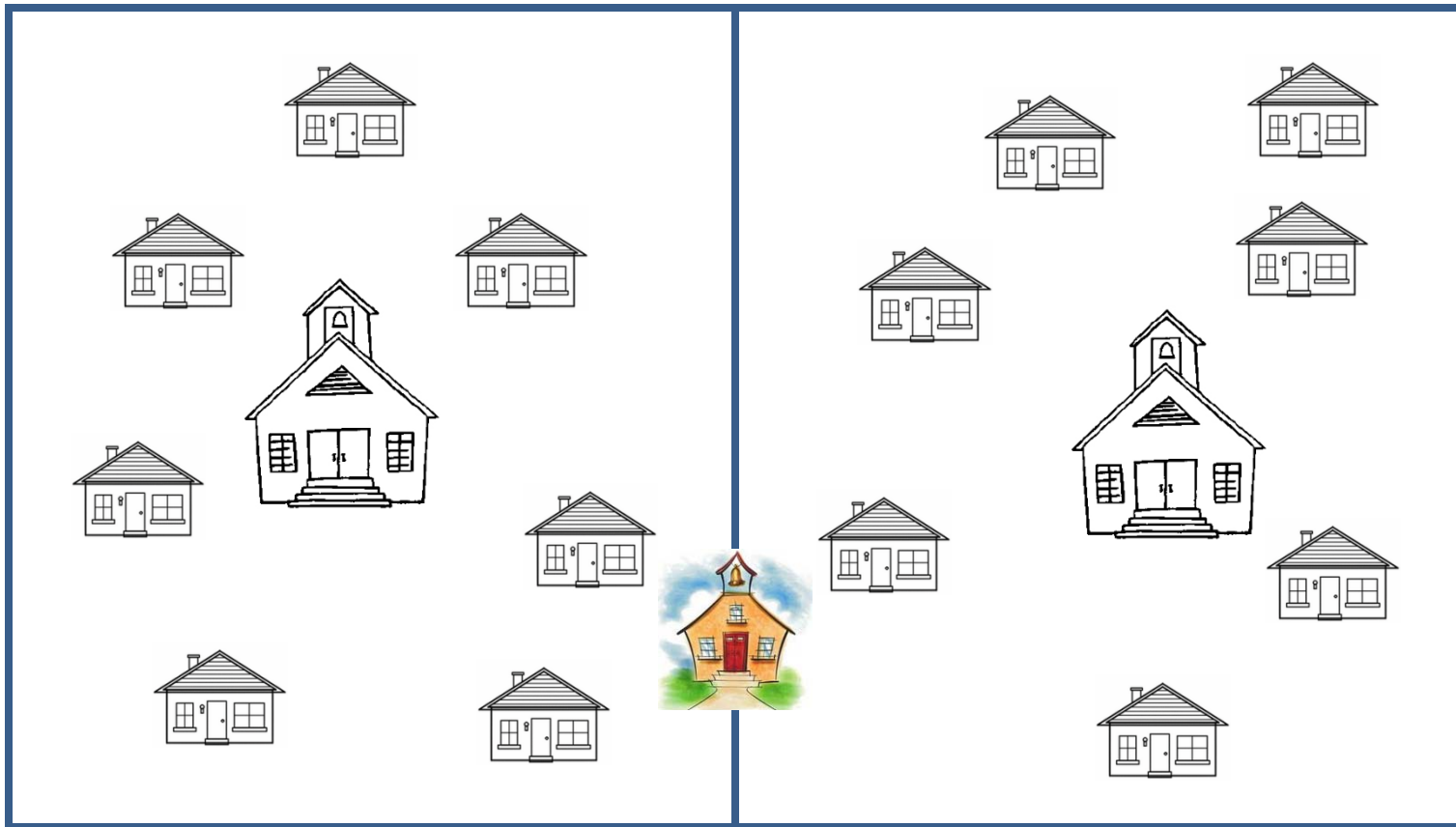
- Proximity of alternative school choices does dampen the relationship between the zoned elementary school and property values.
  - Reduces capitalization rate by approximately 1/3<sup>rd</sup>.
- Opening of a choice school is positively capitalized into housing values.
  - Opening of a choice school is associated with a 2% increase in housing values.
- The quality of the choice school also affects property values.
  - Higher performing choice schools are associated with increases in property values.

# Motivating relationship

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School Zone A

School Zone B



# Motivating relationship

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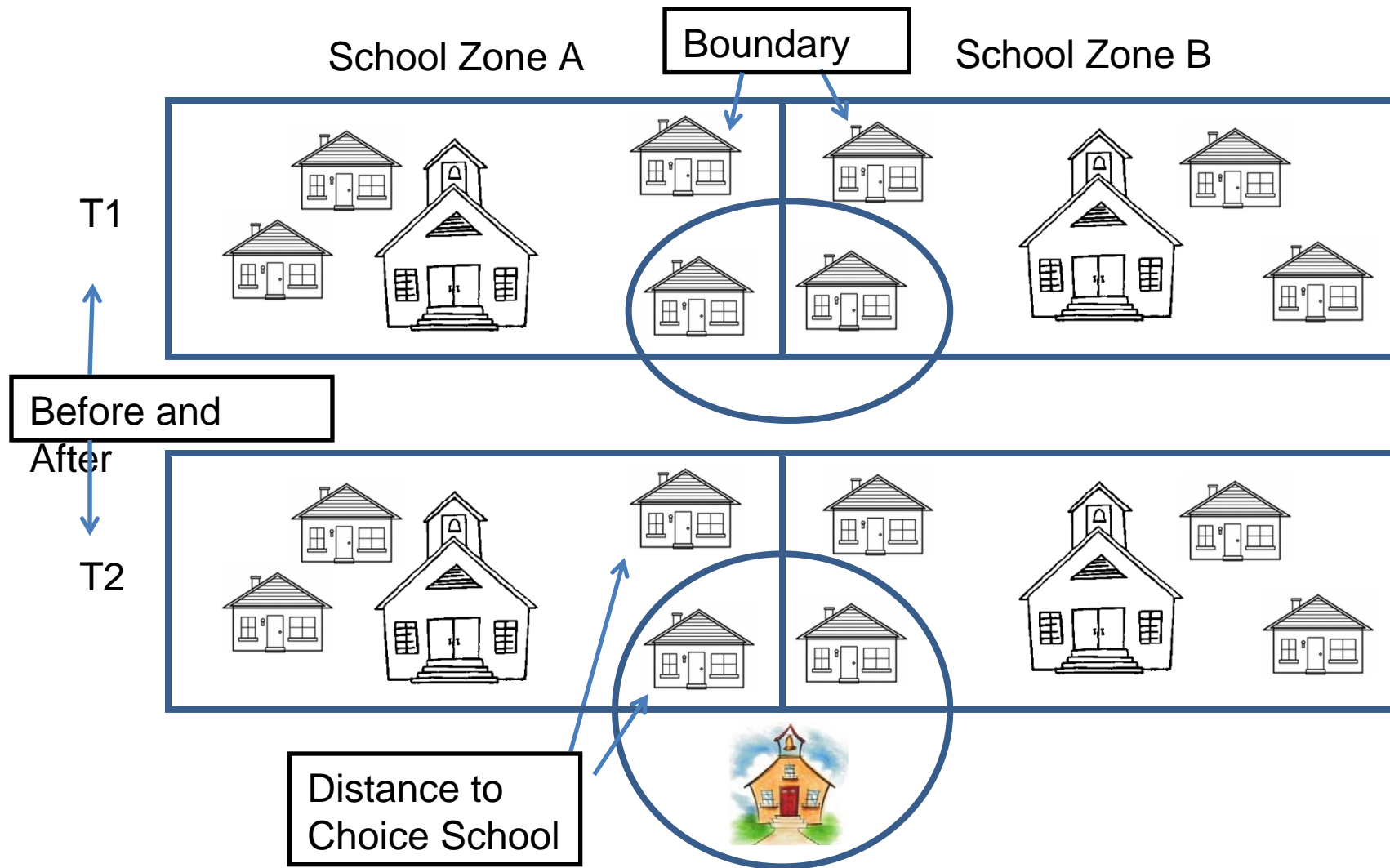
- Choice schools predicted to dampen relationship between zoned school and housing values
  - By delinking school attendance from a household's residential address, this could reduce the willingness of parents to pay for a high performing zoned school, and make housing in lower performance zones relatively more valuable.
- Impact of choice school on overall housing values not as clear
  - If increasing choice makes neighborhood more attractive, then additional choices could increase property values. For example, by now offering schools with different pedagogies.
  - If viewed by residents as dis-amenity, could decrease housing values. For example, if choice schools are seen as bringing 'undesirable' children into the neighborhood.

# What do we know

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- Inter-district school choice programs on housing values
  - Reback (2005) and Brunner et al (2012) find that districts receiving students experience declines in housing values, and districts sending students experience increases in housing values
- Intra-district school choice programs on housing values
  - Machin and Salvanes (2010) valuations to school performance fall by over 50 percent after all high schools in the district become choice schools
  - Chisesi (2012) property values in initial low-quality school attendance zones increase while property values in initially high quality zones decline
- Increasing option of choice schools
  - Fack and Grenet (2010) investigate impact of private middle schools on real estate in Paris school district, finding an increase in number of private schools is linked to decreased capitalization of public school performance into residential property values

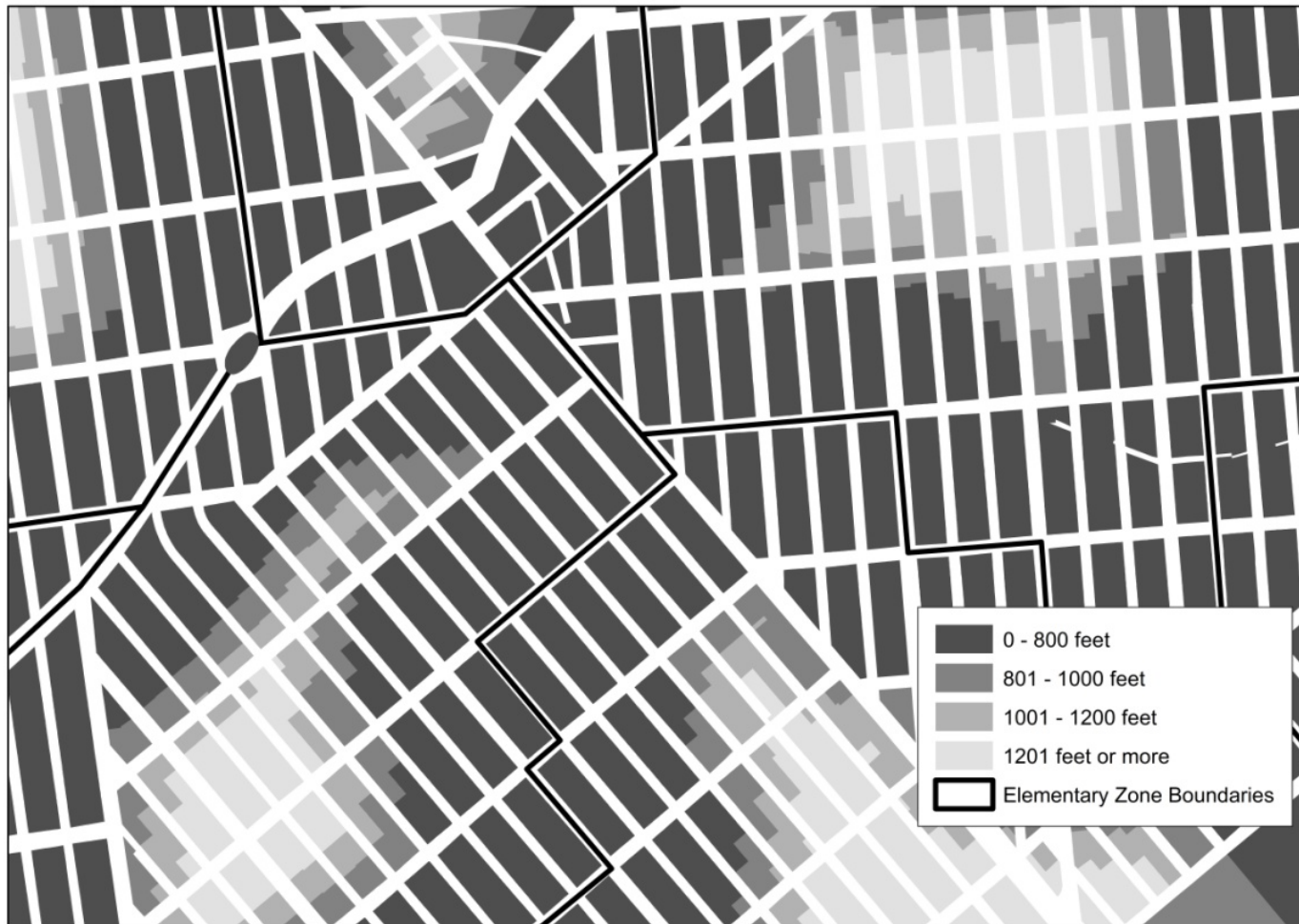
# Difference in Difference and Boundary Discontinuity





# Constructing 'Boundary Groups'

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# Methods

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$$\begin{aligned} \ln P_{izkdt} = & \alpha + \beta X_{izkdt} + \varphi^z \text{Test}_{zdt-1}^z \\ & + \lambda \text{Ever\_C}_i + \gamma \text{Ever\_C}_i * \text{Test}_{zdt-1}^z \\ & + \theta \text{Post\_C}_{it} + \eta \text{Post\_C}_{it} * \text{Test}_{zdt-1}^z \\ & + \rho_{dt} V_{dt} + \omega_k + \varepsilon_{izkdt} \end{aligned}$$

i	unit of property
z	school zone
k	boundary group
d	community school district
t	time period

# Methods

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$$\begin{aligned} \ln P_{izkdt} = & \alpha + \beta X_{izkdt} + \phi^z \text{Test}_{zdt-1}^z \\ & + \lambda \text{Ever\_C}_i + \gamma \text{Ever\_C}_i * \text{Test}_{zdt-1}^z \\ & + \theta \text{Post\_C}_{it} + \eta \text{Post\_C}_{it} * \text{Test}_{zdt-1}^z \\ & + \rho_{dt} V_{dt} + \omega_k + \varepsilon_{izkdt} \end{aligned}$$

$\ln P$	log of sales price per units of property
$X$	vector of property-related characteristics
$\text{Test}$	average math and ELA proficiency rates
$\text{Ever\_C}$	indicator variable if ever near choice school
$\text{Post\_C}$	indicator variable if near open choice school
$V$	indicator variable for quarter and district of sale
$\omega$	boundary group fixed effect

# Data

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- Property Sales between 1989 and 2004
  - Over 350,000 sales, spread across 32 community school districts
  - Includes apartment buildings, condominium apartments and single-family homes

# Sales data

**Table 1**

Characteristics of residential properties sold.

	Percentage of all property sales <sup>a</sup>	Percentage of property sales within 3000 ft of one choice school	Percentage of property sales within 3000 ft of two or more choice schools
<i>Price per unit<sup>b</sup></i>	\$253,579	\$319,163	\$241,016
<i>Borough</i>			
Manhattan	10.1%	29.5%	34.4%
Bronx	9.5%	14%	36.4%
Brooklyn	30.9%	32.5%	28.3%
Queens	37.1%	19.6%	0.9%
Staten Island	12.5%	4.5%	0%
<i>Building class<sup>c</sup></i>			
Single-family detached	25.9%	12.9%	4.3%
Single-family attached	15.2%	8.8%	5.6%
Two-family	29.9%	28.2%	25.9%
Walk-up apartments	13%	19%	31.4%
Elevator apartments	0.4%	1%	2%
Loft buildings	0%	0.1%	0%
Condominiums	12.4%	26.1%	25.3%
Mixed-use, primarily residential (includes store or office plus residential units)	3.2%	4%	5.8%
<i>Other structural characteristics</i>			
Building age	61.6	69.3	78.6
Square feet per unit	1262	1191	1105
Garage	37.4%	20.4%	7.6%
Corner location	8.5%	6.5%	7.1%
Major alteration prior to sale	1.6%	3.5%	6.8%
Odd shape	11.7%	11.8%	11.1%
N = 352,291			

# Data

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- Property Sales between 1989 and 2004
  - Over 350,000 sales, spread across 32 community school districts
  - Includes apartment buildings, condominium apartments and single-family homes
- School characteristics between 1988 and 2003
  - Focus on elementary schools because of strong tie between residential location and choice of elementary school
  - Sample varies from 615 in 1988 to 700 elementary schools in 2003
  - Includes student proficiency rate, as well as information on student characteristics (race and free lunch eligibility), as well as school resources (teacher pupil ratio, share of teachers with more than 5 years experience)

# School characteristics

Table 2 School Characteristics

	All Schools			Zoned Schools			Choice Schools		
	1988	2003	Change* 1988- 2003	1988	2003	Change* 1988- 2003	1988	2003	Change* 1988- 2003
Mean % students passing math	62.8	56.4	-6.4	63.4	56.8	-6.6	53.4	52.7	-0.7
Mean % students passing reading	44.5	53.7	9.2	45.2	53.9	8.7	34.2	51.9	17.7
Mean % teachers with more than 5 years experience	80.4	52.7	-27.7	80.8	53.5	-27.3	75	45.3	-29.6
Mean % teachers with masters	66.9	78.2	11.3	67.5	78.4	10.9	57.2	76.4	19.3
Mean % teachers with less than 2 years in this school	11.6	35.7	24	11.3	34.5	23.2	16.3	46.4	30.1
Mean teacher-pupil ratio**	5.6	6.9	1.2	5.6	6.7	1.1	6	8.1	2.1
Mean school enrollment	753.3	749	-0.6	759.9	772.3	1.6	656	529.4	-19.3
Mean % of students who are:									
free lunch eligible	62.6	74	11.4	61.4	74.2	12.8	79.8	72.2	-7.6
White	23.4	16	-7.5	24.5	16.1	-8.4	7.6	14.6	7
Black	36	33.6	-2.4	35.9	33.3	-2.6	37.7	35.9	-1.8
Hispanic	33.9	38.3	4.4	32.7	37.9	5.2	51.2	41.7	-9.4
Asian	6.8	12.2	5.5	7	12.7	5.7	3.5	7.7	4.2
LEP	10.5	11.4	0.9	10.3	11.6	1.2	13	10	-3
N	615	700	85	576	633	57	39	67	28

\* For enrollment, this figure represents the percentage change in mean between the two years; for the other characteristics, this figure represents the change in mean between the two years.

\*\* Teacher-pupil ratio is expressed as teachers per 100 pupils.

# Data

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- Elementary school attendance zone boundaries



# Location of Choice Schools

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# NYC Choice School Context

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- Choice schools represent a variety of different types of schools including:
  - Talented and gifted schools
  - Alternative schools
  - Magnet schools
  - Charter schools
- Opened for a variety of different reasons
  - Need for new capacity
  - Desire to create new opportunities

# Results

**Table 4**

Impact of school performance on house prices, including boundary group fixed effects.

	<1200 ft		<1000 ft		<800 ft	
Pass rate zoned school	0.171	***	0.161	***	0.133	***
	(0.008)		(0.008)		(0.009)	
Building controls	X		X		X	
Boundary group fixed effects	X		X		X	
Community school district by quarter FE	X		X		X	
N	233,908		217,295		192,503	
R <sup>2</sup>	0.73		0.73		0.73	

*Notes:* Standard errors in parentheses. \*\*\* denotes 1% significance level; \*\* denotes 5% significance level; and \* denotes 10% significance level.

# Results

Table 5a Impact of Choice Schools on House Prices, before and after choice schools open

	<1,200 feet		<1,000 feet		<800 feet	
Pass Rate Zoned School	0.17919 ***		0.16762 ***		0.14037 ***	
	(0.00835)		(0.00868)		(0.00929)	
Ever Choice School	0.01499		0.00999		0.00944	
	(0.01165)		(0.01190)		(0.01246)	
Ever Choice School*Pass Rate Zoned School	-0.01114		-0.00168		-0.00467	
	(0.01936)		(0.01981)		(0.02089)	
Post Choice School	0.02463 **		0.02657 *		0.02233 *	
	(0.01185)		(0.01208)		(0.01260)	
Post Choice School*Pass Rate Zoned School	-0.05403 ***		-0.05631 ***		-0.04813 **	
	(0.02054)		(0.02099)		(0.02208)	
Building Controls	X		X		X	
Boundary Group Fixed Effects	X		X		X	
Community School District by Quarter FE	X		X		X	
N	233,908		217,295		192,503	
R <sup>2</sup>	0.73		0.73		0.73	

Notes:

Standard errors in parentheses. \*\*\* denotes 1% significance level; \*\* denotes 5% significance level; \* denotes 10% significance level

# Results

Table 5b Impact of Choice Schools on House Prices, before and after choice schools open

	<1,200 feet		<1,000 feet		<800 feet	
Pass Rate Zoned School	0.178	***	0.166	***	0.139	***
	(0.008)		(0.009)		(0.009)	
Ever Choice School	0.016		0.010		0.008	
	(0.012)		(0.012)		(0.013)	
Ever Choice School*Pass Rate Zoned School	-0.016		-0.005		-0.005	
	(0.020)		(0.020)		(0.021)	
Post Choice School	0.025	**	0.027	**	0.024	*
	(0.012)		(0.012)		(0.013)	
Post Choice School*Pass Rate Zoned School	-0.055	***	-0.058	***	-0.051	**
	(0.021)		(0.021)		(0.022)	
Closed Choice	-0.027	*	-0.024		-0.013	
	(0.015)		(0.016)		(0.016)	
Closed Choice*Pass Rate Zoned School	0.086	***	0.090	***	0.063	**
	(0.028)		(0.029)		(0.031)	
Building Controls	X		X		X	
Boundary Group Fixed Effects	X		X		X	
Community School District by Quarter FE	X		X		X	
N	233,908		217,295		192,503	
R <sup>2</sup>	0.73		0.73		0.73	

Notes:

Standard errors in parentheses. \*\*\* denotes 1% significance level; \*\* denotes 5% significance level; \* denotes 10% significance level

# Results

**Table 6**

Impact of choice school on house prices with detailed school characteristics.

	<1200 ft		<1000 ft		<800 ft	
Pass rate zoned school	0.119	***	0.115	***	0.097	***
	(0.010)		(0.011)		(0.011)	
% Black	−0.001	***	−0.001	***	−0.001	***
	(0.000)		(0.000)		(0.000)	
% Hispanic	−0.001	***	−0.001	***	−0.001	***
	(0.000)		(0.000)		(0.000)	
Total enrollment (logs)	−0.002		0.000		0.001	
	(0.003)		(0.003)		(0.003)	
Ever choice school	−0.055		−0.040		−0.010	
	(0.053)		(0.055)		(0.058)	
<i>Interactions with ever:</i>						
Pass rate zoned school	−0.010		−0.015		−0.025	
	(0.026)		(0.027)		(0.028)	
% Black	0.000	*	0.000	***	0.000	***
	(0.000)		(0.000)		(0.000)	
% Hispanic	0.000		0.000		0.000	
	(0.000)		(0.000)		(0.000)	
Total enrollment (logs)	0.012		0.011		0.008	
	(0.007)		(0.008)		(0.008)	
Post choice school	0.095		0.085		0.042	
	(0.061)		(0.062)		(0.065)	
<i>Interactions with post:</i>						
Pass rate zoned school	−0.069	**	−0.063	**	−0.053	*
	(0.029)		(0.029)		(0.031)	
% Black	0.000		0.000		0.000	
	(0.000)		(0.000)		(0.000)	
% Hispanic	0.000	**	0.000	*	0.000	*
	(0.000)		(0.000)		(0.000)	
Total enrollment (logs)	−0.006		−0.006		0.000	
	(0.008)		(0.009)		(0.009)	
Building controls	X		X		X	
Boundary group fixed effects	X		X		X	
Community school district by quarter FE	X		X		X	
N	233,908		217,295		192,503	
R <sup>2</sup>	0.73		0.73		0.73	

# Results

**Table 7**

Impact of choice schools on house prices, including performance at choice school.

	<1200 ft		<1000 ft		<800 ft	
Pass rate zoned school	0.183	***	0.171	***	0.144	***
	(0.008)		(0.009)		(0.009)	
Ever choice school	0.013		0.008		0.007	
	(0.012)		(0.012)		(0.012)	
Ever choice school * pass rate zoned school	−0.010		−0.000		−0.003	
	(0.019)		(0.020)		(0.021)	
Post choice school	0.015		0.016		0.012	
	(0.012)		(0.012)		(0.013)	
Post choice school * pass rate zoned school	−0.086	***	−0.092	***	−0.082	***
	(0.022)		(0.023)		(0.024)	
Pass rate choice school	0.054	***	0.060	***	0.058	***
	(0.015)		(0.015)		(0.016)	
Building controls	X		X		X	
Boundary group fixed effects	X		X		X	
Community school district by quarter FE	X		X		X	
N	233,908		217,295		192,503	
R <sup>2</sup>	0.73		0.73		0.73	

# Conclusions

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- We find evidence that the opening of a choice school weakens the relationship between housing values and the zoned elementary school by approximately one third
- We find evidence that the opening of a choice school is positively capitalized into housing values
- Incorporating quality of choice school – find a higher quality choice school associated with high values for nearby properties



# Analyzing the net effect

- House valued at \$100,000 and a choice school opens nearby (<800 feet)
- Zoned school has a performance of 54.3%
- Direct effect of choice school is to increase housing values by 2.23%
- Indirect effect through dampened relationship with zoned school is ( $-0.048 \times .543$ ), i.e., a decrease in housing value of 2.61%
- Leading to a net decrease of 0.38%, or \$380

# Analyzing the net effect (low performance zone)

- House valued at \$100,000 and a choice school opens nearby (<800 feet)
- Zoned school has a performance of 30%
- Direct effect of choice school is to increase housing values by 2.23%
- Indirect effect through dampened relationship with zoned school is  $(-0.048 \times .30)$ , i.e., a decrease in housing value by 1.44%
- Leading to a net increase of 0.79%, or \$790

# Next Questions

- Are urban school district choice programs attracting households to these areas, increasing demand for housing in these districts?
  - Some evidence from our research that choice schools are viewed as an amenity, as the primary effect is positive on nearby housing values, but does this translate to an overall positive impact for a city?
  - Perhaps if they are not attracting households, they may be able to retain higher income households in the city once they enter, and in this way keep demand for housing higher.
- Does increasing school choice reduce economic and racial segregation within school districts?
  - If there is now less of an incentive to sort across school attendance zone boundaries do we find decreased sorting by particular households across these borders?