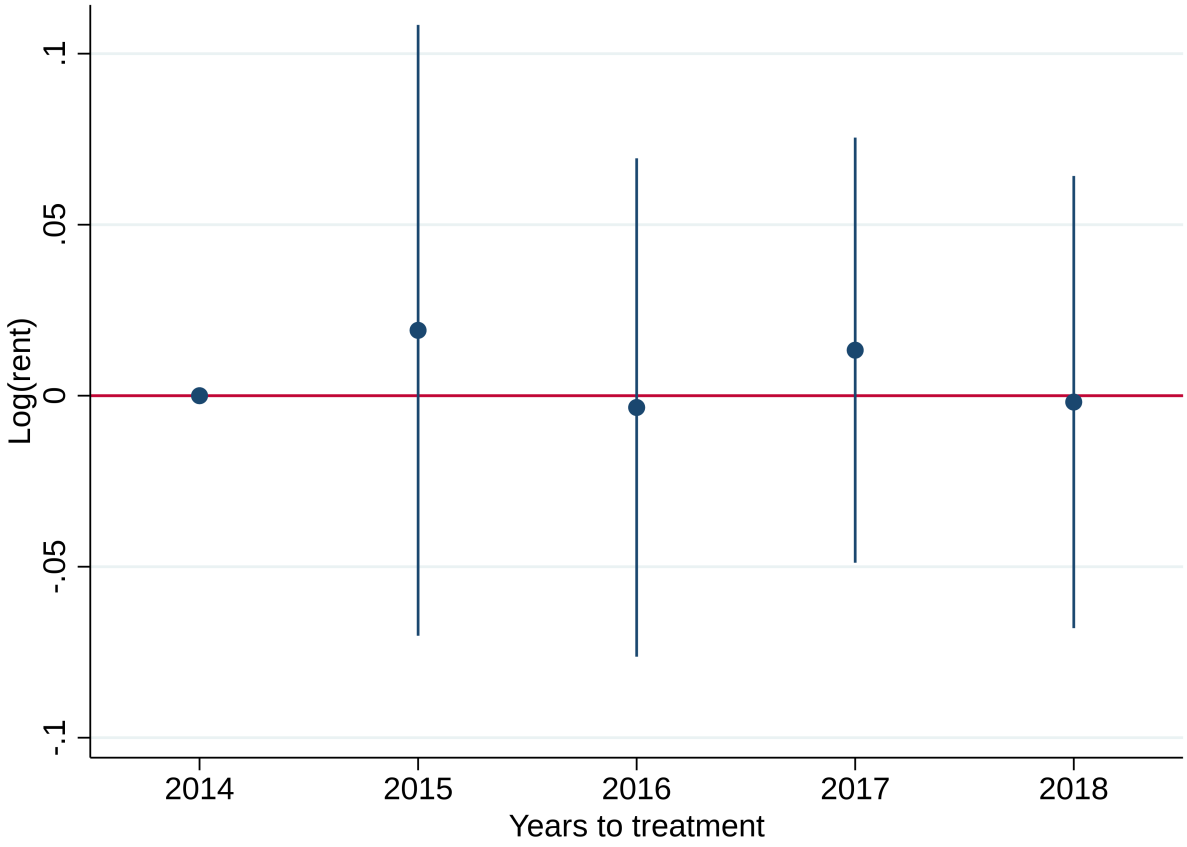
Figure A.11: Longer-Run Near-Far Effect for 2010–2013 buildings



Note: In this figure, we repeat the main near-far event study specification including only buildings completed before 2014. We restrict to the post-period and include year × treatment dummies instead of years-to-treatment dummies so that the sample composition underlying the dummies does not change.

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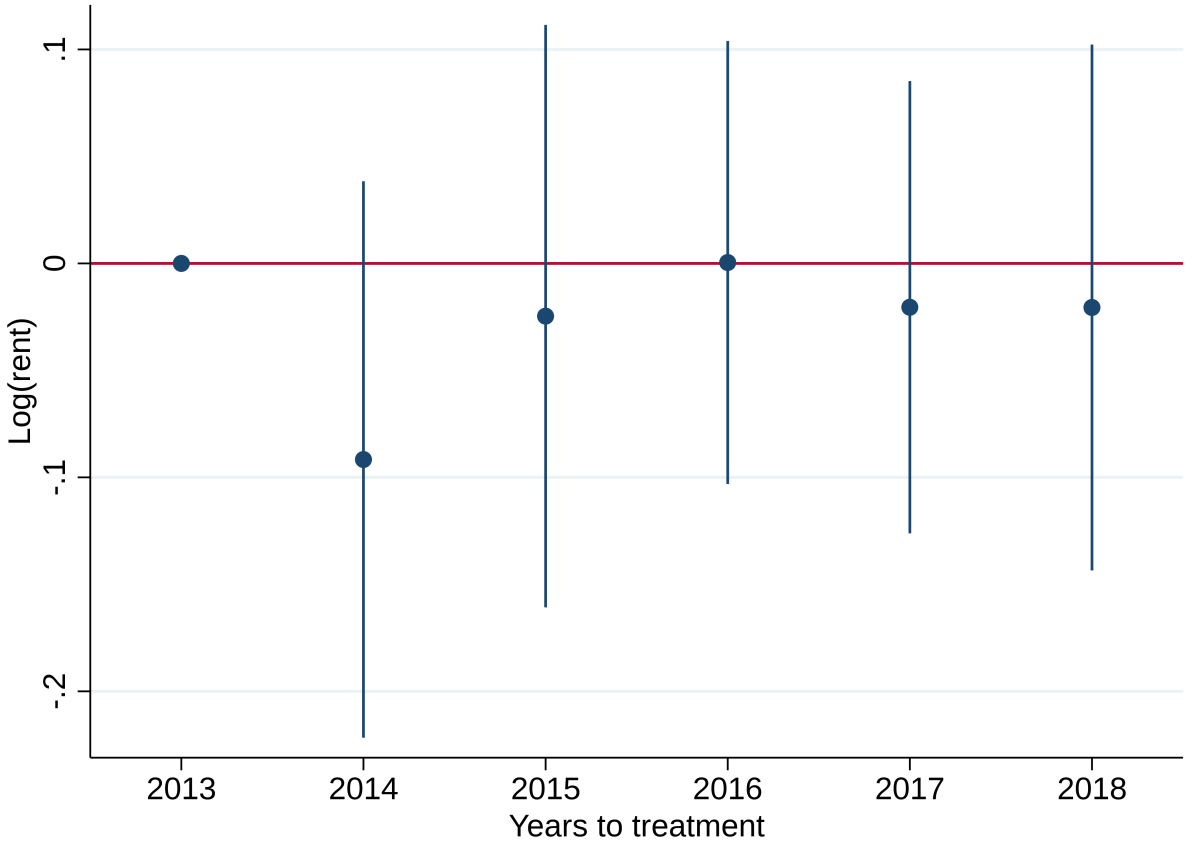
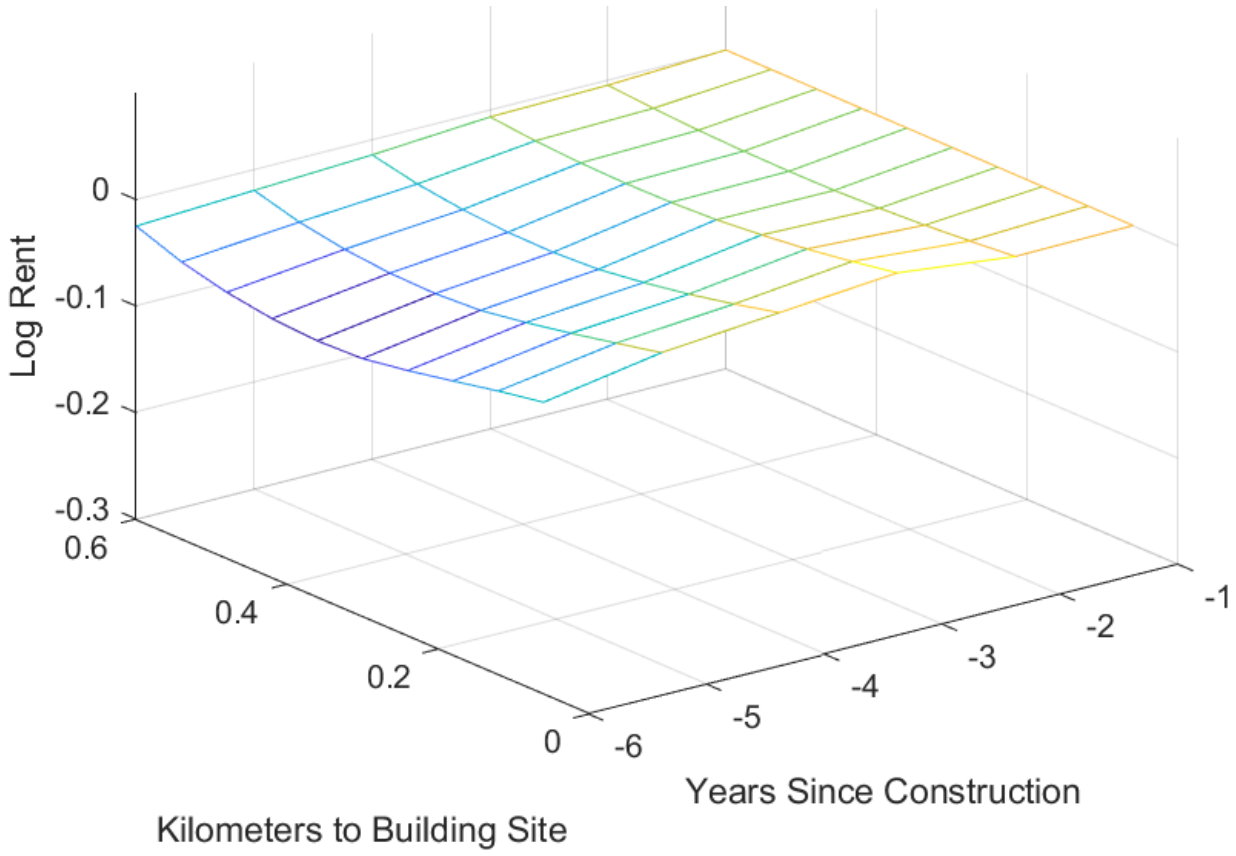
District of Columbia
CASE NO.20-18
EXHIBIT NO.43G3

Figure A.12: Longer Near-Far Pretrends for 2019 Buildings



Note: In this figure, we repeat the main near-far event study specification including only buildings completed in 2019. We restrict to the pre-period and note that the year × treatment dummies shown in the figure are equivalent to years-to-treatment dummies because there is only one year of treatment buildings.

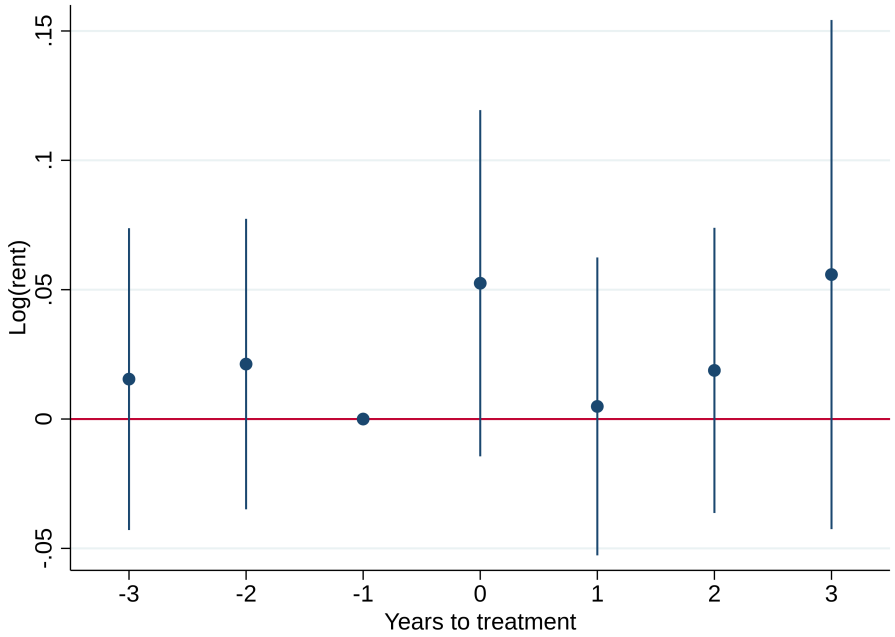
Figure A.13: Hyperlocal Price Pre-Trends in 2018-2019 Building Sites



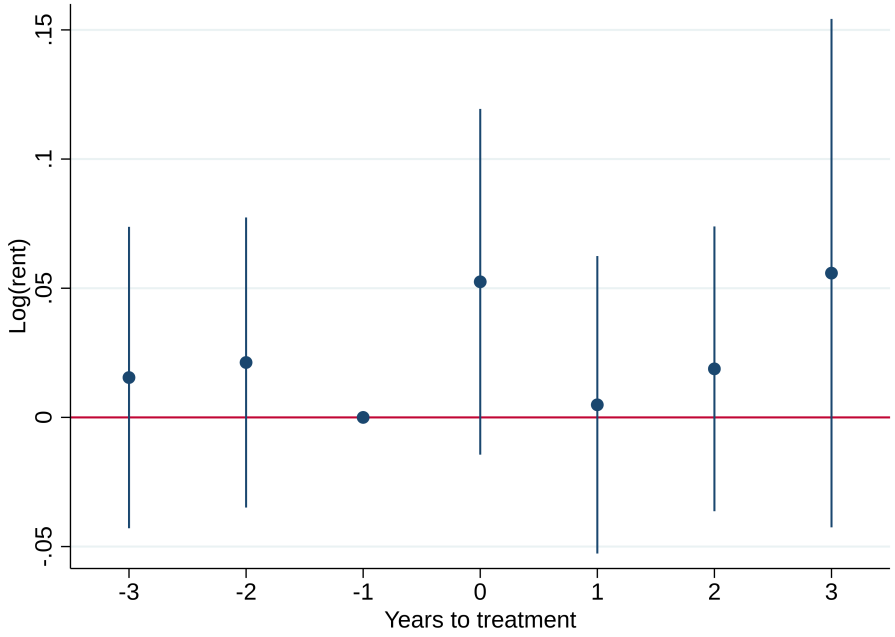
Note: This surface represents the pre-period treatment effect of new buildings completed in 2019. Further details are included in the Appendix.

Figure A.14: Near-Far Event Studies for Rent Outcome (All New Buildings)

Panel A: 250m Treatment Radius

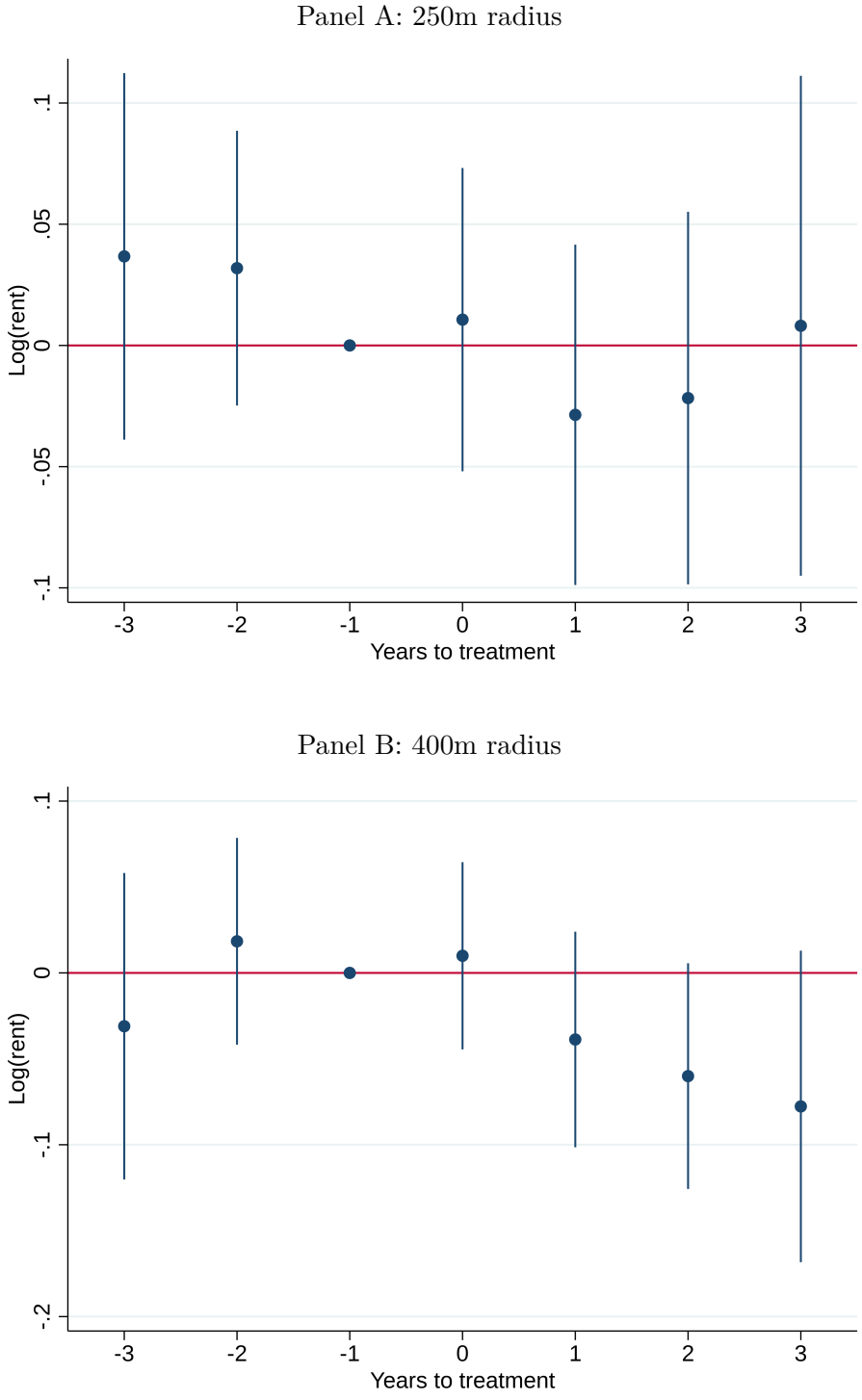


Panel A: 400m Treatment Radius



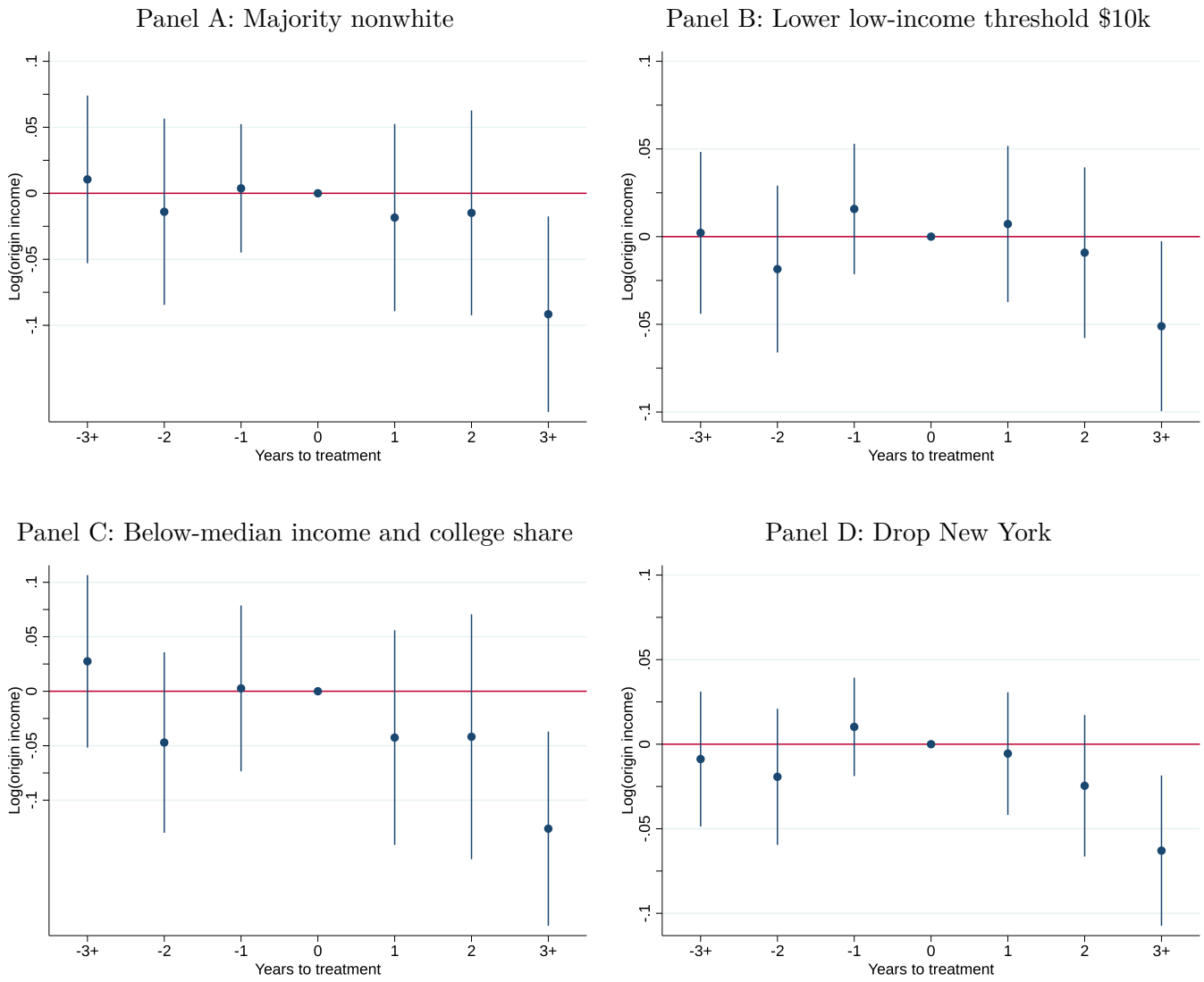
Note: This figure shows near-far results for the set of all new buildings. Panel A repeats the baseline near-far event study shown in Figure 3, while Panel B repeats the larger treatment radius robustness check shown in Figure A.6

Figure A.15: Near-Near Event Studies for Rent Outcome (All New Buildings)



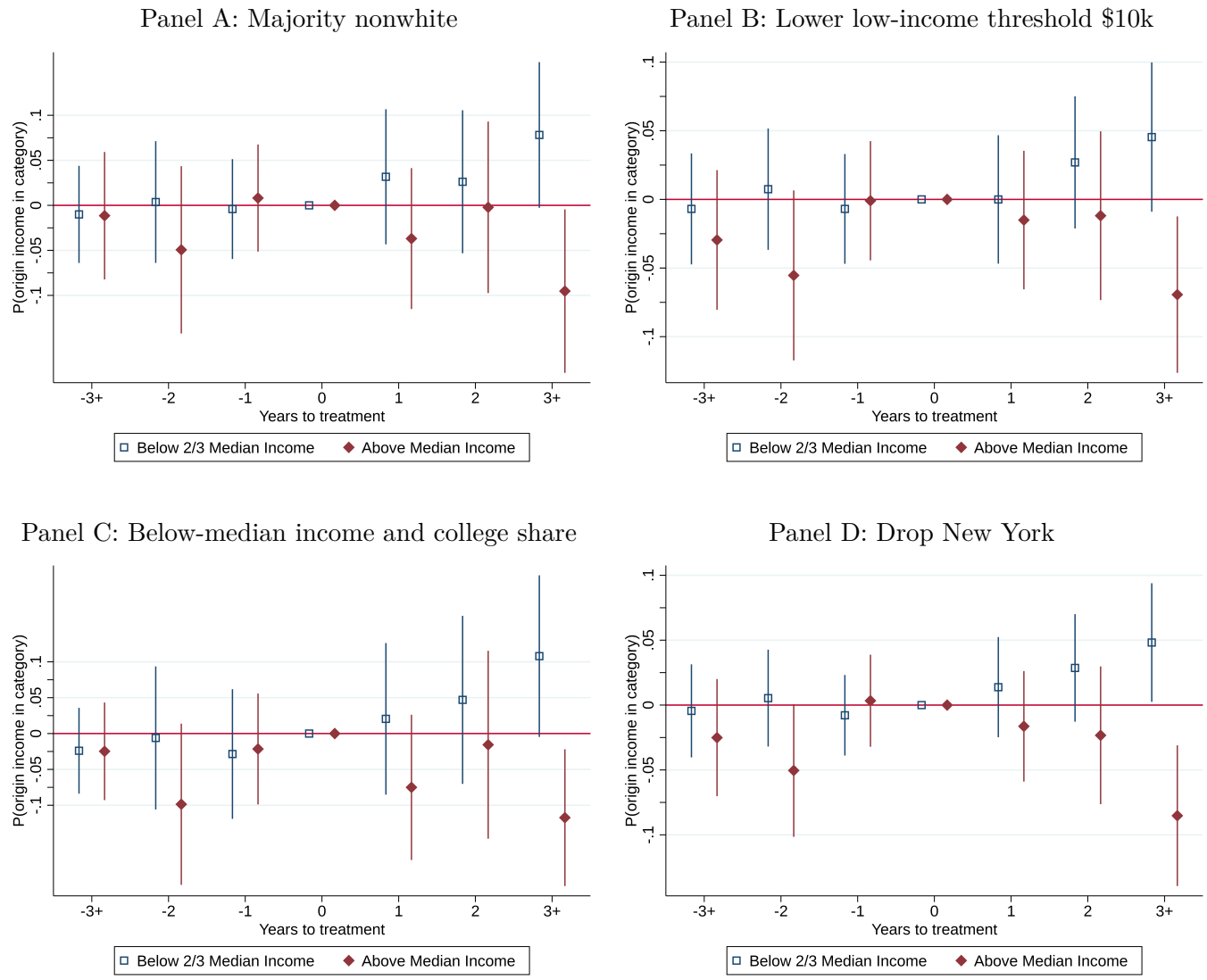
Note: This figure shows near-near results for the set of all new buildings. Panel A repeats the baseline near-far event study shown in Figure 4, while Panel B repeats the larger treatment radius robustness check shown in Figure A.7.

Figure A.16: Near-Near Event Study Robustness (Log(Origin Income))



Note: Each panel repeats the baseline near-near event study for log(origin income) shown in Panel A of Figure 5 with a change to the sample. Panel A drops buildings in tracts that are over 50% white, and Panel B lowers the income threshold by $10,000. Panel C requires that both tract income and college share be below the CBSA median, while Panel D drops observations in New York City.

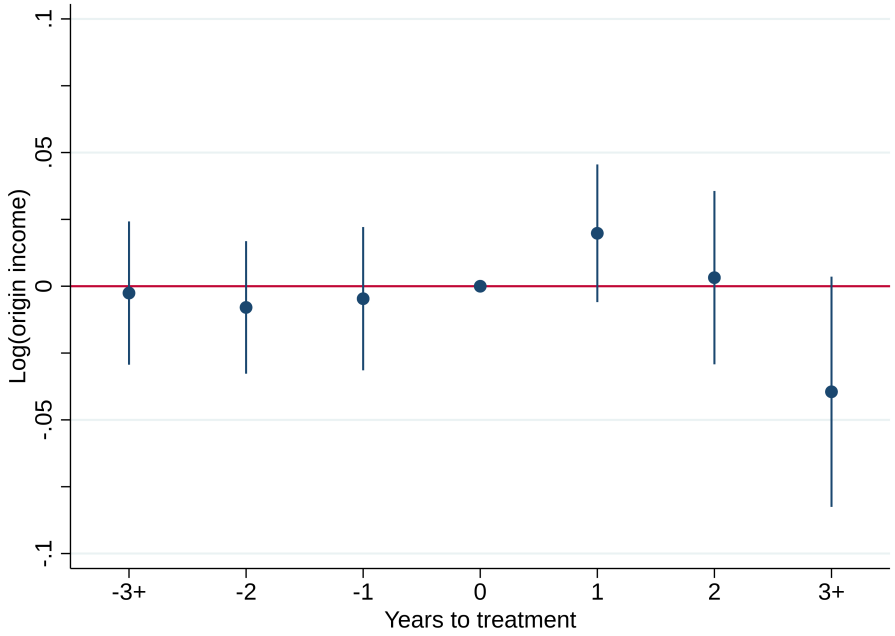
Figure A.17: Near-Near Event Study Robustness (High- and Low-Income Origins)



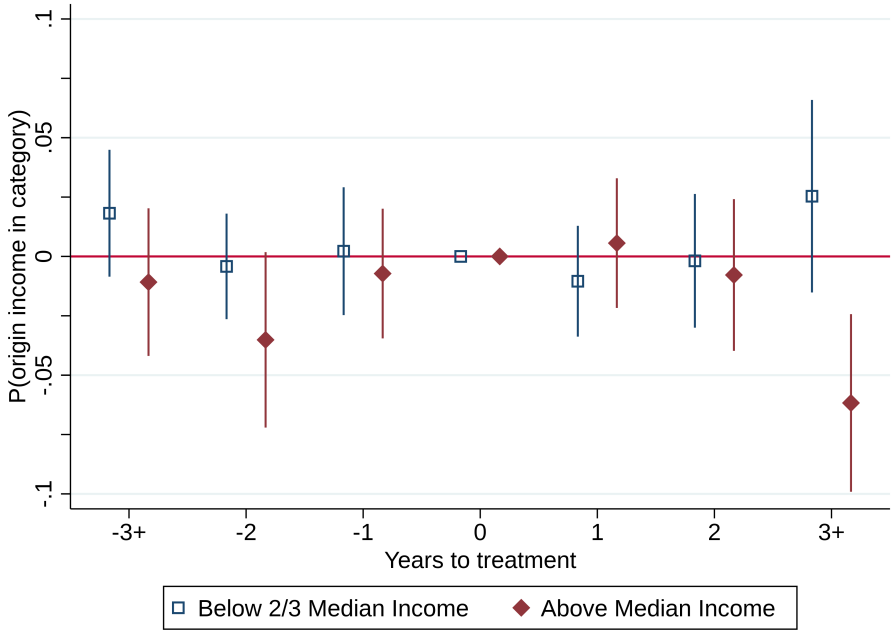
Note: Each panel repeats the baseline near-near event study for high- and low-income arrivals shown in Panel B of Figure 5 with a change to the sample. Panel A drops buildings in tracts that are over 50 percent white, and Panel B lowers the income threshold by $10,000. Panel C requires that both tract income and college share be below the CBSA median, while Panel D drops observations in New York City.

Figure A.18: Near-Near Event Studies for Migration Outcomes (400m Treatment Radius)

Panel A: Log(origin income)



Panel B: High and low-tracts



Note: This figure repeats the near-near event study shown in Figure 5 but increases the treatment radius from 250 meters to 400.

Table A.1: Mean Rents by Year and CBSA

	2013	*2014*	*2015*	*2016*	*2017*	*2018*
Atlanta, GA	1113	1174	1190	1314	1375	1477
Austin, TX	1309	1504	1581	1618	1636	1607
Chicago, IL	1680	1657	1947	1755	1680	1814
Denver, CO	1508	1688	1718	1730	1703	1762
Los Angeles, CA	1921	1965	2218	2431	2411	2309
New York, NY	3167	2692	2815	2849	2536	2187
Philadelphia, PA	1328	1235	1410	1399	1433	1458
Portland, OR	1339	1380	1513	1617	1595	1618
San Francisco, CA	2472	3103	3479	3621	3304	3304
Seattle, WA	1522	1581	1677	1847	1912	1912
Washington, DC	1958	2056	2073	2172	2181	2182

Note: This table shows the mean rent in a given year and CBSA in the provided sample of Zillow™ listings. The sample only includes listings in buildings with fewer than 50 units.

Table A.2: Mean One-Bedroom Rents by Year and CBSA

	2013	*2014*	*2015*	*2016*	*2017*	*2018*
Atlanta, GA	981	1045	1032	1234	1261	1402
Austin, TX	1005	1092	1139	1093	1149	1229
Chicago, IL	1481	1422	1749	1525	1469	1584
Denver, CO	1190	1385	1207	1226	1215	1299
Los Angeles, CA	1406	1344	1581	1761	1787	1780
New York, NY	2661	2343	2300	2363	1843	1741
Philadelphia, PA	1147	990	986	1039	1123	1196
Portland, OR	1079	1081	1224	1257	1234	1255
San Francisco, CA	2157	2736	2911	2922	2685	2693
Seattle, WA	1245	1307	1338	1467	1536	1541
Washington, DC	1682	1885	1736	1875	1794	1869

Note: This table shows the mean rent for one-bedroom units in a given year and CBSA in the provided sample of Zillow™ listings. The sample only includes listings in buildings with fewer than 50 units.

Table A.3: Rent Difference-in-Differences Results with 400m Treated Radius

	Near versus far	Near versus near	Triple-difference
After*within 400	-0.023		
(S.E.)	(0.025)		
After*treated building		-0.027	
(S.E.)		(0.032)	
After*within 400*treated building			-0.068
(S.E.)			(.041)
Treated buildings	47	44	43
Control buildings		20	15
Listing observations	41,500	28,400	46,400

Note: This table shows difference-in-differences results for rents with a 400 meter treatment radius. The first column shows the near-far specification shown in Equation 2, where the treatment group is listings within 400m of a building completed in 2015–2016, and the control group is listings between 400m and 600m of the same buildings. The second column shows the near-near specification, in which the treatment group is listings within 400m of a building completed in 2015–2016, and the control group is listings within 400m of buildings completed in 2019 (after the sample period). The third column shows the triple-difference specification from Equation 5, which compares the near-far gap in the 2015–2016 and 2019 buildings. Specification details are identical to Table 4, except the isolation restriction on new buildings is increased to 400 meters to match the treatment radius.

Table A.4: Far-Far Difference-in-Differences (Rent Outcome)

	250-600m band	250-800m band
After*treated building	0.028	0.015
(S.E.)	(0.026)	(0.021)
Treated buildings	73	80
Control buildings	28	31
Listing observations	41,000	60,900

Note: This table repeats the near-near rent specification, but compares the 250–600 meter (or 250–800 meter) bands around the treatment and control of buildings.

Table A.5: Near-Far Difference-in Differences Robustness (Rent Outcome)

	Low College	Low Percent White	Lower Income	No New York
After*within 250	-0.051	-0.074	-0.052	-0.061
(S.E.)	0.021	0.025	0.025	0.027
Treated buildings	21	25	37	36
Listing observations	30,308	35,840	52,799	24,178

Note: Each column repeats the baseline near-far DiD shown in Equation 2 with a change to the sample. Panel A drops buildings in tracts that are over 50 percent white, and Panel B lowers the income threshold by $10,000. Panel C requires that both tract income and college share be below the CBSA median, while Panel D drops observations in New York City.

Table A.6: Near-Near Difference-in Differences Robustness (Rent Outcome)

	Low College	Low Percent White	Lower Income	No New York
After*treated building	-0.16	-0.13	-0.069	-0.058
(S.E.)	0.042	0.05	0.037	0.043
Treated buildings	19	22	34	34
Control buildings	9	13	15	18
Listing observations	10,388	12,701	19,240	8,491

Note: Each column repeats the baseline near-near DiD shown in Equation 4 with a change to the sample. Panel A drops buildings in tracts that are over 50 percent white, and Panel B lowers the income threshold by $10,000. Panel C requires that both tract income and college share be below the CBSA median, while Panel D drops observations in New York City.

Table A.7: All-Income Difference-in-Differences Results (Rent Outcome)

	Near versus far	Near versus near	Triple-difference
After*within 250	0.016		
(S.E.)	(0.016)		
After*treated building		-0.017	
(S.E.)		(0.029)	
After*within 250*treated building			0.019
(S.E.)			(0.04)
Treated buildings	103	94	91
Control buildings		31	30
Listing observations	190,020	75,710	201,818

Note: This table shows difference-in-differences results for rents including all new buildings (instead of only those in low-income tracts). The estimations are otherwise identical to Table 4.

Table A.8: All-Income Difference-in-Differences Results, (Rent Outcome, 400m Radius)

	Near versus far	Near versus near	Triple-difference
After*within 250	-0.013		
(S.E.)	(0.018)		
After*treated building		-0.015	
(S.E.)		(0.023)	
After*within 250*treated building			-0.069
(S.E.)			(.033)
Treated buildings	95	95	85
Control buildings		23	20
Listing observations	120,032	80,320	127,292

Note: This table shows difference-in-differences results for rents including all new buildings (instead of only those in low-income tracts) and using a 400 meter treatment radius. The isolation restriction on new buildings is also increased to 400 meters to match the larger treatment radius. The estimations are otherwise identical to Table 4.

Table A.9: Far-Far Difference-in-Differences (Log(origin income))

	250-600m band	250-800m band
After*treated building	-0.01	-0.013
(S.E.)	(0.01)	(0.009)
Treated buildings	70	70
Control buildings	83	83
Listing observations	135,600	207,650

Note: This table repeats the near-near estimation for log(origin income), but compares the 250–600 meter (or 250–800 meter) bands around the treatment and control buildings.

Strategies for Increasing Housing Supply in High-Cost Cities

DC Case Study

Pamela M. Blumenthal, John R. McGinty, and Rolf Pendall

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The laws of supply and demand dictate that when housing demand outpaces supply, prices go up. In theory, supply increases in response to that demand and prices stop their climb. The housing market has not followed this pattern in many jurisdictions in the United States: rents and housing prices have risen and vacancies have fallen, but the housing supply has not yet rebounded. With limited housing supply and anemic income growth, millions of households now struggle to afford housing. A growing number of households, including moderate-income households, are cost burdened, spending more than 30 percent of their income on housing, with the burden greater among renters. In the 10 highest-cost metropolitan areas, 41 percent of households were cost burdened in 2013, compared with 34 percent of households nationwide (JCHS 2015).

These high-cost jurisdictions, which include San Francisco, Boston, New York, and Washington, DC, are of particular interest to understanding market dynamics and can be testing grounds for methods that increase housing supply to better serve unmet demand. This brief discusses the recent literature on the implications of insufficient housing supply in high-productivity jurisdictions, then it uses the Washington, DC, region to explore barriers and opportunities to increase housing supply.

The Economics of Housing Supply

More people want to live in high-cost metropolitan areas like Washington, DC, New York, Boston, and San Francisco than can afford to. The high cost of housing in these areas harms individual well-being and regional economic competitiveness.

Across the United States, housing continues to get more expensive while wages remain flat (Shierholz and Mishel 2013). Housing already makes up the largest share of most Americans' spending, and continued escalation in housing costs forces individuals to spend less on food, health care, utilities, and other necessities (JCHS 2015; Mills et al. 2006). Various factors contribute to the insufficient supply of housing in high-cost areas: scarcity of land, restrictive land-use controls, environmental and other regulations, insufficient infrastructure, expensive building materials, cumbersome permitting processes, community opposition to higher-density development, tight credit and financing, and more. The severity of these barriers varies from place to place, but taken as a whole, they almost always lead to the production of too few housing units.

Competition for Scarce Housing Bids Up Housing Prices

Insufficient housing supply means households wishing to move to a particular area must compete for a limited number of units. This competition leads to a bidding up of housing costs, pricing many individuals out of the market altogether. A shortage of available, affordable housing threatens to displace long-term residents as more affluent households pay a premium for homes that would traditionally be occupied by lower-income families.

This process reinforces itself. Gyourko, Mayer, and Sinai (2013) analyzed "superstar" cities: desirable metropolitan areas that cannot increase their housing density through construction, cannot continually expand their borders, and have few close substitute locations. The authors found that high-income families strongly prefer to live in these desirable areas and are willing to outbid lower-income families, driving up land prices. As the number of high-income families grows across the country, residents of high-cost cities are outbid by even higher-income families, increasing housing costs and pricing out low- and middle-income earners. This cycle is extreme in cities like New York, Boston, San Francisco, and Los Angeles, but similar dynamics play out in other cities.

Lack of Housing Reduces Productivity

The competition for limited housing units pushes job-seekers away from centers of economic activity. Ganong and Shoag (2013) find that over the past 30 years the flow of less-skilled workers to cities that offer high-paying jobs and opportunity has greatly declined as a result of prohibitively expensive housing. Hsieh and Moretti (2015) chronicle how the US economy suffers as a result of the insufficient supply of housing in high-cost cities. Their analysis estimates how land-use restrictions have shaped economic growth over the past 50 years. Examining the contribution of 220 metropolitan areas (metros) to economic growth, Hsieh and Moretti find that if workers were able to freely move to metros with more robust economies, the US economy would have grown 0.3 percent more a year from 1964 to 2009. This amounts to nearly $2 trillion more in economic gain and an annual wage increase of $8,775 for the average worker. Hsieh and Moretti also find that the fast productivity growth in New York, San Francisco, and San Jose increased local housing prices and local wages, but employment did not expand accordingly. As Richard Florida sums up, "Instead of fueling productivity and growth, too much of America's urban economic power is simply being wasted on higher housing bills."[1]

While Hsieh and Moretti speak to the effects of inadequate housing supply on the US economy as a whole, research says little about how much an insufficient supply of housing affects the economic growth and competitiveness of individual jurisdictions. High housing costs have been associated with declines in employment and income and a loss of population (Glaeser 2006). Regulations that reduce housing supply have a substantial impact on housing and labor market dynamics (Glaeser, Gyourko, and Saks 2005). Focusing on the Massachusetts economy, Bluestone recommends that "increasing the supply of housing to reduce price appreciation and … developing affordable housing for young working families may be the best economic development strategy the state could undertake" (2006, 30).

Although housing starts average only 2.2 percent of housing stock (Mayer and Somerville 2000), a region's ability to respond to increased demand for housing from labor demands or income shocks through the construction of new units is important to its economic well-being (Saks 2005). Income inequality is reinforced when low-income households, who might benefit most from moving, cannot afford to relocate to high-productivity areas (Furman 2015).

Analysis by Taylor (2016) suggests expanding the supply of market-rate housing is necessary to reduce displacement and alleviate rent burdens for residents of all income levels. In contrast, an analysis by New York City's comptroller (Stringer 2015) finds that the city's efforts to spur more affordable housing construction would inadvertently displace tens of thousands of families and worsen the affordability crisis. Both pieces highlight the ongoing debate among scholars and policymakers about whether the construction of market-rate housing, especially higher-end luxury condos, drives rents up or down. Moretti firmly believes that "on net, adding more units tends to lower rents."[2] Yet many practitioners in high-cost cities don't see such a theory playing out on the ground. Market-rate homes traditionally become affordable as they age, but in gentrifying neighborhoods developers are instead buying them and producing higher-end units. Gentrifying prevents the traditional filtering process from creating housing affordable for low- and middle-income families.

Expensive Housing Forces People to Make Trade-Offs

Though research remains directional on the macro effects of limited housing supply, evidence is more conclusive on the detrimental effects of high housing costs on individuals. Quality, affordable, and stable housing is central to the well-being of families and individuals. Housing plays a critical role in people's lives; it serves as a major consumption item, acts as a key source of stability and safety, and anchors people in places where they can pursue education or employment opportunities.

Yet many individuals must make trade-offs when housing is unaffordable. People may choose to spend a greater share of household income on housing, live in more crowded housing, commute farther to work, or live and work in other areas altogether (Taylor 2015).

Families living in unaffordable housing reduce their spending on other necessities and are more vulnerable to economic shocks. Homeownership can be a buffer against material hardship and is an important way to accumulate wealth (Lerman and Zhang 2014), but the high cost of housing has forced

many people to delay homeownership or forgo it entirely. In this light, high housing costs could reinforce and deepen existing inequalities (Rognlie 2015).

Many middle- and low-income people are forced to the outskirts of high-cost cities, far from job locations and often in neighborhoods with fewer resources and opportunities. Longer commutes harm the economic and general well-being of individuals and impose more traffic, congestion, air pollution, and infrastructure maintenance costs on society at large.

These national trends are evident in the DC region, where housing costs have accelerated in the past 25 years and the share of mega-commuters—people who travel at least 90 minutes and at least 50 miles, one way, to work—is among the highest in the country (Rapino and Fields 2013). We use the DC region to examine barriers to increasing housing supply and opportunities to surmount these challenges. We first provide background on the housing market and demographics of the region then outline the barriers, challenges, and opportunities as informed by interviews with experts involved in housing and development in the District of Columbia and Arlington, Fairfax, and Montgomery Counties.

DC Region Case Study

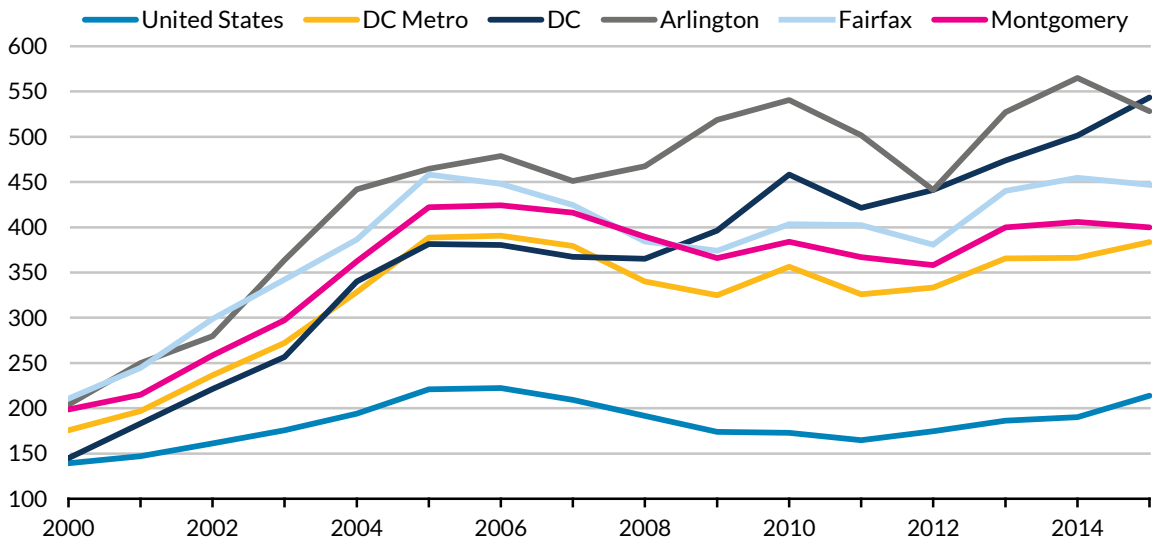
Insufficient Housing Supply

The Washington, DC, region is one of the most expensive places in the country to own and rent property.[3] The median house price in the region was $372,500 in 2013, compared with the national median price of $175,700. Similarly, rents were $1,481 regionally compared with $905 nationally.[4] Since 2000, the average year-end sale price of a home in the United States has increased 53 percent, compared with 118 percent in the DC region and as much as 275 percent in the District (figure 1). With high housing costs, low- and even moderate-income residents experience housing cost burdens. More than 33 percent of households in the DC region pay more than 30 percent of their income on housing. When looking just at renters, that share increases to 46 percent, with over 22 percent of households putting more than half their income toward rent (JCHS 2015).

FIGURE 1

DC Region Home Values Outpace Nation

Median end-of-year sale prices (in thousands of dollars), all homes, by jurisdiction



Source: Zillow.

The DC region is a high-productivity area, ranked in the top 10 of metropolitan areas for gross domestic product in 2014 (Bureau of Economic Analysis 2015). Thus, the potential loss in productivity identified by Hsieh and Moretti could be harming individuals, jurisdictions, the region, and the country. To better understand the experiences of a high-cost region, we conducted a case study on the DC region. We recognize housing and employment markets are regional. However, a detailed study of over a dozen counties and a half-dozen cities in three states and the District of Columbia is beyond the scope of this project. Since our goal is to identify opportunities to increase housing supply, we selected four jurisdictions. We used a "density and dollars" approach, applying the criteria in box 1.

BOX 1

Criteria to Identify Jurisdictions

- Suffer from high housing costs
- Are built up with high housing density
- Have the greatest projected housing demand over the next decade
- Are projected to generate a considerable number of jobs over the next decade
- Represent differing state environments and local governance structures
- Use a range of tools to produce affordable housing

The District of Columbia and the counties of Arlington, Fairfax, and Montgomery are the most expensive jurisdictions in the DC region for housing (table 1). Various factors contribute to the high home values in these localities, including good schools and access to Metro. These jurisdictions are some of the most desirable places to live not only in the region but in the country, as reflected in their high price tags. They are also where future jobs will be: in 2023, 57 percent of the projected 777,000 new jobs in the DC area will be in these four jurisdictions (Chapman 2015). The selected jurisdictions are shown in figure 2.

TABLE 1

Median Home Value and Median Monthly Rent, by Jurisdiction, 2013

Metropolitan Washington Council of Government member counties and DC

	Jurisdiction	Median home value	Median monthly rent
1	Arlington County, Virginia	$584,600	$1,733
2	Fairfax County, Virginia	$476,600	$1,687
3	Montgomery County, Maryland	$446,300	$1,568
4	District of Columbia, District of Columbia	$445,200	$1,242
5	Loudoun County, Virginia	$437,700	$1,654
6	Prince William County, Virginia	$321,400	$1,477
7	Frederick County, Maryland	$307,000	$1,243
8	Charles County, Maryland	$297,900	$1,463
9	Prince George's County, Maryland	$269,800	$1,241

Source: US Census Bureau, American Community Survey, 2009–13.

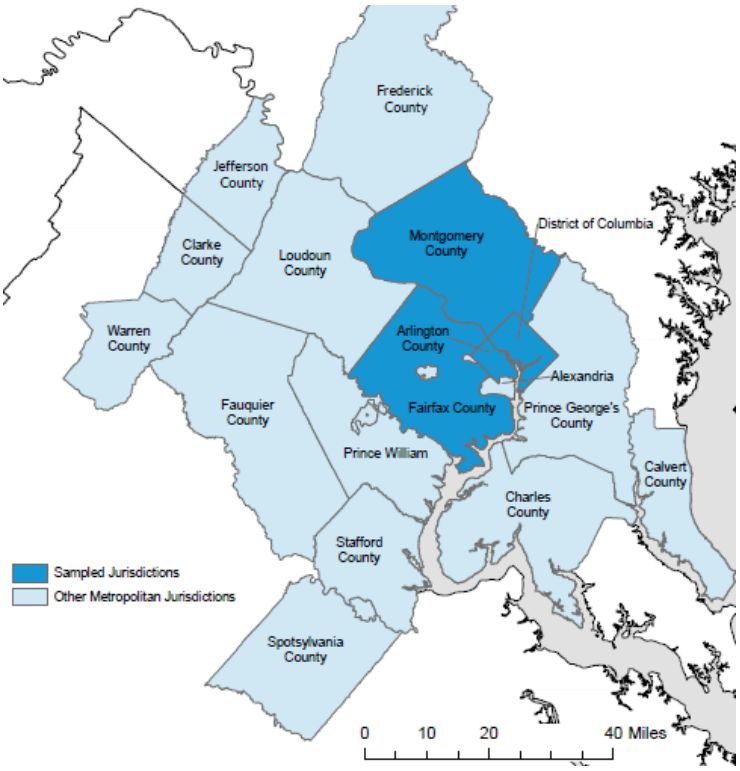
Various factors have helped drive up housing prices in the DC region. Most fundamentally, the shortage of buildable land has limited development options and slowed housing production. Arlington County is only 26 square miles. At 68 square miles, the District has little land that isn't developed or owned by the federal government, and the height limitation inhibits efforts to increase density. Fairfax and Montgomery Counties, much larger areas, have made policy decisions that reduce available land. Fairfax has identified a mere 10 percent of its land for higher-density development, and Montgomery County has a significant amount of land designated as agricultural reserve.

At the same time, ongoing population growth in the region, fueled by millennials and recovery from the federal budget sequester, has created a clear and present need for housing units. The District has continued to add residents since 2000, reversing five decades of decline; over the past 15 years the region has absorbed over 830,000 residents.[5]

After the housing boom in the early 2000s, regional housing production plummeted with the onset of the Great Recession in 2008. Today, some evidence points to supply increasing in response to demand, particularly within the District. The city issued just under 5,000 housing permits in 2015, the most since the Census began tracking the statistic at the beginning of the 1980s. Those 5,000 permits equate to 7.5 per 1,000 District residents, putting the city permitting on par with Boston and ahead of New York, San Francisco, Los Angeles, and Portland.[6]

FIGURE 2

The Case Study Explores Washington, DC, and Arlington, Fairfax, and Montgomery Counties



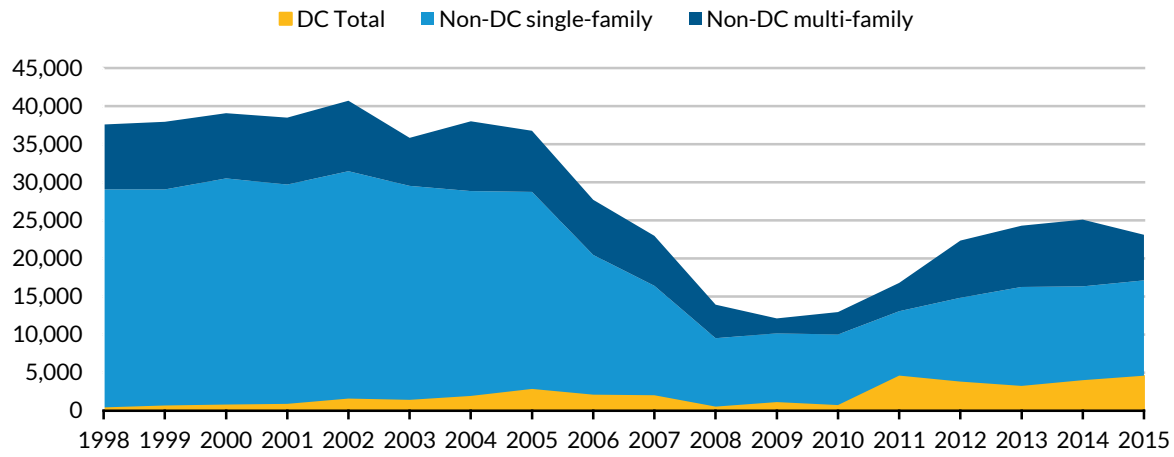
Source: 2010 Census TIGER files.

Outside the District, the overarching narrative continues to be limited supply and large demand. While the District has doubled its housing permitting since the start of the recession, the rest of the region lags far behind for both single- and multifamily units (figure 3). The region's issuance of building permits over the last four years is lagging behind pre-recession levels (2003–07) by over 30 percent. Meanwhile, the regional population has continued to grow, raising concerns that the region does not have sufficient new construction to meet the need.

FIGURE 3

Construction in DC Outpaces the Rest of the Region

Units issued building permits, 1998–2015



Source: US Census Annual Permits by Metropolitan Area, DC Office of Planning.
Notes: 2015 annualized production through September. Single-family totals include units in buildings with up to four units.

While supply has increased in the District, new construction has consisted primarily of high-end luxury apartments, failing to directly address the need for affordable housing. From 2005 to 2012, the number of rental units available for over $1,500 a month doubled in the District, while the number of units priced under $800 nearly halved. Housing costs have increased faster than incomes in the DC region,[7] making many mid- to high-market units out of reach for large swaths of the population.

The DC region has seen a significant shift in where new residential development is taking place. In the early 1990s, more than half of all new residential construction took place in the inner suburbs of Fairfax, Montgomery, and Prince George's Counties, while the region's inner core of DC, Arlington County, and Alexandria accounted for less than 5 percent of all residential permits. Over time, distant suburbs have captured greater shares of construction, but building activity in the inner core has skyrocketed as well. The share of residential building activity in DC, Arlington County, and Alexandria stands at nearly 40 percent today (Sturtevant 2015).

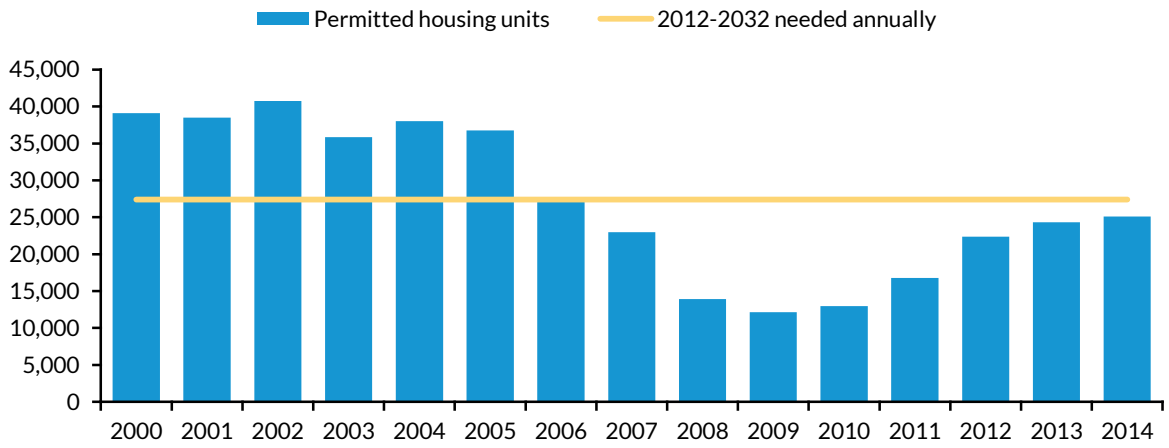
Future Demand

Sturtevant and Chapman (2013) predict that if every jurisdiction in the DC region is to provide enough housing for its future workforce over the next two decades, the entire metropolitan statistical area will need to add 548,298 housing units between 2012 and 2032. This averages out to 27,415 housing units per year. That level of production has not been seen in the DC region since 2006 (figure 4). The region needs to not only produce and maintain that level of production moving forward but also make up for the deficit it continues to run yearly.

FIGURE 4

DC Region Must Ramp Up Housing Production to Meet Future Demand

Annual building permits issued, DC metropolitan statistical area, and projected annual future need



Sources: US Census Annual Permits by Metropolitan Area, DC Office of Planning; Sturtevant and Chapman (2013).

All jurisdictions in the DC region need to produce more housing. From 2012 to 2032, the area needs to build more than 344,000 single-family units and more than 203,000 multifamily units (table 2). When examining housing production by jurisdiction, even the District's historically high permitting of 4,956 units in 2015 falls short of the 5,262-unit floor needed to meet future demand. As construction remains sluggish in surrounding jurisdictions, meeting future need becomes all the more difficult.

TABLE 2

To Meet Projected Need, All Jurisdictions Need More Production

Future housing demand, 2012 to 2032, by jurisdiction

Jurisdiction	Total units needed	Single-family	Multifamily	Units needed per year
Washington, DC MSA	**548,298**	**344,624**	**203,675**	**27,415**
District of Columbia	105,240	38,012	67,229	5,262
Arlington County	19,717	6,546	13,171	986
Fairfax County	83,069	62,095	20,974	4,153
Montgomery County	83,829	51,316	32,514	4,191
Rest of MSA	256,443	186,655	69,787	12,822

Source: Sturtevant and Chapman (2013).

This projected population growth will place additional upward pressure on the area's housing costs. The Metropolitan Washington Council of Governments (MWCOG) projects that its 22 member jurisdictions will gain over 2 million people by 2040 (Goodwin 2015), and the Urban Institute estimates the DC region's population will grow by nearly 38 percent over the next two decades (to approximately

2.1 million people),[8] compared with only 6.5 percent growth in Philadelphia, 7.4 percent in New York, and 7.5 percent in Boston.

Housing the region's new workforce will require a shift in the type of housing unit produced as the demographic shifts and changing preferences result in residents who demand more multifamily housing, smaller housing, and rental housing (Sturtevant and Chapman 2013). For the region to attract and accommodate these new residents, it must provide a diversity of housing options that meet the needs of all its residents: renters and owners, high income and low income.

Demographic Change Fueling Changes in Housing Need

The demographics of the DC region are changing dramatically and in a myriad of ways. A younger, more racially and ethnically diverse workforce will impact the type, location, and price point of housing required in the future.

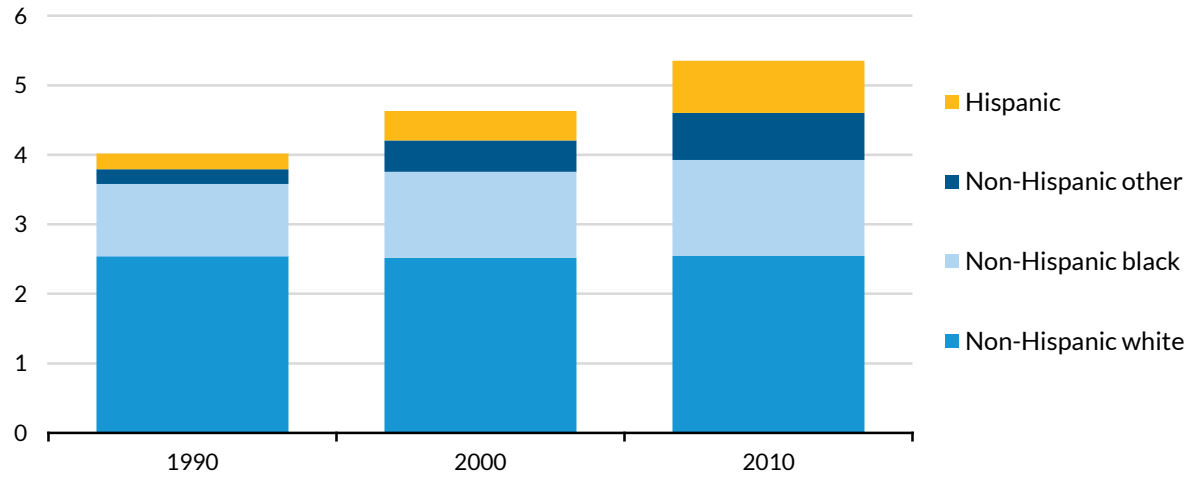
ETHNIC DIVERSITY

Between 1990 and 2010, the population of the DC region grew from 4.0 million to over 5.3 million. The non-Hispanic white population did not grow, while all other groups did, with Hispanics and non-Hispanics of other races more than tripling (figure 5).[9]

FIGURE 5

DC Region's Recent Growth Entirely Composed of Hispanics and Nonwhites

Population by race and ethnicity (millions)



Sources: US Census, Decennial Censuses of Population and Housing, calculated for the DC commuting zone.

INCOMING: YOUNG ADULTS

At the most simple level, the bulk of the growth in any region's housing demand occurs when children in a metropolitan area age and form their own households. People begin entering housing markets as early as their late teens, a process that usually picks up when they enter their early 20s usually as renters; the

late 20s and 30s are prime years for transitioning into homeownership, often accompanying marriage and childbearing (Clark and Dieleman 1996). The recession has slowed this process, and the trend in the DC area has been changing with the growth of Hispanic and Asian families whose children remain at home for longer on average than do non-Hispanic whites and blacks (Goodman, Pendall, and Zhu 2015). The DC area also is a destination for people moving from other regions. Even here, however, the new arrivals account for only about a quarter of those in their 20s.

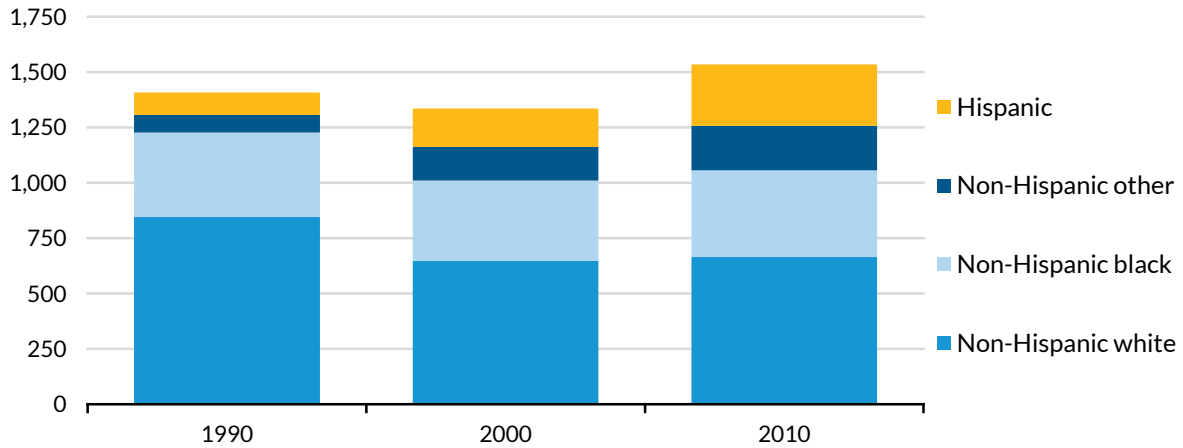
In 2010, millennials surpassed baby boomers as the largest demographic cohort in the history of the United States (Fry 2015). While the United States on the whole is aging, the DC region is doing so to a lesser degree, and jurisdictions like the District and Arlington are getting younger. The District now has a higher percentage of millennials than any other major US city: millennials make up 35 percent of the population, compared with 23 percent nationwide.[10] The median age of District residents decreased 0.9 years over the past 15 years, while it rose 2.1 years nationwide.[11]

Millennials matter to the housing market now because they constitute the majority of those in their prime years for household formation and homeownership growth. The number of people ages 15 to 34 dropped in the 1990s, when the baby boomers were aging out of this group and being followed by the smaller generation X (figure 6). Entry-level housing and rentals became more affordable during this period. But since 2000, the situation has reversed, with very rapid growth in this age group because millennials who already lived in the region grew older and the DC region attracted incoming millennials.

FIGURE 6

Minorities Fueling the Surge in the DC Region's 15- to 34-Year-Old Population

Thousands



Source: US Census, Decennial Censuses of Population and Housing, calculated for the DC commuting zone.

Though non-Hispanic whites dominate popular characterizations of millennials, they accounted for only 43 percent of the 15- to 34-year-olds in the DC region in 2010, down from 60 percent 20 years earlier. Blacks, non-Hispanics of other races, and especially Hispanics made up most of the surge in the region's 15- to 34-year-olds.

The District and the "inner" jurisdictions on which we focus offer several advantages over the "outer" counties that encourage households with means to prefer them, bid up their housing prices, and support land-use plans and regulations that reduce permitted residential density and increase costs. Current preferences among many workers—but especially millennials—for walkable, transit-accessible workplaces have allowed the District to sustain its employment even as auto-oriented job centers have scrambled to reposition themselves to recover market share. School choice and universal prekindergarten make staying in the District conceivable for young adults who two decades ago would have thought a suburban move was inevitable.

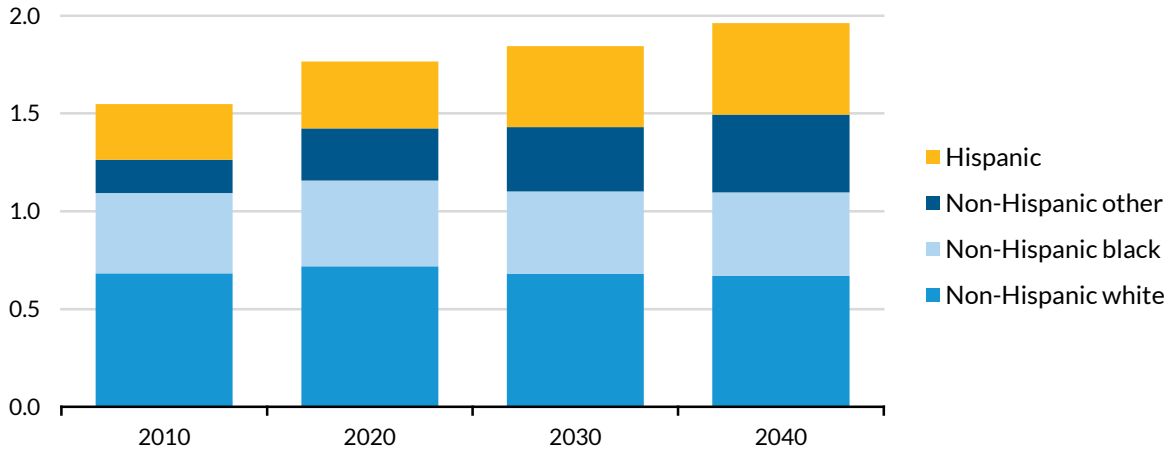
Most young families, however, choose to live in the suburbs because the lower housing cost and high-quality schools offer a balance they prefer. The challenge arises, however, when they need to move to less advantageous outer suburbs where they drive longer distances to work and shop, housing values appreciate less, and schools aren't as good as in the constrained suburbs.

What about the future? The Urban Institute's Mapping America's Futures project, which examines growth scenarios, suggests that the number of people ages 15 to 34 in the DC region will grow from 1.5 million to almost 2.0 million from 2010 to 2040, reflecting the assumptions that young people will continue to migrate to DC and that today's diverse young adults will continue to have children who decide to stay in the region (figure 7). Most of the growth will consist of Hispanics, Asians, and non-Hispanics of multiple races, as the numbers of non-Hispanic blacks and whites peak at around 420,000 and 720,000, respectively, in 2020.

FIGURE 7

Young Adults Will Continue to Grow, Add Diversity to the DC Region

Projected population of 15–34-year-olds (millions)



Source: US Census, Decennial Censuses of Population and Housing, calculated for the DC commuting zone.

OUTGOING: OLDER ADULTS

Adults ages 65 and older account for 10 percent of the DC region, with a population of about 534,000 in 2010. Urban Institute projections suggest that this number will grow to over 830,000 by 2020, 1.2 million in 2030, and 1.4 million in 2040.

Few of these older adults will move. On average, only about 6 percent of older adults move over the course of a year nationwide. Those who remain in their longtime homes may want to refurbish them for comfort, safety, and energy-efficiency. They may need or want to rely on their houses as a source of retirement income. As the number of older adults increases, a greater number of movers will be seniors than at present. This may lead to an increase in the number of older adults who would prefer—and may have the means—to live in the central part of the region.

On net, though, older adults do not constitute a source of demand for housing. Rather, attrition through mortality reduces the number of households who begin a decade in their 50s or older over the following decade. This means that while baby boomers are at this moment fueling a very big increase in the DC region's senior-headed households, they are already starting to fuel an increase in the number of homes vacated because of mortality. This trend will accelerate for the next two decades. Since a disproportionate share of the region's older residents live in the constrained inner jurisdictions, the attrition could represent an excellent opportunity to rejuvenate, diversify, and densify many neighborhoods that offer outstanding opportunity to young households. As with millennials and other residents, the baby boomers' decisions will depend in part on the choice set the jurisdictions provide.

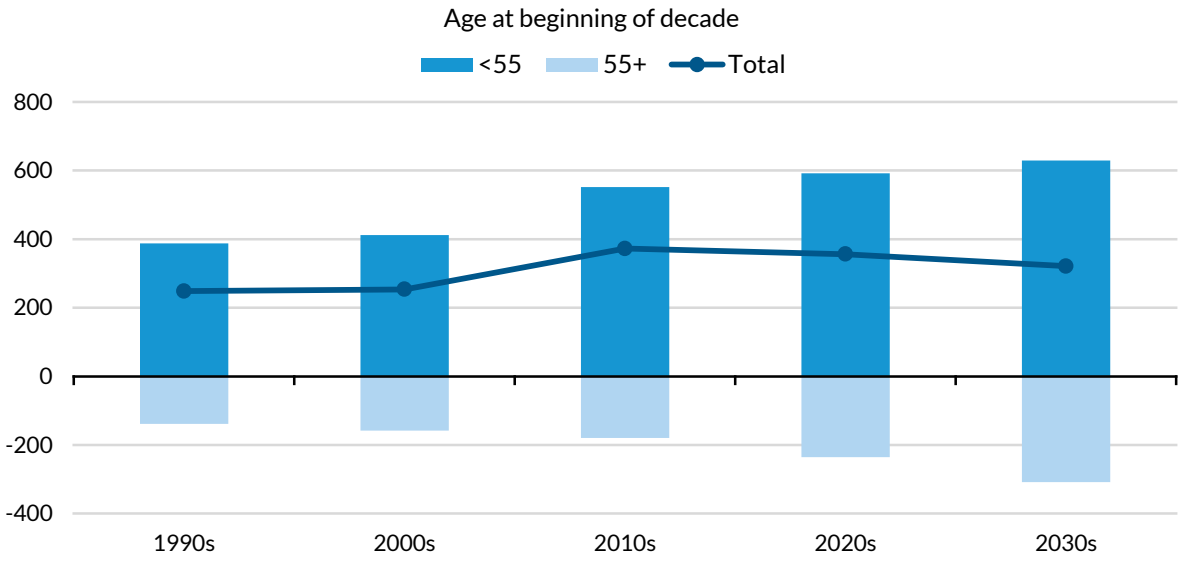
ADDING IT UP: COHORTS AND HOUSING TRENDS

Our projections suggest that the DC area has a large amount of potential growth in housing demand, largely driven by the large number of young Hispanic and Asian people in the region already. These residents have children at higher rates than non-Hispanic whites and blacks partly because they are younger and partly because Hispanics have relatively high birth rates. Their concentration in the DC area will likely attract other coethnics. The incoming cohorts (those headed by a person younger than 55 at the beginning of the decade) are expected to increase from just over 400,000 in the 2000s to over 550,000 in the 2010s, 590,000 in the 2020s, and 630,000 in the 2030s (figure 8).

FIGURE 8

Growth in Households: Surging Young Population Will Fuel Continued Housing Demand despite Attrition of Baby Boomers

Cohort change over decade (thousands)



Source: US Census, Decennial Censuses of Population and Housing, and Urban Institute projections using Mapping America's Futures, calculated for the DC commuting zone.

Attrition will diminish the demand for housing, but the growing tendency of older adults to remain in their own homes is likely to smooth the supply of housing from attrition. The number of older adults will decline by about 180,000 in the 2010s, 235,000 in the 2020s, and 308,000 in the 2030s. Not all this attrition will occur in parts of the region where incoming households want to live, but much of it will.

In light of these demographic changes, continued strong demand, and the relative advantages of increasing housing in the region's most constrained locations, policymakers and decisionmakers need to provide housing options and financing tools that support urban lifestyles, suburban town centers, aging in place, and other urban forms. Pursuing promising strategies to adequately meet the housing needs of millennials, baby boomers, and the rest of the DC region's population will require decision-makers to overcoming various challenges and barriers, which the rest of this brief investigates.

Barriers, Challenges, and Opportunities

A vast literature examines regulatory barriers to development (e.g., Advisory Commission on Regulatory Barriers to Affordable Housing 1991; Quigley and Rosenthal 2005) with a smaller set looking at community opposition (e.g., Babcock 1969; Lowry and Ferguson 1992; Pendall 1999). An evolving body of work explores mechanisms for reducing development costs and producing affordable

housing (e.g., Hickey and Sturtevant 2015; Jakabovics et al. 2014). And work is being done to better build support for housing, creating toolkits and identifying best practices.[12]

Our task was to reach beyond the literature to learn from the experiences of experts in the DC region about the barriers, challenges, and opportunities to addressing the region's need for more housing across the income spectrum. We interviewed 33 people during a three-month exploratory phase and then hosted a small, day-long roundtable discussion to test the ideas and themes that interviewees raised. Our goal during the interview phase was to talk to an elected official, planning commissioner, and staff member from the housing, planning, and economic development departments in each jurisdiction. We also sought to interview two of the largest private employers in each jurisdiction. We reached out to advocates, trade associations, philanthropy, and researchers ("other"). We chose to not focus on developers, speaking to a few who operated in multiple jurisdictions in the DC region and brought additional perspectives to the conversation. Table 3 shows the breakdown of the people with whom we originally spoke.[13] The roundtable discussion was attended by key stakeholders and decisionmakers from the DC region, including a subset of our interviewees.

TABLE 3

Number of Interviewees by Type and Jurisdiction

Type	Arlington	District	Fairfax	Montgomery	Multiple	Total
Government	4	6	4	3		17
Employer					3	3
Developer					3	3
Other					10	10

Source: Authors' analysis of interviews.

The following discussion draws from our interviews and roundtable discussion. While many barriers and interventions were place-specific, themes emerged that could be applicable beyond the region.

The DC Region Needs More Housing to Reduce Price Pressures

Interviewees and convening participants generally agreed that "greater housing supply is necessary but not sufficient" (23) in the DC region. A few DC experts thought that the District was keeping up with demand, although the suburban jurisdictions were not. As one person explained, "If you track median sales price with area median income and purchasing power, it shows supply is keeping up in DC." Many interviewees noted that, regardless of supply, cost would remain a challenge (22), with pressure on existing stock "as bad as ever" as naturally occurring affordable housing is "getting swept up across the region" (18). Discussions of supply invariably touched on affordability. More specifically, as one discussion participant phrased it, "supply for whom and to what end?"

The hard costs of construction and land make new housing expensive (4). Except at the top of the market, the price of land per unit wipes out projects that have any rent constraints (18). As new housing

is built, the rents don't cover operating expenses; subsidies are needed to fill the gap (13). Several people mentioned the government's inability to provide enough subsidies to meet low-income households' housing needs. Current solutions to affordability were not seen as scalable. Some questioned whether "we have a housing problem or an income problem" and why we subsidize housing rather than increasing income (9).

Another stream of comments focused on the need for sufficient political will to tackle the issue. The strongest statement of this issue was, "We are having million-dollar conversations about billion-dollar problems" (7). Interviewees saw the common response that the jurisdictions don't have money as a choice to not prioritize affordable housing (12). Lack of leadership and vision, cited by several people, may be related to this unwillingness to bring bold thinking to address unmet housing needs.

In addition to building more housing, preservation of existing housing is considered critical, since we "can't build out of the hole, production of new supply is not sufficient" (9). Not enough housing is being produced to replace the units that are being lost (18); preservation is cheaper, and it supports mixed-income neighborhoods (12). The convening added more texture to this issue, with participants noting that the scarcity of land made preservation even more important and asking how to balance preservation with densification. For example, if you replace affordable garden apartments with a project that has more units, the affordable units produced through inclusionary zoning are unlikely to have offset the lost garden apartments. Areas opened up to rezoning put naturally occurring affordable housing at risk. Could other ways of adapting current supply increase housing supply?

With Hsieh and Moretti's findings in mind, we asked interviewees about the role of housing in local economic competitiveness. Though most interviewees viewed having sufficient housing across income ranges as important to economic competitiveness, they felt a clear analysis was needed on housing costs' impact on competitiveness. As one person explained, "We have plenty of data, but you need to cut the data in a way that connects the dots" (7). People discussed the need for more analysis on why development is important to the health of the jurisdiction (1) and why having residents across a range of incomes is beneficial (31). One recommendation was for research linking land use and transportation to the future economic condition of the county (e.g., tax base, services), research that brings it down from the 50,000-foot view (29).

Barriers to Meeting the Region's Housing Needs

Interviewees identified various barriers that contribute to the insufficient supply of housing. Limited availability of land was posited in each jurisdiction. Montgomery County estimates it has about 28,800 acres where development should be encouraged; over 47 percent of the county is agricultural reserve and parks and only 4 percent is undeveloped (MCPD 2009). Fairfax has identified 10 percent of its land as available for higher-density development (20). Much of the land in DC is owned by the federal government or set aside as parks. Supply in DC is further constrained by the height limitation (18).[14] Arlington is trying to accommodate more people in its fixed amount of space (13). Absent major policy changes, the limited developable land means building with greater density to meet population growth.

COMMUNITY OPPOSITION

The most commonly discussed barrier was community reluctance to support higher-density development. Resident opposition to new developments, particularly when they bring increased residential density, is well established in the literature (e.g., Lowry and Ferguson 1992; Pendall 1999). Fischel (2005) explains why the "homevoter" will go to great efforts to protect his greatest investment, his home, from perceived threats to property values.

"We have limited land for residential development, the regulations make approvals difficult, and public participation makes it even harder" (14).

This phenomenon is evident in the DC region: residents in established single-family neighborhoods in each of the four jurisdictions oppose new development, whether from resistance to change, fears, or "the prejudice of the day" (2). People are like "Jekyll and Hyde," supporting affordable housing until it is going to be located in their own neighborhood (20). A developer explained, "Existing residents are voters, and they fear traffic, lower-income people, schools getting crowded; they fear change and its impact on their community." A roundtable participant noted a significant stigma in the United States when it comes to being poor and living around low-income individuals; until we find ways to have frank conversations about this stigma, progress would not happen. This recognition of resident fears was reiterated across jurisdictions from a range of respondents.

In addition to homeowners protecting their property values, opposition comes from long-time residents who fear being pushed out of their neighborhoods as redevelopment raises housing costs, particularly for renters (12). The opposition is greatest when developers and planners seek greater density in established neighborhoods, particularly suburban communities that residents don't want to become urban (27). Often residents won't support even mild densification, citing concerns about preserving neighborhood character (6). One person noted that efforts to affirmatively further fair housing will require building affordable housing in neighborhoods with significant resistance, which could add years to a project (18).

Community opposition creates significant barriers to development. Local elected officials need to be responsive to their constituents' concerns if they want to be reelected. Additionally, community opposition adds real costs to development under current approval procedures. These costs include extra years before the project is approved; fees for attorneys, studies, and hearings; and concessions of reduced density, more amenities, and other commitments (18).

SCHOOLS

Community resistance to increased density often reflects concerns of overcrowding local schools, according to interviewees from each jurisdiction. This issue has been particularly salient in the past few

years. Schools in many jurisdictions are over capacity. The increase in students results mostly from a new generation of children in existing single-family housing, not from new multifamily developments. Many schools were closed decades ago when enrollment was extremely low, and the remaining schools have insufficient capacity to serve growth as neighborhoods experience a new cycle of families. In addition, children attending private schools moved to public schools during the financial crisis. Meanwhile, standards have changed: a school that could accommodate 900 students in the past is now considered appropriate for 730 (2). As an interviewee noted, it is hard to plan when the rules change. Nevertheless, residents fear crowded schools and associate higher-density development with additional students.

In addition to educating residents about the facts—that the new development is not responsible for the influx of students—interviewees noted the need to rethink school buildings. Large 30- to 60-acre lots are no longer available, requiring innovation; "we need to consider smaller sites, reusing buildings, and policy changes" (8). New approaches will require better coordination among the housing, planning, and transportation folks to provide for services, schools and infrastructure (13). County staff members expect the adjustment will be difficult for residents, with one warning of a "future battle looming" as residents fail to moderate their expectations (32).

Another interviewee saw residents' commitment to high-quality schools as an opportunity to build more acceptance of affordable housing and resident diversity. By tapping into people's core values of their community (and country) as a place of opportunity and economic mobility, one could show them maps of who has access to quality schools and how that relates to going to college (28). The need for school funding, for both construction and operations, could also be used to support the argument for growing the tax base through additional density to provide the needed resources (31).

OTHER BARRIERS

Another barrier to greater housing supply was the current financing environment, particularly the lack of capital and the difficulty in attracting private equity. "Capital has in mind what it wants to invest in" (18). The roundtable discussion fleshed this out as developers clarified that, "Capital plays a huge role. It's not the developer's sole decision; the investor runs the deal." For example, pension plans invest in real estate and expect it to outperform other sectors. They want both yield and product diversification within their real estate investments. Capital is fluid; thus, DC is competing with other regions for the residential investment dollars.

A related issue is construction costs. Many construction subcontractors (e.g., plumbers, electricians) were hard hit by the recession and had to lay off crews. With a much smaller staff, a reluctance to rebuild too quickly, and efforts to recoup their losses from the recession, subcontractors are taking the opportunity to make up the margins, which increases construction costs.

Interviewees noted the need for a "better financing structure" that would support affordable housing (22). Related comments noted the lack of incentives to developers to build middle-income housing (11). Again, the convening provided more details. Participants explained that developers build the most expensive units they can to maximize their profit. This results in a lack of starter homes.

Additionally, if investors and policymakers have a choice to build for low-income or middle-income residents, they will choose middle income. Race is part of this equation, though it is rarely voiced.

Developers and elected officials we interviewed also mentioned the regulatory environment. We did not probe this issue and do not focus on it since a substantial body of work has explored the relationship between different aspects of land-use regulation and housing supply (e.g., Gyourko and Molloy 2015). A detailed assessment of the District's affordable housing needs included recommendations related to the regulatory environment and funding (Tatian et al. 2015).

Two categories of barriers were not raised by interviewees: the role of state fiscal incentives and whether the jurisdiction had sufficient infrastructure (other than schools) to support greater density. These omissions may be an artifact of the interview protocol making them less salient. Since these are areas where state policy can make a significant difference in outcomes, they deserve further examination in future work despite their absence from our discussions.

Promising Strategies to Increase Housing Supply in Low- and High-Density Places

The interviews consistently conveyed that elected officials and planning staff in the jurisdictions respect the low-density character of many of their single-family neighborhoods and are not going to pursue creating significantly higher density there: we are "not bulldozing existing, stable single-family neighborhoods for higher density" (8). With elected officials, staff, and residents in many jurisdictions reluctant to change the character of single-family neighborhoods, accommodating new growth will require increasing density in already dense areas and increasing infill. Accordingly, we group the following strategies into two categories: those for existing high-density areas and those for low-density single-family neighborhoods.

STRATEGIES FOR HIGH-DENSITY AREAS

As an Arlington participant explained, it makes more sense to invest in corridors with decent transportation and put density there rather than trying to make single-family neighborhoods accessible. Similar comments were made about Fairfax. This is consistent with the sentiment expressed during the roundtable that when we talk of supply, we need to be thinking in terms of creating livable places connected to jobs, not solely housing units. It is easier to provide infrastructure in concentrated areas (20). Increasing density often provides the needed incentive for reinvestment. It also can give the jurisdiction an opportunity to capture value (5). High-density development is seen as providing greater opportunity for affordable units as well as enabling the jurisdiction to grow its tax base.

New neighborhoods. Several models are available for high-density development. One is creating new residential neighborhoods at underused land near Metro stations. DC's NOMA neighborhood is a good example. An area previously known for the Greyhound bus station, it is now a vibrant community with about 4,000 housing units, 358,000 square feet of retail, and more residential and commercial development in the pipeline. Other areas in DC are poised for redevelopment, such as the former Walter Reed Hospital site, Saint Elizabeth's East Campus, and part of the McMillan Reservoir site. Similarly, Merrifield, an "industrial suburban crossroads" in Fairfax,[15] has developed into a mixed-use

town center with 1,000 housing units, a multiplex theatre, 125,000 square feet of office space, and 500,000 square feet of other nonresidential space (OCR 2016). A key benefit of creating new neighborhoods is that existing community opposition is low, and that can make building political will and support for development easier.

Transportation corridors. One strategy recommended by several interviewees was continuing to build high-density residential and mixed-use developments along transportation corridors. Building near Metro stations is an explicit target of the Metropolitan Washington Council of Governments' Region Forward vision (MWCOG 2010). This approach recognizes that transportation offers people greater access to jobs, reflects the role of transportation costs in housing affordability, and is likely to limit community opposition. Further, greater density around Metro stations and along transportation corridors can be leveraged to create mixed-income developments to ensure low-income households benefit (19).

Without careful thought and appropriate regulations or policies, creating or improving a transit corridor can raise property values in a low-income community and put current residents at risk of being priced out. "No doubt: when you improve transportation and job connectivity, housing prices increase" (31). This is particularly important as the demand from millennials for transit-oriented development has contributed to premium rents (18). The jurisdiction can benefit by establishing a process that uses the value of the land to subsidize low-income units (4), particularly if the development involves city-or county-owned land or Washington Metropolitan Area Transit Authority–controlled land (19).

Several interviewees emphasized the need to establish mechanisms to protect existing residents. One person noted that concerns about displacement from development around Metro stations reflect a shortage of transit and of high-quality urban places with access to jobs and opportunities (29). He recommended improving transportation networks to better connect affordable neighborhoods to jobs and opportunities, looking beyond Metro and bus corridors. Current transit doesn't always match people's living and work locations, and it is unaffordable for many (21). Many people rely on buses, which are cheaper than Metrorail but also unreliable, leaving people at risk of losing their jobs (1). Several people were concerned about an emphasis on transit-oriented development in a region with unreliable transit (16). A roundtable participant noted smart growth is hard without a reliable public transportation system, and the need for widespread repairs to the Metro this summer only heightens this concern.

Commercial properties. Another opportunity is to redevelop surplus shopping centers and office buildings into residential units or mixed-use nodes. Several people noted the high commercial vacancy rates in the region, reflecting employers' shrinking workspace per employee. One interviewee explained that 25 percent of the commercial space in Arlington is empty, as is 20 million square feet of commercial space in Fairfax (27). This option has not been fully embraced, in part because people want to believe commercial tenants will return, sparing residents from having to pay higher property taxes. Another explanation was that converting commercial to residential use comes with a higher square foot rate because a significant number of commercial real estate investors are coupon holders. This conversion approach was also recommended on a larger scale in Montgomery, where industrial parks are being

abandoned. Significant housing could be built if these campuses were developed into mixed-use communities and connected with bus rapid transit or other reliable public transportation.

Commercial development can also be leveraged for residential purposes through linkage fees. Although several interviewees felt this was good policy, they agreed that linkage fees were not feasible in the current environment, with the region's office sector having been hit so hard (28).

Mixed-use development. Interviewees view the transition from single use to mixed use positively. In fact, one person noted that "mixing uses is key to success—financial and otherwise" (32). It provides an opportunity to add in affordability. Redevelopment also offers an opportunity to obtain value when a public-private partnership gives benefits to a developer (5). For example, using public land for a mixed-income development can provide the deeper subsidy necessary for affordable units for lower-income households (4). Fairfax's decision to focus growth on transit station areas, urban centers like Tysons Corner, and commercial business centers enabled much higher intensity. The departure from single-use patterns took pressure off low-density residential communities (20).

STRATEGIES FOR SINGLE-FAMILY NEIGHBORHOODS

With political constraints on increasing density in single-family neighborhoods, what opportunities are available in these locations? Some of these neighborhoods are located near transit and provide access to jobs, great schools, and other high-quality resources. Others are in disconnected subdivisions that would be difficult to retrofit. Both types of single-family neighborhoods are likely to be home to older adults seeking to remain in the community.

Fairfax policymakers considered "neighborhood recycling," which would involve reassembling land in old subdivisions, decades ago. After trying it in a few situations and finding it "very messy," they abandoned the strategy (20). Instead, a mild increase in density can be accomplished by more easily permitting accessory dwelling units.

Accessory dwelling units (ADUs), which may be better known as in-law suites, granny flats, or accessory apartments, are additional living quarters on single-family lots. They may be separate buildings or part of the same structure, but they contain a separate living space equipped with a kitchen and bathroom facilities (HUD 2008). ADUs increase density by providing small, more affordable dwelling units. They can bring an additional source of income to a homeowner. They also can enable an older adult to have another person live on site, providing services formally or informally.

The current regulations for ADUs are stringent in the four jurisdictions. One respondent noted they are "not really allowed in DC now" (11), although a convening participant noted that ADUs are a historical form in DC, with English basements in row houses and carriage houses. Whether ADU-friendly changes made to the District's zoning code this January lead to increased density remains to be seen. Rules regarding ADUs are so onerous in Arlington that only about 12 units have been approved (32). Similarly, Fairfax's strict provisions have led to few being built (20).

While ADUs make sense economically, they are likely to continue to be met with significant neighborhood pushback. However, with an aging population in many single-family neighborhoods, older

adults may see ADUs as an opportunity to stay in their homes. This shift in public opinion within an influential political constituency could help build support for changing regulations to better promote ADUs (32). Highlighting the possibility of this shift, one interviewee said that residents who opposed ADUs when they were considered by a jurisdiction 10 years ago are now reconsidering their position since the additional units could help them age in place (31).

To increase supply and address affordability, the jurisdiction could provide a tax break if the unit meets affordability requirements or provide funds to create an ADU in exchange for rent restrictions on the unit. DC's program to help low-income homeowners with historic preservation is a possible model, offering full turnkey services, including the agreements, inspections, and approvals. Some roundtable participants were skeptical that an ADU strategy could actually move the needle on affordability, questioning whether it was "too much bloodshed for the units you get." Others took a more bullish perspective and viewed such units as an important tool, if sufficient communication with neighborhood members occurred.

Single-family neighborhoods pose additional challenges. DC is working to ensure it preserves single-family homes. Pressure to convert row houses to several flats creates the risk of losing single-family homes. In suburban jurisdictions, single-family houses are not being broken up but instead are being torn down and replaced with larger single-family houses. This by-right development also changes the character of the neighborhood. These large homes appear out of place on small lots, and the construction often necessitates the removal of trees (20).

MATCHING SUPPLY AND DEMAND

One complication of pursuing these strategies is to ensure that the units added to the supply match the demand. Sturtevant and Chapman's (2013) projections note the need for 344,000 single-family homes and 203,000 multifamily homes in the region. Several of our interviewees noted the mismatch between what is built and what residents want. For DC, the issue arose in the context of having a large percentage of single-person households, which is creating some of the pressure to convert row houses to flats (28). While young people and older adults are creating demand for smaller units (requiring some jurisdictions to change their regulations) (5), families' needs for larger apartments are not being met (11). A roundtable participant noted that the focus on demographic changes highlights the needs of millennials and older adults, with insufficient attention to the needs of families. The lack of intergenerational housing was also mentioned (5). We did not explore how much of the mismatch results from zoning and regulations and how much is driven by market considerations, but this is an area for further probing.

EDUCATING THE COMMUNITY

The interviewees acknowledged that the "risks [residents] perceive are reasonable" (29), requiring developers, planning staff and elected officials to find ways to address residents' concerns. Change, economic development, mixed income communities—these issues need to be communicated to residents in a way that assuages their concerns.

The interviews generated three opportunities for reducing resident resistance to increased density:

- encourage greater engagement by new residents who are more open to higher density,
- educate residents to reduce their fears, and
- strategically introduce higher density.

The changing demographics in the DC region present the opportunity to get younger, newer residents who are less attached to the way things are and more supportive of higher density and mixed-use development involved in the development process. Some interviewees were encouraged by newer residents' enthusiasm for high density and general pro-development approach. This was attributed in part to more people living in urban neighborhoods as well as some residents having fought development, seen the resulting low-density units, but then realized they can't afford them (14). In effect, their own actions were pricing them out of the market in their neighborhoods. These anecdotes reflect the need provide more and stronger rational and economic arguments, as moral arguments alone are not sufficient (31). A bit more skepticism was voiced at the roundtable. Participants questioned whether society's "entrenched desire for homeownership" would change. As one person expressed it, if this generation's values are inculcated by the former generation, will they also become "defenders of the faith" and resist greater density?

Community members of color are seeking to participate in the process, wanting to ensure their housing needs and concerns over gentrification and displacement are being taken into consideration (27). Leaders need to build trust and establish better working relationships with these communities. At our roundtable discussion, recent efforts were identified, such as Arlington closed-captioning board meetings in Spanish to engage and inform traditionally excluded groups in the policymaking process, and Montgomery allowing testimony to be given in Spanish.

Additionally, "the constituency is aging out of the debate" (33). The general sense among interviewees was that most of the resistant residents are older and that younger residents are more likely to have moderate or supportive views so they should be encouraged to become involved. A few people were concerned that new residents were less informed about the development process and would be just as likely to be focused on home values (11) instead of creating a more inclusive community with greater density to support services. Others were concerned that it is hard to get people to participate, particularly those sympathetic to change (29). We heard of examples from each jurisdiction of local conflicts between residents supporting and opposing a development.

Consideration needs to be given to what are the best engagement and education strategies to reduce opposition and build support for development. Both long-term residents aging out of the debate and wishing to stay in their communities as well young residents moving to the area and seeking to put down roots share changing visions for their communities to enable them to stay in them.

The roundtable included a session focused on engagement strategies. Greater inclusivity was an important theme as millennials, low-income households, seniors, and many others would benefit from

"housing for everybody." This could involve building on existing coalitions to include voices and needs not currently being served, but other vehicles would likely be needed. It also requires new ways of engagement that allow community involvement beyond attending community and planning board meetings. Building more trust, including working through a trusted partner, was an important component of any outreach activities. Another suggestion was to ensure people see how their voice mattered, such as identifying the "wins" and letting people know how their participation had an effect. In general, improving feedback and follow up with community members was seen as important.

Recognizing the many successful organizations in the region, participants suggested the benefit of having advocates share effective messaging and other lessons learned with each other. Similarly, creating a tool that made best practices more accessible, particularly on how to reach different audiences, could be useful.

Many of the people we interviewed thought education could play an important role, with residents as well as with local officials and the business community. The three main elements to be communicated were (1) how to best manage projected growth, (2) the benefits of density, and (3) the value of diverse housing types and people. One interviewee realized that "our policies are misunderstood, because we've been lazy, not adequately educating our constituents" (26).

As one elected official stated, "the projections show the population is still growing. That's good news, we aren't becoming Detroit." Yet, with limited land for development, we have to make decisions about how to fit the growth in the space we have (8). If you can get the community to view growth positively, you can start the conversation and get them focused on problem solving rather than saying no. Data can help tell the story. People may be fighting density while wanting stores and restaurants to return. They don't realize that household size has diminished, eliminating the population necessary to support those services (28). Roundtable participants noted the importance of understanding each audience's "real" issues, rather than what they say, to enable advocates and policymakers to address those concerns. It was also important to arm policymakers with the economic arguments supporting increased housing, particularly affordable housing. One recommendation was to provide officials with information on earlier experiences (i.e., we did the same thing we are proposing now in this other neighborhood and look how well it's turned out) to help them counter the arguments they face.

"People see change occur, and it's not the horror they expected" (2).

A need was identified to help communities understand the value of having affordable housing throughout the jurisdiction and region, of having economic and social diversity among their neighbors (5). This requires more data and outreach. It was recommended that issues be framed to emphasize "us" rather than "them." One example was to consider the target affordability range, then identify the jobs at

that income level. Trying to reach households that make 60 percent of the area median income might apply to a school worker or hospital worker. If you can then talk about providing housing for these workers, you humanize the issue; you are talking about your neighbors, not "them" (31).

A roundtable participant shared the framework she uses, observing that "analytical people listen with their heads, emotional people listen with their hearts, and financially motivated people listen with their wallets." Building coalitions to implement change in the region require successfully addressing all three of these constituencies.

People had more ideas about the content than the process by which to educate residents. Several people noted the importance of getting information to residents early so they don't fill gaps with misinformation or fears (12). The role of "positive" bloggers on development issues, such as Greater Greater Washington, was seen as an important resource (28). Of course, as one person noted, "In theory, education can be good." With some neighborhoods, you can explain, get their involvement, and meet their concerns. In other cases, it still doesn't work; the neighborhood may not want the development (2). Organizations like the Northern Virginia Affordable Housing Alliance could help jurisdictions educate their residents and engage a diverse group of residents.[16]

One strategy to increase engagement and educate residents to build support for change is choosing an initial development wisely, then using that successful example as a model (5). This advice was given by numerous interviewees (and reiterated at the roundtable) and applied to both high-density market-rate housing and affordable housing. For example, if people see a well-designed development with retail in a 10-story apartment complex that transitions well to the surrounding low-density housing, they may be more likely to allow it to be replicated (13). The importance of design was emphasized by numerous people as key to community acceptance.

IMPORTANCE OF DESIGN

Good design is critical to promoting additional development, regardless of which strategy to increase density is being pursued. When asked about community response to new development, a continued refrain was that people don't like "density," but really badly designed density is the problem (28).

"Good design can make change more palatable; bad design exacerbates the problems of change" (8).

Design defines how a community feels about itself, it allows you to provide amenities for everyone and density makes it affordable (33). If the project is designed well, "then everyone wants it, this is the kind we would want to live in" (22). Some might argue that good design gets ruined as the developer adjusts the plan during community negotiations. Additionally, given how much community angst has

stemmed from poorly designed buildings, who arbitrates what constitutes good design can be controversial. Research continues to support the need for more consistent, timely development review (Jakabovics et al. 2014). It is unclear how that fits into having planning departments focus more on design and compatibility.

PRIORITIZING HOUSING

As discussed above, lack of leadership and vision was identified as a barrier. If elected officials were committed to prioritizing housing, one suggestion was that the jurisdiction's leadership creates a council of agencies to optimize housing production. These agencies are housing and community development, the public housing authority (which has a huge need for redevelopment and increased density), transportation (given the significant investments and discretion), land disposition agency (with a goal of increasing housing, rather than optimizing revenues), the agency managing current property (i.e., general services), planning, and the state housing finance agency (28).

Without leadership from the public sector, strategies will not be implemented unless the press, residents, or the "money people," such as businesses and philanthropy, force officials to act (7).

This issue received more attention at the roundtable. Greater prioritization could be encouraged by externalizing the true costs of lack of affordable housing connected to jobs so policymakers better understand the cost of their decisions. They need to learn to recognize the trade-offs in development. Another recommendation was to recognize housing as a critical part of transportation policy, possibly through the Council of Governments.

COMPLEMENTARY STRATEGIES AND OPPORTUNITIES

Employer engagement. We began this project with the hypothesis that employers could support local or regional efforts to increase housing supply, such as the role Chicago Metropolis 2020 and Silicon Valley Leadership Group have played in supporting housing development that met specified criteria. We anticipated they would be particularly supportive of efforts to increase housing supply as a critical component of their ability to hire quality workers across the income and skills spectrum. We reached out to the human capital departments in some of the largest private-sector employers in the region, particularly hospitals and universities, but also defense contractors and hotel chains, to ask about the role of housing in attraction and retention of employees. We were able to obtain very few interviews; whether this reflected lack of interest in the issue, higher priority demands, or our failure to find the right person and make a compelling argument for the interview, we don't know. Other interviewees, however, were not surprised by the lack of response.

We spoke with human capital staff at two universities and a defense contractor. We also asked other interviewees about the opportunity to engage employers. The consensus is that the private sector is not providing leadership locally or regionally in meeting housing needs. Several reasons were given for this lack of involvement. The most common was the large role of the federal government in the region, reducing the impact of the private sector. The structure of the private sector further explains a lower level of involvement than in other communities. Defense contractors, for example, may have a large campus in a small jurisdiction. In the DC region, staff members often work on site for the federal

government, reducing the office footprint of the contractor as well as its connection with the local community (30). Many local hospitals and universities now have multiple campuses in the region, so their employees live in various jurisdictions, reducing the organization's involvement in a single jurisdiction (25). The regional distribution of housing works well for some companies, enabling senior employees to live in large homes in the suburbs and younger employees to commute by public transportation from an urbanized area to offices in, for example, Bethesda, Tysons, or Arlington (30).

Some people thought business leaders were aware of the lack of affordable housing but were unwilling to take a leadership role. Others thought they weren't "tuned in." Business leaders have identified the lack of a range of affordable housing as a challenge. For example, they established housing as an issue of economic competitiveness in developing Fairfax's Strategic Plan for Economic Success (26).

We were told greater involvement by the private sector would only occur if the housing situation became an employment constraint (15). One would need to find firms having difficulty retaining and attracting employees, likely the smaller employers, and they don't have time for meetings (31). Others felt a better case needed to be made as to housing's importance to the region's economic competitiveness. "We haven't made the case well enough for them to enter the conversation" (31). At the roundtable, identifying employer "champions" and clearly explaining what you want from them, was identified as an important engagement strategy.

The Greater Washington Housing Leaders Group (GWHLG), begun in June 2014, convenes more than a dozen public and private-sector leaders concerned about housing affordability to examine the nature of the affordable housing shortage in the greater Washington area; the relationship of housing affordability to economic growth; and strategies to increase affordable housing for low- and moderate-income households in the region (GWHLG 2015). It seeks to get the business sector involved by helping businesses understand how the housing shortage affects their bottom line (3).

Our probes to identify other opportunities for building a coalition were unsuccessful. While we were told by an interviewee new voices are needed, because the region is not making much progress, no one offered ideas of who those new voices should be.

Regional opportunities. Jurisdictions in the DC region are fairly sophisticated in addressing housing needs, particularly for low-income households. The four jurisdictions we examined in detail have inclusionary zoning programs, funding streams for housing, and a stated recognition of the important role that housing plays in the well-being of individuals, communities, and the city or county. Several organizations bring together people from different jurisdictions to address housing and other regional issues. In addition to Metropolitan Washington Council of Governments, they include the 2030 Group,[17] a business organization; Washington Regional Association of Grantmakers;[18] and most recently the Greater Washington Housing Leaders Group, a combination of public- and private-sector leaders (GWHLG 2015). Despite various entities discussing regional issues, we found near-consensus among the people we interviewed that not much regional activity is occurring around housing: the jurisdictions "have collaborative discussions, but not a regional approach" (12). "People talk but there is

no action" (1). Even collaboration among the jurisdictions in Northern Virginia was seen as limited with greater engagement unlikely. The region lacks political leadership at the regional level (32).

While we perceived a sense of frustration at the lack of regional approaches to increasing housing supply, particularly for affordable housing, we did not get a sense that there was much appetite for regionalism when we asked about such opportunities. Only one person responded affirmatively (8). Yet, many of the interviewees identified the importance of a regional approach to solve the housing problem, with two people noting the absence of a regional housing compact (13, 16). This apparent conflict may reflect the challenges in developing and implementing a regional housing plan.

The largest challenge appears to be the multiple jurisdictions and levels of government involved in the region. As one person explained, typically, when there are "growing regional problems, governors start to realize the problem, but here we have two states, the District, and the federal government. That's four jurisdictions" (16).

Several people had little confidence in regional approaches: "I don't see a regional approach [to housing]; they can't agree on transportation or water" (9). Another person cited the many problems facing the Washington Metropolitan Area Transit Authority as an example of how the region's jurisdictions do not cooperate (24). Yet others mentioned the larger regional needs to be addressed, such as connecting the region to Fort Meade and Baltimore, where thousands of jobs are inaccessible to residents in the DC region (29).

Competition among jurisdictions was also seen as a barrier to regional activity. For example, the perceived inability of the jurisdictions to work together to attract international investment to the region, a situation in which they are not directly competing against each other, was seen as an indicator of the ineffectiveness of the MWCOG (1). With housing, the challenges are even larger. For example, DC doesn't want to solve its homelessness problem only to have people experiencing homelessness in neighboring jurisdictions come to DC for assistance (12). Similarly, disproportionate funding of housing trust funds creates problems as governments providing more money per capita may become politically vulnerable when their residents question why they are paying more (13). A DC interviewee suggested that neighboring jurisdictions have no incentive to adopt a regional approach to affordable housing because they are getting a great deal with DC housing a disproportionate number of the region's low-income households (11).

While a regional approach does not seem promising in the current environment, jurisdictions can learn from each other. One roundtable participant reflected that positive messaging that highlights successful examples in the region might be more prudent than simply shaming politicians and leaders into action. Jurisdictions can have shared goals even if they have different policies. At the core, the arguments are the same across the region (both for and against development), providing opportunities to work as a region, according to a roundtable participant. A primary function of MWCOG appears to be highlighting best practices (26). It provides space for officials and staff to have regional conversations and work toward collaboration (5). Through Region Forward, MWCOG members agreed on goals and shared research and policy initiatives (26) as they developed a vision for a more accessible, sustainable,

prosperous, and livable region.[19] Containing explicit goals, Region Forward can help each jurisdiction assess its activities as well as measure the region's performance (5). However, its greatest value may be as a shaming tool (14). One challenge to the best practices approach identified by interviewees and roundtable participants is the lack of scalability.

Perhaps more promising is the potential for regional coordination to build from smaller inter-jurisdictional collaboration (26). DC, Montgomery County, and Prince George's County worked together on a plan to address homelessness and coordinated their adoption of a $15 minimum wage. An approach to address housing regionally by focusing on transit corridors that span jurisdictions could be promising, such as development along Lee Highway running through Arlington and Fairfax (26). These small steps could grow into a greater degree of regional collaboration.

The private and philanthropic sectors could be necessary to force local officials to act regionally. As best summed up, "We need the money folks to tell elected folks to figure it out" (7). There was a sense that in the absence of local leadership, the region needs "someone to step in—perhaps philanthropy—to bust out of this" (31). The Washington Regional Association of Grantmakers recently teamed up with Enterprise Community Loan Fund to create Our Region, Your Investment, an initiative to access more capital to support the creation of affordable housing in the region. Continued innovation combined with more leadership capital will be necessary. Having large, regional employers at the table could be effective, but that would require a strategy to get them to the table.

The need for more affordable housing at all income levels throughout the DC region necessitates new strategies, collaborations, and innovative ways of thinking that move beyond traditional approaches. As Cohen (2015) writes:

> The challenge may be less a matter of coming up with effective strategies for increasing the production of affordable housing than a challenge of generating the political will across the region and across sectors to bring these ideas to fruition. The mobilization of public sector, business, and nonprofit advocates working together throughout the region will be the linchpin for making progress.

Future Research

Our focus was on action items, not on creating a future research agenda. However, our case study identified a few major research needs. People spoke of the importance of having sufficient housing to ensure the jurisdiction's or region's economic competitiveness, but they consistently noted the lack of analysis enabling them to make that argument to political leaders, business leaders, and community members. The general request was to connect the dots between housing and economic competitiveness. A related request was for analysis on the benefits of income diversity in a neighborhood.

The second issue requiring additional research is the availability of financing for housing development. This topic was not identified through the interviews, but the discussions make it clear that policy makers would benefit from better understanding the constraints imposed by the financing

available to developers. What is private equity willing to fund? When can a developer obtain acquisition and development financing? Funding sources and costs are critical to increasing supply and may influence both the type of developers and what gets built.

Another area that would benefit from research relates to the infrastructure needs created by new development, particularly the standards and financing. For example, jurisdictions are beginning to change their standards for on-site parking, which reduces direct costs. Other standards may be subject to revision as urban and suburban forms change. Financing needed infrastructure is accomplished through impact fees in Maryland and by proffers in Virginia. With proffers currently under review by the Virginia legislature, other methods for paying for new infrastructure need to be examined. To the extent infrastructure costs delay or deter development, this is an area ripe for further exploration.

Notes

1. Richard Florida, "The Urban Housing Crunch Costs the U.S. Economy about $1.6 Trillion a Year," *City Lab*, May 18, 2015, http://www.citylab.com/housing/2015/05/the-urban-housing-crunch-costs-the-us-economy-about-16-trillion-a-year/393515/.
2. Emily Badger, "How to make expensive cities affordable for everyone again," *Wonkblog, Washington Post*, February 19, 2016, https://www.washingtonpost.com/news/wonk/wp/2016/02/19/how-to-make-expensive-cities-affordable-for-everyone-again/.
3. We use "DC region" as shorthand for the Washington, DC, metropolitan statistical area, which consists of the District of Columbia, 5 counties in Maryland, 11 counties and six independent cities in Virginia, and 1 county in West Virginia. See "Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas," Bulletin 13-01, Office of Management and Budget, February 28, 2013, https://www.whitehouse.gov/sites/default/files/omb/bulletins/2013/b-13-01.pdf.
4. US Census Bureau, American Community Survey, 2009–13.
5. US Census Bureau, Census 2000 and American Community Survey 2014 one-year estimates.
6. John Ricco, "DC Added Record Housing in 2015. That's Slowing Down Price Increases," *Greater Greater Washington*, February 4, 2016, http://greatergreaterwashington.org/post/29640/dc-added-record-housing-in-2015-thats-slowing-down-price-increases/.
7. Lisa Sturtevant and Agnes Artemel, "DC Area Incomes Fall behind Skyrocketing Housing Costs," *Greater Greater Washington*, October 4, 2012, http://greatergreaterwashington.org/post/16343/dc-area-incomes-fall-behind-skyrocketing-housing-costs/.
8. See Rolf Pendall et al., "Mapping America's Futures," accessed June 2016, http://apps.urban.org/features/mapping-americas-futures/.
9. Calculations for the DC region in the demographics section are based on the DC commuting zone (CZ). Unlike metropolitan statistical areas, CZs include nonmetropolitan areas (http://www.ers.usda.gov/data-products/commuting-zones-and-labor-market-areas.aspx). The DC CZ consists of the District of Columbia; Calvert, Charles, Frederick, Montgomery, Prince George's, and St. Mary's Counties, Maryland; Arlington, Fairfax, Fauquier, Loudoun, Prince William, Rappahannock, and Warren Counties, Virginia; and the cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park, Virginia.
10. Robert McCartney, "Why the DC area risks losing its allure to millennials," *Washington Post*, October 17, 2015.
11. US Census Bureau, Census 2000 and American Community Survey 2015 one-year estimates.
12. For example, see the Housing Communications HUB's Messaging and Framing Toolkit and the Coalition for Affordable Housing's Housing Advocacy Catalog.
13. To provide anonymity to the people we interviewed, we reference their statements by a number that we can use to identify the person if required.
14. In evaluating the height limitation, the DC Office of Planning estimated 4.9 percent of the District's land area had development capacity, after applying a number of filters such as single-family zone districts (Office of Planning 2013).
15. Alison Rice, "A Suburban Wasteland in Virginia Gets a Modern Urban Feel," *New York Times*, December 18, 2012.
16. "About NVAHA," Northern Virginia Affordable Housing Alliance, http://nvaha.org/about-nvaha/.
17. See http://the2030group.com/.
18. See https://www.washingtongrantmakers.org/.
19. See https://www.mwcog.org/regionforward/.

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Inclusionary Zoning and Housing Market Outcomes

Emily Hamilton

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Abstract

As regions across the United States are experiencing high and rising house prices, inclusionary zoning is increasing in popularity as a tool to increase the availability of affordable housing for households making less than their region's median income. However, when inclusionary zoning requires private developers to subsidize below-market-rate units, it may act as a tax on housing, leading to reduced supply and higher prices than cities would experience without the policy. Few empirical studies have attempted to measure how inclusionary zoning affects housing supply and prices. In this paper, I use a new dataset on inclusionary zoning in the Baltimore-Washington region to estimate its effects on market-rate house prices and building permits in a difference-in-difference study. I find some evidence that inclusionary zoning increases market-rate house prices, but none that it reduces new housing supply. Additionally, I find that most optional programs that offer developers increased development rights if they choose to provide below-market-rate housing units have been unsuccessful in producing affordable units. Alexandria, Virginia, and Falls Church, Virginia, are exceptions, where density bonuses are very valuable owing to traditional zoning's restrictions on new housing construction.

JEL codes: R52, R58, R31, R32

Keywords: inclusionary zoning, affordable housing, housing prices, housing supply, regional housing market, residential real estate, land development, land use, land use regulation, zoning

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Inclusionary Zoning and Housing Market Outcomes

Emily Hamilton

I. Introduction

Inclusionary zoning (IZ) is a policy under which local governments require or incentivize real estate developers to provide some below-market-rate housing units in new housing developments. IZ proponents promote it as a tool to address the important public policy concern of access to affordable housing for households of diverse income levels. Its name indicates that its creators view IZ as an antidote to exclusionary zoning policies. Exclusionary zoning rules include minimum-lot-size requirements, multifamily housing bans, and other rules that limit the housing supply in a jurisdiction, thereby driving up housing prices.[1]

While IZ may be intended to address the serious consequences of other land use regulations that limit housing supply and drive up prices, economic theory predicts that IZ could actually exacerbate regulatory constraints on housing supply. As legal scholar Robert Ellickson explains, IZ is a tax on the construction of new housing units and a price ceiling on the units that must be set aside at below-market rates.[2] Both of these factors can be expected to reduce the quantity of housing supplied, resulting in higher prices for units that are available at market rates.

IZ programs vary widely in design. Many jurisdictions offer developers density bonuses in exchange for providing set-aside units. This practice allows more market-rate units to be built than would otherwise be permitted, offsetting some or all of the cost of providing below-market-

[1] Sanford Ikeda and Emily Washington (now Hamilton), "How Land-Use Regulation Undermines Affordable Housing" (Mercatus Working Paper, Mercatus Center at George Mason University, Arlington VA, November 2015).
[2] Robert Ellickson, "The Irony of Inclusionary Zoning" (Faculty Scholarship Series No. 468, Yale Law School, New Haven, CT, January 1981).

rate units. These density bonuses will be more valuable where market-rate prices are higher and where other land use regulations are more binding. If the value of these density bonuses outweighs the cost of providing below-market-rate units, the real-world effects of IZ could be the opposite of Ellickson's predictions.

As a further complication, in some cases, IZ units are required to serve households making up to 120 percent of their region or locality's median income, and little rent reduction may be required relative to market rents. In these cases, IZ may have little effect on development outcomes. In other cases when IZ units are required to serve very-low-income households, IZ programs may be a large tax on development.

While Ellickson describes mandatory IZ programs that require developers to set aside affordable units as a condition of building new housing, some jurisdictions have optional IZ programs under which developers may provide affordable units in exchange for a density bonus. Some past empirical work on the effect of IZ on housing markets has not distinguished between the effects of mandatory and optional IZ programs, but theory says they should have different effects. Mandatory IZ may be a tax on new housing if the cost of providing below-market-rate units exceeds the benefit of density bonuses or other offsets to developers. Optional IZ, however, allows developers to participate in the program if the value of the density bonuses exceeds the cost of providing subsidized units. The introduction of optional IZ should either lead to increased housing supply and lower prices relative to a jurisdiction's status quo or have no effect if developers elect not to participate in the program.

In this paper, I review the empirical and theoretical evidence of the effects of IZ on housing market outcomes and contribute a new analysis of the effects of IZ on house prices and new housing supply in the Baltimore-Washington region. The following section will review the

literature on the effects that IZ has on house prices and new housing supply. Section 3 describes the history and growth of IZ in the Baltimore-Washington region. Section 4 explores how economic theory predicts IZ programs of various designs can be expected to affect house prices and new housing supply. Section 5 explains my dataset and data-gathering process. In section 6, I explain the results of my empirical model, in which I use a difference-in-difference study design to estimate the effects of IZ in the Baltimore-Washington region on house prices and new housing supply. Building on past empirical work on IZ, I distinguish between mandatory and optional programs, which have different expected effects on market outcomes, and I use a spatial model to account for IZ's potential cross-border effects. I find some evidence that IZ raises prices, but none that it decreases housing supply. The final section concludes.

II. Literature Review

While IZ programs continue to proliferate,[3] their effect on housing market outcomes remains in debate. IZ advocates often promote two key goals for these programs: (1) promoting mixed-income housing development as a tool to reduce socioeconomic segregation, and (2) serving a population that may struggle to afford market-rate rents in their neighborhood or jurisdiction of choice (particularly new-construction housing), but who are not recipients of other public assistance for housing that is typically targeted toward a lower-income population. In her testimony on New York City's IZ program, legal scholar and Commissioner of the Department of Housing Preservation and Development City Planning Commission Vicki Been explains the program will "stretch our public dollars so that we can devote more public funds to the most

[3] One study identifies 507 programs in the United States, most of which were adopted in the first decade of the 21st century. See Brian Stromberg and Lisa Sturtevant, "What Makes Inclusionary Zoning Happen?," National Housing Conference, May 2016, http://media.wix.com/ugd/19cfbe_2b02286eba264acd872fd2edb3d0cb8f.pdf.

critical needs, will enhance neighborhood economic diversity, and [will] allow mobility among our neighborhoods, thereby reducing inequality."[4]

On the other hand, critics of IZ suggest that Ellickson's analysis of its effects on the housing market are correct; IZ comes with the cost of taxing new development, reducing supply, and increasing market-rate house prices. IZ undoubtedly benefits the households that receive below-market-rate units, but if these benefits to a small percentage of generally middle-income households come at the cost of increased housing scarcity and higher prices for everyone not receiving IZ units, the programs likely exacerbate the problems they are trying to help.

Only four studies have used causal inference methods to measure the effect of IZ on broader housing market outcomes. This literature is likely small because of the difficulty of gathering data on IZ policy across permitting jurisdictions. Three of the four studies examine the effects of IZ across California localities, and one uses data from the Bay Area and the Boston region.

Antonio Bento and his coauthors use a two-way fixed effects model to measure the effects of IZ on housing starts, the percentage of housing starts that are single family versus multifamily, the prices of new homes, and the size of new homes.[5] They find that IZ caused prices to increase 2 to 3 percent faster relative to jurisdictions without the policy, but that IZ did not decrease housing starts. They also find that IZ reduced the size of new single-family homes and led to a larger portion of new construction being multifamily rather than single family. The

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[4] Vicki Been, "Testimony of Vicki Been, Commissioner of the Department of Housing Preservation and Development City Planning Commission," December 16, 2015, https://www1.nyc.gov/assets/hpd/downloads/pdf/community/vicki-been-testimony-cpc.pdf.

[5] Antonio Bento, Scott Lowe, Gerrit-Jan Knaap, and Arnab Chakraborty, "Housing Market Effects of Inclusionary Zoning," *Cityscape* 11, no. 2 (2009): 7.

authors characterize their findings: "The results are fully consistent with economic theory and demonstrate that inclusionary zoning policies do not come without costs."[6]

Ann Hollingshead also studies IZ in California, looking at the effect of a state court ruling that IZ programs without density bonuses or other offsets violated a state prohibition on local rent control. This ruling reduced the tax effect of IZ by leading some jurisdictions to increase their density bonuses and to transition from mandatory to optional programs.[7] Hollingshead does not find that reducing the burden of IZ programs led to a reduction in house prices.

Jenny Schuetz, Rachel Meltzer, and Vicki Been study the effects of IZ in the Boston area and the Bay Area on the single-family home market.[8] They use a model with jurisdiction fixed effects, time trends, and a control for whether house prices were appreciating during a given year. In the Boston area, they find that the implementation of IZ rules has corresponded with higher housing prices and reduced construction rates during times of regional house-price appreciation, but not during soft markets. In the Bay Area, Schuetz, Meltzer, and Been find that, as in Boston, IZ corresponds with more rapidly rising house prices during periods of market appreciation but that it decreases prices during soft markets.[9] They find no evidence of a relationship between IZ and housing supply in the Bay Area.[10]

Tom Means and Edward Stringham use a first difference model to estimate the effect of IZ on California housing markets, controlling for the number of years that each jurisdiction has

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[6] Bento et al., "Housing Market Effects of Inclusionary Zoning," 7.
[7] Ann Hollingshead, *When and How Should Cities Implement Inclusionary Housing Policies?* (Berkeley, CA: Cornerstone Partnership, 2015), http://www.monroecountyem.com/DocumentCenter/View/9447/Implement-Inclusionary-2015-APA2?bidId=.
[8] Jenny Schuetz, Rachel Meltzer, and Vicki Been, "Silver Bullet or Trojan Horse? The Effects of Inclusionary Zoning on Local Housing Markets in the United States," *Urban Studies* 48, no. 2 (2011): 297.
[9] Schuetz, Meltzer, and Been, "Silver Bullet or Trojan Horse?," 297.
[10] Schuetz, Meltzer, and Been, "Silver Bullet or Trojan Horse?," 297.

had an IZ program in place.[11] They find significant and large effects of IZ increasing house prices and reducing new housing supply, and they find that IZ's effect on house prices has increased over time. Their work builds on Benjamin Powell and Stringham's case study work on IZ in California.[12]

III. History of Inclusionary Zoning in the Baltimore-Washington Region

In 1971, Fairfax County, Virginia, adopted the country's first ordinance that required developers to build below-market-rate housing as a condition of building market-rate housing. The program did not offer a density bonus or other regulatory reduction to offset the cost of providing subsidized units.[13] Following the rule's implementation, the development company DeGroff Enterprises, Inc. sued the county for takings without just compensation. Their case reached the Virginia Supreme Court in 1973. The court overturned the county's IZ ordinance, finding that IZ was not a power granted to local governments under the state's zoning enabling act and that the requirement was a regulatory taking without compensation.[14]

Following this decision, the Virginia General Assembly passed two new sections to the Code of Virginia that enabled localities to implement IZ programs. The first, Va. Code Ann. § 15.2-2304, applies specifically to Albermarle, Arlington, Fairfax, and Loudoun counties, and Alexandria and Fairfax cities.[15] These jurisdictions are permitted to implement IZ programs that include density bonuses in exchange for below-market-rate units or other incentives to

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[11] Tom Means and Edward P. Stringham, "Unintended or Intended Consequences? The Effect of Below-Market Housing Mandates on Housing Markets in California," *Journal of Public Finance and Public Choice* 30, nos. 1–3 (2012): 39–64.
[12] Benjamin Powell and Edward Stringham, "Housing Supply and Affordability: Do Affordable Housing Mandates Work?" (Reason Policy Study No. 318, Reason Public Policy Institute, Los Angeles, April 2004).
[13] Housing Virginia, "Welcome to the Neighborhood: A Practitioner's Guide to Inclusionary Housing," September 2017, http://www.housingvirginia.org/wp-content/uploads/2018/07/HV_Inclusionary_Guidebook.pdf.
[14] Housing Virginia, "Welcome to the Neighborhood."
[15] Va. Code Ann. § 15.2-2304, https://law.lis.virginia.gov/vacode/title15.2/chapter22/section15.2-2304/.

compensate developers for at least some of the cost of the affordable units.[16] The second, Va. Code Ann. § 15.2-2305, enables all the state's municipalities to implement IZ programs for projects that receive a rezoning or otherwise do not comply with their jurisdiction's by-right development.[17] Programs allowed by § 15.2-2305 must have affordability set-asides that are not more than 57 percent of the density bonus they offer (in other words, if a project requires 57 income-restricted units, the density bonus would have to allow the developer to build at least 100 more units than they would be allowed under the baseline zoning). Additionally, the number of IZ units required may not exceed 17 percent of the total units in a new development.

In addition to the IZ programs specifically enabled by Va. Code Ann. § 15.2-2304 and § 15.2-2305, any Virginia municipality may enact optional IZ programs. Under these programs, developers are not required to build below-market-rate housing as a condition of building market-rate housing even under a rezoning; however, jurisdictions may offer incentives such as density bonuses to developers that choose to provide below-market-rate housing.

Shortly after Fairfax County's original IZ program was found to violate the Virginia constitution, Montgomery County, Maryland, implemented its Moderately Priced Dwelling Unit (MPDU) program in 1974.[18] It is now the longest-running IZ program in the region and the country. Montgomery County's program has been held up frequently as an example of successful IZ.[19]

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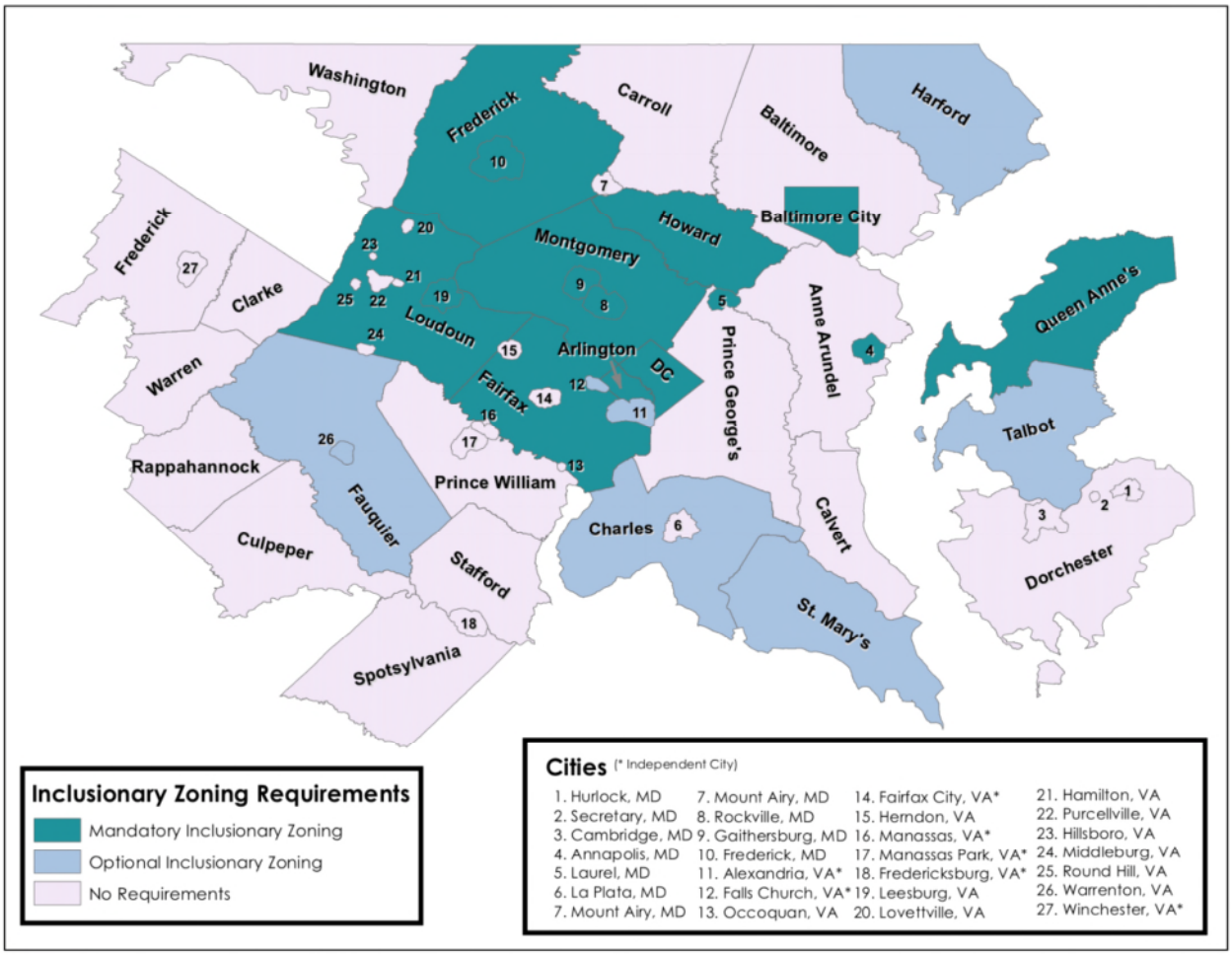
[16] Housing Virginia, "Welcome to the Neighborhood."
[17] Va. Code Ann. § 15.2-2305, https://law.lis.virginia.gov/vacode/title15.2/chapter22/section15.2-2305/.
[18] Jurisdictions use various terms to refer to requirements or incentives for developers to provide below-market-rate housing. Aside from MPDU programs, other terms include bonuses for Affordable Dwelling Units or Workforce Dwelling Units. I refer to all of these programs as IZ throughout.
[19] Diane K. Levy et. al, *Expanding Housing Opportunities through Inclusionary Zoning: Lessons From Two Counties* (Washington, DC: Department of Housing and Urban Development, Office of Policy Development and Research, December 2012).

In 2004 Montgomery County policymakers made a few changes to the MPDU program.[20] They increased the affordability period for IZ units from 20 to 99 years for rental units and from 10 to 30 years for owner-occupied units. At the same time, the county reduced the project size that triggers MPDU requirements from 35 to 20 units and adopted a 20 percent density bonus for projects that include MPDUs. The reform also began allowing the affordable units to be provided off-site in some cases.

Most of the permitting in the Baltimore-Washington region is done at the county level, but some cities and towns are also permitting jurisdictions. Today, among the 26 permitting jurisdictions in Maryland within the Baltimore-Washington region, 14 have IZ programs, 5 of which are optional programs. Of the 28 Virginia permitting jurisdictions that are part of the Baltimore-Washington region, 8 have adopted IZ programs, 4 of which are optional. The District of Columbia adopted a mandatory IZ policy in 2009. The map in figure 1 shows mandatory and optional IZ programs across the region as of 2017.

[20] Montgomery County Code Chapter 25A, "Housing, Moderately Priced," http://library.amlegal.com/nxt /gateway.dll/Maryland/montgom/partiilocallawsordinancesresolutionsetc/chapter25ahousingmoderatelypricednote ?f=templates$fn=default.htm$3.0$vid=amlegal:montgomeryco_md_mc$anc=JD_Chapter25A.

Figure 1. Jurisdictions with Mandatory and Optional Inclusionary Zoning Programs, 2017

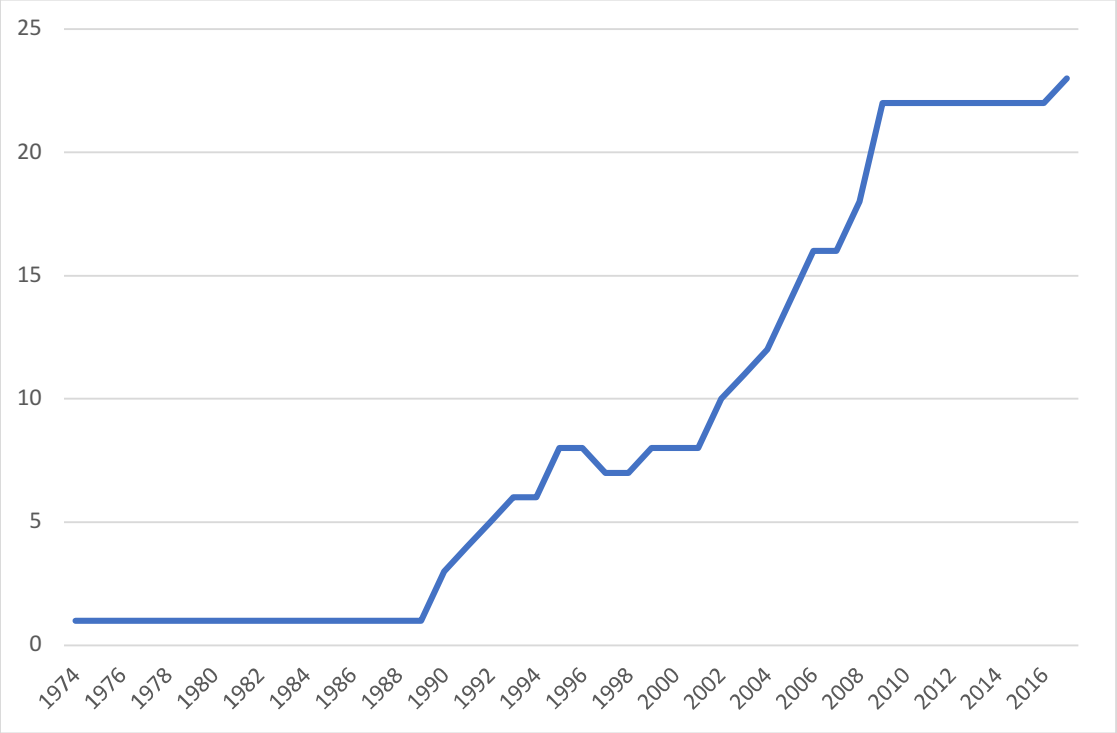


Source: Illustration by Nolan Gray.

Aside from Fairfax County, whose first IZ program ended because of the Virginia Supreme Court ruling, Prince George's County, Maryland, is the only locality in the region that implemented and then abolished an IZ program. In 1991, the county adopted an IZ program that applied to portions of the jurisdiction. County policymakers repealed the program in 1996 because, as a Brookings Institution report describes, county officials "believed that Prince

George's County had more than its fair share of the region's affordable housing."[21] With this exception, the prevalence of regional IZ programs has increased steadily over time. Figure 2 shows the number of IZ policies in the region over time.

Figure 2. Number of Jurisdictions with Inclusionary Zoning in the Baltimore-Washington Region, 1974–2017



Source: Data are gathered from the zoning ordinances of the permitting jurisdictions in the Baltimore-Washington region.

Policymakers in the region have indicated awareness and concern about how their IZ programs affect market outcomes. In 2015, five years after Washington, DC, adopted a mandatory IZ program, two local organizations, the Coalition for Smarter Growth and the DC

[21] Karen Destorel Brown, *Expanding Affordable Housing through Inclusionary Zoning: Lessons from the Washington Metropolitan Area* (Washington, DC: Brookings Institution Center on Urban and Metropolitan Policy, October 2001).

Fiscal Policy Institute, proposed amendments to the program that would require a larger percentage of IZ units and would target rental IZ units to households earning 60 percent of area median income (AMI) rather than 80 percent.[22] They pointed out that housing affordable to residents earning 80 percent of AMI is available on the private market, whereas households earning 60 percent of AMI may struggle to find housing they can afford. These organizations also demonstrated that following the adoption of IZ in DC, new housing supply continued its recovery following the 2008 financial crisis, providing evidence that the original program was not a tax on development, or at least not such a tax that it choked off new construction drastically. In response to their proposal, the Office of Planning revised its IZ program to require rental IZ units to be affordable to households earning 60 percent of AMI but kept the number of units required at 8 to 10 percent of new units in projects covered by IZ requirements.

The recommendation to reduce the income limits for IZ units in DC was based on a model showing that the expected value of bonus density more than offset the cost of providing set-aside units under the original IZ program.[23] In adopting changes to increase the cost of subsidized units relative to bonus density, DC policymakers seemed to be seeking an IZ policy that produced as much income-restricted housing as possible while maintaining roughly the same amount of total new development permitted under its zoning regime before the adoption of IZ.

Aside from the distinction between mandatory and optional IZ programs, IZ policy varies widely across regional jurisdictions. Most of the regional jurisdictions with IZ programs offer density bonuses for affordable units, with the exceptions of Howard County, Maryland, and Gaithersburg, Maryland. The density bonuses that developers receive as a condition of providing

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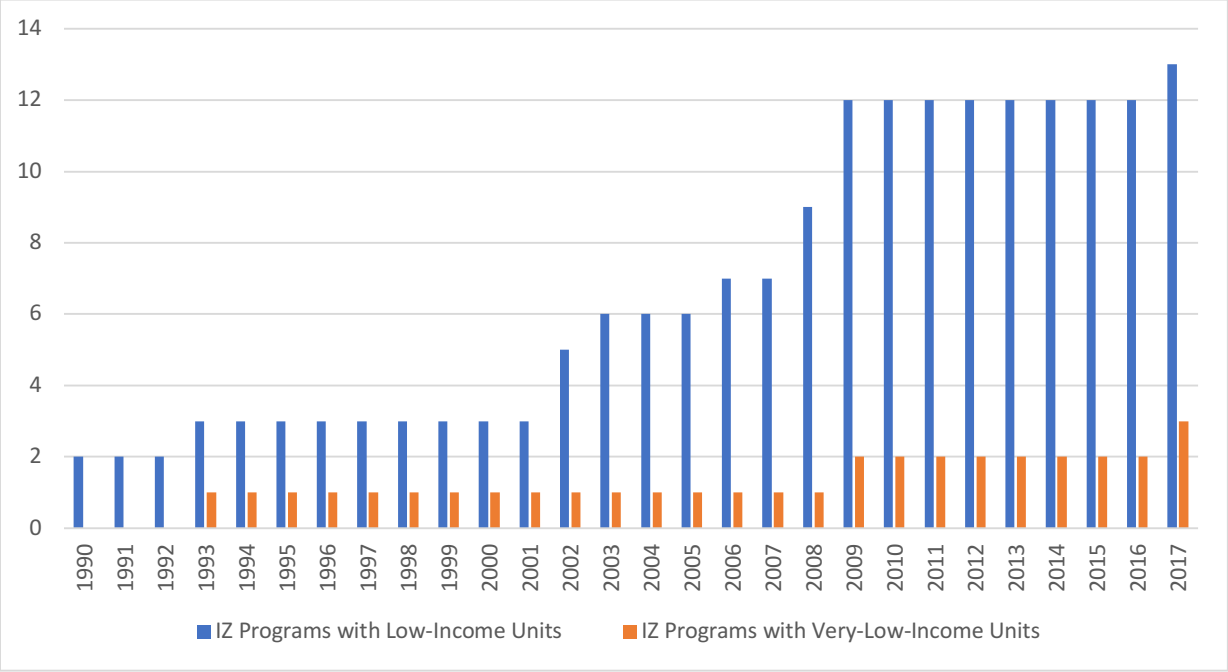
[22] Claire Zippel and Cheryl Cort, "Petitioner Statement in Support for Zoning Case No. 04-33G" (Testimony before the District of Columbia Zoning Commission, March 3, 2016), https://www.smartergrowth.net/wp-content/uploads/2016/03/2016.3.3-Petitioner-statement-for-ZC-No-04-33G-IZ.pdf.

[23] Zippel and Cort, "Petitioner Statement in Support for Zoning Case No. 04-33G."

affordable housing range from 10 to 100 percent of density that would be permitted without IZ. In some suburban jurisdictions, these density bonuses generally mean a reduction in minimum-lot-size rules.

Following others in the IZ literature, I define IZ units that must be affordable to households making 50 percent or less of the AMI as applying to "low-income households" and those that must be affordable to households making less than 30 percent of the AMI as applying to "very-low-income households." Until 1990, no IZ programs in the region included requirements to serve low- or very-low-income households, but the number of IZ programs requiring set-asides for lower-income households has increased steadily since then. Figure 3 shows this trend over time.

Figure 3. Number of Inclusionary Zoning Programs that Require Units Affordable to Low- and Very-Low-Income Households, 1990–2017



Source: Data are gathered from the zoning ordinances of the permitting jurisdictions in the Baltimore-Washington region.

Table 1 provides additional information on some of the key details of the IZ programs in place in the region as of 2017. I gathered all the data on IZ mandates and the details of programs from local land use ordinances and special reports on IZ. In some cases where these sources were ambiguous or incomplete, I contacted planning offices for clarification via phone or email.

IZ programs in the region have varied widely in the number of income-restricted units they have produced. Among the jurisdictions with optional IZ programs, only Alexandria, Virginia, and Falls Church, Virginia, have produced any units. In addition to offering density bonuses in exchange for subsidized units, the Alexandria rule gives planners discretion to reduce parking requirements.[24] In jurisdictions where land is expensive, complying with parking requirements presents a large cost to developers, so this may be a particularly valuable offset.[25] Falls Church offers reduction development fees in addition to density bonuses in exchange for affordable units.

Relative to other jurisdictions with optional IZ programs, Alexandria and Falls Church have high house prices. Among my full sample, the median per-square-foot house price in 2017 is $206. Among those with IZ, it is $239. Among the jurisdictions with mandatory versus optional programs, the medians are $247 and $210, respectively. The median price in Alexandria is $361 per square foot and in Falls Church it is $417, both well above the typical jurisdiction with an optional IZ program. These high prices are owing in large part to the jurisdictions' otherwise exclusionary zoning. Large parts of both municipalities permit only single-family, detached development.

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[24] City of Alexandria, VA, Municipal Code, Article VII: Supplemental Zone Regulations, Sec. 7-700 (1995), https://library.municode.com/va/alexandria/codes/zoning?nodeId=ARTVIISUZORE_S7-700ALINFLARRADEHEREREOREPAINPRLODCOHO.

[25] Donald C. Shoup, "The High Cost of Free Parking," *Journal of Planning Education and Research* 17 (1997): 3–20.

Table 1. Inclusionary Zoning Policies in the Baltimore-Washington Region in 2017

Jurisdiction	Years IZ in place as of 2017	Mandatory IZ	Number of units that triggers IZ program	IZ units required	Applies to households earning 50% or less of AMI	Applies to households earning 30% or less of AMI	Payment to jurisdiction allowed in lieu of IZ units	IZ units may be provided off-site	Maximum density bonus
Alexandria County, VA	23	No	5	9.0%	No	No	Yes	Yes	30%
Annapolis, MD	14	Yes	10	6.0%	No	No	Yes	No	15%
Arlington County, VA	13	Yes	50	5.0%	No	No	Yes	Yes	25%
Baltimore, MD	9	Yes	30	10.0%	Yes	Yes	Yes	Yes	20%
Charles County, MD	26	No	50	12.0%	No	No	No	No	100%
Fairfax County, VA	28	Yes	50	12.0%	Yes	No	Yes	Yes	20%
Falls Church, VA	16	No	0	6.0%	Yes	No	Yes	No	20%
Fauquier County, VA	23	No	2	20.0%	No	No	No	No	100%
Frederick County, MD	15	Yes	25	12.0%	Yes	No	Yes	Yes	22%
Frederick, MD	9	Yes	25	12.5%	No	No	No	No	22%
Gaithersburg, MD	12	Yes	20	15.0%	Yes	No	Yes	No	0%
Harford County, MD	9	No	0	10.0%	Yes	No	No	No	20%
Howard County, MD	19	Yes	0	10.0%	No	No	Yes	Yes	0%
Laurel, MD	10	Yes	50	6.0%	Yes	No	No	No	6%

(continued on next page)

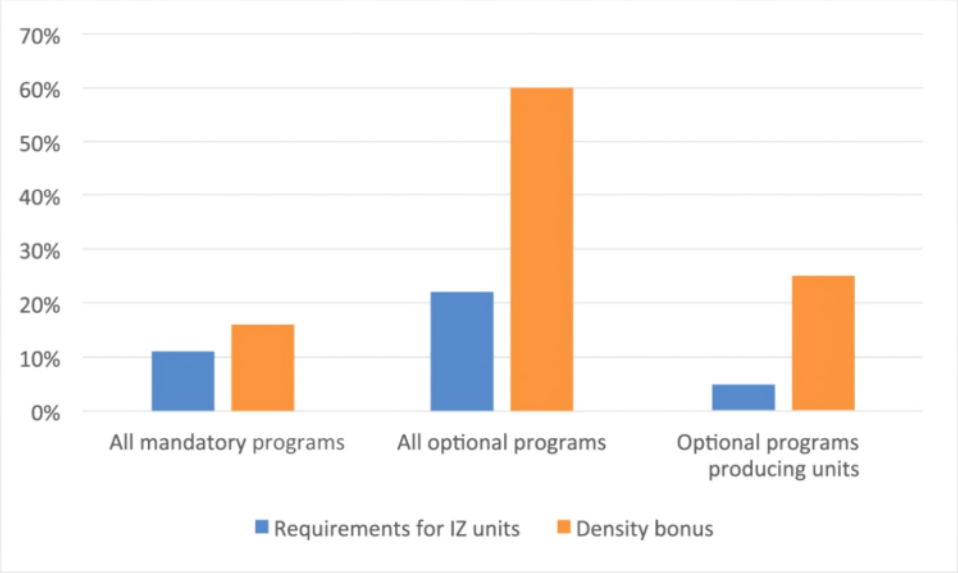
Jurisdiction	Years IZ in place as of 2017	Mandatory IZ	Number of units that triggers IZ program	IZ units required	Applies to households earning 50% or less of AMI	Applies to households earning 30% or less of AMI	Payment to jurisdiction allowed in lieu of IZ units	IZ units may be provided offsite	Maximum density bonus
Leesburg, VA	10	Yes	24	6.3%	Yes	No	Yes	No	20%
Loudoun County, VA	25	Yes	50	6.3%	Yes	Yes	Yes	No	20%
Montgomery County, MD	44	Yes	20	12.5%	No	No	Yes	Yes	20%
Queen Anne's County, MD	13	Yes	20	10.0%	No	No	Yes	Yes	10%
Rockville, MD	29	Yes	50	12.5%	Yes	No	No	Yes	22%
St. Mary's County, MD	16	No	0	12.0%	Yes	No	No	No	10%
Talbot County, MD	12	No	0	50.0%	No	No	No	No	100%
Warrenton, VA	1	No	2	0.0%	Yes	Yes	No	No	100%
Washington, DC	9	Yes	10	8.0%	Yes	No	No	No	20%

Source: Data are gathered from the zoning ordinances of the permitting jurisdictions in the Baltimore-Washington region.

Alexandria's and Falls Church's limitations on the rights to build housing give their density bonuses value. Because they permit much less housing than what developers would provide absent land use regulations, developers are willing to provide affordable housing in exchange for the right to build very valuable market-rate housing. In other jurisdictions with optional programs, typical land use regulations are likely less binding, so density bonuses are less of an incentive for providing subsidized units. In these jurisdictions the value of the density bonuses may not outweigh the cost of providing below-market-rate units.

On the whole, the ratio of density bonuses relative to below-market-rate units that optional IZ programs would require is much larger than under mandatory programs. Alexandria and Falls Church have larger density bonuses and require fewer IZ units than the typical mandatory IZ program. This provides some evidence that density bonuses under the region's mandatory programs are not large enough to offset the cost of providing IZ units, particularly considering that Alexandria's program, with high density bonuses relative to the typical mandatory program, has delivered only 17 IZ units per year on average, and Falls Church has delivered fewer than 5 units per year on average. However, this evidence is also consistent with density bonuses in the jurisdictions with optional programs offering little value because their existing zoning does not constrain housing supply significantly. Figure 4 shows average IZ unit requirements and density bonuses for all optional programs, mandatory programs, and optional programs that have produced IZ units.

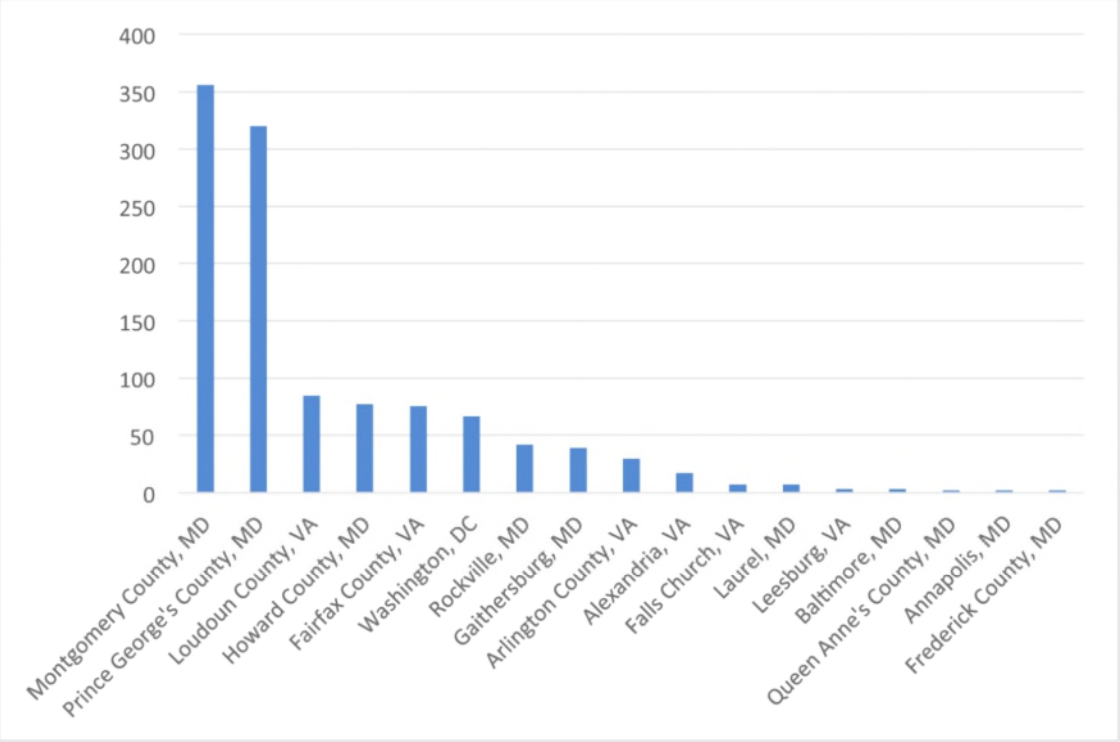
Figure 4. Mean Inclusionary Zoning Requirements and Density Bonuses across Program Types



Source: Author's calculations, based on data gathered from the zoning ordinances of the permitting jurisdictions in the Baltimore-Washington region.

Over half of the IZ units in the entire region have been built in Montgomery County (15,660 of 26,733 units). This is partly a result of the program's long history, but Montgomery County's program is also the most productive on an annual basis. Figure 5 shows the production of IZ units by jurisdiction, per year the IZ program has been in place.

Figure 5. Inclusionary Zoning Units Produced under the Baltimore-Washington Region's IZ Programs per Year of Program, 1974–2017



Source: Data are gathered from permitting jurisdictions' reports on their IZ programs, supplemented with conversations with planning staff where necessary.

One complicating factor in studying the effect of IZ on overall housing supply and prices is that many jurisdictions' IZ programs give city planners wide discretion to determine requirements on a site-by-site basis. For example, many of the large multifamily buildings permitted since Washington, DC, adopted IZ have received approval through the city's Planned Unit Development (PUD) process that allows projects to be built that deviate from the city's by-right zoning. When developers receive approvals through the PUD process, they are required to provide a benefits and amenities package to the project's neighborhood. Often these packages include more affordable housing units, and units that are affordable to lower-income households, than would otherwise be required under the city's IZ ordinance. The requirement to provide

additional affordable units as a result of negotiations between the developer, the city's Zoning Board of Adjustments, and other vested interests is not reflected in the de jure ordinances.

Additionally, local policymakers have often granted themselves discretion to waive IZ requirements on a project-by-project basis. Baltimore city's IZ program has produced only 27 units since it went into effect in 2009. The city's IZ ordinance provides for a 20 percent density bonus, but if developers are able to show that this bonus does not compensate them for the cost of providing the IZ units, they can receive waivers from complying with the requirement.[26] As a result of these waivers, the IZ units produced have fallen far short of what the ordinance would seem to require, and the program is having less of an effect on the city's housing market as a whole.[27]

Thirteen jurisdictions allow developers to pay fees rather than providing affordable units in a mixed-income building. In some cases, the revenue raised by these programs has become unmoored from the narrow goals that are typically associated with IZ. Arlington County, Virginia, has collected more fees in lieu of IZ units than any other jurisdiction in the region. The fees collected from developers go into the county's Affordable Housing Trust Fund. These funds are used to build homeless shelters and projects that consist of entirely subsidized housing. In these cases, fees collected do not meet typical IZ objectives of supporting mixed-income housing, but they are in line with the county's stated goal of directing subsidies for its least-well-off individuals.[28]

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[26] Baltimore City Department of Legislative Reference, Art. 13, "Housing and Urban Renewal (As Last Amended by Ord. 16-503)" (2016), http://legislativereference.baltimorecity.gov/sites/default/files/Art%2013%20-%20Housing.pdf.
[27] Natalie Sherman, "Despite Rule, Few Affordable Units Created in New Developments," *Baltimore Sun*, December 27, 2014.
[28] Arlington County Department of Community Planning, Housing, and Development, *Annual Affordable Housing Targets Report for 2015*, February 2016.

Finally, in some cases, the complex array of an IZ program's taxes and subsidies has little effect on ultimate rent prices for IZ units relative to market-rate units. For example, one Washington, DC, project built in 2016 includes units affordable to households earning 30 percent, 60 percent, 100 percent, and 120 percent of AMI. In many cases, the units affordable to households earning 100 percent to 120 percent of AMI receive only a slight subsidy of less than $100 per month relative to market rents.[29] The discrepancy between real-world IZ implementation and stated policies presents a challenge to measuring their effects empirically.

IV. Thc Economic Theory of Inclusionary Zoning

Given that IZ programs vary widely in their implementation, economic reasoning will predict different effects on housing market outcomes from different specific programs. Table 2 describes how common aspects of IZ programs can be expected to affect new housing supply and in turn prices, all else equal. An explanation of how each aspect of IZ programs can be expected to affect housing markets follows.

Components of typical IZ programs contribute to the "IZ tax," while others are an "IZ subsidy." The primary IZ subsidy to development is the density bonus that developers usually receive when they are required to provide IZ units under mandatory IZ programs or incentivized to provide them under optional programs. Allowing for more potential units under current zoning is the key way IZ programs may increase new housing supply and, in turn, potentially lower market-rate prices in addition to producing new subsidized units.

[29] Gordon Chaffin, "The Wharf Development Raises the Question: How Affordable Is Affordable?," *Greater Greater Washington*, January 12, 2018.

Table 2. Inclusionary Zoning Components' Expected Effects on New Housing Supply and Prices

Policy	Expected effect on new building permits	Expected effect on market rate house prices
Density bonus	↑	↓
Percent of new units required to be income restricted	↓	↑
Income-restricted units for lower-income residents	↓	↑
Years IZ units are income restricted	↓	↑
Developer allowed to make a payment to the jurisdiction in lieu of building IZ units	↑	↓
IZ units allowed to be built off-site	↑	↓
Applies to both multifamily and single family development	↓	↑
IZ program applies to entire jurisdiction	↓	↑
Minimum project size IZ program applies to	↓	↑
Participation in IZ program is optional	↑ or no effect	↓ or no effect
Participation in IZ program is mandatory	↑, ↓, or no effect	↑, ↓, or no effect

The IZ tax consists of the cost of providing IZ units, which includes several components. The percentage of total new units required to be subsidized, the requirement of IZ units to be affordable to lower-income residents, and the length of time that the IZ units must remain subsidized all contribute to the cost of complying with the program.

Finally, some programs include flexibility for developers to comply in ways that reduce their cost. In the case of mandatory IZ programs that as a whole tax new housing construction, introducing flexibility will reduce the IZ tax, holding other aspects of the program constant. In some jurisdictions, developers are permitted to contribute to an affordable housing fund in lieu of providing units. If the required contribution is less than the cost of providing subsidized units over the required affordability period, this option will reduce the program's tax. Similarly, some programs allow developers to provide affordable units at a site other than where the new market-rate units are built. This may reduce the cost of the IZ units if, for example, they are built in a

mid-rise building with lower per-unit construction costs than new market-rate units in a high-rise building. In some cases, IZ programs apply to only multifamily development or only single-family development. If the IZ program as a whole is a tax on development, but it only applies to new multifamily construction, new supply can move to single family rather than multifamily, causing a smaller decline in new construction and a smaller increase in market-rate prices than the program would have caused otherwise. Similarly, when IZ requirements apply to only a portion of the jurisdiction, developers may move construction to the exempted portions rather than reducing it overall. IZ programs vary in the size of new development that they apply to. Projects that only apply to large new developments may allow new construction to continue apace if developers are able to avoid the IZ tax by building more, smaller new housing projects.

Ideally, studies of IZ would take into account the nuances of each IZ program to determine the effects of each program aspect on housing market outcomes. Bento and his coauthors come closest by controlling for IZ programs that apply to projects with 10 or fewer housing units and programs that apply to low-income households.[30] In my study, the sample size is unfortunately too small to include IZ program characteristics beyond distinguishing between optional and mandatory programs.

In addition to the disparate effects from each aspect of an IZ program, the programs will have different effects over time. On the supply side, IZ programs that are a tax on development can be expected to reduce new housing supply as soon as the program goes into effect. They may lead to a spike in permits before their implementation if developers know that an IZ tax will affect development in the future and advanced notice of the coming IZ requirement gives them an opportunity to secure building permits before the program takes effect. On the price side, the

[30] Bento et al., "Housing Market Effects of Inclusionary Zoning."

effects of IZ can be expected to increase the longer the program is in place. Whether an IZ program as a whole is a tax or a subsidy, its effects on price will increase the longer the program affects a city's new housing supply and, in turn, its total housing stock.

Because housing in one jurisdiction is a substitute for housing in nearby jurisdictions, IZ programs may affect market outcomes not only in the jurisdiction that implements them but in their neighboring jurisdictions as well. If an IZ program is a tax on development, it can be expected to reduce new housing supply in the jurisdiction that implements it while increasing supply in nearby localities where development can be expected to become relatively more profitable. On the price side, an IZ program that taxes development can be expected to raise prices in the jurisdiction that implements the program and also to cause a smaller price increase in nearby jurisdictions.

De jure and de facto IZ programs often differ significantly, creating challenges for estimating the effects of an IZ program on market outcomes. In many jurisdictions, the permitting process for each major project is a negotiation between a developer and city officials. This process may result in actual IZ requirements being greater or less than the policy would seem to require. In my empirical work, I use the number of IZ units produced relative to a jurisdiction's population as a proxy for the program's expected effect on house prices and new housing supply. The following section explains the data on IZ in the Baltimore-Washington region that I use to test the effects of IZ on house prices and new building permits.

V. Data

The sample I use in my analysis includes the 56 permitting jurisdictions in the Baltimore-Washington Combined Statistical Region that are in Maryland, Virginia, and the District of

Columbia. These are 28 counties, 5 independent cities, 22 cities and towns that are within counties, and the District of Columbia. I exclude the region's jurisdictions in West Virginia, Pennsylvania, and Delaware. None of these jurisdictions have IZ programs. Twenty-four jurisdictions in my sample have or once had IZ programs, 16 mandatory and 8 optional. Within the time period for which I have data on new housing supply, 20 jurisdictions adopted IZ, and Prince George's County repealed it. Within the time period for which I have data on house prices, 16 jurisdictions adopted IZ.

In coding each jurisdiction's IZ ordinance, I use some discretion in determining how to categorize specific features of each program. The program in Arlington County, Virginia, is ambiguous in whether it is mandatory or optional. The county does not require developers to provide affordable units in any projects that are permitted by right. However, the county does require IZ units for any projects that require a site plan review. The median project size that triggers IZ requirements in the region is 20 units. Any project of 20 units or more in Arlington will very likely go through the site plan review process, so I classify this program as mandatory.

The most difficult data to gather, and potentially the least accurate data in my dataset, are the number of units that have been built in each jurisdiction and the fees they have collected in lieu of affordable units. These data are in dispersed places if jurisdictions report it at all. Montgomery County, Maryland, Washington, DC, Arlington, Virginia, and Alexandria, Virginia, provide excellent reports on their IZ programs, including detailed information on the number of units produced and fees collected, where applicable. For other jurisdictions, I pieced together information from their websites, conversations with planning staff, news reports, and reports from other researchers to develop the most accurate dataset possible. In some cases, I obtained data on the total number of IZ units produced, but not the year in which each unit was delivered.

In these cases, I reported the average number of units produced for each year of the program's existence. If my data on the number of units produced and fees collected are not accurate, they are likely biased toward 0 because planning staff in jurisdictions with IZ programs that produce few units may not know about a small number of units produced in the past. My data reflect the total number of IZ units produced under each program, to the best of my knowledge, but not all of these units are still income restricted.

In order to isolate the effect of IZ on housing supply and house prices, ideally a model would control for the effect of a jurisdiction's other land use regulations on these outcome variables. However, simply controlling for the existing land use regulations across jurisdictions will not be an effective control because the effect of the same regulations on house prices and new housing supply will vary across jurisdictions. The effect of, say, a minimum-lot-size regulation on housing supply and prices will be heterogeneous across jurisdictions. For example, a 10,000-square-foot minimum-lot-size requirement in a jurisdiction where the market would otherwise provide multifamily housing will have a much larger effect on housing supply and prices than the same regulation would have in a jurisdiction where the market would provide single family homes on 5,000-square-foot lots.

Rather than attempt to control for the effects of land use regulations on my dependent variables of interest, I restrict my analysis to those jurisdictions where IZ was introduced at a distinct time from other land use regulations. The majority of the jurisdictions in my sample introduced IZ with a stand-alone IZ ordinance rather than including IZ as a component of a larger zoning rewrite. The exceptions are Loudoun County, Virginia, which adopted IZ and a new zoning ordinance in 1993; Annapolis, Maryland, in 2004; and Harford County, Maryland, in 2008. I exclude these three jurisdictions from my regressions since I am unable to isolate the

effect of IZ relative to other land use policies introduced at the same time. After this I am left with a sample of 56 jurisdictions, 7 with optional IZ programs and 13 with mandatory IZ programs.

To measure the effect of IZ on house prices, I use Zillow data on median per-square-foot house prices.[31] Zillow researchers provide an index that mimics the price of a constant set of homes in each jurisdiction over time, using both actual sale data and data on the hedonic factors that affect house value, even among houses that are not sold during the period. Zillow uses its Zestimate value for each home in a jurisdiction to identify an estimate of the median home in that jurisdiction.[32] Zillow has found its Zestimates to be unbiased.[33] Relative to repeat sales indices, Zillow's methodology better reflects the effect of new-construction homes on median prices as well as any type of housing that is relatively unlikely to be sold during the period of interest.

Permitting jurisdictions in the Baltimore-Washington region include counties, independent cities, and incorporated cities and towns that do their own permitting. Zillow provides price data at the county level, which include any towns and cities within those counties, and at the city level. Counties with incorporated towns or cities that issue building permits require an adjustment to isolate the prices for homes in the county outside of other permitting jurisdictions. I use the number of households in each jurisdiction from Decennial Censuses and the American Community Survey (ACS) to take a weighted average of the prices of incorporated jurisdictions relative to county prices to isolate the median price at the county level.

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[31] Since Zillow has made its estimates available, economists have been using them in real estate research. See, for example, Laurie S. Goodman and Christopher Mayer, "Homeownership and the American Dream," *Journal of Economic Perspectives* 32, no. 1 (2018): 31–58.
[32] Zillow Research, "Zillow Home Value Index: Methodology," Zillow.com, January 3, 2014, https://www.zillow.com/research/zhvi-methodology-6032/.
[33] Zillow Research, "Zillow Home Value Index: Methodology."

For measuring the effect of IZ on new housing supply, I use jurisdictions' total permitted housing units from the Census and the Department of Housing and Urban Development's Building Permit Survey (BPS). This is not a perfect data source for new housing supply because it reflects gross new housing permits rather than permits net of demolitions. Additionally, not all permitted housing ends up being built, and the rate of building to permits may vary across jurisdictions. In spite of these problems, the BPS is used widely as a supply variable in the housing literature, including in some work on the effects of IZ on housing supply.[34]

I use demographic control variables from the ACS and from the Decennial Census at the county level and place level in the years in which they are available. I use linear interpolation to fill in these control variables in the years in which they are not available. These years include non-Census years prior to the start of the ACS in 2005 and the years in which not all demographic controls are available for places in the ACS. Margaret M. Weden and her coauthors provide support for using linear interpolation for Census demographic controls in longitudinal studies at the county level.[35] Table 3 provides summary statistics for my data on house prices, housing permits, demographic data, and mandatory and optional IZ.

The observations I am able to use in my regression analysis range from 561 to 1,054, depending on the specification. My spatial regressions require strongly balanced panels, causing them to have fewer observations than the standard cross-sectional regressions.

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[34] For example, Schuetz, Meltzer, and Been use it in their research on the effects of IZ on housing supply.
[35] Margaret M. Weden et al., "Evaluating Linearly Interpolated Intercensal Estimates of Demographic and Socioeconomic Characteristics of U.S. Counties and Census Tracts 2001–2009," *Population Research and Policy Review* 34, no. 4 (August 2015): 541–59.

Table 3. Summary Statistics for Data Included in Regressions

Variable	Observations	Mean	Std. dev.	Min.	Max.
Price per square foot	864	163.70	75.46	43	495
Residential unit building permits	1,320	756.40	1,172.21	0	7898
Inclusionary zoning	2,645	0.12	0.33	0	1
Mandatory IZ	2,645	0.09	0.28	0	1
Optional IZ	2,645	0.04	0.19	0	1
Inclusionary units built	2,645	9.16	60.43	0	1,224
Population	1,483	148,397	252,472	54	1,142,234
Population density	1,445	1,909.71	2,142.59	24.8	10,154.7
Median household income	1,367	63,632.28	21,767.46	20,185	148,750
Mean commute time	1,378	31.49	5.62	16.6	63
Percentage over age 25 with bachelor's degree or higher	1,371	28.48	14.93	2.5	80.9
Percentage of white non-Hispanic householders	1,366	75.14	16.79	16.1	100

VI. Model

I use a difference-in-difference study design and a two-way fixed effects model to estimate the effect of IZ on new housing supply and prices by comparing the change in these outcome variables after jurisdictions adopt IZ to outcomes in jurisdictions that have not adopted it.

Endogeneity is a potential identification problem in this research—if IZ corresponds with higher market-rate housing prices, this could either be because of an IZ tax that reduces new housing supply and drives up house prices or because localities adopt IZ programs in response to high and rising prices. To test for this endogeneity, I use a two-way fixed effects model to estimate whether the years before a jurisdiction adopts an IZ program correspond with price increases. Equation 1 shows this model:

$$_{jt} = \beta_1 I_{jt-1} + \beta_2 I_{jt-2} + \beta_3 I_{jt-3} + u_j + v_t + \varepsilon_{jt} \quad (1)$$

Here, P_{jt} is the log of median per-square-foot house price at the level of permitting jurisdiction j at time t. $I_{jt\text{-}1}$ is a dummy variable indicating whether a permitting jurisdiction adopted a mandatory or optional IZ program in the following year, $I_{jt\text{-}2}$ indicates whether the jurisdiction adopted IZ two years later, and $I_{jt\text{-}3}$ indicates adoption three years later. Table 4 shows the result of this basic model in column 1. In column 2 I add demographic controls.

Table 4. House Prices in the Years Preceeding Inclusionary Zoning Implementation

	1	2
Variables	**ln(price per sq. ft.)**	**ln(price per sq. ft.)**
One year before IZ	–0.013	–0.0072
	(0.018)	(0.017)
Two years before IZ	–0.016	–0.0056
	(0.016)	(0.015)
Three years before IZ	–0.021	–0.0086
	(0.020)	(0.019)
ln(median household income)		0.090
		(0.14)
Population density		0.00015***
		(0.000029)
Mean commute time		-0.0066
		(0.0041)
Percentage over age 25 with bachelor's degree or higher		–0.0023**
		(0.00090)
Percentage of white non-Hispanic householders		0.0055**
		(0.0021)
Constant	4.442***	3.041*
	(0.018)	(1.54)
Jurisdiction fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	864	818
^{2}	0.940	(0.952)
Number of Jurisdictions	41	41

Notes: Robust standard errors clustered by jurisdiction in parentheses. *** represents $p < 0.01$, ** represents $p < 0.05$, * represents $p < 0.1$.

In both models, the coefficients on the IZ leads are small, negative, and insignificant, providing evidence that IZ is not adopted in response to a price spike. Among the demographic controls, population density and the percentage of householders who are white alone have small, positive coefficients, and the percentage of residents over age 25 with a bachelor's degree or higher has a surprising small, negative coefficient.

Next, I test the effect of IZ programs on median per-square-foot prices at the permitting jurisdiction level. I take advantage of the difference between mandatory and optional programs in my sample to distinguish between programs that are likely to have an effect on housing markets versus those that are not. Because jurisdictions with optional programs have adopted these affordability policies, we know they share some characteristics with the jurisdictions that have mandatory programs, including policymakers who express concern for affordability and a willingness to provide density bonuses in exchange for below-market-rate units. However, because the optional programs, with the exception of those in Alexandria and Falls Church, have not produced IZ units, the adoption of these programs should not have an effect on house prices and housing supply within the jurisdiction. To use a randomized control trial analogy, it is as if the jurisdictions with optional IZ programs that are not producing units are receiving a placebo rather than the treatment.

I first test the effect of mandatory IZ programs on house prices and supply, using jurisdictions with no IZ program as the control group. Then I separately test the effect of optional IZ programs, dropping Alexandria and Falls Church, with jurisdictions with no IZ program as the control group. My dependent variable is $_{jt}$, again the log of median per-square-foot house prices in jurisdiction *j* at time *t*, as shown in equation 2:

$$P_{jt} = \beta_0 + \beta_1 Y_{jt} + u_j + v_t + \varepsilon_{jt} \quad (2)$$

Table 5. Effect of Length of Mandatory Inclusionary Zoning Programs on House Prices

	1	2	3
Variables	**ln(price per sq. ft.)**	**ln(price per sq. ft.)**	**ln(price per sq. ft.)**
Number of years of mandatory IZ	0.011***	0.0081***	0.011*
	(0.0026)	(0.0018)	(0.0061)
ln(median household income)		0.0026	1.6***
		(0.13)	(0.087)
Population density		0.00012	0.000031
		(0.000029)	(0.000039)
Mean commute time		–0.0057044	–0.0019
		(0.0038)	(0.0053)
Percentage over age 25 with bachelor's degree or higher		–0.0019	–0.0026
		(0.00081)	(0.0016)
Percentage of white non-Hispanic householders		0.0074	–0.0031
		(0.0028)	(0.0028)
Constant	4.420***	3.830***	
	(0.020)	(1.332)	
Jurisdiction fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	
Spatial autoregression			Yes
Number of years of mandatory IZ year			Yes
Spatial autocorrelation λ			3.50
			(2.21)
Observations	734	690	561
^{2}	0.947	0.955	
Pseudo ^{2}			0.113
Number of jurisdictions	35	35	33

Notes: Robust standard errors clustered by jurisdiction in parentheses. *** represents $p < 0.01$, ** represents $p < 0.05$, * represents $p < 0.1$. In the maximum likelihood estimation, the pseudo R^2 is $\{corr(\text{y} .\ \ )\}^2$.

Because IZ can be expected to affect prices over time, with little or no effect on prices before its effect on new housing supply has had cumulative effects on the jurisdiction's total housing stock, my variable of interest is Y_{jt}, the number of years a mandatory IZ program has been in effect. Table 5 shows the results of this model.

Column 1 shows the results of this basic specification. I find that each year of a mandatory IZ program can be expected to increase per-square-foot house prices by 1.1 percent, significant at the 1 percent level. In column 2, I add demographic controls, which reduces the coefficient of interest to 0.81 percent. The demographic controls are all small and insignificant.

In column 3, I move to a spatial model. The "IZ tax" that increases prices in the jurisdiction that adopts it can also be expected to increase prices in nearby jurisdictions, since real estate markets are competitive across borders. To account for this, I use a model with spatial lags. I create a weighting matrix, W, of the inverse distance between the centroid of each jurisdiction relative to the other jurisdictions in the region, weighted by the jurisdiction's share of the region's total population. I use the maximum likelihood estimation method Lung-fei Lee and Jihai Yu developed to estimate the effect of Y_{jt} on P_{jt} with a spatial lag on price.[36] Because this model does not allow for year fixed effects with my sample size, I instead use an interaction term of year and the number of years the jurisdiction's IZ program has been in place, as shown in equation 3:

$$\begin{aligned} P_{jt} = \ & \lambda W_j P_{jt} + \beta_0 Y_{jt} + \beta_1 \left(Y_{jt} \times T_j \right) + u_j + \ \varepsilon_{jt} \\ & \varepsilon_{jt} = \rho W \varepsilon_{jt} + v_{jt}, \end{aligned} \tag{3}$$

[36] Lung-fei Lee and Jihai Yu, "Estimation of Spatial Autoregressive Panel Data Models with Fixed Effects," *Journal of Econometrics* 154, no. 2 (February 2010): 165–85.

where ε_{jt} is a spatially autoregressive error term. In this specification, I find that one additional year of a mandatory IZ program can be expected to increase per-square-foot home prices by 1.1 percent, indicating that model 2 may understate the effect of mandatory IZ on price. The spatial autocorrelation coefficient λ is not quite significant at the 10 percent level. In this specification, all of the demographic controls are small and insignificant, except for the natural log of median income, which is large, positive, and significant at the 5 percent level.

Table 6. Effect of Length of Optional Inclusionary Zoning Programs on House Prices

	1	2
Variables	**ln(price per sq. ft.)**	**ln(price per sq. ft.)**
Number of years of optional IZ	0.00086	0.0018
	(0.0022)	(0.0016)
ln(median household income)		–0.028
		(0.11)
Population density		0.000073***
		(0.000023)
Mean commute time		–0.0026
		(0.0030)
Percentage over age 25 with bachelor's degree or higher		–0.0017
		(0.0012)
Percentage of white non-Hispanic householders		0.0019
		(0.0014)
Constant	4.37***	4.57***
	(0.0234)	(1.21)
Jurisdiction fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Observations	560	5243
^{2}	0.957	0.955
Number of jurisdictions	27	27

Notes: Robust standard errors clustered by jurisdiction in parentheses. *** represents $p < 0.01$, ** represents $p < 0.05$, * represents $p < 0.1$.

I turn next to testing the effects of optional IZ requirements on price after dropping Alexandria and Falls Church. Because these programs have not produced IZ units, I expect them to have no effect on price. The results from these models are reported in table 6.

As expected, the coefficient on the number of years an optional program has been in place is small and insignificant in column 1. After including the demographic controls in column 2, the coefficient of interest remains insignificant. Population density is the only significant demographic control, and it is positive and small.

Turning now to the effects of IZ on new housing supply, I use the same two-way fixed effects approach to estimate the effect of mandatory IZ programs on total new residential units permitted, as shown in equation 4:

$$T_{jt} = \beta_0 + \beta_1 U_{jt} + u_j + v_t + \varepsilon_{jt} \quad (4)$$

On the supply side, my dependent variable is total residential units permitted, T_{jt}. My independent variable of interest, U_{jt}, is the number of IZ units delivered under a mandatory IZ program in jurisdiction j in year t per 10,000 residents. I use this variable as a proxy for the size of the IZ program's effect on its jurisdiction's housing market. Mandatory IZ requirements that are commonly waived, such as in Baltimore, will produce few units and in turn will have little effect on housing market outcomes. Similarly, IZ programs that are enforced will have little effect on the jurisdiction's housing market if they apply only to large projects and if developers can avoid them if they are a tax on development. The results from this regression model are reported in table 7.

Table 7. Effect of Inclusionary Zoning Unit Production under Mandatory Programs on New Building Permits

Variables	1 log(total permits)	2 log(total permits)	3 log(total permits)
IZ units per 10,000 people	0.021	0.036	–0.19
	(0.022)	(0.027)	(78)
ln(median household income)		0.45	–1.03***
		(1.2)	(0.36)
Population density		–7.2	–0.00017
		(0.00040)	(0.00012)
Mean commute time		–0.010	0.0025
		(0.045)	(0.027)
Percentage over age 25 with bachelor's degree or higher		–0.0095	–0.0025
		(0.012)	(0.0083)
Percentage of white non-Hispanic householders		0.029	0.082***
		(0.037)	(0.011)
Jurisdiction fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	
Spatial autoregression			Yes
IZ units per 10,000 people year			Yes
Constant	5.47***	–1.02	
	(0.14)	(12.65)	
Spatial autocorrelation λ			–2.31
			(4.08)
Observations	1054	1005	900
^{2}	0.82	0.81	
Pseudo ^{2}			0.0010
Number of jurisdictions	46	45	36

Notes: Robust standard errors clustered by jurisdiction in parentheses. *** represents $p < 0.01$, ** represents $p < 0.05$, * represents $p < 0.1$. In the maximum likelihood estimation, the pseudo R^2 is $\{corr(\text{y} .\ )\}^2$.

Here, I find no evidence of mandatory IZ programs having an effect on new housing supply in the results of the cross-sectional models reported in columns 1 and 2. Column 3 uses the same spatial autoregression approach described in equation 3 above for new housing supply rather than price. As in the cross-sectional models, I find no evidence that mandatory IZ reduces

new building permits. Finally, I test the effect of IZ units delivered per 10,000 residents in jurisdiction *j* in year *t* on house price. The results are reported in table 8.

Table 8. Effect of Inclusionary Zoning Unit Production under Mandatory Programs on House Prices

Variables	1 ln(price per sq. ft.)	2 ln(price per sq. ft.)	3 ln(price per sq. ft.)
IZ units per 10,000 people	0.0040	0.00074	-0.00036
	(0.0030)	(0.0018)	(0.012)
ln(median income)		0.0068	1.7***
		(0.15)	0.087
Population density		0.00015	0.000052
		(0.000031)	(0.000037)
Mean commute time		–0.0059	–0.0014
		(0.0043)	(0.0053)
Percentage over age 25 with bachelor's degree or higher		–0.0027	–0.0029
		(0.00093)	(0.0016)
Percentage of white non-Hispanic householders		0.0067	-0.0029
		(0.0027)	(0.0029)
Jurisdiction fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	
Spatial autoregression			Yes
IZ units per 10,000 people year			Yes
Constant	4.43***	3.82**	
	(0.02)	(1.54)	
Spatial autocorrelation λ			1.17
			(1.92)
Observations	732	690	561
^{2}	0.941	0.957	
Pseudo ^{2}			0.275
Number of jurisdictions	35	35	33

Notes: Robust standard errors clustered by jurisdiction in parentheses. *** represents $p < 0.01$, ** represents $p < 0.05$, * represents $p < 0.1$. In the maximum likelihood estimation, the pseudo R^2 is $\{corr(\text{y}\ .\ \ )\}^2$.

The results of the cross-sectional models in columns 1 and 2 and the spatial model in column 3 indicate that, using this dependent variable as a proxy for a mandatory IZ program's effect on market-rate prices, mandatory IZ does not have an effect on price.

The specification in equation 2, with the number of years a mandatory IZ program has been in place as the dependent variable of interest (results in table 5), provides some support for Ellickson's description of mandatory IZ as a tax on development. If mandatory IZ programs tax construction and result in reduced new housing construction, their effect will increase over time as reduced housing construction year after year reduces a jurisdiction's total housing supply relative to what it would have had without the IZ program. The results in table 4 provide evidence that IZ is not adopted in response to rising prices, indicating that its effect on price is exogenous. Further, optional IZ programs (results in table 6) that do not produce units have no effect on prices, indicating that these jurisdictions do not experience the same price increase as jurisdictions where IZ may tax new construction. My empirical finding that, on average, mandatory IZ programs in the Baltimore-Washington region tax market-rate housing is supported by the lack of uptake of optional IZ programs with higher density bonuses than those offered under the region's mandatory programs.

However, the supply model in table 7 provides evidence that IZ programs, proxied by the number of units they produce relative to their jurisdiction's size, have no effect on new housing permits. A potential explanation for mandatory IZ increasing price while not decreasing supply is that IZ increases the cost of building new housing without reducing the quantity of construction. For example, IZ may lead developers to pursue more, smaller projects.[37] Smaller projects may

[37] Since Portland, Oregon, has adopted an IZ program that applies to new housing developments with 20 or more units, it has seen an uptick in permits for projects between 12 and 19 units. See Noel Johnson and Mike Kingsella, "The Cautionary Tale of Portland's Inclusionary Housing Policy," *Up for Growth*, April 25, 2019.

allow them to avoid IZ requirements by staying below a unit threshold for each project. It may be less efficient to build smaller numbers of units in each project, resulting in higher prices without a reduction in total new supply. Alternatively, IZ may lead developers to shift to higher-end housing that has the profit margins to cross-subsidize IZ units where lower-end new construction may be infeasible under IZ requirements.[38]

As reported in table 8, I find that using a jurisdiction's number of IZ units produced relative to its population as the independent variable of interest indicates that IZ programs do not affect market prices. While I think that the number of years an IZ program has been in place is the more theoretically sound model for how IZ programs can be expected to affect prices, this finding shows that the results reported in table 5 are sensitive to specification.

VII. Conclusion

IZ's prevalence is rapidly increasing, but relatively little work has been done to study its effects on housing markets. My results contribute to the small literature on this question and provide new data on the characteristics of IZ programs in the Baltimore-Washington region.

Measuring the effects of IZ on housing market outcomes is difficult because each program is unique, and the sample size of jurisdictions in a housing market is relatively small. Actual requirements for income-subsidized units may deviate from a locality's stated policy, so data on IZ policies are noisy.

These measurement challenges provide reasons to be cautious about making strong claims about IZ's effect on housing markets based on empirical studies, but the body of research

[38] Emily Hamilton and Stephen Smith, "The Renewed Debate on Inclusionary Zoning," *Market Urbanism*, October 10, 2012.

attempting to measure the causal effect of IZ on house prices and new housing construction provides some evidence that IZ increases house prices and reduces housing supply.

In my analysis of IZ's effects in the Baltimore-Washington region, I find evidence that mandatory IZ programs increase house prices but not that they reduce new housing construction. Measuring the effect of optional programs separately from that of mandatory programs allows me to distinguish between programs that Ellickson's theory would predict act as a tax on development versus those that it would not. As expected, I find that optional programs that are not producing IZ units are not associated with higher house prices.

As IZ continues to gain prevalence as a tool for attempting to increase access to affordable housing, more empirical work on its effects on housing markets is needed to evaluate whether it is possible for IZ to achieve affordable housing goals without exacerbating affordability problems for those who do not receive IZ units. Additionally, case study work on specific IZ programs can provide important insights. For example, the general lack of IZ production under optional programs indicates that even large density bonuses may not offset the cost of providing below-market-rate units.

Optional IZ programs with density bonuses large enough to result in production present a way for policymakers to incentivize affordable housing construction without the risk of introducing a new tax on market-rate development. However, optional programs rely on exclusionary zoning to work, as the cases of Alexandria and Falls Church show. They do not solve an underlying problem of exclusionary zoning.