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How Does an Expansion of Mandatory Inclusionary Housing Affect Housing Supply? Evidence from London, UK

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Problem, research strategy, and findings: Mandatory inclusionary housing, which requires private developers to include a portion of affordable housing units in market-rate developments, has become an internationally popular policy instrument to recapture land value and create affordable housing. Two common criticisms of mandatory inclusionary housing are 1) it produces limited affordable housing, and 2) it constrains housing supply and pushes up housing prices. This study examines how private developers responded to an expansion of a strong mandatory inclusionary housing scheme in London, UK. Between 2005 and 2008, each of the 33 local authorities in Greater London extended their affordable housing requirements, previously for housing projects with 15 or more units, to those with 10-14 units. We find that the expansion has led to a reduction in new developments in the target market segment (projects with 10-14 units) and an increase in new developments in the unregulated alternative market segment (projects with 9 or fewer units). There has been no net loss of new homes, though the strategic behavior of private developers could have dampened the affordable housing output of the expansion of mandatory inclusionary housing.

Takeaway for practice: Our findings suggest that, given appealing unregulated alternatives with low barriers, developers tend to divert development to avoid mandatory inclusionary housing. This, overall, calls for better evaluation of the potential alternatives and a more comprehensive, regional approach to inclusionary housing in order to maximize its effectiveness and to minimize its impacts on housing supply.

Keywords: affordable housing; mandatory inclusionary housing; housing supply; London

Housing policies in many countries have seen a growing trend of privatization and marketization over the past few decades (Clapham, 2006; Gurran & Bramley, 2017; Trillo, 2020a). Governments around the globe, including many in North America and Europe, have shifted from directly providing public and subsidized housing to using policy and planning tools to promote the private production of affordable housing (Newman, 2010; Trillo, 2020b). One of the market-oriented planning tools that has gained popularity is mandatory inclusionary housing (Calavita & Mallach, 2010; City of New York, 2015; Jacobus, 2015; Lerman, 2006; Schuetz, Meltzer, & Been, 2009). Mandatory inclusionary housing requires private developers to include a portion of affordable housing units in new developments, aiming to produce affordable housing *and* facilitate mixed-income housing and social integration. Proposals of mandatory inclusionary housing policies, however, often meet considerable skepticism. Major criticisms include 1) mandatory inclusionary housing tends to apply to small numbers of projects and generate limited amounts of affordable housing; and 2) the affordable housing requirement may act as a *de facto* development tax that reduces housing supply and/or increases the price of market-rate homes in regulated markets (Metcalf, 2018; Powell & Stringham, 2004; Sturtevant, 2016; Vandell, 2003). Fragmented adoption of inclusionary housing, varying features of individual programs, and inconsistent data pose significant challenges to empirically testing these claims (Schuetz et al., 2009; Wang & Balachandran, 2021).

This study seeks to better understand how development activities and housing supply respond to mandatory inclusionary housing by contrasting housing production in regulated and alternative market sectors, including slightly smaller developments and neighboring jurisdictions, which are not subject to affordable housing requirements. It examines the case of London, UK, where mandatory inclusionary housing has been an

important source of new affordable housing since the early 2000s. The 2008 London Plan expanded the mandatory inclusionary housing requirement by lowering the threshold size, above which new developments were required to include affordable housing, from 15 units to 10 units. We use this policy change to test the market response to mandatory inclusionary housing. We observe that, within 6-8 years after the expansion of mandatory inclusionary housing, there was a substantial decrease in the number of housing developments that fell under the newly expanded affordable housing mandate. Meanwhile, the number of slightly smaller developments, which remained exempt from mandatory inclusionary housing, had increased. The overall housing production did not change significantly, suggesting little or no net loss of new housing as mandatory inclusionary housing shifted supply into the unregulated market.

The study uses a quasi-experimental approach to estimate the effects of mandatory inclusionary housing on housing production in directly affected developments and the broader housing market. It addresses the methodological limitations in existing studies and makes a unique contribution to the growing literature and the ongoing policy debate around mandatory inclusionary housing. The findings highlight the need to evaluate unregulated alternative market sectors when estimating the potential housing market impacts of adopting or expanding mandatory inclusionary housing, as well as the importance of a more comprehensive, regional approach in order to maximize the effectiveness of inclusionary housing. We recommend policymakers to apply inclusionary housing more broadly within and across jurisdiction borders and use a combination of different set-asides, cost offsets and alternative contribution options to discourage the strategic behavior of developers and minimize the impacts on local housing supply.

An Overview of Inclusionary Housing Policies and Their Effects

Inclusionary housing (IH) refers to a variety of policy instruments that require or incentivize the inclusion of affordable housing in private developments. The practice first started in the U.S. in the 1970s and spread quickly to other parts of the world over the past few decades (Calavita & Mallach, 2010; California Coalition for Rural Housing (CCRH) & Non-Profit Housing Association of Northern California (NPH), 2003; CCRH & NPH, 2007; Thaden & Wang, 2017; Wang & Balachandran, 2021). IH provides a tool to capture and utilize land value appreciation in fighting the affordable housing crisis, a welcome innovation to governments around the world taking a neoliberal turn in housing policies (Clapham, 2010; Trillo, 2020a). This section of the paper summarizes the main features and variations of IH programs, the outcomes of IH, and research on the housing market effects of IH. The bulk of the literature reviewed examines U.S. cases, owing to its longer history and broader application of IH.

Varied Features of Inclusionary Housing Programs

Wang and Balachandran (2021) reported more than 1,000 local IH programs across the U.S. through 2019, most of which are at the municipality level. Local IH programs vary substantially in design and implementation. Internationally, countries and cities adopting similar policies (sometimes under different names, like the "planning gain" approach in London described below) also make various adaptations to IH, with varying degrees of success (Calavita & Mallach, 2010; Granath Hansson, 2019; Mishra & Mohanty, 2017; Santoro, 2019).

Mandatory vs. Voluntary Programs

Mandatory IH policies require developers to contribute to affordable housing, while voluntary policies encourage this through economic or procedural incentives. Recent

surveys have shown that the vast majority of local IH programs in the U.S. are mandatory (Hickey, Sturtevant, & Thaden, 2014; Wang & Balachandran, 2021). Many cities have recently adopted mandatory IH to replace or add to existing voluntary policies, such as Boston (2015) and New York City (2016). This study focuses on mandatory IH and, unless otherwise stated, uses "inclusionary housing" interchangeably with "mandatory inclusionary housing."

Scope of Programs

Cities that use IH as a value capture strategy often tie it to rezoning or public works expected to increase nearby property values. Mandatory IH in New York City, "the nation's most progressive affordable housing law" (de Blasio, 2016), is only applicable to rezoned areas (City of New York, 2016). The IH program in Atlanta, GA applies to the area within about 0.5 miles of the Beltline, a major revitalization project that converts old railroads into the city's new landmark loop trail (City of Atlanta, 2018).

In other cases, IH may apply to the entire city or jurisdiction but only to certain developments. Small projects below a threshold size are often exempt from affordable housing requirements. Wang and Balachandran (2021) found the most popular threshold sizes among 550 U.S. programs to be between 6 and 10 units (35% of the programs), followed by 5 or fewer units (27% of the programs), though the threshold can be as high as 50 units (e.g., Irvine, CA; Fairfax County, VA). As to be expected, narrow scopes of IH programs, either by geographical areas or development sizes, generally limit the impact and the quantity of affordable housing produced.

Definition and Duration of Affordability

The strength of IH policies largely depends on what counts as "affordable housing" and

the duration of affordability. Housing delivered under IH programs may be "affordable" to very low, low, or moderate-income households. The duration of affordability ranges from 10 years to perpetuity/life of the building (Schuetz et al., 2009; Wang & Balachandran, 2021).

Percentages of Affordable Housing

The percentage of affordable housing required in a housing project, or the "set-aside," is another key feature of IH programs. Most IH programs in the U.S. require 10% to 20% of the added units to be affordable (Hickey et al., 2014; Innovative Housing Institute, 2010). The percentage of affordable housing required for a specific project can depend on the type of affordable housing provided (e.g., rental or for-sale units); the level of affordability; whether the units will be provided on-site or off-site; if there is any subsidy; and the size of the project.

Incentives and Cost Offsets

Mandatory IH policies may include instruments similar to those in voluntary programs to help developers offset the costs. Common cost offsets include density bonuses (including upzoning), subsidies, tax abatements, waivers or reductions of other zoning requirements or fees, fast-tracking processing, etc. (CCRH & NPH, 2007; Hickey, 2014; Innovative Housing Institute, 2010).

Alternative Contribution Options

IH policies typically expect the on-site inclusion of affordable units, though most programs accept alternative forms of contribution to affordable housing such as off-site production, in-lieu fees, or land donation if the development becomes infeasible otherwise, or if more affordable units can be provided off-site (CCRH & NPH, 2007;

Innovative Housing Institute, 2010).

The Effectiveness of Inclusionary Housing

Studies that evaluate the outcomes of IH programs mostly focus on the production of affordable housing, with a handful of studies examining the social integration effects or the distribution of the affordable units created (Crook et al., 2016; Kontokosta, 2014, 2015; Li & Guo, 2020). Findings vary, depending on the specific programs examined. A recent survey of IH programs across the U.S. suggested that, among 221 programs with relevant data, each program has provided on average 27 affordable units per year (Wang & Balachandran, 2021). This, of course, obscures a wide range of productivity between major programs that have created over 10,000 units and those in small suburban communities with few units ever produced (Nzau & Trillo, 2020; Schwartz, Ecola, Leuschner, & Kofner, 2012; Wang & Balachandran, 2021). Critics have pointed out that IH can be used to justify gentrification and speculative interests in jurisdictions where the production of affordable housing is small and limited to low-cost areas (Stein, 2018; Trillo, 2020b).

Global comparisons have shown similar levels of variation, with IH being an essential tool in land value recapture and affordable housing production in some countries (e.g., England and France) and playing a smaller and more marginal role in others (Calavita & Mallach, 2010; Granath Hansson, 2019; Gurran & Bramley, 2017; Santoro, 2019). Additional indicators of effectiveness include the type of affordable housing created, the duration and level of affordability, and the amount of public resources needed per unit. Rental units, for example, are generally more accessible to lower-income households compared to ownership units, and long-term or permanent affordability is more desirable than short-term affordability (Wang & Balachandran, 2021).

Some have attempted to link the effectiveness of IH to the various program features or local contexts. Mandatory IH programs, in general, provide more affordable units and serve lower-income families than voluntary ones (Brunick, 2004; CCRH & NPH, 2007). Reports on IH programs in California found that the most successful programs – those producing and sustaining more affordable homes – allowed more flexibility and provided more incentives to developers (CCRH & NPH, 2003, 2007). Supportive institutions (such as existing social housing systems), clear guidelines, and strong housing markets could also be crucial contributors to successful IH programs (Crook & Whitehead, 2002; Granath Hansson, 2019; Sturtevant, 2016).

The Housing Market Effects of Inclusionary Housing

Research has established that land use regulations could have the side-effects of curtailing housing supply and raising housing prices (Quigley & Raphael, 2004; Quigley & Rosenthal, 2005). Theoretical models have suggested that mandatory IH could have similar impacts (Clapp, 1981; Hughen & Read, 2014; Mishra & Mohanty, 2017; Read, 2009; Vandell, 2003). Clapp (1981), for example, argued that households and developers could leave the IH-covered housing market if attractive alternatives existed and that a study of alternative market segments was necessary before the introduction of IH. The empirical evidence on the significance or policy implications of these effects, however, remains far from conclusive (Hollingshead, 2015; Mukhija, Regus, Slovin, & Das, 2010; Rosen, 2004; Schuetz, Meltzer, & Been, 2011).

Early studies that examined how IH was or was not associated with diminishing housing supply – by comparing cities with and without IH programs, or before and after the introduction of IH (Powell & Stringham, 2004; Rosen, 2004) – suffered from major methodological flaws (Basolo & Calavita, 2004). More recent studies have taken confounding variables such as city-specific market conditions into account, though it

remains challenging to establish a clear causal relationship between IH and changes in housing supply or prices. Bento, Lowe, Knaap, and Chakraborty (2009) used statistical models to control for spatial and temporal conditions that could affect housing markets. They found that IH did not reduce total housing starts in Californian cities in 1988-2005, though it did increase the ratio of multifamily housing to single-family homes, reduce the size of single-family homes, and accelerate the increase in housing prices, all of which were consistent with the hypothesis that IH acts as a tax on housing, especially single-family housing development. Mukhija et al. (2010), in contrast, found no evidence of negative effects of IH on housing production in Los Angeles and Orange Counties.

Schuetz et al. (2009, 2011) argued that the diversity of IH programs in the U.S. made it difficult to derive meaningful conclusions about the housing market effects of IH from cross-jurisdiction comparisons. They criticized previous studies for treating IH as a unitary policy and instead used a number of variables to reflect the varied features of local programs (Schuetz et al., 2011). Their study produced mixed results: IH programs in the San Francisco metropolitan area had no statistically significant effect on total housing supply, while those in suburban Boston increased housing prices and deterred housing production. Notably, most of the aforementioned studies did not distinguish mandatory programs from voluntary ones in the statistical analyses. The inclusion of voluntary programs could lead these studies to underestimate the housing market effects of mandatory IH, as voluntary programs are unlikely to restrain housing supply.

Hollingshead (2015) took a different approach and examined the effect of *Palmer v. City of Los Angeles* (2009), which limited Californian cities' ability to implement IH policies on rental housing.[1] The court ruling led to a state-wide removal

or weakening of rental IH programs external to any local jurisdiction's decision, therefore the study design addressed an important weakness of the existing literature – the concern of reverse causality – in that the adoption of IH could be a result of rising prices rather than the cause. Hollingshead (2015) found that jurisdictions with IH witnessed a greater increase in rents after *Palmer*, especially in lower-cost rentals, indicating that the existence of IH pre-*Palmer* was unlikely to have caused higher rents. The study was unable to perform a similar analysis on rental housing supply, however, due to the strong intervening impact of the financial crisis on housing production around the same time (Hollingshead, 2015).

After decades of practice, much remains unclear about the housing market effects of IH, and mandatory IH in particular. The lack of proper counterfactual scenarios poses a major challenge to empirically evaluating these effects. Housing market conditions and policy environments can be very different in cities with and without IH, or the same cities before and after the introduction of IH, thus confounding the results of such comparisons. The varied features of local programs, moreover, limit the generalizability and transferability of empirical findings. Our study addresses these limitations by comparing IH-covered market sectors with close alternatives within the same metropolitan area and including a range of variation in a key feature of IH program design, the required percentage of affordable housing. We believe these measures can produce strong empirical evidence and help inform generalization of our findings.

Mandatory Inclusionary Housing in London

The "Planning Gain" Approach

The "planning gain" refers to the increase in land value when a development plan is

approved. The extraction of planning gains has been a key feature in British planning policies since the nationalization of development rights in the 1950s (Crook, Henneberry, & Whitehead, 2015). The *Town and Country Planning Act 1990* in Section 106 (S106) allowed local planning authorities to require a "planning obligation" from landlords or developers seeking approval for developments. Two subsequent national policies, *Circular 6/98: Planning and Affordable Housing* and *Planning Policy* (DETR, 1998) and *Guidance 3 (PPG3): Housing* (ODPM, 2000), further empowered local planning authorities to require affordable housing as a planning obligation, through *S106 agreements*, and to refuse proposals that fail to fulfill such requirements. These policies paved the way for local governments to use S106 agreements as *de facto* mandatory IH policies, which have since become a primary source of new affordable housing in England (Crook, Monk, Rowley, & Whitehead, 2006; DCLG, 2012; Whitehead, 2007).

The Greater London Authority (GLA), created in 2000, outlines the regional framework of mandatory IH for the 33 local authorities in Greater London, including 32 boroughs and the City of London (the central financial district). The 2004 London Plan urged local authorities to "seek the maximum reasonable amount of affordable housing" from private residential and mixed-use projects above threshold sizes set by local authorities, but "no greater than 15 units," with an overall target of making 50% of all new homes affordable (Mayor of London, 2004, pp. 65-66). The affordable units, upon completion, are transferred to and subsequently allocated by non-profit housing associations, which have been the major providers and owners of affordable housing since the withdrawal of local governments from building public housing (Crook et al., 2006; Whitehead, 2007). These units remain affordable under housing associations'

management, though it is possible for qualified occupants to purchase their units and resell them afterwards (Kleinhans & Van Ham, 2013; UK Government, 2020).

The definition of "affordable housing" traditionally comprises *social rented* and *intermediate housing*, both described as "genuinely affordable" (Mayor of London, 2020a). The median cost of social rented housing ranges between 20% to 45% of the median private market rents in London (Mayor of London, 2020a; Trust for London, 2020; Valuation Office Agency, 2018; Worledge, 2020). Intermediate housing includes rentals and shared ownership housing that targets lower middle- and middle-income households (Mayor of London, 2020a, 2020b; UK Government, 2020). A third category, *affordable rent*, introduced in 2011, allows rents as high as 80% of the market levels (DCLG & The Rt Hon Grant Shapps, 2011). Many consider affordable rent housing as not sufficiently affordable, especially in the strong markets in many parts of London, and as a tool for developers to circumvent local affordable housing requirements (Wainwright, 2015; Wiles, 2014). Social rented and intermediate housing remained the primary types of affordable housing throughout our study period.

Mandatory IH in London, bound by national and regional policy frameworks, is considerably more consistent across the 33 local authorities than among local programs in the U.S. There are some variations, however, notably in the required set-asides. Some London boroughs require a minimum percentage, while others leave it to case-by-case negotiation with a borough-wide target or seek the "maximum reasonable" percentage. Table 1 compares the various set-aside targets or requirements mentioned in different boroughs' local plans. Most of the local authorities that indicate a minimum percentage set it between 30% and 50%, substantially higher than the average set-aside of 16% among U.S. programs (Wang & Balachandran, 2021).

[Table 1]

As Table 1 shows, the distinction between boroughs with and without a stated set-aside is not always clear. Many boroughs have, at different points of time, switched from specific set-asides to a more flexible, negotiation-based approach (e.g., Islington) or vice versa (e.g., Hounslow). One may expect, though, when an updated local plan drops a specific set-aside in the previous plan, the former set-aside could still serve as a benchmark for future applications of IH. Another common benchmark is the borough-wide affordable housing target, or the percentage of all new housing units a borough expects to be affordable. Following the 2004 London Plan, many boroughs set this target at 50% and use this as a basis when negotiating the affordable housing contribution with developers. Hackney, for example, stated in its 2010 Local Development Framework Core Strategy that "[n]ew housing should seek to meet a borough-wide affordable housing target of 50% of all units subject to site characteristics, location and overall scheme viability" (London Borough of Hackney, 2010, p. 110). The borough-wide affordable housing target, nevertheless, is not equivalent to a development-level set-aside, because private developments above the IH threshold produce neither all new housing nor all new affordable housing in a borough: smaller private developments not subject to IH and 100% affordable developments by housing associations also contribute to the equation.

Local authorities do, "in certain exceptional cases" (Mayor of London, 2004, p. 66), allow off-site provision or in-lieu payments for future affordable housing development, if justified by an independent viability assessment that shows the proposed development would become financially inviable, or the expected return would fall below a reasonable level of 15%–20% with the affordable housing requirement. With this flexibility, several boroughs (Croydon, Enfield, Islington, Kingston upon Thames, and Merton during the latter part of our study period) also expect smaller sites

below the IH threshold to contribute toward affordable housing provision when possible, typically in the form of a financial contribution.

The Expansion of Mandatory Inclusionary Housing

The GLA has long sought to extend mandatory IH to smaller sites as part of its affordable housing strategy. The 2004 London Plan directed local authorities to use a 15-unit or lower threshold, a stricter threshold than *Circular 6/98* (DETR, 1998), which suggested a threshold size of 25 units or 1 hectare sites outside of inner London, and 15 units or 0.5 hectare sites within inner London. Merely four years later, an updated London Plan asked local authorities to "require affordable housing provision on a site which has a capacity to provide 10 or more homes" (Mayor of London, 2008, p. 78).[2] This essentially expanded mandatory IH to a new sector of the market, developments with 10-14 units. Developers with planned projects above the new threshold size might attempt to circumvent IH in a number of ways. They could slightly reduce density, split up the site, or give up the development plan. The first two responses would shift housing production from the affected market segment (developments with 10-14 units) to smaller projects with 9 or fewer units. The third option would result in a net loss of new housing, unless the developer could find a smaller or more lucrative site elsewhere in the same jurisdiction.

The threshold change did not take place in all London boroughs at once. The GLA encouraged local authorities to use lower thresholds, and 10 boroughs adopted the 10-unit threshold before 2008 when they updated local plans, mostly in 2006 and 2007. This further created a possibility for affected developers to divert investment to a neighboring borough that had not extended IH to smaller sites, though they could be constrained by the availability of comparable sites and local market knowledge. The staggered introduction of the 10-unit threshold allows us to detect the policy effect by

comparing the boroughs that had adopted the 10-unit threshold with their neighboring boroughs that had not. Figure 1 shows the 10 boroughs that expanded IH before 2008, henceforth referred to as the *early adopters*.

[Figure 1]

We noted the possibility that the early adopters could have more urgent needs for affordable housing or a more progressive agenda than their neighbors, which could in turn lead to differences in developers' behavior. To test this possibility, we compared the land use, demographic, socioeconomic and political characteristics between the early adopters and other boroughs.[3] We found no statistically significant differences in any of the variables, suggesting that the early adoption of the 10-unit threshold was more likely attributable to the different schedules of local plan-making, which should be independent of housing needs or strategies. Neither did we find any clear association between whether a borough adopted the 10-unit threshold early and whether it had a specific set-aside. Among the five aforementioned boroughs that required some form of affordable housing contribution from smaller sites below the IH threshold, only Kingston upon Thames was among the 10 early adopters, further suggesting that the early adopters were not necessarily the most demanding in their affordable housing requirements. Even if they were, their approaches were likely consistent right before and after the threshold change. Changes in development activity following the threshold change, if any, are therefore likely the result of the expansion of mandatory IH after controlling for other relevant factors.

The extension of mandatory IH to smaller sites was not uncontroversial. Eric Pickles, Secretary of State for Communities and Local Government, introduced a small site exemption from S106 obligations for sites of 10 homes or fewer in November 2014, calling S106 obligations including the affordable housing contributions "stealth taxes"

that hammered small builders and stalled construction on small sites (Ministry of Housing & The Rt Hon Lord Rickles, 2014). This small site exemption was subsequently challenged in the High Court and repealed in 2015 ("Regina (West Berkshire District Council and another) v Secretary of State for Communities and Local Government," 2015). A new proposal in 2020, in response to the economic impact of the COVID-19 pandemic, suggested temporarily lifting the IH threshold to 40 or 50 units. The government decided not to adopt this proposal after a public consultation period but would continue to monitor the situation (Ministry of Housing, 2021).

How Did the Expansion of Mandatory Inclusionary Housing Affect Housing Supply?

The expansion of mandatory IH in London around 2008 presents an opportunity to observe developers' response to the introduction of mandatory IH in a relatively small sector of the market, i.e., developments with 10-14 units. We intend to answer two questions in the empirical analysis that follows. First, does housing supply decrease in the affected market sector following the introduction of mandatory IH? Second, what is the net effect on housing supply, with alternative market segments not covered by IH taken into account? In other words, does IH reduce overall housing supply or simply divert it to unregulated market segments?

Data and Methods

We obtained housing supply data from the London Development Database (LDD), which has recorded all development permits in Greater London since April 1, 2004. The study period, 4/1/2004 to 3/31/2014, includes 10 financial years[4] around the aforementioned expansion of mandatory IH. We chose 2013/14 as the last year in the study period due to two considerations. First, the small site exemption introduced in late

2014 (Ministry of Housing & The Rt Hon Lord Rickles, 2014) could have influenced the implementation of IH in developments with 10 units. Second, the substantial increase of affordable rent and decrease of social rent in new affordable housing after 2014/15 (Mayor of London, 2019) could have affected how developers react to IH. We identified 44,090 developments from the LDD that involved the construction or creation of housing units during the study period after removing repeated applications by matching site address and planning descriptions, totaling 572,138 housing units, of which 161,626 are affordable.[5] Nearly ¾ of the affordable units (118,748) are on *S106 sites*, developments that include a mixture of affordable and market-rate housing. The rest are on development sites that are 100% affordable, presumably developed by housing associations or (in rare cases) local authorities. We excluded these 100% affordable sites from the regression analysis, as they were not subject to mandatory IH. The City of London, which contains predominantly business uses and few residential developments, was also excluded from the analysis.

The introduction of the 10-unit threshold could lead to fewer developments with 10-14 units (the target market segment) and an increase in smaller developments (the unregulated alternative segment) if developers reduced density or split sites to avoid the affordable housing requirement. We expected to detect this latter effect in developments with 5-9 units, as those with 1-4 units would be too small as an appealing alternative. Slightly larger developments above the former 15-unit threshold (e.g., developments with 15-19 units, 20-24 units, etc.) served as comparisons, as did developments with 10-14 units in boroughs that had not adopted the 10-unit threshold, since the expansion of IH did not directly affect either.

The regression analysis compares the borough-level annual quantities of housing developments and units in each of the market segments (target, unregulated alternative,

and comparison), before and after the expansion of IH. The models include two variations in local IH policies: the minimum set-asides (if any), and whether financial or in-kind contributions to affordable housing were sought from smaller developments (9 or fewer units). Control variables include demographics (population, density, and population growth), housing market conditions (median housing price and property sales), and local governments' attitudes toward development, measured by the approval rate and processing speed of residential development applications and the annual housing target set in local plans. Housing market and policy indicators are lagged by one year, as development decisions are often made on the basis of recent policy and market conditions. Also included are lagged dependent variables (i.e., housing supply in the previous financial year) to control for housing market trends, borough fixed effects to control for unobservable local factors, and year fixed effects to control for other citywide shocks. Table 2 lists the variables used in the regression models.

[Table 2]

Market Response to the Expansion of Mandatory Inclusionary Housing

Figure 2 shows the distribution of new developments by size in the 5-20 units range, before and after the expansion of IH. "Market and S106 developments" refer to developments with or without on-site provision of affordable housing, all potentially subject to IH (except for those under the threshold size). 100% affordable developments, not subject to IH, serve as a comparison. An obvious discontinuity is present for market and S106 developments at the IH threshold: under the 15-unit threshold, the number of 14-unit developments (270) is almost 9 times that of 15-unit developments (32); the ratio between 9-unit (802) and 10-unit developments (88) is similar under the new 10-unit threshold. The same pattern persists across inner and outer London, as well as boroughs with and without defined affordable housing set-

asides.[6] It appears that, on the margin, developers do strongly prefer to build under the IH threshold.

[Figure 2]

Figure 3 further compares housing supply in three development size ranges (5-9, 10-14, and 15-19) between early adopters and other boroughs. The "early adoption period," for an early adopter, refers to the pre-2008 period when it had the 10-unit threshold. For a borough that is not an early adopter (i.e., one of the "other boroughs"), the "early adoption period" refers to the pre-2008 period during which one or more of its neighboring boroughs had the 10-unit threshold. The sharp decline in the number of housing units in the target market segment (10-14 units) and the increase in the unregulated alternative segment (5-9 units) among early adopters in the early adoption period contrast with the minor changes in other boroughs during the same period, indicating that developers could have reacted to the early adoption of the 10-unit threshold by switching to smaller developments not subject to IH. The small increases of 10-14 unit or 5-9 unit developments in other boroughs during the early adoption period, meanwhile, do not provide strong evidence for the hypothesis that developers could have switched to other jurisdictions in response to the expansion of IH.

[Figure 3]

Regression analyses controlling for local market and policy factors corroborate this story. Boroughs see on average 3.3 fewer developments with 10-14 units and 5.6 more developments with 5-9 units per year after the expansion of IH. Figure 4 summarizes the regression results. The minor or insignificant changes in developments with 15-19, 20-24, 25-29, 30-34, or 35-39 units help rule out the possibility of market conditions leading to these results (Figure 4). Being adjacent to an early adopter does not significantly increase housing supply in similar sized developments during the early

adoption period, suggesting that the expansion of IH diverted development to smaller sites in the same jurisdictions more than to other jurisdictions.

Among other policy variables, higher minimum set-asides are associated with fewer developments above the IH threshold, and seeking affordable housing contribution (payments or in-kind) from small sites below 10 units is associated with fewer developments with 5-9 units. These results further demonstrate the association between more stringent IH policies and reduced development in specifically affected market segments. It is possible that developers in those boroughs switch to other unregulated alternative market segments – such as adjacent boroughs or non-residential developments – though we do not have the data to explore these possibilities in this study.

[Figure 4]

The decrease of new housing in the target market segment and the increase in the unregulated alternative roughly offset each other, leading to no significant change in the total number of developments with 5-14 units. The expansion of IH, despite acting like a leaky bucket that loses a significant number of target developments, still accounts for a net increase of 2 affordable units per borough per year among developments with 10-14 units after controlling for borough characteristics.[7]

Discussion: What Does the London Case Tell Us?

This study examines the market response to mandatory inclusionary housing (IH) using a recent expansion of IH in London, UK. We conclude that introducing mandatory IH to a previously unregulated market segment could divert some development to the closest unregulated alternative, in this case, smaller developments below the IH threshold size. We observe a sharp decline in the number of developments of target size following the IH expansion and a proportionate increase in smaller developments below the IH

threshold. Our findings support Clapp's (1981) thesis that, with attractive alternative market segments, developers could leave the market covered by IH. We do not find, however, evidence suggesting that developers switched to neighboring jurisdictions in response to the expansion of IH, possibly due to the fact that all London boroughs eventually adopted the expansion within a few years. One may expect a stronger diversion to other jurisdictions if there are more permanent differences in the adoption or implementation of IH.

The finding that the IH expansion has led to no loss of new housing can be consistent with studies showing little or no housing market effects of IH on the jurisdiction level (Bento et al., 2009; Mukhija et al., 2010), when there are attractive alternatives within the jurisdiction or sufficient barriers to discourage relocating to another jurisdiction. The availability of unregulated alternatives that allows developers to easily shuffle out of IH-covered market segments, however, could hamper the effectiveness of mandatory IH in creating affordable housing and inclusive communities. The expansion of IH in London has created on average 2 additional affordable units per borough per year by 2013/14. The IH output could have been bigger if fewer developers were able to circumvent the affordable housing requirement.

The study overcomes a major methodological challenge in the existing literature on the housing market effect of IH. The availability of close counterfactuals (developments above the 15-unit threshold and those in other boroughs during the early adoption period) allows a quasi-experimental approach to estimating how the expansion of IH affected housing production in the target and unregulated alternative market segments. The local authorities included in the study share the same IH framework but have various affordable set-asides, and we observe similar outcomes across boroughs with and without defined set-asides. The strong reaction to the expansion of IH we

observe should be viewed vis-à-vis the strong affordable housing requirements in London enabled by supportive national and regional policies, including nationalized development rights (Crook et al., 2015). In a typical U.S. IH program, for example, where the required set-aside is well below the common 30-50% in London, the impact on development activity could be smaller.

What lessons can cities and policymakers draw from these findings? First, the effectiveness of IH and its effect on housing supply could depend on the attractiveness of, and barriers to, alternative unregulated markets, and a thorough consideration of these alternatives can be crucial for the design of successful IH programs. Second, policymakers should employ the various tools used in IH programs, such as cost offsets and alternative contribution options, to "soften" the transition between IH-covered market sectors and unregulated market sectors and reduce the incentive for developers to divert investment into the latter. A sliding scale approach that allows lower set-asides, in-lieu payments, or additional subsidies for smaller developments, for example, could be less distortive than a single threshold-based approach, especially for programs with larger threshold sizes (e.g., the proposed IH plan in Toronto).

The London case mostly concerns the project size, though the lesson could be applicable to other limits on IH. The more narrowly an IH program is defined – by the size or type of developments, or by geographical areas – the more easily developers could switch to other market segments, therefore limiting the affordable housing output. We recommend broader application of IH within jurisdictions as well as across neighboring jurisdictions, as fragmented implementation of IH could create an environment where developers are more incentivized to leave the IH-covered jurisdictions. We believe a regional approach to IH, as demonstrated in Greater London, can achieve better outcomes with a lesser impact on local housing supply.

Acknowledgements

The authors are obliged to the Greater London Authority for help with the London Development Database (LDD). We also owe our most sincere thanks to the planners, developers, and scholars in London who have offered invaluable insights into the affordable housing policy in London.

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[1] Since repealed in 2017 (*AB-1505*).

[2] In addition to lowering the IH threshold from 15 to 10 units, the 2008 London Plan also corroborated Circular 6/98 in suggesting that land area be taken into account when applying the affordable housing requirements. Two-thirds of the local authorities took up this point and included some land area thresholds in their plans, though the land area threshold is generally more lenient than the unit threshold. The land area equivalent to 15 units, for example, is 0.5 hectare, which could accommodate from 17-37 dwellings in the sparsely populated and least accessible areas of outer London to 70-202 units in central areas well served by public transit (Mayor of London, 2008, p. 69). Developers that try to build up density, therefore, will hit the unit threshold well before the land area threshold kicks in.

[3] Available online in the Technical Appendix, Table A1.

[4] The financial year runs from 4/1 to 3/31 of the next calendar year.

[5] The LDD records approved planning applications, which may or may not be subsequently developed. By the end of 2014 when we obtained the dataset, 72% of the 44,090 developments (31,547) had been started or completed. We believe development permits reflect the intention to build at certain sizes under prevailing policy at the time of approval, and therefore provide a reliable indicator of developers' response to the expansion of IH.

[6] Figures available upon request.

[7] Regression results are available online in the Technical Appendix.

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Table 1. Mentions of set-aside requirements or targets in local plans

		Minimum or Target Percentage (Year Effective)
Inner London	City of London	"an appropriate proportion" (2002); 30% on-site or 60% off-site (2011)
	Camden	"maximum reasonable amount" (2010)
	Hackney	"an element of" (1995); "New housing should seek to meet a borough-wide affordable housing target to 50% of all units subject to site characteristics, location and overall scheme viability" (2010)
	Hammersmith and Fulham	"maximum amount" (2011)
	Haringey	"a proportion of" (2006)
	Islington	25% (2002); "maximum reasonable share" (2011)
	Kensington and Chelsea	50% (2010)
	Lambeth	40%, or 50% with public subsidy (2007)
	Lewisham	30% (2004); 50% (2011)
	Newham	25% on-site or 33% off-site (2001); 35%-50% (2012)
	Southwark	10%-40% (2007); 35% (2011)
	Tower Hamlets	35% (2010)
	Wandsworth	33% (2010)
	Westminster	10%-50% stepping with development size (2007); "a proportion" (2011)
Outer London	Barking and Dagenham	35% (2007); 50% (2010)
	Barnet	"maximum reasonable amount" (2006)
	Bexley	35% (2004)
	Brent	"maximum reasonable proportion, generally 30%-50%" (2004); "maximum reasonable" (2010)
	Bromley	35% (2006)
	Croydon	40%-50% (2006)
	Ealing	50% (2004)
	Enfield	40%, or 20% for smaller sites with 1-9 homes (2010)
	Greenwich	"a significant element" (2006); 35% (2011)
	Harrow	30% (2004)
	Havering	"maximum reasonable amount" (2008)
	Hillingdon	35% (2012)
	Hounslow	"highest achievable" (2003); 50% (2011)
	Kingston upon Thames	30%-50% (2005); 20%-50% (2012)
	Merton	30% (2003); 40%, or 20% financial contribution for smaller sites (2011)
	Redbridge	25% (2003); 50% (2008)
	Richmond upon Thames	50% (2009)
	Sutton	30% (2003); 40%, or 50% with public subsidy (2009)
	Waltham Forest	40% (2006); 50% (2008)

Sources: Local planning documents.

Table 2. Variables in the regression analysis

Category	Variables
Dependent Variables	# of developments and units in a certain market segment (e.g., 5-9 units, 10-14 units, or 15-19 units) in a certain borough, a certain financial year
Independent Variable	Has the borough adopted the 10-unit threshold? (Yes = 1)
Policy Variables	Does the borough have a minimum or target set-aside? (Yes = 1) (If yes) the minimum or target set-aside Does the borough seek affordable housing contribution from smaller sites with 9 or fewer homes? (Yes = 1)
Borough Characteristics	Population Population density Population growth rate Median housing price (previous financial year) Property sales (previous financial year) % of residential applications approved (previous financial year) % of residential applications processed within a period of time (8 weeks for minor developments or 13 weeks for major developments, previous financial year) Borough-wide annual housing target

Data sources: London Development Database; Office for National Statistics (ONS); Land Registry; Ministry of Housing, Communities & Local Government; Local planning documents

Figure 1. Early adopters of the 10-unit IH threshold

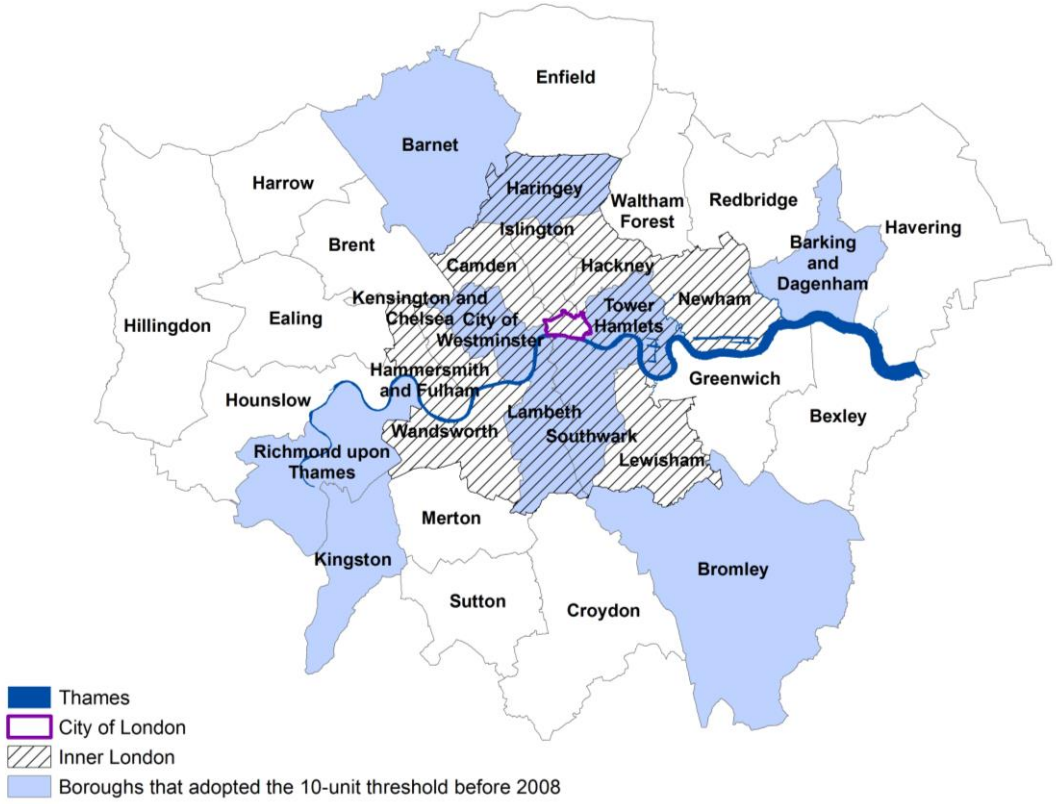
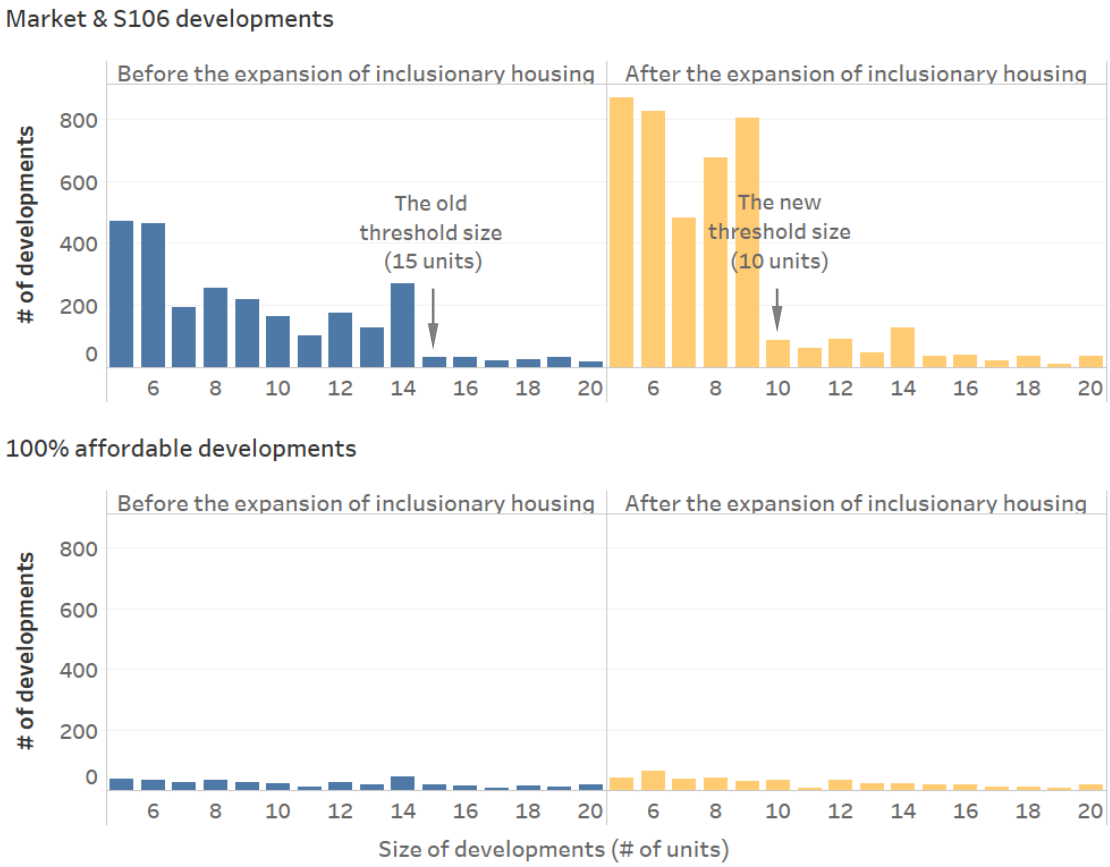
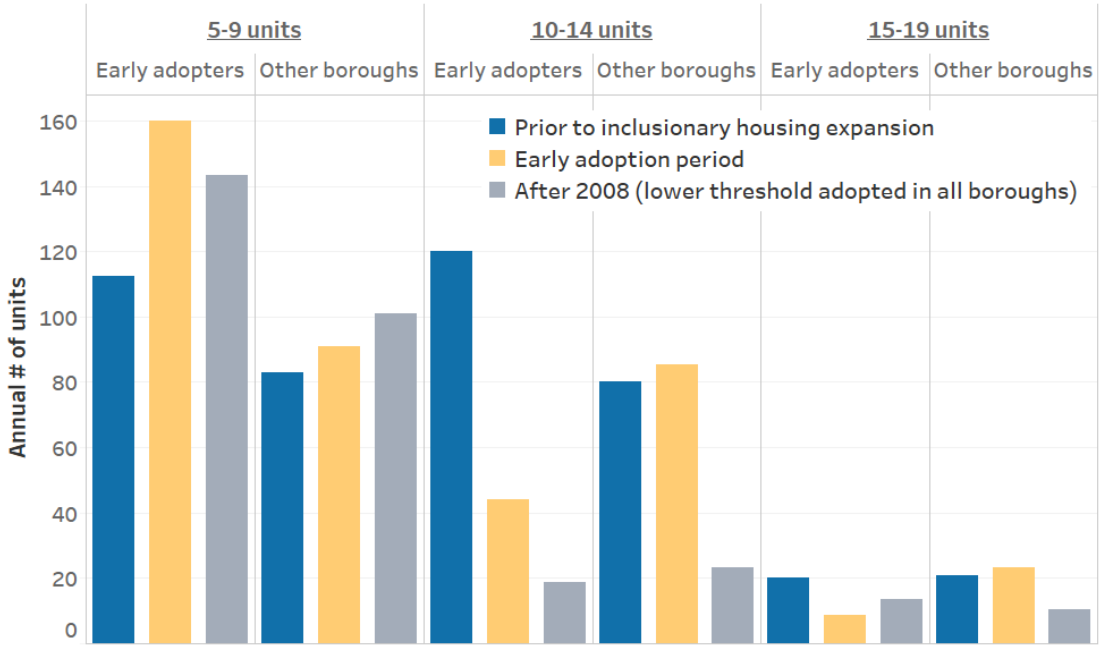


Figure 2. New developments by size, 5-20 units, 4/1/2004-3/31/2014



Data source: London Development Database.

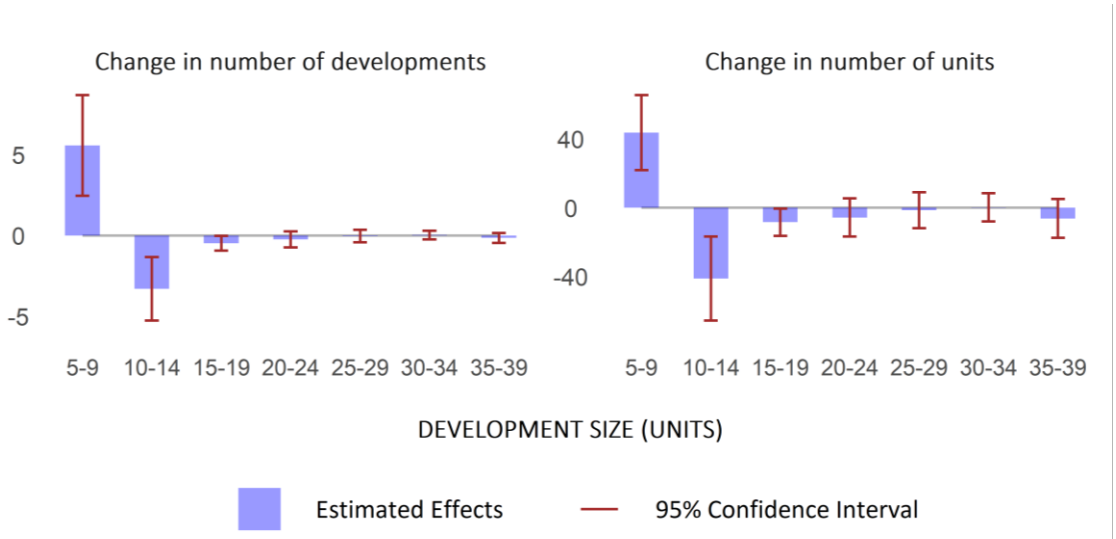
Figure 3. Housing supply in the target, unregulated alternative, and comparison market segments, 4/1/2004-3/31/2014



Note: "Early adopters" refer to the 10 boroughs that adopted the 10-unit threshold before 2008. "Early adoption period" refers to the pre-2008 years during which (1) an early adopter implemented the 10-unit threshold, or (2) one of the other boroughs had a neighboring borough that implemented the 10-unit threahold.

Data source: London Development Database.

Figure 4. The effects of the expansion of IH on housing developments of different sizes



Note: The blue bars represent the regression coefficients of the expansion of IH. The estimated effect is statistically significant if the 95% confidence interval does not include zero.

Technical Appendix

Figure A1 illustrates the identification strategy we used to detect the housing supply effects of the expansion of mandatory inclusionary housing (IH). The adoption of the 10-unit threshold directly affected developments with 10-14 units (*Target*) and could have diverted some development to smaller sites (*Unregulated alternative*). Therefore, we expected a decrease in housing development in the target market segment (blue box) and an increase in development in the unregulated alternative segment (purple box) after the IH expansion. In addition, there might be an increase in development in the green box if some developers switched to neighboring boroughs that had not adopted the 10-unit threshold. We tested these hypotheses using the following regression model:

$$y_{it} = \beta TC_{it} + \mu y_{i(t-1)} + X_{it}\theta + u_i + v_t + \varepsilon_{it}$$

where y_{it} is an outcome variable (number of developments or units in a certain market segment) in borough i in financial year t, TC_{it} indicates whether the 10-unit threshold had been adopted in borough i in financial year t, $y_{i(t-1)}$ is the one-year lagged value of the outcome variable, and X_{it} is a vector of control variables (see Table 2). u_i and v_t are borough and year fixed effects. All grey boxes in Figure A1 served as comparisons or counterfactuals, as they were not directly affected by the expansion of IH but could be affected by other confounding factors, such as market fluctuations. Comparing β between the target, unregulated alternative, and comparison market segments allows us to isolate the effect of the IH expansion from that of other local or citywide shocks.

Table A1 compares the characteristics of the 10 early adopters, which extended IH to smaller sites before the 2008 London Plan, and those of the other boroughs. None of the differences are statistically significant, suggesting that the early adoption of the 10-unit threshold is more likely attributable to the different schedules of local plan-making rather than any systematic differences between the local authorities.

Table A2 shows the regression results with total number of units in developments with 5-14 units as the dependent variable. None of the predictors but for the lagged development variable and affordable housing contributions required from small sites have a statistically significant effect. Notably, the IH expansion had no discernable effect on the joint supply of target and unregulated alternative developments. The loss of target developments was fully compensated by the increase in smaller developments. Nevertheless, boroughs that sought affordable housing contributions from small sites (below 10 units) did see fewer small developments. It is possible that developers in those boroughs switched to other unregulated alternative market segments – such as adjacent boroughs or non-residential developments – though we do not have the data to further explore this possibility.

Table A3 shows the effects of the IH expansion on affordable housing provision in the target market segment. Despite the sharp decline in the number of developments with 10-14 units, the IH expansion led to a net increase of affordable housing in this market segment, averaging 2 units per borough per year.

Figure A1. The target, comparison, and unregulated market segments

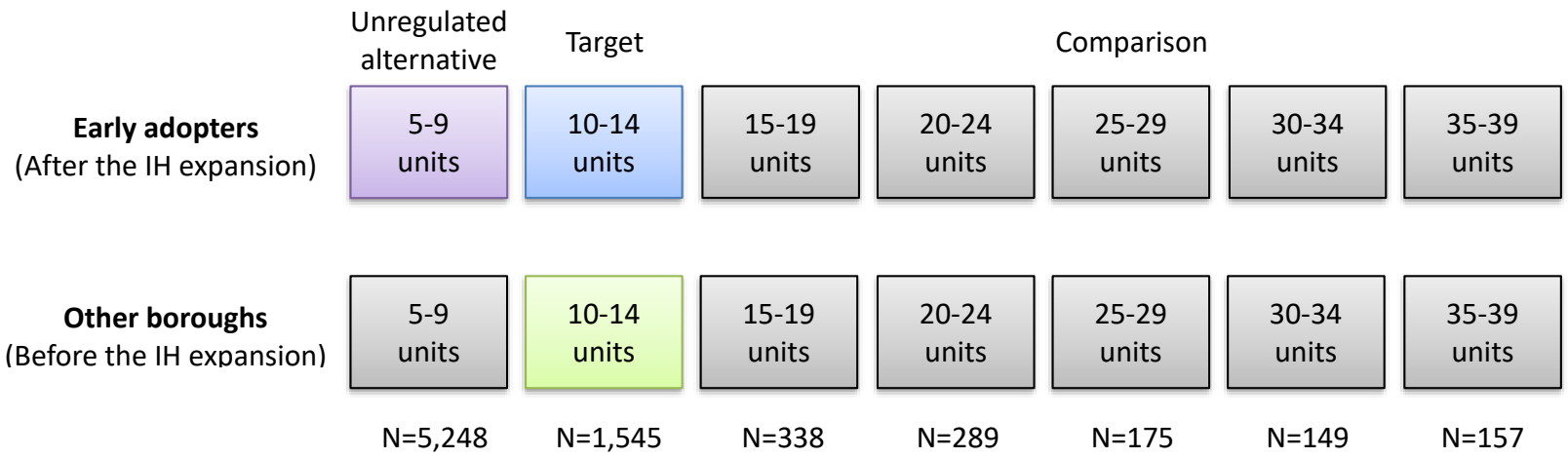


Table A1. Characteristics of the early adopters and other boroughs

	Early adopters	**Other boroughs**
N	10	22
Population density (persons per hectare)[a]	51.0	52.6
Residential land (%)[b]	9.9	10.5
Land potentially suitable for housing redevelopment (%)[b]	1.1	1.3
Council seats won by the Conservative Party (%), 2014	35.9	31.3
Median household income (£), 2012/13[c]	40,387	38,214
Median housing price (£)[a]	332,045	310,535
Black, Asian and ethnic minority (%)[a]	35.5	40.5
Unemployment rate (%)[a]	9.3	9.2
Housing benefit rate (%)[a]	13.3	12.6
Social housing renters (%)[a]	25.6	22.6

[a] 2011 UK Census, Office for National Statistics (ONS)
[b] Land Use Statistics, 2005, Communities & Local Government
[c] Modelled household income estimates, Greater London Authority

Table A2. The net effect of the IH expansion on housing supply (5-14 units)

Dependent Variable (y): Number of units in developments with 5-14 units	Coefficients	Robust Std. Err.
The expansion of IH (After = 1)	-0.5964	(13.6628)
Having a minimum or target set-aside (=1)	34.5816	(31.6037)
The minimum or target set-aside	-0.9920	(0.9609)
Affordable housing contribution sought from small developments with 9 or fewer units (=1)	-40.6200**	(17.2514)
Lagged value of DV (y_{t-1})	0.2346***	(0.0658)
Population	-0.0003	(0.0010)
Population density	-0.5231	(2.7046)
Population growth rate	6.2882	(6.3690)
Median housing price (t-1)	0.0003	(0.0002)
Property sales (t-1)	0.0082	(0.0105)
Residential applications grant rate (t-1)	0.6314	(0.4460)
Residential applications processing speed (t-1)	-0.2752	(0.5253)
Borough-wide housing target	-0.0213	(0.0171)
Borough-fixed effects	+	
Year-fixed effects	+	
R^2	*0.2022*	

***: p<0.01; **: p<0.05; *: p<0.1.

Table A3. The effect of the IH expansion on affordable housing production in the target market segment (10-14 units)

Dependent Variable (*y*): Number of new affordable units in developments with 10-14 units	Coefficients	Robust Std. Err.
The expansion of IH (After = 1)	1.9145*	(0.7974)
Having a minimum or target set-aside (=1)	-0.6824	(1.1835)
The minimum or target set-aside	0.0270	(0.0299)
Affordable housing contribution sought from small developments with 9 or fewer units (=1)	0.6211	(0.9710)
Population	-3.2e-5	(4.7e-5)
Population density	0.1511	(0.1025)
Population growth rate	-0.0385	(0.3162)
Median housing price (t-1)	5.2e-6	(5.3e-6)
Property sales (t-1)	-0.0003	(0.0005)
Lower quartile housing price to earnings ratio (t-1)	-0.0423	(0.1624)
Share of Labour seats in the council	-0.0009	(0.0180)
Borough fixed effects	+	
Year fixed effects	+	
R^2		*0.0010*

***: p<0.01; **: p<0.05; *: p<0.1.