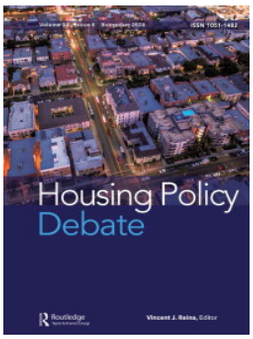

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Can Fair Share Policies Expand Neighborhood Choice? Evidence From Bypassing Exclusionary Zoning Under Massachusetts Chapter 40B

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ABSTRACT

Opening up neighborhoods that offer greater opportunities for social mobility to low- and moderate-income households remains a challenge in the United States. Exclusionary zoning practices act as a barrier to current efforts by restricting the supply of affordable housing. In this paper, we examine whether fair share policies that seek to bypass these restrictive zoning practices offer one potential solution. Focusing on Massachusetts Chapter 40B, we find clear evidence that such policies build affordable housing in neighborhoods with strikingly greater opportunities for social mobility than are otherwise available to low- and moderate-income households. Leveraging novel data on 40B development addresses linked to a wide range of public and administrative records, we find that 40B produces affordable units in neighborhoods with greater economic mobility, higher performing schools, greater social capital, less pollution, better health outcomes, and lower incarceration rates than both the typical neighborhood in Massachusetts and those available to beneficiaries of the state's Low-Income Housing Tax Credit, Housing Choice Voucher, and public housing programs. Consistent with previous research on policies that have segregated affordable housing and opportunity, we also find that neighborhoods with affordable 40B units are whiter and more affluent than average. An examination of underlying policy mechanisms suggests that 40B's ability to bypass exclusionary zoning plays a central role in explaining differences in neighborhood characteristics between 40B and other programs. We further find little evidence to support concerns that 40B's zoning override leads to affordable 40B units being built in the least advantaged areas of municipalities, in polluted zones, or near highways, though a non-trivial share of units are located in industrial zones. These results suggest that policies like 40B may be valuable complements to other major housing programs in the United States.

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Despite the Housing Act of 1949's goal to provide "a decent home and a suitable living environment for every American family," beneficiaries of federal housing programs overwhelmingly live in neighborhoods with higher-than-average poverty rates, poor environmental health exposures, and lower-than-average opportunities for social mobility (Collinson et al., 2016). Most efforts to open up new types of neighborhoods to lower-income families have focused on the Housing Choice Voucher (HCV) program, which provides financial subsidies aimed at expanding housing choice in the private rental market. Yet only one in five families receiving Housing Choice Vouchers lives in a neighborhood with low poverty rates (McClure et al., 2015), despite the program's explicit goal of helping beneficiaries reach neighborhoods that promote upward social mobility (US Department of Housing and Urban Development, 2010; Ellen, 2020).[1] However, the success of such demand-side policies is limited by the availability of qualified affordable housing options in higher "opportunity" neighborhoods (Collinson & Ganong, 2017; Ellen, 2020; McClure, 2010), which these communities deliberately make scarce through restrictive zoning practices (Einstein, 2021; Greene & Ellen, 2020; Rothstein, 2017; Sharkey, 2013).

"Fair share" policies that seek to bypass these exclusionary zoning practices and distribute the supply of affordable housing across municipalities offer one potential solution. Commonly enacted at the state level, fair share policies work by requiring all municipalities to maintain some minimum share of their housing as affordable and allowing developers of affordable housing to bypass local zoning rules in municipalities that do not meet this minimum standard.[2] Through these mechanisms, fair share policies seek to expand the choice of neighborhoods where low- and moderate-income households can afford to live and overcome the supply-side barriers that maintain racial and economic segregation. Though these aims are similar to those of inclusionary zoning policies (Bento et al., 2009; Schuetz et al., 2011) whose effects on neighborhood integration have previously been studied (Kontokosta, 2013), fair share policies differ from inclusionary zoning in both geographic scale and in whether policies are adopted voluntarily. That is, while inclusionary zoning policies tend to be voluntarily adopted and may distribute affordable housing within a municipality, fair share policies are adopted at the state level and aim to distribute affordable housing across municipalities. Researchers studying the effects of fair share policies have largely focused on overall housing production (Goetz & Wang, 2020; Kalra et al., 2023; Krefetz, 2001), municipal compliance (Goetz & Wang, 2020; Hoch, 2007; Krefetz, 2001; Lohe, 2000; Stockman, 1992), and effectiveness at overriding exclusionary zoning practices (Cowan, 2006; Fisher & Marantz, 2015; PlaHovinsak, 2020).

Surprisingly little research has examined the types of neighborhoods that fair share policies make available to the households that qualify for the affordable units in these developments, despite the fact that such policies' primary goal is to open up previously inaccessible kinds of neighborhoods to low- and moderate-income households (Krefetz, 2001, 2016; The Commonwealth of Massachusetts, 1968). We address this gap by identifying and characterizing the neighborhoods where affordable housing was built under Massachusetts Chapter 40B, the oldest and longest running fair share policy in the United States (Krefetz, 2001).

Chapter 40B (henceforth "40B") is a fair share policy that streamlines the permitting process for housing developments in which at least 20 or 25% of units are set aside as affordable for people earning 50% or 80% of area median income (AMI), respectively.[3] In municipalities in which less than 10% of the total housing stock is affordable, 40B further enables developments that meet these criteria to bypass existing zoning regulations. Despite this design, it is not a priori clear that 40B will create affordable housing in higher-income, higher-opportunity areas. The policy can be used in municipalities that already meet the policy's 10% standard (where it may be appealing because it expedites the permitting process), and for a large portion of the policy's existence, nearly all Massachusetts municipalities were subject to the zoning override provision: in 1997, nearly 30 years after the policy's introduction, 93% of municipalities failed to meet the 10% threshold. This, paired with the fact that sizable opposition to 40B projects (Einstein, 2021) was likely to be larger in the most advantaged areas (Einstein, 2021; Einstein et al., 2019;

Monkkonen, 2016; Whittemore & BenDor, 2019), suggests that many communities could remain outside the program's reach.

There are also important open questions about whether affordable 40B units are being built in worse neighborhoods within receiving municipalities. Chapter 40B's mechanism for bypassing zoning rules has raised concerns that municipalities and/or developers may respond by building housing in neighborhoods with undesirable features such as proximity to industrial zones or highways (DeGenova et al., 2009; Girouard, 2023; Martinez et al., 2020). These concerns, paired with the growing number of state and local policies that seek to overcome restrictive zoning practices (Manji et al., 2023; Schuetz, 2023), underscore the importance of conducting a careful, geographically precise examination of 40B neighborhood characteristics that balances these concerns against the program's goals.

Our study therefore has three goals. First, we aim to understand the extent to which 40B builds housing in areas likely to foster upward social mobility and better health, which other housing assistance programs have struggled to reach (Collinson et al., 2019).[4] In these analyses, we compare 40B to three other major housing programs in Massachusetts—the HCV program, the Low-Income Housing Tax Credit (LIHTC) program, and the public housing program—and focus on neighborhood characteristics identified in the previous literature as affecting social mobility and health throughout the life course (Chyn & Katz, 2021; Diez Roux & Mair, 2010; Galster, 2012; Galster & Sharkey, 2017). Second, we investigate potential policy mechanisms that may drive differences in siting characteristics between 40B and other housing assistance programs. Because exclusionary zoning plays a central role in segregating housing opportunities by race and income (Greene et al., 2020; Rothstein, 2017), we concentrate in particular on Chapter 40B's mechanism for bypassing local zoning rules. Finally, we examine whether 40B housing is more likely to be built in industrial zones, near highways, and/or in less advantaged areas of destination municipalities to address potential concerns about 40B's zoning override.

For these analyses, we construct a novel dataset of precise, geocoded 40B addresses based on the public data used to monitor compliance with the policy's minimum affordable housing standard.[5] Previous research on 40B neighborhoods has been limited by the fact that these data only contain approximate subsidized housing locations. Our novel dataset improves upon these approximated locations using existing 40B development characteristics in combination with public sources such Google Maps, Zillow, and news reports to recover the precise addresses of nearly all subsidized housing permitted under 40B, making it possible to conduct a detailed study of the program's location characteristics for the first time. These data can be accessed via the Harvard Dataverse at https://dataverse.harvard.edu/dataverse/ch40b/.

Linking these novel data to a wide variety of public and administrative records,[6] we find that affordable 40B units are located in neighborhoods that offer greater opportunities for social mobility and health when compared *both* to the typical Massachusetts resident and to the neighborhoods available to beneficiaries of other affordable housing programs in the state. Consistent with previous research on policies that have segregated affordable housing and opportunity (Rothstein, 2017; Sharkey, 2013), we also find that 40B neighborhoods are substantially whiter and more affluent than both types of comparison areas. Differences between 40B neighborhoods and those with HCV program beneficiaries, LIHTC units, and public housing are strikingly large in magnitude. As an example, elementary schools in 40B neighborhoods have math scores that are 1.5 to 2 standard deviations higher than schools in neighborhoods with other housing assistance programs. The median 40B neighborhood is also between 20 and 30 percentage points whiter than the median neighborhood for other programs, representing a 1 to 1.5 standard deviation increase in the proportion of white residents. We find comparable gaps across nearly all other measures—especially with respect to factors that affect the well-being of children, such as pollution exposure.

An examination of underlying policy mechanisms suggests that bypassing exclusionary zoning plays an important role in explaining the differences between 40B neighborhoods and those of

other housing assistance programs. Using a comprehensive spatial dataset of zoning characteristics,[7] we find that over half of affordable 40B units are located in areas that were previously zoned for single-family residential uses with large minimum lot size requirements—a share that is 2–3 times larger than that of other housing assistance programs. Moreover, 40B systematically builds affordable housing in municipalities with *very* large minimum lot requirements (of roughly one to two acres per home). We find few differences in the neighborhood characteristics of 40B ownership and 40B rental developments.

When we compare 40B units permitted with and without formal municipal support as a rough proxy for municipal opposition to 40B housing, we find that these single-family areas use both types of permitting mechanisms to differing degrees. Single-family areas with smaller minimum lot requirements—which tend to be more urban, lower-income, and more polluted but have higher house values and higher performing schools than areas with larger minimum lots—are more likely to formally support 40B developments. In contrast, less dense communities have similar shares of "voluntary" and "involuntary" 40B units, suggesting that involuntary permitting mechanisms may be necessary to increase affordable housing supply in these less dense suburban communities.

Finally, while we find little evidence to support concerns that 40B developments are located in polluted zones or near highways, we do find that a non-trivial fraction of affordable 40B units are located in industrial areas. Though we do not find evidence that these areas have higher levels of pollution, this pattern still raises concerns about the potential effects of industrial characteristics on beneficiaries' well-being. We also find that 40B housing is located in slightly less advantaged neighborhoods than the average neighborhood within the same municipality. However, the magnitude of these differences is small even among the highest-income and whitest municipalities, limiting cause for concern.

The remainder of this paper proceeds as follows. We begin with background on Chapter 40B, what is currently known about the siting characteristics of the program, and the basic process of permitting a 40B development. Then we describe our data, methodology, and results before concluding with policy implications and questions for future research.

Background: Massachusetts Chapter 40B

Massachusetts Chapter 40B—also known as the Comprehensive Permit Law—was enacted in 1969 with the explicit goal of overcoming exclusionary zoning and expanding the types of communities where low- and moderate-income households can afford to live (Goetz & Wang, 2020; Krefetz, 2001, 2016; The Commonwealth of Massachusetts, 1968; Vaughn, 1974). Today, 40B is widely regarded as one of the most important housing policies in Massachusetts (Citizens' Housing and Planning Association, 2011, 2014). Chapter 40B has directly permitted over 70,000 total and 18,000 affordable homes, accounting for about 20% of the state's affordable housing stock.[8] This total number of units also makes 40B the second largest supply-side housing policy in the state after the LIHTC program, which has produced about 77,000 units overall (though the LIHTC program has produced many more affordable units than 40B has).

As the oldest and longest running "fair share" housing policy in the United States (Krefetz, 2001), 40B has influenced policy outside of Massachusetts. For example, 40B has been cited as the first concerted attempt at overcoming the negative effects of exclusionary zoning practices (Rodgers, 1969; Vaughn, 1974). It has also served as an example for other states seeking to implement similar policies, including New Jersey's Fair Housing Act (Krefetz, 2001; Mallach, 2011) and others in Connecticut (Krefetz, 2016; Stonefield, 2001), Rhode Island (Krefetz, 2016; Stonefield, 2001), Illinois (Krefetz, 2016), and New Hampshire (Krefetz, 2016).

Despite its importance and the fact that 40B aims to open up previously inaccessible kinds of neighborhoods to low- and moderate-income households (Krefetz, 2001, 2016; The

Commonwealth of Massachusetts, 1968), surprisingly little is known about the types of neighborhoods 40B makes available. Nearly all evaluations of the program have focused on other important issues, including how much affordable housing it produces (Goetz & Wang, 2020; Krefetz, 2001; Koshgarian et al., 2010; Meck et al., 2002), municipal compliance with the 10% standard (Bratt & Vladeck, 2014; Fisher, 2013; Goetz & Wang, 2020; Krefetz, 2001; Stockman, 1992),[9] and effectiveness at overriding exclusionary zoning practices at the municipal level (Cowan, 2006; Fisher & Marantz, 2015).[10] Because of limitations in the administrative data available on the program, these previous studies also focus on all subsidized housing that counts toward Chapter 40B's minimum standard rather than housing permitted directly under 40B, making it difficult to know how comprehensive (40B) permits are used.

Regulatory Mechanisms and Potential Concerns

Chapter 40B aims to distribute affordable housing throughout communities of all kinds in order to increase the choice of neighborhoods available to low- and moderate-income households (Citizens' Housing and Planning Association, 2014). To do this, 40B requires that municipalities maintain at least 10% of their housing stock or 1.5% of their land area as affordable,[11] which it enforces using a "carrot and stick" approach.[12]

As a positive incentive for municipalities to participate, Massachusetts General Laws Chapter 40B introduces the comprehensive "40B" permit, which bundles all permit applications into a single application to one regulatory body to reduce the administrative burden of reviewing many permit applications and to speed up development timelines. Comprehensive permits can be used in any municipality—regardless of how much affordable housing that municipality has—so long as at least 20 or 25% of the proposed development's units are set aside for people earning 50% or 80% of AMI, respectively (Department of Housing and Community Development Massachusetts, 2014). Thus, comprehensive permits provide a positive incentive for *any* municipality seeking to voluntarily increase its share of affordable housing, including those that already meet 40B's minimum standards (i.e., including municipalities with more than 10% affordable housing). This means that—by design—housing permitted via 40B could be found in any type of municipality in Massachusetts, regardless of how much affordable housing it has or what types of opportunities its neighborhoods afford. By streamlining the permitting process, comprehensive permits also serve to encourage developers to apply for projects by reducing the administrative burden of many permit applications to various regulatory bodies (Krefetz, 2001).

Chapter 40B also contains a negative incentive directed at municipalities that do not meet 40B's minimum housing requirements. In such municipalities, 40B grants developers the ability to bypass local zoning decisions if the proposed development meets 40B's comprehensive permit requirements (Department of Housing and Community Development Massachusetts, 2014). This zoning override directly enforces 40B's minimum standards and serves as a strong incentive for municipalities seeking to retain control over the development process to use alternative, voluntary means of increasing their affordable housing supply.

Despite 40B's explicit aim of increasing affordable housing across all municipalities, it is not a priori clear that 40B housing will predominantly reach the highest-income and highest-opportunity areas. It is well documented that 40B developments can draw heavy local opposition (Einstein et al., 2019), which previous research suggests will be greater in wealthy municipalities (Einstein, 2021; Einstein et al., 2019; Monkkonen, 2016; Whittemore & BenDor, 2019). Such unequal opposition could distort the policy's goals by, for example, leading developers to systematically drop applications in these high-income areas due to excessive delays and overly high costs (Brinker, 2023; Cronin, 2021). Moreover, it would not be correct to assume that only wealthy municipalities were subject to 40B's zoning override. In 1972, only 4% of municipalities met 40B's 10% affordable housing standard. In 1997, nearly 30 years after the policy was enacted, this figure

increased to just under 7%.[13] Many of these municipalities were larger urban centers such as Boston, Springfield, or Worcester; the remaining 93% of municipalities had a wide range of median household incomes (from roughly $22,000 to $154,000 in 2000 dollars) and poverty levels (from roughly 1% to 24%) with means not statistically distinguishable from that of the state as a whole ($59,710 vs. $58,315 in 2000, $p = 0.2$; 5.3% vs. 5.9% in 2000, $p = 0.1$). Thus, the overwhelming majority of municipalities were subject to 40B's 10% standard, making it unclear where the bulk of 40B development would have occurred.

Finally, because 40B aims to distribute affordable housing through *all* types of communities, it includes no additional incentives to site affordable housing in higher-income, higher-opportunity municipalities that may be more likely to oppose new construction. It also includes no provisions incentivizing development in particular kinds of neighborhoods, like those that can be included in LIHTC Qualified Allocation Plans (Ellen et al., 2015).[14] This lack of incentive has led to concerns among advocates that municipalities may respond to 40B's zoning override by siting housing in areas that disadvantage program beneficiaries, such as in industrial zones or near highways (DeGenova et al., 2009; Girouard, 2023; Martinez et al., 2020). Municipal representatives have also raised similar concerns, calling 40B's ability a "blunt instrument" (DeGenova et al., 2009; Girouard, 2023; Martinez et al., 2020) that strips municipalities of the ability to enforce local zoning laws meant to protect public health and beneficiary well-being (Woods, 2007). These concerns, paired with the growing number of state and local policies that target restrictive zoning practices (Manji et al., 2023), underscore the importance of conducting a careful examination of 40B neighborhood characteristics that balances these concerns against the program's goals.

Development Permitting Process

The process of applying for a "comprehensive" 40B permit proceeds in four stages and typically takes about 9 months to complete (Barrett, 2017).[15] In the first step, projects are screened for eligibility by one of the three subsidizing agencies that oversee 40B: the Executive Office of Housing and Livable Communities (EOHLC),[16] MassHousing, or Mass Housing Partnership (MHP). Developments are eligible if at least 25% of units are affordable for households making at or below 80% of AMI.[17] Developments that meet this mixed-income requirement may be rental, ownership, or mixed tenure. Rental developments may also qualify for 40B if they set aside at least 20% of units for households earning at or below 50% of AMI (Department of Housing and Community Development Massachusetts, 2014). For rental units, affordability is defined as not paying more than 30% of gross income on rent. Affordability for 40B ownership units is retained by restricting the resale value of the property so that a household earning 70% to 80% of AMI would not spend more than 30% of their income for the cost of purchasing that housing. This restriction, which is described in detail beginning on page VI–6 of the EOHLC Chapter 40B regulation guidelines (Department of Housing and Community Development Massachusetts, 2014) as well as online (Mass.Gov, 2023), means that owners cannot accumulate housing wealth through the program. Affordable housing under 40B is therefore designed to serve a wider range of income groups than most federal affordable housing programs, though rental units may be paired with voucher benefits to make them more affordable.[18]

Once a project is deemed eligible, developers then apply to the local Zoning Board of Appeals (ZBA) for a "comprehensive permit" (so called because it bundles an administratively burdensome set of permit applications into a single, streamlined application). The local ZBA, which enforces the affected municipality's zoning decisions, then has a strictly regulated amount of time to obtain public comment and approve, conditionally approve, or deny the developer's 40B permit application. In this process, the ZBA is allowed to apply more flexible zoning standards and impose additional conditions on any aspect of the project, such as restrictions on height and density, requiring a longer-term affordability of the project, or utility improvements.

In the case where the ZBA denies the application (or approves it with conditions that are financially prohibitive) and the affected municipality does not meet the 10% or 1.5% standards, 40B allows developers to appeal to a legal body known as the Housing Appeals Committee (HAC) to override the local municipality's zoning rules (Krefetz, 2001). Because the HAC nearly always sides with the developer in these appeals (Barrett, 2017), municipalities that wish to retain some control over the development process have a strong incentive not to deny the developer's application. Once the developer has obtained approval from either the ZBA or the HAC, they enter the fourth stage of the permitting process where they obtain final approval from EOHLC, MassHousing, or MHP (Barrett, 2017).[19] Note that additional permitting steps and/or development incentives may then differ between EOHLC, MassHousing, and MHP. For example, MassHousing projects are eligible for funding provided via the New England Fund, while EOHLC projects do not receive specific funding (Federal Home Loan Bank Boston, 2023).

Program Features That May Affect Siting Characteristics

Chapter 40B includes several distinctive features relative to other housing assistance programs that may introduce heterogeneity in the characteristics of 40B neighborhood locations. We focus on two that may provide key insights into municipal responses to 40B and the effective design of future similar policies.

The first distinctive feature of 40B relative to other housing assistance programs is that it enables the construction of both rental and ownership units,[20] and policy incentives vary by tenure. While only the affordable ownership units may count toward a municipality's 10% threshold, 40B incentivizes additional rental construction by allowing municipalities to count all rental units (both market-rate and affordable) toward their minimum threshold. Thus, municipalities seeking to reach the 10% threshold as quickly as possible may be more likely to construct rental developments. Systematic differences between rental and ownership developments may also affect how municipalities respond to each development type and siting characteristics. For example, 40B rental developments tend to be larger apartment buildings while 40B ownership developments tend to consist of clusters of single-family homes or townhouses. Because many of the destination neighborhoods that receive 40B projects are predominantly composed of single-family homes, there may be greater local opposition to rental developments, thus leading these to be sited in locations with worse characteristics for social mobility and health (Department of Housing and Community Development Massachusetts, 2014).[21]

Chapter 40B siting characteristics may also vary across the three subsidizing agencies that oversee the policy, as each agency accepts different kinds of projects. For example, both EOHLC and MHP's 40B programs are meant for collaborative projects between developers and municipalities and require formal municipal support. In contrast, MassHousing's 40B programs do *not* require formal municipal support. MassHousing is therefore the only agency that receives the most contentious 40B developments where there may be significant municipal opposition to development's construction.[22] Thus, the agency through which each development was permitted can serve as a *rough* proxy for whether 40B developments were permitted via a more "voluntary" or a more "involuntary" mechanism.[23]

Data and Methods

Data

To examine the types of neighborhoods 40B makes available, we construct a novel dataset of geocoded 40B addresses based on the December 2020 version of the Massachusetts Subsidized Housing Inventory (SHI), the public dataset used to monitor compliance with 40B (Department of Housing and Community Development Massachusetts, 2014).[24]

Past research on 40B neighborhoods has been limited as the state does not maintain records of exact subsidized housing locations.[25] We directly address this data gap by recovering the precise, geocoded addresses of developments permitted under 40B, making it possible to conduct detailed analyses of 40B subsidized housing locations for the first time. With these data, it will now be possible to answer questions that require precise location information, such as distance from 40B homes to amenities like public transportation, health care, and schools or harmful exposures such as heavily trafficked roadways, pollution, and localized violence (Ang, 2020; Brugge et al., 2007; Sharkey, 2018). Precise addresses also make it possible to answer questions that require linking 40B data to other types of data, such as data on individuals (that protect beneficiary identities and privacy), at the address level. Finally, though it was previously possible, these data will now make it much easier to answer research questions that focus on buildings permitted via a 40B permit alone or in comparison to other programs.[26] Online Appendix A contains a full description of our novel 40B address dataset, address verification, and data cleaning methodology. The full 40B address dataset will be made publicly available on the Harvard Dataverse upon publication.

In addition to approximate development addresses, the SHI also contains information such as development names, the number of subsidized units, the dates that building and occupancy permits were filed, and the state agency responsible for overseeing that development. Using these development characteristics and the approximate 40B addresses in combination with Google Maps, Zillow, internet searches, and public records, we recover the precise addresses of 1,025 40B rental buildings (85% of total) and 3,420 subsidized 40B ownership units (99% of total). All addresses of both types were verified twice by two separate research team members and were shared with staff at EOHLC, MassHousing, and MHP for additional verification. We then rely on these 40B street addresses to geocode each location using the Google API[27] and assign them to their corresponding 2010 census tract using the *sf* package in R (Pebesma, 2018). To capture the entirety of what 40B has produced, our analyses combine our 40B address dataset with a small number of additional addresses we were not able to verify.[28]

We then link these 40B addresses to census tract and municipality[29] characteristics from the US Census; the Opportunity Atlas (Chetty et al., 2018); the US Small-area Life Expectancy Estimates Project (USALEEP) (National Center for Health Statistics, 2018); the Massachusetts Bureau of Geographic Information (MassGIS) (Commonwealth of Massachusetts, Executive Office of Technology Services & Security, 2022); the Center for Air, Climate, and Energy Solutions (CACES) (Kim et al., 2020; Saha et al., 2021); and the Metropolitan Area Planning Council (MAPC). We examine both tract and municipal characteristics to reflect the multiple geographic scales at which places can affect people's outcomes (Chetty et al., 2016; Graif et al., 2016; Sharkey & Faber, 2014).

Next, and to compare 40B neighborhood characteristics to those of other major affordable housing programs, we repeat these steps for the LIHTC, HCV, and public housing programs in Massachusetts. We obtain Massachusetts LIHTC addresses from the Department of Housing and Urban Development (HUD)'s LIHTC property database (US Department of Housing and Urban Development, 2023b), as well as public housing addresses, the addresses of the project-based HCV program administered through the office of Multifamily Housing, and HCV beneficiary counts[30] by census tract from HUD's Assisted Housing query tool (US Department of Housing and Urban Development, 2023a).

Finally, because one of the key aims of 40B is to bypass exclusionary zoning, we link 40B, HCV, LIHTC, and public housing addresses to detailed spatial zoning data from MassGIS (Office of Geographic Information, 2013; Resseger, 2022).[31] The zoning codes in these data are generally not subject to changes made in response to 40B proposals, as nearly 80% of 40B developments began the permitting process after these data were last updated.[32] We therefore conceive of these data as a measure of the baseline zoning code of the neighborhoods where 40B housing was eventually built.

Measures of Neighborhood Characteristics

We include two sets of measures of neighborhood characteristics. To provide an overview of what each set of neighborhoods is like, we begin by describing the basic demographic, housing, and economic characteristics of each area. We then turn to our primary focus of area characteristics that capture the social, economic, and environmental conditions that affect upward social mobility and health (Chyn & Katz, 2021; Diez Roux & Mair, 2010; Galster, 2012; Galster & Sharkey, 2017; Ludwig et al., 2012; Sharkey & Faber, 2014). To broadly capture factors that may affect social mobility and health outcomes, we use a wide range of validated measures in the literature including median household income, educational attainment, and life expectancy (Chetty et al., 2016), neighborhood-level poverty, racial demographics, school quality, social capital, and family structure (Casciano & Massey, 2012a, 2012b, 2012c; Chetty et al., 2014; Galster, 2012; Galster & Sharkey, 2017), commute times (Miller, 2023; Popkin et al., 1993; Rosenbaum, 1995; Rosenbaum & Harris, 2001), incarceration rates, and the adult outcomes of children raised in the area (Chetty & Hendren, 2018; Chetty et al., 2020). To these, we also add a range of vehicular and industrial pollutants based on a broad literature showing that they are implicated in a wide range of health outcomes such as asthma (Corburn et al., 2006; Gold & Wright, 2005), poor birth outcomes (Currie, 2011; Currie et al., 2014; Trasande et al., 2016), mortality (Finkelstein et al., 2021) and cardiovascular disease (Brugge et al., 2007).

Sample

Our analyses focus on the universe of developments permitted directly under 40B (that is, via a comprehensive permit). Our final sample consists of 1,398 40B developments, representing about 4,530 buildings, 75,263 total units, and 19,053 affordable units. Of these, we were able to verify and geocode the building's exact location for 96% of buildings (representing 96% of affordable units, 94% of total units, and 86% of developments). We also include 946 LIHTC developments (77,348 total and 52,401 affordable units), 152,639 HCV beneficiary households (95,413 for the mobile HCV program and 58,311 for project-based Section 8 housing), and 210 public housing developments (32,662 units) that we are able to link to 2010 census tracts.

Table 1 provides a basic description of our sample of 40B developments, which consist mostly of rental (53%) and ownership (45%) properties with a small subset that are mixed tenure (2%). The average 40B rental development tends to consist of one to two larger buildings with an average of about 17 affordable units. The typical 40B ownership development tends to be composed of smaller clusters of single-family homes or townhouses with an average of about five buildings and nine affordable units. Overall, 40B has permitted about 20% more rental than ownership developments, and the number of affordable 40B rental units it has produced is about 2.5 times larger than the number of affordable 40B ownership homes.

Table 1. Characteristics of housing units permitted under 40B.

	Rental	Ownership	Mixed	Total
Developments	743	631	24	1,398
Number of buildings per development (mean)	1.4	5.4	3.7	3.2
Number of affordable units per development (mean)	17.3	8.5	34.0	13.6
Buildings	1,025	3,420	89	4,534
Affordable units[a]	12,874	5,362	817	19,053
Total units counted toward 10%	50,547	5,362	817	56,726
Total units permitted[a]	50,547	21,448	3,268	75,263

[a]To incentivize additional rental development, 40B allows municipalities to count *all* units in rental developments toward their minimum 10%, while it only counts the affordable units for ownership developments. Because the Executive Office of Housing and Livable Communities (EOHLC) does not release data on the specific affordability mix of each project, we do not have the precise number of affordable units for rental developments as well the total units for ownership and mixed income developments. The numbers presented in Table 1 are estimates based on the fact that nearly all developments have an affordability mix in which 25% of units are affordable.

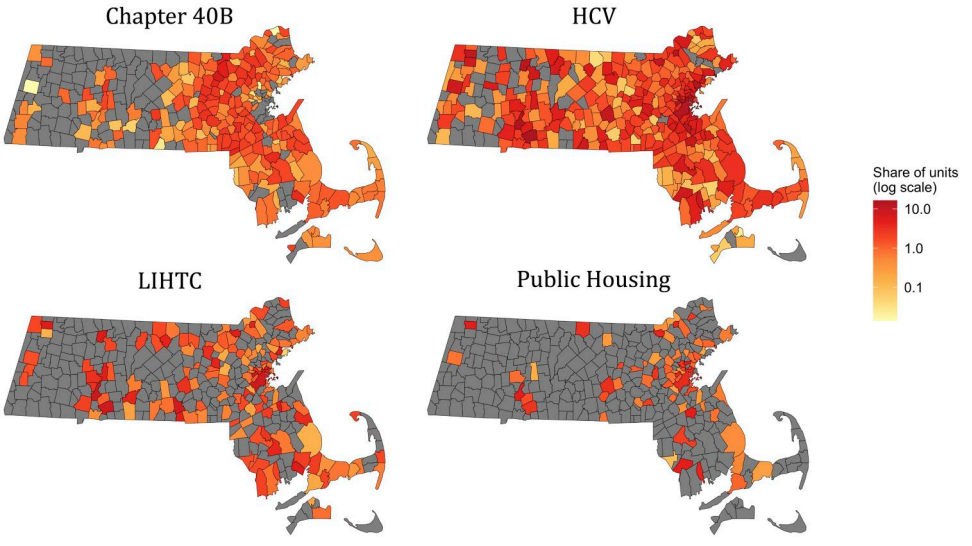

Figure 1. Share of housing stock occupied by affordable 40B units, HCV beneficiaries, affordable LIHTC units, and public housing units in Massachusetts.

The map depicts the share of housing units in each municipality that is occupied by affordable 40B units, Housing Choice Voucher (HCV) households, affordable Low-Income Housing Tax Credit (LIHTC) units, and public housing units. The total number of housing units is drawn from the 2010 census and we obtain program unit counts based on our novel dataset of 40B addresses, Massachusetts LIHTC addresses from the US Department of Housing and Urban Development (HUD)'s LIHTC property database (US Department of Housing and Urban Development, 2023b), public housing addresses and the addresses of the project-based HCV program administered through the office of Multifamily Housing, and HCV beneficiary counts by census tract from HUD's Assisted Housing query tool (US Department of Housing and Urban Development, 2023a). Municipal HCV counts are calculated by taking the municipality that occupies the greatest share of land area for that census tract. All boundaries are based on 2010 census designations.

Figure 1 illustrates the geographic distribution of affordable 40B housing when compared to the LIHTC, HCV, and public housing programs in Massachusetts. Maps for 40B, LIHTC, and public housing show the share of housing units within each municipality built under each of these programs. The map for the HCV program illustrates the share of households in that municipality that are HCV beneficiaries. As these maps show, the distribution of affordable 40B homes differs substantially from the distribution of homes under the other three programs. Specifically, 40B developments tend to be located in the suburbs around Boston and along Cape Cod. In contrast, LIHTC developments and public housing developments are concentrated in urban centers around Boston, Springfield, and Lowell. Figure 1 also shows that a similar pattern applies to the HCV program, whose beneficiaries are also the most broadly distributed throughout the state.

Methodology

We ask five primary research questions. The first three examine the extent to which 40B achieves its goal of building housing in areas that foster greater social mobility and better health, while the last two aim to shed light on the underlying policy mechanisms.

Aim 1: What are the siting characteristics of areas with affordable 40B housing?

1. How does the typical neighborhood with affordable 40B housing compare to the typical neighborhood in Massachusetts?
2. How do the neighborhoods surrounding affordable 40B units compare to neighborhoods with beneficiaries of the HCV program, neighborhoods with affordable units produced though the LIHTC program, and neighborhoods with public housing units?

Aim 2: How do program features affect the 40B siting characteristics?

3. How do neighborhoods with affordable 40B rental units differ from neighborhoods with affordable 40B ownership units?
4. To what extent does bypassing exclusionary zoning explain differences in the neighborhood characteristics where affordable 40B units are located, relative to the neighborhood characteristics surrounding other affordable housing programs?

Aim 3: Are affordable 40B homes built in less desirable areas within destination municipalities?

5. That is, to what extent are affordable 40B units located in polluted areas, industrial zones, and less "desirable" neighborhoods when compared to other neighborhoods within the same municipality?

To answer the first two questions, we test for differences between the median characteristics of tracts or municipalities with at least one 40B development, the median Massachusetts tract, and tracts with beneficiaries from other subsidized housing programs. We use the nonparametric Wilcoxon rank sum test to draw these comparisons, to account for the fact that most of our variables are not normally distributed. In each comparison, we weight areas with housing developments by the proportion of affordable units in that geography (i.e., by the proportion of affordable 40B units, affordable LIHTC units, HCV beneficiaries, or public housing units in that tract). We weight each area by the proportion of affordable units to compare the types of neighborhoods made available to the beneficiaries of affordable housing programs, which previous research has shown is much more limited than what is available for the residents of market rate housing (Collinson et al., 2016). When comparing to the state or surrounding municipality, we weight areas with no housing developments by the total number of housing units.

To answer the third and fourth questions, we test for differences between the median characteristics of tracts (a) by tenure (rental vs. ownership) and (b) by zoning and by subsidizing agency. That is, to answer the third question we examine whether 40B rental housing is permitted in different types of neighborhoods when compared to 40B ownership housing. To answer our fourth research question, we first compare the development-level zoning characteristics between 40B and other housing assistance programs to identify the extent to which affordable 40B units are located in areas with more stringent zoning regulations. Then—because EOHLC only oversees "friendly" 40B developments while MassHousing oversees a mix of contentious and supportive developments—we test whether 40B housing regulated by MassHousing is located in areas with different zoning and neighborhood characteristics than housing regulated by EOHLC.[33] Because zoning data are categorical, we use the chi-squared test with Rao and Scott's second-order correction to draw comparisons based on zoning data.

Finally, we run two sets of analyses to answer our last question. First, we regress each neighborhood characteristic on a 40B indicator variable, which takes a value of 1 if that tract has at least one 40B development, and include municipality fixed effects.[34] The specific model we will estimate takes the form:

$$y_{t,m} = \alpha + \beta 40B_{t,m} + \delta_m + \varepsilon_{t,m} \quad (1)$$

where $y_{t,m}$ refers to a neighborhood social mobility or health characteristic for some census tract t within a municipality m, and δ_m corresponds to municipal fixed effects. In Equation (1) the coefficient of interest is β, which represents the difference in each neighborhood characteristic between the average tract with a 40B development and other tracts within the same municipality. In these regressions, we weight tracts with 40B developments by the number of affordable units and the tracts without any 40B developments by the number of housing units. We weight

in this way to compare the areas where the average affordable 40B unit is located compared with where the average unit in Massachusetts is located. As a robustness check, we also present results in Online Appendix F where both groups are weighted by population.

Next, because these patterns may vary across different types of municipalities, we run the regression in Equation (2) to identify the extent to which they differ for the highest-income and whitest communities:

$$y_{t,m} = \alpha + \beta 40B_{t,m} + \gamma(40B_{t,m}.M_m) + \delta_m + \varepsilon_{t,m} \quad (2)$$

Variable definitions remain the same as in Equation (1), with the addition of M_m, which takes the value of 1 if a given municipality *m* is either in the top quartile of median household income in 2010 (>$90,950) or in the top quartile of the percentage of white residents in 2010 (>97% white). In Equation (2), the coefficients of interest are β, which represents the difference in each neighborhood characteristic between the average tract with a 40B development and other tracts within the same municipality among municipalities among lower-income or less-white municipalities, and γ, which represents the additional difference in neighborhood characteristics among municipalities in higher-income or whiter communities.

Finally, we draw from our analyses to answer our fourth research question to examine the extent to which 40B developments are located in industrial areas.

Results

What Are the Siting Characteristics of Areas with Affordable 40B Housing?

Our first set of results, shown in Table 2, compare 40B neighborhood characteristics to those of the median Massachusetts neighborhood.[35] These results indicate several patterns that are consistent with 40B housing being located in wealthy, white suburbs around Boston.[36] The first two columns of Table 2 show that affordable 40B units are located in whiter, more affluent neighborhoods when compared to the median Massachusetts neighborhood. Though differences in racial composition are modest, differences in affluence are substantively large. For instance, the proportion of Black, Hispanic, Asian, or other non-white residents is about 1–2 percentage points lower in 40B neighborhoods than in the state overall. These values are about one tenth of a standard deviation lower than the proportion of each of these groups across Massachusetts. In contrast, the median household income of 40B neighborhoods is about $15,000 higher, or 22% higher, than that for the median Massachusetts neighborhood. This value is nearly half a standard deviation higher than that of median household incomes across all neighborhoods, which was about $31,000 in 2010. We also find similar differences for the proportion of households with college degrees, median home values, and the ownership rate (which are half of a standard deviation, a third of a standard deviation, and 40% of a standard deviation higher, respectively, in 40B neighborhoods than in the median neighborhood).

Table 2 further illustrates that—consistent with the relative wealth of Boston suburbs—40B developments offer beneficiaries better conditions for social mobility and health than residents of the median Massachusetts neighborhood. The magnitude of most of these differences is modest. The main exception is that factors relating to certain conditions for children, such school performance, are substantially better in 40B neighborhoods: third grade math scores are 17% or 0.73 standard deviations higher in school districts that contain 40B neighborhoods. Adult earnings of children who grew up in the area are also about 0.5 to 0.6 standard deviations higher (12% higher for earnings in adulthood and 23% higher for the probability of being among the top-income-earning households).

Differences in the types of neighborhoods made available under 40B are considerably larger when compared to other major affordable housing programs.[37] These results can be found in the right four sets of columns in Table 2, which compare the median type of neighborhood

Table 2. Characteristics of neighborhoods with affordable 40B units compared to neighborhoods with other affordable housing beneficiaries in Massachusetts.

	MA Overall		Chapter 40B			All HCV			LIHTC			Public Housing		
	Median	(IQR)	Median	(IQR)		Median	(IQR)		Median	(IQR)		Median	(IQR)	
Demographic														
Female	0.52	(0.51, 0.53)	0.52	(0.51, 0.53)	*	0.52	(0.51, 0.54)	***	0.52	(0.51, 0.55)	***	0.53	(0.51, 0.55)	***
Age														
<18	0.22	(0.18, 0.25)	0.23	(0.21, 0.27)	***	0.22	(0.18, 0.26)	***	0.23	(0.17, 0.27)		0.23	(0.19, 0.28)	
18–64	0.63	(0.61, 0.66)	0.62	(0.59, 0.64)	***	0.64	(0.61, 0.68)	***	0.63	(0.60, 0.71)	***	0.63	(0.60, 0.67)	*
>64	0.14	(0.11, 0.17)	0.14	(0.11, 0.17)		0.12	(0.09, 0.15)	***	0.12	(0.09, 0.15)	***	0.12	(0.09, 0.15)	***
Race/ethnicity														
White	0.88	(0.74, 0.94)	0.91	(0.85, 0.94)	***	0.67	(0.44, 0.85)	***	0.60	(0.38, 0.79)	***	0.58	(0.44, 0.77)	***
Black	0.03	(0.01, 0.06)	0.02	(0.01, 0.03)	***	0.08	(0.04, 0.19)	***	0.11	(0.05, 0.24)	***	0.10	(0.05, 0.20)	***
Hispanic	0.04	(0.02, 0.09)	0.02	(0.02, 0.04)	***	0.13	(0.05, 0.28)	***	0.18	(0.06, 0.35)	***	0.19	(0.09, 0.38)	***
Asian	0.03	(0.01, 0.06)	0.03	(0.01, 0.08)	***	0.03	(0.01, 0.08)		0.03	(0.01, 0.10)		0.04	(0.01, 0.12)	
Other race	0.04	(0.02, 0.08)	0.03	(0.02, 0.04)	***	0.10	(0.05, 0.20)	***	0.13	(0.05, 0.24)	***	0.18	(0.08, 0.22)	***
Education														
Less than high school	0.08	(0.04, 0.15)	0.05	(0.03, 0.07)	***	0.16	(0.09, 0.27)	***	0.18	(0.10, 0.30)	***	0.25	(0.15, 0.33)	***
High school	0.53	(0.41, 0.62)	0.50	(0.35, 0.58)	***	0.54	(0.44, 0.62)	***	0.50	(0.42, 0.60)		0.51	(0.46, 0.58)	
College or more	0.36	(0.24, 0.52)	0.45	(0.33, 0.61)	***	0.24	(0.15, 0.41)	***	0.22	(0.14, 0.41)	***	0.18	(0.10, 0.34)	***
Population density	2,582	(792, 7,983)	1,033	(635, 2,269)	***	8,459	(3,480, 16,941)	***	11,061	(3,998, 21,175)	***	10,657	(5,705, 19,690)	***
Economic														
Median household income[a]	68,430	(51,339, 85,636)	84,866	(69,675, 106,495)	***	46,616	(29,992, 63,648)	***	36,665	(20,510, 58,452)	***	32,160	(20,988, 48,523)	***
Below poverty	0.07	(0.04, 0.14)	0.05	(0.03, 0.07)	***	0.18	(0.09, 0.29)	***	0.24	(0.13, 0.37)	***	0.28	(0.18, 0.38)	***
Unemployed	0.08	(0.06, 0.10)	0.07	(0.05, 0.09)	***	0.10	(0.07, 0.15)	***	0.12	(0.08, 0.18)	***	0.14	(0.09, 0.17)	***
Commute time (2000 census)	28.5	(24.8, 32.0)	30.2	(27.0, 32.6)	***	28.2	(24.1, 32.6)	***	27.7	(23.5, 32.5)	**	26.8	(23.4, 31.2)	***
Housing														
Median home value[a]	329,924	(259,068, 411,129)	372,370	(318,400, 481,650)	***	290,300	(221,758, 360,698)	***	290,652	(205,553, 395,559)	***	265,013	(206,545, 356,341)	***
Rent, two-bed	946	(751, 1,167)	1,028	(842, 1,308)	***	845	(642, 1,048)	***	794	(550, 1,020)	***	591	(441, 850)	***
Renters	0.32	(0.18, 0.56)	0.22	(0.16, 0.36)	***	0.63	(0.41, 0.79)	***	0.74	(0.53, 0.88)	***	0.73	(0.53, 0.86)	***
Opportunity for social mobility and health														
Education														
3rd grade math score(s)	3.99	(3.22, 4.67)	4.67	(4.10, 5.18)	***	3.32	(2.96, 3.98)	***	2.96	(2.96, 3.65)	***	2.96	(2.96, 3.54)	***
Incarceration														
Overall	0.003	(0.001, 0.008)	0.002	(0.000, 0.005)	***	0.008	(0.003, 0.017)	***	0.010	(0.003, 0.024)	***	0.010	(0.005, 0.020)	***
Black male	0.05	(0.02, 0.09)	0.03	(0.01, 0.10)		0.06	(0.03, 0.10)		0.07	(0.03, 0.10)		0.09	(0.03, 0.13)	
Health														
Life expectancy at birth	80.7	(78.7, 82.3)	81.2	(79.4, 83.0)	***	78.7	(76.6, 81.1)	***	78.3	(76.3, 81.1)	***	78.0	(76.1, 79.8)	***
Pollution														
Sulfur dioxide (SO_2)	2.11	(1.84, 2.35)	2.04	(1.84, 2.26)	***	2.21	(1.97, 2.46)	***	2.15	(1.92, 2.33)	**	2.27	(2.02, 2.52)	***
Carbon monoxide (CO)	0.30	(0.28, 0.31)	0.29	(0.27, 0.30)	***	0.31	(0.29, 0.33)	***	0.31	(0.29, 0.33)	***	0.32	(0.29, 0.33)	***
Nitrogen dioxide (NO_2)	6.65	(4.61, 9.51)	5.22	(4.10, 6.61)	***	9.67	(7.07, 11.90)	***	10.9	(7.8, 12.6)	***	10.2	(8.2, 12.4)	***
Ozone (O_3)	44.61	(43.87, 45.24)	44.90	(44.10, 45.32)	***	44.23	(43.47, 44.95)	***	43.88	(43.09, 44.65)	***	44.08	(43.11, 45.01)	***
$PM_{2.5}$	7.97	(7.26, 8.64)	7.55	(7.00, 8.02)	***	8.46	(7.96, 8.90)	***	8.51	(7.93, 8.99)	***	8.48	(8.08, 8.88)	***
Ultrafine particulate matter	7,348	(4,722, 10,343)	5,668	(4,459, 7,795)	***	10,532	(7,842, 12,164)	***	11,126	(7,938, 12,786)	***	11,230	(9,025, 12,581)	***
Very proximate to traffic[b]	–	–	0.07	(0.26)	–	0.24	(0.43)	***	0.27	(0.44)	***	0.23	(0.42)	***
Proximate to traffic[b]	–	–	0.53	(0.50)	–	0.68	(0.47)	***	0.70	(0.46)	***	0.76	(0.43)	***

(*continued*)

Table 2. Continued.

	MA Overall		Chapter 40B			All HCV			LIHTC			Public Housing		
	Median	(IQR)	Median	(IQR)		Median	(IQR)		Median	(IQR)		Median	(IQR)	
Adult outcomes for children who grew up in tract														
Median household income[a]	52,264	(44,491, 60,222)	58,926	(53,804, 66,815)	***	41,531	(32,596, 50,596)	***	38,648	(28,316, 47,520)	***	35,685	(29,752, 43,164)	***
Probability of living in low-poverty neighborhood[c]	0.69	(0.48, 0.75)	0.75	(0.71, 0.78)	***	0.43	(0.33, 0.62)	***	0.38	(0.25, 0.51)	***	0.37	(0.29, 0.48)	***
Family structure														
Two-parent share	0.80	(0.69, 0.86)	0.85	(0.80, 0.89)	***	0.63	(0.42, 0.76)	***	0.50	(0.34, 0.71)	***	0.56	(0.39, 0.66)	***
Social capital														
Census mail return rate	0.80	(0.74, 0.85)	0.83	(0.79, 0.86)	***	0.73	(0.68, 0.79)	***	0.72	(0.68, 0.78)	***	0.72	(0.69, 0.76)	***
N tracts	1,478		515			1,402			389			171		

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

p values are calculated using the Wilcoxon rank sum test for continuous non-normally distributed variables, using the gtsummary (1.7.2) and survey (v. 4.2-1) packages in R (Lumley, 2004, 2023; Sjoberg et al., 2021). Values in each column correspond to the median and interquartile ratio (IQR) of the characteristic in that row. Tests of statistical significance under the "Chapter 40B" heading compare the median of each 40B characteristic to the median for all of Massachusetts while tests of statistical significance under the Low-Income Housing Tax Credit (LIHTC), Housing Choice Voucher (HCV), and public housing headings compare the neighborhood characteristics for each of those programs to the neighborhood characteristics for 40B. All calculations for Massachusetts are weighted by the total number of housing units while all housing assistance program statistics are weighted by the proportion of affordable units in that tract. HCV beneficiaries include both households who receive mobile vouchers and those in project-based Section 8 housing. All demographic, economic, and housing variables are drawn from the 2010 US census. Third grade math scores (measured in 2013), incarceration rates (measured in 2010), adult outcomes for children (measured for adults who were 35 in 2014–2015), family structure (measured from the 2006–2010 American Community Survey estimate), and the census mail return rate (measured in 2010) are drawn from the Opportunity Atlas. Life expectancy (measured in 2010–2015) is drawn from the US Small-area Life Expectancy Estimates Project (USALEEP); pollution measures come from the Center for Air, Climate, and Energy Solutions (CACES); and proximity to traffic is based on road buffers and average daily traffic counts provided by the Metropolitan Area Planning Council.

[a]Income and home values are measured in 2010 USD.

[b]Proximity to traffic values represent means and standard deviations and is defined as follows: very proximate refers to housing within 100 m of a roadway with a daily vehicle count at or over 20,000, while proximate refers to housing within 500 m of roadways with that same volume of traffic. Since we do not have precise addresses for beneficiaries of the mobile HCV program, traffic proximity values only include project-based Section 8 housing.

[c]Low neighborhood poverty is defined as <10%.

made available to affordable 40B beneficiaries to the types of neighborhoods made available to the Massachusetts beneficiaries of the HCV, LIHTC, and public housing programs.

When compared to HCV, LIHTC, and public housing neighborhoods, affordable 40B units are located in much whiter, lower-poverty areas. Table 2 shows that these differences are strikingly large. The smallest difference in poverty rates—between 40B and the HCV program—is 13 percentage points. This equates to the difference between a neighborhood in roughly the 80th percentile of poverty in Massachusetts to one in the 30th percentile. Online Appendix B further shows that these differences persist if we focus only on mobile Housing Choice Voucher recipients. Similarly, the median 40B neighborhood is between 20 and 30 percentage points whiter than the median neighborhood for other programs, representing a 1 to 1.5 standard deviation increase in the proportion of white residents.

We also find comparable gaps between 40B and other housing assistance programs across nearly all characteristics that affect social mobility and health, where the most substantial differences between program neighborhoods again relate to health and the conditions for children. As an example, the fraction of children living in two-parent households—one of the strongest predictors of upward income mobility (Chetty et al., 2014)—is 3 times higher (1.5 standard deviations) in the median 40B neighborhood compared to the median neighborhood with HCV households. There are also sizable disparities in exposure to a wide range of pollutants (which are particularly important for birth outcomes (Almond & Currie, 2011), adult outcomes for children who grow up in the area, school quality, and teen birth rates. Finally, disaggregating these results shows that patterns are not driven by differences in racial composition and income across the two types of areas. As Online Appendix C shows, differences pertaining to people between neighborhoods (e.g., in health outcomes and adult outcomes) largely persist within different racial/ethnic and low-income groups.[38]

Finally, Online Appendix D shows that affordable 40B units tend to be built in wealthier, more privileged areas even when compared only to median neighborhoods in municipalities that failed to meet 40B's 10% standard. Only 16 municipalities successfully met 40B's minimum standard in 1972, the most recent date for which we have data after the policy was enacted.[39] Online Appendix E shows that these tended to be larger municipalities with lower median incomes and worse characteristics for social mobility when compared to the overall state median.

How Do Program Features Affect 40B Siting Characteristics?

How Do Siting Characteristics Vary Across 40B Rental and Ownership Developments?

Table 3 shows relatively few substantive differences by tenure. Affordable 40B rental units are located in neighborhoods that are slightly less white, lower income, and have somewhat worse rates of pollution and social capital. However, the magnitude of these differences generally does not exceed about a fifth of a standard deviation. Most dimensions of social mobility and health—including school quality and the outcomes of children who grow up in the area—are essentially no different between areas with 40B rental and ownership units. The main exceptions are that affordable 40B rental units are clearly located in more populous areas with slightly higher rents. Generally, these patterns imply that affordable 40B rental units tend to be in slightly more diverse, central, and urban areas when compared to affordable 40B ownership units.

To What Extent Does Bypassing Exclusionary Zoning Explain Differences in the Siting Characteristics for 40B Relative to Other Housing Assistance Programs?

Table 4 compares the zoning characteristics measured at the building level for the median 40B neighborhood to those of the median neighborhood with beneficiaries from other housing programs. Each set of statistical tests compares the housing program in that column to 40B.

Table 3. Differences in the characteristics of neighborhoods with affordable 40B units by unit tenure.

	Ownership		Rental		
	Median	(IQR)	Median	(IQR)	
Demographic					
Female	0.51	(0.51, 0.52)	0.52	(0.51, 0.53)	
Age					
<18	0.24	(0.22, 0.27)	0.23	(0.21, 0.26)	*
18–64	0.62	(0.59, 0.64)	0.62	(0.59, 0.65)	
>64	0.14	(0.11, 0.17)	0.15	(0.11, 0.17)	
Race/ethnicity					
White	0.93	(0.88, 0.96)	0.90	(0.83, 0.93)	***
Black	0.01	(0.007, 0.018)	0.02	(0.009, 0.035)	***
Hispanic	0.02	(0.015, 0.027)	0.03	(0.018, 0.041)	***
Asian	0.03	(0.01, 0.05)	0.04	(0.02, 0.09)	***
Other race	0.02	(0.017, 0.033)	0.03	(0.018, 0.039)	***
Education					
Less than high school	0.05	(0.03, 0.06)	0.05	(0.03, 0.08)	
High school	0.51	(0.39, 0.59)	0.49	(0.34, 0.58)	
College or more	0.45	(0.33, 0.57)	0.45	(0.34, 0.62)	
Population density	781	(522, 1,530)	1,278	(673, 2,606)	***
Economic					
Median household income[a]	85,086	(70,602, 111,304)	84,768	(69,187, 102,232)	
Below poverty	0.04	(0.03, 0.07)	0.05	(0.03, 0.07)	
Unemployed	0.07	(0.05, 0.09)	0.07	(0.05, 0.09)	
Commute time (2000 census)	30.6	(27.6, 33.4)	30.2	(26.9, 32.4)	
Housing					
Median home value[a]	371,953	(325,840, 454,713)	373,966	(315,548, 482,789)	
Rent, two-bed	926	(804, 1,208)	1,067	(846, 1,333)	**
Renters	0.17	(0.12, 0.25)	0.25	(0.17, 0.41)	***
Opportunity for social mobility and health					
Education					
3rd grade math score(s)	4.71	(4.18, 5.10)	4.66	(4.08, 5.19)	
Incarceration					
Overall	0.002	(0.000, 0.004)	0.002	(0.000, 0.005)	
Black male	0.03	(0.00, 0.07)	0.03	(0.01, 0.11)	
Health					
Life expectancy at birth	81.5	(79.9, 83.1)	81.2	(79.3, 83.0)	
Pollution					
Sulfur dioxide (SO_2)	1.99	(1.71, 2.19)	2.05	(1.88, 2.28)	***
Carbon monoxide (CO)	0.29	(0.255, 0.300)	0.29	(0.279, 0.305)	***
Nitrogen dioxide (NO_2)	4.33	(3.81, 5.38)	5.45	(4.38, 7.18)	***
Ozone (O_3)	44.9	(44.25, 45.26)	44.9	(44.06, 45.32)	
$PM_{2.5}$	7.24	(6.70, 7.75)	7.64	(7.15, 8.20)	***
Ultrafine particulate matter	4,624	(3,979, 6,542)	6,223	(4,722, 8,289)	***
Adult outcomes for children who grew up in tract					
Median household income[a]	58,408	(52,121, 64,861)	59,343	(54,058, 67,013)	*
Probability of living in low-poverty neighborhood[c]	0.75	(0.72, 0.78)	0.75	(0.70, 0.78)	
Family structure					
Two-parent share	0.85	(0.80, 0.89)	0.85	(0.80, 0.88)	
Social capital					
Census mail return rate	0.85	(0.82, 0.87)	0.83	(0.79, 0.86)	***
N tracts	309		377		

*$p < 0.05$; ** $p < 0.01$; ***$p < 0.001$.

Values are medians with p values calculated using the Wilcoxon rank sum test for continuous variables that are not normally distributed, using the gtsummary (1.7.2) and survey (v. 4.2-1) packages in R (Lumley, 2004, 2023; Sjoberg et al., 2021). Interquartile ranges (IQRs) are included in parentheses. All calculations are weighted by the proportion of affordable 40B units located in that tract. Buildings in mixed-tenure developments are not included in this comparison. All demographic, economic, and housing variables are drawn from the 2010 US census. Third grade math scores (measured in 2013), incarceration rates (measured in 2010), adult outcomes for children (measured for adults who were 35 in 2014–2015), family structure (measured from the 2006–2010 American Community Survey estimate), and the census mail return rate (measured in 2010) are drawn from the Opportunity Atlas. Life expectancy (measured in 2010–2015) is drawn from the US Small-area Life Expectancy Estimates Project (USALEEP); pollution measures come from the Center for Air, Climate, and Energy Solutions (CACES); and proximity to traffic is based on road buffers and average daily traffic counts provided by the Metropolitan Area Planning Council.

[a]Income and home values are measured in 2010 USD.

[b]Proximity to traffic values represent means and standard deviations and is defined as follows: very proximate refers to housing within 100 m of a roadway with a daily vehicle count at or over 20,000 while proximate refers to housing within 500 m of roadways with that same volume of traffic. Since we do not have precise addresses for beneficiaries of the mobile Housing Choice Voucher (HCV) program, traffic proximity values only include project-based Section 8 housing.

[c]Low neighborhood poverty is defined as <10%.

Table 4. Zoning characteristics in neighborhoods with affordable 40B units compared to neighborhoods with LIHTC, project-based HCV, and public housing units.

	Chapter 40B		Project-based HCV			LIHTC			Public housing		
	Mean	(SD)	Mean	(SD)		Mean	(SD)		Mean	(SD)	
Single-family residential (SFR)	0.53	(0.50)	0.21	(0.41)	***	0.15	(0.36)	***	0.18	(0.38)	***
SFR, 5,000–14,999 sq. ft.	0.08	(0.27)	0.12	(0.33)		0.06	(0.24)		0.12	(0.32)	
SFR, 15,000–19,999 sq. ft.	0.04	(0.19)	0.03	(0.16)		0.02	(0.14)		0.02	(0.13)	
SFR, 20,000–39,999 sq. ft.	0.13	(0.33)	0.03	(0.18)	***	0.03	(0.16)	***	0.02	(0.15)	***
SFR, 40,000–79,999 sq. ft.	0.26	(0.44)	0.03	(0.17)	***	0.04	(0.20)	***	0.02	(0.13)	***
SFR, ≥80,000 sq. ft	0.030	(0.17)	0.006	(0.08)	**	0.005	(0.07)	***	0.002	(0.04)	***
Multi-family (MF)	0.03	(0.17)	0.45	(0.50)	***	0.47	(0.50)	***	0.57	(0.50)	***
MF, low density	0.01	(0.09)	0.01	(0.12)		0.02	(0.14)		0.02	(0.14)	
MF, medium density	0.01	(0.10)	0.10	(0.30)	***	0.09	(0.29)	***	0.12	(0.33)	***
MF, high density	0.01	(0.10)	0.34	(0.47)	***	0.35	(0.48)	***	0.42	(0.49)	***
Mixed-use	0.03	(0.17)	0.05	(0.23)		0.07	(0.25)		0.02	(0.14)	
Non-residential business	0.12	(0.32)	0.21	(0.41)	***	0.20	(0.40)	***	0.17	(0.38)	
Central business	0.02	(0.13)	0.05	(0.21)	**	0.03	(0.17)		0.01	(0.11)	
Highway business	0.01	(0.11)	0.010	(0.09)		0.012	(0.11)		0.005	(0.07)	
Non-residential other	0.070	(0.26)	0.030	(0.18)	*	0.050	(0.22)		0.003	(0.06)	***
Industrial	0.22	(0.41)	0.03	(0.18)	***	0.07	(0.25)	***	0.05	(0.22)	***
General industrial	0.09	(0.28)	0.01	(0.11)	***	0.03	(0.18)	***	0.02	(0.12)	**
Light industrial	0.13	(0.34)	0.02	(0.15)	***	0.03	(0.18)	***	0.04	(0.19)	**
Not zoned	0.01	(0.07)	0.01	(0.09)		0.00	(0.02)	*	0.01	(0.11)	
N developments	1,209		620			1,054			210		
Chi-squared test with Rao and Scott's second-order correction											

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

The table compares zoning characteristics at the building level for each 40B development and at the development level for project-based Housing Choice Voucher (HCV), Low-Income Housing Tax Credit (LIHTC), and public housing. Because we focus on lot-level zoning characteristics, we only examine zoning characteristics for the 4,391 40B buildings that are among the 1209 developments for which we were able to verify precise street addresses. *p* values compare each housing program to 40B housing and are calculated using the chi-squared test with Rao and Scott's second-order correction for categorical variables, using the gtsummary (1.7.2) and survey (v. 4.2-1) packages in R (Lumley, 2004, 2023; Sjoberg et al., 2021). All values are weighted by the proportion of affordable housing units at that development. Zoning data is drawn from the most recent MassGIS zoning layer, which was last updated in 2004. Among the categories for multi-family housing, low density refers to 3–8 dwelling units per acre, medium density to 9–20 dwelling units per acre, and high density to more than 20 dwelling units per acre. Non-residential business also includes general business and limited business. Non-residential other refers to areas where the primary use is institutional, health care, office park, and residential/agricultural mixed purposes.

If bypassing exclusionary zoning explains differences in neighborhood characteristics between 40B and other housing programs, then affordable 40B units should be located in neighborhoods with more restrictive zoning practices. We follow previous research and measure exclusionary zoning based on whether lots are zoned for large single-family residential housing (i.e., single-family residential with minimum lot size requirements) (Ihlanfeldt, 2004; Whittemore, 2021) or multi-family housing by right (Fisher & Marantz, 2015).

Using these measures, Table 4 shows clear evidence that affordable 40B units are located in areas with more stringent zoning regulations—a pattern that, to the best of our knowledge, has not previously been documented. Over half of affordable 40B units are located in areas that were previously zoned for single-family residential uses with large minimum lot size requirements.[40] The next closest comparison is project-based Section 8 (HCV) housing, which sites roughly a fifth of program units in single-family residential areas (though primarily in areas with smaller lots). Moreover, these differences are driven by the large proportion of 40B units located in municipalities with *very* large minimum lot requirements, that range between 40,000 and 80,000 square feet per home (equating to homes that are roughly one to two acres each). In stark contrast, only 3% of 40B units are located in areas zoned primarily for multi-family housing, in comparison to about half of HCV, LIHTC, and public housing units. Table 4 also shows that 40B units are more likely to be located in industrial zones—a pattern which we discuss in the subsequent section of this paper.

Next we examine whether this difference in zoning stringency explains the changes in neighborhood conditions made available under 40B. These results, presented in Table 5, show that neighborhoods with affordable 40B units with more stringent zoning regulations likely drive some—but not all—of the different neighborhood conditions made available under 40B. Compared to areas zoned for other uses, neighborhoods zoned primarily for large single-family homes are whiter, more affluent, and have better characteristics for social mobility and health (though they also incarcerate Black men at higher rates).[41] If zoning stringency were the only factor driving the fact that affordable 40B units are located in more privileged areas, we would expect areas zoned for other uses to be less advantaged than the median Massachusetts neighborhood. However, neighborhoods zoned for other uses are *also* more privileged than the median neighborhood in Massachusetts (see the first column of Table 2), suggesting that it is not only zoning stringency that drives differences in neighborhood characteristics.

To further understand what drives these patterns, we leverage the fact that 40B housing permitted through EOHLC must have formal municipal support while housing permitted through MassHousing does not. Though municipal support is not the only feature that distinguishes projects permitted under each agency, it remains an important difference between the types of projects that the agencies take on. The results in Table 6 therefore compare projects permitted under each subsidizing agency as a *rough* proxy for whether 40B housing was permitted voluntarily (through EOHLC) or involuntarily (through MassHousing).[42] We do not focus on housing permitted under Mass Housing Partnership due to small sample sizes.

Somewhat counterintuitively, Table 6 shows that 40B housing in areas previously zoned for single-family use is more likely to be permitted with formal municipal support. This difference is driven largely by 40B housing built in areas with smaller minimum lot requirements, which are more urban, lower-income, and more polluted but have *higher* house values and *higher performing* schools than areas with larger minimum lot requirements (see Table 5). These patterns suggest that involuntary permitting mechanisms may be necessary to increase affordable housing supply in less dense suburban communities. Table 7 further shows that neighborhoods with 40B units permitted with municipal support are less privileged than those permitted involuntarily through MassHousing. This difference in privilege further lends support to the idea that bypassing exclusionary zoning explains the improved neighborhood conditions made available under 40B.

Are Affordable 40B Homes Built in Less Desirable Areas Within Destination Municipalities?

Chapter 40B's ability to bypass zoning regulations has raised concerns that this may also bypass important public health protections and lead municipalities and/or developers to respond by placing housing in areas such as industrial zones or near highways, which could harm beneficiaries' well-being (DeGenova et al., 2009; Girouard, 2023; Martinez et al., 2020). Though we find that affordable 40B units tend to be located in whiter, more affluent neighborhoods overall relative to the housing provided via other affordable housing policies, 40B housing may still be sited in relatively worse areas within the municipalities that receive them.

Our next set of analyses address the validity of these concerns. To do so, we run the regression described in Equation (1) to test whether the average affordable 40B unit is located in a neighborhood with worse characteristics when compared to the average housing unit in that municipality. Table 8 shows that 40B beneficiaries live in neighborhoods with below-average characteristics relative to their surrounding municipality, though the magnitude of these differences is relatively small. Consider the case of the share of residents in poverty, which is 2 percentage points higher in neighborhoods with 40B developments than in the average neighborhood in those same municipalities. The standard deviation for neighborhood poverty across all

Table 5. Primary zoning use of neighborhoods with affordable 40B units.

			Single family					
	Other zoning		Large minimum lot requirements			Very large minimum lot requirements		
	Median	(IQR)	Median	(IQR)		Median	(IQR)	
Demographic								
Female	0.51	(0.51, 0.52)	0.53	(0.52, 0.53)	***	0.52	(0.51, 0.52)	
Age								
< 18	0.23	(0.21, 0.27)	0.22	(0.21, 0.25)		0.25	(0.21, 0.27)	
18–64	0.63	(0.60, 0.65)	0.62	(0.59, 0.65)		0.61	(0.59, 0.63)	***
> 64	0.13	(0.11, 0.16)	0.15	(0.13, 0.18)	**	0.14	(0.12, 0.17)	*
Race/ethnicity								
White	0.89	(0.83, 0.93)	0.87	(0.80, 0.93)		0.92	(0.87, 0.95)	***
Black	0.02	(0.01, 0.03)	0.02	(0.01, 0.04)		0.01	(0.01, 0.02)	***
Hispanic	0.03	(0.02, 0.05)	0.03	(0.02, 0.05)		0.02	(0.01, 0.03)	***
Asian	0.03	(0.01, 0.08)	0.05	(0.02, 0.11)		0.03	(0.01, 0.06)	
Other race	0.03	(0.02, 0.04)	0.03	(0.02, 0.04)		0.02	(0.02, 0.03)	***
Education								
Less than high school	0.05	(0.03, 0.09)	0.05	(0.03, 0.08)		0.04	(0.03, 0.06)	**
High school	0.49	(0.34, 0.56)	0.50	(0.32, 0.56)		0.50	(0.37, 0.59)	
College or more	0.45	(0.33, 0.62)	0.44	(0.35, 0.63)		0.45	(0.33, 0.57)	
Population density	1,160	(642, 2,583)	2,541	(1,309, 4,407)	***	871	(567, 1,529)	***
Economic								
Median household income[a]	84,745	(65,462, 103,918)	79,101	(67,965, 96,056)		85,807	(74,532, 108,807)	*
Below poverty	0.05	(0.03, 0.08)	0.05	(0.03, 0.08)		0.04	(0.03, 0.06)	*
Unemployed	0.07	(0.06, 0.10)	0.06	(0.05, 0.08)		0.07	(0.05, 0.08)	
Commute time (2000 census)	30.4	(26.9, 32.1)	28.6	(26.1, 30.3)		31.3	(27.2, 33.3)	
Housing								
Median home value[a]	359,803	(312,956, 458,359)	373,839	(299,336, 513,817)		377,738	(323,649, 482,390)	
Rent, two-bed	1,066	(846, 1,340)	1,020	(761, 1,300)		1,021	(811, 1,251)	
Renters	0.26	(0.16, 0.43)	0.26	(0.21, 0.44)		0.19	(0.14, 0.28)	***
Opportunity for social mobility and health								
Education								
3rd grade math score(s)	4.62	(3.99, 5.18)	4.58	(4.07, 5.23)		4.71	(4.14, 5.14)	
Incarceration								
Overall	0.002	(0.000, 0.005)	0.002	(0.001, 0.004)		0.001	(0.000, 0.004)	
Black male	0.07	(0.02, 0.11)	0.02	(0.01, 0.03)		0.00	(0.00, 0.02)	
Health								
Life expectancy at birth	80.9	(78.7, 82.6)	81.4	(80.0, 82.9)		81.5	(80.3, 83.6)	***
Pollution								
Sulfur dioxide (SO_2)	2.06	(1.90, 2.29)	2.23	(2.00, 2.39)	***	1.99	(1.78, 2.17)	***
Carbon monoxide (CO)	0.30	(0.28, 0.31)	0.30	(0.29, 0.31)		0.29	(0.26, 0.30)	***

(*continued*)

Table 5. Continued.

	Other zoning		Single family					
			Large minimum lot requirements			Very large minimum lot requirements		
	Median	(IQR)	Median	(IQR)		Median	(IQR)	
Nitrogen dioxide (NO_2)	5.31	(4.27, 7.07)	7.18	(5.60, 8.21)	***	4.87	(3.93, 5.70)	***
Ozone (O_3)	44.95	(44.15, 45.33)	44.22	(43.81, 45.14)		44.71	(44.06, 45.27)	
$PM_{2.5}$	7.63	(7.05, 8.22)	8.20	(7.64, 8.65)	***	7.35	(6.93, 7.71)	***
Ultrafine particulate matter	5,793	(4,499, 8,318)	8,133	(6,368, 9,560)	***	5,253	(4,287, 6,571)	***
Adult outcomes for children who grew up in tract								
Median household income[a]	58,616	(53,312, 66,477)	58,904	(54,239, 66,076)		59,891	(53,984, 67,202)	
Probability of living in low-poverty neighborhood[b]	0.74	(0.69, 0.78)	0.73	(0.67, 0.77)		0.76	(0.72, 0.79)	*
Family structure								
Two-parent share	0.85	(0.78, 0.88)	0.84	(0.77, 0.87)		0.86	(0.82, 0.89)	*
Social capital								
Census mail return rate	0.83	(0.78, 0.86)	0.82	(0.78, 0.86)		0.85	(0.82, 0.87)	***
N tracts	274		120			298		

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

p values are calculated using the Wilcoxon rank sum test for continuous variables that are not normally distributed, using the gtsummary (1.7.2) and survey (v. 4.2-1) packages in R (Lumley, 2004, 2023; Sjoberg et al., 2021). All zoning data come from MassGIS and were last updated in 2004. Primary zoning use is calculated based on the primary use designation that corresponds to the largest share of the land area in that census tract. Large minimum lots refer to those that are 5,000 to <20,000 square feet, while very large minimum lot sizes are 20,000 square feet or more. All calculations are weighted by the proportion of affordable 40B units in that tract. All demographic, economic, and housing variables are drawn from the US census. School quality, incarceration rates, adult outcomes for children, family structure, and social capital are drawn from the Opportunity Atlas and Opportunity Insights data. Life expectancy is drawn from the US Small-area Life Expectancy Estimates Project (USALEEP); pollution measures come from the Center for Air, Climate, and Energy Solutions (CACES); and proximity to traffic is based on road buffers and average daily traffic counts provided by the Metropolitan Area Planning Council.

[a]Income and home values are measured in 2010 USD.

[b]Low neighborhood poverty is defined as <10%.

Table 6. Heterogeneity in the primary zoning use of neighborhoods with affordable 40B units by subsidizing agency.

	MassHousing		EOHLC		
	Mean	(SD)	Mean	(SD)	
Single-family residential (SFR)	0.46	(0.49)	0.61	(0.50)	**
SFR, 5,000–14,999 sq. ft.	0.04	(0.33)	0.12	(0.20)	**
SFR, 15,000–19,999 sq. ft.	0.04	(0.14)	0.02	(0.20)	
SFR, 20,000–39,999 sq. ft.	0.10	(0.38)	0.17	(0.31)	
SFR, 40,000–79,999 sq. ft.	0.24	(0.44)	0.27	(0.43)	
SFR, $\geq$80,000 sq. ft	0.03	(0.18)	0.03	(0.18)	
Multi-family	0.01	(0.20)	0.04	(0.12)	
Multi-family, low density	0.01	(0.11)	0.01	(0.09)	
Multi-family, medium density	0.01	(0.12)	0.01	(0.08)	
Multi-family, high density	0.00	(0.12)	0.01	(0.00)	**
Mixed-use	0.04	(0.11)	0.01	(0.19)	
Non-residential business	0.07	(0.36)	0.15	(0.25)	**
Central business	0.01	(0.15)	0.02	(0.11)	
Highway business	0.00	(0.12)	0.01	(0.05)	*
Non-residential other	0.08	(0.22)	0.05	(0.28)	
Industrial	0.32	(0.34)	0.14	(0.47)	***
General industrial	0.16	(0.20)	0.04	(0.37)	***
Light industrial	0.16	(0.29)	0.10	(0.37)	
Not zoned	0.01	(0.04)	0.00	(0.11)	
Number of developments	356		579		
N tracts	319		234		

* $p < 0.05$; ** $p < 0.01$; ***$p < 0.001$.

p values compare affordable 40B housing permitted under MassHousing to affordable 40B housing permitted under the Executive Office of Housing and Livable Communities (EOHLC) according to the subsidizing agency of record in the Subsidized Housing Inventory (SHI) and are calculated using the chi-squared test with Rao and Scott's second-order correction for categorical variables, using the gtsummary (1.7.2) and survey (v. 4.2-1) packages in R (Lumley, 2004, 2023; Sjoberg et al., 2021). All values are weighted by the proportion of affordable housing units at that development. Zoning data is drawn from the most recent MassGIS zoning layer, which was last updated in 2004. Among the categories for multi-family housing, low density refers to 3–8 dwelling units per acre, medium density to 9–20 dwelling units per acre, and high density to more than 20 dwelling units per acre. Non-residential business also includes general business and limited business. Non-residential other refers to areas where the primary use is institutional, health care, office park, and residential/agricultural mixed purposes.

Massachusetts neighborhoods is 11 percentage points, while the standard deviation of poverty across neighborhoods within municipalities that have 40Bs is 9 percentage points. Thus, a 2 percentage point increase translates to modest change of about 0.2 standard deviations in both cases. Similar patterns apply to various other characteristics, including educational attainment, home values, and factors that affect social mobility and health.

The results in Table 8 also show that 40B neighborhoods have no difference in exposure to a wide range of pollutants, which is consistent with our results from Table 2 showing that only a small share of affordable 40B units are located within 100 m of high-traffic roadways.

Finally, we find no evidence that these patterns differ in the highest income and/or whitest municipalities compared to those in the bottom 75% of each. The results for household income are presented in Table 9, and those for the percentage of white residents are shown in Online Appendix G.

In contrast, Table 4 does show that affordable 40B units are much more likely to be located in industrial zones, especially if they were permitted through MassHousing (see Table 6). The tendency for 40B units to be located in industrial areas raises potential concerns about the well-being of program beneficiaries in those areas. Though industrial uses and their impacts on residents can vary substantially, exposure to pollution is a common problem.[43] Encouragingly, Table 7 shows no difference in neighborhood-level pollution between voluntarily and involuntarily permitted 40B housing across any of the six pollutants we test for. These results should be interpreted with caution, however: neighborhood-level measures may not capture hyperlocal variation in these pollutants, and existing publicly available pollution datasets may be limited in

Table 7. Heterogeneity in the characteristics of neighborhoods with affordable 40B units by subsidizing agency.

	EOHLC		MassHousing		
	Median	(IQR)	Median	(IQR)	
Demographic					
Female	0.52	(0.51, 0.53)	0.51	(0.51, 0.53)	
Age					
<18	0.23	(0.21, 0.26)	0.24	(0.21, 0.27)	*
18–64	0.62	(0.59, 0.65)	0.62	(0.59, 0.64)	
>64	0.14	(0.12, 0.17)	0.14	(0.11, 0.17)	
Race/ethnicity					
White	0.91	(0.82, 0.94)	0.91	(0.85, 0.94)	
Black	0.02	(0.01, 0.04)	0.01	(0.01, 0.03)	
Hispanic	0.02	(0.02, 0.04)	0.02	(0.02, 0.04)	
Asian	0.03	(0.01, 0.08)	0.04	(0.01, 0.08)	
Other race	0.03	(0.02, 0.04)	0.03	(0.02, 0.04)	
Education					
Less than high school	0.04	(0.02, 0.06)	0.03	(0.02, 0.05)	*
High school	0.36	(0.24, 0.42)	0.33	(0.22, 0.40)	
College or more	0.30	(0.22, 0.39)	0.32	(0.25, 0.43)	
Population density	1,117	(687, 2,283)	971	(635, 2,028)	
Economic					
Median household income[a]	78,559	(64,841, 97,879)	85,909	(73,107, 112,584)	***
Below poverty	0.05	(0.03, 0.08)	0.04	(0.02, 0.07)	***
Unemployed	0.07	(0.05, 0.09)	0.06	(0.06, 0.09)	
Commute time (2000 census)	30.0	(26.3, 33.0)	31.2	(27.7, 33.0)	*
Housing					
Median home value[a]	354,048	(297,656, 459,133)	378,031	(332,710, 490,820)	**
Rent, two-bed	998	(807, 1,260)	1,097	(856, 1,362)	*
Renters	0.24	(0.16, 0.37)	0.21	(0.15, 0.33)	
Opportunity for social mobility and health					
Education					
3rd grade math score(s)	4.59	(3.98, 5.07)	4.85	(4.18, 5.30)	**
Incarceration					
Overall	0.002	(0.001, 0.005)	0.002	(0.000, 0.004)	
Black male	0.03	(0.01, 0.10)	0.12	(0.05, 0.14)	**
Health					
Life expectancy at birth	80.9	(79.3, 82.8)	81.4	(79.2, 83.3)	
Pollution					
Sulfur dioxide (SO_2)	2.02	(1.82, 2.23)	2.05	(1.88, 2.27)	
Carbon monoxide (CO)	0.29	(0.28, 0.31)	0.29	(0.28, 0.30)	
Nitrogen dioxide (NO_2)	5.23	(4.18, 6.62)	5.25	(4.15, 6.53)	
Ozone (O_3)	44.91	(44.07, 45.32)	44.9	(44.13, 45.28)	
$PM_{2.5}$	7.55	(7.11, 7.95)	7.57	(6.97, 8.10)	
Ultrafine particulate matter	5,665	(4,452, 7,829)	5,877	(4,455, 7,481)	
Adult outcomes for children who grew up in tract					
Median household income[a]	57,934	(50,257, 66,157)	62,083	(55,400, 68,359)	***
Probability of living in low-poverty neighborhood[b]	0.73	(0.69, 0.78)	0.75	(0.71, 0.79)	*
Family structure					
Two-parent share	0.84	(0.77, 0.87)	0.86	(0.82, 0.89)	***
Social capital					
Census mail return rate	0.83	(0.79, 0.86)	0.84	(0.80, 0.86)	
N tracts =		341		266	

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

p values are calculated using the Wilcoxon rank sum test for continuous variables that are not normally distributed, using the gtsummary (1.7.2) and survey (v. 4.2-1) packages in R (Lumley, 2004, 2023; Sjoberg et al., 2021). All calculations are weighted by the proportion of affordable 40B units in that tract. All demographic, economic, and housing variables are drawn from the US census. School quality, incarceration rates, adult outcomes for children, family structure, and social capital are drawn from the Opportunity Atlas and Opportunity Insights data. Life expectancy is drawn from the US Small-area Life Expectancy Estimates Project (USALEEP); pollution measures come from the Center for Air, Climate, and Energy Solutions (CACES); and proximity to traffic is based on road buffers and average daily traffic counts provided by the Metropolitan Area Planning Council.

[a]Income and home values are measured in 2010 USD.

[b]Low neighborhood poverty is defined as <10%.

Table 8. Differences between neighborhoods with affordable 40B units compared to other neighborhoods within municipalities that have at least one 40B development.

	β	SE		R^2
Demographic				
Female	0.00	0.00		0.34
Age				
< 18	0.01	0.00		0.54
18–64	0.00	0.01		0.56
> 64	0.00	0.00		0.53
Race/ethnicity				
White	−0.02	0.01		0.65
Black	0.00	0.01		0.45
Hispanic	0.02	0.01	*	0.70
Asian	0.01	0.00		0.64
Other race	0.01	0.01	*	0.68
Education				
Less than high school	0.02	0.01	**	0.63
High school	0.01	0.01		0.76
College or more	−0.02	0.01	*	0.75
Population density	412	615		0.62
Economic				
Median household income[b]	−$ 5,463	$ 1,718	**	0.71
Below poverty	0.02	0.01	*	0.54
Unemployed	0.01	0.00	**	0.41
Commute time (2000 census)	0.04	0.24		0.77
Housing				
Median home value[b]	−$ 13,769	$ 7,115		0.79
Rent, two-bed	3.43	23.16		0.58
Renters	0.07	0.01	***	0.62
Opportunity for social mobility and health				
Education				
3rd grade math score(s)	0.03	0.02		0.97
Incarceration				
Overall	0.00	0.00	*	0.40
Black male	0.00	0.02		0.32
Health				
Life expectancy at birth	−0.89	0.22	***	0.56
Pollution				
Sulfur dioxide (SO_2)	−0.03	0.02		0.81
Carbon monoxide (CO)	0.00	0.00	*	0.71
Nitrogen dioxide (NO_2)	0.18	0.11		0.89
Ozone (O_3)	−0.04	0.04		0.86
$PM_{2.5}$	−0.06	0.04		0.86
Ultrafine particulate matter	207	124		0.86
Adult outcomes for children who grew up in tract				
Household income at age 35	−$ 1,482	$ 683	*	0.71
Probability of living in low-poverty neighborhood at age 35[a]	−0.01	0.01		0.72
Family structure				
Two-parent share	−0.02	0.01	*	0.62
Social capital				
Census mail return rate	−1.33	0.43	**	0.68

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

The table depicts the relative difference between tracts with at least one affordable 40B unit and tracts with no affordable 40B units that are located within the same municipality. The table presents the results of a linear regression with municipal fixed effects where we regress each neighborhood characteristic (shown in each row) on a 40B indicator variable, which takes a value of 1 if that tract has at least one 40B development. The equation we estimate is Equation (1). The coefficient of interest in this model is β, which represents the difference in each neighborhood characteristic between the average tract with a 40B development and other tracts within the same municipality. In these regressions, we weight tracts with at least one 40B development by the number of affordable units and the tracts without any 40B developments by the number of housing units. The number of tracts included in each regression varies across each variable (based on data availability), but typically ranges from 1350 and 1450 tracts. There are 229 municipalities with at least one affordable 40B unit. Slightly more than half of the tracts within these 229 municipalities have at least one affordable 40B unit (n = 515 or 53%). All demographic, economic, and housing variables are drawn from the US census. School quality, incarceration rates, adult outcomes for children, family structure, and social capital are drawn from the Opportunity Atlas and Opportunity Insights data. Life expectancy is drawn from the US Small-area Life Expectancy Estimates Project (USALEEP); pollution measures come from the Center for Air, Climate, and Energy Solutions (CACES); and proximity to traffic is based on road buffers and average daily traffic counts provided by the Metropolitan Area Planning Council.

[a]Low neighborhood poverty is defined as <10%.

[b]Income and home values are measured in 2010 USD.

Table 9. Additional differences between neighborhoods with affordable 40B units compared to other neighborhoods within municipalities that have at least one 40B development, for municipalities in the top quartile vs. municipalities in the bottom three quartiles of median household income.

	β	SE		γ	SE		R^2
Demographic							
Female	0.00	0.00		0.005	0.005		0.35
Age							
< 18	0.01	0.01		−0.001	0.009		0.55
18–64	0.00	0.01		−0.009	0.01		0.56
> 64	−0.01	0.00		0.01	0.009		0.53
Race/ethnicity							
White	−0.02	0.01		−0.013	0.025		0.65
Black	0.00	0.01		0	0.019		0.45
Hispanic	0.02	0.01	**	−0.023	0.017		0.70
Asian	0.00	0.01		0.025	0.009	**	0.65
Other race	0.01	0.01	*	−0.011	0.011		0.68
Education							
Less than high school	0.02	0.01	**	−0.022	0.014		0.63
High school	0.01	0.01		0	0.017		0.76
College or more	−0.03	0.01	*	0.023	0.024		0.75
Population density	651	714		−845	1405		0.62
Economic							
Median household income[b]	−$ 4,683	$ 1,993	*	−$ 2,651	$ 3,920		0.71
Below poverty	0.02	0.01	*	−0.009	0.016		0.54
Unemployed	0.01	0.00	*	−0.002	0.008		0.41
Commute time (2000 census)	−0.10	0.28		0.559	0.555		0.77
Housing							
Median home value[b]	−$ 14,147	$ 8,174		$ 4,747	$ 16,040		0.79
Rent, two-bed	$ 27	$ 27		−$ 90	$ 53		0.58
Renters	0.08	0.02	***	−0.02	0.03		0.62
Opportunity for social mobility and health							
Education							
3rd grade math score(s)	0.04	0.02	**	−0.04	0.03		0.98
Incarceration							
Overall	0.00	0.00	**	0.00	0.00	*	0.40
Black male	0.00	0.02		0.05	0.03		0.32
Health							
Life expectancy at birth	−0.97	0.25	***	0.35	0.50		0.56
Pollution							
Sulfur dioxide (SO_2)	−0.02	0.02		−0.04	0.04		0.81
Carbon monoxide (CO)	0.00	0.00		0.00	0.00		0.71
Nitrogen dioxide (NO_2)	0.20	0.13		−0.04	0.25		0.89
Ozone (O_3)	−0.03	0.04		−0.06	0.09		0.86
$PM_{2.5}$	−0.03	0.04		−0.11	0.08		0.86
Ultrafine particulate matter	273.8	144.7		−243.1	283.5		0.86
Adult outcomes for children who grew up in tract							
Household income at age 35	−$ 1,997	$ 791	*	$ 2,126	$ 1,557		0.71
Probability of living in low-poverty neighborhood at age 35[a]	−0.02	0.01		0.02	0.02		0.73
Family structure							
Two-parent share	−0.02	0.01	*	0.02	0.02		0.62
Social capital							
Census mail return rate	−1.21	0.50	*	−0.40	0.98		0.68

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

The table depicts the additional difference between tracts with at least one affordable 40B unit and tracts with no affordable 40B units that are located within the same municipality, among municipalities below and above the top quartile of household income in 2010 (with median household incomes over $90,950). The table presents the results of the linear regression with municipal fixed effects shown in Equation (2), which regresses each neighborhood characteristic (shown in each row) on a 40B indicator variable and the interaction between that 40B indicator and an indicator for municipalities in the top quartile of household incomes. The coefficients of interest in this model are β, which represents the difference in each neighborhood characteristic between the average tract with a 40B development and other tracts within the same municipality among municipalities with median household incomes under $90,950, and γ, which represents the additional difference in neighborhood characteristics among municipalities with incomes above $90,950. In these regressions, we weight tracts with at least one 40B development by the number of affordable units and the tracts without any 40B developments by the number of housing units. There are 229 municipalities with at least one affordable 40B unit. Slightly more than half of the tracts within these 229 municipalities have at least one affordable 40B unit (n = 515 or 53%). All demographic, economic, and housing variables are drawn from the US census. School quality, incarceration rates, adult outcomes for children, family structure, and social capital are drawn from the Opportunity Atlas and Opportunity Insights data. Life expectancy is drawn from the US Small-area Life Expectancy Estimates Project (USALEEP); pollution measures come from the Center for Air, Climate, and Energy Solutions (CACES); and proximity to traffic is based on road buffers and average daily traffic counts provided by the Metropolitan Area Planning Council.

[a]Low neighborhood poverty is defined as <10%.

[b]Income and home values are measured in 2010 USD.

their ability to detect hyperlocal hotspots (Montgomery et al., 2023).[44] Industrial zoning was also designed to protect residents and businesses from smoke, noise, and other forms of adverse exposures (Schilling & Linton, 2005). Future research should therefore investigate whether any of these other factors could potentially impact 40B beneficiaries' health and welfare.

Conclusion

Focusing on Massachusetts Chapter 40B, this study examines the extent to which fair share policies mandating that municipalities build a minimum share of affordable housing—enforced by bypassing exclusionary zoning—can increase the supply of affordable housing in lower poverty, health-promoting neighborhoods, thereby opening new types of housing opportunities for low- and moderate-income households. Factors such as heavy municipal opposition and a lack of provisions incentivizing development in high-opportunity neighborhoods make it a priori unclear whether 40B would succeed at this goal. Despite these concerns, our results suggest that 40B does in fact provide an effective mechanism for building affordable housing in these previously inaccessible neighborhoods.

Neighborhoods with 40B housing have drastically different opportunities for social mobility and health than neighborhoods that are available to beneficiaries of other major housing assistance programs. Some of the most striking of these neighborhood differences, such as differences in exposure to pollution and the quality of local schools, may improve the lifelong social and health outcomes for children if households with children move to 40B units from neighborhoods with worse pollution or schools (Chetty et al., 2016; Chyn & Katz, 2021; Currie et al., 2014). The fact that 40B neighborhoods are substantially whiter and more affluent, and are zoned more stringently, further suggests that 40B achieves these neighborhood outcomes due to its ability to bypass local zoning regulations.

We further find small differences in siting characteristics between 40B neighborhoods and other neighborhoods within that municipality, which do not vary for the highest-income or whitest municipalities. Our analyses also show that few 40B units are located near heavily trafficked roads (like highways) and this proportion is much lower than that of project-based HCV, LIHTC, or public housing units. These results suggest that municipal backlash does not strongly undermine 40B's potential to improve life opportunities for beneficiaries. They also imply relatively little cause for concern regarding the effects on well-being of beneficiaries, at least along the dimensions we examine in this paper.

These findings point to several directions for future research. First, there is a need to better understand who is served by programs like 40B. Aside from a working paper focused on the health impacts of moving to 40B housing for pregnant parents and their newborn infants (Sportiche, 2023) and one case study of 16 families living in affordable 40B homes (Citizens' Housing and Planning Association, 2003), we are not aware of any work describing the beneficiaries of affordable 40B homes. Yet knowing more about the basic characteristics of who applies to live in these units (e.g., beneficiaries' income levels, racial/ethnic backgrounds, household composition, etc.), who eventually moves in, and what types of neighborhoods beneficiaries move from is crucial to the program's goal of desegregation and facilitating neighborhood change.[45] Second, though the majority of 40B units are not, the fact that a non-negligible proportion of 40B units are located in industrial zones highlights the need to examine the potential consequences for beneficiaries moving forward.[46] Though we find no differences in the health exposures we measure, it is not clear whether this lack of difference reflects the fact that there are indeed few impacts, that areas may be rezoned in response to 40B developments (Meck et al., 2002), or that we are simply not able to capture those impacts. Finally, because of the large opposition to 40B developments by incumbent neighbors, future work should examine

how these pre-existing residents respond to 40B developments built in their neighborhoods and whether these responses undermine the policy's goals.

Nevertheless, our results highlight the potential of fair share policies that bypass exclusionary zoning to successfully distribute affordable housing throughout those communities that have traditionally resisted it. By incentivizing an increase in the supply of affordable housing, we find that fair share policies like Chapter 40B could provide a key component of a policy response that could enable low- and middle-income families to access neighborhoods from which they have historically been excluded, suggesting that such policies may be valuable complements to other major housing programs in the United States.

Notes

1. Similar patterns apply to other programs. More than a third of public housing residents live in neighborhoods with poverty rates close to 40% (Schwartz, 2014), while the average beneficiary of the Low-Income Housing Tax Credit (LIHTC) program lives in a neighborhood with higher poverty rates, lower performing schools, and weaker labor markets than the average renter (Ellen et al., 2018).
2. Developers may only qualify for this zoning override if their proposed building(s) include a minimum share of affordable units. Not all fair share policies provide a state override of local zoning decisions, and some fair share policies are enacted at the regional or municipal level (e.g., in Minnesota) (Manji et al., 2023; Meck et al., 2002).
3. Affordability for rental units is defined as setting rents at or below 30% of households earning 50% or 80% of AMI. For ownership units, affordability is maintained by restricting the resale value of the property. More information on 40B unit affordability can be found in the "Development Permitting Process" section and in the "Program Features That May Affect Siting Characteristics" section of this article.
4. Given the robust empirical literature highlighting the importance of place for health outcomes (Chyn & Katz, 2021; Diez Roux & Mair, 2010; Galster, 2012; Galster & Sharkey, 2017; Ludwig et al., 2012; Sharkey & Faber, 2014), we also consider whether these areas may foster better health.
5. This dataset is the Subsidized Housing Inventory (SHI), managed by the Executive Office of Housing and Livable Communities (EOHLC). Because the purpose of the SHI is to monitor compliance with the minimum share of affordable housing stipulated under 40B, the state does not maintain precise records of subsidized housing locations in the SHI.
6. Our full list of data sources includes: the US census; Opportunity Insights and the Opportunity Atlas; the US Small-area Life Expectancy Estimates Project (USALEEP); MassGIS; the Center for Air, Climate, and Energy Solutions; the Metropolitan Area Planning Council (MAPC); LIHTC addresses, public housing addresses, project-based HCV addresses, and HCV beneficiary counts at the census tract level.
7. These data are no longer being hosted on MassGIS's website but are available upon request from the authors. We thank Matthew Resseger for making these data available for our use.
8. These numbers focus only on units permitted directly under 40B (i.e., using a Comprehensive Permit) and are estimated based on unit counts in the Massachusetts Subsidized Housing Inventory (SHI), the public dataset used to monitor municipal compliance with Chapter 40B's 10% of housing stock or 1.5% of land area standards.
9. This includes studies that focus on the demographic characteristics of those municipalities that incorporate 40B housing.
10. One study (Marantz & Zheng, 2020) does examine affordable housing in high opportunity areas of Massachusetts; however, the policies of interest in this study are state affordable housing appeals systems (SAHAS). Thus, the authors focus on all affordable housing produced in Massachusetts, rather than only units permitted through 40B (which make up about 20% of the total share of units in the state).
11. Affordability is defined according to HUD Area Median Income standards. More information on how 40B unit affordability is defined can be found in the *Development Permitting Process* section on pages 9–10 and in the *Program features that may affect siting characteristics* section that begins on page 11.
12. In practice, nearly all monitoring and compliance is based on the 10% standard rather than the 1.5% standard. The law also allows communities to retain local control over housing decisions if the local Planning Board and Board of Selectmen *or* City Council adopts a Housing Production Plan that specifically outlines how that municipality will meet the minimum threshold. Adequate progress is monitored by the EOHLC but typically consists of increasing the proportion of affordable housing stock by 1 to 2% each year.
13. The earliest year of data on 40B compliance we obtained from EOHLC was 1972. We also use data from 1997, as the bulk of 40B developments were permitted after 2000 and 1997 is the closest period to 2000 when the state tracked municipalities' share of affordable housing stock.

14. All provisions are targeted at the municipal level.
15. The average permitting time is based on internal EOHLC, MassHousing, and Mass Housing Partnership (MHP) records that track 40B permitting across all projects. We were not able to obtain an estimate of the permitting time for comparable non-40B projects, but conversations with local planners suggest that these processes ordinarily take 2–3 years.
16. EOHLC, formerly known as the Department of Housing and Community Development (DHCD), was established in 2023.
17. As with other policies, AMI corresponds to the limits set by the US Department of Housing and Urban Development.
18. Anyone who meets the income requirements for 40B units (earning at or below 80% or 50% of AMI) is eligible to apply for a 40B rental unit. To qualify for an affordable 40B ownership home, beneficiaries must meet the same qualifications as renters and, with some exceptions, may not have owned a home within 3 years preceding their 40B application. Unlike renters, 40B owners may earn more without any penalties once they move in.
19. Typically, developers return to the agency that issued the original PEL, though this may change depending on the municipality's response to the developer's application or changes to the project that occurred during negotiations with the ZBA.
20. Over half of the affordable ownership housing in Massachusetts was permitted under 40B.
21. Differences in resident selection across the ownership vs. rental program may also affect local political responses to the program. While 40B rental units remain subsidized only as long as a beneficiary remains under the income limit for that unit (which is often 80% of AMI), beneficiaries of ownership units may earn more without any program changes once they move in. If a 40B renter's income exceeds the income threshold for their subsidized unit, it simply reverts to a market-rate rent. Affordability for rental units is defined as not paying more than 30% of gross income on rent and may be paired with Housing Choice Vouchers to make them more affordable. In addition to being subject to the same income limits as 40B renters at the time of purchase, 40B owners may not have a financial interest in the development, must be able to secure a bank loan, and—with some exceptions—must not have owned a home within the 3 years preceding the application (Department of Housing and Community Development Massachusetts, 2014).
22. The most contentious of these developments, which are sometimes referred to as "unfriendly" 40Bs, might not have been built under a carrot-only policy strategy. Note that while MassHousing is the only agency to receive contentious projects, not all MassHousing projects are contentious.
23. Though EOHLC only takes on projects that have formal municipal support ("friendly") and MassHousing is the only agency that takes highly contested ("unfriendly") 40B developments, the latter does not exclusively oversee contested projects. For example, a developer may choose to apply to MassHousing because they are interested in receiving financing from the New England Fund, which can only be obtained by permitting the development through MassHousing. The comparison between EOHLC and MassHousing projects should therefore be interpreted as a preliminary difference in the absence of other means of making this comparison. Moreover, the presence of 40B's provision that allows developers to bypass local zoning rules may strongly motivate municipalities to formally support projects so that they may retain more local control. Thus, the difference between agencies should be considered only a rough proxy for municipal preference.
24. The SHI is maintained by the Massachusetts Executive Office of Housing and Livable Communities and tracks basic information about all subsidized housing in the state. Our dataset focuses on the subset of roughly 1,400 developments (which account for about 24% of all developments in the SHI) that were directly permitted under 40B (i.e., using a comprehensive permit).
25. Development-level records are often incomplete or inaccurate because addresses are added at the time when the initial comprehensive permit is filed. As this is early in the development process, precise addresses often are not yet known (e.g., permit applications may include a street intersection) or may change as the development proceeds through the permitting process.
26. The subsidized housing inventory did make it possible to focus exclusively on developments permitted via the 40B process; however, these development-level data were not posted online.
27. API stands for Application Programming Interface.
28. Of the addresses we were not able to verify, 16% were still under construction (so they do not yet have addresses), 48% were accessory dwelling units with no information that could be used to triangulate addresses, 13% were built in or before 1990 and had little to no internet presence, and the remaining 23% did not have enough information to confirm addresses with certainty. The vast majority of our sample is based on addresses that we were able to verify, and none of our results change when we subset our analyses only to the addresses we verify.
29. We use 2010 census tract and municipal boundaries for all analyses.

30. These counts include mobile HCVs and project-based vouchers administered through the Public and Indian Housing (PIH) voucher program.
31. Note that these data are no longer being hosted on MassGIS's website but are available upon request from the authors. We thank Matthew Resseger for making these data available for our use in this paper. We categorize zoning types based on their primary use, which classifies uses based on one of nine residential categories, five commercial categories, two industrial categories, two institutional categories, mixed-use, conservation or recreation, and no zoning. Residential areas in these data are coded by their densest possible use by right (the densest structures that can be built without special permitting). For additional details on these data, see Resseger (2022).
32. These data were most recently updated in 2004, though the most recent data for certain areas go back as far as 1978. Forty-six percent of lots were most recently updated before 2000, 23% in 2000, and 30% between 2001 and 2004.
33. As described in the background section, MassHousing regulates the most contentious 40B projects where the municipality and its residents are most likely to oppose construction (often referred to as "unfriendly" 40B developments). We therefore focus on whether MassHousing 40B development locations differ from developments managed by EOHLC. We do not include developments regulated by MHP as the sample is too small to make meaningful comparisons.
34. To run this regression, we create a dataset that links tract and municipal characteristics such that each row corresponds to a census tract.
35. We include all Massachusetts neighborhoods in this comparison as all municipalities (and thus all neighborhoods) are eligible for affordable 40B units, regardless of whether they meet the 10% minimum standard (see the section on "Regulatory Mechanisms and Potential Concerns" for more detail).
36. These results are not driven by differences between Boston and the surrounding suburbs, as omitting Boston from our analyses does not change the interpretation of results.
37. In the absence of 40B, affordable housing beneficiaries who stay in Massachusetts may end up either in market-rate housing or in housing produced under another major affordable housing program. Though 40B serves beneficiaries with a wider range of incomes than the HCV, LIHTC, and public housing programs do, no work has described the incomes of beneficiaries served by 40B, making it unclear what the counterfactual housing options would be for the program's beneficiaries. For instance, 40B units can be paired with mobile vouchers to make units more affordable, so it is possible that a meaningful proportion of rental program beneficiaries have low rather than moderate incomes.
38. Lower income refers to parents with incomes in the bottom quartile of the income distribution. The main exception to this pattern is in the share of two-parent households among households in the bottom quartile of the income distribution, which do not differ statistically between 40B neighborhoods and neighborhoods with beneficiaries of other affordable housing programs.
39. In 1972, the municipalities that met 40B's 10% standard were Amherst, Boston, Brockton, Cambridge, Chelsea, Fall River, Falmouth, Franklin, Haverhill, Holyoke, Lawrence, Lowell, Malden, Milford, New Bedford, and Quincy.
40. Based on previous work, we consider minimum lot requirements over 5,000 square feet to be large (Gray & Furth, 2019).
41. We define a census tract's zoning category based on the zoning category that takes up the largest share of land area in that tract. The proportion of 40B units allocated to each tract will therefore differ slightly from the numbers in Table 4, which categorize zoning based on the primary use at the development level. In other words, a modest share of 40B units are located in tracts where single-family is the predominant use but are not themselves located on a lot zoned for single-family residential only.
42. As described in note 23, MassHousing does not exclusively oversee contested projects, thus the difference between agencies should be considered only a rough proxy for municipal preference.
43. For example, light industrial uses could include a commercial bakery or solar energy facility while heavy industrial uses could include airports, chemical plants, or power plants.
44. We do not have a large enough sample to test for differences in neighborhood-level pollution exposure between industrial and non-industrial tracts.
45. Though 40B rental units can be paired with Housing Choice Vouchers, most 40B units are typically subsidized at 80% of AMI, which may restrict access to the program for many lower income beneficiaries.
46. It is possible that this pattern has few consequences, as industrial uses are varied in their impacts and areas may be rezoned in response to new developments (Meck et al., 2002; Schuetz, 2009).

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